AGENDA

JAMES CITY COUNTY BOARD OF SUPERVISORS

REGULAR MEETING

COUNTY GOVERNMENT CENTER BOARD ROOM

101 MOUNTS BAY ROAD, WILLIAMSBURG, VA 23185

June 9, 2026

5:00 PM

A. CALL TO ORDER

B. ROLL CALL

C. MOMENT OF SILENCE

D. PLEDGE OF ALLEGIANCE

E. PRESENTATION

1. VACo Achievement Award Presentation

F. PUBLIC COMMENT

G. CONSENT CALENDAR

1. Budget Appropriation of Proffered Affordable Housing Funds - $58,516
2. Appropriation of Funds to the Transportation Match Account - $69,436
3. Grant Award — $283,500 -James City County Child Health Initiative
4. NACo Annual Conference Voting Delegate

H. PUBLIC HEARING(S)

1. SUP-25-0021. James River Elementary School Learning Cottage
2. SUP-26-0011. Clara Byrd Baker Elementary School Learning Cottage
3. SUP-26-0012. D.J. Montague Elementary School Learning Cottage
4. SUP-26-0013. J. Blaine Blayton Elementary School Learning Cottage
5. SUP-26-0014. Laurel Lane Elementary School Learning Cottage
6. SUP-26-0015. Jamestown High School Learning Cottage
7. SUP-26-0016. Norge Elementary School Learning Cottages
8. SUP-26-0017. Stonehouse Elementary School Learning Cottages
9. Resolutions of Support for Smart Scale Transportation Funding Applications
10. SUP-26-0003. 4305 Fenton Mill Rd. Short-Term Rental

11. SUP-26-0005. 5251 John Tyler Hwy. Williamsburg Crossing Tobacco and Vape Shop

12. Z-24-0013/MP-24-0005/SUP-24-0033. The Bluffs at Kiskiack

13. Z-23-0004/MP-23-0001. Westwood Park Rezoning

14. LU-20-0003. Eastern State (Parcels A, B, and D) - Land Use Designation Change

15. Z-23-0008. Cardinal Ridge (Eastern State) Rezoning

I. BOARD CONSIDERATION(S)

J. BOARD REQUESTS AND DIRECTIVES

K. REPORTS OF THE COUNTY ADMINISTRATOR

L. CLOSED SESSION

M. ADJOURNMENT

1. Adjourn until 1 pm on June 23, 2026 for the Business Meeting

M E M O R A N D U M

DATE: June 9, 2026

TO: The Board of Supervisors

FROM: Paul D. Holt, III, Director of Community Development

SUBJECT: Budget Appropriation of Proffered Affordable Housing Funds - $58,516

In 2019, the James City County Board of Supervisors approved a Master Plan and Rezoning amendment request for Stonehouse. In consideration of the amendment request, proffers were accepted with certain requirements designed to mitigate impacts.

Proffer No. 7(b)(g) requires that the Owner "make a one-time contribution to the County of $1,254.94 plus any adjustment included in the Marshall and Swift Building Cost Index for each residential dwelling unit constructed on the Property" and that "such contributions shall be used by the County for the provision of affordable housing within the County."

For Fiscal Year 2026, staff has collected $58,516 in proffer funds for the purpose of providing affordable housing within the County.

Staff recommends approval of the attached resolution which would appropriate the related proffered funds to the Housing and Neighborhood Community Development Fund.

PDH/tm
BA-ProfAffHsgFnds-mem

Attachment

R E S O L U T I O N

BUDGET APPROPRIATION OF PROFFERED AFFORDABLE HOUSING FUNDS - $58,516

WHEREAS, in 2019, the James City County Board of Supervisors approved a Master Plan and Rezoning amendment request for Stonehouse and in consideration of the amendment request, proffers were accepted with certain requirements designed to mitigate impacts; and

WHEREAS, Proffer No. 7(b)(g) requires that the Owner make a one-time contribution to the County of $1,254.94 plus any adjustment included in the Marshall and Swift Building Cost Index for each residential dwelling unit constructed on the Property and that such contributions shall be used by the County for the provision of affordable housing within the County; and

WHEREAS, for Fiscal Year 2026, staff has collected $58,516 in proffer funds for the purpose of providing affordable housing within the County.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby authorizes the following appropriation to the Housing and Neighborhood Development Fund for the purposes described above:

Revenue:

Proffers	$58,516

Expenditure:

Affordable Housing Incentive Program	$58,516

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
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LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

BA-ProfAffHsgFnds-res

M E M O R A N D U M

DATE: June 9, 2026

TO: The Board of Supervisors

FROM: Paul D. Holt, III, Director of Community Development

SUBJECT: Appropriation of Funds to the Transportation Match Account - $69,436

In the 2021-2023 timeframe, the County and the Virginia Department of Transportation (VDOT) worked together to extend the left-hand turn lane on Olde Towne Road at the Longhill Road intersection. Sidewalk improvements were made as well and a portion of the project included undergrounding existing overhead utilities.

The cost of the $389,497 project included state funding and local funding. Local funds consisted of required local matching funds for an approved Revenue Sharing application and funds to underground utility lines.

While physical construction of the roadway improvement project concluded some time ago, VDOT recently completed a financial analysis and financial closeout of the project. Reconciliation of project funding versus project expenditures resulted in $69,436 in local match funding needing to be returned to James City County.

Staff recommends approval of the attached resolution appropriating the returned funds back to the Transportation Match Account. Such funds can then be used on new projects moving forward.

PDH/ap
AppFdsTransMat-mem

Attachment:
1. Resolution

R E S O L U T I O N

APPROPRIATION OF FUNDS TO THE TRANSPORTATION MATCH ACCOUNT - $69,436

WHEREAS, in the 2021-2023 timeframe, the County and the Virginia Department of Transportation (VDOT) worked together to extend the left-hand turn lane on Olde Towne Road at the Longhill Road intersection; and

WHEREAS, the $389,497 project included state funding and local funding and local funds consisted of required local matching funds for an approved Revenue Sharing application and funds to underground utility lines; and

WHEREAS, VDOT recently completed a financial analysis and financial closeout of the project and reconciliation of project funding versus project expenditures resulted in $69,436 in local match funding needing to be returned to James City County.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby authorizes the acceptance and appropriation of funds to the Special Projects/Grants Fund as follows:

Revenue:

Prior Year Expenditure Refund	$69,436

Expenditure:

Transportation Match Account	$69,436

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
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Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

AppFdsTransMat-res

M E M O R A N D U M

DATE: June 9, 2026

TO: The Board of Supervisors

FROM: Lynette Diaz, Assistant Director of Social Services

SUBJECT: Grant Award - $283,500 - James City County Child Health Initiative

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The James City County Child Health Initiative has been invited to receive funding through a grant received by the Williamsburg Health Foundation to operate the program through the Department of Social Services for the ninth year. The program is a collaborative effort between the Williamsburg Health Foundation, Child Development Resources, Williamsburg-James City County Public Schools, Williamsburg Department of Human Services, Williamsburg/James City County Community Action Agency, and James City County Department of Social Services.

Through the program, community families who need support with effectively managing health, educational, and public service systems work in partnership with a three-person Care Team. The Care Team brings professional and natural support teams together to partner with families using a two-generation (2Gen) approach, working with children and the adults in their lives together. With support, education, and navigation, children and families can build social connections, access community resources, and address their health in a more preventative way. The program focuses specifically on families who have children aging out of preschool and/or home visiting programs and who are transitioning into the public school system.

The Williamsburg Health Foundation's invitation for the grant award in the amount of $283,500 is for the continuation of the program from July 1, 2026, through June 30, 2027. During Fiscal Year (FY) 2026, Care Team staff assisted 67 individuals (44 children and 23 adults) with connecting to services and/or programs to support health and socioeconomic goals, including achieving general education development, housing stability, system navigation, public school support, addressing untreated medical and dental needs, and advocacy with service providers.

Included in the grant is full funding for the continuation of three full-time positions under the Department of Social Services - Care Team Coordinator, Social Work Case Manager, and Community Health Specialist. In-kind services are provided by the Department of Social Services and some direct financial support from the County has also been budgeted to continue the James City County Child Health Initiative.

Staff respectfully requests that the Board accept the grant award in the amount of $283,500 and approve the continuation of the three full-time positions for FY27.

LD/ap
GA-ChHlthInt26-mem

Attachment

R E S O L U T I O N

GRANT AWARD - $283,500 - JAMES CITY COUNTY CHILD HEALTH INITIATIVE

WHEREAS, the Williamsburg Health Foundation seeks to continue the James City County Child Health Initiative, the goal of which is to improve health outcomes for children by eliminating barriers and promoting positive social determinants of health; and

WHEREAS, the program is a collaborative effort between the Williamsburg Health Foundation, Child Development Resources, Williamsburg-James City County Public Schools, Williamsburg Department of Human Services, James City County Department of Social Services, and Williamsburg/James City County Community Action Agency; and

WHEREAS, the Williamsburg Health Foundation has invited James City County to receive an award of $283,500 (the "Grant") to continue implementation of the James City County Child Health Initiative, to include the continuation of three full-time positions under the supervision of the Department of Social Services; and

WHEREAS, in-kind services are provided by the Department of Social Services and some direct financial support from the County has been budgeted to continue the James City County Child Health Initiative.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby directs the County Administrator to execute the Grant contract and authorizes the acceptance of the Grant, the continuation of three positions, and the following appropriation amendment to the Special Projects/Grants Fund:

Revenue:	
Williamsburg Health Foundation	$283,500
Expenditure:	
James City County Child Health Initiative	$283,500

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
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MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

GA-ChHlthInt26-res

M E M O R A N D U M

DATE: June 9, 2026

TO: The Board of Supervisors

FROM: Teresa J. Saeed, Deputy Clerk

SUBJECT: Designation of Voting Delegate for NACo Annual Conference

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Each year, the National Association of Counties (NACo) holds an Annual Business Meeting during its Annual Conference. As a member county of NACo, James City County is entitled to one voting delegate to cast the County's vote(s) at this meeting.

The NACo Annual Business Meeting will be held on July 20, 2026, during the NACo Annual Conference in New Orleans, Louisiana. At this meeting, NACo members will vote on policy issues, resolutions, and other matters impacting counties nationwide.

Staff recommends that Ruth M. Larson, Vice Chair of the Board of Supervisors, be designated as James City County's voting delegate for the upcoming NACo Annual Business Meeting. Vice Chair Ruth M. Larson has experience representing our County at state and national events and is well-versed in the policy issues to be addressed.

If approved, Vice Chair Ruth M. Larson will be authorized to cast James City County's vote(s) on all matters brought before the NACo Annual Business Meeting. A formal resolution documenting this designation has been prepared for your consideration.

TJS/ap
VtngDelNACo26-mem

Attachment

R E S O L U T I O N

DESIGNATION OF VOTING DELEGATE FOR NACo ANNUAL CONFERENCE

WHEREAS, James City County is a member of the National Association of Counties (NACo); and

WHEREAS, NACo's Annual Business Meeting will be held on July 20, 2026, during the NACo Annual Conference in New Orleans, Louisiana; and

WHEREAS, NACo's policy allows each member county to designate one voting delegate to cast the County's vote(s) at the Annual Business Meeting; and

WHEREAS, the Vice Chair of the Board of Supervisors, Ruth M. Larson, has been determined to serve as the voting delegate for James City County at the NACo Annual Business Meeting.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby designates Ruth M. Larson, Vice Chair of the Board of Supervisors, as the voting delegate for James City County at the NACo Annual Business Meeting to be held on July 20, 2026, in New Orleans, Louisiana.

BE IT FURTHER RESOLVED that Ruth M. Larson is authorized to cast James City County's vote(s) as required on all matters brought before the NACo Annual Business Meeting.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
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Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

VtngDelNACo26-res

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowners:	Williamsburg-James City County Schools
Proposal:	Obtain approval for one existing modular learning cottage at James River Elementary School to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students.
Location:	8901 Pocahontas Trail
Tax Map/Parcel No.:	5920100046
Project Acreage:	± 32.82 acres
Zoning:	PL, Public Land
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.

2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.

3. Impacts: See Impact Analysis on Page 3.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Page 3.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain Special Use Permit (SUP) approval for one existing modular learning cottage to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students. The Board of Supervisors previously approved SUP-21-0002 on April 13, 2021, which granted approval for this learning cottage to remain on-site until July 1, 2025, at which time the approval expired. This learning cottage has remained on-site and has continued to be in use following this expiration date. As such, a new SUP is necessary.

Subject to the current proposal, the attached resolution (see Attachment No. 1) specifies that the new SUP would expire on July 1, 2028. The cottage would remain in its current location as approved on a site plan application previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4), James River Elementary School is anticipated to have an enrollment of 440 students in the 2026/2027 school year and 435 students in the 2027/2028 school year.* Per the applicant's narrative, two new Bright Beginnings preschool buildings will open in Fall 2027 which will free approximately 350 classroom seats for elementary school use. Accordingly, a school zone redistricting process is underway to balance elementary school enrollment with available space. The narrative indicates the cottage is expected to remain in use until the school redistricting process is complete.

  **School system projected enrollment does not account for Pre-K/Bright Beginnings, which is not offered at James River Elementary.*

PLANNING AND ZONING HISTORY

- In April 2021, the Board of Supervisors approved Case No. SUP-21-0002 for the addition of one temporary learning cottage until July 1, 2025. While this approval has expired, the learning cottage has remained on-site and in use. A new SUP is necessary for the continued use of the cottage to be in compliance with the Zoning Ordinance.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	R-2, General Residential; and R-5, Multifamily Residential	Single-family residential units, and townhouse units	Low Density Residential; and Moderate Density Residential
SOUTH	R-8, Rural Residential; and M-1, Limited Business/Industrial	Single-family residential and industrial	Community Character Conservation, Open Space or Recreation; and Mixed Use
EAST	M-1, Limited Industry	Industrial	Mixed Use - Grove
WEST	R-8, Rural Residential	Single-family residential	Community Character Conservation, Open Space or Recreation

Impacts/Potentially Unfavorable Conditions	Status *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	Considerations/Proposed Mitigation of Potentially Unfavorable Conditions
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- Subject property is located within a six-minute radius of Fire Station 2. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until the two Bright Beginnings preschool facilities and the school zone redistricting are complete.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	- The Stormwater and Resource Protection Division previously reviewed and approved the location and details of the learning cottage installation in the previously approved site plan application.
Cultural/Historic	No Mitigation Required	- The learning cottage was previously approved on a site plan application which found no impacts to cultural or historic resources.
Nearby and Surrounding Properties	No Mitigation Required	- The school learning cottage is interior to the subject property and is not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- This learning cottage is located adjacent to Pocahontas Trail, which is a Community Character Corridor. The proposed cottage is not expected to impact this corridor.

COMPREHENSIVE PLAN

The surrounding properties are designated Community Character Conservation, Open Space, or Recreation to the west, Low Density Residential and Moderate Density Residential to the north, and Mixed Use - Grove to the east and south. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly owned lands, which include the Eastern State Hospital, military installations, County offices and facilities (schools), and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the learning cottage is not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Overall, staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP25-2_JamesRvr

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative and Plan
4. Final Report: Enrollment Projections Update October 21, 2025

R E S O L U T I O N

CASE NO. SUP-25-0021. JAMES RIVER ELEMENTARY SCHOOL LEARNING COTTAGE

WHEREAS, the Board of Supervisors of James City County, Virginia, has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of James River Elementary School, has applied for an SUP to allow one temporary classroom trailer on property owned and developed by the applicant located at 8901 Pocahontas Trail, further identified as James City County Real Estate Tax Map Parcel No. 5920100046 (the "Property"); and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-25-0021.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-25-0021 for the placement of a temporary classroom trailer as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2028.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
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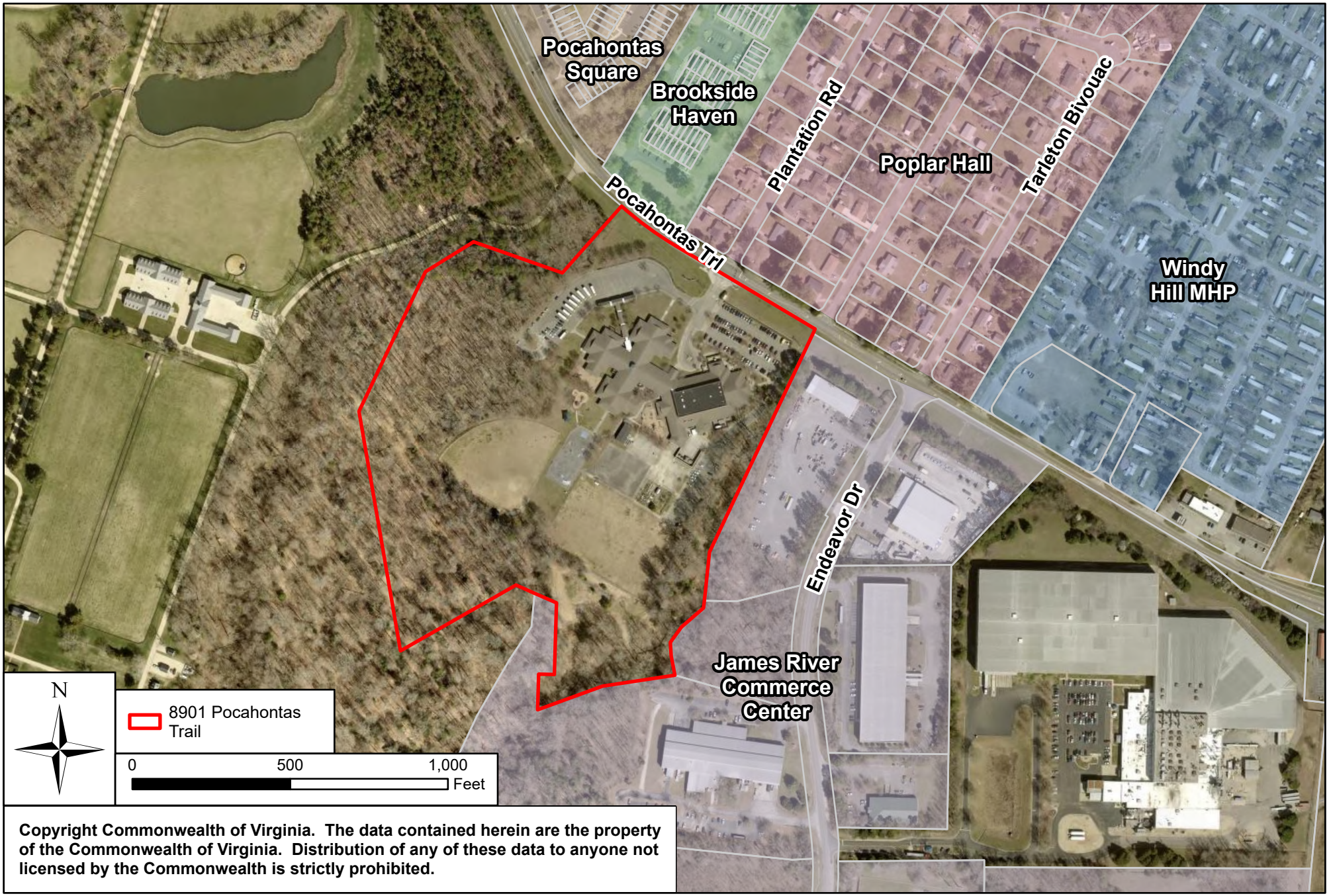
MCGLENNON	____	____	____	____

_____
Teresa J. Saeed
Deputy Clerk to the Board

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP25-2JamesRvr-res

JCC SUP-25-0021.
James River Elementary School Learning Cottage



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Special Use Permit Application

James River Elementary School Temporary Classroom Trailer

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 28, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottage at James River Elementary School

Dear Mr. Leininger,

We are requesting a Special Use Permit for one (1) existing learning cottage, with two (2) classrooms and ADA restrooms, behind James River Elementary School. The existing cottage was installed in 2021 under SUP-21-0002 (expired). James River Elementary School is described in GIS as 8901 Pocahontas Tr, Williamsburg VA 23185, Parcel ID 5920100046. Please see the attached proposed locations on Figure 1, next page.

In 2021, WJCC Schools modified the ratio of students-to-teachers in our schools based on the percentage of students in each school that were receiving free or reduced lunches. With smaller class sizes we faced an immediate need for two additional classrooms at James River Elementary School. We are now in the process of building two new Bright Beginnings Pre-K Buildings which, once open in the Fall of 2027, will free classroom seating for approximately 350 K-5 students in our existing elementary schools. We expect the temporary learning cottages to be in-use through the 2027/2028 school year while the School Division redistricts elementary schools in response to opening the new Pre-K Buildings.

We are submitting an application for a Special Use Permit to maintain use of the existing learning cottage. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838

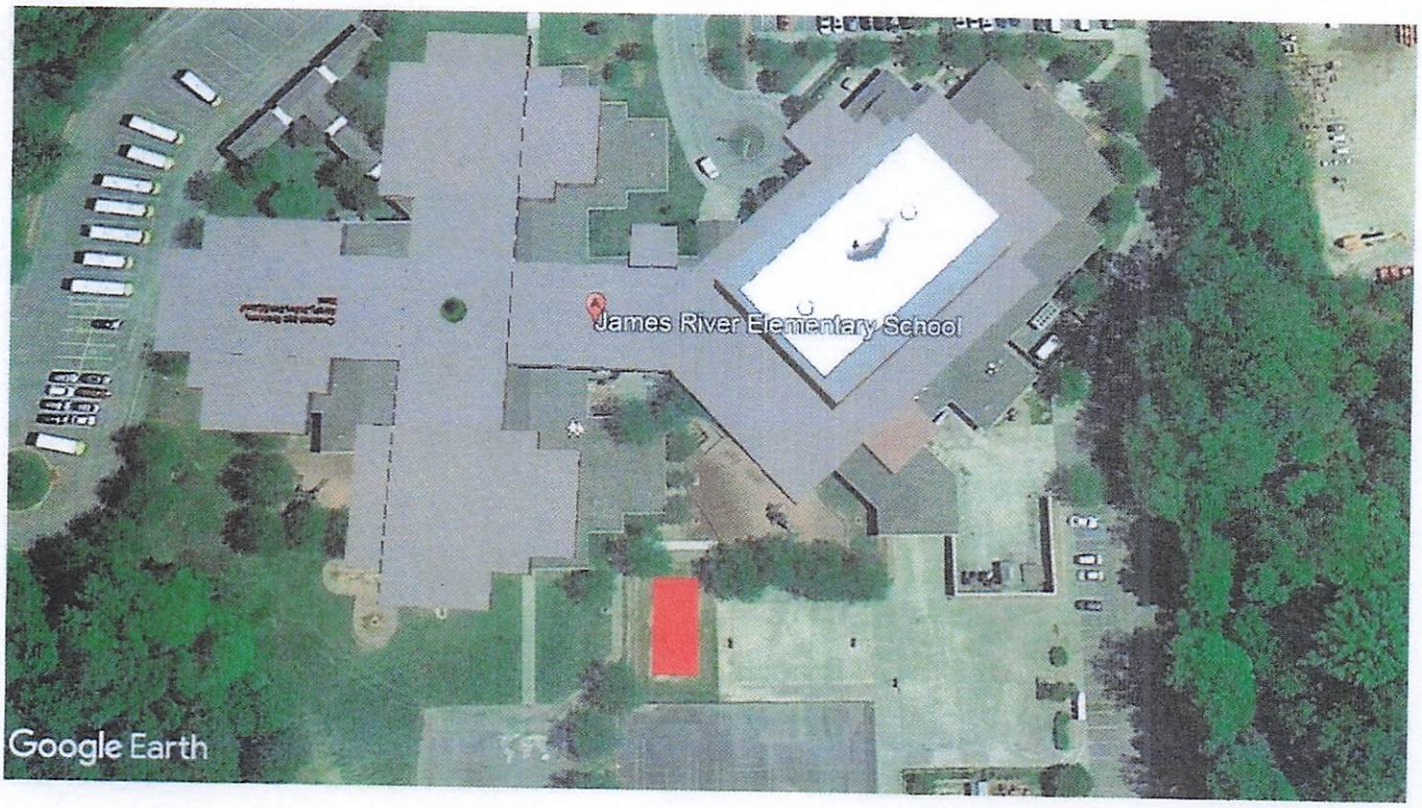
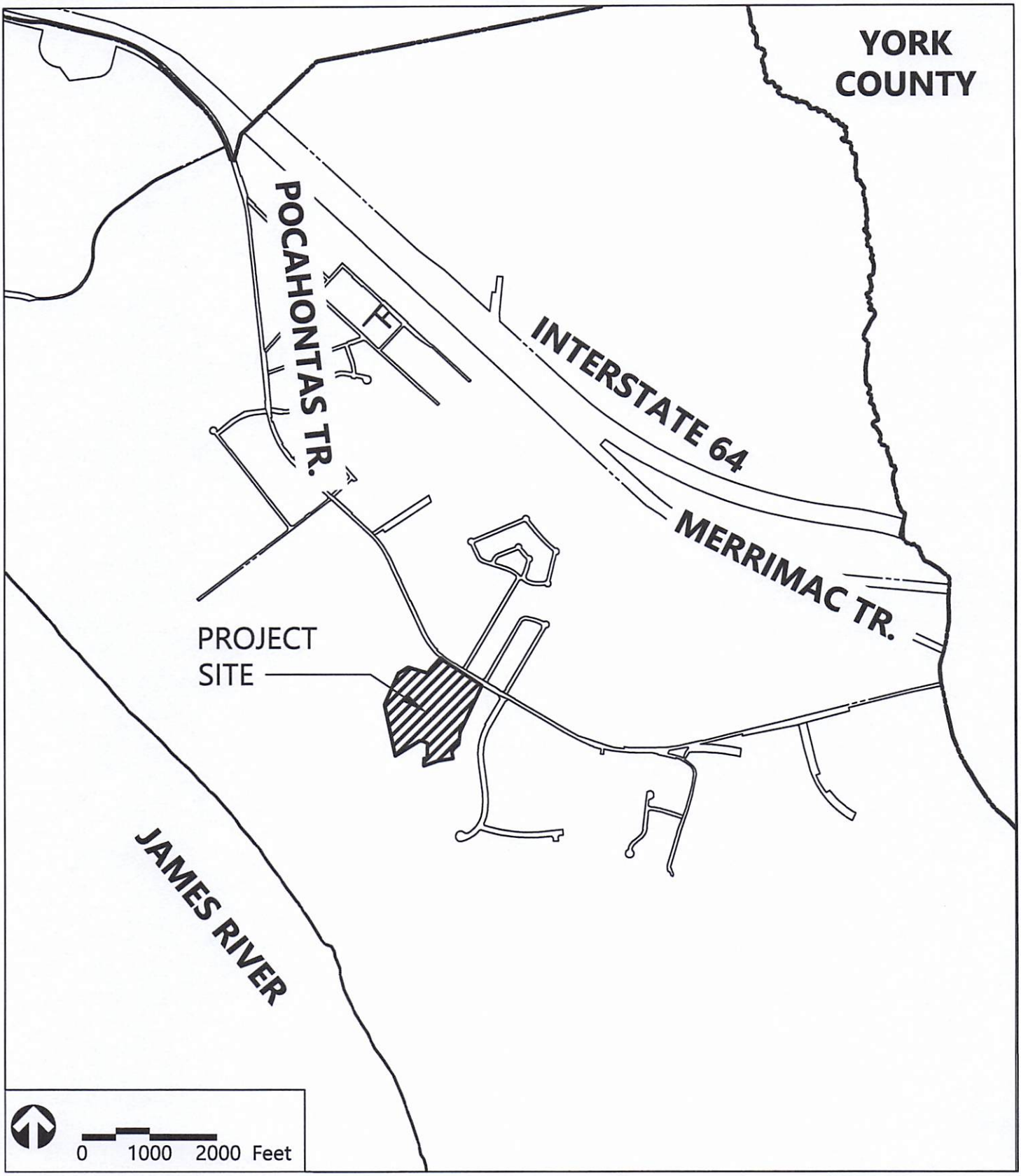


Figure 1. Classroom Trailer Location behind James River Elementary School



VICINITY MAP

TEMPORARY CLASSROOM TRAILER INSTALLATION
JAMES RIVER ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT
8901 Pocahontas Trail, Williamsburg, VA 23185

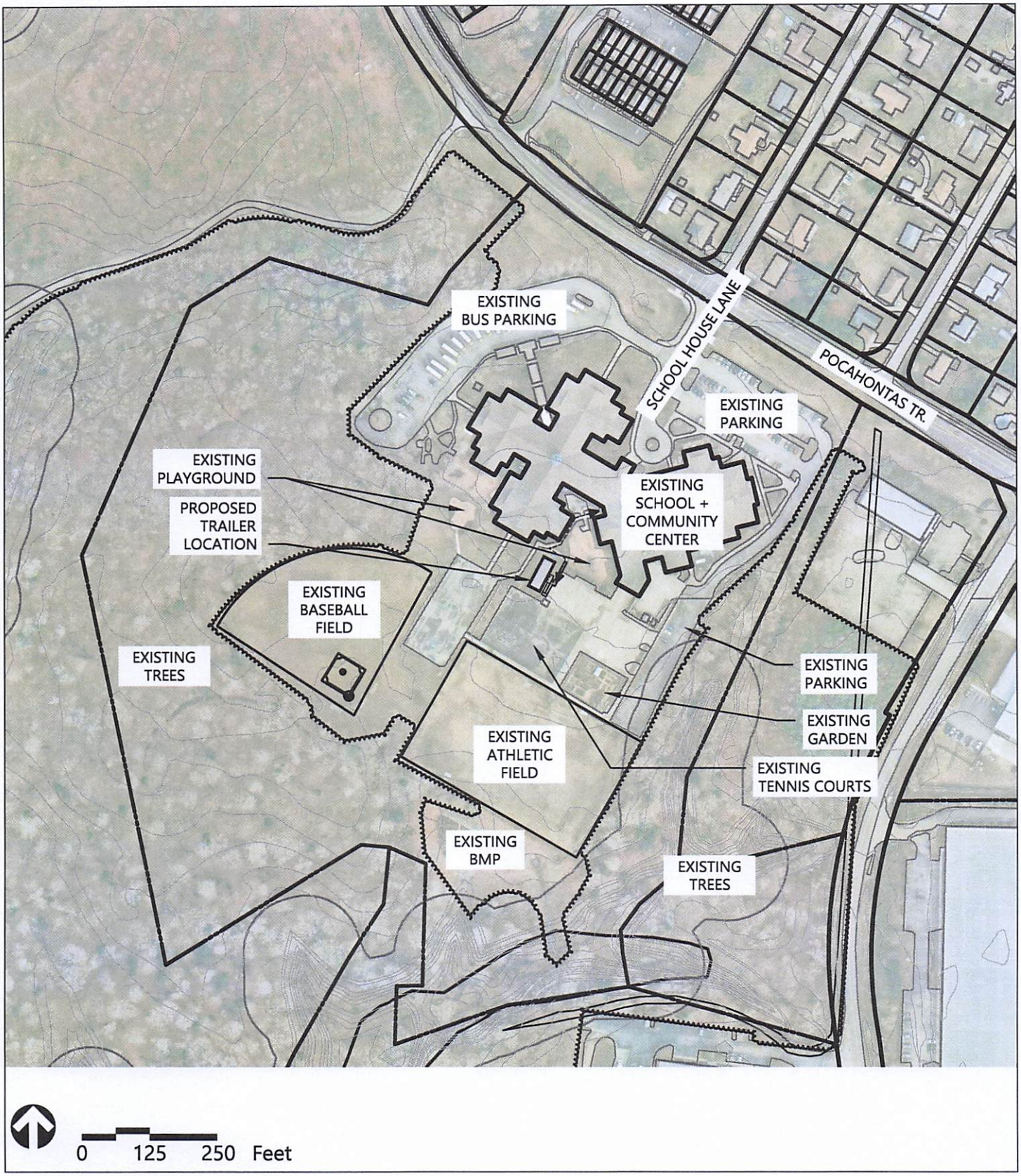
PARCEL ID: 5920100046

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/02/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



SITE PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION
JAMES RIVER ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT
8901 Pocahontas Trail, Williamsburg, VA 23185

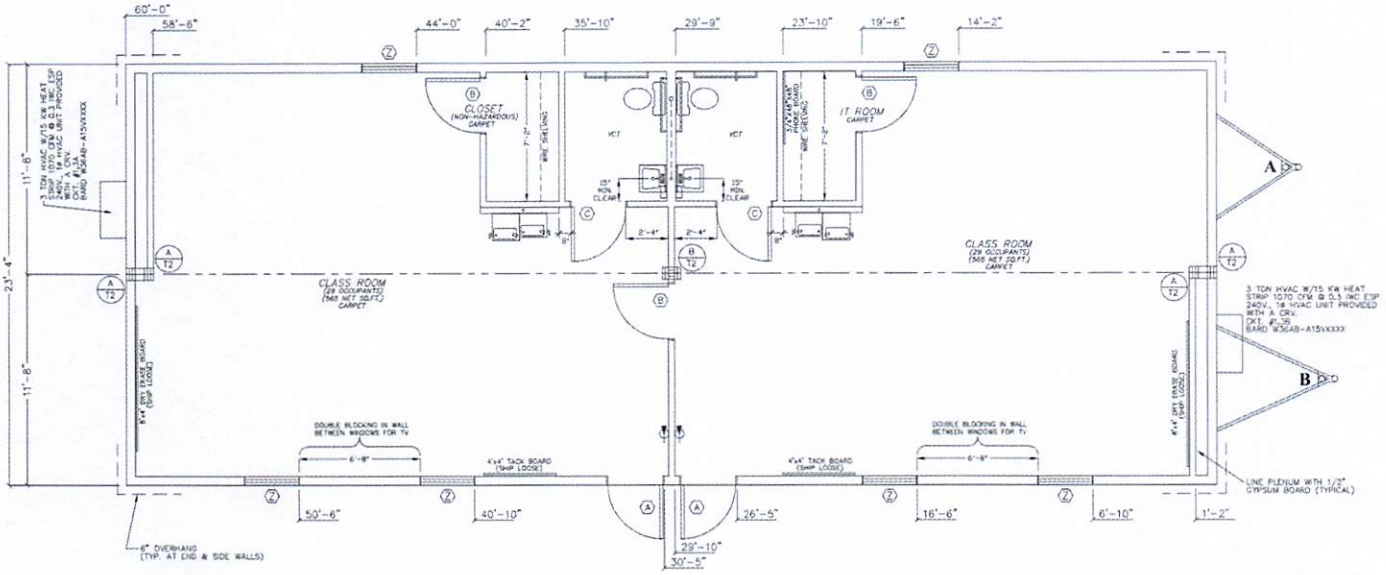
PARCEL ID: 5920100046

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/02/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES: (2) CLASSROOMS - APPROXIMATELY (50) STUDENTS

ELECTRICAL SERVICE: TO BE PROVIDED FROM BUILDING ELECTRICAL SERVICE

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION
JAMES RIVER ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT
8901 Pocahontas Trail, Williamsburg, VA 23185

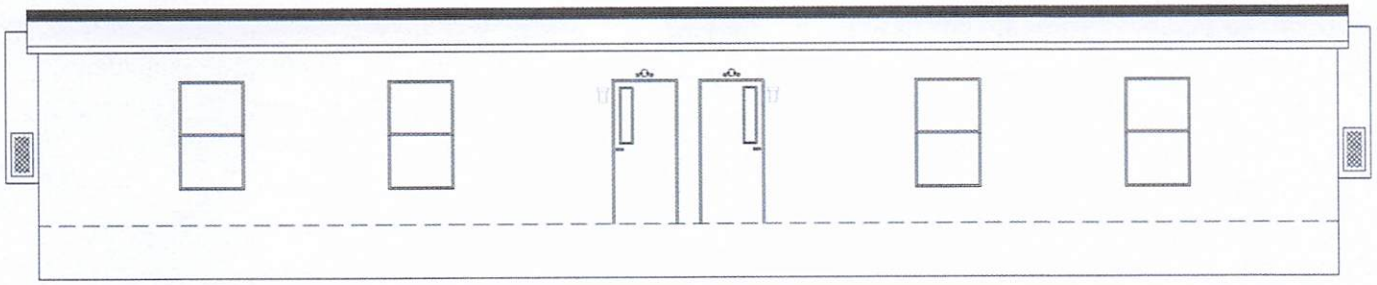
PARCEL ID: 5920100046

ZONING: PL - PUBLIC LANDS

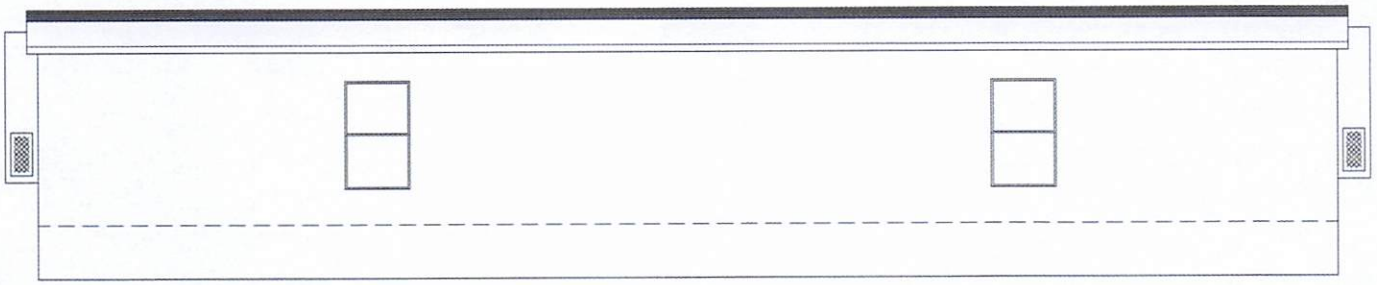
SPECIAL USE PERMIT APPLICATION

DATE: 03/02/2021

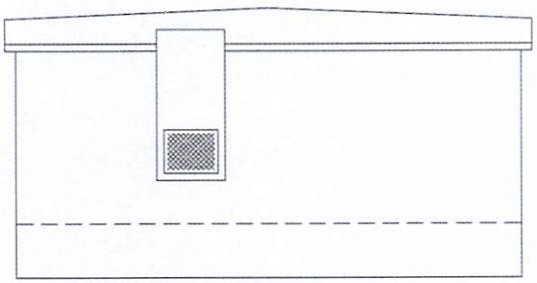
vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



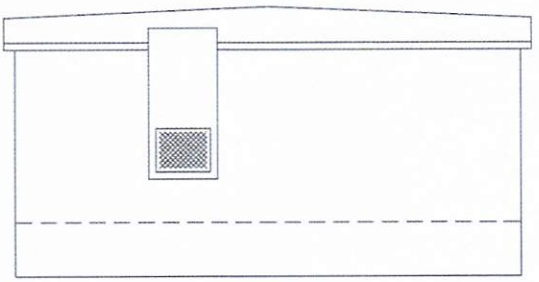
FRONT ELEVATION



REAR ELEVATION



LEFT ELEVATION



RIGHT ELEVATION

TYPICAL CLASSROOM TRAILER SECTION ELEVATION

NOT TO SCALE

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

JAMES RIVER ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT

8901 Pocahontas Trail, Williamsburg, VA 23185

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

PARCEL ID: 5920100046

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/02/2021

FutureThink

PLAN TO EMPOWER

FINAL REPORT

Enrollment Projections Update

October 21, 2025

ACKNOWLEDGEMENTS

FutureThink would like to extend our appreciation to the Williamsburg-James City County Public Schools for selecting us to assist them in developing these enrollment projections. In addition, thank you to Rene Ewing for providing information necessary in the completion of this report.

As a consulting team, we appreciate this opportunity to serve your school community as you embark on your vision for the future of education in the Williamsburg-James City County Public Schools.

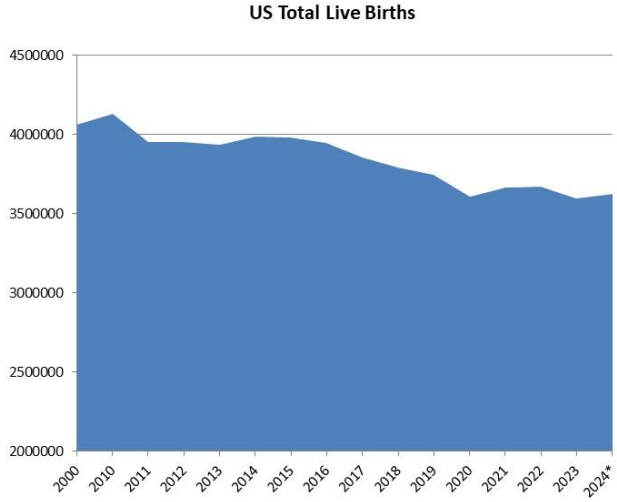
Tracy Healy

President

ENROLLMENT PROJECTION INTRODUCTION

NATIONAL & VIRGINIA TRENDS IN ENROLLMENT

The United States as a whole continues to undergo major shifts in public student enrollment. Births are a significant part of this shift. From 2000 to 2010, births increased, then declined from 2011 to 2013. In 2014, there was a slight uptick. Since 2014, there has been steady decline. The decrease from 2019 to 2020 was approximately 4 percent. However, in 2021, there was a slight uptick of 1.5 percent. Since, birth counts reached an all-time low in 2023 and had another slight uptick in 2024 of less than 1 percent.

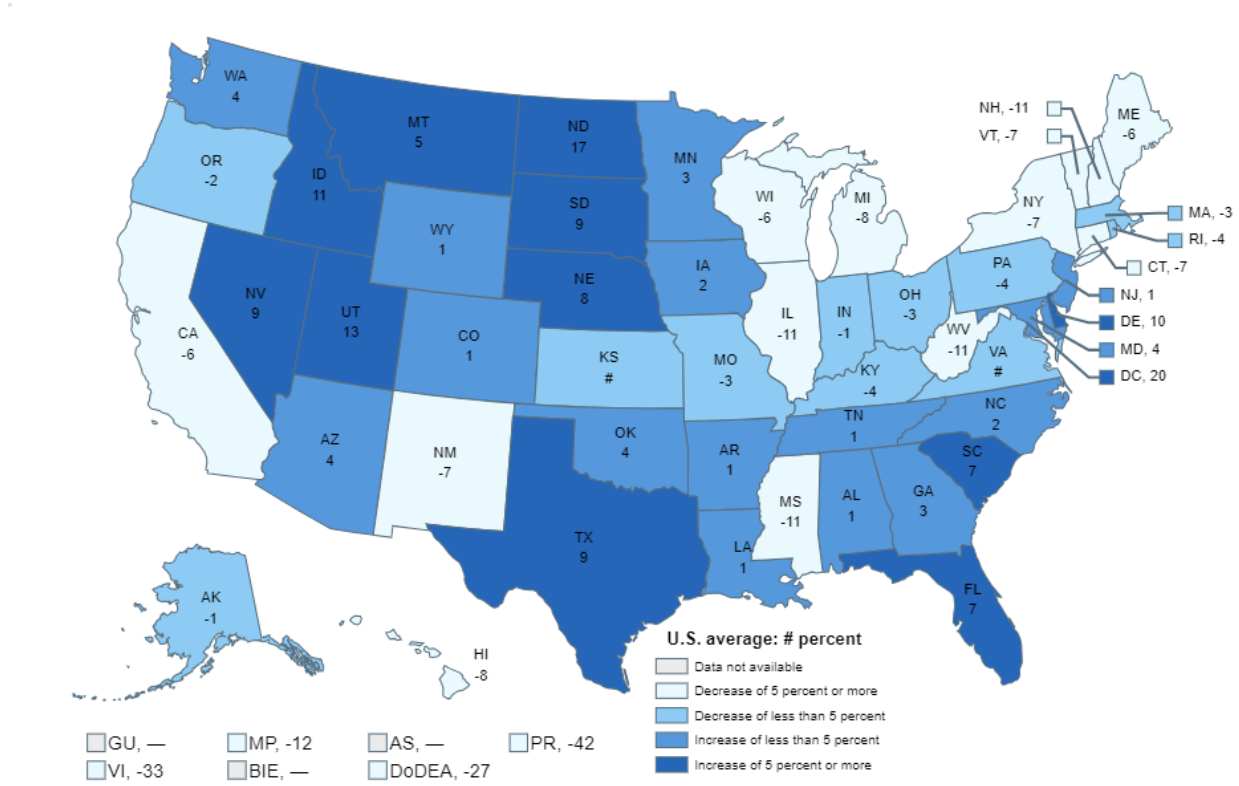


Source: CDC, NVSS, Vital Statistics Rapid Release, Report No. 38, April 2025
*provisional

Williamsburg-James City County Public Schools

The figure below illustrates the change in Pre-K - 12 public school enrollment from the 2012-13 to the 2022-23 school year. States with growth in enrollment were primarily in the southeast and west. Virginia experienced no change.

Figure 2. Percentage change in public elementary and secondary school enrollment, by state or jurisdiction: Fall 2012 to fall 2022



— Not available.

Rounds to zero.

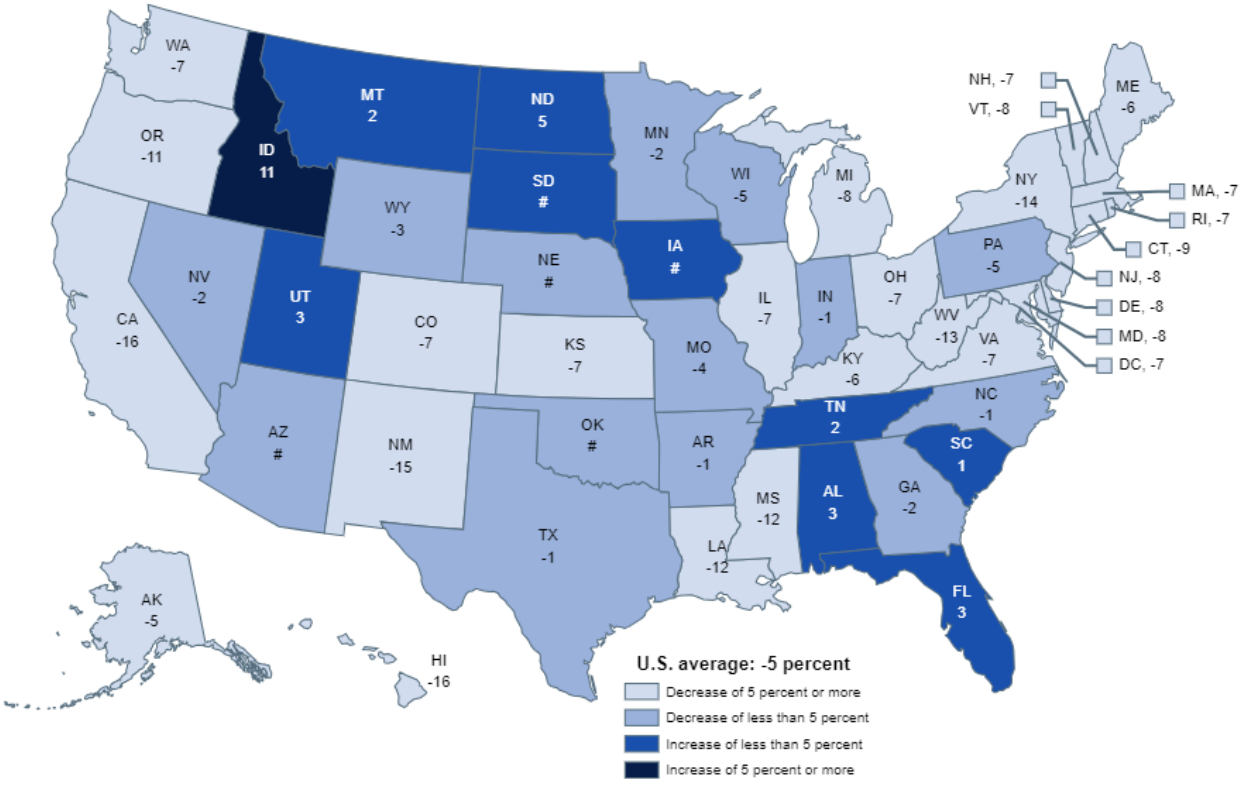
NOTE: U.S. average is for the 50 states and the District of Columbia. Data include both traditional public schools and public charter schools. Includes imputations for nonreported prekindergarten enrollment in California and Oregon for fall 2022. Figures are plotted based on unrounded data.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Nonfiscal Survey of Public Elementary/Secondary Education," 2012–13 and 2022–23. Department of Defense Education Activity (DoDEA) Data Center, Enrollment Data, 2012 and 2022, retrieved December 12, 2022, from https://www.dodea.edu/datacenter/enrollment.cfm. See *Digest of Education Statistics 2023*, table 203.20.

Williamsburg-James City County Public Schools

The figure below illustrates the projected change in Pre-K-12 public school enrollment from the 2022-23 to the 2031-32 school year. Growth is expected in only 10 states over this time period. Virginia is projected to experience a decrease of 7 percent.

Figure 3. Projected percentage change in public elementary and secondary school enrollment, by state: Fall 2022 to fall 2031



Rounds to zero.

NOTE: U.S. average is for the 50 states and the District of Columbia. Projected enrollment data are not available for the other U.S. jurisdictions. Data include both traditional public schools and public charter schools. Includes imputations for nonreported prekindergarten enrollment in California and Oregon for fall 2022. Projections in this figure were calculated after the onset of the coronavirus pandemic and take into account the expected impacts of the pandemic. Projections for fall 2023 through fall 2031 are based on historical data through fall 2021, only. Figures are plotted based on unrounded data.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Nonfiscal Survey of Public Elementary/Secondary Education," 2022–23; and State Public Elementary and Secondary Enrollment Projection Model, through 2031. See *Digest of Education Statistics 2023*, table 203.20.

ENROLLMENT PROJECTION METHODOLOGIES

When projecting future enrollments, it is vital to track the number of births, the patterns of enrollment, the amount of new housing activity, and the change in household composition.

In addition, any of the following factors could cause a significant change in projected student enrollments:

- Boundary adjustments
- New school openings
- Changes/additions in program offerings
- Preschool programs
- Change in grade configuration
- Interest rates/unemployment shifts
- Magnet/charter/private school opening or closure
- Zoning changes
- Unplanned new housing activity
- Planned, but not built, housing

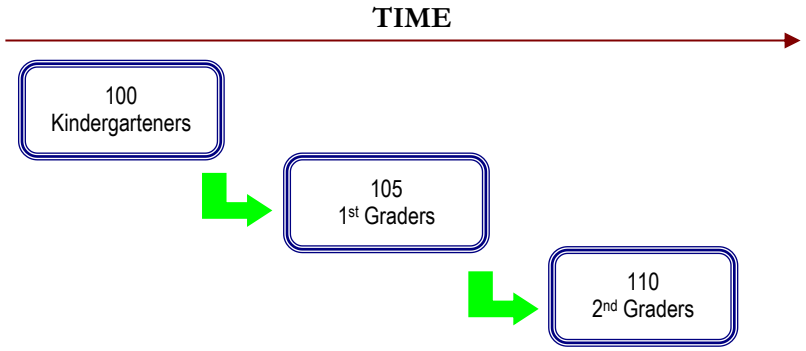
Obviously, certain factors can be gauged and planned for far better than others. For instance, it may be relatively straightforward to gather housing data from local builders regarding the total number of lots in a planned subdivision and calculate the potential student yield. However, planning for changes in the unemployment rate, and how these may either boost or reduce public school enrollment, proves more difficult. In any case, it is essential to gather a wide variety of information in preparation for producing enrollment projections.

When looking ahead at a school Division's enrollment over the next two, five, or ten years, it is helpful to approach the process from a global perspective. For example: How many new homes have been constructed each year? How many births have occurred each year in relation to the resident population? Is housing experiencing a turnover – if so, what is the composition of families moving in/out? Are more or less students attending private school or being home-schooled? What has the unemployment rate trend been over the past ten years? What new educational policies are in place now that could affect student enrollment figures?

The data sets generated from questions such as these have led to the development of general methodologies to project future student enrollments. They are as follows:

Cohort Survival Method

A cohort is a group of persons [in this case, students]. The cohort survival projection methodology uses previous live birth data and historical student enrollments to "age" a known population or cohort throughout the school grades. For instance, a cohort begins when a group of kindergarteners enrolls in grade K and moves to first grade the following year, second grade the next year, and so on.



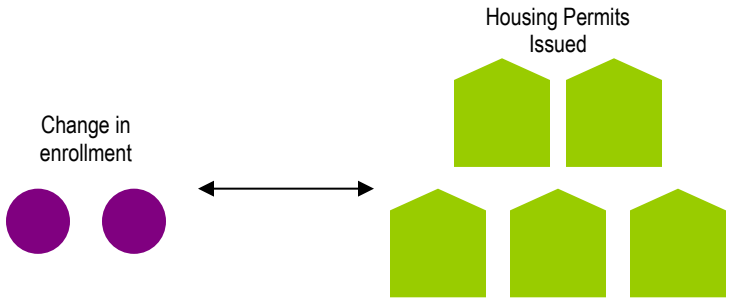
A "survival ratio" is developed to track how this group of students grew or shrunk in number as they moved through the grade levels. By developing survival ratios for each grade transition [i.e., 2nd to 3rd grade] over a ten-year period of time, patterns emerge and can be folded into projections by using the survival ratios as a multiplier.

For example, if student enrollment has consistently increased from the 8th to the 9th grade over the past ten years, the survival ratio would be greater than 100% and could be multiplied by the current 8th grade to develop a projection for next year's 9th grade. This methodology can be carried through to develop ten years of projection figures. Because there is not a grade cohort to follow for students coming into kindergarten, live birth counts are used to develop a survival ratio. Babies born five years previous to the kindergarten class are compared in number, and a ratio can be developed to project future kindergarten enrollments.

The cohort survival method is useful in areas where population is stable [relatively flat, growing steadily, or declining steadily], and where there have been no significant fluctuations in enrollment, births, and housing patterns from year to year.

Housing

Enrollment projections can also be determined by analyzing the housing data for the areas that make up a school Division. Yield factors can be established by comparing the historic change in enrollment from year to year divided by the total number of building or occupancy permits issued. For example, if student enrollment has increased by approximately 100 students each year and approximately 200 building permits have been issued each year for the past ten years, then the yield factor would be approximately .5 students per building permit.

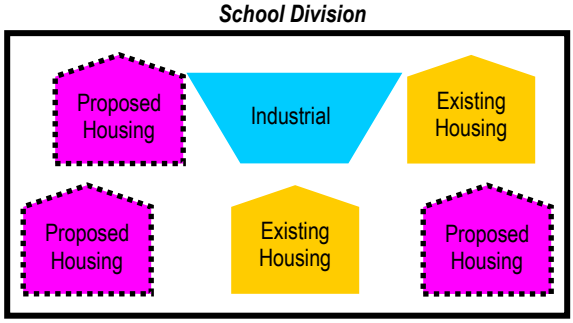


Once yield factors are established, the number of new students per year can be estimated by multiplying the yield factor by the number of projected new housing units. This method is effective when the rate of student enrollment far exceeds the live birth rate.

If housing demolitions are occurring in a Division, these must also be taken into account. For instance, if housing demolitions/withdrawals have increased rapidly over recent years while new housing starts have remained relatively constant over many years, the conclusion may be that some of the new housing starts will simply be replacements for the families displaced by the demolitions. Of course, housing value and household composition would need to be further analyzed to confirm that this is indeed the case. It is possible that enrollment may remain flat or even decline even though there is new housing occurring in the area.

Land-Saturation Analysis

Housing data also drives the land-saturation analysis enrollment methodology. In areas where there is a high rate of development and the future development patterns in the area are clear, a "build-out" scenario can be developed. The scenario takes into consideration the remaining acreage to be developed, planned rate of completion, zoning policies, density per acre, type of housing, and ratios of school-age children per household type. This method is particularly useful in areas experiencing rapid growth.



HISTORICAL ENROLLMENT

Over the past ten years, student enrollment in the Williamsburg-James City County Public Schools has decreased by 285 students in grades K–12. Total enrollment for the 2025-26 school year is 11,146, a decrease of 233 students from the previous school year.

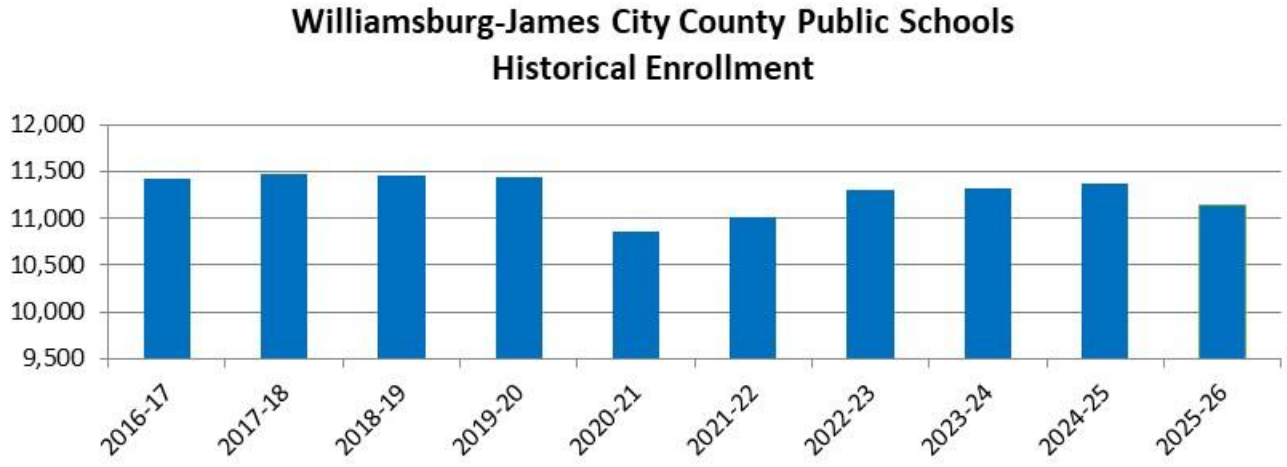
The following table and graphs illustrate the Division's enrollment history from 2016-17 through 2025-26.

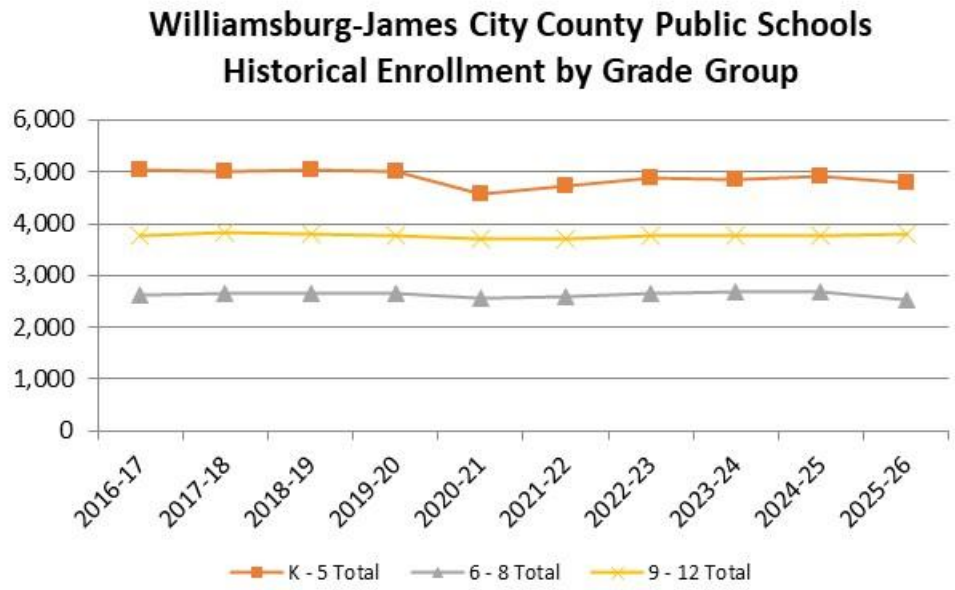
Williamsburg-James City County Public Schools
Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	813	770	807	788	670	763	786	733	727	751
1	792	863	791	811	765	724	847	824	803	742
2	808	808	886	832	747	803	779	850	847	793
3	860	828	825	902	762	772	814	780	883	831
4	868	868	840	833	843	784	825	834	808	864
5	887	881	875	853	796	879	822	832	856	809
K - 5 Total	**5,028**	**5,018**	**5,024**	**5,019**	**4,583**	**4,725**	**4,873**	**4,853**	**4,924**	**4,790**
6	879	857	897	884	824	836	922	835	845	846
7	886	876	872	892	864	851	869	961	860	853
8	863	907	872	879	867	898	874	896	976	853
6 - 8 Total	**2,628**	**2,640**	**2,641**	**2,655**	**2,555**	**2,585**	**2,665**	**2,692**	**2,681**	**2,552**
9	1,008	931	989	940	958	1,015	1,036	957	1,043	1,056
10	965	1,035	948	1,005	912	932	991	992	906	988
11	918	959	958	897	964	833	886	928	925	852
12	884	894	901	932	886	928	857	902	900	908
9 - 12 Total	**3,775**	**3,819**	**3,796**	**3,774**	**3,720**	**3,708**	**3,770**	**3,779**	**3,774**	**3,804**
K - 12 Total	**11,431**	**11,477**	**11,461**	**11,448**	**10,858**	**11,018**	**11,308**	**11,324**	**11,379**	**11,146**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Williamsburg-James City County Public Schools





Williamsburg-James City County Public Schools

The following table illustrates the Division's enrollment history by school from 2016-17 through 2025-26. During that time, James Blair Middle School opened.

Williamsburg-James City County Public Schools
Historical Enrollment by School

School	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Baker Elementary	528	513	515	491	443	469	493	475	457	434
Laurel Lane Elementary	487	486	465	464	430	419	494	485	526	507
Montague Elementary	461	482	503	506	464	507	514	520	515	506
Norge Elementary	591	583	583	593	553	569	603	575	578	555
Whaley Elementary	489	480	541	500	429	452	435	454	485	473
James River Elementary	502	498	448	454	428	420	431	445	449	445
Stonehouse Elementary	727	723	745	764	718	758	802	827	838	841
Matoaka Elementary	730	754	745	760	674	675	643	601	595	573
Blayton Elementary	513	499	479	487	444	456	458	471	481	456
Berkeley Middle	860	881	596	633	599	631	652	665	666	647
Toano Middle	826	816	701	678	628	616	678	700	704	681
Hornsby Middle	942	943	794	809	795	793	790	807	805	760
James Blair Middle				535	533	545	545	520	506	464
Lafayette High	1,152	1,130	1,112	1,113	1,123	1,137	1,213	1,249	1,251	1,199
Jamestown High	1,328	1,317	1,296	1,289	1,257	1,237	1,232	1,232	1,244	1,290
Warhill High	1,295	1,372	1,388	1,372	1,340	1,334	1,325	1,298	1,279	1,315
Total	**11,431**	**11,477**	**10,911**	**11,448**	**10,858**	**11,018**	**11,308**	**11,324**	**11,379**	**11,146**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

ACTUAL VERSUS PROJECTED ENROLLMENT

Actual enrollment for the 2025-26 school year is less than the previously developed "low" projections by 199 students or approximately 2 percent.

Williamsburg-James City County Public Schools
Actual vs. Projected Enrollment - Low

Grade	2025-26 Actual	Low Projection	Difference	Percentage
K	751	761	-10	-1.33%
1	742	777	-35	-4.72%
2	793	816	-23	-2.90%
3	831	851	-20	-2.41%
4	864	910	-46	-5.32%
5	809	822	-13	-1.61%
6	846	865	-19	-2.25%
7	853	856	-3	-0.35%
8	853	870	-17	-1.99%
9	1,056	1,068	-12	-1.14%
10	988	947	41	4.15%
11	852	850	2	0.23%
12	908	952	-44	-4.85%
Total	**11,146**	**11,345**	**-199**	**-1.79%**

Source: Williamsburg-James City County Public Schools, FutureThink

Williamsburg-James City County Public Schools

The following compares the low projections by school. The schools with the largest differences between actual and projected enrollment include: Lafayette High School (-76), Laurel Lane Elementary School (-44), and Warhill High School (-40). The rest are within 29 students or less.

Williamsburg-James City County Public Schools
Actual vs. Projected Enrollment - Low

School	2025-26 Actual	Low Projection	Difference	Percentage
Baker Elementary	434	460	-26	-5.99%
Laurel Lane Elementary	507	551	-44	-8.68%
Montague Elementary	506	523	-17	-3.36%
Norge Elementary	555	576	-21	-3.78%
Whaley Elementary	473	502	-29	-6.13%
James River Elementary	445	452	-7	-1.57%
Stonehouse Elementary	841	847	-6	-0.71%
Matoaka Elementary	573	559	14	2.44%
Blayton Elementary	456	467	-11	-2.41%
Berkeley Middle	647	645	2	0.31%
Toano Middle	681	681	0	0.00%
Hornsby Middle	760	777	-17	-2.24%
James Blair Middle	464	488	-24	-5.17%
Lafayette High	1,199	1,275	-76	-6.34%
Jamestown High	1,290	1,267	23	1.78%
Warhill High	1,315	1,275	40	3.04%
Total	**11,146**	**11,345**	**-199**	**-1.79%**

Source: Williamsburg-James City County Public Schools, FutureThink

LIVE BIRTH DATA

Utilization of live birth data is recommended when projecting future kindergarten enrollments. This data provides a helpful overall trend. Large bubbles in birth counts, both up or down, can also be planned for and anticipated by the Division.

In addition, the live birth counts are used in determining a birth-to-kindergarten survival ratio. This ratio identifies the percentage of children born in a representative area who attend kindergarten in the Division five years later. The survival ratios for birth-to-kindergarten as well as grades 1-12 can be found later in this report.

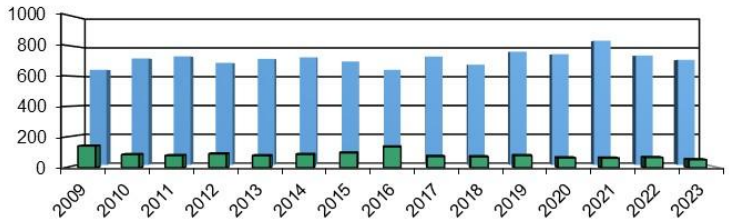
The chart and graph that follow illustrate live birth counts in Williamsburg and James City County.

Williamsburg & James City County
Live Birth Counts
2009-2023

Year	Williamsburg	James City County	Total
2009	142	644	786
2010	86	721	807
2011	80	735	815
2012	91	691	782
2013	79	718	797
2014	87	729	816
2015	97	701	798
2016	137	644	781
2017	74	734	808
2018	72	679	751
2019	80	767	847
2020	65	750	815
2021	63	841	904
2022	67	741	808
2023	53	712	765

Source: Virginia Department of Health, Office of Vital Records and Health

Williamsburg & James City County
Birth Counts



DEMOGRAPHICS

The Williamsburg-James City County Public School Division is comprised of Williamsburg City and James City County, Virginia. General demographic information follows.

General Demographic Information

	James City County	Virginia
Per Capita Income	$57,962	$47,199
Median Household Income	$110,137	$85,873
Persons Below Poverty	7.9%	10.6%

Source: US Census, American Community Survey 2022, 5-year estimates

Total Population

	2010	2020
Williamsburg City	14,068	15,425
James City County	67,009	78,254

Source: US Census 2010; 2020 Decennial Census

Following are block group estimates and projections provided by ESRI Business Information Solutions (ESRI BIS). ESRI BIS uses a time series of estimates from the U.S. Census Bureau that includes the latest estimates and intercensal estimates adjusted for error of closure. The Census Bureau's time series is consistent, but testing has revealed improved accuracy by using a variety of sources to track county population trends.

ESRI BIS also employs a time series of building permits and housing starts plus residential deliveries. Finally, local data sources that tested well against Census data are reviewed. Data sources are integrated and then analyzed by Census Block Groups.

Sources of data include:

- Supplementary Surveys of the Census Bureau
- Bureau of Labor Statistics' (BLS) Local Area Unemployment Statistics
- BLS Occupational Employment Statistics
- *Info*USA
- U.S. Bureau of the Census' Current Population Survey
- National Planning Association Data Service

Below is a list of definitions as they appear on the U.S. Census Bureau website, to aid in interpretation of the following tables and maps.

Household:
A household includes all the people who occupy a housing unit as their usual place of residence.

Average family size:
A measure obtained by dividing the number of members of families by the total number of families (or family householders).

Family household (Family):
A family includes a householder and one or more people living in the same household who are related to the householder by birth, marriage, or adoption. All people who are related to the householder are regarded as members of his or her family. A family household may contain people not related to the householder, but those people are not included as part of the householder's family in census tabulations. Thus, the number of family households is equal to the number of families, but family households may include more members than do families. A household can contain only one family for purposes of census tabulations. Not all households contain families since a household may comprise a group of unrelated people or one person living alone.

Householder:
The person, or one of the people, in whose name the home is owned, being bought, or rented. If there is no such person present, any household member 15 years old and over can serve as the householder for the purposes of the census. Two types of householders are distinguished: a family householder and a nonfamily householder. A family householder is a householder living with one or more people related to him or her by birth, marriage, or adoption. The householder and all people in the household related to him are family members. A nonfamily householder is a householder living alone or with nonrelatives only.

Williamsburg-James City County Public Schools

The following tables illustrate the current estimates and 5-year population projections based on block groups that comprise the Division, indicating areas of current and projected growth. The tables have been developed to determine selected age group projections and projections for household income, family size, and family income.

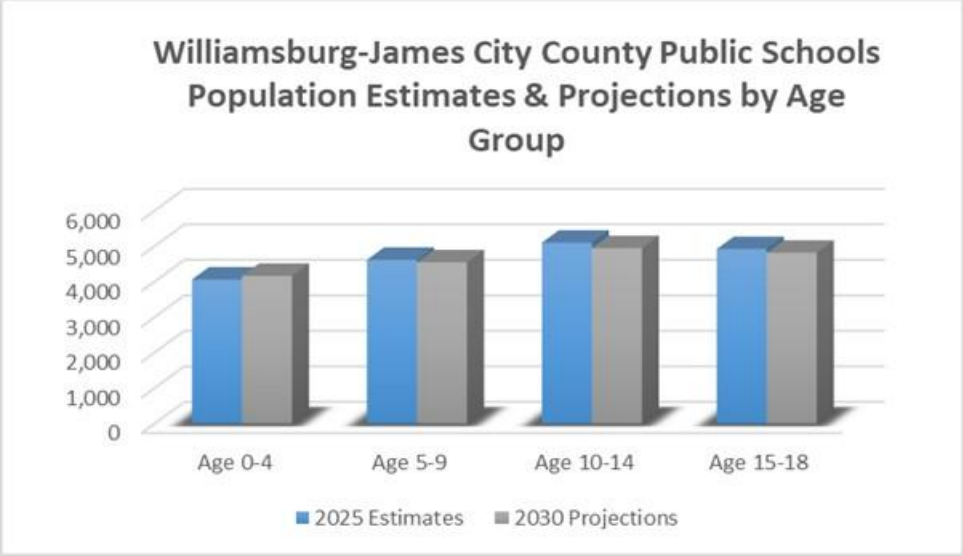
The total population in the Division is 100,061. This population is projected to increase by 4,347 people, or approximately 4% over a 5-year period.

The 0–18-year-old population in the Division currently totals 18,703. This population is projected to decrease by 226 children, or approximately 1 percent.

The median age is projected to increase by approximately 3% from 44.9 to 46.1 years of age.

Williamsburg-James City County Public Schools	2025 Estimates	2030 Projections	Change 2025-30	Change 2025-30 (%)
Total Population	100,061	104,408	4,347	4.3%
Age 0-4	4,065	4,165	100	2.5%
Age 5-9	4,616	4,548	-68	-1.5%
Age 10-14	5,100	4,948	-152	-3.0%
Age 15-18	4,922	4,816	-106	-2.2%
Total Age 0-18	18,703	18,477	-226	-1.2%
Median Age	44.9	46.1	1.2	2.7%

Source: Esri



Williamsburg-James City County Public Schools

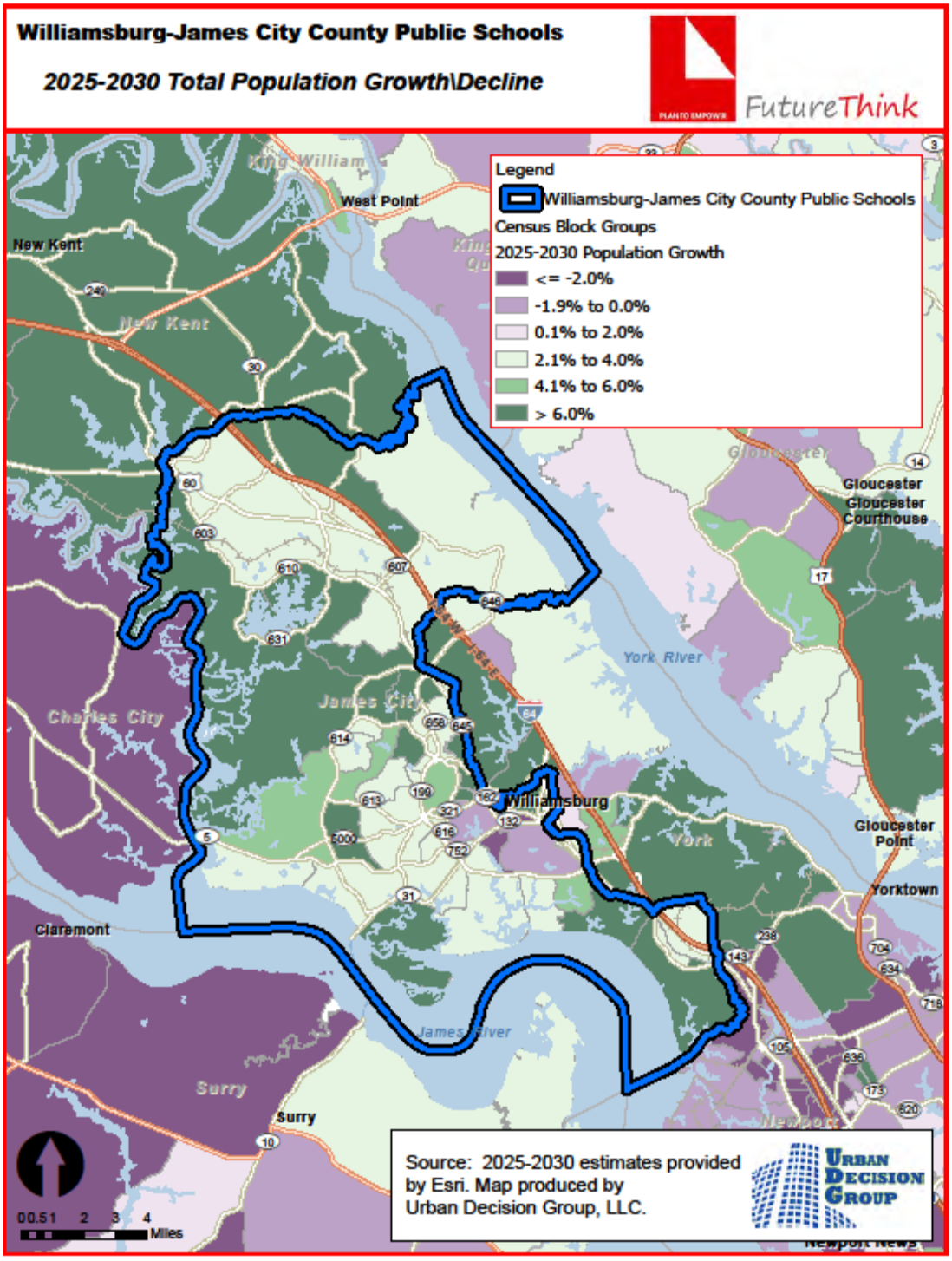
Median and average household incomes in the Division are projected to increase by approximately 10% and 11%, respectively, over a 5-year period. The average family size is projected to increase slightly, and the number of family households is projected to increase by approximately 4 percent.

Williamsburg-James City County Public Schools	2025 Estimates	2030 Projections	Change 2025-30	Change 2025-30 (%)
Median Household Income	$108,025	$119,002	$10,977	10.2%
Average Household Income	$140,850	$155,765	$14,915	10.6%
Average Family Size	2.87	2.88	0.01	0.3%
Total Family Households	26,588	27,771	1,183	4.4%

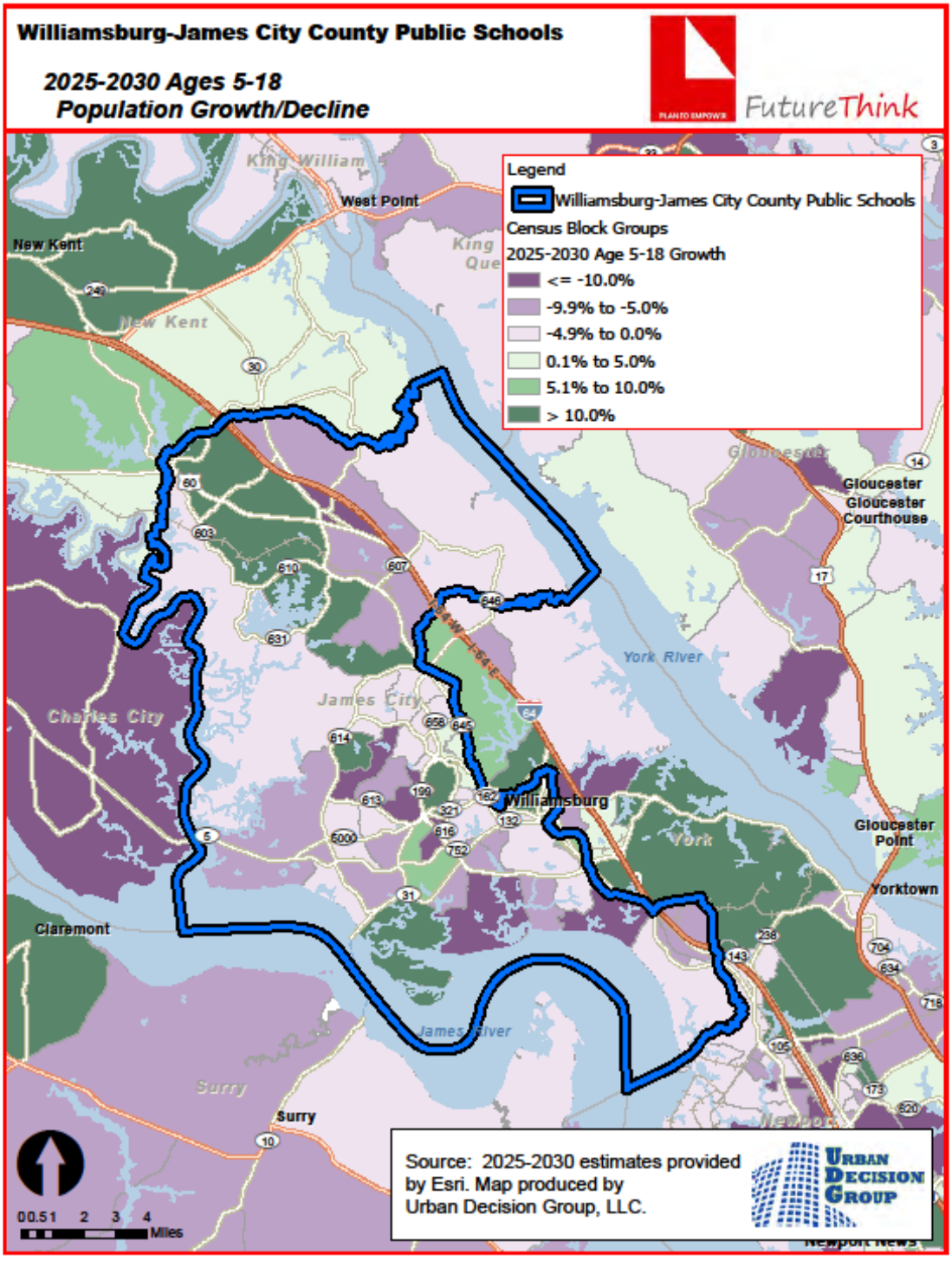
Source: Esri

The maps on the following pages illustrate the population data identified in the tables. The color coding identifies areas within the Division that may be increasing or decreasing at different rates than others.

Williamsburg-James City County Public Schools



Williamsburg-James City County Public Schools



HOUSING INFORMATION

The total number of new single-family dwellings in Williamsburg and James City County has fluctuated between 279 and 423 units over the past several years. Beginning in 2021, there are no age-restricted communities reflected in the number of permits issued.

# of Single-Family Building Permits Issued

Year	Williamsburg	James City County	Total
2015	21	381	402
2016	49	374	423
2017	43	335	378
2018	25	386	411
2019	29	250	279
2020	28	314	342
2021	33	341	374
2022	47	261	308
2023	15	321	336
2024	10	296	306
2025*	19	116	135

Source: City of Williamsburg, SOCDS Building Permits Database

* through September 14, 2025 for Williamsburg & June 30, 2025 for James City County

SURVIVAL RATIOS

The chart below demonstrates the changes in enrollment as students move through the system. Percentages greater than 100 indicate that there are more students than there were in the previous grade the previous year. In other words, there was growth and new students were added to the system. Percentages less than 100 indicate that there was decline or students left the system.

- Birth to Kindergarten: This ratio indicates the number of children born in the area who attend kindergarten in the Division 5 years later. Percentages less than 100% result from movement out of the Division, attendance at a non-public or charter school, or residence in another Division within the same area. Percentages greater than 100% represent people moving into the Division with children of Kindergarten age.

- Grades 8-9: The higher than usual percentage often is a result of Division promotion policies. Often in school Divisions, students are promoted from 8th to 9th grade and after one year in 9th grade do not have sufficient credits to be classified as 10th graders and are counted again as 9th graders the following year. There may also be students who are attending private or charter schools or are home schooled through grade 8 and then attend public schools for high school education.

The following table illustrates the survival ratios for the Williamsburg-James City County Public Schools.

from	to	birth -> K	K->1	1->2	2->3	3->4	4->5	5->6	6->7	7->8	8->9	9->10	10->11	11->12
2016	2017	98.5%	106.2%	102.0%	102.5%	100.9%	101.5%	96.6%	99.7%	102.4%	107.9%	102.7%	99.4%	97.4%
2017	2018	101.3%	102.7%	102.7%	102.1%	101.4%	100.8%	101.8%	101.8%	99.5%	109.0%	101.8%	92.6%	94.0%
2018	2019	96.6%	100.5%	105.2%	101.8%	101.0%	101.5%	101.0%	99.4%	100.8%	107.8%	101.6%	94.6%	97.3%
2019	2020	84.0%	97.1%	92.1%	91.6%	93.5%	95.6%	96.6%	97.7%	97.2%	109.0%	97.0%	95.9%	98.8%
2020	2021	97.7%	108.1%	105.0%	103.3%	102.9%	104.3%	105.0%	103.3%	103.9%	117.1%	97.3%	91.3%	96.3%
2021	2022	97.3%	111.0%	107.6%	101.4%	106.9%	104.8%	104.9%	103.9%	102.7%	115.4%	97.6%	95.1%	102.9%
2022	2023	97.6%	104.8%	100.4%	100.1%	102.5%	100.8%	101.6%	104.2%	103.1%	109.5%	95.8%	93.6%	101.8%
2023	2024	85.8%	109.5%	102.8%	103.9%	103.6%	102.6%	101.6%	103.0%	101.6%	116.4%	94.7%	93.2%	97.0%
2024	2025	92.1%	102.1%	98.8%	98.1%	97.8%	100.1%	98.8%	100.9%	99.2%	108.2%	94.7%	94.0%	98.2%
	average	94.53%	104.663%	101.83%	100.5%	101.16%	101.3%	100.9%	101.6%	101.2%	111.138%	98.135%	94.423%	98.166%
	standard deviation	5.627%	4.259%	4.245%	3.555%	3.552%	2.540%	2.902%	2.133%	2.050%	3.696%	2.942%	2.170%	2.582%

ENROLLMENT PROJECTIONS

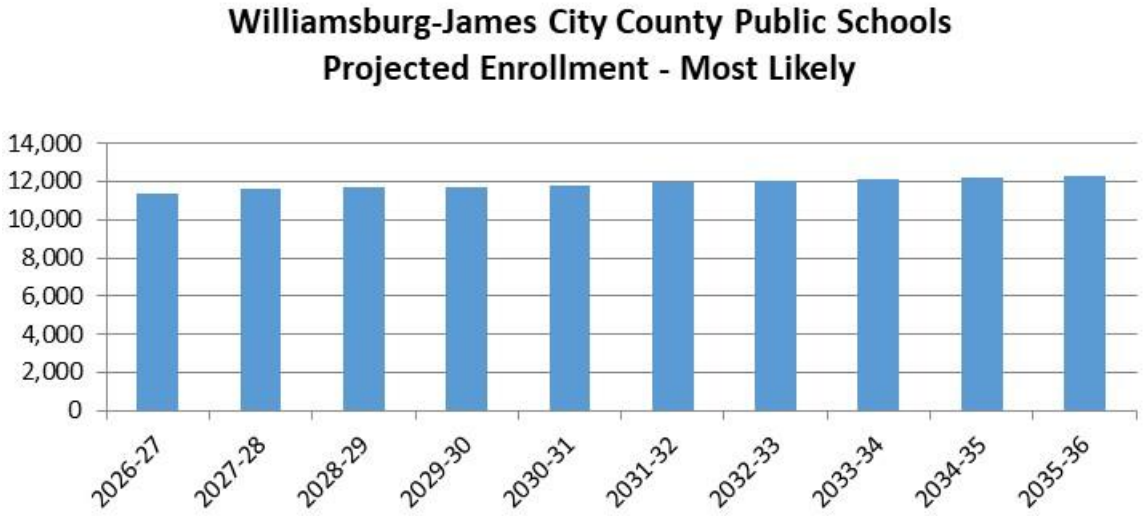
Following is the most likely ten-year projected enrollment. According to this projection, enrollment would increase 1,147 students in grades K–12 from the current 2025-26 enrollment of 11,146 to the 2035-36 projected enrollment of 12,293, an increase of approximately 10 percent.

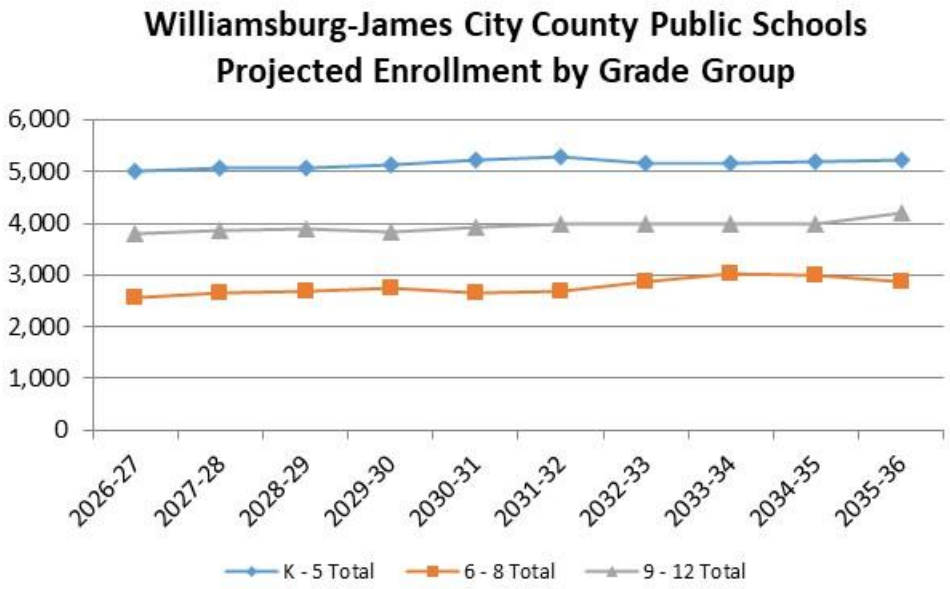
Williamsburg-James City County Public Schools
Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	889	795	753	773	787	787	787	787	787	787
1	798	943	842	797	821	838	838	838	838	838
2	762	821	968	867	822	842	860	860	860	860
3	817	784	843	996	889	843	867	883	883	883
4	855	840	808	869	1,026	916	868	892	910	910
5	886	880	861	829	893	1,052	941	891	916	936
K - 5 Total	**5,007**	**5,063**	**5,075**	**5,131**	**5,238**	**5,278**	**5,161**	**5,151**	**5,194**	**5,214**
6	833	904	888	866	836	912	1,067	953	903	929
7	871	859	931	914	891	860	939	1,099	983	930
8	872	891	879	953	934	911	879	961	1,124	1,004
6 - 8 Total	**2,576**	**2,654**	**2,698**	**2,733**	**2,661**	**2,683**	**2,885**	**3,013**	**3,010**	**2,863**
9	972	993	1,017	983	1,070	1,051	1,028	990	1,081	1,265
10	1,038	955	976	1,000	967	1,052	1,033	1,010	973	1,063
11	945	995	916	936	959	927	1,009	991	968	932
12	847	932	983	904	924	946	915	995	978	956
9 - 12 Total	**3,801**	**3,876**	**3,892**	**3,823**	**3,919**	**3,976**	**3,984**	**3,986**	**4,000**	**4,216**
K - 12 Total	**11,384**	**11,593**	**11,665**	**11,687**	**11,818**	**11,937**	**12,030**	**12,150**	**12,204**	**12,293**

Source: FutureThink

Williamsburg-James City County Public Schools





Historical & Projected Enrollment by School

The following charts illustrate the historical and most likely projected enrollment of each school in the Division.

Baker Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	83	79	86	72	55	75	93	68	81	71
1	79	94	78	86	70	57	81	92	66	77
2	91	76	96	83	78	76	61	78	88	68
3	95	89	74	91	86	82	84	61	73	84
4	80	96	84	74	85	86	88	88	66	65
5	100	79	97	85	69	93	86	88	83	69
Total	**528**	**513**	**515**	**491**	**443**	**469**	**493**	**475**	**457**	**434**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Baker Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	89	80	76	78	79	79	79	79	79	79
1	72	90	80	76	78	80	80	80	80	80
2	79	73	92	82	78	80	82	82	82	82
3	69	79	74	93	83	79	81	82	82	82
4	87	71	83	77	97	86	82	84	86	86
5	65	89	72	84	78	98	88	83	85	87
Total	**461**	**482**	**477**	**490**	**493**	**502**	**492**	**490**	**494**	**496**

Source: FutureThink

Williamsburg-James City County Public Schools

Laurel Lane Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	79	84	77	81	66	74	86	94	81	74
1	87	88	81	80	77	68	83	82	104	80
2	75	90	72	74	69	75	85	79	95	99
3	80	74	88	83	68	62	78	78	88	89
4	79	71	72	76	71	78	79	73	83	88
5	87	79	75	70	79	62	83	79	75	77
Total	**487**	**486**	**465**	**464**	**430**	**419**	**494**	**485**	**526**	**507**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Laurel Lane Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	98	87	83	85	87	87	87	87	87	87
1	77	101	90	85	88	90	90	90	90	90
2	79	76	99	89	84	86	88	88	88	88
3	101	80	76	100	89	84	87	88	88	88
4	90	102	81	78	101	90	86	88	90	90
5	89	92	104	83	79	103	92	87	90	92
Total	**534**	**538**	**533**	**520**	**528**	**540**	**530**	**528**	**533**	**535**

Source: FutureThink

Montague Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	91	72	80	71	75	71	83	87	70	85
1	73	87	77	84	73	75	83	88	97	72
2	75	81	90	84	82	84	84	87	87	96
3	68	74	91	91	68	91	82	83	96	76
4	79	82	81	92	87	81	93	87	80	95
5	75	86	84	84	79	105	89	88	85	82
Total	**461**	**482**	**503**	**506**	**464**	**507**	**514**	**520**	**515**	**506**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Montague Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	96	86	81	83	85	85	85	85	85	85
1	90	102	91	86	89	91	91	91	91	91
2	75	94	106	95	90	92	94	94	94	94
3	97	76	95	107	96	91	93	95	95	95
4	77	98	77	96	109	97	92	95	96	96
5	97	79	101	78	99	111	99	94	97	99
Total	**532**	**535**	**551**	**545**	**568**	**567**	**554**	**554**	**558**	**560**

Source: FutureThink

Williamsburg-James City County Public Schools

Norge Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	102	105	102	92	88	96	106	71	89	99
1	109	91	96	101	91	84	106	107	87	90
2	91	97	96	108	93	99	89	99	106	79
3	100	95	99	95	94	96	95	93	102	99
4	92	100	98	109	84	98	105	100	91	94
5	97	95	92	88	103	96	102	105	103	94
Total	**591**	**583**	**583**	**593**	**553**	**569**	**603**	**575**	**578**	**555**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Norge Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	111	99	94	96	98	98	98	98	98	98
1	102	113	101	96	99	100	100	100	100	100
2	89	102	113	101	96	98	100	100	100	100
3	81	91	105	116	103	98	101	103	103	103
4	103	84	94	108	119	107	101	104	106	106
5	98	106	86	96	111	123	110	104	107	109
Total	**584**	**595**	**593**	**613**	**626**	**624**	**610**	**609**	**614**	**616**

Source: FutureThink

Whaley Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	69	74	105	73	59	71	72	77	82	73
1	71	85	87	104	59	68	74	74	82	79
2	86	68	91	89	89	65	66	80	83	79
3	108	81	74	81	75	88	65	71	86	82
4	77	95	86	62	81	68	84	70	81	86
5	78	77	98	91	66	92	74	82	71	74
Total	**489**	**480**	**541**	**500**	**429**	**452**	**435**	**454**	**485**	**473**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Whaley Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	89	80	76	78	79	79	79	79	79	79
1	78	94	84	79	82	83	83	83	83	83
2	83	81	98	88	83	85	87	87	87	87
3	83	87	84	102	91	86	89	90	90	90
4	87	88	92	89	108	97	91	94	96	96
5	88	88	89	93	90	109	98	93	95	97
Total	**508**	**518**	**523**	**529**	**533**	**539**	**527**	**526**	**530**	**532**

Source: FutureThink

Williamsburg-James City County Public Schools

James River Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	80	68	70	72	67	69	78	71	57	69
1	77	85	57	69	76	75	75	78	76	54
2	74	75	94	62	63	77	84	76	78	76
3	78	83	75	93	61	62	71	81	79	87
4	103	80	79	74	88	55	65	71	83	77
5	90	107	73	84	73	82	58	68	76	82
Total	**502**	**498**	**448**	**454**	**428**	**420**	**431**	**445**	**449**	**445**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

James River Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	85	76	72	74	75	75	75	75	75	75
1	69	87	78	74	76	78	78	78	78	78
2	54	71	89	80	76	78	79	79	79	79
3	78	56	73	92	82	78	80	82	82	82
4	88	80	57	74	94	84	79	81	83	83
5	79	92	82	59	77	97	87	82	84	86
Total	**453**	**462**	**451**	**453**	**480**	**490**	**478**	**477**	**481**	**483**

Source: FutureThink

Stonehouse Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	119	97	116	133	106	139	116	114	120	126
1	110	129	106	113	127	117	156	129	127	130
2	112	126	140	112	113	131	132	161	135	135
3	117	118	129	141	111	115	142	139	159	140
4	132	119	126	137	134	116	134	143	150	158
5	137	134	128	128	127	140	122	141	147	152
Total	**727**	**723**	**745**	**764**	**718**	**758**	**802**	**827**	**838**	**841**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Stonehouse Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	140	125	118	122	124	124	124	124	124	124
1	139	155	139	131	135	138	138	138	138	138
2	138	148	165	148	140	144	147	147	147	147
3	142	145	155	173	155	147	151	154	154	154
4	146	147	151	161	180	161	153	157	160	160
5	163	151	152	156	167	187	167	158	162	166
Total	**868**	**871**	**880**	**891**	**901**	**901**	**880**	**878**	**885**	**889**

Source: FutureThink

Williamsburg-James City County Public Schools

Matoaka Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	103	115	107	111	84	97	90	80	82	84
1	117	112	132	109	113	105	106	105	95	91
2	123	127	117	135	103	112	102	98	96	97
3	133	127	124	133	125	114	110	94	105	101
4	131	141	125	133	122	121	114	110	95	107
5	123	132	140	139	127	126	121	114	122	93
Total	**730**	**754**	**745**	**760**	**674**	**675**	**643**	**601**	**595**	**573**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Matoaka Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	98	88	83	85	87	87	87	87	87	87
1	96	112	100	95	97	99	99	99	99	99
2	90	96	112	100	95	97	99	99	99	99
3	100	93	99	116	103	98	101	103	103	103
4	103	103	95	102	119	106	100	103	105	105
5	108	104	104	97	103	120	107	102	105	107
Total	**595**	**596**	**593**	**595**	**604**	**607**	**593**	**593**	**598**	**600**

Source: FutureThink

Blayton Elementary School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
K	87	76	64	83	70	71	62	71	65	70
1	69	92	77	65	79	75	83	69	69	69
2	81	68	90	85	57	84	76	92	79	64
3	81	87	71	94	74	62	87	80	95	73
4	95	84	89	76	91	81	63	92	79	94
5	100	92	88	84	73	83	87	67	94	86
Total	**513**	**499**	**479**	**487**	**444**	**456**	**458**	**471**	**481**	**456**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Blayton Elementary School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	83	74	70	72	73	73	73	73	73	73
1	75	89	79	75	77	79	79	79	79	79
2	75	80	94	84	80	82	84	84	84	84
3	66	77	82	97	87	82	84	86	86	86
4	74	67	78	84	99	88	84	86	88	88
5	99	79	71	83	89	104	93	88	91	93
Total	**472**	**466**	**474**	**495**	**505**	**508**	**497**	**496**	**501**	**503**

Source: FutureThink

Williamsburg-James City County Public Schools

Berkeley Middle School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
6	288	313	192	232	202	207	227	204	207	206
7	280	283	216	194	210	195	214	235	219	223
8	292	285	188	207	187	229	211	226	240	218
Total	**860**	**881**	**596**	**633**	**599**	**631**	**652**	**665**	**666**	**647**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Berkeley Middle School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	202	219	215	210	203	221	259	231	219	225
7	219	215	233	229	223	216	235	275	246	233
8	233	229	225	244	239	233	225	246	288	257
Total	**654**	**663**	**673**	**683**	**665**	**670**	**719**	**752**	**753**	**715**

Source: FutureThink

Toano Middle School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
6	275	262	232	207	190	210	235	215	228	237
7	275	276	230	245	195	203	233	250	220	219
8	276	278	239	226	243	203	210	235	256	225
Total	**826**	**816**	**701**	**678**	**628**	**616**	**678**	**700**	**704**	**681**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Toano Middle School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	220	239	235	229	221	241	282	252	239	246
7	242	225	244	240	234	225	246	288	258	244
8	221	245	228	247	242	236	228	249	291	260
Total	**683**	**709**	**707**	**716**	**697**	**702**	**756**	**789**	**788**	**750**

Source: FutureThink

Williamsburg-James City County Public Schools

Hornsby Middle School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
6	316	282	270	279	262	248	278	262	248	244
7	331	317	244	262	279	264	248	287	263	253
8	295	344	280	268	254	281	264	258	294	263
Total	**942**	**943**	**794**	**809**	**795**	**793**	**790**	**807**	**805**	**760**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Hornsby Middle School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	253	275	270	263	254	277	324	290	274	282
7	248	258	279	274	267	258	282	330	295	279
8	260	255	265	287	282	275	265	290	339	303
Total	**761**	**788**	**814**	**824**	**803**	**810**	**871**	**910**	**908**	**864**

Source: FutureThink

James Blair Middle School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
6				166	170	171	182	154	162	159
7				191	180	189	174	189	158	158
8				178	183	185	189	177	186	147
Total				**535**	**533**	**545**	**545**	**520**	**506**	**464**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

James Blair Middle School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	158	171	168	164	158	173	202	180	171	176
7	162	161	175	171	167	161	176	206	184	174
8	158	162	161	175	171	167	161	176	206	184
Total	**478**	**494**	**504**	**510**	**496**	**501**	**539**	**562**	**561**	**534**

Source: FutureThink

Williamsburg-James City County Public Schools

Lafayette High School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
9	290	284	287	273	283	309	362	307	333	312
10	318	287	295	306	258	295	314	353	301	321
11	291	289	263	285	310	247	272	307	324	258
12	253	270	267	249	272	286	265	282	293	308
Total	**1,152**	**1,130**	**1,112**	**1,113**	**1,123**	**1,137**	**1,213**	**1,249**	**1,251**	**1,199**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Lafayette High School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	309	316	323	313	339	333	324	313	342	400
10	309	306	313	320	310	336	329	321	310	339
11	306	294	291	298	305	295	320	314	306	295
12	244	289	278	275	281	288	279	302	296	289
Total	**1,168**	**1,205**	**1,205**	**1,206**	**1,235**	**1,252**	**1,252**	**1,250**	**1,254**	**1,323**

Source: FutureThink

Jamestown High School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
9	346	307	336	324	330	341	346	332	325	354
10	321	362	307	339	320	290	309	311	314	316
11	323	333	330	296	311	287	284	284	305	307
12	338	315	323	330	296	319	293	305	300	313
Total	**1,328**	**1,317**	**1,296**	**1,289**	**1,257**	**1,237**	**1,232**	**1,232**	**1,244**	**1,290**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Jamestown High School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	322	330	337	326	354	347	339	327	357	418
10	344	313	320	327	317	344	337	329	317	347
11	306	333	304	310	318	307	333	327	319	308
12	319	318	346	315	322	329	319	346	339	331
Total	**1,291**	**1,294**	**1,307**	**1,278**	**1,311**	**1,327**	**1,328**	**1,329**	**1,332**	**1,404**

Source: FutureThink

Warhill High School

Historical Enrollment

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
9	372	340	366	343	345	365	328	318	385	390
10	326	386	346	360	334	347	368	328	291	351
11	304	337	365	316	343	299	330	337	296	287
12	293	309	311	353	318	323	299	315	307	287
Total	**1,295**	**1,372**	**1,388**	**1,372**	**1,340**	**1,334**	**1,325**	**1,298**	**1,279**	**1,315**

Source: Williamsburg-James City County Public Schools, 9/30/25 Count

Warhill High School

Projected Enrollment - Most Likely

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	345	353	361	349	379	372	362	350	382	447
10	385	341	348	356	345	374	367	358	345	377
11	335	367	325	332	340	329	357	350	341	329
12	281	328	359	318	325	332	322	349	342	334
Total	**1,346**	**1,389**	**1,393**	**1,355**	**1,389**	**1,407**	**1,408**	**1,407**	**1,410**	**1,487**

Source: FutureThink

In addition to the most likely enrollment projection presented in this report, following are low, moderate, and high enrollment projections developed based on the cohort survival method. Historically, the most likely projections have fallen between the moderate and high projections. The following defines, in terms of economy and housing, the differences between the projections.

Low Projection

- Higher inflation/interest rates
- Decline in new housing and births

Moderate Projection

- Moderate inflation/interest rates
- Moderate level of new housing & births remain steady

High Projection

- Low inflation/interest rates
- High level of new housing & increase in births

The most likely projection falls fairly equally between the moderate and high projections. The projections range from a low of 10,339 students to a high of 13,022 students in the 2035-36 school year.

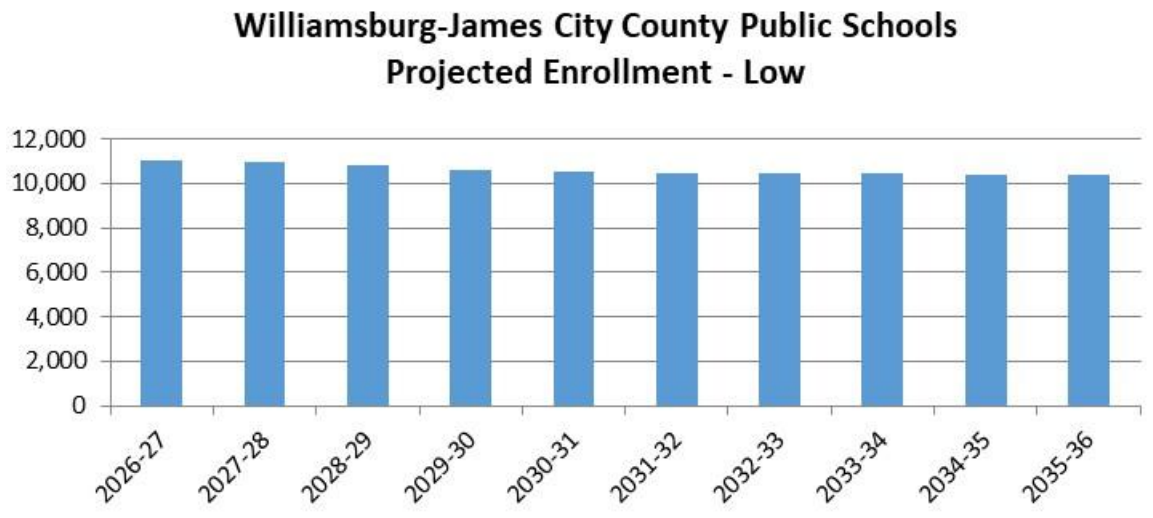
Low Projection

According to this projection, enrollment would decrease 807 students in grades K–12 from the current 2025-26 enrollment of 11,146 to the 2035-36 projected enrollment of 10,339, a decrease of 7 percent.

Williamsburg-James City County Public Schools
Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	844	756	716	735	749	749	749	749	749	749
1	783	880	788	744	766	781	781	781	781	781
2	745	785	881	791	747	767	784	784	784	784
3	793	743	785	880	788	745	767	783	783	783
4	828	789	740	781	878	784	743	765	780	780
5	866	830	793	743	787	881	789	746	768	784
K - 5 Total	**4,859**	**4,783**	**4,703**	**4,674**	**4,715**	**4,707**	**4,613**	**4,608**	**4,645**	**4,661**
6	805	865	830	792	743	783	908	811	768	790
7	852	810	871	837	798	748	789	914	818	774
8	847	847	805	866	831	792	744	784	907	812
6 - 8 Total	**2,504**	**2,522**	**2,506**	**2,495**	**2,372**	**2,323**	**2,441**	**2,509**	**2,493**	**2,376**
9	940	938	942	890	956	920	876	823	866	1,004
10	1,002	893	891	894	845	909	873	832	782	823
11	919	932	831	829	832	787	846	812	774	727
12	824	886	901	801	800	804	760	816	784	748
9 - 12 Total	**3,685**	**3,649**	**3,565**	**3,414**	**3,433**	**3,420**	**3,355**	**3,283**	**3,206**	**3,302**
K - 12 Total	**11,048**	**10,954**	**10,774**	**10,583**	**10,520**	**10,450**	**10,409**	**10,400**	**10,344**	**10,339**

Source: FutureThink



Baker Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	84	75	71	73	75	75	75	75	75	75
1	70	84	75	71	73	74	74	74	74	74
2	77	70	83	75	71	73	74	74	74	74
3	67	76	69	82	73	69	71	73	73	73
4	83	66	75	68	81	72	69	71	72	72
5	64	83	66	75	69	81	73	69	71	72
Total	**445**	**454**	**439**	**444**	**442**	**444**	**436**	**436**	**439**	**440**

Source: FutureThink

Laurel Lane Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	89	80	76	78	79	79	79	79	79	79
1	77	91	82	77	79	81	81	81	81	81
2	78	73	87	78	74	76	78	78	78	78
3	96	75	71	84	75	71	73	75	75	75
4	86	93	72	68	81	72	68	70	72	72
5	87	86	93	72	68	81	72	68	70	72
Total	**513**	**498**	**481**	**457**	**456**	**460**	**451**	**451**	**455**	**457**

Source: FutureThink

Montague Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	91	82	77	79	81	81	81	81	81	81
1	88	95	85	80	83	84	84	84	84	84
2	73	89	96	86	81	83	85	85	85	85
3	95	72	88	95	85	80	83	84	84	84
4	75	94	71	87	94	84	79	82	83	83
5	94	75	93	71	87	93	83	79	81	83
Total	**516**	**507**	**510**	**498**	**511**	**505**	**495**	**495**	**498**	**500**

Source: FutureThink

Norge Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	106	95	90	92	94	94	94	94	94	94
1	101	106	95	90	93	95	95	95	95	95
2	87	98	104	93	88	90	92	92	92	92
3	79	86	97	103	92	87	90	92	92	92
4	99	78	85	96	102	91	86	89	91	91
5	96	100	79	86	97	103	92	87	90	92
Total	**568**	**563**	**550**	**560**	**566**	**560**	**549**	**549**	**554**	**556**

Source: FutureThink

Whaley Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	86	77	73	75	76	76	76	76	76	76
1	76	88	79	74	76	78	78	78	78	78
2	81	77	89	80	75	77	79	79	79	79
3	79	80	76	88	79	75	77	78	78	78
4	83	80	82	77	90	80	76	78	80	80
5	84	80	78	79	75	87	77	73	75	77
Total	**489**	**482**	**477**	**473**	**471**	**473**	**463**	**462**	**466**	**468**

Source: FutureThink

James River Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	79	71	67	69	70	70	70	70	70	70
1	67	79	71	67	69	70	70	70	70	70
2	53	67	79	71	67	69	70	70	70	70
3	77	54	68	80	72	68	70	71	71	71
4	87	76	53	67	80	71	68	70	71	71
5	77	88	78	54	69	81	73	69	71	72
Total	**440**	**435**	**416**	**408**	**427**	**429**	**421**	**420**	**423**	**424**

Source: FutureThink

Stonehouse Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	136	121	115	118	120	120	120	120	120	120
1	138	150	134	127	130	133	133	133	133	133
2	137	145	157	141	133	137	140	140	140	140
3	139	141	150	162	145	137	141	144	144	144
4	141	140	142	151	163	146	138	142	145	145
5	161	143	143	144	153	166	149	141	145	148
Total	**852**	**840**	**841**	**843**	**844**	**839**	**821**	**820**	**827**	**830**

Source: FutureThink

Matoaka Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	94	84	80	82	83	83	83	83	83	83
1	92	103	92	87	90	92	92	92	92	92
2	87	90	100	90	85	87	89	89	89	89
3	97	87	90	100	90	85	87	89	89	89
4	100	97	87	90	100	90	85	87	89	89
5	107	100	97	87	90	100	90	85	87	89
Total	**577**	**561**	**546**	**536**	**538**	**537**	**526**	**525**	**529**	**531**

Source: FutureThink

Williamsburg-James City County Public Schools

Blayton Elementary School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	79	71	67	69	71	71	71	71	71	71
1	74	84	75	71	73	74	74	74	74	74
2	72	76	86	77	73	75	77	77	77	77
3	64	72	76	86	77	73	75	77	77	77
4	74	65	73	77	87	78	74	76	77	77
5	96	75	66	75	79	89	80	75	78	79
Total	**459**	**443**	**443**	**455**	**460**	**460**	**451**	**450**	**454**	**455**

Source: FutureThink

Berkeley Middle School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	197	212	203	194	182	192	222	199	188	193
7	213	204	219	211	201	188	199	230	206	195
8	223	214	204	220	211	201	189	199	230	206
Total	**633**	**630**	**626**	**625**	**594**	**581**	**610**	**628**	**624**	**594**

Source: FutureThink

Toano Middle School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	214	229	221	210	197	208	241	215	204	210
7	235	211	227	218	208	195	206	238	213	202
8	219	235	211	227	218	208	195	206	238	213
Total	**668**	**675**	**659**	**655**	**623**	**611**	**642**	**659**	**655**	**625**

Source: FutureThink

Hornsby Middle School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	244	262	251	240	225	237	275	245	232	239
7	244	244	262	252	240	225	237	275	246	233
8	253	244	244	262	252	240	225	237	275	246
Total	**741**	**750**	**757**	**754**	**717**	**702**	**737**	**757**	**753**	**718**

Source: FutureThink

James Blair Middle School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	150	162	155	148	139	146	170	152	144	148
7	160	151	163	156	149	140	147	171	153	144
8	152	154	146	157	150	143	135	142	164	147
Total	**462**	**467**	**464**	**461**	**438**	**429**	**452**	**465**	**461**	**439**

Source: FutureThink

Williamsburg-James City County Public Schools

Lafayette High School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	296	296	297	281	301	290	276	259	273	316
10	303	287	287	288	272	293	281	268	252	265
11	296	279	265	265	266	251	270	259	247	232
12	240	275	260	246	246	247	234	251	241	230
Total	**1,135**	**1,137**	**1,109**	**1,080**	**1,085**	**1,081**	**1,061**	**1,037**	**1,013**	**1,043**

Source: FutureThink

Jamestown High School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	312	311	312	295	317	305	291	273	287	333
10	332	293	292	293	277	298	286	273	256	270
11	303	319	281	280	281	266	286	275	262	246
12	312	308	324	285	285	286	270	290	279	266
Total	**1,259**	**1,231**	**1,209**	**1,153**	**1,160**	**1,155**	**1,133**	**1,111**	**1,084**	**1,115**

Source: FutureThink

Warhill High School

Projected Enrollment - Low

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	332	331	333	314	338	325	309	291	306	355
10	367	313	312	313	296	318	306	291	274	288
11	320	334	285	284	285	270	290	278	265	249
12	272	303	317	270	269	271	256	275	264	252
Total	**1,291**	**1,281**	**1,247**	**1,181**	**1,188**	**1,184**	**1,161**	**1,135**	**1,109**	**1,144**

Source: FutureThink

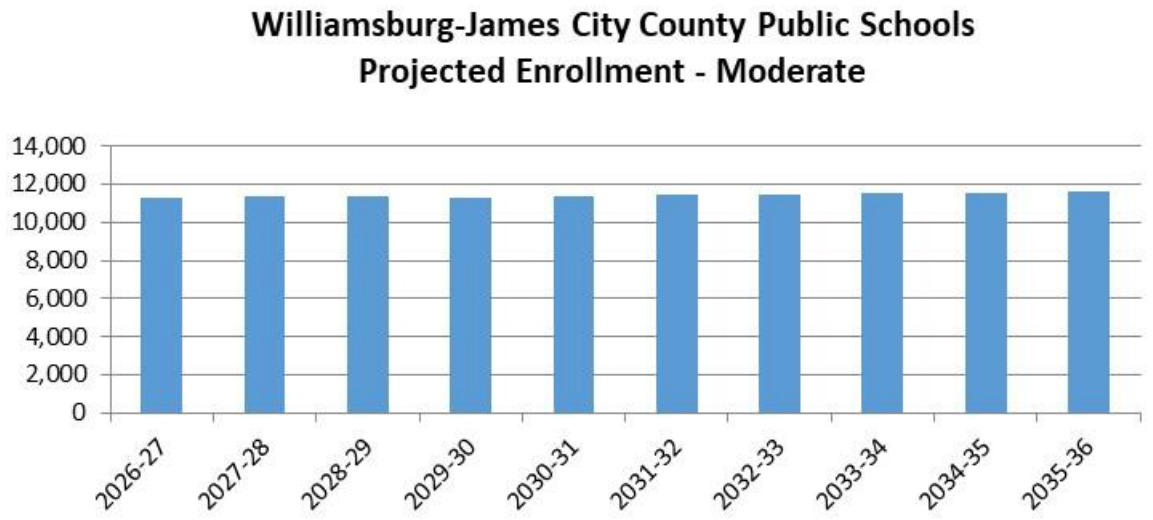
Moderate Projection

According to this projection, enrollment would increase 463 students in grades K–12 from the current 2025-26 enrollment of 11,146 to the 2035-36 projected enrollment of 11,609, an increase of approximately 4 percent.

Williamsburg-James City County Public Schools
Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	874	783	742	762	776	776	776	776	776	776
1	792	922	825	781	803	818	818	818	818	818
2	757	808	939	841	795	819	837	837	837	837
3	809	771	824	957	858	810	835	851	851	851
4	847	826	788	842	978	875	827	851	868	868
5	881	863	843	803	858	997	891	844	868	885
K - 5 Total	**4,960**	**4,973**	**4,961**	**4,986**	**5,068**	**5,095**	**4,984**	**4,977**	**5,018**	**5,035**
6	821	889	867	841	807	868	1,009	903	854	878
7	869	845	915	892	865	828	892	1,038	928	879
8	868	884	860	930	907	879	843	907	1,054	943
6 - 8 Total	**2,558**	**2,618**	**2,642**	**2,663**	**2,579**	**2,575**	**2,744**	**2,848**	**2,836**	**2,700**
9	954	967	984	951	1,028	1,003	972	932	1,004	1,167
10	1,025	926	939	957	923	999	974	945	905	974
11	936	971	877	889	905	874	945	922	894	857
12	836	915	951	859	870	887	856	926	903	876
9 - 12 Total	**3,751**	**3,779**	**3,751**	**3,656**	**3,726**	**3,763**	**3,747**	**3,725**	**3,706**	**3,874**
K - 12 Total	**11,269**	**11,370**	**11,354**	**11,305**	**11,373**	**11,433**	**11,475**	**11,550**	**11,560**	**11,609**

Source: FutureThink



Williamsburg-James City County Public Schools

Baker Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	88	79	75	77	78	78	78	78	78	78
1	71	88	79	75	77	78	78	78	78	78
2	77	71	88	79	75	77	79	79	79	79
3	68	77	71	88	79	75	77	79	79	79
4	85	69	79	72	90	80	76	78	80	80
5	65	86	70	79	73	91	81	77	79	81
Total	**454**	**470**	**462**	**470**	**472**	**479**	**469**	**469**	**473**	**475**

Source: FutureThink

Laurel Lane Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	97	87	82	85	86	86	86	86	86	86
1	77	100	89	85	87	89	89	89	89	89
2	79	76	98	88	83	85	87	87	87	87
3	100	80	76	98	88	83	86	87	87	87
4	90	101	80	77	99	89	84	86	88	88
5	88	90	102	81	77	100	89	85	87	89
Total	**531**	**534**	**527**	**514**	**520**	**532**	**521**	**520**	**524**	**526**

Source: FutureThink

Montague Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	94	84	80	82	83	83	83	83	83	83
1	90	100	89	84	87	88	88	88	88	88
2	75	93	103	92	87	90	92	92	92	92
3	97	75	94	104	93	88	91	93	93	93
4	76	97	76	95	105	94	89	91	93	93
5	96	77	99	77	96	106	95	90	92	94
Total	**528**	**526**	**541**	**534**	**551**	**549**	**538**	**537**	**541**	**543**

Source: FutureThink

Norge Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	108	97	92	94	96	96	96	96	96	96
1	101	109	98	93	95	97	97	97	97	97
2	89	100	109	97	92	95	97	97	97	97
3	80	90	102	110	99	93	96	98	98	98
4	102	82	92	104	113	101	95	98	100	100
5	97	104	84	94	106	115	103	97	100	102
Total	**577**	**582**	**577**	**592**	**601**	**597**	**584**	**583**	**588**	**590**

Source: FutureThink

Whaley Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	89	79	75	77	79	79	79	79	79	79
1	77	93	83	78	81	82	82	82	82	82
2	82	79	95	85	81	83	85	85	85	85
3	83	85	82	99	88	83	86	87	87	87
4	86	87	89	86	103	92	87	90	91	91
5	87	86	87	89	86	103	92	87	90	91
Total	**504**	**509**	**511**	**514**	**518**	**522**	**511**	**510**	**514**	**515**

Source: FutureThink

James River Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	82	74	70	72	73	73	73	73	73	73
1	68	84	75	71	73	75	75	75	75	75
2	54	69	85	76	72	74	76	76	76	76
3	77	55	71	87	78	74	76	77	77	77
4	88	78	55	72	88	78	74	76	78	78
5	78	90	81	57	74	90	81	76	79	80
Total	**447**	**450**	**437**	**435**	**458**	**464**	**455**	**453**	**458**	**459**

Source: FutureThink

Stonehouse Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	138	124	117	120	123	123	123	123	123	123
1	139	153	137	130	133	136	136	136	136	136
2	138	147	162	145	137	141	144	144	144	144
3	140	143	152	169	151	143	147	150	150	150
4	145	146	149	158	175	157	148	153	156	156
5	163	150	150	153	163	180	161	153	157	160
Total	**863**	**863**	**867**	**875**	**882**	**880**	**859**	**859**	**866**	**869**

Source: FutureThink

Matoaka Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	97	86	82	84	86	86	86	86	86	86
1	95	109	98	92	95	97	97	97	97	97
2	90	95	109	98	92	95	97	97	97	97
3	99	92	97	111	100	94	97	99	99	99
4	101	100	93	98	113	101	96	98	100	100
5	108	102	101	94	99	114	102	96	99	101
Total	**590**	**584**	**580**	**577**	**585**	**587**	**575**	**573**	**578**	**580**

Source: FutureThink

Williamsburg-James City County Public Schools

Blayton Elementary School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	81	73	69	71	72	72	72	72	72	72
1	74	86	77	73	75	76	76	76	76	76
2	73	78	90	81	76	79	80	80	80	80
3	65	74	79	91	82	77	79	81	81	81
4	74	66	75	80	92	83	78	81	82	82
5	99	78	69	79	84	98	87	83	85	87
Total	**466**	**455**	**459**	**475**	**481**	**485**	**472**	**473**	**476**	**478**

Source: FutureThink

Berkeley Middle School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	201	218	213	206	198	213	247	221	209	215
7	217	212	230	224	217	208	224	261	233	221
8	231	225	220	238	232	225	215	232	270	241
Total	**649**	**655**	**663**	**668**	**647**	**646**	**686**	**714**	**712**	**677**

Source: FutureThink

Toano Middle School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	218	236	230	224	214	231	268	240	227	233
7	244	225	243	237	230	220	237	276	247	234
8	222	247	228	247	241	233	224	241	280	250
Total	**684**	**708**	**701**	**708**	**685**	**684**	**729**	**757**	**754**	**717**

Source: FutureThink

Hornsby Middle School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	249	270	263	255	245	263	306	274	259	267
7	247	253	274	267	259	248	267	311	278	263
8	259	253	259	280	273	265	254	273	317	284
Total	**755**	**776**	**796**	**802**	**777**	**776**	**827**	**858**	**854**	**814**

Source: FutureThink

James Blair Middle School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	153	165	161	156	150	161	188	168	159	163
7	161	155	168	164	159	152	164	190	170	161
8	156	159	153	165	161	156	150	161	187	168
Total	**470**	**479**	**482**	**485**	**470**	**469**	**502**	**519**	**516**	**492**

Source: FutureThink

Williamsburg-James City County Public Schools

Lafayette High School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	298	302	307	297	321	313	303	291	313	364
10	306	292	296	302	291	315	307	298	285	307
11	301	287	274	278	283	273	295	288	279	268
12	243	283	270	258	261	266	257	278	271	263
Total	**1,148**	**1,164**	**1,147**	**1,135**	**1,156**	**1,167**	**1,162**	**1,155**	**1,148**	**1,202**

Source: FutureThink

Jamestown High School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	318	322	328	317	343	334	324	311	335	389
10	339	305	309	315	304	329	321	311	298	321
11	305	327	294	298	303	293	317	309	300	287
12	316	313	336	302	306	312	301	326	318	308
Total	**1,278**	**1,267**	**1,267**	**1,232**	**1,256**	**1,268**	**1,263**	**1,257**	**1,251**	**1,305**

Source: FutureThink

Warhill High School

Projected Enrollment - Moderate

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	338	343	349	337	364	356	345	330	356	414
10	380	329	334	340	328	355	346	336	322	346
11	330	357	309	313	319	308	333	325	315	302
12	277	319	345	299	303	309	298	322	314	305
Total	**1,325**	**1,348**	**1,337**	**1,289**	**1,314**	**1,328**	**1,322**	**1,313**	**1,307**	**1,367**

Source: FutureThink

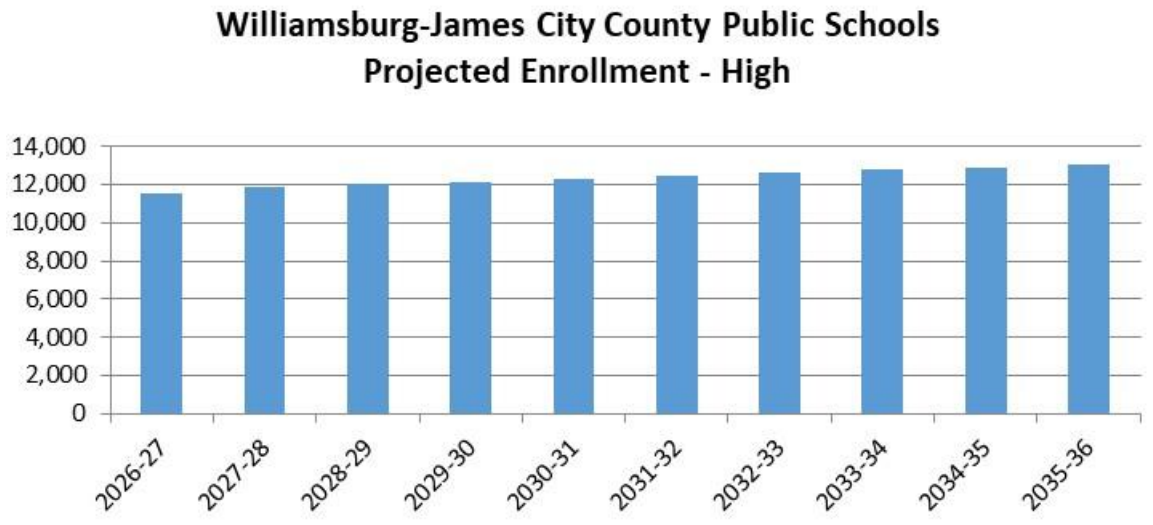
High Projection

According to this projection, enrollment would increase 1,876 students in grades K–12 from the current 2025-26 enrollment of 11,146 to the 2035-36 projected enrollment of 13,022, an increase of approximately 17 percent.

Williamsburg-James City County Public Schools
Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	902	806	762	786	799	799	799	799	799	799
1	806	964	860	816	840	858	858	858	858	858
2	768	832	999	889	844	868	885	885	885	885
3	824	795	863	1,032	922	874	901	917	917	917
4	864	854	828	897	1,074	960	908	936	954	954
5	892	894	883	856	927	1,111	993	938	966	986
K - 5 Total	**5,056**	**5,145**	**5,195**	**5,276**	**5,406**	**5,470**	**5,344**	**5,333**	**5,379**	**5,399**
6	845	920	908	890	865	959	1,128	1,009	956	982
7	885	883	962	949	931	905	1,003	1,180	1,054	998
8	881	914	912	993	980	961	934	1,035	1,217	1,088
6 - 8 Total	**2,611**	**2,717**	**2,782**	**2,832**	**2,776**	**2,825**	**3,065**	**3,224**	**3,227**	**3,068**
9	999	1,024	1,052	1,021	1,112	1,097	1,075	1,046	1,159	1,364
10	1,050	993	1,018	1,046	1,015	1,105	1,091	1,069	1,040	1,152
11	958	1,019	963	988	1,016	985	1,073	1,059	1,037	1,009
12	847	951	1,012	956	980	1,008	978	1,065	1,050	1,030
9 - 12 Total	**3,854**	**3,987**	**4,045**	**4,011**	**4,123**	**4,195**	**4,217**	**4,239**	**4,286**	**4,555**
K - 12 Total	**11,521**	**11,849**	**12,022**	**12,119**	**12,305**	**12,490**	**12,626**	**12,796**	**12,892**	**13,022**

Source: FutureThink



Baker Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	90	81	77	79	80	80	80	80	80	80
1	72	92	82	78	80	82	82	82	82	82
2	80	75	96	85	81	83	85	85	85	85
3	69	81	76	97	87	82	85	86	86	86
4	89	74	87	81	104	93	88	90	92	92
5	65	91	75	88	83	106	94	89	92	94
Total	**465**	**494**	**493**	**508**	**515**	**526**	**514**	**512**	**517**	**519**

Source: FutureThink

Laurel Lane Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	99	88	83	86	88	88	88	88	88	88
1	78	102	91	86	89	91	91	91	91	91
2	79	76	100	89	85	87	89	89	89	89
3	101	80	77	101	90	85	88	90	90	90
4	91	103	82	79	103	92	87	90	92	92
5	90	94	107	85	81	107	95	90	93	95
Total	**538**	**543**	**540**	**526**	**536**	**550**	**538**	**538**	**543**	**545**

Source: FutureThink

Montague Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	98	87	83	85	87	87	87	87	87	87
1	91	104	93	88	91	93	93	93	93	93
2	75	95	109	97	92	95	96	96	96	96
3	97	76	96	110	98	93	96	97	97	97
4	78	99	78	98	113	101	95	98	100	100
5	98	81	103	80	101	116	104	98	101	103
Total	**537**	**542**	**562**	**558**	**582**	**585**	**571**	**569**	**574**	**576**

Source: FutureThink

Norge Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	113	101	95	98	100	100	100	100	100	100
1	104	117	104	99	102	104	104	104	104	104
2	89	104	117	104	99	102	104	104	104	104
3	82	92	108	121	108	103	106	108	108	108
4	104	85	96	112	126	113	107	110	112	112
5	98	107	88	99	116	130	117	110	113	116
Total	**590**	**606**	**608**	**633**	**651**	**652**	**638**	**636**	**641**	**644**

Source: FutureThink

Whaley Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	90	81	77	79	80	80	80	80	80	80
1	78	95	85	81	83	85	85	85	85	85
2	85	82	101	90	85	88	89	89	89	89
3	84	89	86	105	94	89	92	94	94	94
4	88	90	95	93	113	101	96	99	101	101
5	89	91	92	98	95	116	104	98	101	103
Total	**514**	**528**	**536**	**546**	**550**	**559**	**546**	**545**	**550**	**552**

Source: FutureThink

James River Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	87	78	73	76	77	77	77	77	77	77
1	70	91	81	77	79	80	80	80	80	80
2	55	72	94	84	79	81	83	83	83	83
3	79	57	75	97	87	82	85	86	86	86
4	89	81	58	77	100	89	84	87	88	88
5	79	93	84	61	80	104	93	88	90	92
Total	**459**	**472**	**465**	**472**	**502**	**513**	**502**	**501**	**504**	**506**

Source: FutureThink

Stonehouse Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	141	126	119	123	125	125	125	125	125	125
1	140	157	141	133	137	140	140	140	140	140
2	139	149	168	150	142	146	149	149	149	149
3	143	147	158	178	159	151	155	158	158	158
4	146	149	153	164	186	166	157	162	165	165
5	164	152	155	159	171	193	173	163	168	171
Total	**873**	**880**	**894**	**907**	**920**	**921**	**899**	**897**	**905**	**908**

Source: FutureThink

Matoaka Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	100	89	84	87	88	88	88	88	88	88
1	97	115	102	97	100	102	102	102	102	102
2	90	97	115	102	97	100	102	102	102	102
3	102	94	101	120	107	102	105	107	107	107
4	104	105	98	105	124	111	105	108	111	111
5	109	106	107	100	107	127	113	107	111	113
Total	**602**	**606**	**607**	**611**	**623**	**630**	**615**	**614**	**621**	**623**

Source: FutureThink

Williamsburg-James City County Public Schools

Blayton Elementary School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
K	84	75	71	73	74	74	74	74	74	74
1	76	91	81	77	79	81	81	81	81	81
2	76	82	99	88	84	86	88	88	88	88
3	67	79	86	103	92	87	89	91	91	91
4	75	68	81	88	105	94	89	92	93	93
5	100	79	72	86	93	112	100	95	97	99
Total	**478**	**474**	**490**	**515**	**527**	**534**	**521**	**521**	**524**	**526**

Source: FutureThink

Berkeley Middle School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	203	221	218	214	208	231	271	243	230	236
7	221	218	237	234	230	223	247	291	260	246
8	235	233	230	250	247	242	235	261	307	274
Total	**659**	**672**	**685**	**698**	**685**	**696**	**753**	**795**	**797**	**756**

Source: FutureThink

Toano Middle School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	222	242	239	234	228	252	297	265	251	258
7	252	236	257	254	249	242	268	316	282	267
8	224	257	241	263	259	254	247	274	322	288
Total	**698**	**735**	**737**	**751**	**736**	**748**	**812**	**855**	**855**	**813**

Source: FutureThink

Hornsby Middle School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	257	280	276	271	263	292	343	307	291	299
7	249	262	286	282	276	269	298	350	313	296
8	262	258	271	295	292	286	278	308	362	324
Total	**768**	**800**	**833**	**848**	**831**	**847**	**919**	**965**	**966**	**919**

Source: FutureThink

James Blair Middle School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
6	163	177	175	171	166	184	217	194	184	189
7	163	167	182	179	176	171	190	223	199	189
8	160	166	170	185	182	179	174	192	226	202
Total	**486**	**510**	**527**	**535**	**524**	**534**	**581**	**609**	**609**	**580**

Source: FutureThink

Williamsburg-James City County Public Schools

Lafayette High School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	320	328	337	327	356	351	344	335	371	437
10	312	320	328	337	327	356	351	344	335	371
11	310	302	309	317	326	316	344	340	333	324
12	245	295	287	294	302	310	301	328	323	317
Total	**1,187**	**1,245**	**1,261**	**1,275**	**1,311**	**1,333**	**1,340**	**1,347**	**1,362**	**1,449**

Source: FutureThink

Jamestown High School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	327	335	344	334	364	359	352	342	379	446
10	348	321	329	338	328	357	353	346	336	372
11	308	339	313	321	330	320	349	344	337	328
12	321	323	355	328	336	346	335	365	360	353
Total	**1,304**	**1,318**	**1,341**	**1,321**	**1,358**	**1,382**	**1,389**	**1,397**	**1,412**	**1,499**

Source: FutureThink

Warhill High School

Projected Enrollment - High

Grade	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36
9	352	361	371	360	392	387	379	369	409	481
10	390	352	361	371	360	392	387	379	369	409
11	340	378	341	350	360	349	380	375	367	357
12	281	333	370	334	342	352	342	372	367	360
Total	**1,363**	**1,424**	**1,443**	**1,415**	**1,454**	**1,480**	**1,488**	**1,495**	**1,512**	**1,607**

Source: FutureThink

CONCLUSION

The enrollment projections presented in this report were developed using the cohort-survival methodology while incorporating housing and geographic information system data.

As with any projection, the Division should pay close attention to live birth counts, enrollment in elementary schools, and housing starts. Each of these factors will have an impact on future student enrollment.

FutureThink is pleased to have had the opportunity to provide the Division with enrollment projection services. We hope this document will provide the necessary information to make informed decisions about the future of the Williamsburg-James City County Public Schools.

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowner:	Williamsburg-James City County Schools
Proposal:	Obtain approval for one existing modular learning cottage at Clara Byrd Baker Elementary School to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students.
Location:	3131 Ironbound Road
Tax Map/Parcel No.:	4710100058
Project Acreage:	± 25.72 acres
Zoning:	PL, Public Land
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.

2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.

3. Impacts: See Impact Analysis on Pages 4-5.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Pages 4-5.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain approval for one existing modular learning cottage to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students. The Board of Supervisors previously approved SUP-21-0005 on May 11, 2021, which granted approval for this learning cottage to remain on-site until July 1, 2025, at which time the approval expired. This learning cottage has remained on-site and has continued to be in use following this expiration date. As such, a new Special Use Permit (SUP) is necessary.

Subject to the current proposal, the attached resolution (see Attachment No. 1) specifies that the new Special Use Permit would expire on July 1, 2028. The cottage would remain in its current location as approved on a site plan application previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4 in the agenda materials for Case No. SUP-25-0021), Clara Byrd Baker Elementary School is anticipated to have an enrollment of 445 students in the 2026/2027 school year and 454 students in the 2027/2028 school year.* Per the applicant's narrative, two new Bright Beginnings preschool buildings will open in Fall 2027 which will free approximately 350 classroom seats for elementary school use. Accordingly, a school zone redistricting process is underway to balance elementary school enrollment with available space. The narrative indicates the cottage is expected to remain in use until the school redistricting process is complete.

  **School system projected enrollment does not account for Pre-K/Bright Beginnings, which is offered at Clara Byrd Baker Elementary School.*

PLANNING AND ZONING HISTORY

There have been many SUP applications for learning cottages over the past 36 years. The following is a brief overview of the previously submitted SUPs for learning cottages specific to Clara Byrd Baker Elementary School:

- In April 1990, the Board of Supervisors approved Case No. SUP-20-90 for the addition of seven temporary learning cottages until July 1, 1993.
- In May 1991, the Board of Supervisors approved Case No. SUP-11-91 for the addition of two temporary learning cottages until July 1, 1993.
- In March 1995, the Board of Supervisors approved Case No. SUP-11-95 for the addition of three temporary learning cottages until August 1, 1999.
- In April 2000, the Board of Supervisors approved Case No. SUP-11-00 for the addition of one temporary learning cottage until July 1, 2004.
- In 2002, Case No. SUP-08-02 was submitted to request an extension of Case No. SUP-11-00 to be valid until July 1, 2006. However, this application was withdrawn prior to a public hearing by the Board of Supervisors.
- In April 2003, the Board of Supervisors approved Case No. SUP-07-03 for the addition of one temporary learning cottage until July 1, 2006.
- In March 2004, the Board of Supervisors approved Case No. SUP-06-04 for the addition of two temporary learning cottages and to extend Case No. SUP-11-00 until July 1, 2007.
- In March 2005, the Board of Supervisors approved Case No. SUP-11-05 for the addition of one temporary learning cottage until July 1, 2008.
- In April 2006, the Board of Supervisors approved Case No. SUP-12-06 to extend Case No. SUP-07-03 until July 1, 2007.

- In May 2007, the Board of Supervisors approved Case No. SUP-09-07 to extend the expiration date of two learning cottages in Case No. SUP-06-04 and one learning cottage in Case No. SUP-11-05 until July 1, 2009.

- In May 2021, the Board of Supervisors approved Case No. SUP-21-0005 for the addition of one temporary learning cottage until July 1, 2025. While this approval has expired, the learning cottage has remained on-site and in use. A new SUP is necessary for the continued use of the cottage to be in compliance with the Zoning Ordinance.

Additionally, the Board of Supervisors approved Case No. Z-24-0002/SUP-24-0002 in June 2024 to permit the construction of a Bright Beginnings preschool facility on the Clara Byrd Baker Elementary School property. Construction of the facility is currently in progress. Completion of the facility will include the need to finalize a Deed of Natural Open Space and the accompanying Open Space plat, finalizing an Easement & Declaration of Covenants for the inspection and maintenance of drainage systems, and finalizing a building permit application for a retaining wall.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	MU, Mixed Use; and B-1, General Business	Self-storage warehousing and commercial uses	Low Density Residential; Moderate Density Residential; and Mixed Use
SOUTH	R-8, Rural Residential	Single-family residential units	Low Density Residential
EAST	R-2, General Residential; R-8, Rural Residential; B-1, General Business; and LB, Limited Business	Single-family residential units and commercial uses	Low Density Residential; and Mixed Use
WEST	R-8, Rural Residential	JCSA Five Forks Water Treatment Plant	Federal, State, or County Lands

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- Subject property is located within a six-minute radius of Fire Station 3. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until the two Bright Beginnings preschool facilities and the school zone redistricting are complete.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	The Stormwater and Resource Protection Division previously reviewed and approved the location and details of the learning cottage installation in the previously approved site plan application.
Cultural/Historic	No Mitigation Required	- The learning cottage was previously approved on a site plan application which found no impacts to cultural or historic resources.

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Nearby and Surrounding Properties	No Mitigation Required	- The school learning cottage is interior to the subject property and is not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- The location of this learning cottage is adjacent to Ironbound Road, which is a Community Character Corridor, and is located inside the Five Forks Community Character Area. The proposed learning cottage is not expected to impact the corridor or area.

COMPREHENSIVE PLAN

The surrounding properties are designated Mixed Use - Five Forks and Moderate Density Residential to the north, and Low Density Residential to the east, south, and west. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly owned lands, which include the Eastern State Hospital, military installations, County offices and facilities (schools), and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the learning cottage is not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP26-11CBBLrnCott

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative and Plan

R E S O L U T I O N

CASE NO. SUP-26-0011. CLARA BYRD BAKER ELEMENTARY SCHOOL

LEARNING COTTAGE

WHEREAS, the Board of Supervisors of James City County, Virginia, has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ('SUP") process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of Clara Byrd Baker Elementary School, has applied for an SUP to allow one temporary classroom trailer on property owned and developed by the applicant located at 3131 Ironbound Road, further identified as James City County Real Estate Tax Map Parcel No. 4710100058 (the "Property"); and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-26-0011.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-26-0011 for the placement of a temporary classroom trailer as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2028.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

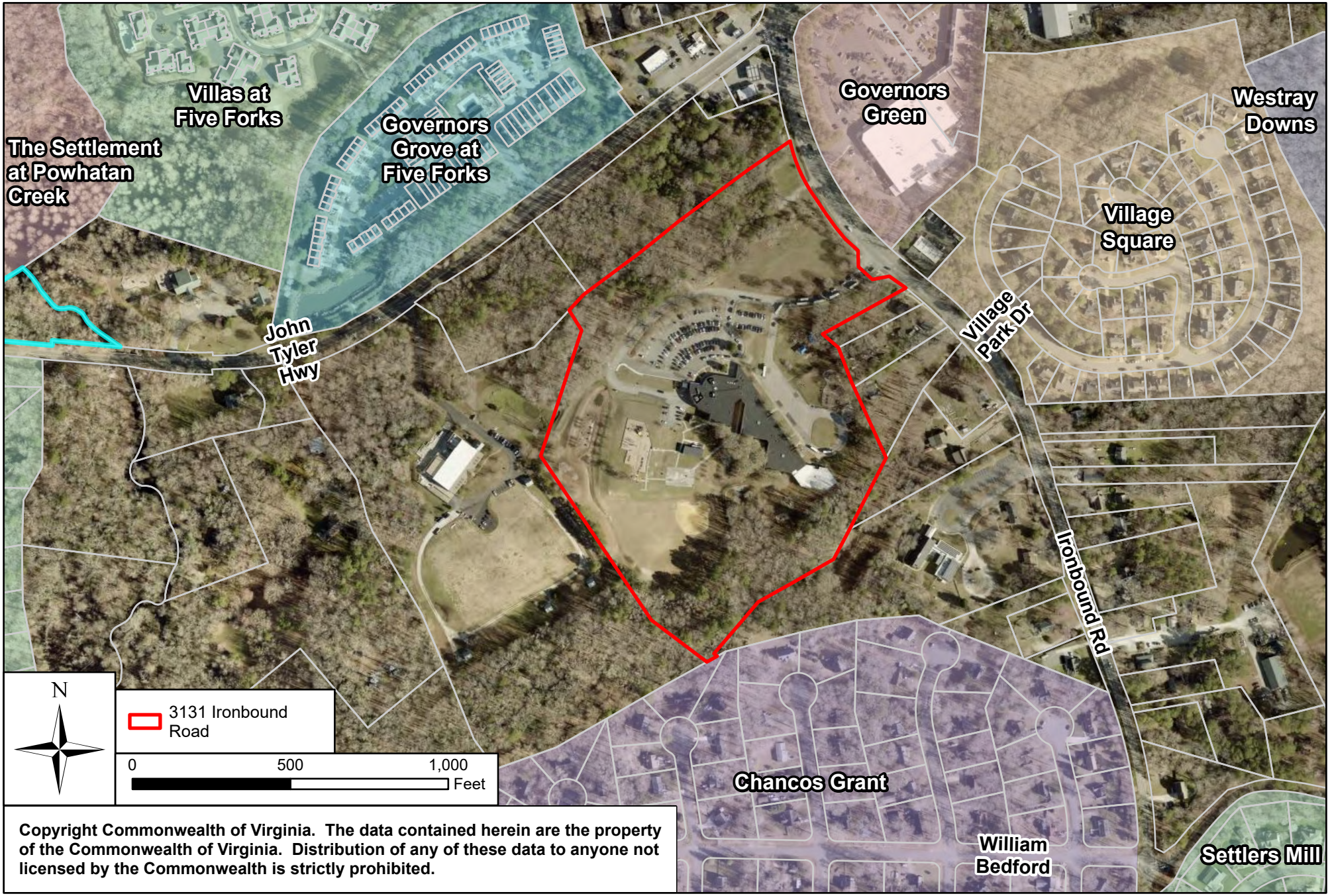
_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-11CBBLrnCott-res

JCC SUP-26-0011.
Clara Byrd Baker Elementary School Learning Cottage



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SUP·26·0011

Special Use Permit Application

Clara Byrd Baker Elementary School Temporary Classroom Trailer

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 27, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottage at Clara Byrd Baker Elementary School

Dear Mr. Leininger,

We are requesting a Special Use Permit for one (1) existing learning cottage, with two (2) classrooms and ADA restrooms, behind Clara Byrd Baker Elementary School. The existing cottage was installed in 2021 under SUP-21-21-0005 (expired). Clara Byrd Baker Elementary School is described in GIS as 3131 Ironbound Rd, Williamsburg VA 23185, Parcel ID 4710100058. This cottage is located behind the school in a location where WJCC Schools has installed classroom trailers in the past. The location is not easily seen from the adjacent streets or properties. Please see the attached proposed location on Figure 1, next page.

In 2021, WJCC Schools modified the ratio of students-to-teachers in our schools based on the percentage of students in each school that were receiving free or reduced lunches. With smaller class sizes we faced an immediate need for two additional classrooms at Clara Byrd Baker Elementary School. We are now in the process of building two new Bright Beginnings Pre-K Buildings which, once open in the Fall of 2027, will free classroom seating for approximately 350 K-5 students. We expect the temporary learning cottages to be in-use through the 2027/2028 school year while the School Division redistricts elementary schools in response to opening the new Pre-K Buildings.

We are submitting an application for a special use permit to maintain use of the existing learning cottage. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

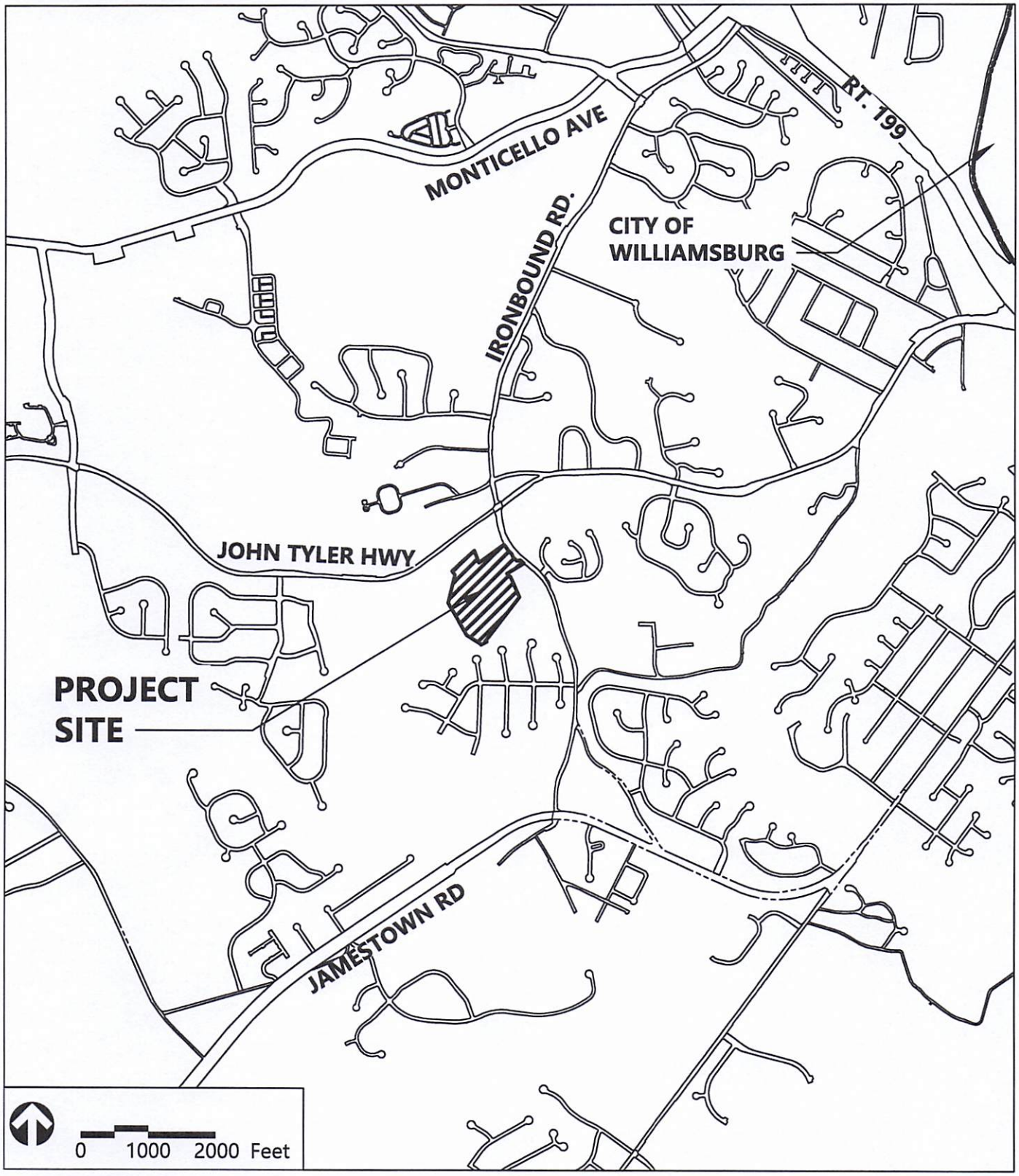
With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838



Figure 1. Classroom Trailer Location behind Clara Byrd Baker Elementary School

\\vhb.com\gbl\proj\Williamsburg\34216.18 WJCC_Norge_TempTrail_SUP\cad\A-prjdwg\SUP\Baker Elementary\A-prjdwg\34216.18-SUP-Baker_ES.dwg



VICINITY MAP

TEMPORARY CLASSROOM TRAILER INSTALLATION
CLARA BYRD BAKER ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

BERKELEY DISTRICT
3131 Ironbound Road, Williamsburg, VA 23185

PARCEL ID: 4710100058

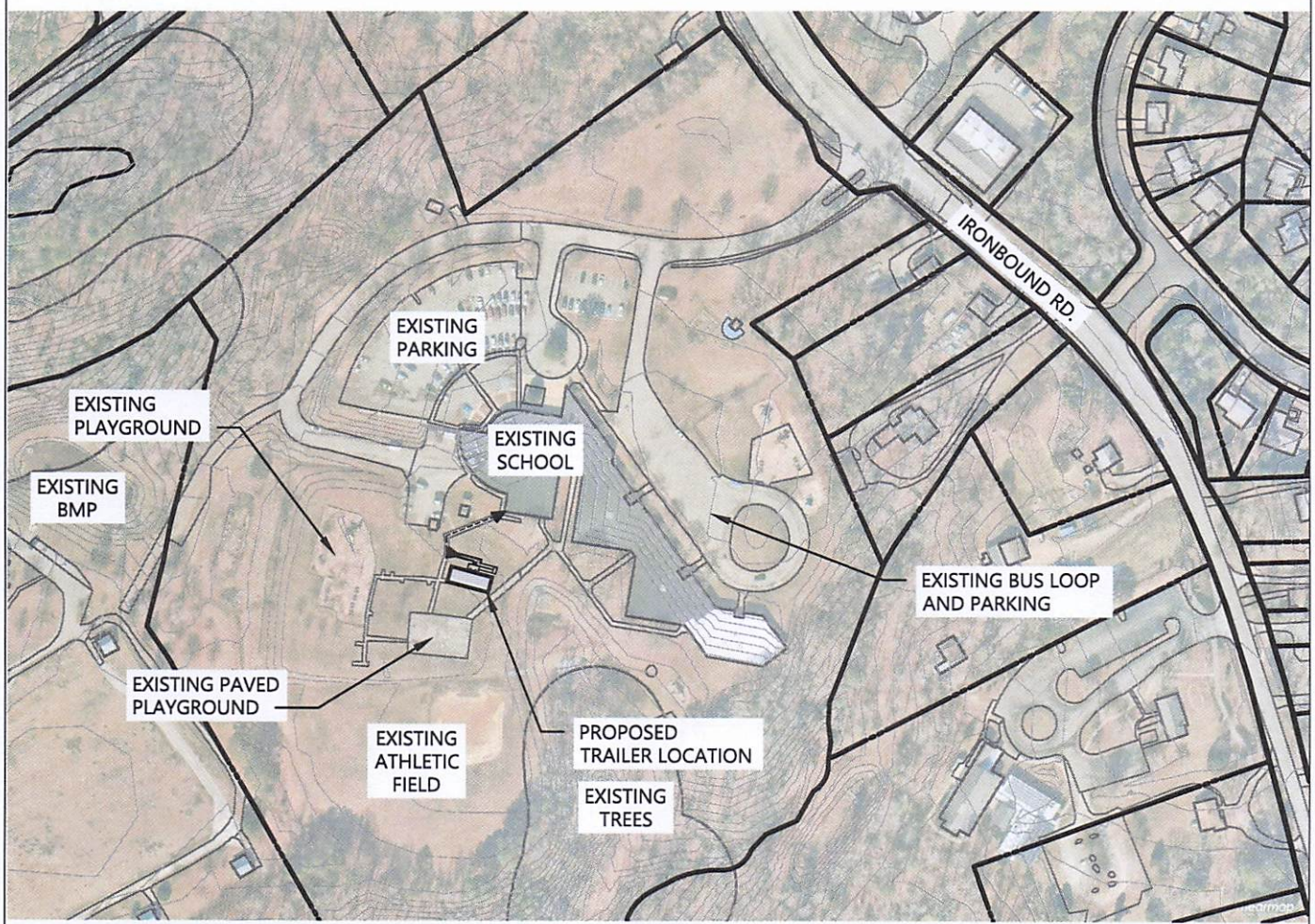
ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

\\vhb.com\gbl\proj\Williamsburg\34216.18 WJCC_Norge_TempTrail_SUP\cad\A-prjdwg\SUP\Baker Elementary\A-prjdwg\34216.18-SUP-Baker_ES.dwg



0 125 250 Feet

SITE PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION

CLARA BYRD BAKER ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

BERKELEY DISTRICT

3131 Ironbound Road, Williamsburg, VA 23185

PARCEL ID: 4710100058

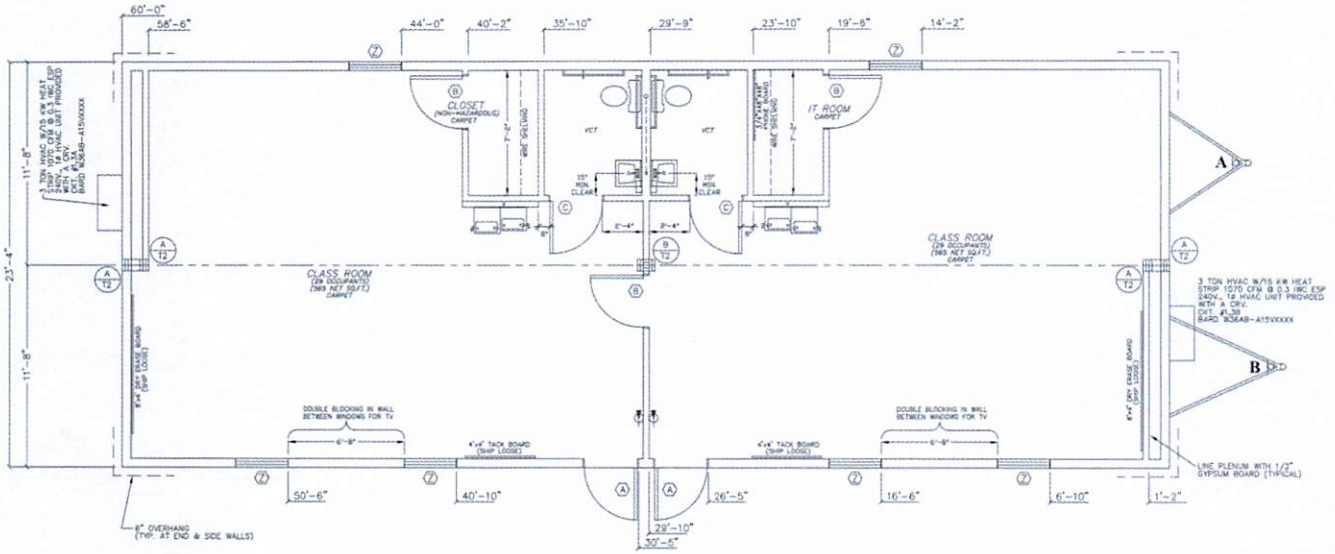
ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb

351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES: (2) CLASSROOMS

ELECTRICAL SERVICE: EXISTING (FROM FORMER TRAILER INSTALLATIONS

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

CLARA BYRD BAKER ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

BERKELEY DISTRICT

3131 Ironbound Road, Williamsburg, VA 23185

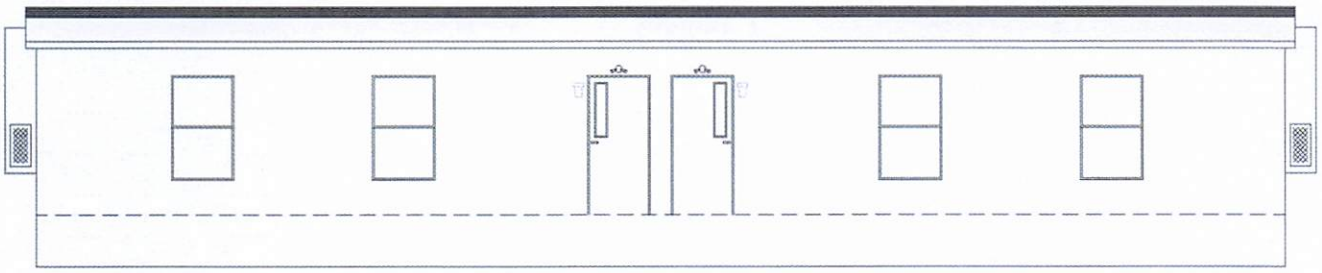
PARCEL ID: 4710100058

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

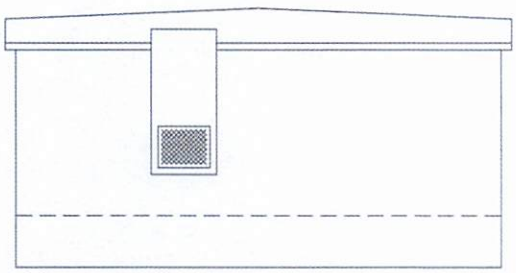
vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



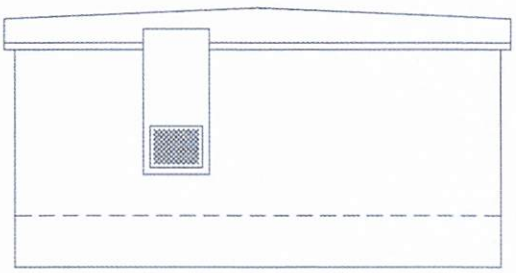
FRONT ELEVATION



REAR ELEVATION



LEFT ELEVATION



RIGHT ELEVATION

TYPICAL CLASSROOM TRAILER SECTION ELEVATION

NOT TO SCALE

ELEVATION DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

CLARA BYRD BAKER ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

BERKELEY DISTRICT

3131 Ironbound Road, Williamsburg, VA 23185

PARCEL ID: 4710100058

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowner:	Williamsburg-James City County Schools
Proposal:	Obtain approval for one existing modular learning cottage at D.J. Montague Elementary School to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students.
Location:	5380 Centerville Road
Tax Map/Parcel No.:	3130100049
Project Acreage:	± 22.52 acres
Zoning:	PL, Public Land
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.

2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.

3. Impacts: See Impact Analysis on Page 4.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Page 4.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain approval for one existing modular learning cottage to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students. The Board of Supervisors previously approved SUP-21-0007 on May 11, 2021, which granted approval for this learning cottage to remain on-site until July 1, 2025, at which time the approval expired. This learning cottage has remained on-site and has continued to be in use following this expiration date. As such, a new SUP is necessary.

Subject to the current proposal, the attached resolution (see Attachment No. 1) specifies that the new Special Use Permit (SUP) would expire on July 1, 2028. The cottage would remain in its current location as approved on a site plan application previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4 in the agenda materials for Case No. SUP-25-0021), D.J. Montague Elementary School is anticipated to have an enrollment of 516 students in the 2026/2027 school year and 507 students in the 2027/2028 school year.* Per the applicant's narrative, two new Bright Beginnings preschool buildings will open in Fall 2027 which will free approximately 350 classroom seats for elementary school use. Accordingly, a school zone redistricting process is underway to balance elementary school enrollment with available space. The narrative indicates the cottage is expected to remain in use until the school redistricting process is complete.

  **School system projected enrollment does not account for Pre-K/Bright Beginnings, which is offered at D.J. Montague Elementary School.*

PLANNING AND ZONING HISTORY

There have been many SUP applications for learning cottages over the past 36 years. The following is a brief overview of the previously submitted SUPs for learning cottages specific to D.J. Montague Elementary School:

- In April 1990, the Board of Supervisors approved Case No. SUP-18-90 for the addition of two temporary learning cottages until July 1, 1993.
- In April 1993, the Board of Supervisors approved Case No. SUP-09-93 to extend Case No. SUP-18-90 until July 1, 1994.
- In May 1994, the Board of Supervisors approved Case No. SUP-06-94 to extend Case No. SUP-09-93 until July 1, 1996.
- In March 1996, the Board of Supervisors approved Case No. SUP-06-96 to extend Case No. SUP-06-94 until July 1, 1999.
- In April 2002, the Board of Supervisors approved Case No. SUP-09-02 for the addition of one temporary learning cottage until July 1, 2006.
- In March 2004, the Board of Supervisors approved Case No. SUP-07-04 for the addition of one temporary learning cottage until July 1, 2007.
- In March 2005, the Board of Supervisors approved Case No. SUP-12-05 for the addition of one temporary learning cottage until July 1, 2008.
- In April 2006, the Board of Supervisors approved Case No. SUP-11-06 for the addition of two temporary learning cottages and to extend Case No. SUP-09-02 until July 1, 2007.
- In May 2007, the Board of Supervisors approved Case No. SUP-08-07 to extend the expiration dates of Case Nos. SUP-07-04 and SUP-12-05 and one learning cottage in Case No. SUP-11-06 until July 1, 2009.
- In February 2009, the Board of Supervisors approved Case No. SUP-02-09 to extend Case No. SUP-08-07 until July 1, 2010.

- In May 2021, the Board of Supervisors approved Case No. SUP-21-0007 for the addition of one temporary learning cottage until July 1, 2025. While this approval has expired, the learning cottage has remained on-site and in use. A new SUP is necessary for the continued use of the cottage to be in compliance with the Zoning Ordinance.

Additionally, County staff is aware of non-compliant building-mounted light fixtures which were installed at D.J. Montague Elementary School. Staff has communicated to Williamsburg-James City County Schools that these fixtures must be modified or replaced to be in compliance with the Zoning Ordinance requirement for full-cutoff light fixtures.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	R-2, General Residential; and R-8, Rural Residential	Single-family residential units	Low Density Residential
SOUTH	R-4, Residential Planned Community; PL, Public Lands	Single-family residential units	Low Density Residential; Federal, State, or County Land
EAST	R-4, Residential Planned Community	Single-family residential units	Low Density Residential
WEST	A-1, General Agricultural	Single-family residential units	Low Density Residential; and Rural Lands

Impacts/Potentially Unfavorable Conditions	Status *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	Considerations/Proposed Mitigation of Potentially Unfavorable Conditions
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until the two Bright Beginnings preschool facilities and the school zone redistricting are complete.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	- The Stormwater and Resource Protection Division previously reviewed and approved the location and details of the learning cottage installation in the previously approved site plan application.
Cultural/Historic	No Mitigation Required	- The learning cottage was previously approved on a site plan application which found no impacts to cultural or historic resources.
Nearby and Surrounding Properties	No Mitigation Required	- The school learning cottage is interior to the subject property and is not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- The location of this learning cottage is adjacent to the Centerville Road Community Character Corridor. The proposed learning cottage is not expected to impact this corridor.

COMPREHENSIVE PLAN

The surrounding properties are designated Low Density Residential, Federal, State or County Land, and Rural Lands. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly owned lands, which include the Eastern State Hospital, military installations, County offices and facilities (schools), and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the learning cottage is not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP26-12DJMLrnCott

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative and Plan

R E S O L U T I O N

CASE NO. SUP-26-0012. D.J. MONTAGUE ELEMENTARY SCHOOL LEARNNG COTTAGE

WHEREAS, the Board of Supervisors of James City County, Virginia, has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of D.J. Montague Elementary School, has applied for an SUP to allow one temporary classroom trailer on property owned and developed by the applicant located at 5380 Centerville Road, further identified as James City County Real Estate Tax Map Parcel No. 3130100049 (the "Property"); and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-26-0012.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-26-0012 for the placement of a temporary classroom trailer as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2028.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

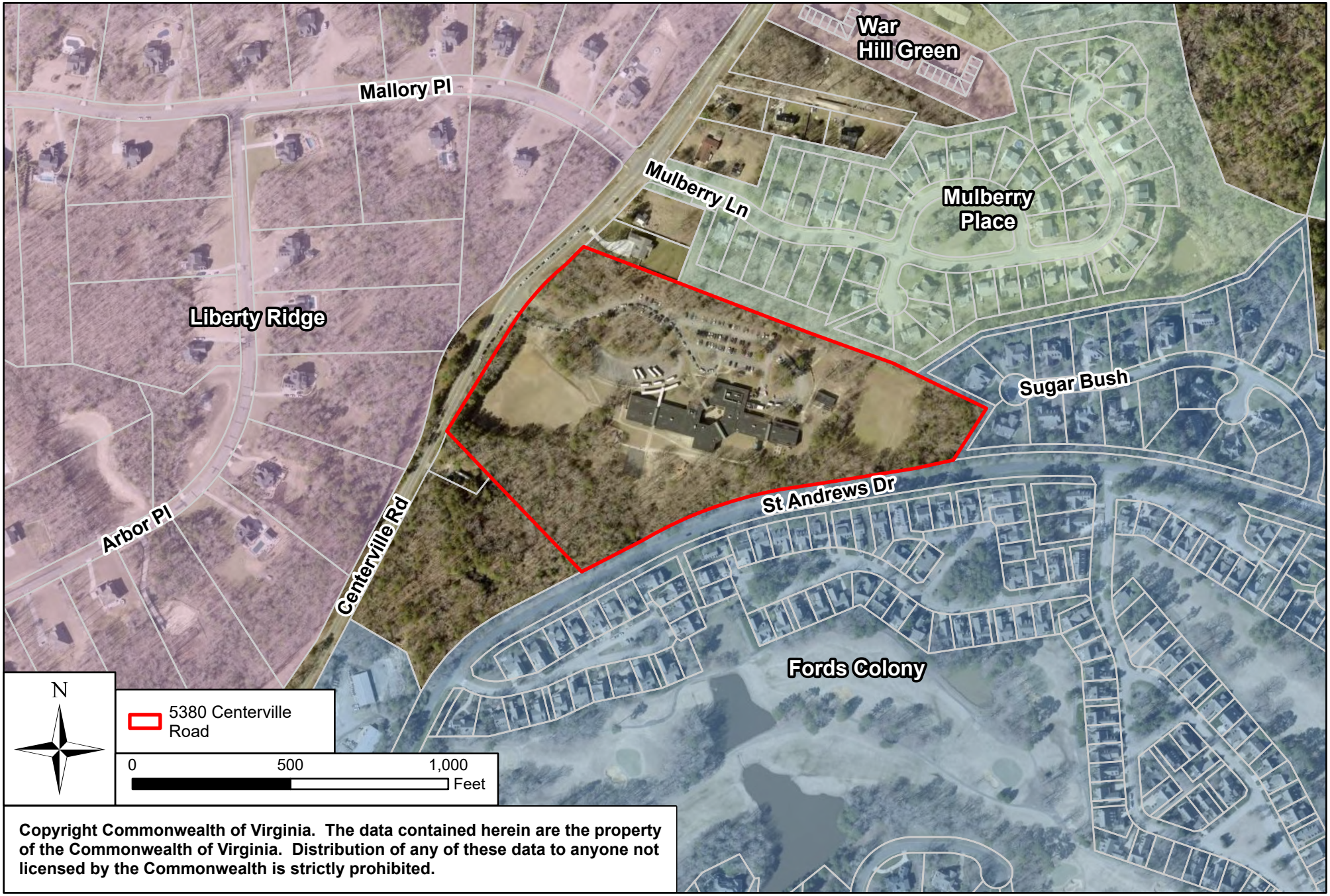
_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-12DJMLrnCott-res

JCC SUP-26-0012.
D.J. Montague Elementary School Learning Cottage



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SUP-26-0012

Special Use Permit Application

DJ Montague **Elementary School Temporary Classroom Trailer**

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 27, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottage at DJ Montague Elementary School

Dear Mr. Leininger,

We are requesting a Special Use Permit for one (1) existing learning cottage, with two (2) classrooms and ADA restrooms, adjacent to DJ Montague Elementary School. The existing cottage was installed in 2021 under SUP-21-0007 (expired). DJ Montague Elementary School is described in GIS as 5380 Centerville Rd, Williamsburg VA 23188, Parcel ID 3130100049. This cottage is located behind the school in a location where WJCC Schools has installed classroom trailers in the past. The location is not easily seen from the adjacent streets or properties. Please see the attached proposed location on Figure 1, next page.

In 2021, WJCC Schools modified the ratio of students-to-teachers in our schools based on the percentage of students in each school that were receiving free or reduced lunches. With smaller class sizes we faced an immediate need for two additional classrooms at DJ Montague Elementary School. We are now in the process of building two new Bright Beginnings Pre-K Buildings which, once open in the Fall of 2027, will free classroom seating for approximately 350 K-5 students. We expect the temporary learning cottages to be in-use through the 2027/2028 school year while the School Division redistricts elementary schools in response to opening the new Pre-K Buildings.

We are submitting an application for a Special Use Permit to maintain use of the existing learning cottage. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

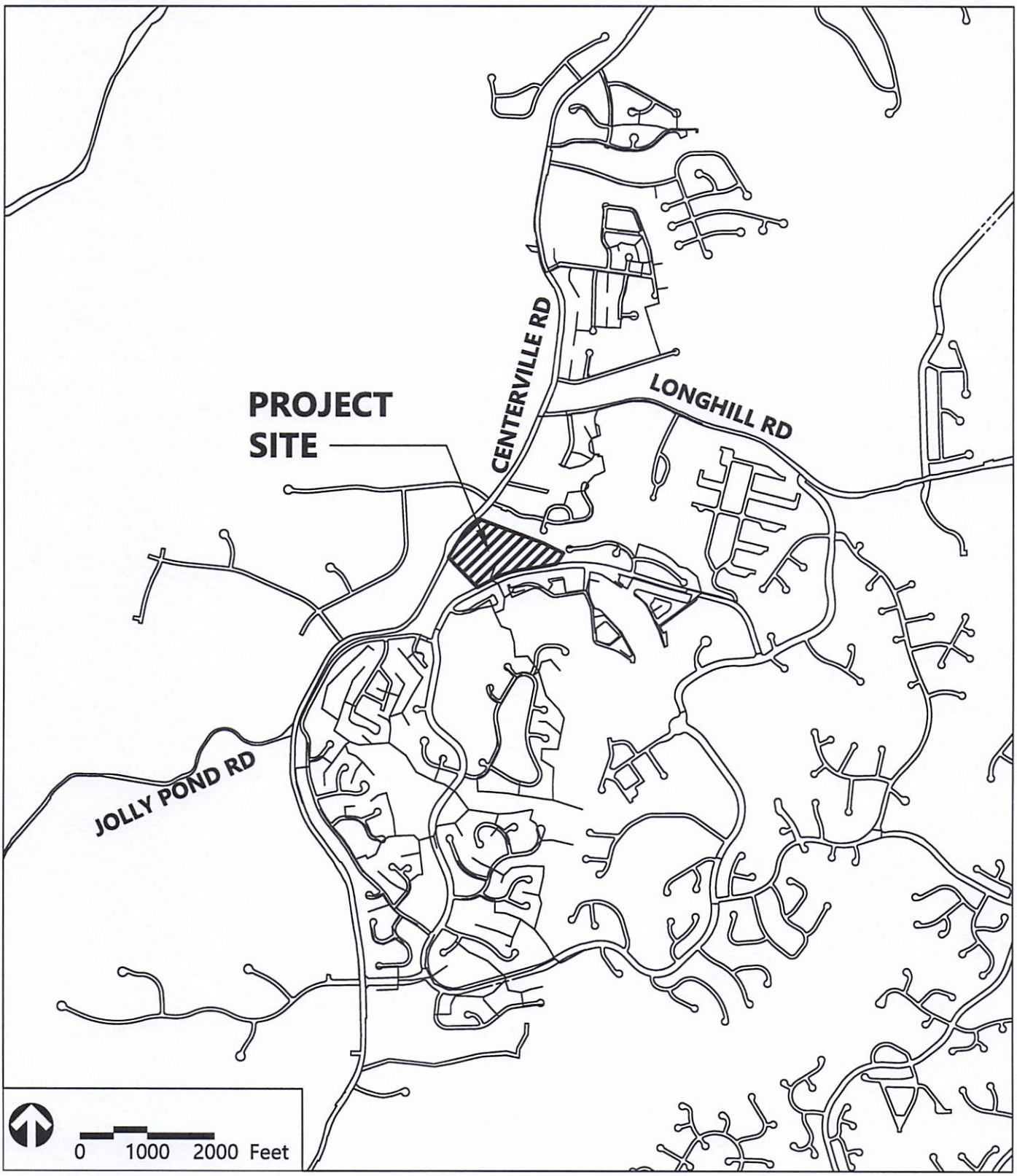
With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838



Figure 1. Classroom Trailer Location behind DJ Montague Elementary School

\\vhb.com\gbl\proj\Williamsburg\34216.18 WJCC_Norge_TempTrail_SUP\cad\A-prjdwg\SUP\DJ Montague Elementary\A-prjdwg\34216.18-SUP-DJ Montague_ES.dwg



VICINITY MAP

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

TEMPORARY CLASSROOM TRAILER INSTALLATION
DJ MONTAGUE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT
5380 Centerville Road, Williamsburg, VA 23188

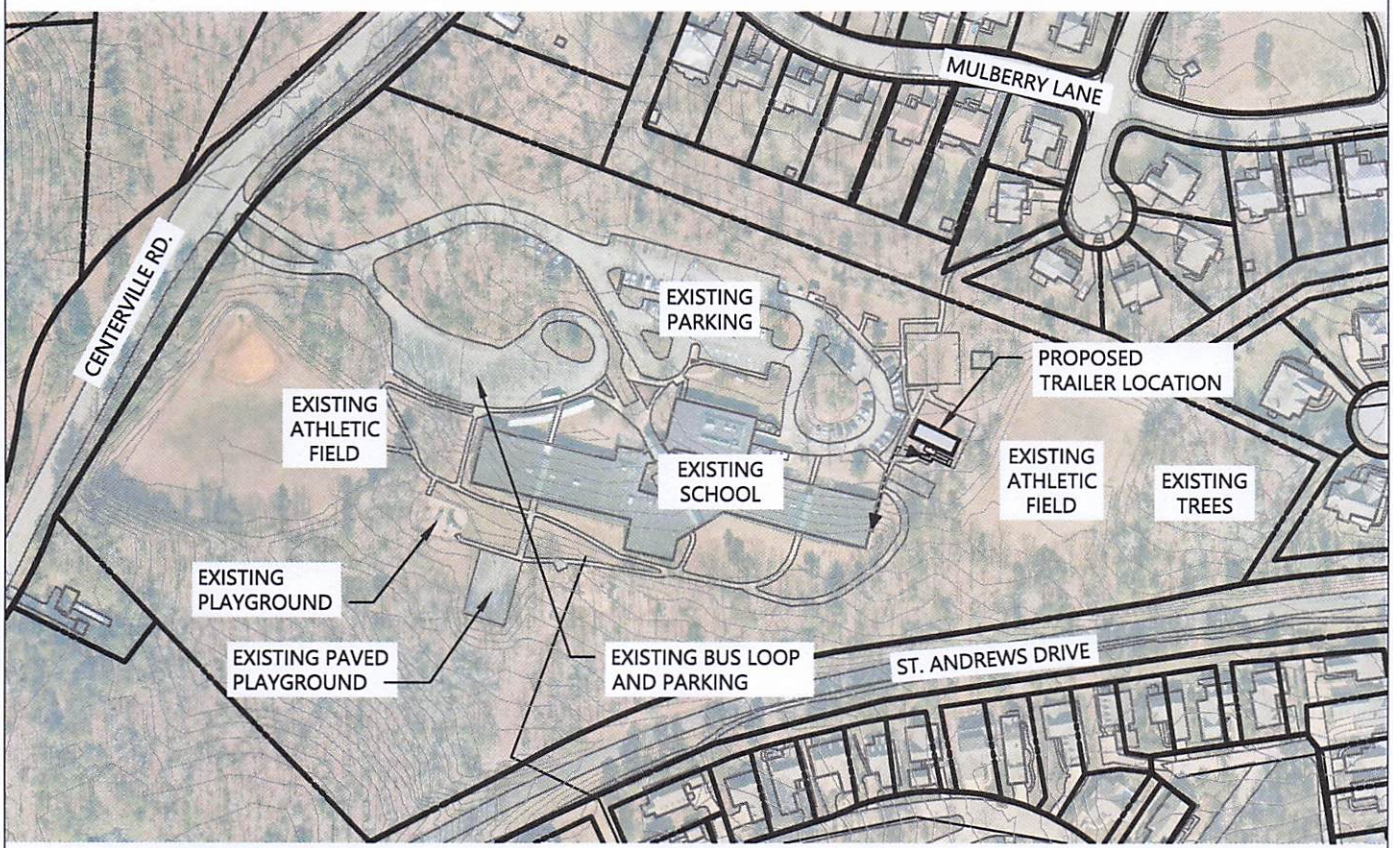
PARCEL ID: 3130100049

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

\\vhb.com\gbl\proj\Williamsburg\34216.18 WJCC_Norge_TempTrail_SUP\cad\A-prjdwg\SUP\DJ Montague Elementary\A-prjdwg\34216.18-SUP-DJ Montague_ES.dwg



0 125 250 Feet

SITE PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION
DJ MONTAGUE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT
5380 Centerville Road, Williamsburg, VA 23188

PARCEL ID: 3130100049

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
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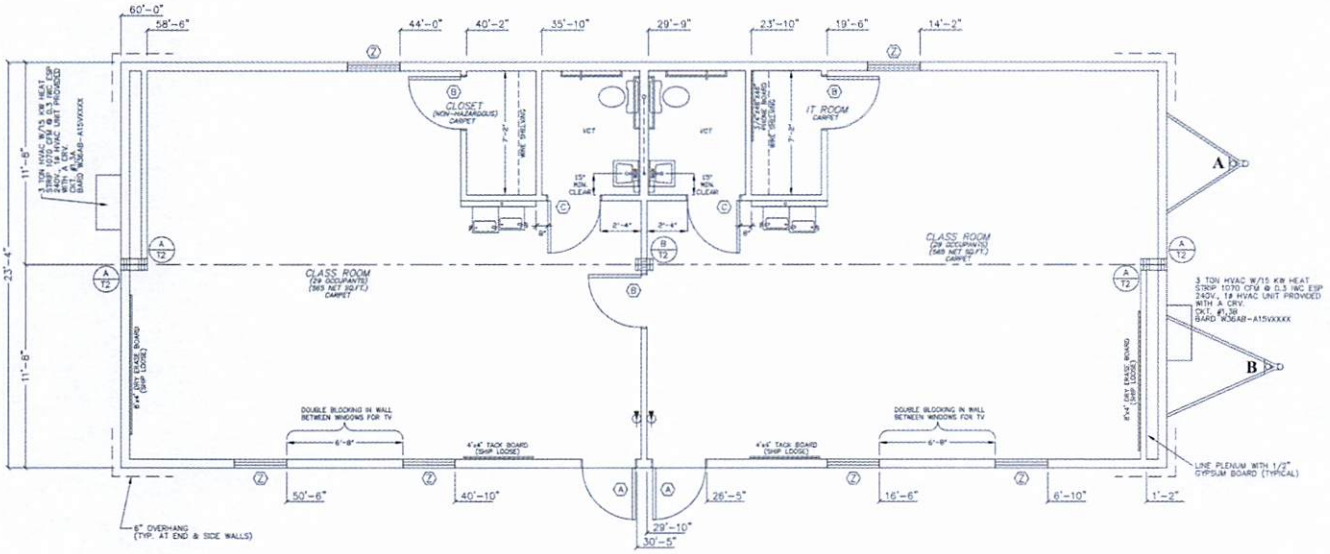

TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES: (2) CLASSROOMS

ELECTRICAL SERVICE: EXISTING (FROM FORMER TEMPORARY BUILDING INSTALLATIONS)

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION
DJ MONTAGUE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT
5380 Centerville Road, Williamsburg, VA 23188

PARCEL ID: 3130100049

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
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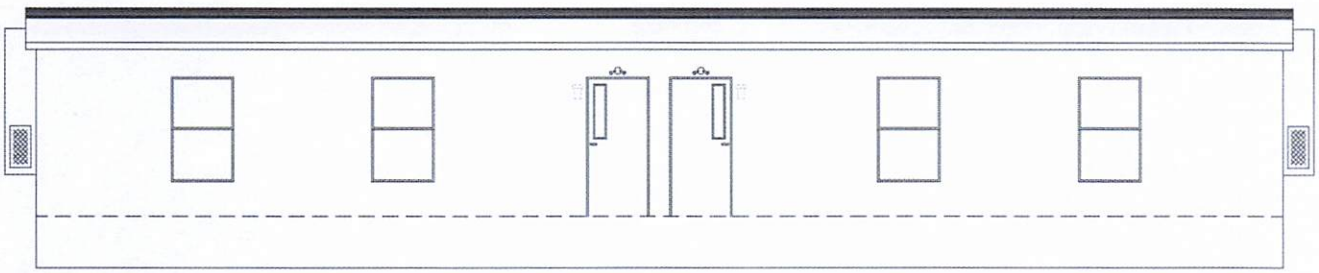
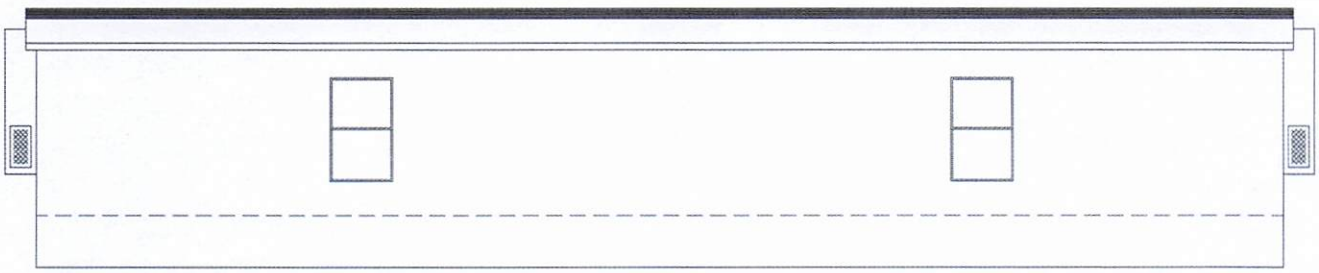
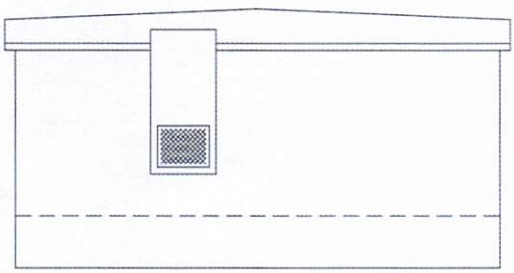


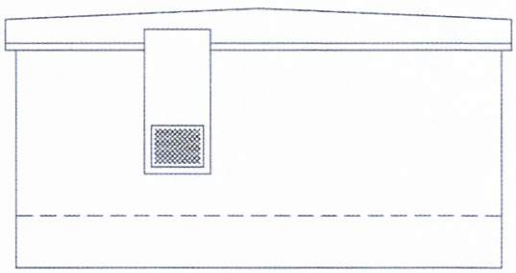
FRONT ELEVATION



REAR ELEVATION



LEFT ELEVATION



RIGHT ELEVATION

TYPICAL CLASSROOM TRAILER SECTION ELEVATION

NOT TO SCALE

ELEVATION DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

DJ MONTAGUE ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT

5380 Centerville Road, Williamsburg, VA 23188

PARCEL ID: 3130100049

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb

351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowner:	Williamsburg-James City County Schools
Proposal:	Obtain approval for one existing modular learning cottage at J. Blaine Blayton Elementary School to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students.
Location:	800 Jolly Pond Road
Tax Map/Parcel No.:	3020100011
Project Acreage:	± 80.55 acres
Zoning:	PL, Public Land
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Outside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.

2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.

3. Impacts: See Impact Analysis on Page 4

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Pages 4.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain approval for one existing modular learning cottage to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students. The Board of Supervisors previously approved SUP-21-0006 on May 11, 2021, which granted approval for this learning cottage to remain on-site until July 1, 2025, at which time the approval expired. This learning cottage has remained on-site and has continued to be in use following this expiration date. As such, a new Special Use Permit (SUP) is necessary.

Subject to the current proposal, the attached resolution (see Attachment No. 1) specifies that the new SUP would expire on July 1, 2028. The cottage would remain in its current location as approved on a site plan application previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4 in the agenda materials for Case No. SUP-25-0021), J. Blaine Blayton Elementary School is anticipated to have an enrollment of 459 students in the 2026/2027 school year and 443 students in the 2027/2028 school year.* Per the applicant's narrative, two new Bright Beginnings preschool buildings will open in Fall 2027 which will free approximately 350 classroom seats for elementary school use. Accordingly, a school zone redistricting process is underway to balance elementary school enrollment with available space. The narrative indicates the cottage is expected to remain in use until the school redistricting process is complete.

  **School system projected enrollment does not account for Pre-K/Bright Beginnings, which is offered at J. Blaine Blayton Elementary School.*

PLANNING AND ZONING HISTORY

- In November 2011, the Board of Supervisors approved Case No. Special Use Permit (SUP)-0009-2011 for the addition of three temporary learning cottages on the property until July 1, 2017.

- In May 2021, the Board of Supervisors approved Case No. SUP-21-0006 for the addition of one temporary learning cottage until July 1, 2025. While this approval has expired, the learning cottage has remained on-site and in use. A new SUP is necessary for the continued use of the cottage to be in compliance with the Zoning Ordinance.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	A-1, General Agricultural; and PL, Public Lands	WJCC School Operations Center and single-family residential units	Federal, State, or County Lands; and Rural Lands
SOUTH	PL, Public Lands	Freedom Park	Community Character Conservation, Open Space or Recreation
EAST	PL, Public Lands; A-1, General Agricultural	Single-family residential units and resource recovery operation	Community Character Conservation, Open Space or Recreation; and Rural Lands
WEST	A-1, General Agricultural	Single-family residential units	Rural Lands

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until the two Bright Beginnings preschool facilities and the school zone redistricting are complete.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	- The Stormwater and Resource Protection Division previously reviewed and approved the location and details of the learning cottage installation in the previously approved site plan application.
Cultural/Historic	No Mitigation Required	- The learning cottage was previously approved on a site plan application which found no impacts to cultural or historic resources.
Nearby and Surrounding Properties	No Mitigation Required	- The school learning cottage is interior to the subject property and is not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- The location of this learning cottage is not adjacent to any Community Character Corridors or located inside any Community Character Areas.

COMPREHENSIVE PLAN

The surrounding properties are designated Federal, State, or County Land to the north, Rural Lands to the east and west, and Community Conservation, Open Space or Recreation to the south and east. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly owned lands, which include the Eastern State Hospital, military installations, County offices and facilities (schools), and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the learning cottage is not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP26-13JBBLrnCott

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative and Plan

R E S O L U T I O N

CASE NO. SUP-26-0013. J. BLAINE BLAYTON ELEMENTARY SCHOOL

LEARNING COTTAGE

WHEREAS, the Board of Supervisors of James City County, Virginia, has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of J. Blaine Blayton Elementary School, has applied for an SUP to allow one temporary classroom trailer on property owned and developed by the applicant located at 800 Jolly Pond Road, further identified as James City County Real Estate Tax Map Parcel No. 3020100011 (the "Property"); and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-26-0013.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-26-0013 for the placement of a temporary classroom trailer as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2028.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

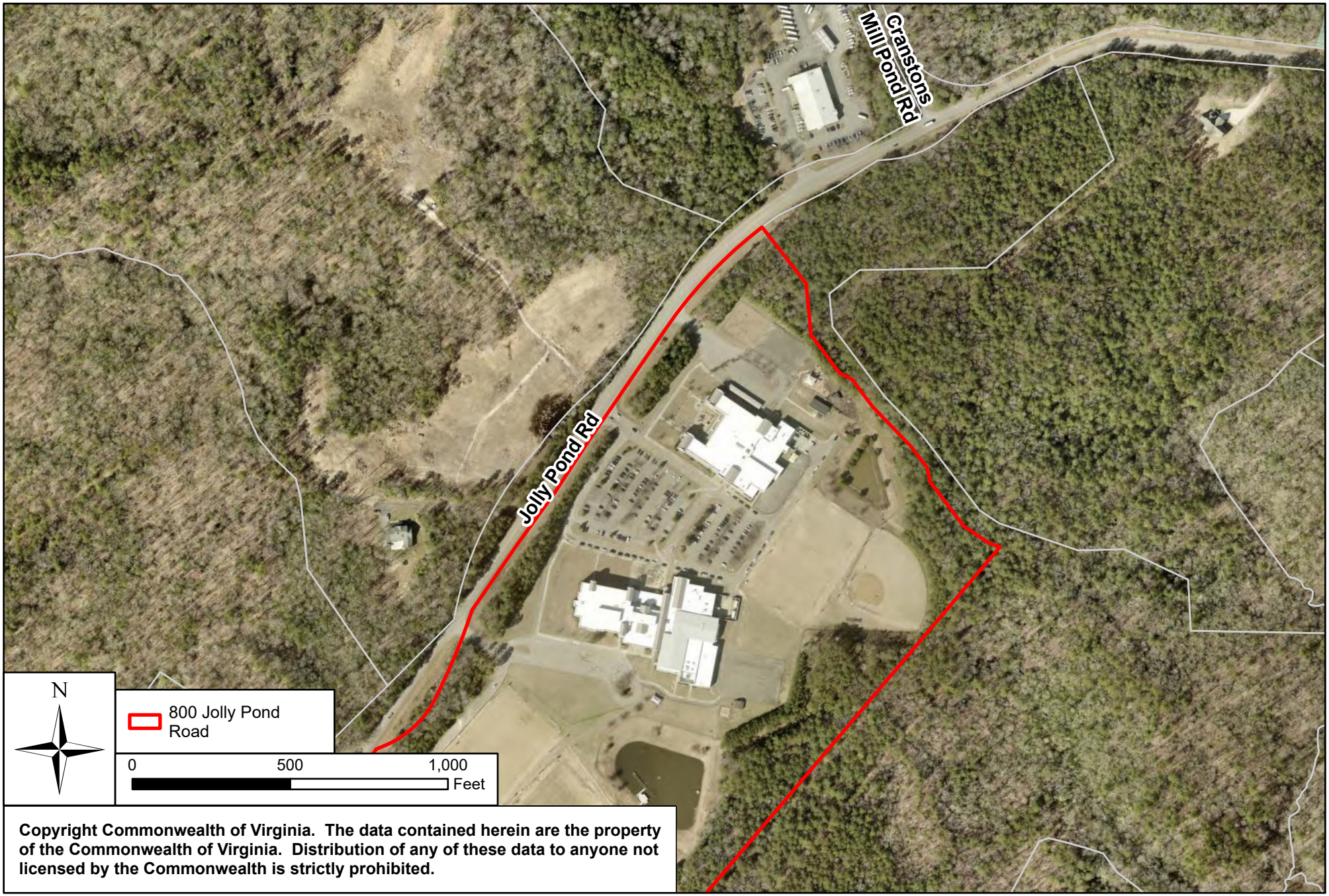
_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-13JBBLrnCott-res

JCC SUP-26-0013.
J. Blaine Blayton Elementary School Learning Cottage



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SUP-26-0013

Special Use Permit Application

J. Blaine Blayton Elementary School Temporary Classroom Trailer

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 27, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottage at J. Blaine Blayton Elementary School

Dear Mr. Leininger,

We are requesting a Special Use Permit for one (1) existing learning cottage, with two (2) classrooms and ADA restrooms, adjacent to J. Blaine Blayton Elementary School. The existing cottage was installed in 2021 under SUP-21-0006 (expired). DJ Montague Elementary School is described in GIS as 800 Jolly Pond Rd, Williamsburg VA 23188, Parcel ID 3020100011. The location is not easily seen from the adjacent streets or properties. Please see the attached proposed location on Figure 1, next page.

In 2021, WJCC Schools modified the ratio of students-to-teachers in our schools based on the percentage of students in each school that were receiving free or reduced lunches. With smaller class sizes we faced an immediate need for two additional classrooms at J. Blaine Blayton Elementary School. We are now in the process of building two new Bright Beginnings Pre-K Buildings which, once open in the Fall of 2027, will free classroom seating for approximately 350 K-5 students in our existing elementary schools. We expect the temporary learning cottages to be in-use through the 2027/2028 school year while the School Division redistricts elementary schools in response to opening the new Pre-K Buildings.

We are submitting an application for a Special Use Permit to maintain use of the existing learning cottage. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838



Figure 1. Classroom Trailer Location behind J. Blaine Blayton Elementary School

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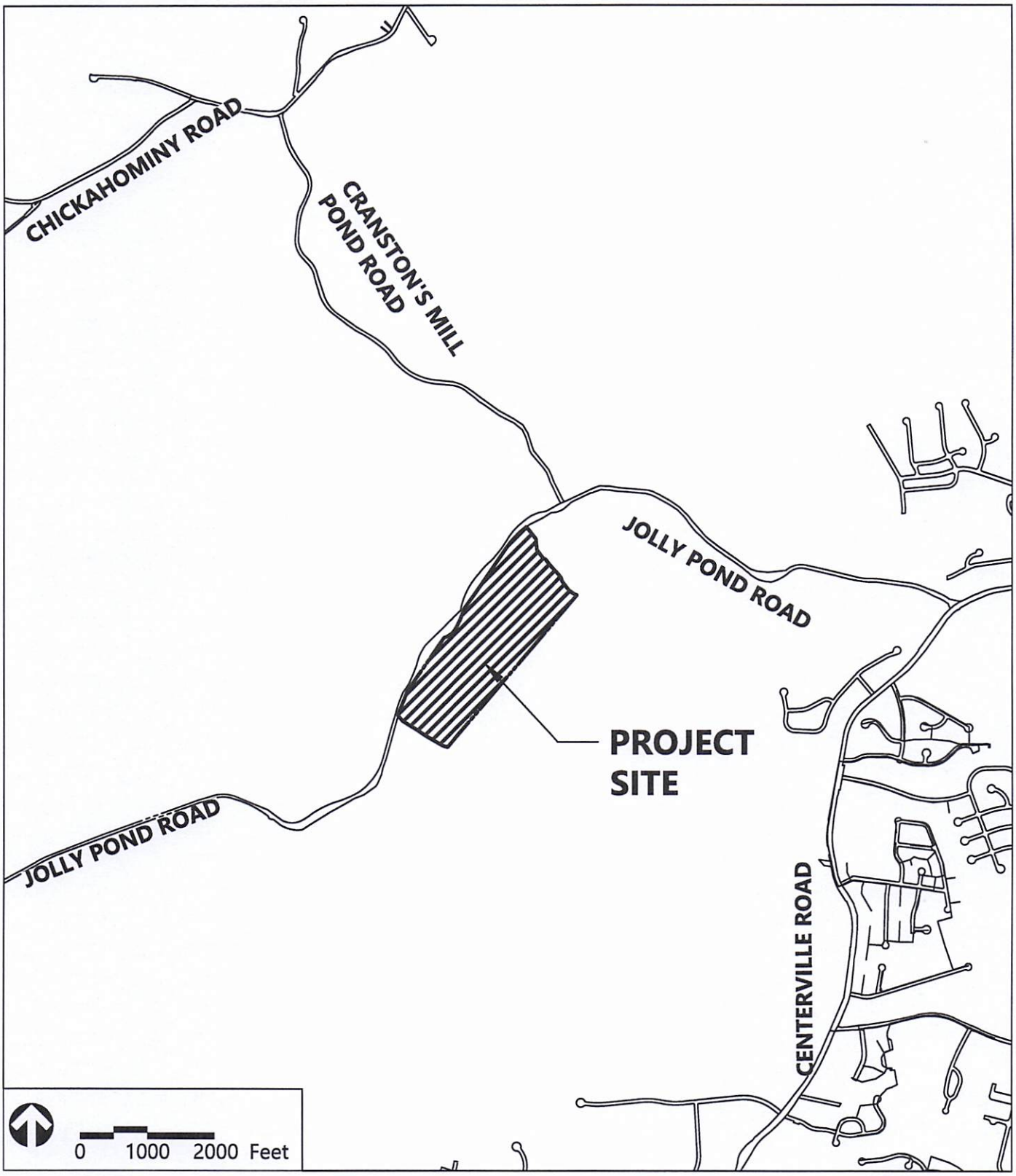


VICINITY MAP

TEMPORARY CLASSROOM TRAILER INSTALLATION
J.B. BLAYTON ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT
800 Jolly Pond Road, Williamsburg, VA 23188

PARCEL ID: 3020100011

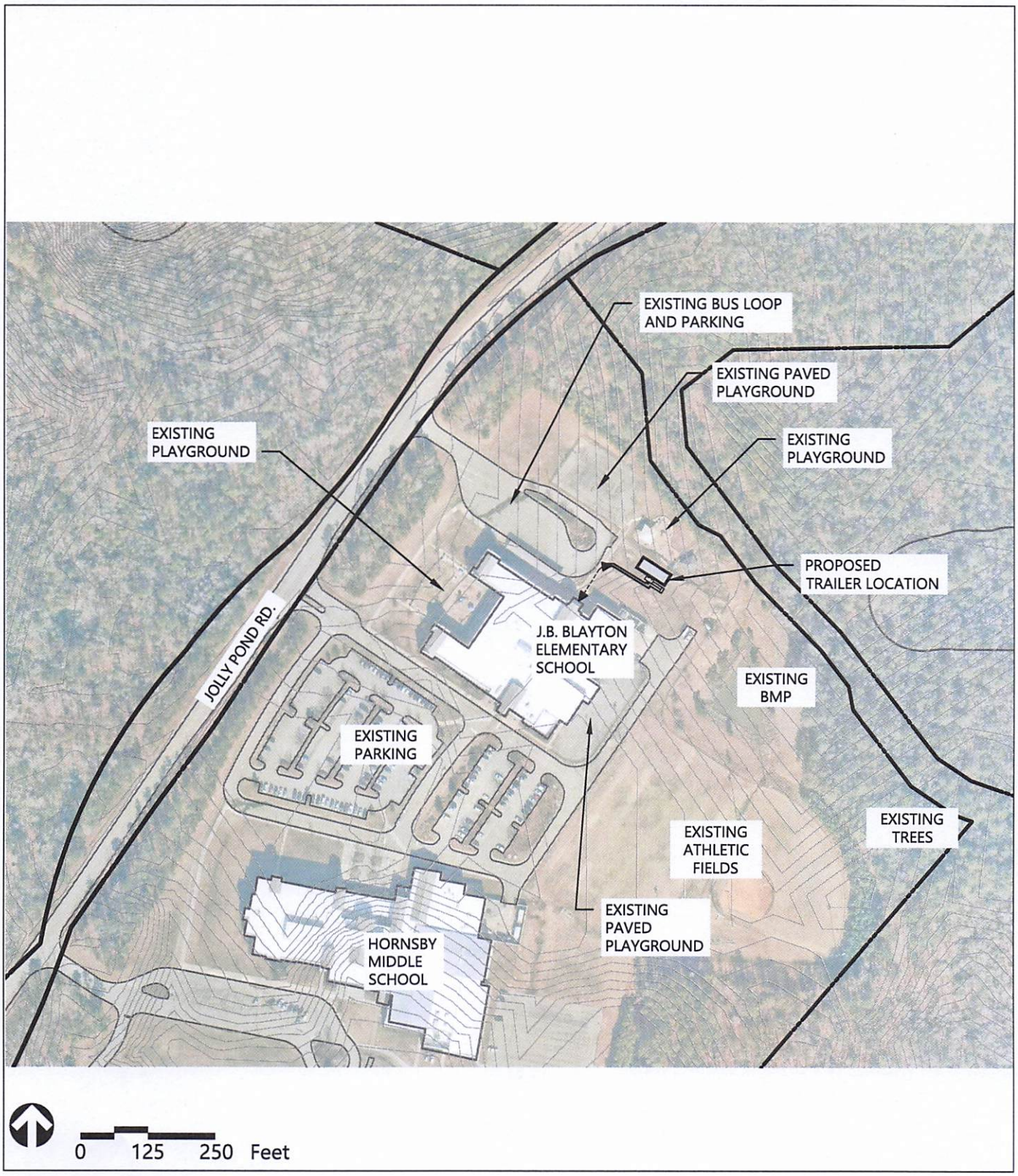
ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

\\vhb\gbl\proj\Williamsburg\34216.18 WJCC_Norge_TempTrail_SUP\cad\A-prjdwg\SUP\Blayton Elementary\A-prjdwg\34216.18-SUP-JB Blayton_ES.dwg



SITE PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION
J.B. BLAYTON ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT
800 Jolly Pond Road, Williamsburg, VA 23188

PARCEL ID: 3020100011

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

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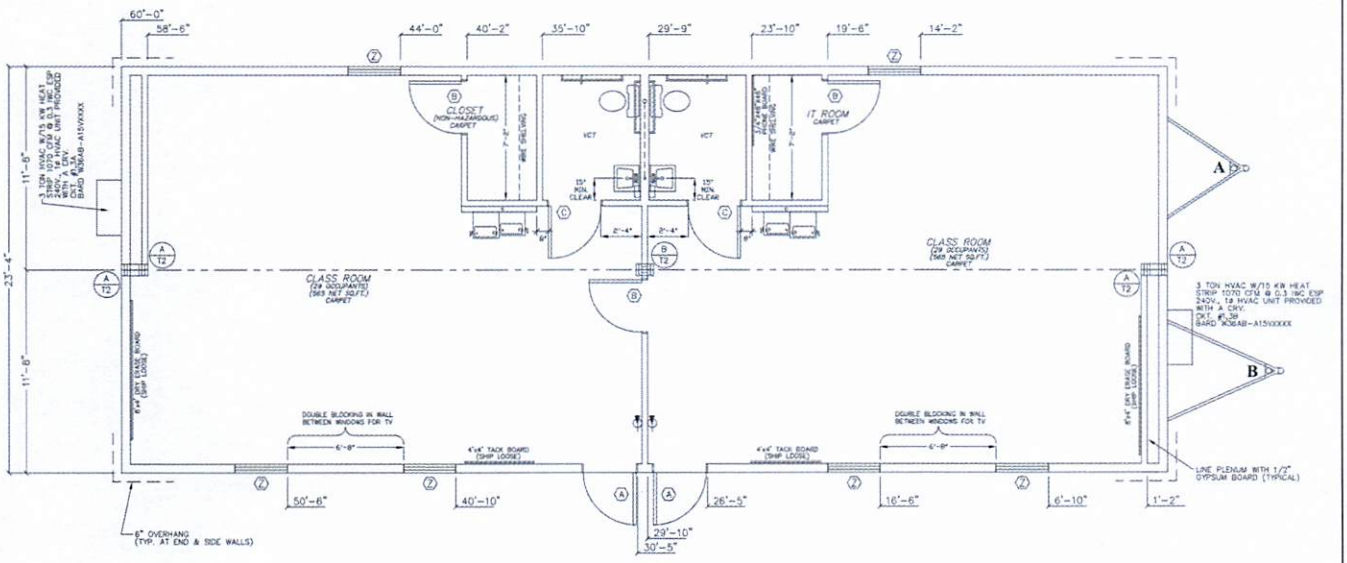

TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES: (2) CLASSROOMS

ELECTRICAL SERVICE: TO BE PROVIDED FROM EXISTING BUILDING SERVICE

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION
J.B. BLAYTON ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT
800 Jolly Pond Road, Williamsburg, VA 23188

PARCEL ID: 3020100011

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

351 McLaws Circle
Suite 3
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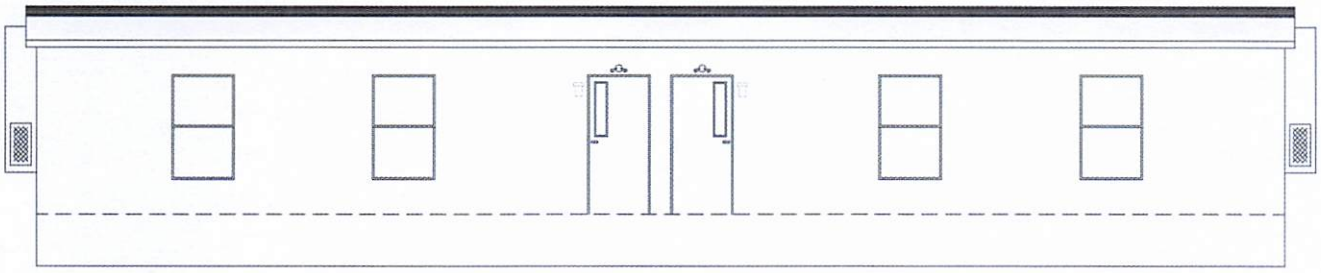
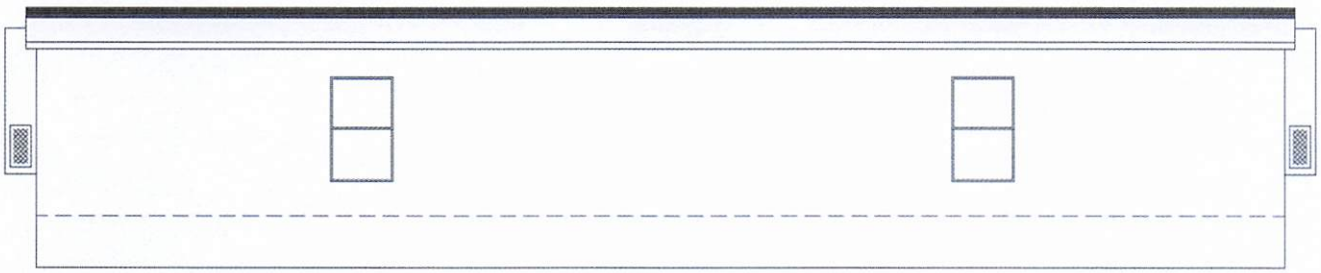


FRONT ELEVATION



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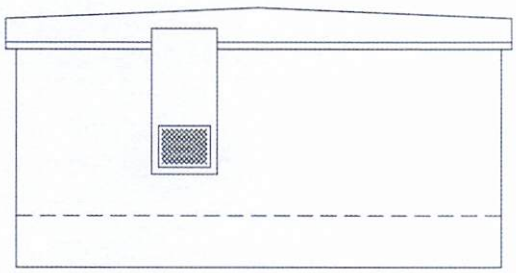
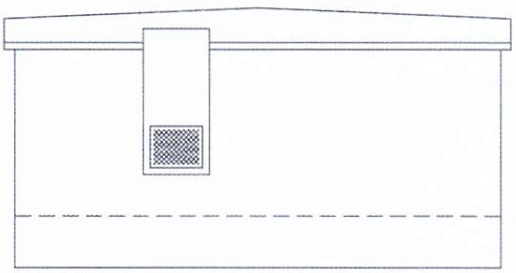


LEFT ELEVATION



RIGHT ELEVATION

TYPICAL CLASSROOM TRAILER SECTION ELEVATION

NOT TO SCALE

ELEVATION DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

J.B. BLAYTON ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

POWHATAN DISTRICT

800 Jolly Pond Road, Williamsburg, VA 23188

PARCEL ID: 3020100011

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb

351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowner:	Williamsburg-James City County Schools
Proposal:	Obtain approval for one existing modular learning cottage at Laurel Lane Elementary School to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students.
Location:	112 Laurel Lane
Tax Map/Parcel No.:	4810600171A
Project Acreage:	± 12.63 acres
Zoning:	PL, Public Land and AA, Airport Approach Overlay District
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.

2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.

3. Impacts: See Impact Analysis on Page 4.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Page 4.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain Special Use Permit (SUP) approval for one existing modular learning cottage to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students. The Board of Supervisors previously approved SUP-21-0008 on May 11, 2021, which granted approval for this learning cottage to remain on-site until July 1, 2025, at which time the approval expired. This learning cottage has remained on-site and has continued to be in use following this expiration date. As such, a new SUP is necessary.

Subject to the current proposal, the attached resolution (see Attachment No. 1) specifies that the new SUP would expire on July 1, 2028. The cottage would remain in its current location as approved on a site plan application previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4 in the agenda materials for Case No. SUP-25-0021), Laurel Lane Elementary School is anticipated to have an enrollment of 513 students in the 2026/2027 school year and 498 students in the 2027/2028 school year.* Per the applicant's narrative, two new Bright Beginnings preschool buildings will open in Fall 2027 which will free approximately 350 classroom seats for elementary school use. Accordingly, a school zone redistricting process is underway to balance elementary school enrollment with available space. The narrative indicates the cottage is expected to remain in use until the school redistricting process is complete.

  **School system projected enrollment does not account for Pre-K/Bright Beginnings, which is offered at Laurel Lane Elementary School.*

PLANNING AND ZONING HISTORY

There have been many SUP applications for learning cottages over the past 38 years. The following is a brief overview of the previously submitted SUPs for learning cottages specific to Laurel Lane Elementary School:

- In June 1988, the Board of Supervisors approved Case No. SUP-13-88 for the addition of two temporary learning cottages until July 1, 1990.
- In April 1990, the Board of Supervisors approved Case No. SUP-21-90 for the addition of five temporary learning cottages and to extend one learning cottage from Case No. SUP-13-88 until July 1, 1993.
- In April 1993, the Board of Supervisors approved Case No. SUP-11-93 to extend three temporary learning cottages from Case No. SUP-21-90 until July 1, 1994.
- In May 1994, the Board of Supervisors approved Case No. SUP-05-94 to extend Case No. SUP-11-93 until July 1, 1996.
- In March 1996, the Board of Supervisors approved Case No. SUP-05-96 for the addition of four temporary learning cottages and to extend two learning cottages in Case No. SUP-05-94 until July 1, 1998.
- In April 2006, the Board of Supervisors approved Case No. SUP-06-06 for the addition of one temporary learning cottage until July 1, 2007.
- In May 2007, the Board of Supervisors approved Case No. SUP-10-07 to extend Case No. SUP-06-06 until July 1, 2009.
- In February 2009, the Board of Supervisors approved Case No. SUP-03-09 to extend Case No. SUP-10-07 until July 1, 2010.
- In May 2021, the Board of Supervisors approved Case No. SUP-21-0008 for the addition of one temporary learning cottage until July 1, 2025. While this approval has expired, the learning cottage has remained on-site and in use. A new SUP is necessary for the continued use of the cottage to be in compliance with the Zoning Ordinance.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	R-5, Multifamily Residential; and R-5 AA, Multifamily Residential and Airport Approach Overlay District	Townhouse and apartment units	Moderate Density Residential
SOUTH	R-2 AA, General Residential and Airport Approach Overlay District	Single-family residential units	Low Density Residential
EAST	R-2, General Residential; and R-2 AA, General Residential and Airport Approach Overlay District	Single-family residential units	Low Density Residential
WEST	R-1 AA, Limited Residential and Airport Approach Overlay District; and R-2 AA, General Residential and Airport Approach Overlay District	Single-family residential units	Low Density Residential

Impacts/Potentially Unfavorable Conditions	Status *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	Considerations/Proposed Mitigation of Potentially Unfavorable Conditions
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- Subject property is located within a six-minute radius of Fire Station 3. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until the two Bright Beginnings preschool facilities and the school zone redistricting are complete.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	- The Stormwater and Resource Protection Division previously reviewed and approved the location and details of the learning cottage installation in the previously approved site plan application.
Cultural/Historic	No Mitigation Required	- The learning cottage was previously approved on a site plan application which found no impacts to cultural or historic resources.
Nearby and Surrounding Properties	No Mitigation Required	- The school learning cottage is interior to the subject property and is not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- The location of this learning cottage is not adjacent to any Community Character Corridors or located inside any Community Character Areas.

COMPREHENSIVE PLAN

The surrounding properties are designated Low Density Residential to the south, west, and east and Moderate Density Residential to the north. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly owned lands, which include the Eastern State Hospital, military installations, County offices and facilities (schools), and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the learning cottage is not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP26-14LaurelLn

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative and Plan

R E S O L U T I O N

CASE NO. SUP-26-0014. LAUREL LANE ELEMENTARY SCHOOL LEARNING COTTAGE

WHEREAS, the Board of Supervisors of James City County, Virginia, has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of Laurel Lane Elementary School, has applied for an SUP to allow one temporary classroom trailer on property owned and developed by the applicant located at 112 Laurel Lane, further identified as James City County Real Estate Tax Map Parcel No. 4810600171A (the "Property"); and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-26-0014.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-26-0014 for the placement of a temporary classroom trailer as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2028.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-14LaurelLn-res

JCC SUP-26-0014.
Laurel Lane Elementary School Learning Cottage



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SUP-26-0014

Special Use Permit Application

Laurel Lane **Elementary School Temporary Classroom Trailer**

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 27, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottage at Laurel Lane Elementary School

Dear Mr. Leininger,

We are requesting a Special Use Permit for one (1) existing learning cottage, with two (2) classrooms and ADA restrooms, adjacent to Laurel Lane Elementary School. The existing cottage was installed in 2021 under SUP-21-0008 (expired). Laurel Lane Elementary School is described in GIS as 112 Laurel Lane, Williamsburg VA 23185, Parcel ID 4810600171A. Please see the attached proposed location on Figure 1, next page.

In 2021, WJCC Schools modified the ratio of students-to-teachers in our schools based on the percentage of students in each school that were receiving free or reduced lunches. With smaller class sizes we faced an immediate need for two additional classrooms at Laurel Lane Elementary School. We are now in the process of building two new Bright Beginnings Pre-K Buildings which, once open in the Fall of 2027, will free classroom seating for approximately 350 K-5 students in our existing elementary schools. We expect the temporary learning cottages to be in-use through the 2027/2028 school year while the School Division redistricts elementary schools in response to opening the new Pre-K Buildings.

We are submitting an application for a Special Use Permit to maintain use of the existing learning cottage. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838

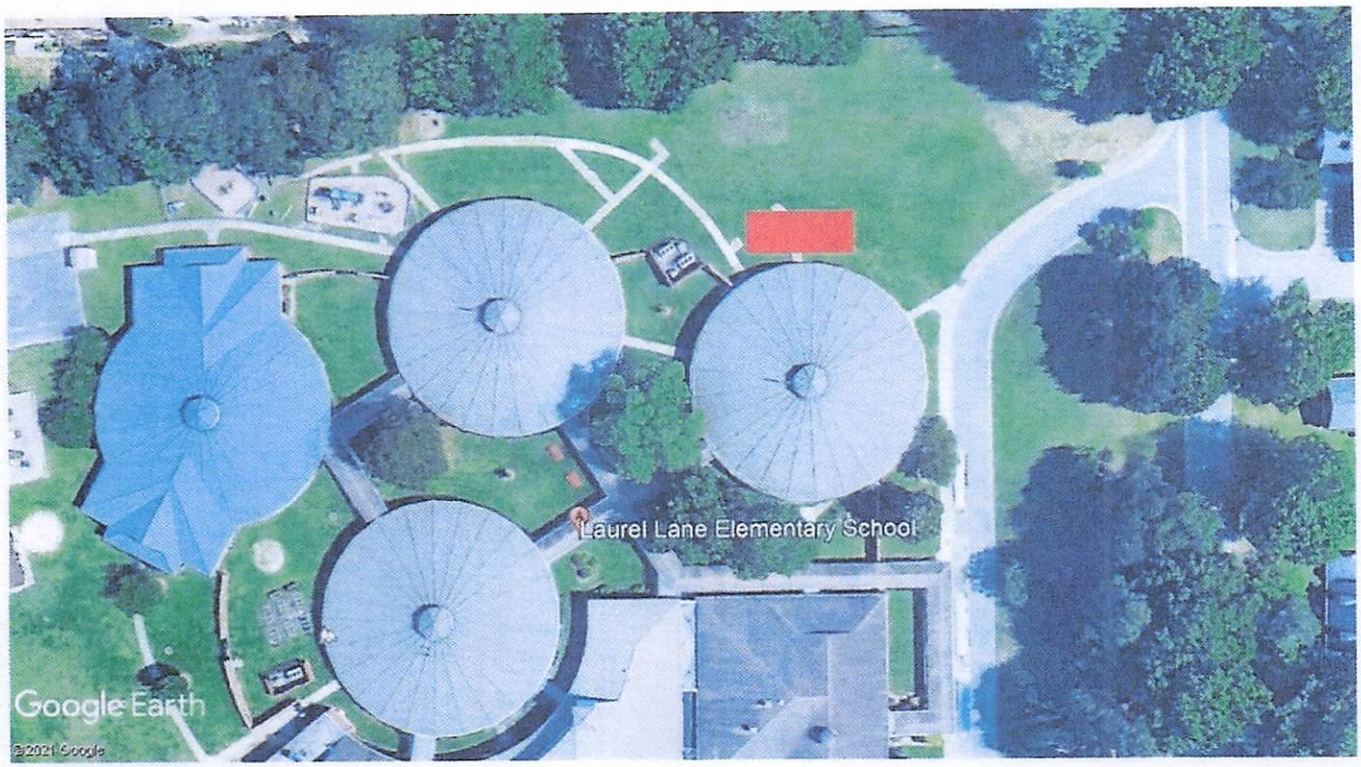

Figure 1. Classroom Trailer Location adjacent to Laurel Lane Elementary School

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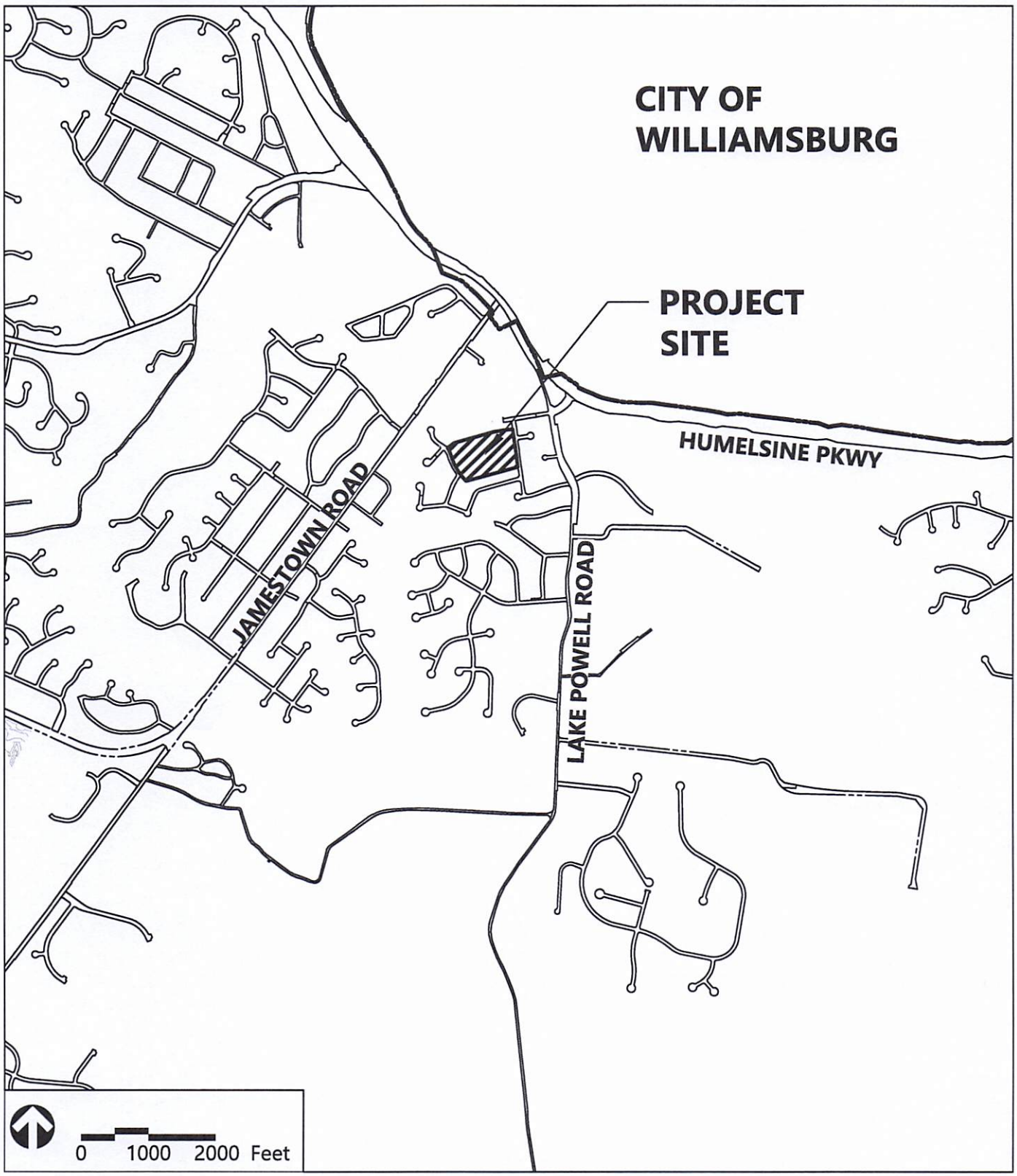

VICINITY MAP

TEMPORARY CLASSROOM TRAILER INSTALLATION
LAUREL LANE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT
112 Laurel Lane, Williamsburg, VA 23185

PARCEL ID: 4810600171A

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

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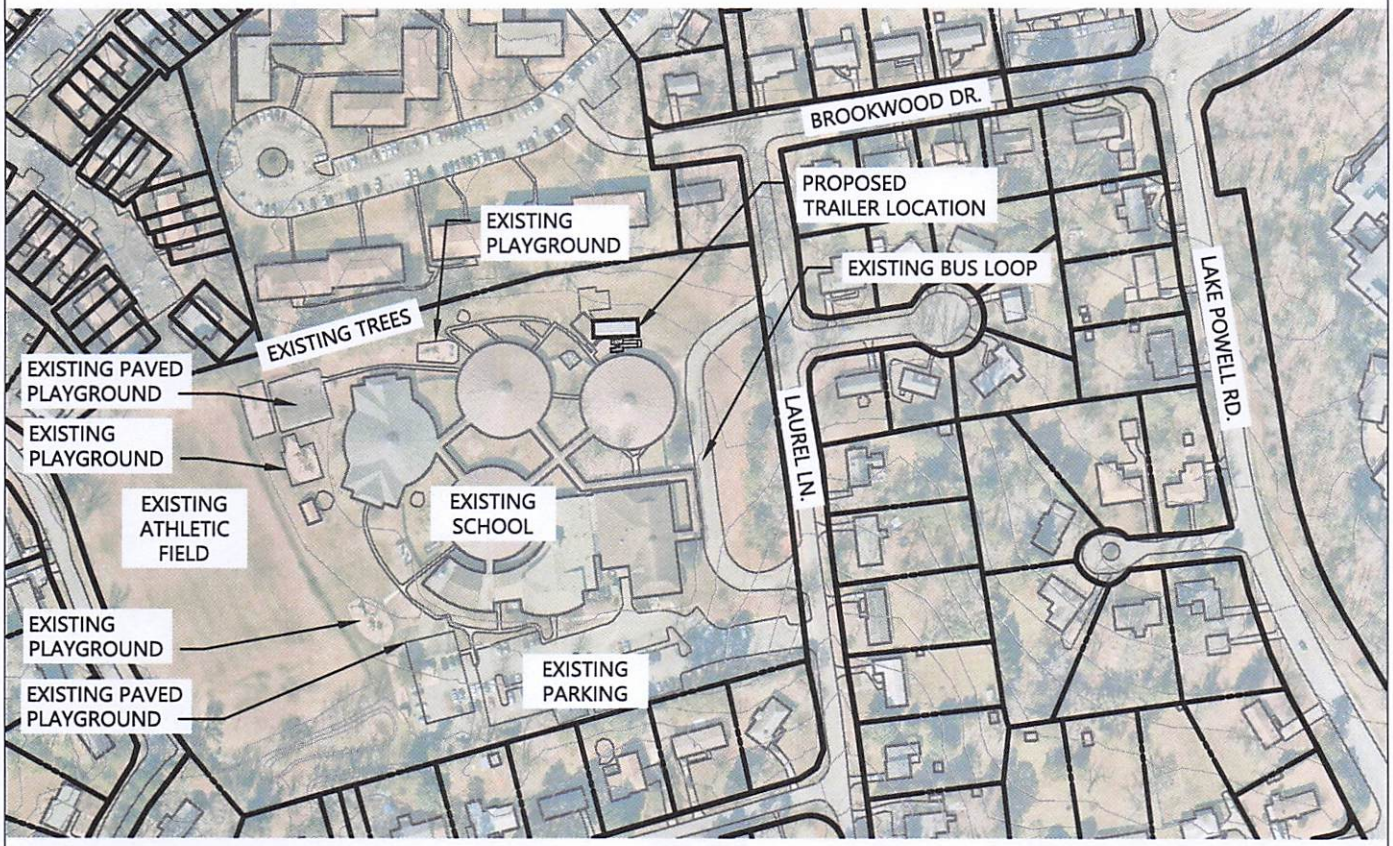


SITE PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION
LAUREL LANE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT
112 Laurel Lane, Williamsburg, VA 23185

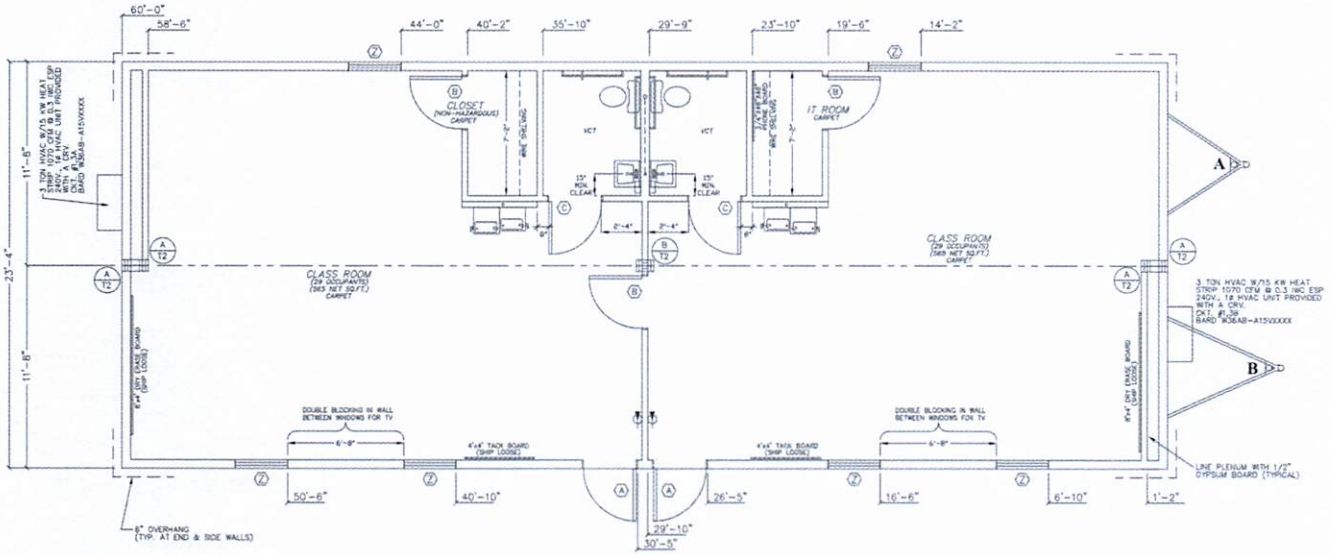
PARCEL ID: 4810600171A

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES: (2) CLASSROOMS

ELECTRICAL SERVICE: EXISTING (FROM FORMER TRAILER INSTALLATIONS)

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION
LAUREL LANE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT
112 Laurel Lane, Williamsburg, VA 23185

PARCEL ID: 4810600171A

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
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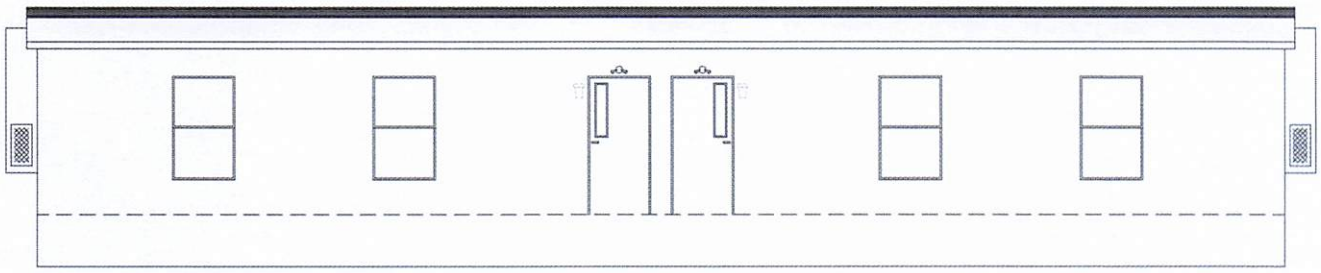
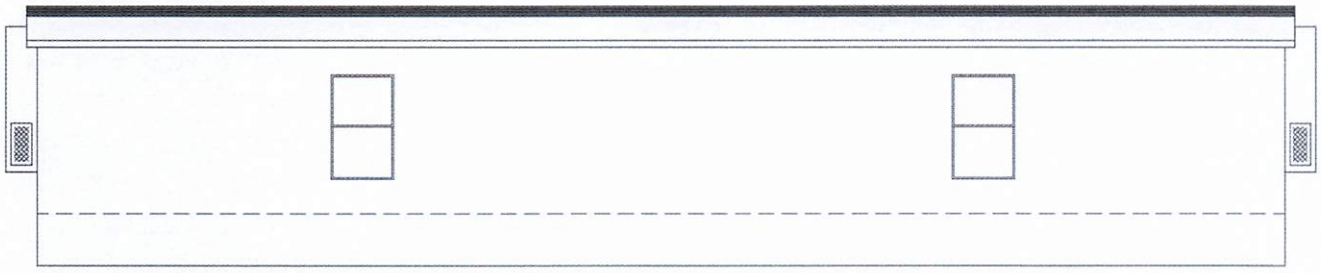
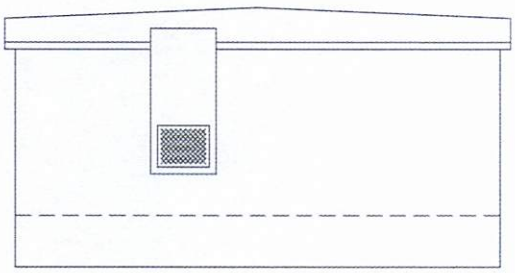


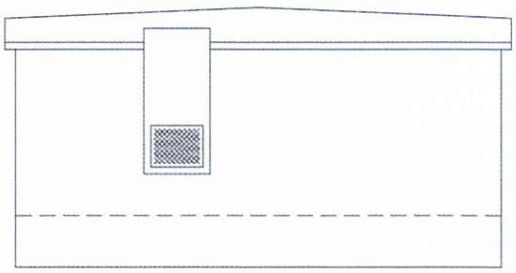
FRONT ELEVATION



REAR ELEVATION



LEFT ELEVATION



RIGHT ELEVATION

TYPICAL CLASSROOM TRAILER SECTION ELEVATION

NOT TO SCALE

ELEVATION DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

LAUREL LANE ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

ROBERTS DISTRICT

112 Laurel Lane, Williamsburg, VA 23185

PARCEL ID: 4810600171A

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb

351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowner:	Williamsburg-James City County Schools
Proposal:	Obtain approval for one existing modular learning cottage at Jamestown High School to remain on-site through the 2031/2032 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students.
Location:	3751 John Tyler Highway
Tax Map/Parcel No.:	4610100002D
Project Acreage:	± 76.99
Zoning:	PL, Public Land
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.

2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.

3. Impacts: See Impact Analysis on Page 4.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Page 4.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain Special Use Permit (SUP) approval for one existing modular learning cottage to remain on-site through the 2031/2032 school year. The learning cottage includes two classrooms, which can accommodate up to 50 additional students. The Board of Supervisors previously approved SUP-20-0003 on March 10, 2020, which granted approval for this learning cottage to remain on-site until July 1, 2024, at which time the approval expired. This learning cottage has remained on-site and has continued to be in use following this expiration date. As such, a new SUP is necessary.

  Subject to the current proposal, the attached resolution (see Attachment No. 1) specifies that the new Special Use Permit would expire on July 1, 2032. The cottage would remain in its current location as approved on a site plan application previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4 in the agenda materials for Case No. SUP-25-0021), Jamestown High School is anticipated to have an enrollment of 1,259 students in the 2026/2027 school year and 1,155 students in the 2031/2032 school year.* Per the applicant's narrative, an expansion of Jamestown High School's classroom space is forecast to be included in Capital Improvement Plan funding in 2030. The cottage is intended to be in use until classroom space expansion is completed.

PLANNING AND ZONING HISTORY

There have been many SUPs for learning cottages over the past 26 years. The following is a brief overview of the previously submitted SUPs for learning cottages specific to Jamestown High School:

- In April 2000, the Board of Supervisors approved Case No. SUP-0013-2000 for the addition of one new temporary learning cottage (two classrooms) at Jamestown High School until July 2004.

- In April 2002, the Board of Supervisors approved Case No. SUP-0006-2002 for an additional temporary learning cottage to accommodate two additional classrooms until July 1, 2006.

- In April 2003, the Board of Supervisors approved Case No. SUP-0005-2003 for two additional temporary learning cottages to accommodate four additional classrooms until July 1, 2006.

- In April 2004, the Board of Supervisors approved Case No. SUP-0004-2004 for an extension of the 2000 SUP to be valid until July 1, 2007. This SUP also approved an additional learning cottage with two classrooms.

- In March 2005, the Board of Supervisors approved Case No. SUP-0009-2005 for an additional temporary learning cottage to accommodate two additional classrooms until July 1, 2008.

- In April 2006, the Board of Supervisors approved Case No. SUP-0008-2006 for an extension of three existing temporary learning cottages until July 1, 2007.

- In May 2007, the Board of Supervisors approved Case No. SUP-0007-2007 for the extension of two learning cottages until July 1, 2008 and four learning cottages until July 1, 2007

- In April 2008, Case No. SUP-0010-2008 requested to extend the 2007 SUP from July 2008 to July 2012 for one existing learning cottage, but was withdrawn by the applicant.

- In February of 2018, Case No. SUP-0015-2017 requested the addition of two additional learning cottages for use during the 2018-23 school years. However, this request was withdrawn by the applicant prior to its scheduled public hearing.

- In March 10, 2020, the Board of Supervisors approved Case No. SUP-20-0003 for the addition of one temporary learning cottage until July 1, 2024. While this approval has expired, the learning cottage has remained on-site and in use. A new SUP is necessary for the continued use of the cottage to be in compliance with the Zoning Ordinance.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	R-4, Residential Planned Community; and PL, Public Lands	Townhouse units and Green Spring Plantation	Low Density Residential; and Community Character Conservation, Open Space or Recreation
SOUTH	PL, Public Lands	Mainland Farm	Community Character Conservation, Open Space or Recreation
EAST	R-2, General Residential; and R-8, Rural Residential	Single-family residential units and place of public assembly use	Low Density Residential
WEST	R1, Limited Residential	Single-family residential units	Low Density Residential

Impacts/Potentially Unfavorable Conditions	Status *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	Considerations/Proposed Mitigation of Potentially Unfavorable Conditions
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- Subject property is located within a five-minute radius of Fire Station 5. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until a classroom expansion is complete at Jamestown High School.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	- The Stormwater and Resource Protection Division previously reviewed and approved the location and details of the learning cottage installation in the previously approved site plan application.
Cultural/Historic	No Mitigation Required	- The learning cottage was previously approved on a site plan application which found no impacts to cultural or historic resources.
Nearby and Surrounding Properties	No Mitigation Required	- The school learning cottage is interior to the subject property and is not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- The location of this learning cottage is shielded from view via a wooded buffer from John Tyler Highway, which is a Community Character Corridor.

COMPREHENSIVE PLAN

The surrounding properties are designated Low Density Residential to the north, west, and east while property to the north and south is designated Community Character Conservation, Open Space or Recreation. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly-owned lands which include the Eastern State Hospital, military installations, County offices and facilities, and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the learning cottage is not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Overall, staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP26-15JmstwnLrnCott

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative & Plan

R E S O L U T I O N

CASE NO. SUP-26-0015. JAMESTOWN HIGH SCHOOL LEARNING COTTAGE

WHEREAS, the Board of Supervisors of James City County has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit (SUP) process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of Jamestown High School, has applied for a Special Use Permit ("SUP") to allow one temporary classroom trailer on property owned and developed by the applicant located at 3751 John Tyler Highway, further identified as James City County Real Estate Tax Map No. 461100002D (the "Property"); and

WHEREAS, a public hearing was advertised, adjoining property owners notified and a hearing conducted on Case No. SUP-26-0015.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-26-0015 for the placement of a temporary classroom trailer as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2032.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

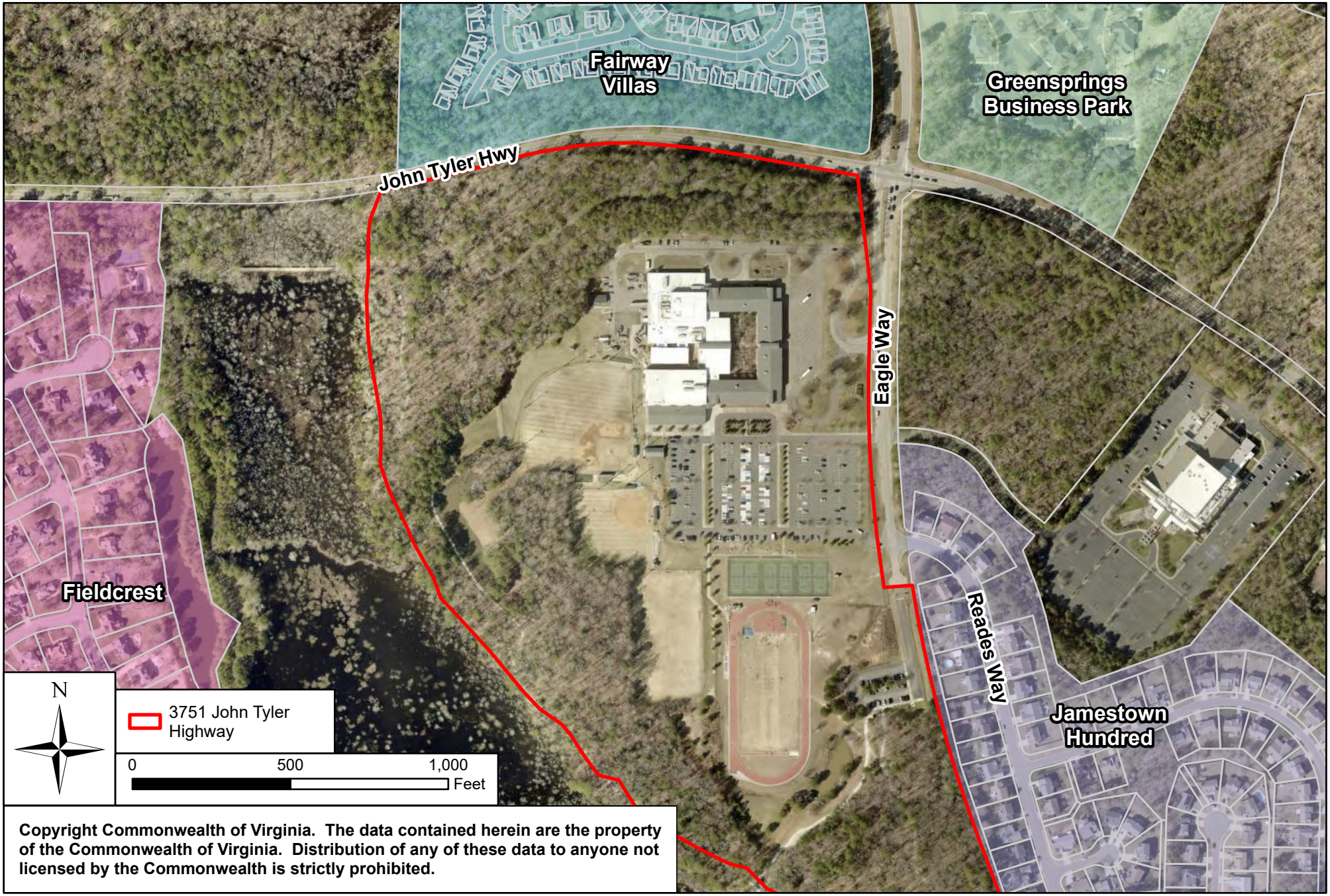
_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-15JamstwnLrnCott-res

JCC SUP-26-0015.
Jamestown High School Learning Cottage



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SUP·26·0015

Special Use Permit Application

Jamestown High School **Temporary Classroom Trailer**

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 27, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottage at Jamestown High School

Dear Mr. Leininger,

We are requesting a Special Use Permit for one (1) existing learning cottage, with two (2) classrooms, behind Jamestown High School. The existing cottage was installed in 2020 under SUP-20-0003 (expired). Jamestown High School is described in GIS as 3751 John Tyler Highway, Williamsburg VA 23185, Parcel ID 4610100002D. The location is not easily seen from the adjacent streets or properties. Please see the attached proposed location on Figure 1, next page.

In 2019 WJCC Schools began preparations for high school classroom expansion projects. In 2024 WJCC Schools renovated the auxiliary building behind Lafayette High School to create additional classroom space. In 2025 WJCC Schools completed a cafeteria expansion at Jamestown High School to allow for 3 lunch periods daily instead of 4. WJCC is forecast to receive CIP funding in 2030 to expand Jamestown High School classroom space. We expect the temporary learning cottage to be in-use through the 2031/2032 school year when Jamestown High School is expanded.

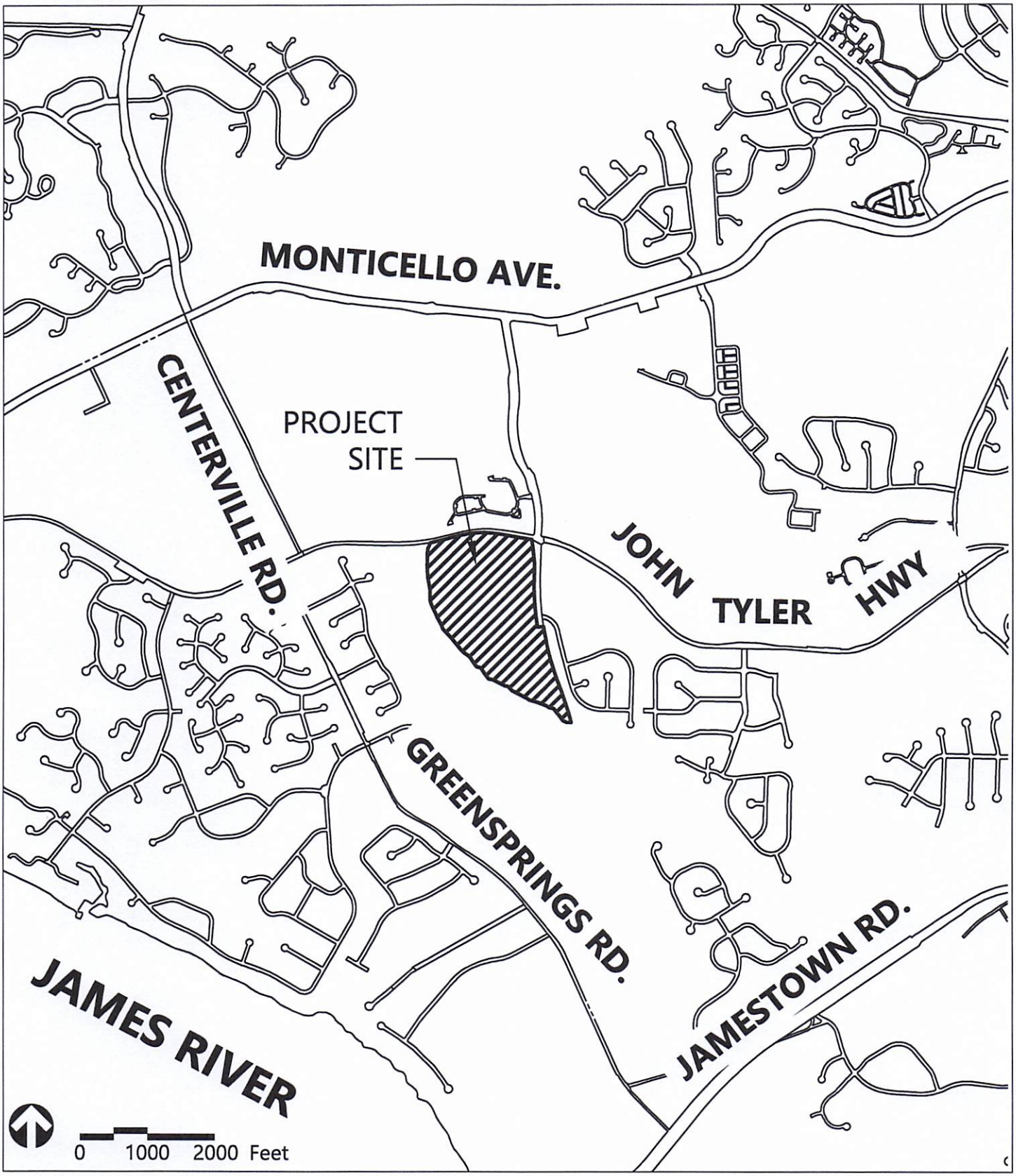
We are submitting an application for a Special Use Permit to maintain use of the existing learning cottage. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838



Figure 1: Proposed Temporary Trailer Classroom Location, Jamestown High School



VICINITY MAP

TEMPORARY CLASSROOM TRAILER INSTALLATION
JAMESTOWN HIGH SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

BERKELEY DISTRICT
3751 John Tyler Hwy, Williamsburg, VA 23185

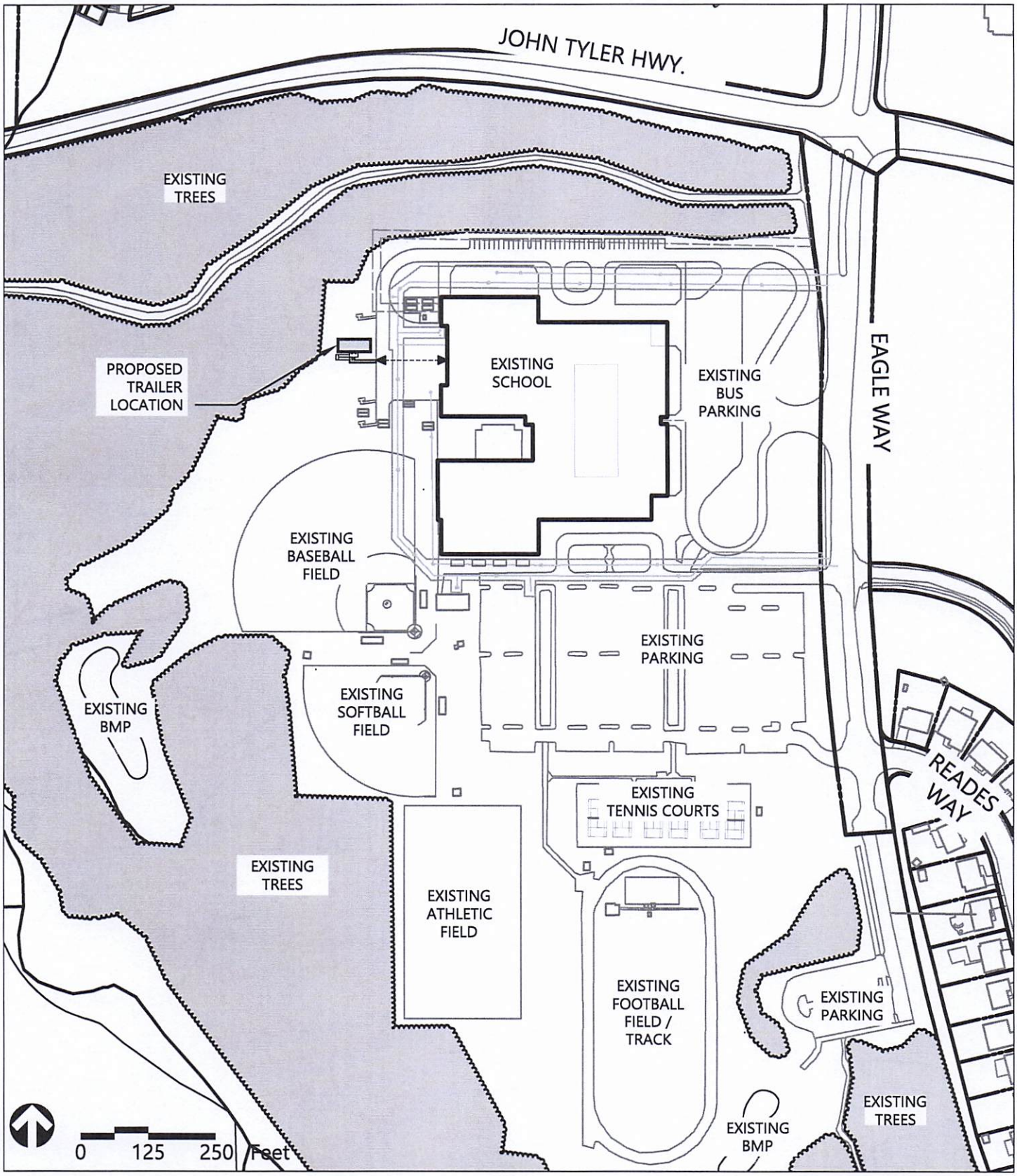
PARCEL ID: 4610100002D

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 1/27/2020

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



SITE PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION

JAMESTOWN HIGH SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

BERKELEY DISTRICT

3751 John Tyler Hwy, Williamsburg, VA 23185

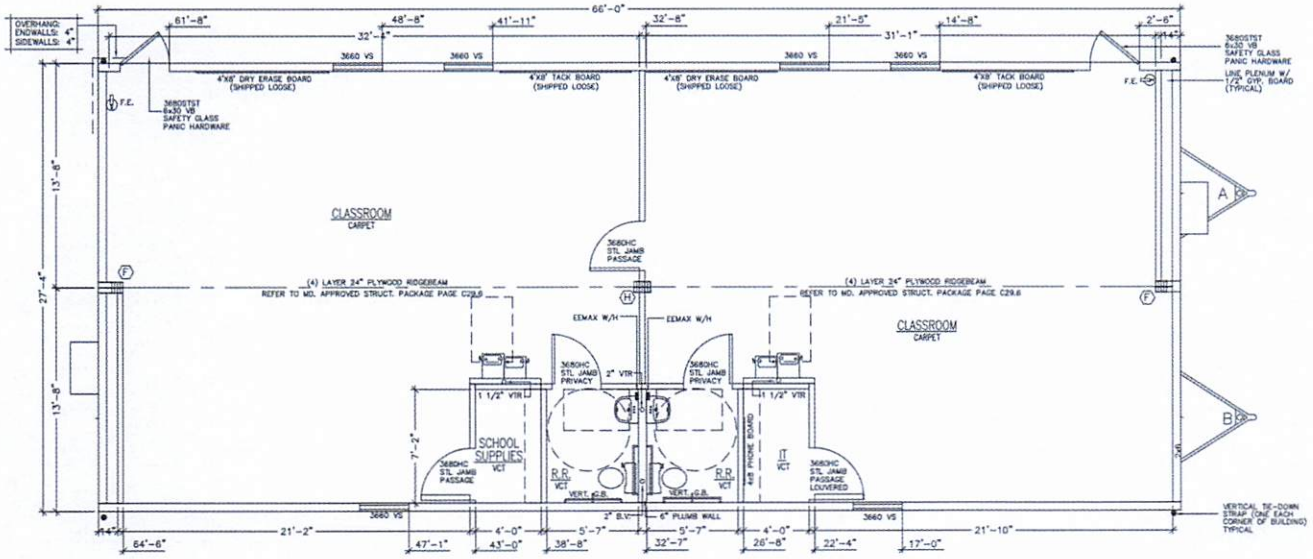
PARCEL ID: 4610100002D

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

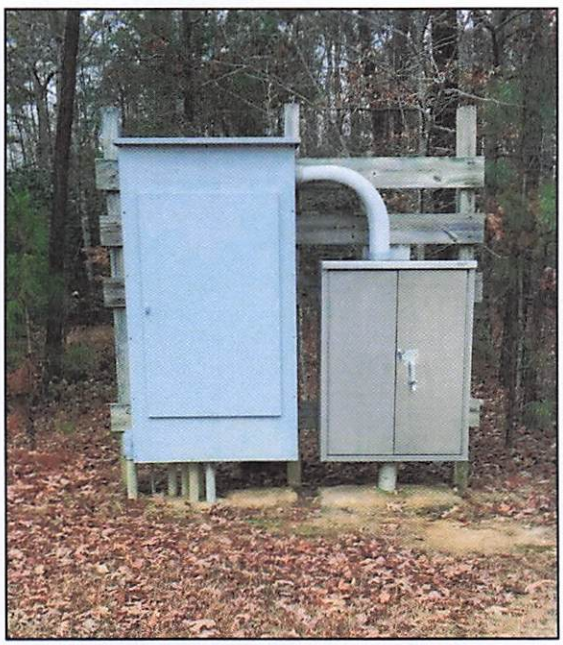
DATE: 1/27/2020

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE



EXISTING ELECTRICAL PANELS FOR TRAILERS

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES: (2) CLASSROOMS - APPROXIMATELY (50) STUDENTS

ELECTRICAL SERVICE: EXISTING (FROM FORMER TRAILER INSTALLATIONS)

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

JAMESTOWN HIGH SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

BERKELEY DISTRICT

3751 John Tyler Hwy, Williamsburg, VA 23185

PARCEL ID: 4610100002D

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 1/27/2020

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowner:	Williamsburg-James City County Schools
Proposal:	Obtain approval for two existing modular learning cottages at Norge Elementary School to remain on-site through the 2027/2028 school year. The learning cottages includes two classrooms each, which can accommodate up to 100 additional students.
Location:	7311 Richmond Road
Tax Map/Parcel No.:	2320100035
Project Acreage:	± 20.02 acres
Zoning:	PL, Public Land
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.
2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.
3. Impacts: See Impact Analysis on Page 4.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Page 4.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain Special Use Permit (SUP) approval for two existing modular learning cottages to remain on-site through the 2027/2028 school year. The learning cottage includes two classrooms, which can accommodate up to 100 additional students. The Board of Supervisors previously approved SUP-21-0010 on May 11, 2021, which granted approval for the learning cottages to remain on-site until July 1, 2025, at which time the approval expired. These learning cottages have remained on-site and have continued to be in use following this expiration date. As such, a new SUP is necessary.

Subject to the current proposal, the attached resolution (see Attachment No. 1) specifies that the new SUP would expire on July 1, 2028. The cottages would remain in their current locations as approved on a site plan application previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4 in the agenda materials for Case No. SUP-25-0021), Norge Elementary School is anticipated to have an enrollment of 568 students in the 2026/2027 school year and 563 students in the 2027/2028 school year.* Per the applicant's narrative, two new Bright Beginnings preschool buildings will open in Fall 2027 which will free approximately 350 classroom seats for elementary school use. Accordingly, a school zone redistricting process is underway to balance elementary school enrollment with available space. The narrative indicates the cottages are expected to remain in use until the school redistricting process is complete.

  **School system projected enrollment does not account for Pre-K/Bright Beginnings, which is offered at Norge Elementary School.*

PLANNING AND ZONING HISTORY

There have been many SUP applications for learning cottages over the past 38 years. The following is a brief overview of the previously submitted SUPs for learning cottages specific to Norge Elementary School:

- In June 1988, the Board of Supervisors approved Case No. SUP-14-88 for the addition of one temporary learning cottage until July 1, 1990.
- In April 1990, the Board of Supervisors approved Case No. SUP-17-90 for the addition of four temporary learning cottages until July 1, 1993.
- In May 1991, the Board of Supervisors approved Case No. SUP-12-91 for the addition of two temporary learning cottages until July 1, 1993.
- In April 1993, the Board of Supervisors approved Case No. SUP-10-93 to extend one trailer until July 1, 1994.
- In January 1994, the Board of Supervisors approved Case No. SUP-35-93 for the addition of seven temporary learning cottages and to extend Case No. SUP-10-93 until June 30, 1995.
- In March 2005, the Board of Supervisors approved Case No. SUP-14-05 for the addition of two temporary learning cottages until July 1, 2008.
- In April 2008, the Board of Supervisors approved Case No. SUP-10-07 to extend Case No. SUP-14-05 until July 1, 2010.
- In May 2021, the Board of Supervisors approved Case No. SUP-21-0010 for the addition of two temporary learning cottages until July 1, 2025. While this approval has expired, the learning cottages have remained on-site and in use. A new SUP is necessary for the continued use of the cottages to be in compliance with the Zoning Ordinance.

Additionally, the Board of Supervisors approved Case No. Z-24-0003/SUP-24-0003 in June 2024 to permit the construction of a Bright Beginnings preschool facility on the Norge Elementary School property. Construction of the facility is currently in progress. Completion of the facility will include the need to finalize a Deed of Natural Open Space and the accompanying Open Space plat, and finalizing an Easement and Declaration of Covenants for the inspection and maintenance of drainage systems.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	R-2, General Residential; and B-1, General Business	Single-family residential units and commercial uses	Low Density Residential
SOUTH	R-2, General Residential; LB, Limited Business; and B-1, General Business	Single-family residential units and commercial uses	Low Density Residential; and Neighborhood Commercial
EAST	B-1, General Business; and A-1, General Agricultural	Single-family residential units and commercial uses	Low Density Residential; and Economic Opportunity
WEST	R-2, General Residential	Single-family residential units	Low Density Residential

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- Subject property is located within a six-minute radius of Fire Station 1. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until the two Bright Beginnings preschool facilities and the school zone redistricting are complete.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	- The Stormwater and Resource Protection Division previously reviewed and approved the locations and details of the learning cottages installation in the previously approved site plan application.
Cultural/Historic	No Mitigation Required	- The learning cottages were previously approved on a site plan application which found no impacts to cultural or historic resources.
Nearby and Surrounding Properties	No Mitigation Required	- The learning cottages are interior to the subject property and are not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- The location of the learning cottages is adjacent to Richmond Road, which is a Community Character Corridor, and is located inside the Norge Community Character Area. The proposed learning cottages are not expected to impact the corridor or area.

COMPREHENSIVE PLAN

The surrounding properties are designated Low Density Residential and Neighborhood Commercial to the north, west, and south. Properties on the eastern side of Richmond Road are designated Economic Opportunity. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly owned lands, which include the Eastern State Hospital, military installations, County offices and facilities (schools), and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the two learning cottages are not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP26-16Norge

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative and Plan

R E S O L U T I O N

CASE NO. SUP-26-0016. NORGE ELEMENTARY SCHOOL LEARNING COTTAGES

WHEREAS, the Board of Supervisors of James City County, Virginia, has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of Norge Elementary School, has applied for an SUP to allow two temporary classroom trailers on property owned and developed by the applicant located at 7311 Richmond Road, further identified as James City County Real Estate Tax Map Parcel No. 2320100035 (the "Property"); and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-26-0016.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-26-0016 for the placement of two temporary classroom trailers as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2028.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

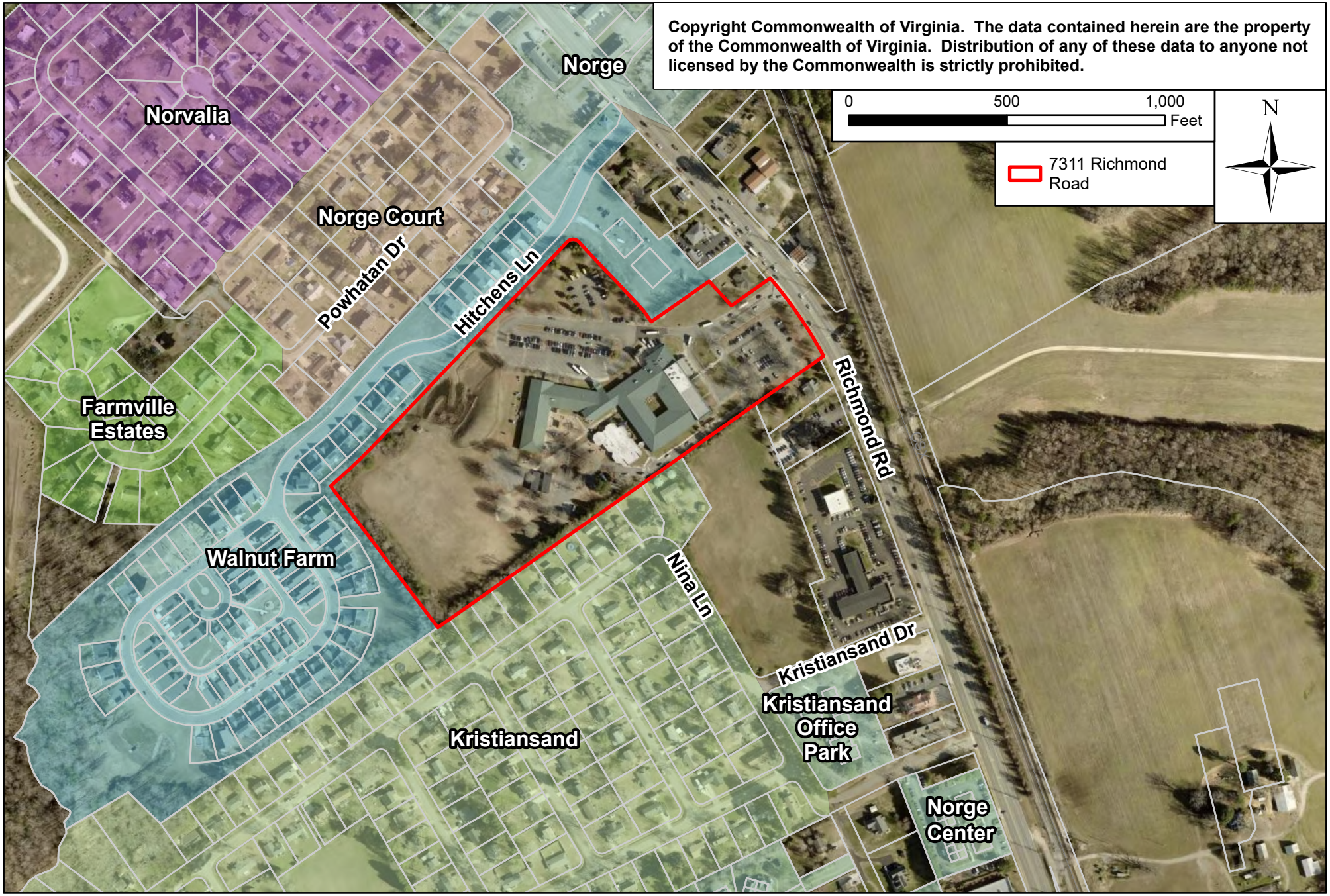
_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-16Norge-res

JCC SUP-26-0016.
Norge Elementary School Learning Cottages



SUP-26-0016

Special Use Permit Application

Norge
Elementary School Temporary Classroom Trailer

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 28, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottages at Norge Elementary School

Dear Mr. Leininger,

We are requesting a Special Use Permit for two (2) existing learning cottages, each with two (2) classrooms and ADA restrooms, adjacent to Norge Elementary School. The existing cottages were installed in 2021 under SUP-21-0010 (expired). Norge Elementary School is described in GIS as 7311 Richmond Road, Williamsburg VA 23188, Parcel ID 2320100035. Please see the attached proposed locations on Figure 1, next page.

In 2021, WJCC Schools modified the ratio of students-to-teachers in our schools based on the percentage of students in each school that were receiving free or reduced lunches. With smaller class sizes we faced an immediate need for four additional classrooms at Norge Elementary School. We are now in the process of building two new Bright Beginnings Pre-K Buildings which, once open in the Fall of 2027, will free classroom seating for approximately 350 K-5 students in our existing elementary schools. We expect the temporary learning cottages to be in-use through the 2027/2028 school year while the School Division redistricts elementary schools in response to opening the new Pre-K Buildings.

We are submitting an application for a Special Use Permit to maintain use of the existing learning cottages. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838

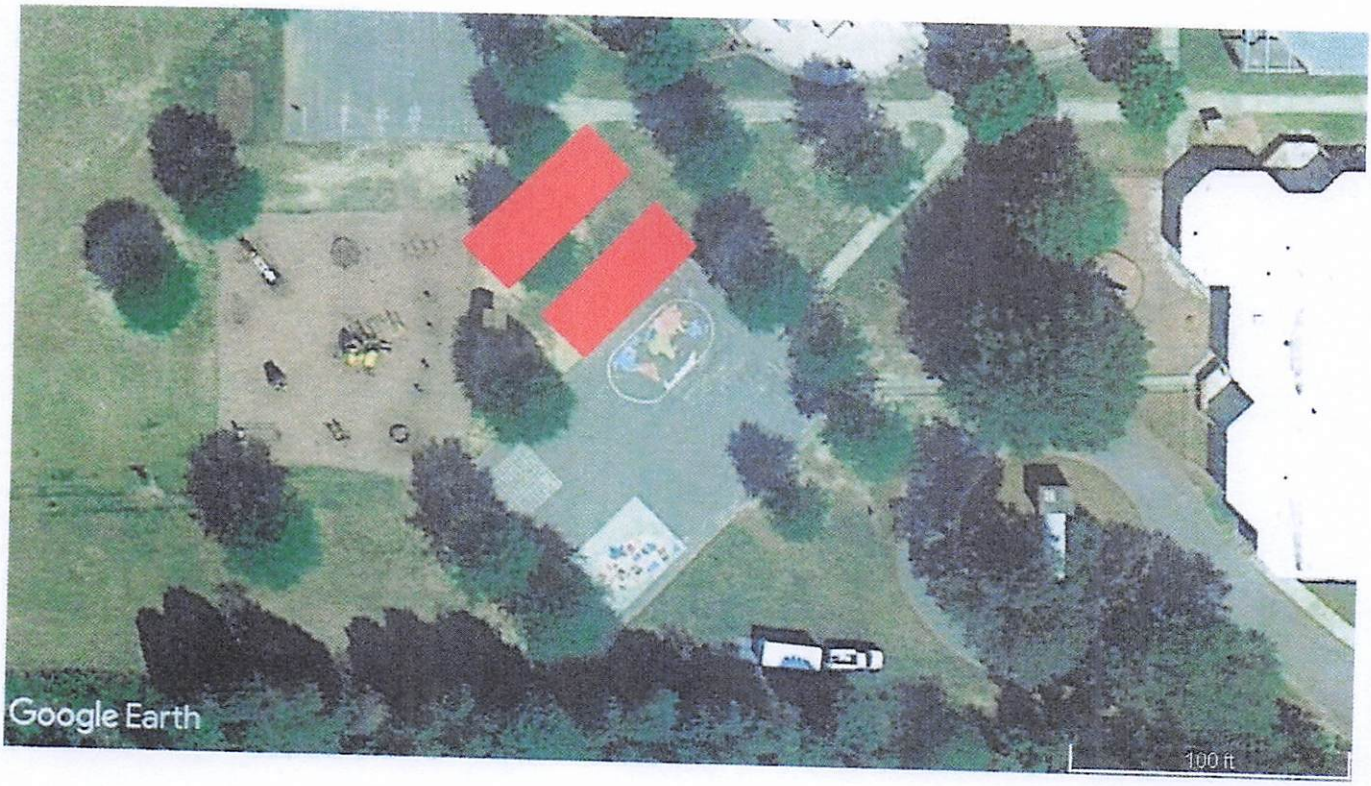


Figure 1. Classroom Trailer Location behind Norge Elementary School

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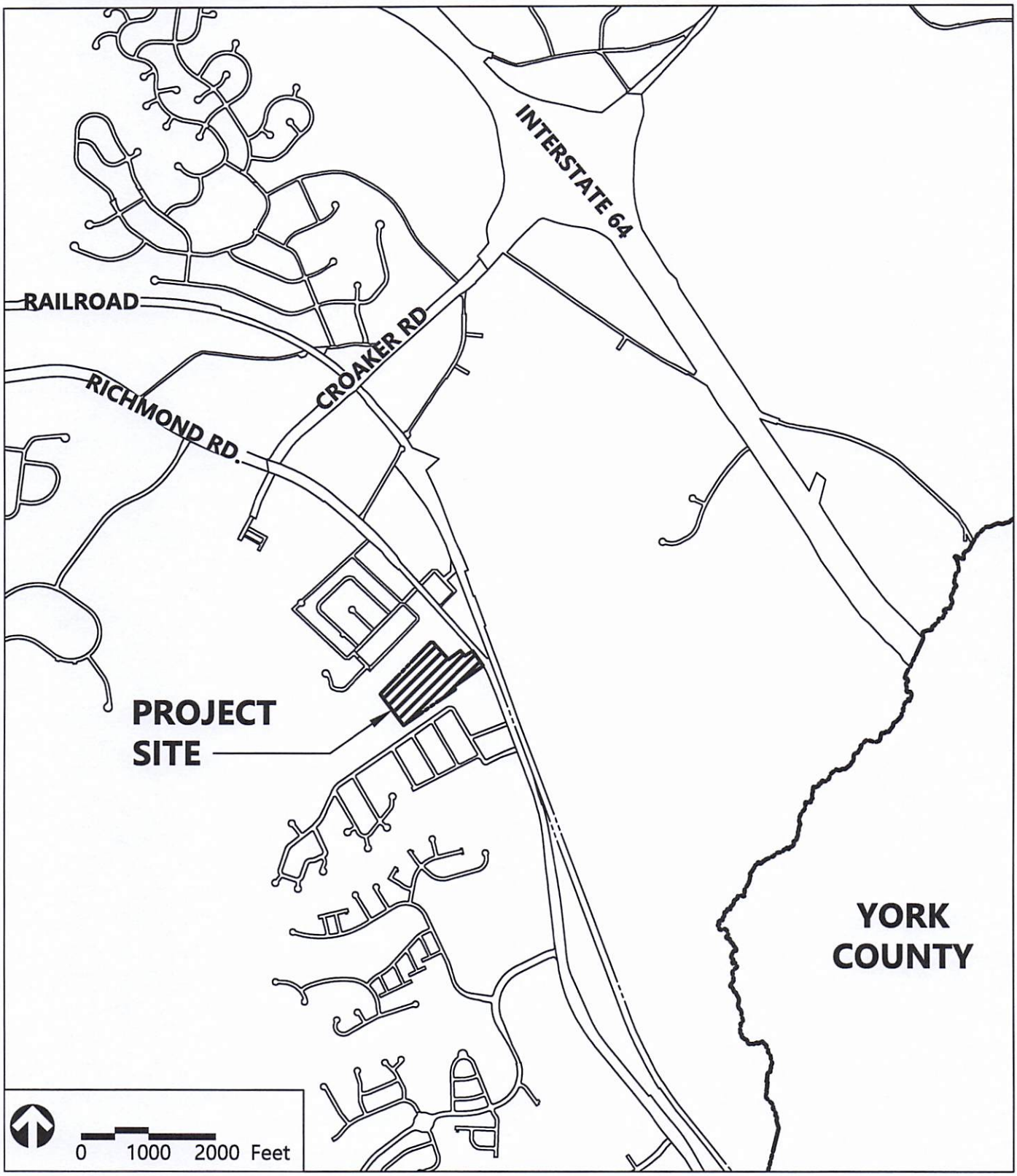

VICINITY MAP

TEMPORARY CLASSROOM TRAILER INSTALLATION
NORGE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT
7311 Richmond Road, Williamsburg, VA 23188

PARCEL ID: 2320100035

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

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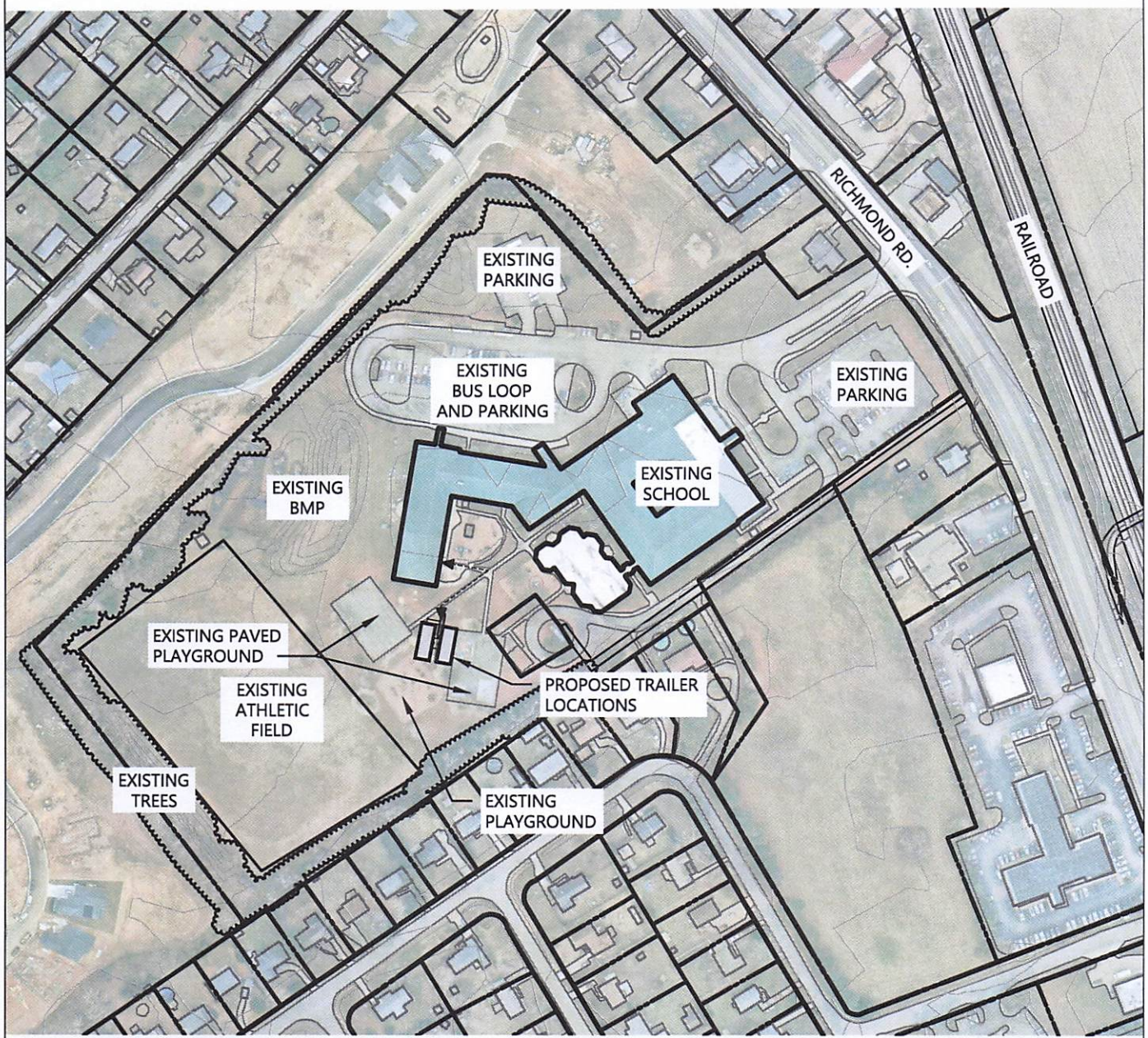


SITE PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION
NORGE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT
7311 Richmond Road, Williamsburg, VA 23188

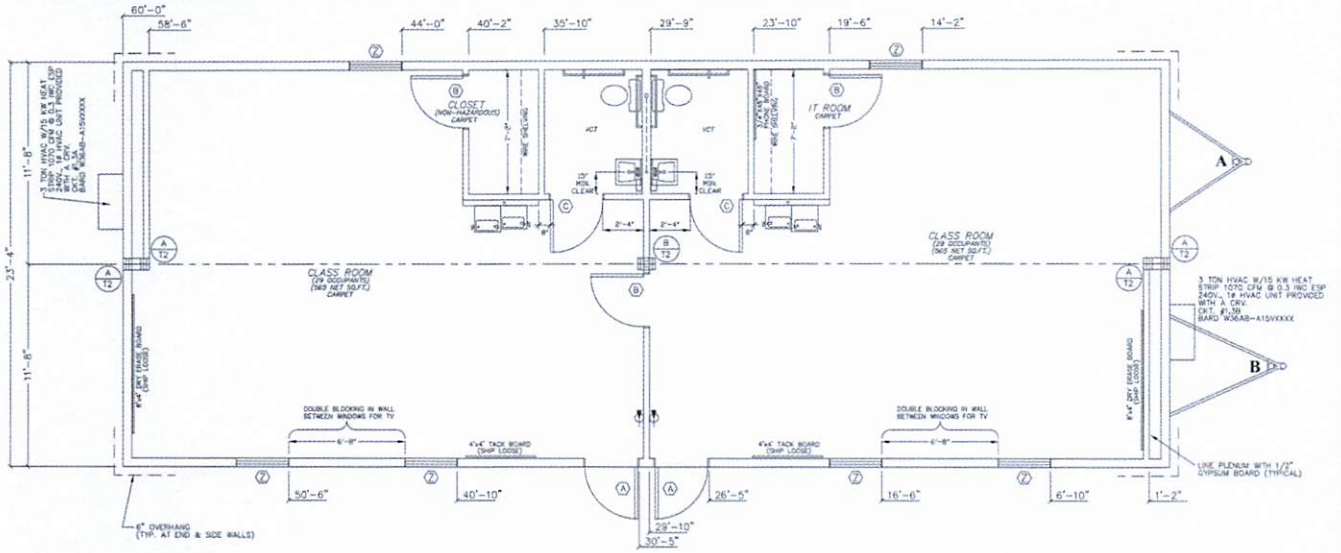
PARCEL ID: 2320100035

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

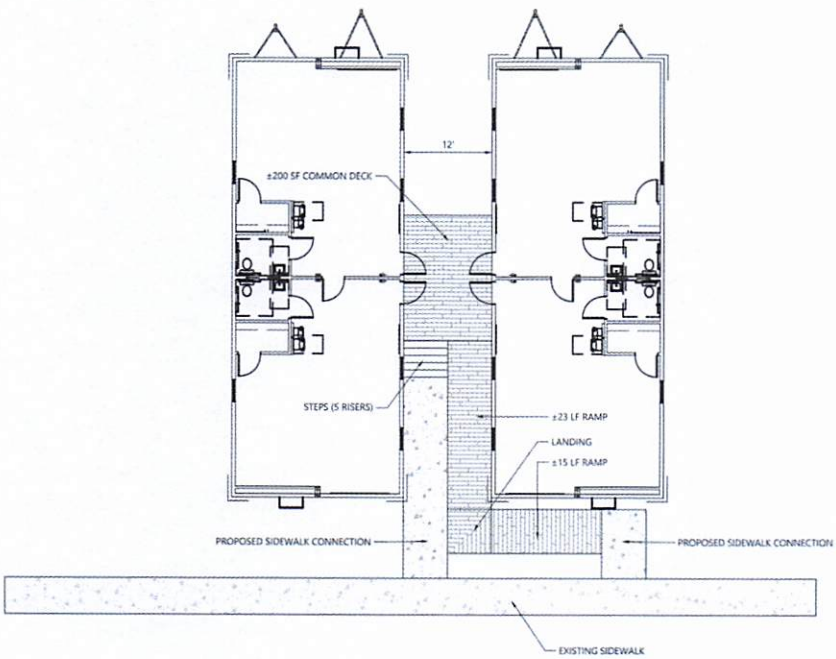
DATE: 03/30/2021

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE



2 CLASSROOM TRAILERS LAYOUT W/ COMMON RAMP AND STEPS

NOT TO SCALE

SUMMARY:

2 MODULAR TRAILER UNITS

ACCOMMODATES: (4) CLASSROOMS

ELECTRICAL SERVICE: EXISTING (FROM FORMER TRAILER INSTALLATIONS)

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION
NORGE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT
7311 Richmond Road, Williamsburg, VA 23188

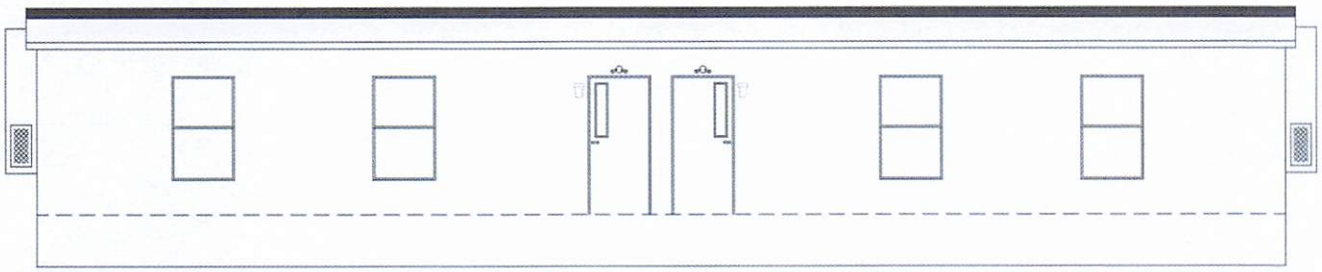
PARCEL ID: 2320100035

ZONING: PL - PUBLIC LANDS

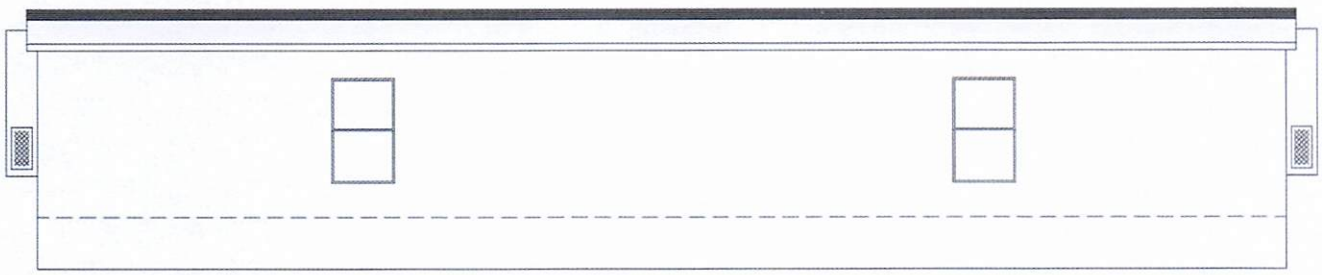
SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

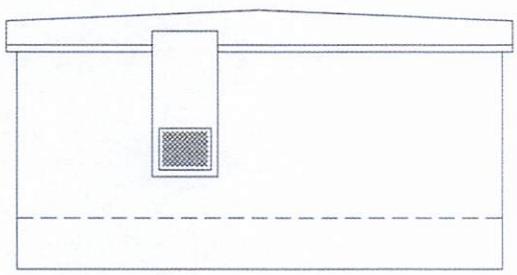
vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



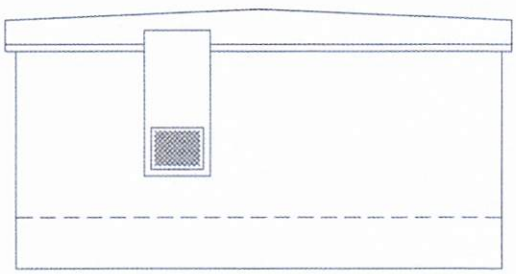
FRONT ELEVATION



REAR ELEVATION



LEFT ELEVATION



RIGHT ELEVATION

TYPICAL CLASSROOM TRAILER SECTION ELEVATION

NOT TO SCALE

ELEVATION DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

NORGE ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT

7311 Richmond Road, Williamsburg, VA 23188

PARCEL ID: 2320100035

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 03/30/2021

vhb

351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

SUMMARY FACTS

Applicant:	Mr. James Falzone
Landowner:	Williamsburg-James City County Schools
Proposal:	Obtain approval for four existing modular learning cottages at Stonehouse Elementary School to remain on-site through the 2027/2028 school year. The learning cottages include two classrooms each, which can accommodate up to 200 additional students in total.
Location:	3651 Rochambeau Drive
Tax Map/Parcel No.:	1310100020
Project Acreage:	± 22.415 acres
Zoning:	PL, Public Land
Comprehensive Plan:	Federal, State, or County Land
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	N/A
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. With the proposed conditions, staff finds the proposal will not impact the surrounding zoning and development.

2. Staff finds the proposal consistent with the recommendations of the adopted 2045 Comprehensive Plan.

3. Impacts: See Impact Analysis on Pages 4-5.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Pages 4-5.

SUMMARY STAFF RECOMMENDATION

Approval, subject to the proposed conditions.

PROJECT DESCRIPTION

- The proposal is to obtain approval to have four existing modular learning cottages remain on-site through the 2027/2028 school year. The learning cottages include two classrooms each, which can accommodate up to 200 additional students in total. The Board of Supervisors previously approved multiple Special Use Permits (SUP) for these learning cottages.
    - SUP-20-0004 was approved on March 10, 2020, which granted approval for one learning cottage to remain on-site until July 1, 2024, at which time the approval expired. This learning cottage has remained on-site and has continued to be in use following this expiration date. As such, a new SUP is necessary.

- SUP-21-0011 was approved on May 11, 2021, which granted approval for two learning cottages to remain on-site until July 1, 2025, at which time the approval expired. These learning cottages have remained on-site and have continued to be in use following this expiration date. As such, a new SUP is necessary.
- SUP-22-0031 was approved on February 14, 2023, which granted approval for one learning cottage to remain on-site until July 1, 2027.

Subject to the current proposal to have all four learning cottages remain on-site through the 2027/2028 school year, the attached resolution (see Attachment No. 1) would bring all four learning cottages into one SUP which would expire on July 1, 2028. The cottages would remain in their current locations as approved on site plan applications previously submitted to the County.

- According to the "Projected Enrollment-Low" in the *Final Report: Enrollment Projections Update October 21, 2025* (see Attachment No. 4 in the agenda materials for Case No. SUP-25-0021), Stonehouse Elementary School is anticipated to have an enrollment of 852 students in the 2026/2027 school year and 840 students in the 2027/2028 school year.* Per the applicant's narrative, two new Bright Beginnings preschool buildings will open in Fall 2027 which will free approximately 350 classroom seats for elementary school use. Accordingly, a school zone redistricting process is underway to balance elementary school enrollment with available space. The narrative indicates the cottage is expected to remain in use until the school redistricting process is complete.

  **School system projected enrollment does not account for Pre-K/Bright Beginnings, which is not offered at Stonehouse Elementary School.*

PLANNING AND ZONING HISTORY

There have been many SUP applications for learning cottages over the past 23 years. The following is a brief overview of the previously submitted SUPs for learning cottages specific to Stonehouse Elementary School:

- In April 2003, the Board of Supervisors approved Case No. SUP-08-03 for the addition of one temporary learning cottage until July 1, 2006.
- In March 2004, the Board of Supervisors approved Case No. SUP-08-04 for the addition of one temporary learning cottage until July 1, 2007.
- In March 2005, the Board of Supervisors approved Case No. SUP-13-05 for the addition of two temporary learning cottages until July 1, 2008.
- In April 2006, the Board of Supervisors approved Case No. SUP-09-06 for the addition of two temporary learning cottages and to extend Case No. SUP-08-03 until July 1, 2007.
- In May 2007, the Board of Supervisors approved Case No. SUP-11-07 to extend Case Nos. SUP-08-04 and SUP-13-05, and two temporary learning cottages from Case No. SUP-09-06 until July 1, 2009.
- In March 2020, the Board of Supervisors approved Case No. SUP-20-0004 for the addition of one temporary learning cottage until July 1, 2024. While this approval has expired, the learning cottage has remained on-site and in use. A new SUP is necessary for the continued use of the cottage to be in compliance with the Zoning Ordinance.

- In May 2021, the Board of Supervisors approved Case No. SUP-21-0011 for the addition of two temporary learning cottages until July 1, 2025. While this approval has expired, the learning cottages have remained on-site and in use. A new SUP is necessary for the continued use of these cottages to be in compliance with the Zoning Ordinance.

- In February 2023, the Board of Supervisors approved Case No. SUP-22-0031 for the addition of one temporary learning cottage until July 1, 2027. This approval remains active at this time, however the applicant's current request includes having this learning cottage remain on-site until July 1, 2028. Staff notes that a CCTV inspection of drainage pipes is required prior to the approval of a Final Stormwater As-built for this learning cottage.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	B-1, General Business; and R-5, Multifamily Residential	Single-family residential units and place of public assembly	Low Density Residential
SOUTH	A-1, General Agricultural	Agricultural uses	Low Density Residential
EAST	A-1, General Agricultural; and B-1, General Business	Williamsburg Christian Academy and agricultural uses	Low Density Residential
WEST	A-1, General Agricultural; and R-2, General Residential	Single-family residential units and agricultural uses	Low Density Residential; and Rural Lands

Impacts/Potentially Unfavorable Conditions	Status *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	Considerations/Proposed Mitigation of Potentially Unfavorable Conditions
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate additional traffic.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pedestrian/bicycle accommodations are not necessitated as a result of this proposed use.
Public Safety	No Mitigation Required	- Subject property is located within a six-minute radius of Fire Station 1. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- The proposal is expected to help accommodate school enrollment until the two Bright Beginnings preschool facilities and the school zone redistricting are complete.
Public Parks and Recreation	No Mitigation Required	- The proposal does not generate impacts that require mitigation to the County's parks and recreation services or facilities.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	No Mitigation Required	- The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs	No Mitigation Required	- The Stormwater and Resource Protection Division previously reviewed and approved the location and details of the learning cottage installation in the previously approved site plan application. - A CCTV inspection is required for drainage piping associated with the learning cottage approved in SUP-22-0031.
Cultural/Historic	No Mitigation Required	- The learning cottages were previously approved on a site plan application which found no impacts to cultural or historic resources.

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Nearby and Surrounding Properties	No Mitigation Required	- The learning cottages are interior to the subject property and are not expected to have any negative impact on surrounding properties.
Community Character	No Mitigation Required	- The location of the learning cottages is not adjacent to any Community Character Corridors or located inside any Community Character Areas.

COMPREHENSIVE PLAN

The surrounding properties are designated Low Density Residential. The 2045 Comprehensive Plan Land Use Map designates this property as Federal, State, or County Land. Federal, State, or County Land designated properties are publicly owned lands, which include the Eastern State Hospital, military installations, County offices and facilities (schools), and larger utilities such as the Hampton Roads Sanitation District Treatment Plant.

Staff finds the proposed use consistent with the Comprehensive Plan as it is accessory to a recommended land use. From a land use perspective, staff finds that the four learning cottages are not expected to have an impact on the school site or adjacent properties.

STAFF RECOMMENDATION

Staff finds the proposal compatible with surrounding development and consistent with the recommendations of the adopted Comprehensive Plan. Staff recommends that the Board of Supervisors approve this application, subject to the attached conditions (Attachment No. 1).

MR/ap
SUP26-17Stnhse

Attachments:
1. Resolution
2. Location Map
3. Applicant Narrative and Plan

R E S O L U T I O N

CASE NO. SUP-26-0017. STONEHOUSE ELEMENTARY SCHOOL LEARNING COTTAGES

WHEREAS, the Board of Supervisors of James City County, Virginia, has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. James Falzone, on behalf of Williamsburg-James City County Schools, owner of Stonehouse Elementary School, has applied for an SUP to allow four temporary classroom trailers on property owned and developed by the applicant located at 3651 Rochambeau Drive, further identified as James City County Real Estate Tax Map Parcel No. 1310100020 (the "Property"); and

WHEREAS, one of the four requested temporary classroom trailers is currently permitted to remain on-site until July 1, 2027, as approved in Case No. SUP-23-0031; and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-26-0017.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby approve Case No. SUP-26-0017 for the placement of four temporary classroom trailers as described above and on the attached site location map subject to the following conditions:

1. This SUP shall be valid until July 1, 2028.

2. Within 90 days of the date of approval of this SUP, final plan and permit approvals shall be obtained for all unpermitted improvements made on the Property. Should extenuating circumstances apply, the Director of Community Development may approve an alternative timeline for all final plan and permit approvals to be obtained within nine months of the date of approval of this SUP.

3. The SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

BE IT FURTHER RESOLVED that Case No. SUP-26-0017 shall replace and supersede Case No. SUP-23-0031 and Case No. SUP-23-0031 shall no longer have any force or effect.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

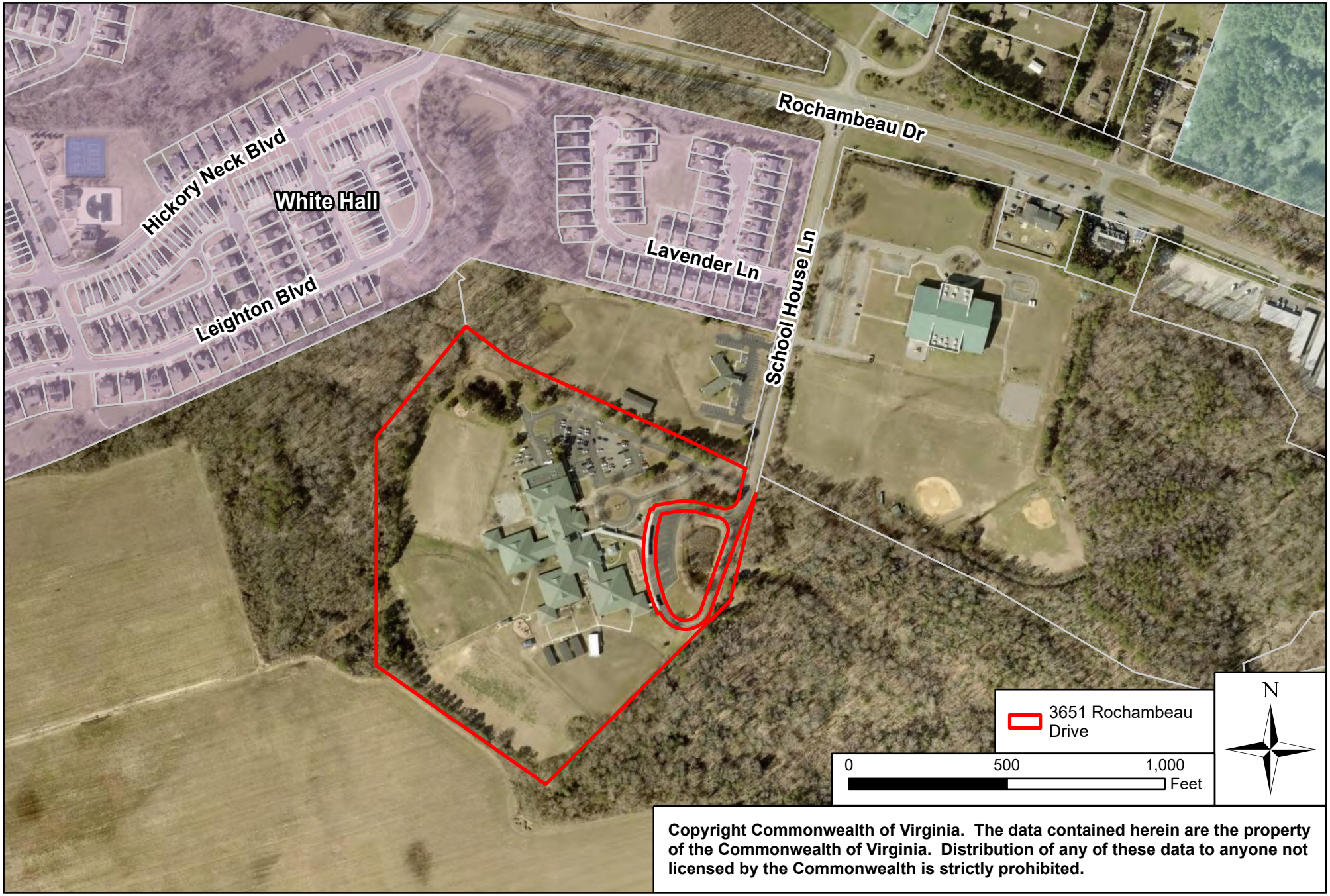
_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-17Stnhse-res

JCC SUP-26-0017.
Stonehouse Elementary School Learning Cottages



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SUP-26-0017

Special Use Permit Application

Stonehouse Elementary School Temporary Classroom Trailer

Williamsburg, VA

PREPARED BY

Williamsburg/ James City County Public Schools
c/o Mr. Jim Falzone
597 Jolly Pond Road
Williamsburg, VA 23188
james.falzone@wjccschools.org

April 27. 2026

Williamsburg-James City County Public Schools
Department of Operations
597 Jolly Pond Road • Williamsburg, VA 23188
Phone: (757) 565-3838 | wjccschools.org

April 28, 2026

James City County Planning Department
Attn: Mr. Tom Leininger, Senior Planner
101 Mounts Bay Road, Building A
Williamsburg VA 23185

Re: Renewing Special Use Permit for Learning Cottages at Stonehouse Elementary School

Dear Mr. Leininger,

We are requesting a Special Use Permit for four (4) existing learning cottages, each with two (2) classrooms and ADA restrooms, adjacent to Stonehouse Elementary School. One of the existing cottages was installed in 2020 under SUP-20-0004 (expired), two cottages were installed in 2021 under SUP-21-0011 (expired), and one cottage was installed in 2022 under SUP-22-0031 (expired). Stonehouse Elementary School is described in GIS as 3651 Rochambeau Dr., Williamsburg VA 23188, Parcel ID 1310100020. Please see the attached proposed locations on Figure 1, next page.

In 2021, WJCC Schools modified the ratio of students-to-teachers in our schools based on the percentage of students in each school that were receiving free or reduced lunches. With smaller class sizes we faced an immediate need for additional classrooms at Stonehouse Elementary School. We are now in the process of building two new Bright Beginnings Pre-K Buildings which, once open in the Fall of 2027, will free classroom seating for approximately 350 K-5 students in our existing elementary schools. We expect the temporary learning cottages to be in-use through the 2027/2028 school year while the School Division redistricts elementary schools in response to opening the new Pre-K Buildings.

We are submitting an application for a Special Use Permit to maintain use of the existing learning cottages. We feel that this plan will meet the needs of our students and the requirements of the County. Please email or call me if you need additional information as you review our application submissions. Thanks for your consideration in this matter.

With Regards,

Jim Falzone
Supervisor of Facilities and Capital Projects
Williamsburg-James City County Public Schools
james.falzone@wjccschools.org
Office (757) 565-3838

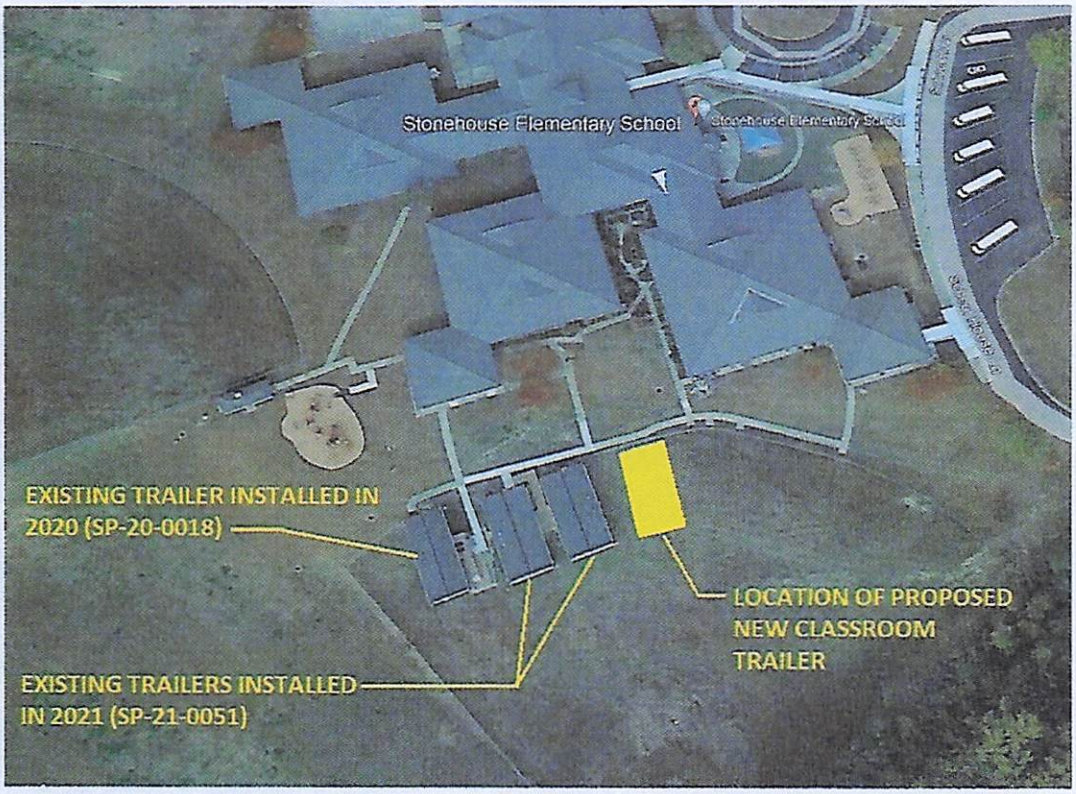
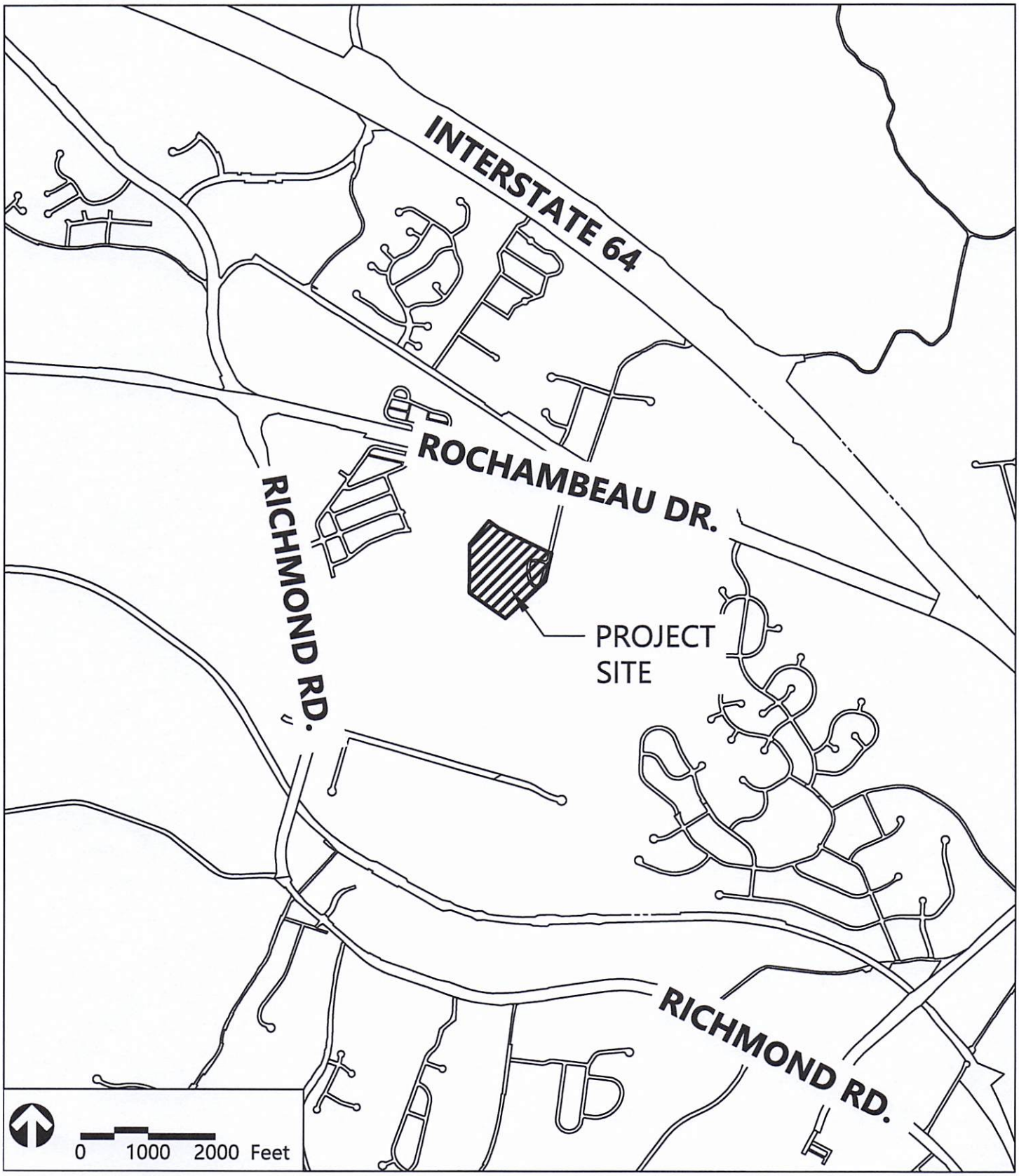


Figure 1. Proposed Classroom Trailer Location behind Stonehouse Elementary School



VICINITY MAP

TEMPORARY CLASSROOM TRAILER INSTALLATION
STONEHOUSE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT
3651 Rochambeau Drive, Williamsburg, VA 23188

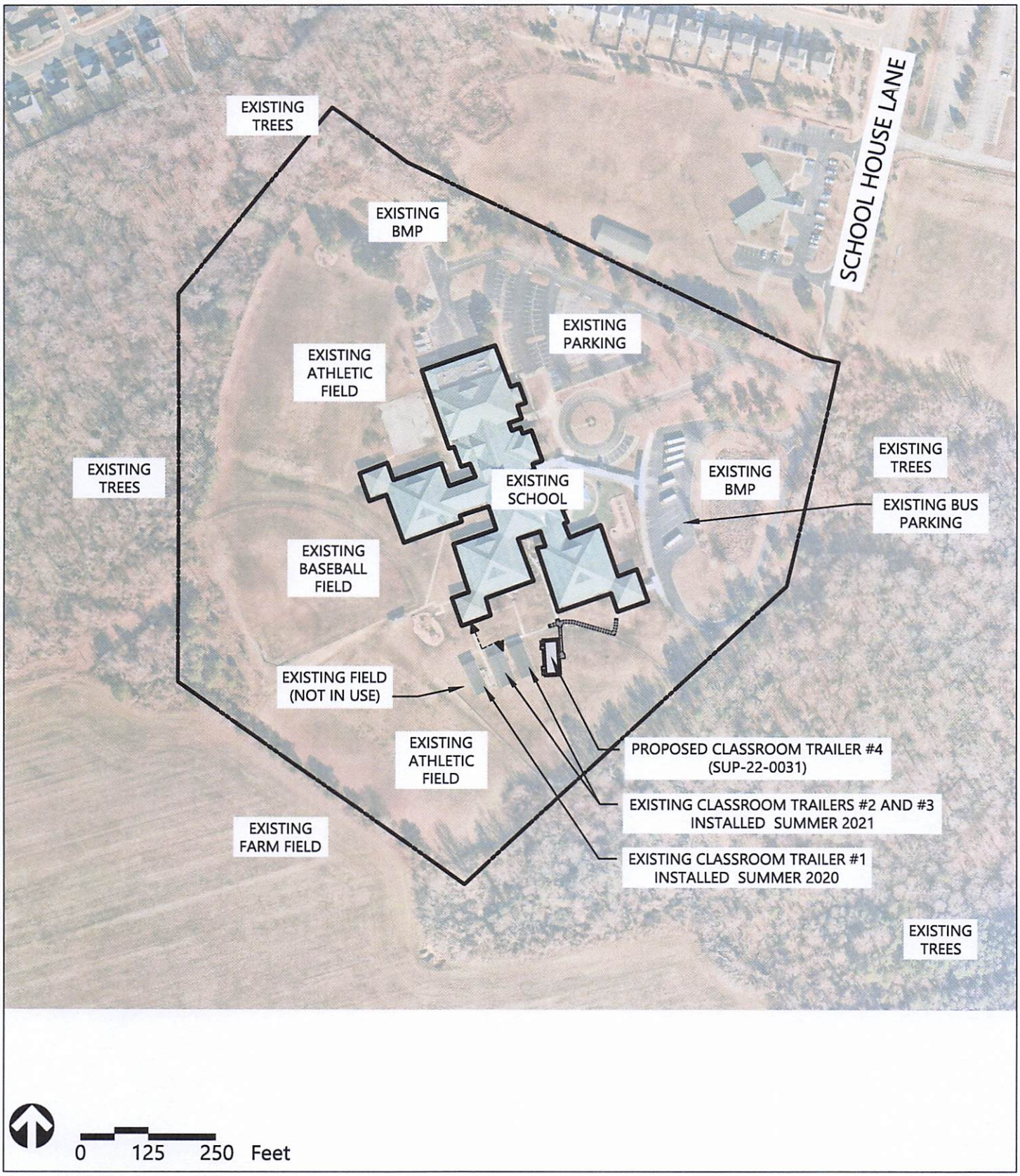
PARCEL ID: 1310100020

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 1/27/2020

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



MASTER PLAN

TEMPORARY CLASSROOM TRAILER INSTALLATION
STONEHOUSE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT
3651 Rochambeau Drive, Williamsburg, VA 23188

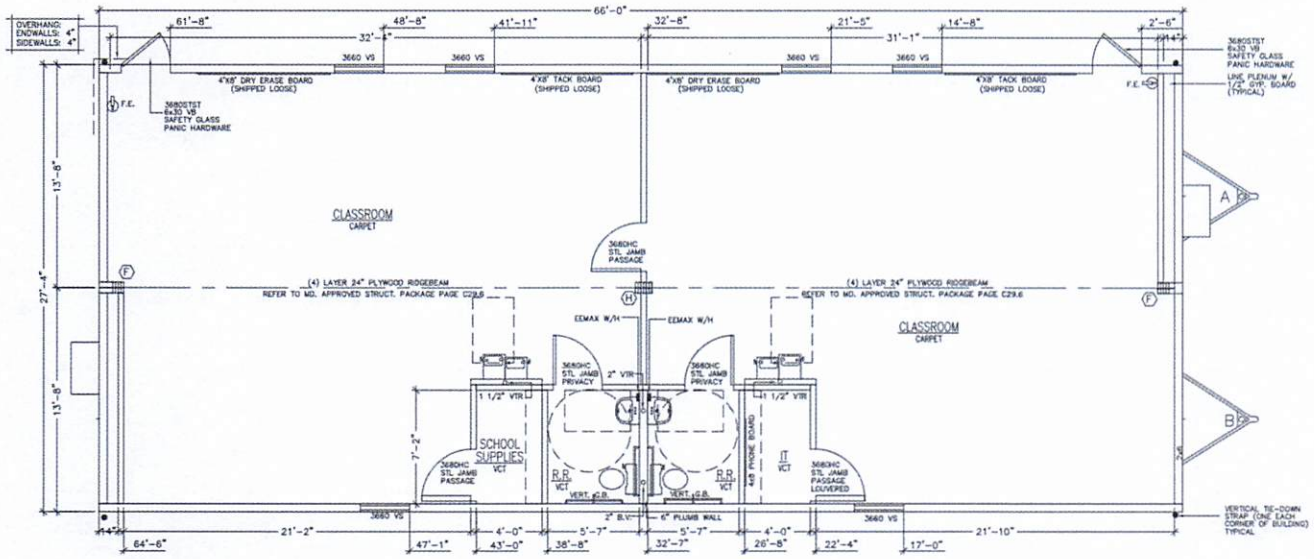
PARCEL ID: 1310100020

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

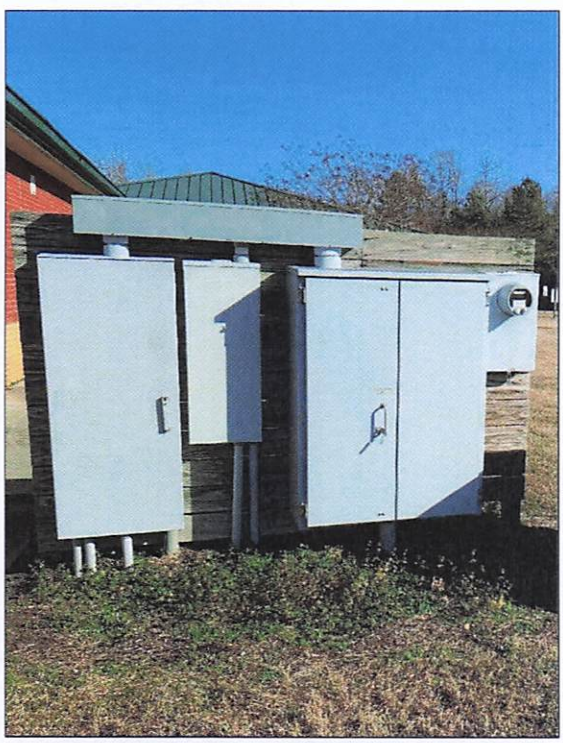
DATE: 1/23/2022

vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE



EXISTING ELECTRICAL PANELS FOR TRAILERS

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES: (2) CLASSROOMS - APPROXIMATELY (50) STUDENTS

ELECTRICAL SERVICE: EXISTING (FROM FORMER TRAILER INSTALLATIONS)

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

STONEHOUSE ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT

3651 Rochambeau Drive, Williamsburg, VA 23188

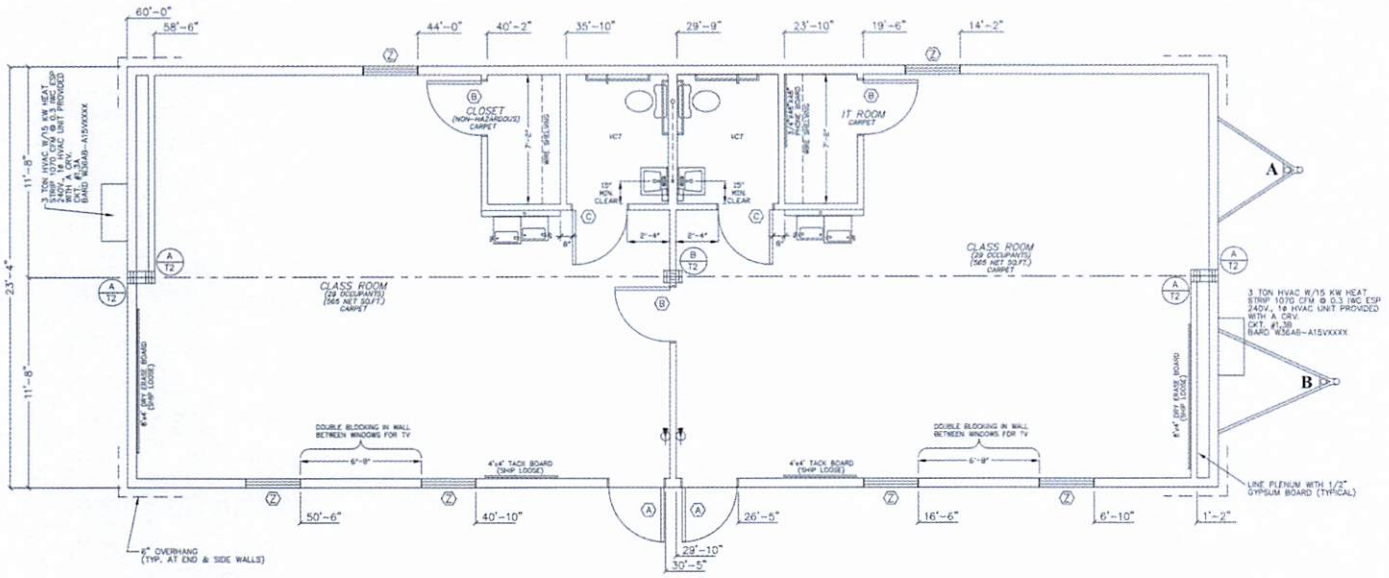
vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

PARCEL ID: 1310100020

ZONING: PL - PUBLIC LANDS

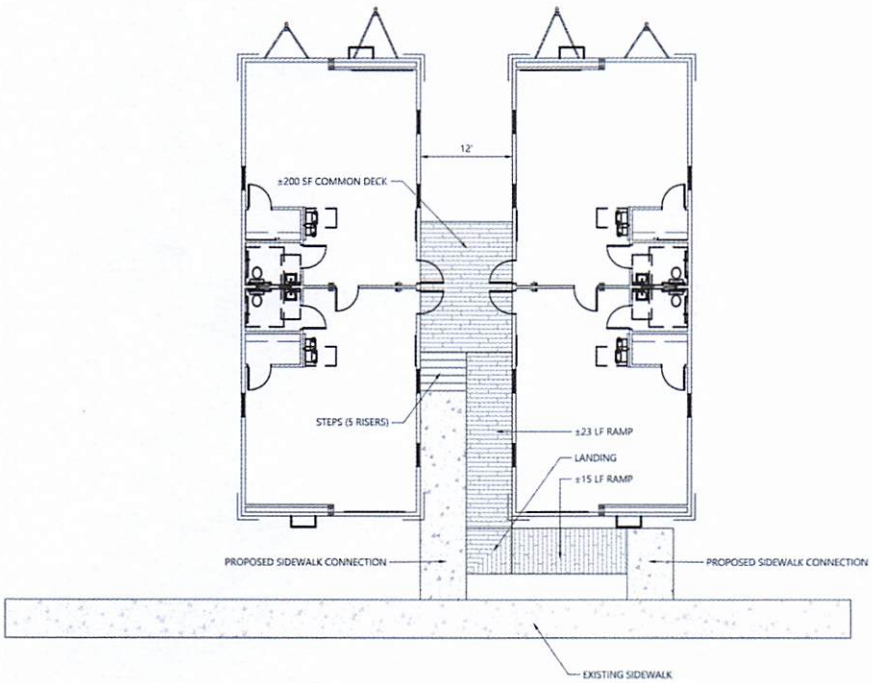
SPECIAL USE PERMIT APPLICATION

DATE: 1/27/2020



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE



2 CLASSROOM TRAILERS LAYOUT W/ COMMON RAMP AND STEPS

NOT TO SCALE

SUMMARY:

2 MODULAR TRAILER UNITS

ACCOMMODATES: (4) CLASSROOMS

ELECTRICAL SERVICE: EXISTING (FROM FORMER TRAILER INSTALLATIONS)

MECHANICAL: INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS: EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

STONEHOUSE ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT

3651 Rochambeau Drive, Williamsburg, VA 23188

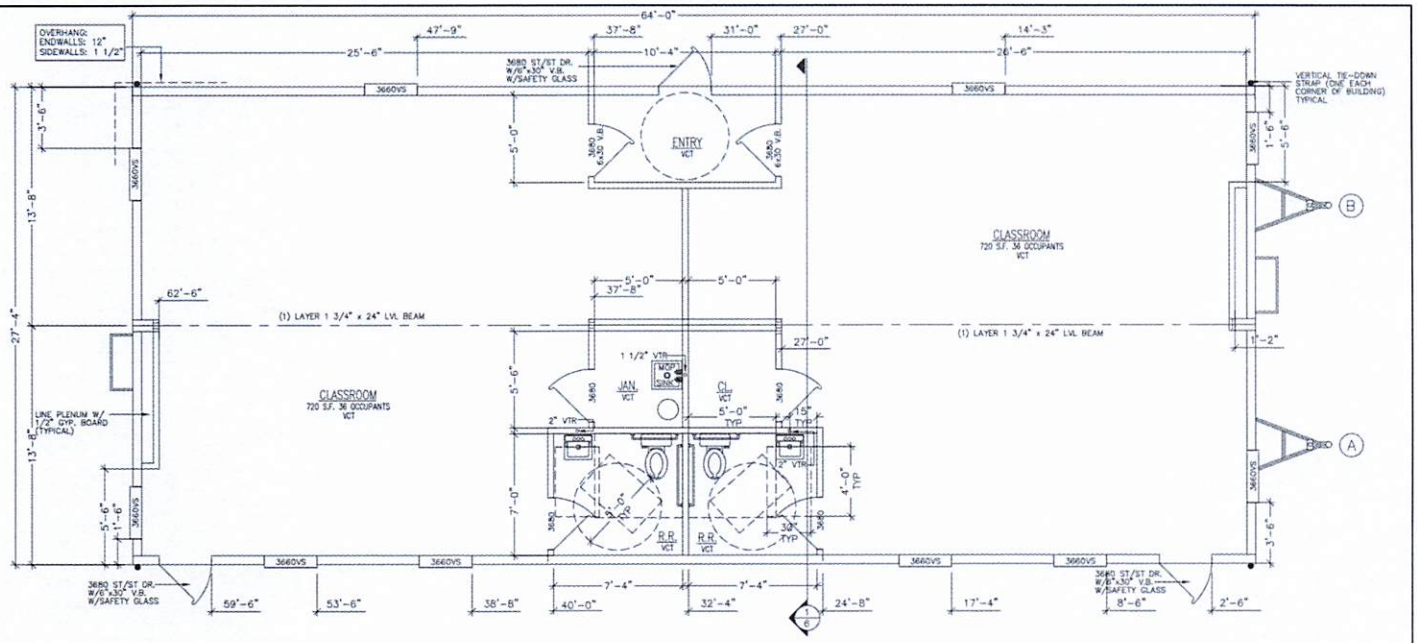
vhb
351 McLaws Circle
Suite 3
Williamsburg, VA 23185-5797
P 757.220.0500

PARCEL ID: 1310100020

ZONING: PL - PUBLIC LANDS

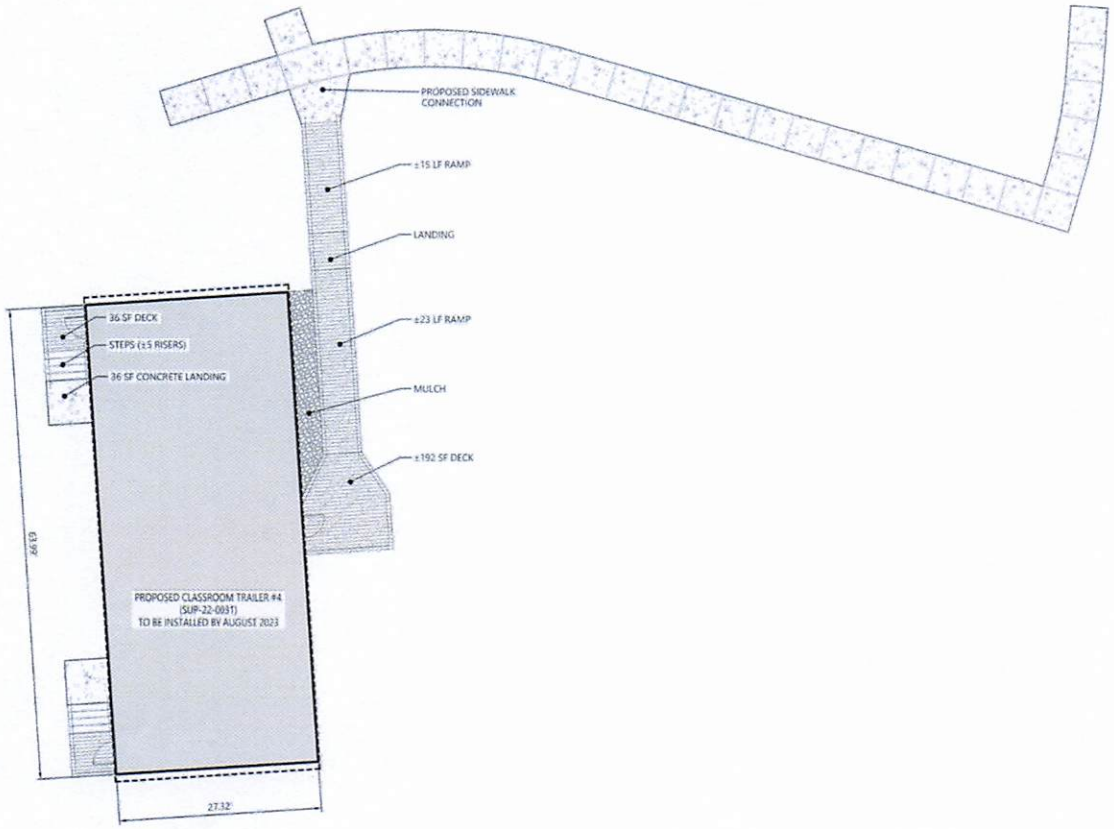
SPECIAL USE PERMIT APPLICATION

DATE: 3/30/2021



TYPICAL CLASSROOM TRAILER FLOOR PLAN

NOT TO SCALE



CLASSROOM TRAILER LAYOUT WITH RAMP AND STEPS

NOT TO SCALE

SUMMARY:

1 MODULAR TRAILER UNIT

ACCOMMODATES:
(2) CLASSROOMS

ELECTRICAL SERVICE:
EXISTING

MECHANICAL:
INCLUDED IN UNIT

PLUMBING: TO BE PROVIDED AND CONNECTED TO EXISTING SERVICE

COMMUNICATIONS AND FIRE ALARM: TO BE PROVIDED AND CONNECTED TO SCHOOL NETWORK

PEDESTRIAN ACCESS: ADA RAMPS TO BE APPROVED BY LOCAL BUILDING OFFICIAL

VEHICULAR ACCESS:
EXISTING

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION
STONEHOUSE ELEMENTARY SCHOOL
WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT
3651 Rochambeau Drive, Williamsburg, VA 23188

PARCEL ID: 1310100020

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

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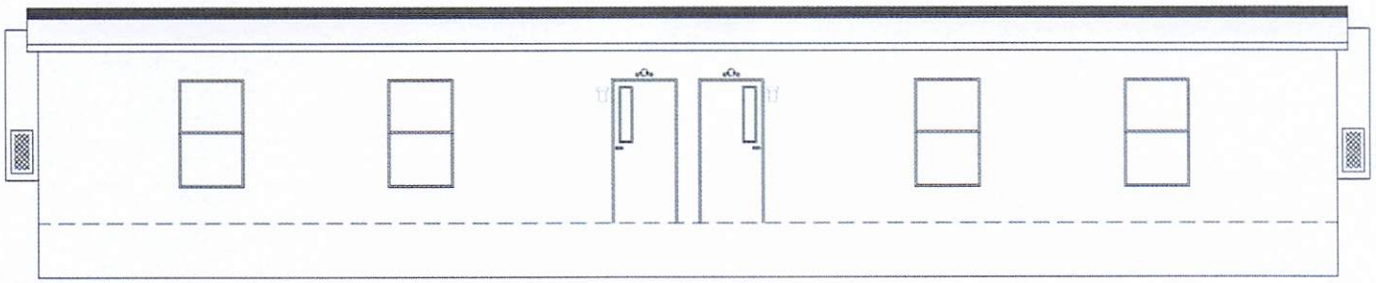
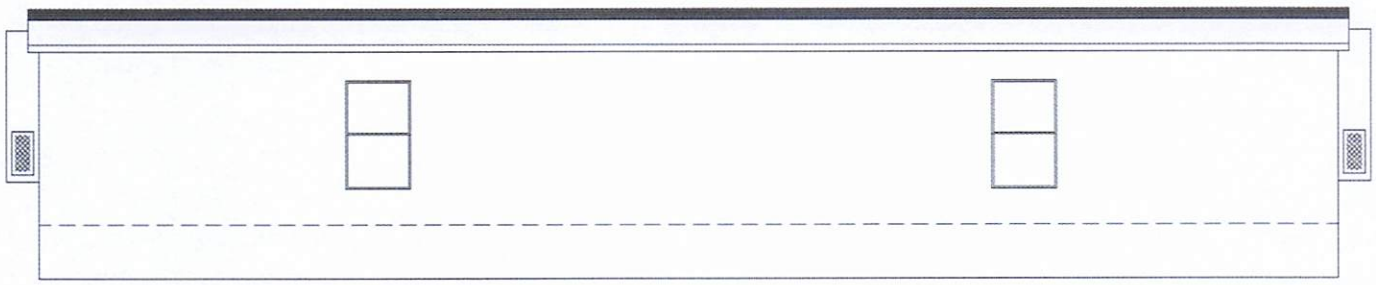
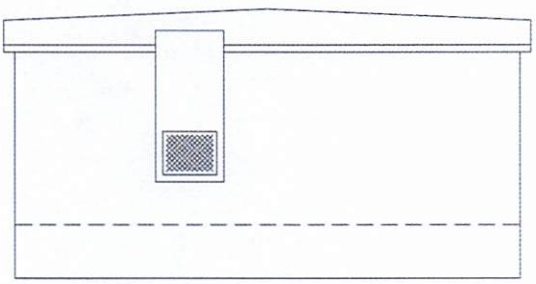


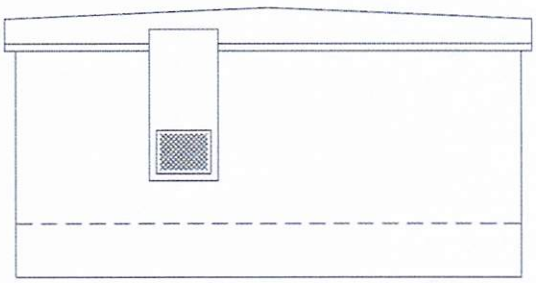
FRONT ELEVATION



REAR ELEVATION



LEFT ELEVATION



RIGHT ELEVATION

TYPICAL CLASSROOM TRAILER SECTION ELEVATION

NOT TO SCALE

DETAILS

TEMPORARY CLASSROOM TRAILER INSTALLATION

STONEHOUSE ELEMENTARY SCHOOL

WILLIAMSBURG/JAMES CITY COUNTY SCHOOLS

STONEHOUSE DISTRICT

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P 757.220.0500

PARCEL ID: 1310100020

ZONING: PL - PUBLIC LANDS

SPECIAL USE PERMIT APPLICATION

DATE: 3/30/2021

M E M O R A N D U M

DATE: June 9, 2026

TO: The Board of Supervisors

FROM: Paul D. Holt, III, Director of Community Development

SUBJECT: Resolutions of Support for Smart Scale Transportation Funding Applications

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Background

In 2013, House Bill (HB) 2313 was signed into law, creating a more sustainable revenue source supporting transportation funding. While passage of this bill enabled the Commonwealth Transportation Board (CTB) to add approximately $4 billion in funding to the Six-Year Improvement Program (SYIP), there are still many transportation needs that cannot be addressed with available revenues.

To find a way to better balance transportation needs and prioritize investments for both urban and rural communities throughout the Commonwealth, new legislation, House Bill 2 (HB2), was signed into law in 2014. HB2 required the CTB to develop and implement a quantifiable and transparent prioritization process for making funding decisions for capacity, enhancing projects within the SYIP. The ultimate goal in the implementation of HB2, now called Smart Scale, is to ensure the best use of limited transportation funds. Transparency and accountability are crucial aspects of this process. Smart Scale projects are evaluated based on a uniform set of measures that are applicable statewide, while recognizing that factors should be valued differently based on regional priorities.

Generally, the prioritization process for the Hampton Roads District evaluates projects in the following major factor areas: congestion mitigation (45%), accessibility (25%); economic development (5%), safety (15%), and environmental quality (10%).

The Smart Scale process does not cover all types of projects within the SYIP. There are many other sources of funding including maintenance and rehabilitation, safety, operations, and other federal and state funding categories (e.g., Revenue Sharing, Congestion Mitigation and Air Quality Improvement Program, and Regional Surface Transportation Program).

There are two main pathways to funding within the Smart Scale process: the Construction District Grant Program and the High-Priority Projects Program. These two grant programs were established under HB1887 and approved by the General Assembly in February 2015.

The High-Priority Projects Program (as defined in Virginia Code § 33.2-370) refers to projects of regional or statewide significance that address a transportation need identified for a Corridor of Statewide Significance or a regional network in the VTrans Multimodal Transportation Plan. In this program, projects and strategies are compared to projects and strategies submitted statewide.

The Construction District Grant Program (as defined in Virginia Code § 33.2-371) refers to projects and strategies solicited from local governments that address a need for a Corridor of Statewide Significance, regional network, improvements to promote urban development areas, or safety improvements identified in the VTrans Multimodal Transportation Plan. In this program, candidate projects and strategies from localities within a highway construction district are compared against projects and strategies within the same construction district.

For both programs, projects and strategies are to be screened, evaluated, and selected according to the process established pursuant to Smart Scale. In 2016, James City County successfully secured funds through this process for the Longhill Road Phase I Widening. In 2017, James City County successfully secured funds through this process for the Skiffes Creek Connector. In 2018, the Longhill Road Shared Use Path secured funding for the proposed shared use path over Route 199. In 2020, James City County successfully secured funds through this process for the Airport Road, Richmond Road, and Mooretown Road improvements.

Proposed Projects

This year, James City County intends to apply for the following projects for Smart Scale funding:

1. *Route 60 (Pocahontas Trail) Trail757 Shared Use Path*

   The proposed project is a portion of the second segment of the Route 60 (Pocahontas Trail) Widening and Complete Street project that addresses transportation and safety needs along a 2-mile stretch of Pocahontas Trail between Fire Station 2 and James River Elementary School. This specific application is from Magruder Avenue to James River Elementary School and proposes a shared use path that is along the Trail757 trail route. This Urban Principal Arterial Roadway has a posted speed limit of 40-45 miles per hour. Currently, there are no designated accommodations for bicyclists and very limited pedestrian connections. The typical roadway cross-section consists of two lanes, no shoulders, and turn lanes at some of the intersections. Roadway drainage is provided by deep, open ditches immediately adjacent to the roadway with little to no existing shoulder. The lack of safe pedestrian and bicycle accommodations in an area with a mix of residential, transit, and industrial traffic causes conflicts and unsafe conditions for all non-motorized travelers. This project specifically includes an 8-foot shared use path and transit stop improvements with bus pull-offs. Such improvements will provide bicycle and pedestrian safety needs for the second half of the Route 60 (Pocahontas Trail) Widening and Complete Street project and provide a portion of Trail757.

2. HR05: Route 199 (Humelsine Parkway) at Brookwood Drive

   To best address current and future safety and capacity needs, the proposed Thru-Cut alternative will reroute through movements on Brookwood Drive (Route 700) to unsignalized U-turn locations to the east and west of the main intersection. Left turns from Brookwood Drive and Route 199 will remain permitted.

3. HR05: Route 199 (Humelsine Pkwy) at Route 5 (John Tyler Highway)

   The preferred concept will allow left turns and through movements on Route 199 to occur simultaneously by displacing the left turn movements. Two additional signals will be constructed along Route 199 to accommodate the left turn movements. Left turns from John Tyler Highway will still be permitted. A shared use path will be constructed along John Tyler Highway to connect Strawberry Plains Road to the existing sidewalk on John Tyler Highway at Ferncliff Drive. A signalized intersection will be constructed at the intersection of John Tyler Highway and John Tyler Lane/Strawberry Plains Road. This signal will be coordinated with the intersection at Route 199 to prevent queues from spilling back into either intersection.

4. HR-25-04: Centerville Road; Route 60 and Route 199 Ramp Improvements

   The preferred alternative selected for this location proposes modifying the ramp approaches to include additional turn lanes. The northbound Route 60 left-turn lane is also being extended.

5. HR-25-04: Centerville Road; Route 60 and Route 614 Intersection Improvements

   At the Route 60/Route 614 intersection, the preferred alternative proposes the reconfiguration of the westbound receiving lanes, beginning at the Centerville Road intersection and terminating just past the RIRO Lightfoot Marketplace access point. There, the innermost travel lane would be converted into a through lane. The outermost travel lane would be converted into a shared through-right lane. The Opportunity Way/Centerville Road intersection will be modified to feature offset dual left-turn lanes. At the Route 60, Lightfoot Road intersection, the preferred alternative converts the existing signalized intersection into a partial Median U-turn (MUT) intersection. A median opening will be provided for Route 60 northbound.

Staff recommends the Board of Supervisors adopt the attached resolutions expressing support for these projects to be submitted through the upcoming Smart Scale cycle.

PDH/tm
SmtScleTranFnd-mem

Attachments:
1. Resolution Route 60 (Pocahontas Trail) Trail757 Shared Use Path
2. Resolution HR05: Route 199 (Humelsine Parkway) at Brookwood Drive
3. Resolution HR05: Route 199 (Humelsine Parkway) at Route 5 (John Tyler Highway)
4. Resolution HR-25-04: Centerville Road; Route 60 and Route 199 Ramp Improvements
5. Resolution HR-25-04: Centerville Road; Route 60 and Route 614 Intersection Improvements
6. Location Map Route 60 (Pocahontas Trail) Trail757 Shared Use Path
7. Location Map HR05: Route 199 (Humelsine Parkway) at Brookwood Drive
8. Location Map HR05: Route 199 (Humelsine Parkway) at Route 5 (John Tyler Highway)
9. Location Map HR-25-04: Centerville Road; Route 60 and Route 199 Ramp Improvements
10. Location Map HR-25-04: Centerville Road; Route 60 and Route 614 Intersection Improvements

R E S O L U T I O N

RESOLUTION OF SUPPORT FOR SMART SCALE TRANSPORTATION FUNDING

APPLICATION: ROUTE 60 (POCAHONTAS TRAIL) TRAIL757 SHARED USE PATH

WHEREAS, in an effort to ensure the best use of limited transportation funds, the Commonwealth has established a transportation funding formula known as Smart Scale, codified in Virginia Code §§ 33.2-214.1, 33.2-370, and 33.2-371; and

WHEREAS, James City County's Comprehensive Plan, *Our County, Our Shared Future - James City County 2045 Comprehensive Plan*, includes transportation as a priority focus area; and

WHEREAS, as noted within the Comprehensive Plan, having a viable multimodal transportation network is fundamental to maintaining a strong economy and a high quality of life for the community; and

WHEREAS, pursuing funding for multimodal transportation infrastructure and facilities is a key initiative to *Protect Community Character and Enhance the Built Environment*; one of eight goals identified within the County's adopted Strategic Plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, expresses support for submitting an application for funding for the Route 60 (Pocahontas Trail) Trail757 Shared Use Path through Smart Scale.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
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MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SmtScleTranFnd60_757-res

R E S O L U T I O N

RESOLUTION OF SUPPORT FOR SMART SCALE TRANSPORTATION FUNDING

APPLICATION: HR05: ROUTE 199 (HUMELSINE PARKWAY)

AT BROOKWOOD DRIVE

WHEREAS, in an effort to ensure the best use of limited transportation funds, the Commonwealth has established a transportation funding formula known as Smart Scale, codified in Virginia Code §§ 33.2-214.1, 33.2-370, and 33.2-371; and

WHEREAS, James City County's Comprehensive Plan, *Our County, Our Shared Future - James City County 2045 Comprehensive Plan*, includes transportation as a priority focus area; and

WHEREAS, as noted within the Comprehensive Plan, having a viable multimodal transportation network is fundamental to maintaining a strong economy and a high quality of life for the community; and

WHEREAS, pursuing funding for multimodal transportation infrastructure and facilities is a key initiative to *Protect Community Character and Enhance the Built Environment*; one of eight goals identified within the County's adopted Strategic Plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, expresses support for submitting an application for funding for Route 199 (Humelsine Parkway) at Brookwood Drive through Smart Scale.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

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Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SmtScleTranFnd199_BW-res

R E S O L U T I O N

RESOLUTION OF SUPPORT FOR SMART SCALE TRANSPORTATION FUNDING

APPLICATION: HR05: ROUTE 199 (HUMELSINE PARKWAY) AT

ROUTE 5 (JOHN TYLER HIGHWAY)

WHEREAS, in an effort to ensure the best use of limited transportation funds, the Commonwealth has established a transportation funding formula known as Smart Scale, codified in Virginia Code §§ 33.2-214.1, 33.2-370, and 33.2-371; and

WHEREAS, James City County's Comprehensive Plan, *Our County, Our Shared Future - James City County 2045 Comprehensive Plan*, includes transportation as a priority focus area; and

WHEREAS, as noted within the Comprehensive Plan, having a viable multimodal transportation network is fundamental to maintaining a strong economy and a high quality of life for the community; and

WHEREAS, pursuing funding for multimodal transportation infrastructure and facilities is a key initiative to *Protect Community Character and Enhance the Built Environment*; one of eight goals identified within the County's adopted Strategic Plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, expresses support for submitting an application for funding for HR05: Route 199 (Humelsine Parkway) at Route 5 (John Tyler Highway) through Smart Scale.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
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MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SmtScleTranFnd5_199-res

R E S O L U T I O N

RESOLUTION OF SUPPORT FOR SMART SCALE TRANSPORTATION FUNDING

APPLICATION: HR-25-04: CENTERVILLE ROAD; ROUTE 60 AND

ROUTE 199 RAMP IMPROVEMENTS

WHEREAS, in an effort to ensure the best use of limited transportation funds, the Commonwealth has established a transportation funding formula known as Smart Scale, codified in Virginia Code §§ 33.2-214.1, 33.2-370, and 33.2-371; and

WHEREAS, James City County's Comprehensive Plan, *Our County, Our Shared Future - James City County 2045 Comprehensive Plan*, includes transportation as a priority focus area; and

WHEREAS, as noted within the Comprehensive Plan, having a viable multimodal transportation network is fundamental to maintaining a strong economy and a high quality of life for the community; and

WHEREAS, pursuing funding for multimodal transportation infrastructure and facilities is a key initiative to *Protect Community Character and Enhance the Built Environment*; one of eight goals identified within the County's adopted Strategic Plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, expresses support for submitting an application for funding for HR-25-04: Centerville Road; Route 60 and Route 199 Ramp Improvements through Smart Scale.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
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Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SmtScleTranFnd60_199-res

R E S O L U T I O N

RESOLUTION OF SUPPORT FOR SMART SCALE TRANSPORTATION FUNDING

APPLICATION: HR-25-04: CENTERVILLE ROAD; ROUTE 60 AND ROUTE

614 INTERSECTION IMPROVEMENTS

WHEREAS, in an effort to ensure the best use of limited transportation funds, the Commonwealth has established a transportation funding formula known as Smart Scale, codified in Virginia Code §§ 33.2-214.1, 33.2-370, and 33.2-371; and

WHEREAS, James City County's Comprehensive Plan, *Our County, Our Shared Future - James City County 2045 Comprehensive Plan*, includes transportation as a priority focus area; and

WHEREAS, as noted within the Comprehensive Plan, having a viable multimodal transportation network is fundamental to maintaining a strong economy and a high quality of life for the community; and

WHEREAS, pursuing funding for multimodal transportation infrastructure and facilities is a key initiative to *Protect Community Character and Enhance the Built Environment*; one of eight goals identified within the County's adopted Strategic Plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, expresses support for submitting an application for funding for HR-25-04: Centerville Road; Route 60 and Route 614 Intersection Improvements through Smart Scale.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

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MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

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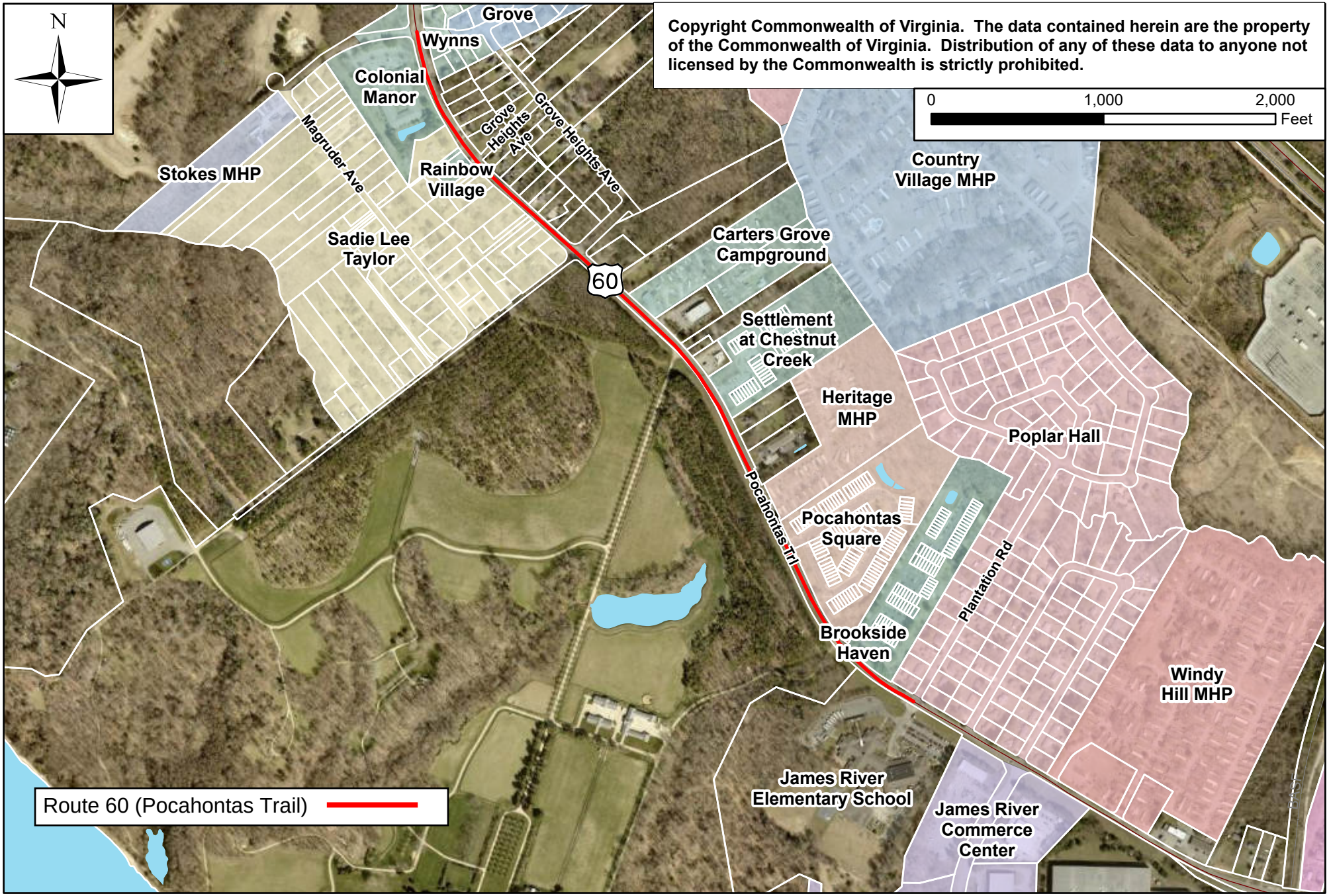
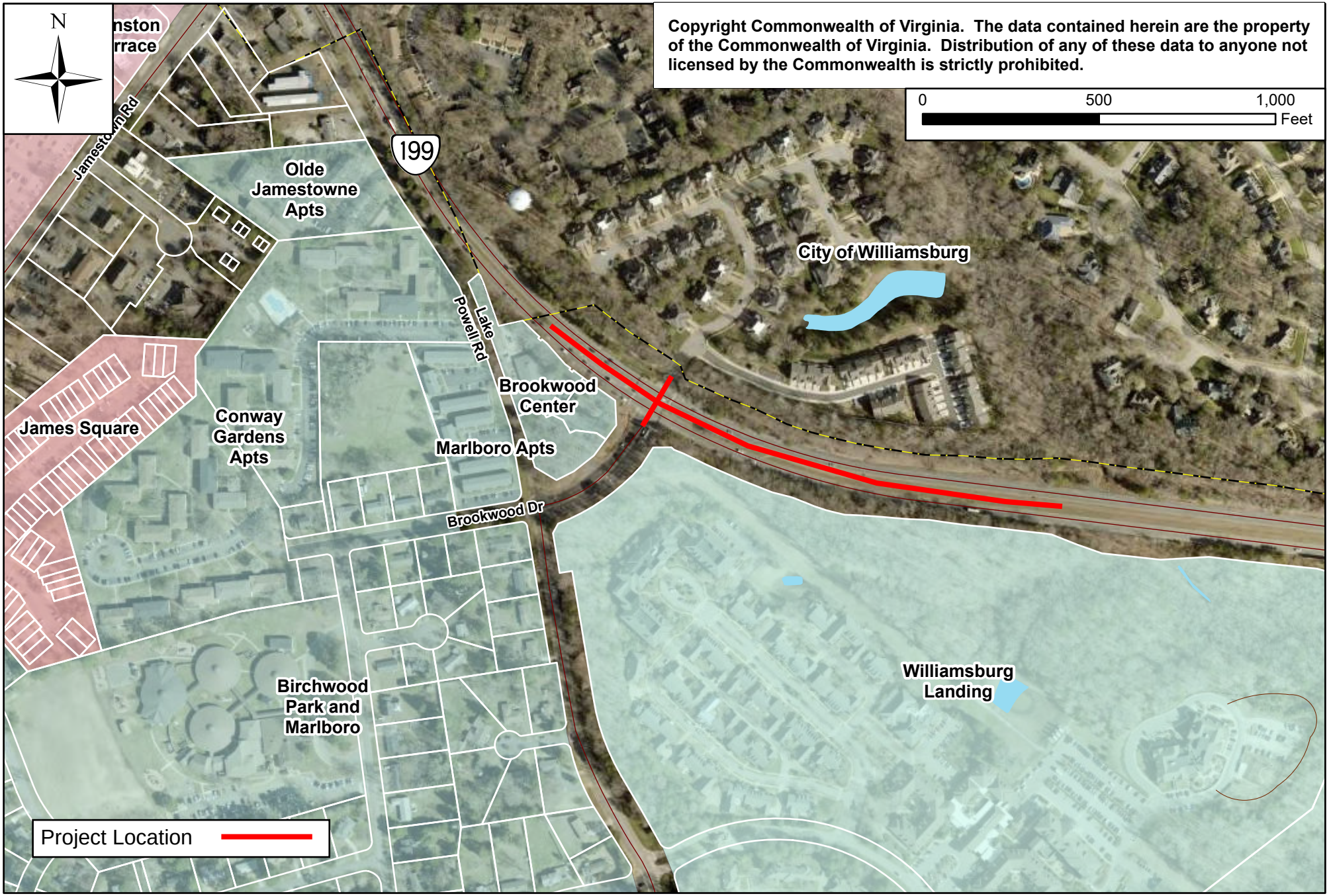
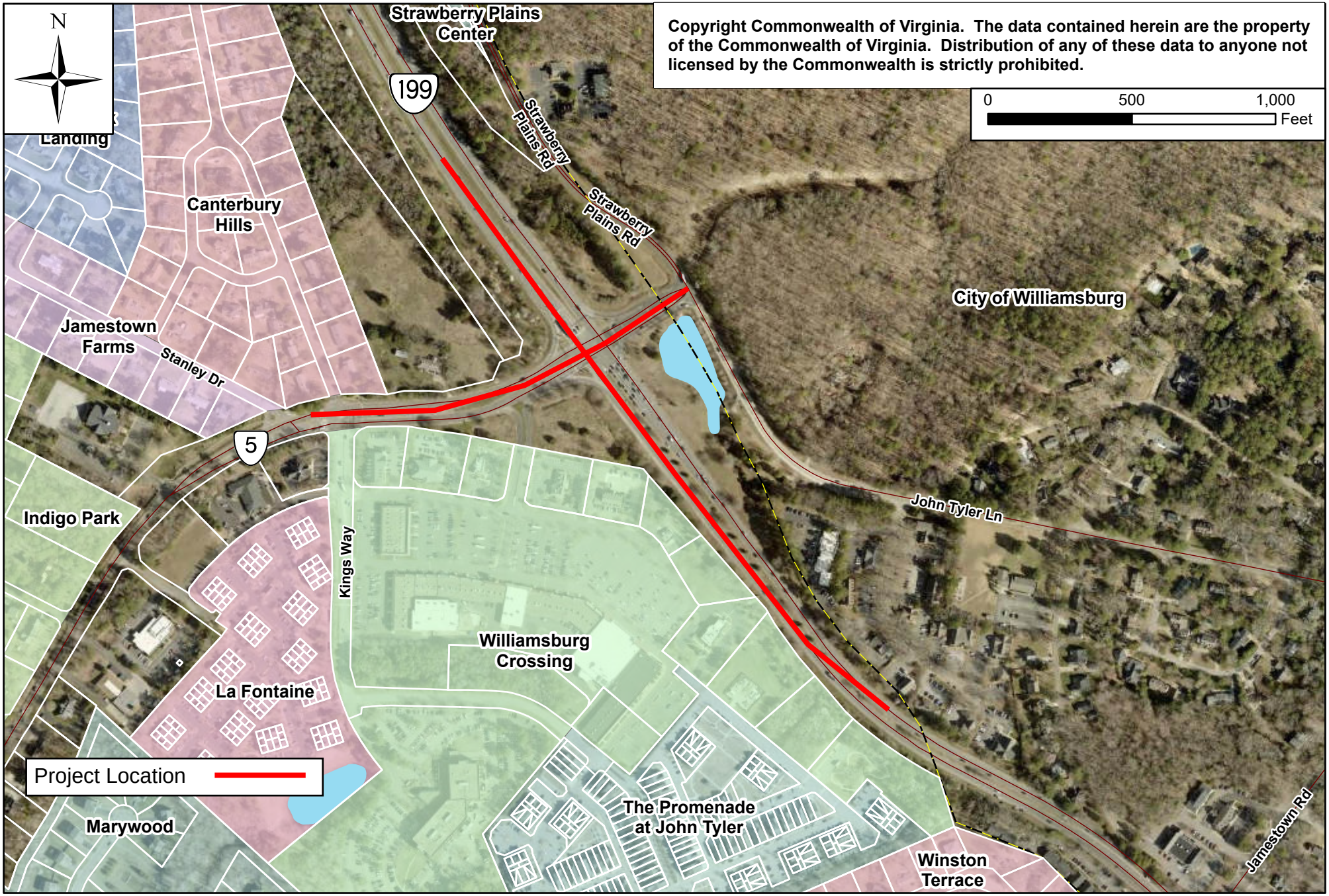
Smart Scale Application
Route 60 (Pocahontas Trail) Trail757 Shared Use Path



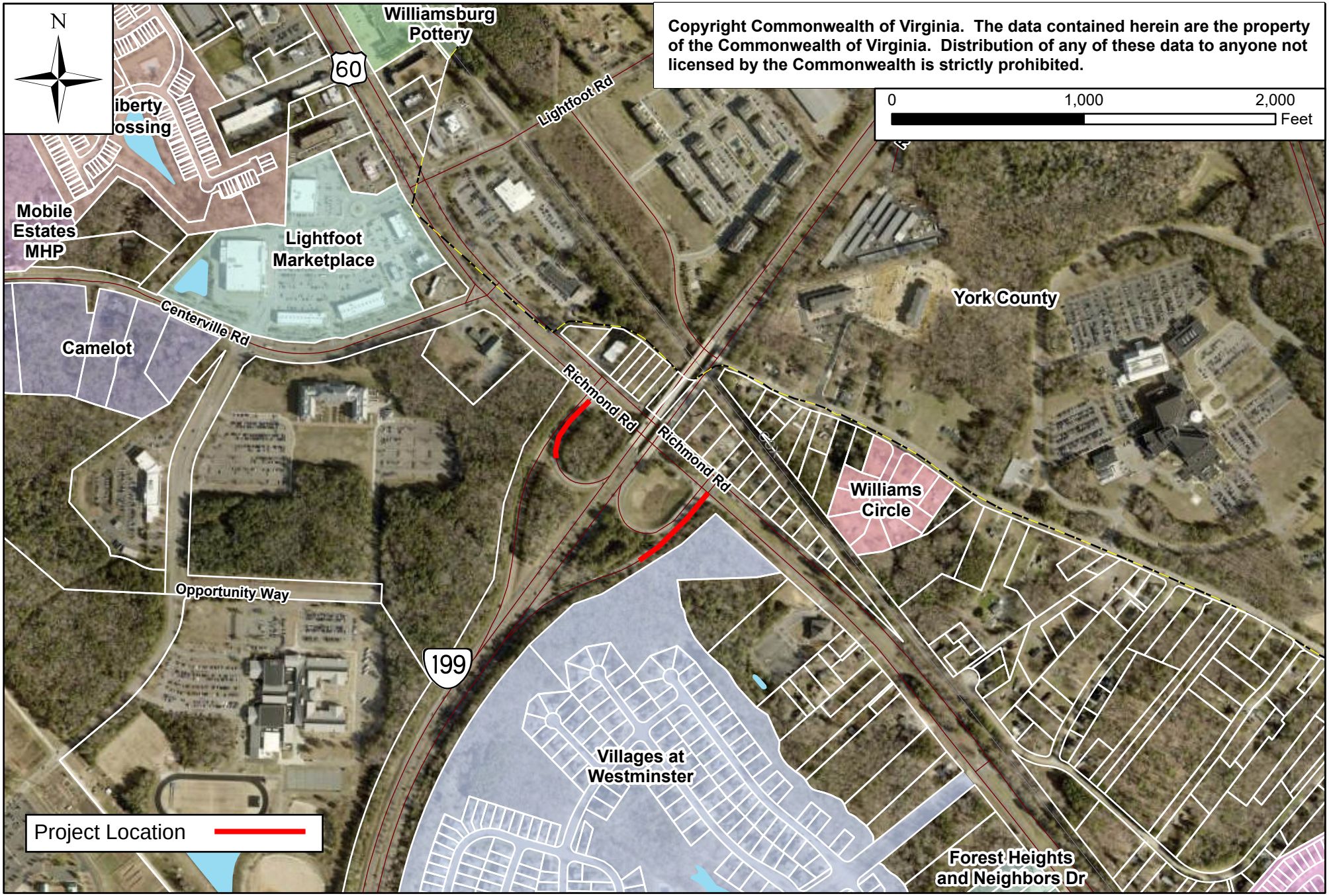
Smart Scale Application
HR05 Route 199 Humelsine Parkway at Brookwood Drive



Smart Scale Application
HR05: Route 199 (Humelsine Pkwy) at Route 5



Smart Scale Application
HR-25-04: Centerville Rd; Rt. 60; Rt. 199 Ramp Improve.



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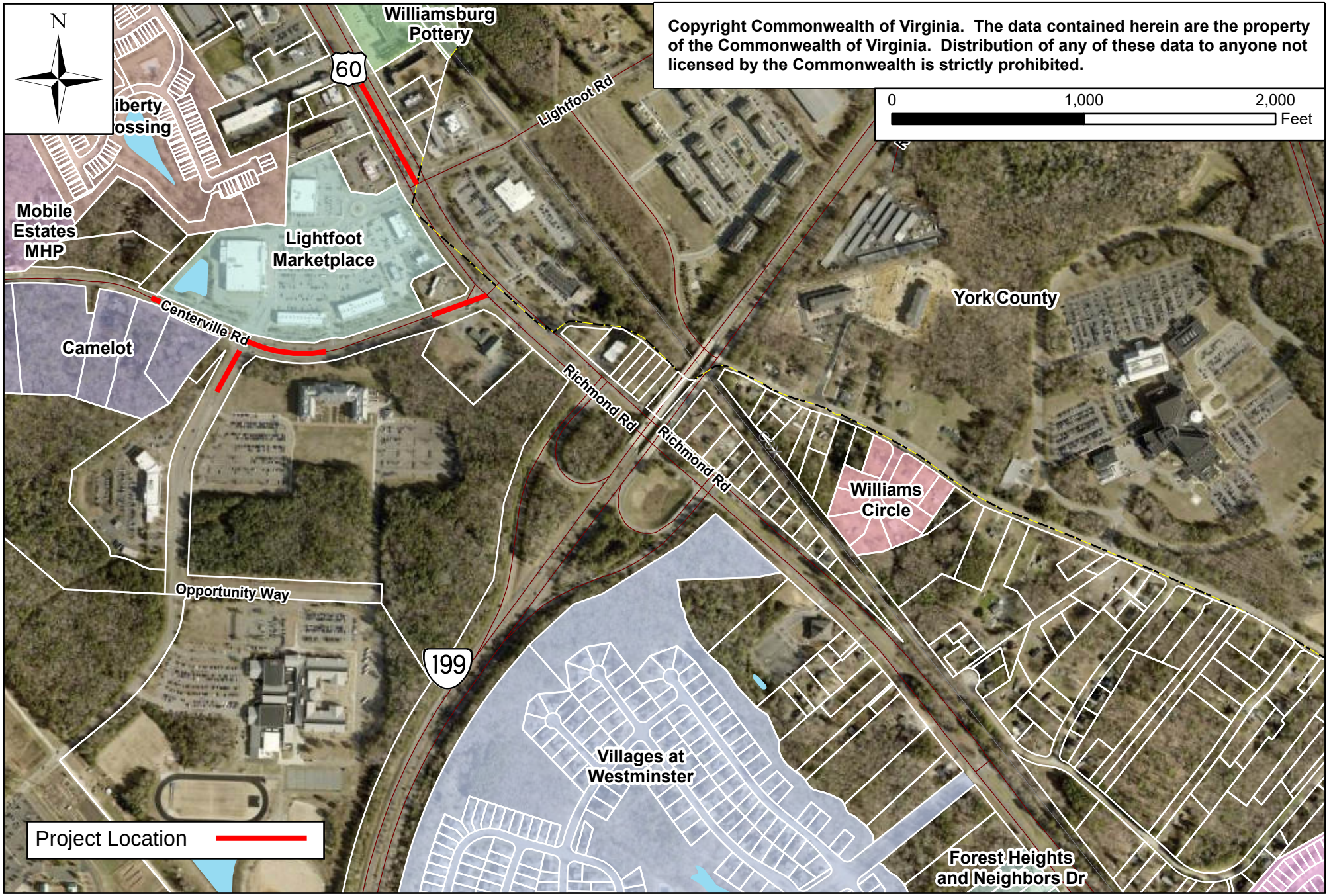
Smart Scale Application
HR-25-04: Centerville Rd; Rt. 60 & Rt. 614 Improvements



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SUMMARY FACTS

Applicant:	Mr. Chase Grogg, Landtech Resources, Inc., on behalf of Mr. John Hill
Landowners:	Mr. John Hill, Ms. Katelyn Grant, and Ms. Sandra Hill
Proposal:	To allow for a tourist home in an existing five-bedroom single-family dwelling.
Location:	4305 Fenton Mill Road
Tax Map/Parcel No.:	1430100034
Property Acreage:	± 17.836 acres
Zoning:	A-1, General Agricultural
Comprehensive Plan:	Neighborhood Commercial and Low Density Residential
Primary Service Area:	Inside
Staff Contact:	Allison Jackura, Planner III

PUBLIC HEARING DATES

Planning Commission:	May 6, 2026, 6:00 p.m.
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. Staff finds the proposal is consistent with the short-term rental recommendations of the *Our County, Our Shared Future: James City County 2045 Comprehensive Plan*.
2. There is adequate off-street parking.
3. The applicant has acknowledged that should this application be approved, the owners will obtain the proper licensing and inspections through the County and will be subject to appropriate use-based taxes.
4. The owners currently reside on the property and intend to remain in close proximity to monitor the operation.
5. The impacts to adjacent properties will be similar to those of a typical five-bedroom single-family home.
6. Impacts: See Impact Analysis on Pages 4-5.
7. See 2045 Comprehensive Plan Analysis on Pages 6-7.

FACTORS UNFAVORABLE

1. Impacts: See Impact Analysis on Pages 4-5.
2. See 2045 Comprehensive Plan Analysis on Pages 6-7.

PLANNING COMMISSION RECOMMENDATION

At its May 6, 2026, Regular Meeting, the Planning Commission recommended approval of this application with staff-proposed conditions by a vote of 7-0.

PROPOSED CHANGES MADE SINCE THE PLANNING COMMISSION MEETING

During the meeting, there was a question from a Planning Commissioner regarding the viewshed from the adjacent dwelling to the proposed tourist home. The owner answered that they have installed a 6-foot privacy fence to provide some privacy and spoke to the neighbor on several occasions who expressed no concern. Since the Planning Commission meeting, the applicant has supplied an updated Master Plan to show the now-existing privacy fence, as well as the driveway entrance. The driveway terminates in a parking area southeast of the existing dwelling, which has also been maintained since submittal of the Special Use Permit (SUP) application.

SUMMARY STAFF RECOMMENDATION

Staff finds the proposal consistent with the recommendations of the 2045 Comprehensive Plan. Therefore, staff recommends the Board of Supervisors (BOS) approve this application with the proposed conditions (Attachment No. 1).

PROJECT DESCRIPTION

Mr. John Hill has applied for an SUP to allow for a tourist home, also referred to as short-term rental, of an existing five-bedroom single-family dwelling. The proposal includes no changes to the size or footprint of the house.

Unlike the "Rental of Rooms" use, the "Tourist Home" use allows the rental of the entire dwelling and does not require that the homeowner reside in the dwelling during the time of rental. While the use permits the rental of the entire dwelling, the *2045 Comprehensive Plan* provides guidance that recommends the owner reside on the property even for the tourist home use. The subject property as currently platted contains two existing single-family dwellings, and the applicant states that it is his intent to remain in the other dwelling on the property which is addressed 4451 Cedar Point Lane. Should the property be subdivided, the owner would still reside in a nearby property.

In previous short-term rental applications, staff calculated the number of occupants to be two people per bedroom. Therefore, Proposed Condition No. 3 states that the maximum number of occupants per rental is 10.

The property is accessed by an existing gravel driveway with a bordered parking area which has not been maintained. Staff has determined there is a large enough parking area to accommodate the necessary parking; however, the parking area is not clearly visible. Without necessary maintenance, guests of the short-term rental may inadvertently park outside of the parking area and cause a nuisance. Proposed Condition No. 6 requires a parking plan to be submitted to the Planning Director or designee prior to the issuance of a Certificate of Occupancy for the tourist home. The required improvement to the parking area will also be required to be completed prior to the issuance of the Certificate of Occupancy.

PLANNING AND ZONING HISTORY

- There have been no legislative cases associated with the property.
- The two existing single-family dwellings on the property were built in 1968 and 1973.
- On September 25, 2025, the applicant submitted a conceptual plan, C-25-0045, for County review which proposed subdividing the existing property and proposing a number of improvements on the resulting lots. In the conceptual plan, the two existing dwellings would be subdivided to each have their own three acres

with one of the dwellings proposed to operate as a tourist home. A portion of the remaining property would be given to an adjacent land-locked parcel without frontage to provide that parcel with street access, and two additional lots would be created from the remainder. The two lots were proposed to operate as a campground and an RV and boat storage location. Staff has attached the materials for the conceptual plan prepared for consideration at the December 17, 2025, Development Review Committee (DRC) meeting, as Attachment No. 5 for reference.

- To date, the applicant has only submitted an application for the proposed tourist home, therefore staff's analysis of the SUP request is based upon the property as a whole which contains two dwellings.

SURROUNDING ZONING AND DEVELOPMENT

- The property is located outside of the Elmwood and the Glenwood Acres subdivisions at the corner of Croaker Road and Fenton Mill Road, near the Interstate 64 interchange.

- To the east of the property is a 7-Eleven gasoline and convenience store, as well as Liberty Live Church at York River.

- Further east is the Kiskiack Golf Club, and southeast is the current location of the President Heads and the Hankins Resource Recovery site.

- The following table lists the information on the adjacent parcels:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	A-1, General Agricultural and R-6, Low-Density Residential	Single-family Residential	Rural Lands
SOUTH	A-1, General Agricultural	Vacant; Interstate interchange	Low Density Residential; Mixed Use
EAST	A-1, General Agricultural and M-1, Limited Business/ Industrial	Commercial; Civic	Neighborhood Commercial; Mixed Use; Community Character Conservation, Open Space or Recreation
WEST	A-1, General Agricultural	Single-family Residential	Low Density Residential

Impacts/Potentially Unfavorable Conditions	Status *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	Considerations/Proposed Mitigation of Potentially Unfavorable Conditions
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate traffic exceeding a typical single-family residential use. - The subject property as currently platted has three frontages, on Cedar Point Lane, on Fenton Mill Road, and on Croaker Road. Croaker Road is classified by the Virginia Department of Transportation as a major collector road. Staff finds that the road is adequate for this use and that Level of Service will not be negatively impacted.
Public Transportation: Bicycle/Pedestrian	No Mitigation Required	- Per the Regional Bikeways Map and Pedestrian Accommodations Master Plan, bicycle and pedestrian accommodations are not required per Section 24-35(c)(2) of the Zoning Ordinance. - The property is not located within walking distance of a Williamsburg Area Transit Authority transit stop.
Public Safety	No Mitigation Required	- Fire Station 1 on Forge Road serves this area of the County and is approximately 3.3 miles from the proposed tourist home property. - Staff finds this project does not generate impacts that require mitigation to the County's Fire Department facilities or services.
Public Schools	No Mitigation Required	- N/A since no residential dwelling units are proposed.
Public Parks and Recreation	No Mitigation Required	- N/A since no residential dwelling units are proposed.
Public Libraries and Cultural Centers	No Mitigation Required	- Staff finds this project does not generate relevant impacts that require mitigation.
Groundwater and Drinking Water Resources	No Mitigation Required	- The property is served by well and septic, and the Virginia Department of Health had no concerns. - The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Watersheds, Streams, and Reservoirs Project is located in the Ware Creek and the Skimino Creek Watersheds.	No Mitigation Required	- The Stormwater and Resource Protection Division has reviewed this application and had no objections. No new impervious surface is proposed as part of this SUP request. Should exterior site improvements be made in the future, those improvements would be subject to additional environmental review at that time.
Cultural/Historic	No Mitigation Required	- The subject property has been previously disturbed and has no known cultural resources on-site and no land disturbance is proposed.
Nearby and Surrounding Properties	Mitigated	- The owners indicated their intention to live in the other residential dwelling unit on the property to provide active monitoring of guest activity and behavior. - The subject property must adhere to the County's Noise Ordinance, and the proposed SUP conditions will restrict commercial signage and rental occupancy. Future expansions of the use would require an SUP amendment.
Community Character	No Mitigation Required	- The property is not on a designated Community Character Corridor and is not located within a Community Character Area.
Covenants and Restrictions	No Mitigation Required	- The applicant has verified that he is not aware of any covenants or restrictions on the property that prohibit the proposed use.

2045 COMPREHENSIVE PLAN ANALYSIS

The property is designated Low Density Residential and Neighborhood Commercial on the 2045 Comprehensive Plan Land Use Map. The proposed tourist home is located on the portion of the property which is designated as Neighborhood Commercial. The properties to the north are designated as Rural Lands, to the west as Low Density Residential, to the east as Neighborhood Commercial, and to the south as Mixed Use. Per the 2045 Comprehensive Plan, appropriate primary uses include small neighborhood scale commercial, professional and office uses such as day care centers, convenience stores with limited hours of operation, small restaurants, and smaller public facilities. The uses should serve the surrounding neighborhoods and have only a limited impact on nearby development.

Specific to short-term rentals, the 2045 Comprehensive Plan states that, if located within a residential context, short-term rentals should serve to complement the residential character of the area rather than altering its nature. Therefore, while every location can be considered uniquely, short-term rentals are most appropriately located subject to the following development standards:

- Be located on lands designated Rural Lands, Neighborhood Commercial, Community Commercial, Mixed Use, or Economic Opportunity.

  This property is designated both Low Density Residential and Neighborhood Commercial on the 2045 Comprehensive Plan Land Use Map with the proposed tourist home located within the Neighborhood Commercial portion of the property, therefore the proposal does meet this standard.

  If the property were to be subdivided as initially proposed by the applicant, the proposal would continue to meet this standard.

- Be located on the edge or corner of an existing platted subdivision, rather than internal to it.

  This property is external to the Elmwood and Glenwood Acres subdivisions, therefore the proposal does meet this standard.

  If the property were to be subdivided as initially proposed by the applicant, the proposal would continue to meet this standard.

- Be located on a major road.

  Croaker Road is classified as a major collector, therefore the location does meet this standard.

  If the property were to be subdivided as initially proposed by the applicant, the proposal would not meet this standard, as the subdivided parcel containing the tourist home would only front on Cedar Point Lane and Fenton Mill Road, both of which are local roads.

- Be operated in a manner such that the property owners will continue to live and reside on the property during the rental.

  Per guidance from the County Attorney's Office, staff does not factor this criteria into the overall staff recommendation for the application. Following adoption of the Comprehensive Plan criteria, the County Attorney's Office formally opined that such a consideration and factor may run afoul of recent jurisprudence.

As the proposal does currently meet all three of the development standards for short-term rentals set forth in the 2045 Comprehensive Plan, staff finds this proposal consistent with the 2045 Comprehensive Plan.

STAFF RECOMMENDATION

Staff finds the proposal consistent with the recommendations of the 2045 Comprehensive Plan. Therefore, staff recommends the BOS approve this application with the proposed conditions (Attachment No. 1).

AJ/ap
SUP26-3_FentonMill

Attachments:
1. Resolution
2. Location Map
3. Master Plan
4. Applicant Narrative
5. Staff Memorandum and Applicant's Conceptual Plan to the DRC
6. Unapproved Minutes of the May 6, 2026, Planning Commission Regular Meeting
7. Public Input

R E S O L U T I O N

CASE NO. SUP-26-0003. 4305 FENTON MILL ROAD SHORT-TERM RENTAL

WHEREAS, the Board of Supervisors of James City County, Virginia (the "Board"), has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. Chase Grogg, Landtech Resources, Inc., on behalf of Mr. John Hill has applied for an SUP to allow for a tourist home located at 4305 Fenton Mill Road and further identified as James City County Real Estate Tax Map Parcel No. 1430100034 (the "Property"); and

WHEREAS, the Planning Commission, following its public hearing on May 6, 2026, recommended approval of Case No. SUP-26-0003 by a vote of 7-0; and

WHEREAS, the Board of Supervisors of James City County, Virginia, finds this use to be consistent with good zoning practices and the 2045 Comprehensive Plan Land Use Map designation for the Property.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, after consideration of the factors in Section 24-9 of the James City County Code (the "County Code"), does hereby approve the issuance of Case No. SUP-26-0003 as described herein with the following conditions:

1. *Master Plan*. This SUP shall permit the tourist home on property located at 4305 Fenton Mill Road and further identified as a portion of James City County Real Estate Tax Map Parcel No. 1430100034 (the "Property"). The use and layout of the Property shall be generally as shown on the document entitled "Special Use Permit AirBNB Short Term Rental 4305 Fenton Mill Road" and date stamped March 6, 2026, and revised May 14, 2026 (the "Master Plan"), with any deviations considered per Section 24-23(a)(2) of the Zoning Ordinance, as amended. This condition does not restrict improvements typical of a residential property as determined by the Director of Planning.

2. *Commencement*. Evidence of a business license and updated Certificate of Occupancy shall be provided to the Director of Planning within twelve (12) months from the issuance of the SUP, or this SUP shall automatically be void.

3. *Number of Rental Room Occupants*. There shall be no more than five (5) bedrooms available for rent to visitors and no more than ten (10) rental occupants total at any one time.

4. *Contracts per Rental Period*. There shall not, during any period of time, be simultaneous rentals of the Property under separate contracts.

5. *Signage*. No signage related to the use of tourist home shall be permitted on the Property.

6. *Parking*. Off-site parking for this use shall be prohibited. No oversized commercial vehicles associated with rental occupants of the tourist home, such as, but not limited to, buses, commercial trucks, and trailers shall be allowed to park on the Property. Prior to the issuance of a Certificate of Occupancy for the use, the applicant shall submit a parking plan demonstrating sufficient parking area and parking surface in compliance with Section 24-57 and Section 24-59 of the Zoning Ordinance. The parking plan shall be approved by the Director of Planning or designee and work shall be completed prior to the issuance of the Certificate of Occupancy.

7. *Validity*. This SUP shall be valid until December 31, 2029.

8. *Severance Clause*. This SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

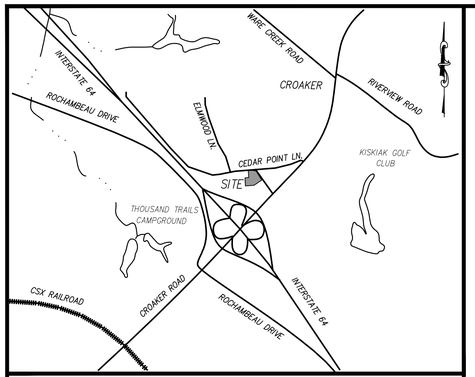
	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-3_4305FentonMill-res

SUP-26-0003. 4305 Fenton Mill Road
Short-Term Rental





VICINITY MAP SCALE: 1" = 2000'

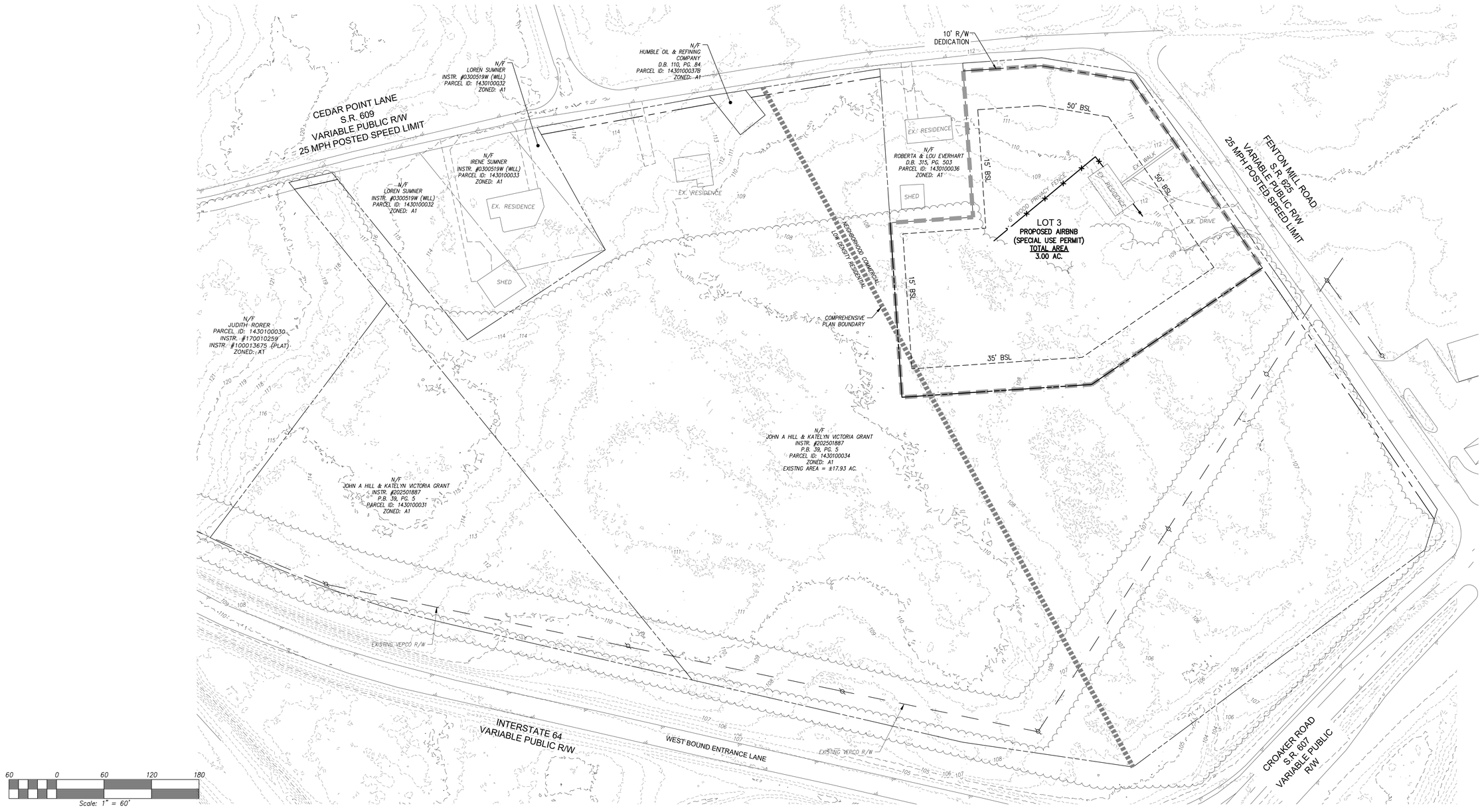
STATISTICAL INFORMATION:

ZONING:	A-1 GENERAL AGRICULTURE
PROPOSED SITE USE:	AIRBNB / SHORT TERM RENTAL
TAX MAP PARCEL ID:	1430100034
SITE ADDRESS:	4305 FENTON MILL ROAD WILLIAMSBURG, VA 23188
UTILITIES:	
WATER	EXISTING WELL
SEWER	EXISTING DRAINFIELD
FLOOD HAZARD MAP:	LOT DOES NOT LIE IN A FEMA DESIGNATED FLOOD HAZARD ZONE PER FIRM 51095C0044D, DATED DECEMBER 16, 2015 (PANEL NOT PRINTED)
HYDROLOGICAL INFORMATION:	
SUBWATERSHED:	WARE CREEK (YO62), SKIMINO CREEK (YO65)
SUBBASIN:	UPPER YORK RIVER (YO-R)
WATERSHED:	YORK RIVER (HUC8 02080107)
HYDROLOGICAL UNIT CODE (HUC):	YO62

GENERAL NOTES:

1. CONTOURS ARE SHOWN PER USGS AND ARE IN US SURVEY FEET, RELATIVE TO NAVD 1988 DATUM.
2. THIS PLAN IS NOT BASED ON A FIELD SURVEY. EXISTING PHYSICAL FEATURES ARE SHOWN PER AERIAL IMAGERY.
3. NO LOT IMPROVEMENTS ARE PROPOSED. SHORT TERM RENTAL SHALL UTILIZE EXISTING HOUSE AND DRIVE.
4. PROJECT IS RELATED TO JCC CONCEPTUAL PLAN CASE NO. C-25-0045.

VIRGINIA STATE PLANE COORDINATES (VA SOUTH ZONE) (NAD 83)



NO.	DATE	REVISION / COMMENT / NOTE
1	5/14/2026	REVISED TO SHOW INSTALLED FENCE AND DRIVE

COMMONWEALTH OF VIRGINIA
WILLIAM S. FELTS
Lic. No. 57903
05/14/2026
PROFESSIONAL ENGINEER

LANDTECH RESOURCES, INC
Engineering & Land Surveying Consultants
205-E Bulifants Boulevard - Williamsburg, VA 23188
Ph: (757) 565-1677 Fax: (757) 565-0782
web: landtechresources.com

SPECIAL USE PERMIT
AIRBNB SHORT TERM RENTAL
4305 FENTON MILL ROAD

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Scale: 1"=60'
Date: 03-06-2026
Job Number: 25-320
Drawn By: MVT
Sheet Title:
SPECIAL USE PERMIT
Sheet Number:
1 OF 1

Special Use Permit for Short Term Rental of Private Residential Property

CONCEPTUAL PLAN

To Whom It May Concern,

We are requesting this permit to be able to rent our home on a short-term basis. Our residential property is located at 4305 Fenton Mill Road Williamsburg, VA 23188. The parcel ID: 1430100034 & LRSN: 9778, Zoning A-1.

We are full-time residents on the property, which has two independent homes. My family and I live at 4451 Cedar Point Ln. Same parcel, just two addresses down to the west. Each home is on 3 acres, and we are not part of any subdivision. I have talked to my neighbor to make sure they are okay with this plan, which they are.

We would like to short-term rent our 4305 Fenton Mill Rd. which totals 2,900sq.ft. and includes 5 bedrooms and 2 full bathrooms. The home has parking for up to 6 cars and a 6ft. tall privacy fence in the backyard.

The home will have a maximum occupancy of 10 guests per night, however our analysis shows that it will be mostly single families renting out the space to visit Williamsburg. We will be clear in the rules of the house that it is not for parties, and list all of the James City County noise ordinances as well. Also, customers will have to request to rent the home and be approved by our management staff before being able to book their reservation.

Additionally, we meet James City County's updated requirements for short-term rentals in the 2045 Comprehensive Plan. Our home is:

- Located on designated rural land,
- Located on the edge of an existing platted subdivision,
- Located on a major road, (Fenton Mill Rd.),
- We will continue to live and reside on the property full-time.

If approved, we will operate with a business license and comply with our State Sales Taxes and monthly James City County Lodging Taxes. We would be happy to discuss further or answer any questions you might have.

Thanks,

John Hill
E: Thumbprintmanagement@gmail.com
P: (615) 869-9193

M E M O R A N D U M

DATE: December 3, 2025

TO: The Development Review Committee

FROM: Allison Jackura, Planner III

SUBJECT: Case No. C-25-0045. 4451 and 4420 Cedar Point Lane - Rezoning and Special Use Permits

---

Mr. Chase Grogg has submitted a conceptual plan for proposed development located at 4451 Cedar Point Lane and 4420 Cedar Point Lane. The parcels are zoned A-1, General Agricultural, designated Low Density Residential (LDR) and Neighborhood Commercial on the 2045 Comprehensive Plan Land Use Map, located inside the Primary Service Area, and are approximately 20.6 acres in size. 4420 Cedar Point Lane is currently vacant, while 4451 Cedar Point Lane has two existing single-family residences and a large area of undeveloped land.

The project includes re-subdivision of the two parcels, to create a total of five lots. As shown in the conceptual plan (Attachment No. 2), the currently vacant land-locked parcel (Lot 1) will gain a flagpole for frontage and access on Cedar Point Lane. The two existing dwellings will be platted on their own individual lots (Lots 2 and 3), and on Lot 3, the applicant proposes to convert the dwelling into a tourist home which would require a Special Use Permit (SUP). The remaining approximately 10.6 acres of undeveloped area will be divided into two parcels (Lots 4 and 5). Lot 4 is proposed to operate as a "glamping" campground with 10 small cabins. The campground use would require an SUP. Lot 5 is proposed to operate as an RV and boat storage which would require a rezoning to the M-1, Limited Business/Industrial Zoning District.

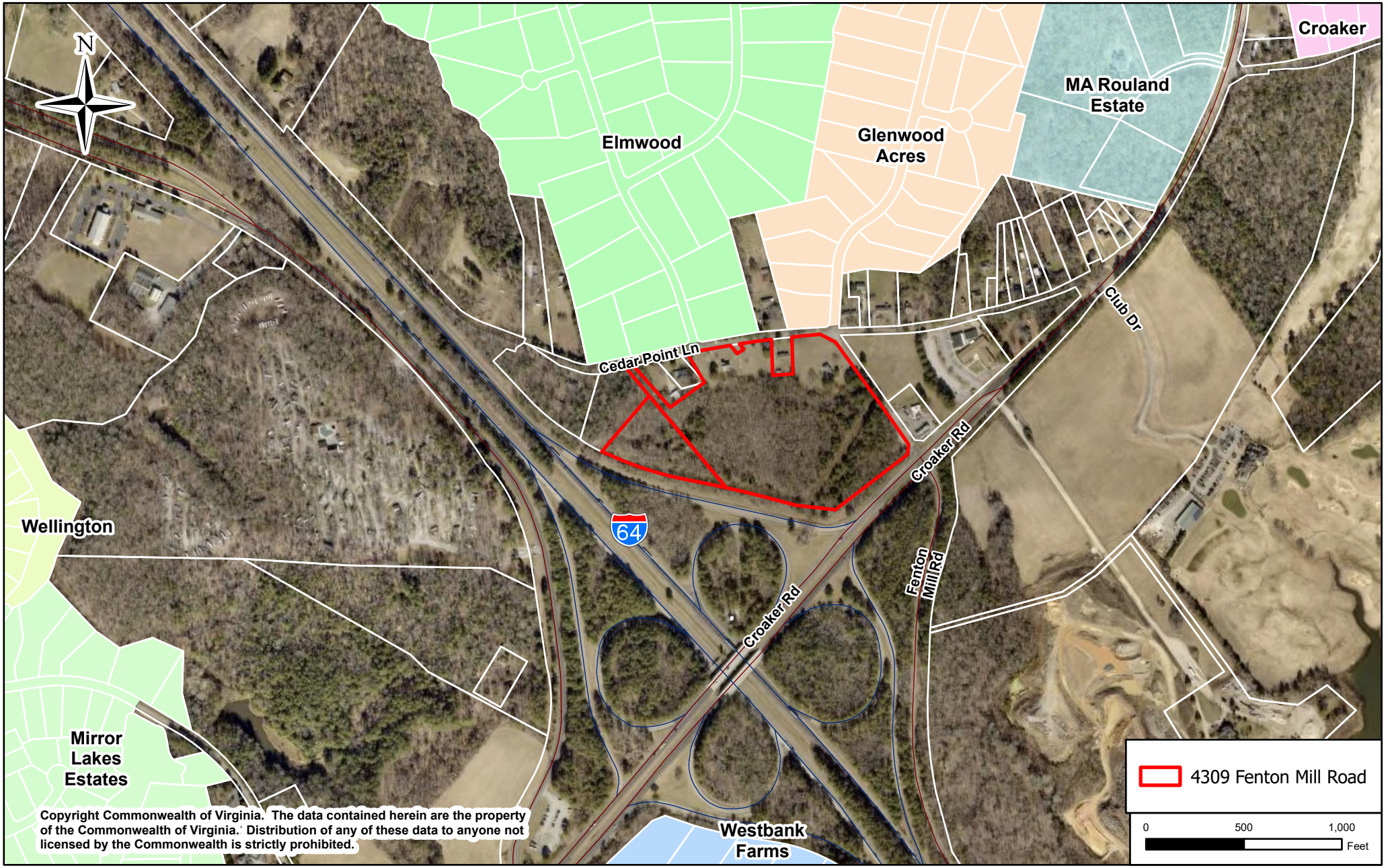
The 2045 Comprehensive Plan recommends tourist homes be located on a major road, among other criteria. The proposed Lot 3 does not meet this criteria. The campground and RV and boat storage uses may align with the Low Density Residential and Neighborhood Commercial land use designations, if their potential impacts on the adjacent residences are suitably minimized. However, staff notes that rezoning to the M-1 Zoning District may allow for uses which do not align with the land use designations.

This application is currently under review by County and agency staff to assess compliance with the County Code and other regulations. As part of this ongoing initial review, the applicant has requested that this item be placed on the Development Review Committee (DRC) Agenda in order to discuss the project and seek input and questions from the DRC members. No action by the DRC is required.

AJ/ap
C25-45_4451-4420CdrPt-mem

Attachments:
1. Location Map
2. Conceptual Plan

C-25-0045. 4451 and 4420 Cedar Point Ln. Subdivision, SUP, and Rezoning



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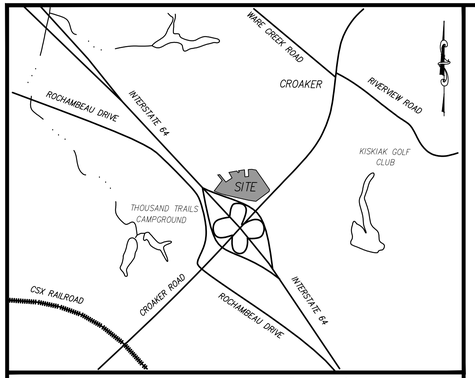


VICINITY MAP SCALE: 1" = 2000'

STATISTICAL INFORMATION:

ZONING:	A-1 GENERAL AGRICULTURE
PROPOSED SITE USE:	RESIDENTIAL (2 LOTS), AIRBNB, CAMPGROUND, BOAT/RV STORAGE
TAX MAP PARCEL ID:	1430100034 & 1430100031
SITE ADDRESS:	4305 FENTON MILL ROAD WILLIAMSBURG, VA 23188
UTILITIES:	
WATER	PUBLIC (JCSA)
SEWER	PUBLIC (JCSA)
FLOOD HAZARD MAP:	LOT DOES NOT LIE IN A FEMA DESIGNATED FLOOD HAZARD ZONE PER FIRM 51095C0044D, DATED DECEMBER 16, 2015 (PANEL NOT PRINTED)
HYDROLOGICAL INFORMATION:	
SUBWATERSHED:	WARE CREEK (YO62), SKIMINO CREEK (YO65)
SUBBASIN:	UPPER YORK RIVER (YO-R)
WATERSHED:	YORK RIVER (HUC8 02080107)
HYDROLOGICAL UNIT CODE (HUC):	YO62

GENERAL NOTES:

1. CONTOURS ARE SHOWN PER JCC GIS AND ARE IN US SURVEY FEET.
2. THIS PLAN IS NOT BASED ON A FIELD SURVEY. EXISTING PHYSICAL FEATURES ARE SHOWN PER AERIAL IMAGERY.

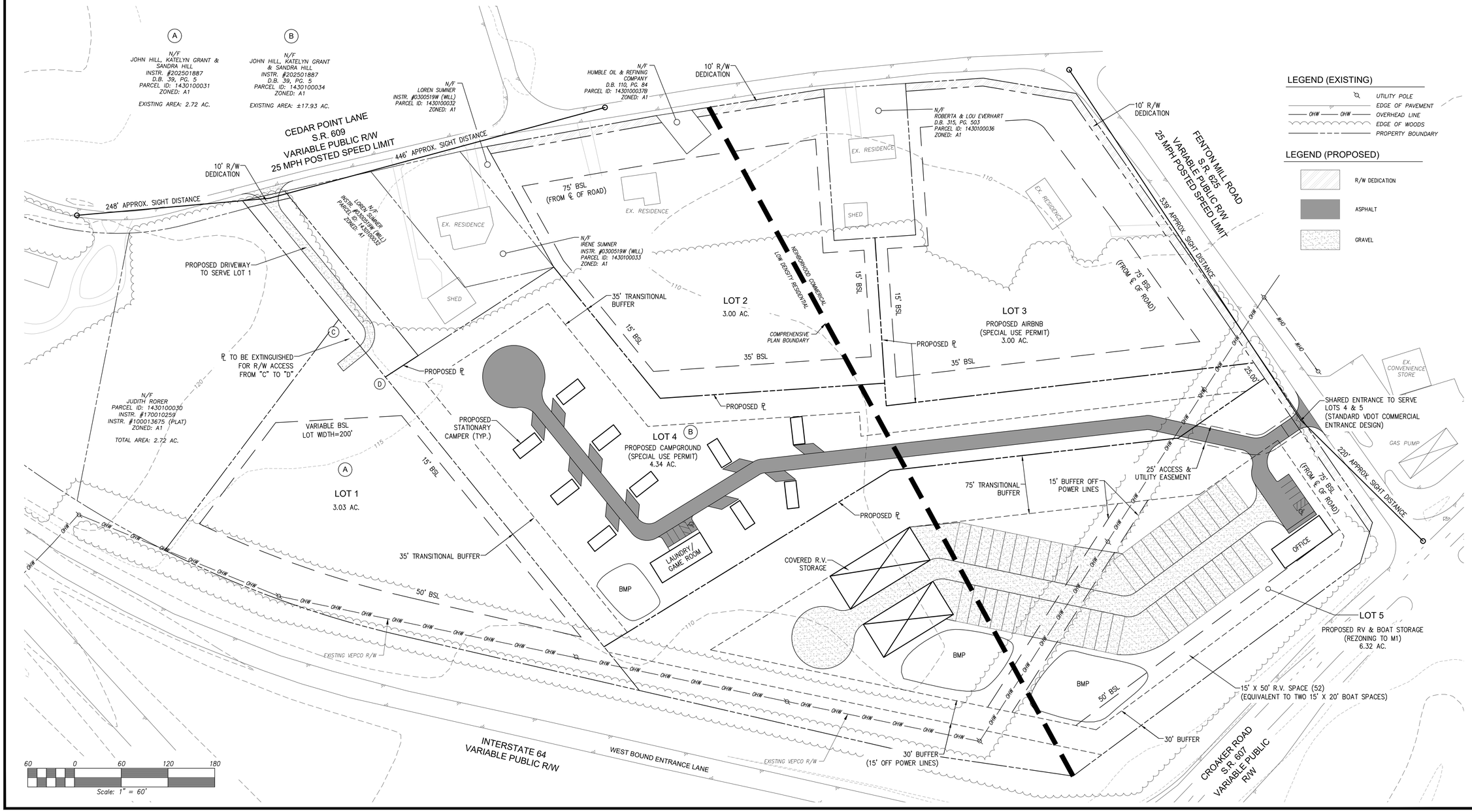
PARKING CALCULATION:

1. BOAT/RV STORAGE
   - 1.1. PROVIDED SPACES (OFFICE): 5, 1 H/C
   - 1.2. R.V. STORAGE SPACES: 57

PROPOSED LOT USE:

1. LOTS 1 AND 2, WILL BE UTILIZED FOR A-1 PURPOSES AS SINGLE FAMILY DWELLINGS.
2. LOT 3 WILL BE USED FOR SHORT-TERM TO MEDIUM TERM RENTAL. (SUP REQUIRED)
3. LOT 4 WILL BE USED FOR A "GLAMPING" CAMPGROUND WITH 10 SMALL 200-400 S.F CABINS PLACED ON THE LOT. A GAME ROOM AND LAUNDRY ROOM FOR ALL OF THE GUESTS WOULD ALSO BE CONSTRUCTED. (SUP REQUIRED)
4. LOT 5 WILL BE USED FOR BOAT AND RV STORAGE. THERE WILL BE OPEN AND COVERED STORAGE OPTIONS. THE OFFICE WOULD SERVE BOTH THE STORAGE AS WELL AS ICE, DRINKS, SNACKS, AND FIREWOOD FOR BOTH THE CAMPGROUND RV AND BOAT STORAGE CLIENTS. (REZONING TO M1 REQUIRED)

VIRGINIA STATE PLANE COORDINATES (VA SOUTH ZONE) (NAD 83)



LEGEND (EXISTING)

- UTILITY POLE
- OHW OHW — OVERHEAD LINE
- EDGE OF WOODS
- PROPERTY BOUNDARY

LEGEND (PROPOSED)

- R/W DEDICATION
- ASPHALT
- GRAVEL

NO.	DATE	REVISION / COMMENT / NOTE
1	11-18-25	REVISED PER COUNTY COMMENTS

LRJ LANDTECH
RESOURCES, INC.
ENGINEERING · SURVEYING · GPS
205-E Bulifants Boulevard – Williamsburg, VA 23188
Ph: (757) 345-1977 Fax: (757) 345-0782
e-mail: landtechresources@gmail.com

CONCEPTUAL PLAN
CAMPGROUND & BOAT/RV STORAGE
4305 FENTON MILL ROAD

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Scale:	1"=60'
Date:	09-16-2025
Job Number:	25-320
Drawn By:	MVT
Sheet Title:	CONCEPTUAL PLAN
Sheet Number:	1 OF 1

MINUTES
JAMES CITY COUNTY PLANNING COMMISSION
REGULAR MEETING
COUNTY GOVERNMENT CENTER BOARD ROOM
101 MOUNTS BAY ROAD, WILLIAMSBURG, VA 23185
May 6, 2026
6:00 PM

A. CALL TO ORDER

Dr. Allman called the meeting to order at 6 p.m.

B. ROLL CALL

Planning Commissioners Present:
Kira Allman, Chair
Jack Haldeman
Frank Polster
Steve Rodgers
Jay Everson
Crystal Haskins
Vincent Passero

Staff Present:
Susan Istenes, Director of Planning
Liz Parman, Deputy County Attorney
Allison Jackura, Senior Planner
Morgan Risinger, Senior Planner
Linda Titus, Administrative Coordinator
Hannah Hunnicutt, Administrative Coordinator

C. PUBLIC COMMENT

Dr. Allman opened Public Comment.

As no one wished to speak, Dr. Allman closed the Public Comment.

D. REPORTS OF THE COMMISSION

Dr. Allman stated that the Policy Committee did not meet in April.

Mr. Polster stated that the Development Review Committee (DRC) met on April 22, 2026, to discuss C-25-0052, Stonehouse Tract 11B, stating that under the current Stonehouse Proffers, the DRC is required to comment on the conceptual development. Mr. Polster stated that the DRC voted unanimously to recommend approval to the Planning Director of C-25-0052, Stonehouse Tract 11B. (4-0)

Mr. Polster stated that the DRC reviewed C-26-0003, 7914 Croaker Road and 4577 Rochambeau Drive Mixed Use Development, as the applicant was seeking input on the application, but no action was required of the DRC.

E. CONSENT AGENDA

1. Minutes of the April 1, 2026, Regular Meeting

2. Development Review Committee Action Item: C-25-0052. Stonehouse Tract 11B

Mr. Haldeman made a motion to approve the Consent Agenda.

On a voice vote, the Commission voted to approve the Consent Agenda. (7-0)

F. PUBLIC HEARING(S)

1. SUP-26-0003. 4305 Fenton Mill Rd. Short-Term Rental

Ms. Allison Jackura, Senior Planner, addressed the Commission stating that an application had been submitted to permit a tourist home at 4305 Fenton Mill Road. Ms. Jackura noted that the property was zoned A-1, General Agricultural, located within the Primary Service Area (PSA), and split designated as Neighborhood Commercial and Low Density Residential on the Comprehensive Plan Land Use Map.

Ms. Jackura noted that the applicant was proposing to operate a tourist home within the existing dwelling located on the corner of Cedar Point Lane and Fenton Mill Road. Ms. Jackura stated that the applicant currently lives in the second dwelling located on the same property.

Ms. Jackura explained that the proposal met all four criteria for tourist homes stated in the Comprehensive Plan, including that the land was designated Neighborhood Commercial, located at the edge of an existing subdivision, on a major road, and the owner lived on the property.

Ms. Jackura stated that staff found the application to be aligned with the Comprehensive Plan and therefore staff recommends that the Commission recommend approval of the application to the Board of Supervisors with the proposed conditions.

Dr. Allman opened the Public Hearing.

Mr. Chase Grogg of Landtech Resources, Inc., 205 Bulifants Boulevard Suite E, Williamsburg, VA, gave a presentation to the Commission about the proposed project. Mr. Grogg explained that staff had recommended a condition to define a parking area for the house, which had since been installed. Mr. Grogg explained that during the conceptual phase of the project, a “glamping” site and boat and RV storage area had been proposed. Mr. Grogg stated that those uses would require their own Special Use Permits (SUPs) and rezoning and were not part of the current application.

Dr. Haskins asked for clarification on whether the applicant would live on the property.

Mr. Grogg stated that there were plans in the future to subdivide the property into four different parcels. Mr. Grogg explained that the subdivision application was still in progress and was not a part of the current application.

Mr. Passero asked if the neighboring property owners were present at the meeting.

Mr. John Hill, 4305 Fenton Mill Road, stated that he had spoken to his neighbors about the proposed project and there were no concerns.

Dr. Allman closed the Public Hearing.

Mr. Everson stated that he intended to support the application as it met all four criteria for tourist homes in the Comprehensive Plan.

Mr. Everson made a motion to recommend approval of SUP-26-0003. 4305 Fenton Mill Rd. Short-Term Rental to the Board of Supervisors.

On a roll call vote, the Commission voted to recommend approval. (7-0)

2. SUP-26-0005. 5251 John Tyler Hwy. Unit 24 Williamsburg Crossing Tobacco and Vape Shop

Dr. Allman stated that due to an administrative error, there would be no staff presentation. Dr. Allman noted that the Commission would still open the Public Hearing, and it would remain open until the June Planning Commission meeting.

Dr. Allman opened the Public Hearing.

G. PLANNING COMMISSION CONSIDERATIONS

There was no discussion.

H. PLANNING DIRECTOR'S REPORT

1. Planning Director's Report - May 2026

Ms. Istenes stated she had no additions to the report.

I. PLANNING COMMISSION DISCUSSION AND REQUESTS

Dr. Allman stated that she would be representing the Planning Commission at the May 12, 2026, Board of Supervisors meeting.

Dr. Allman stated that there was a Policy Committee meeting scheduled for May 14, 2026, and a DRC meeting scheduled for May 20, 2026.

J. ADJOURNMENT

Dr. Allman asked for a motion to adjourn.

Mr. Everson made a motion to adjourn.

The meeting was adjourned at approximately 6:25 p.m.

Susan Istenes, Secretary	Dr. Kira Allman, Chair

Allison Jackura

From: Allison Jackura
Sent: Wednesday, May 27, 2026 8:33 AM
To: Allison Jackura
Subject: FW: [External]Opossion to Tourist home at 4305 Fenton Mill Road

-----Original Message-----
From: William Rorer <wrorer@gmail.com>
Sent: Saturday, May 16, 2026 9:54 AM
To: Community Development <community.development@jamescitycountyva.gov>
Subject: [External]Opossion to Tourist home at 4305 Fenton Mill Road

Dear Susan M Istenes

If this is approved it will greatly reduce the values of all of our two properties next to and the one adjacent to the Fenton Mill property. It also provides a potential hazard to my children and grandchildren.
For these reasons we are adamantly opposed to allowing a permit for a tourist home on the 4305 Fenton Mill Road property which would allow who knows who to dwell there.

Sincerely

William and Judith Rorer Jr.

SUMMARY FACTS

Applicant:	Ms. Kelley Parks, Parks Planning and Consulting, LLC, on behalf of Abdillah Assalahi
Landowner:	Williamsburg Crossing Associates, LLC
Proposal:	To allow for a vape/smoke shop within Unit 24 which is currently vacant.
Location:	5251 John Tyler Highway, Unit 24
Tax Map/Parcel No.:	4812200002
Property Acreage:	± 16.3 acres
Zoning:	B-1, General Business
Comprehensive Plan:	Mixed Use
Primary Service Area (PSA):	Inside
Staff Contact:	Allison Jackura, Planner III

PUBLIC HEARING DATES

Planning Commission:	May 6, 2026, 6:00 p.m. (Deferred) June 3, 2026, 6:00 p.m.
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. The proposed use would fill currently vacant, already constructed commercial space without the need for additional infrastructure improvements.
2. Impacts: See Impact Analysis on Pages 4-5.
3. See Comprehensive Plan Analysis on Page 6.

FACTORS UNFAVORABLE

1. Staff does not identify any unfavorable factors.
2. Impacts: See Impact Analysis on Pages 4-5.

SUMMARY STAFF RECOMMENDATION

Per the Impact Analysis noted below, staff finds the proposed use will not negatively impact surrounding property nor is it expected to negatively impact roads or other public services. Per the Comprehensive Plan analysis noted below, staff finds that the proposed use aligns with the Mixed Use recommendations within the Comprehensive Plan. Staff, therefore, recommends the Board of Supervisors (BOS) approve this application with proposed conditions (Attachment No. 1).

PLANNING COMMISSION RECOMMENDATION

The Planning Commission is scheduled to hear this application at its June 3, 2026, Regular Meeting. Staff will present the Planning Commission's recommendation at the June 9, 2026, BOS Regular Meeting.

CHANGES SINCE THE PLANNING COMMISSION MEETING

Should there be any changes to this application after the June 3, 2026, Planning Commission Regular Meeting, staff will present such changes at the June 9, 206, BOS Regular Meeting.

PROJECT DESCRIPTION

Ms. Kelley Parks has applied on behalf of Abdillah Assalahi for a Special Use Permit (SUP) to allow for the operation of a vape/smoke shop in Unit 24 of the Williamsburg Crossing Shopping Center. The property is within the B-1, General Business Zoning District located at 5251 John Tyler Highway (James City County Real Estate Tax Map Parcel No. 4812200002).

The proposed business would be located within the primary building of the shopping center which faces the intersection of Route 199 and John Tyler Highway, with existing parking located in front. Neighboring businesses within the building include several restaurants, offices, an art gallery, a private school, and a grocery store. The applicant is seeking to operate a new business and does not operate in another location currently. If permitted, the business would occupy approximately 750 square feet of retail space. The applicant did not indicate proposed hours of operation. The merchandise would consist primarily of tobacco, vape, and cannabidiol (CBD) products.

PLANNING AND ZONING HISTORY

Prior to May 9, 2023, vape and smoke shops were categorized within the Zoning Ordinance as general retail sales. On May 9, 2023, the BOS adopted a Zoning Ordinance amendment, ORD-23-0001, which established definitions and uses for "vape/smoke shop" and "vape/smoke lounge". The adopted definition of "vape/smoke shop" is "*A retail establishment that sells cigars, tobacco, and/or tobacco products, such as, but not limited to cigars, pipe tobacco, roll-your-own supplies, herbal and wax vaporizers, and glassware; hookah and water pipes; cannabis and/or hemp products, such as, but not limited to Cannabidiol (CBD); and/or e-cigarettes and associated equipment, such as, but not limited to vape batteries, coils, and e-liquids. Drug stores, retail food stores, grocery stores and convenience stores, the primary purpose of which is to sell goods and services other than those listed above, shall not be considered vape or smoke shops even if the above referenced goods are offered for sale*."

Within the B-1 Zoning District, the "vape/smoke shop" use was established as requiring an SUP. Businesses which pre-date the Ordinance amendment are permitted to continue operating within their existing footprint without obtaining an SUP. If their use ceases to operate for a period of two years, then any operation of a vape/smoke shop after that two-year period would be required to obtain an SUP.

New businesses such as this proposal are not permitted without first obtaining an SUP.

SURROUNDING ZONING AND DEVELOPMENT

This property is located within the Williamsburg Crossing Shopping Center, along Kings Way, John Tyler Highway, and Route 199. To the west are the La Fontaine condominiums, to the south are the Riverside Medical Offices, to the south and east are The Promenade at John Tyler townhomes, and to the north are single-family residences.

Within the Williamsburg Crossing Shopping Center, the Greenwood Christian Academy operates a school program for preschool and Kindergarten through 8th grade, with before- and after-school childcare. The school originally began operation within the center in 2009 as a by-right use and then sought an SUP in 2022 to expand the use at the center.

- The following table lists the information on the adjacent parcels:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	R-8, Rural Residential; R-1, Limited Residential; B-1 General Business	Single-Family Residential; Commercial	Low Density Residential; Mixed Use
SOUTH	B-1, General Business	Medical office	Mixed Use
EAST	MU, Mixed Use	Townhouses	Mixed Use
WEST	MU, Mixed Use	Multifamily	Mixed Use

IMPACT ANALYSIS

The following staff impact analysis is based upon currently adopted policies and Ordinances. However, staff does note that the BOS adopted an Initiating Resolution on April 28, 2026 directing staff to explore an Ordinance requiring separation between schools and smoke/vape shops. A draft Ordinance requiring 1,000 feet of separation between any potential smoke/vape shop and an existing school or daycare was presented by staff to the May 14, 2026, Policy Committee of the Planning Commission. The Policy Committee, at its May 14, 2026, meeting, recommended against adoption of the Ordinance, and, the matter is set to be heard at the June 3, 2026, Planning Commission meeting. The Ordinance is tentatively scheduled for the BOS meeting on July 14, 2026. If the Ordinance was approved by the BOS prior to consideration of this SUP, the use could not be permitted as it is within 150 feet of an existing school.

Given that the Ordinance has not been adopted at the time of this writing, staff has not considered the distance to an existing school as a factor for review.

- *Traffic/Transportation:* The business is not expected to generate a significant increase in vehicle trips to the site. The Williamsburg Crossing Shopping Center takes direct access from John Tyler Highway. This roadway is a minor arterial roadway per the Virginia Department of Transportation's (VDOT) Roadway Classification Map. The section of John Tyler Highway from Route 199 to Stanley Drive currently operates at an acceptable Level of Service (LOS) (A-C) and is expected to remain operating at an acceptable LOS in 2045 for the PM peak hour.

- *Utilities:* The existing infrastructure was designed to accommodate the full occupancy of the building. James City Service Authority staff had no concerns.

- *Stormwater/Environment:* The application would fill a currently vacant commercial space without increasing impervious areas within the County. If exterior site improvements are proposed in the future, those improvements would be subject to environmental review at that time.

- *Nearby Properties:* Staff is recommending conditions to ensure that the business does not cause adverse land use impacts on the neighbors, by limiting operational hours, outdoor operation, and signage.

See the following table for additional details on staff analysis of impacts.

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Public Transportation: Vehicular	No Mitigation Required	- The proposal is not anticipated to generate significant traffic given the small footprint of the retail space. - The subject property is located on Route 199, John Tyler Highway, and Kings Way, publicly maintained roads that are classified by VDOT as other freeway, minor arterial, and local road, respectively. Staff finds that the roads are adequate for this use.
Public Transportation: Bicycle/Pedestrian	No Mitigation Required	- The James City County Sidewalk Master Plan indicates a sidewalk is planned for the south side of John Tyler Highway. The Regional Bikeways Plan indicates that John Tyler Highway is a shared roadway. Zoning Ordinance Section 24-35 would not require installation of the sidewalk for this proposal, as a site plan or major subdivision are not required at this time.
Public Safety	No Mitigation Required	- Fire Station 3 on John Tyler Highway serves this area of the County and is less than half a mile from the proposed shop.
Public Schools	No Mitigation Required	- Staff finds this project does not generate impacts that require mitigation.
Public Parks and Recreation	No Mitigation Required	- Staff finds this project does not generate impacts that require mitigation.
Public Libraries and Cultural Centers	No Mitigation Required	- Staff finds this project does not generate impacts that require mitigation.

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Groundwater and Drinking Water Resources	No Mitigation Required	- The property is served by public water and sanitation. - The proposal does not generate impacts that require mitigation to groundwater or drinking water resources.
Watersheds, Streams, and Reservoirs Project is located in the Mill Creek Watershed.	No Mitigation Required	- No new impervious surface is proposed as part of this SUP request. Should exterior site improvements be made in the future, those improvements would be subject to environmental review at that time.
Cultural/Historic	No Mitigation Required	- No new impervious surface is proposed as part of this SUP request. The subject property has no known cultural resources on-site.
Nearby and Surrounding Properties	Mitigated	- Another vape shop use currently operates at the property with no known adverse impacts. - Condition No. 2 would limit the hours of operation from 8 a.m. to 9 p.m. - Condition Nos. 3 and 4 would prohibit outside display and flashing signs or lights to prevent any nuisance or unsafe conditions for pedestrians or vehicular traffic.
Community Character	No Mitigation Required	- The proposal does not include any alteration that would affect the existing landscaping along the existing roadways.
Covenants and Restrictions	No Mitigation Required	- The applicant has verified that she is not aware of any covenants or restrictions on the property that prohibit the proposed use.

COMPREHENSIVE PLAN

The site is designated Mixed Use on the Comprehensive Plan Land Use Map. In particular, this is designated as "Williamsburg Crossing", a small town or suburban center type of mixed use area.

Per the adopted Comprehensive Plan, appropriate primary uses include "commercial, office, and moderate density residential. Continued access management is needed to maintain acceptable LOS on John Tyler Highway (Route 5). Additional access points beyond those that currently exist for the Route 199 corridor will be strongly discouraged by the County."

Staff analysis: This proposal does not include any additional access points and would fill a currently existing and vacant commercial space.

Several Mixed Use development standards, such as standards b, e, and f, support a diverse mix of uses allowing for compact development, pedestrian utilization, and reduction of vehicle trips. The business is proposing to operate next to two restaurants, with additional restaurants, an art gallery, offices, a grocery store, and fitness centers nearby. To the west and to the southeast are residential complexes. The retail nature of this business supports the diversity of uses within this area and encourages multiple destination vehicle or pedestrian trips.

The Economic Development Strategy ED 4.2 encourages redevelopment of non-residential uses to occur mainly in areas where public utilities are either available or accessible within the PSA and infrastructure is supportive.

Staff analysis: Filling the vacant commercial space within the PSA aligns with the strategy.

STAFF RECOMMENDATION

Per the Impact Analysis noted above, staff finds the proposed use will not negatively impact surrounding property nor is it expected to negatively impact LOS for roads or other public services. Per the Comprehensive Plan analysis noted above, staff finds that the proposed use aligns with the Mixed Use recommendations within the Comprehensive Plan. Staff, therefore, recommends the BOS approve of this application with the proposed conditions (Attachment No. 1).

AJ/tm
SUP26-5_5251JhnTylrHwy

Attachments:
1. Proposed SUP Conditions
2. Location Map
3. Master Plan
4. Applicant Narrative
5. Public Input
6. Applicant Response to Public Input

R E S O L U T I O N

CASE NO. SUP-26-0005. 5251 JOHN TYLER HIGHWAY, UNIT 24

WILLIAMSBURG CROSSING TOBACCO AND VAPE SHOP

WHEREAS, the Board of Supervisors of James City County, Virginia (the "Board"), has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Ms. Kelley Parks, Parks Planning and Consulting, LLC, on behalf of Abdillah Assalahi has applied for an SUP to allow for a vape/smoke shop located at 5251 John Tyler Highway and further identified as James City County Real Estate Tax Map Parcel No. 4812200002 (the "Property"); and

WHEREAS, the Planning Commission, following its public hearing on May 6, 2026 and June 3, 2026, recommended XXXXX of Case No. SUP-26-0005 by a vote of X-X; and

WHEREAS, the Board of Supervisors of James City County, Virginia, finds this use to be consistent with good zoning practices and the 2045 Comprehensive Plan Land Use Map designation for the Property.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, after consideration of the factors in Section 24-9 of the James City County Code (the "County Code"), does hereby approve the issuance of Case No. SUP-26-0005 as described herein with the following conditions:

1. *Master Plan*. This special use permit (SUP) shall permit a vape/smoke shop within Unit 24 (the "Business") on the property located at 5251 John Tyler Highway and further identified as James City County Real Estate Tax Map Parcel No. 4812200002 (the "Property"). The use and layout of the Business on the Property shall be generally as shown on the document entitled "Assalahi Site Plan" and dated March 25, 2026 (the "Master Plan"), with any deviations considered per Section 24-23(a)(2) of the Zoning Ordinance, as amended.

2. *Hours of Operation*. Hours of operations for the Business shall be limited from 8 a.m. to 9 p.m., Monday through Sunday.

3. *Outside Display, Sale, or Storage*. No outside display, sale, or storage of merchandise shall be permitted at the Property.

4. *Signage*. There shall be no flashing signs or lights visible from the exterior of the Business, including within the Business windows.

5. *Commencement of Use*. A final building inspection for the Business into Unit 24 shall be obtained within twenty-four (24) months from the date of approval of this SUP, or this SUP shall automatically be void.

6. *Discontinuance of Use*. Should the use permitted by this SUP be discontinued for a period of two (2) years, the SUP shall become void.

7. *Severability*. This SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

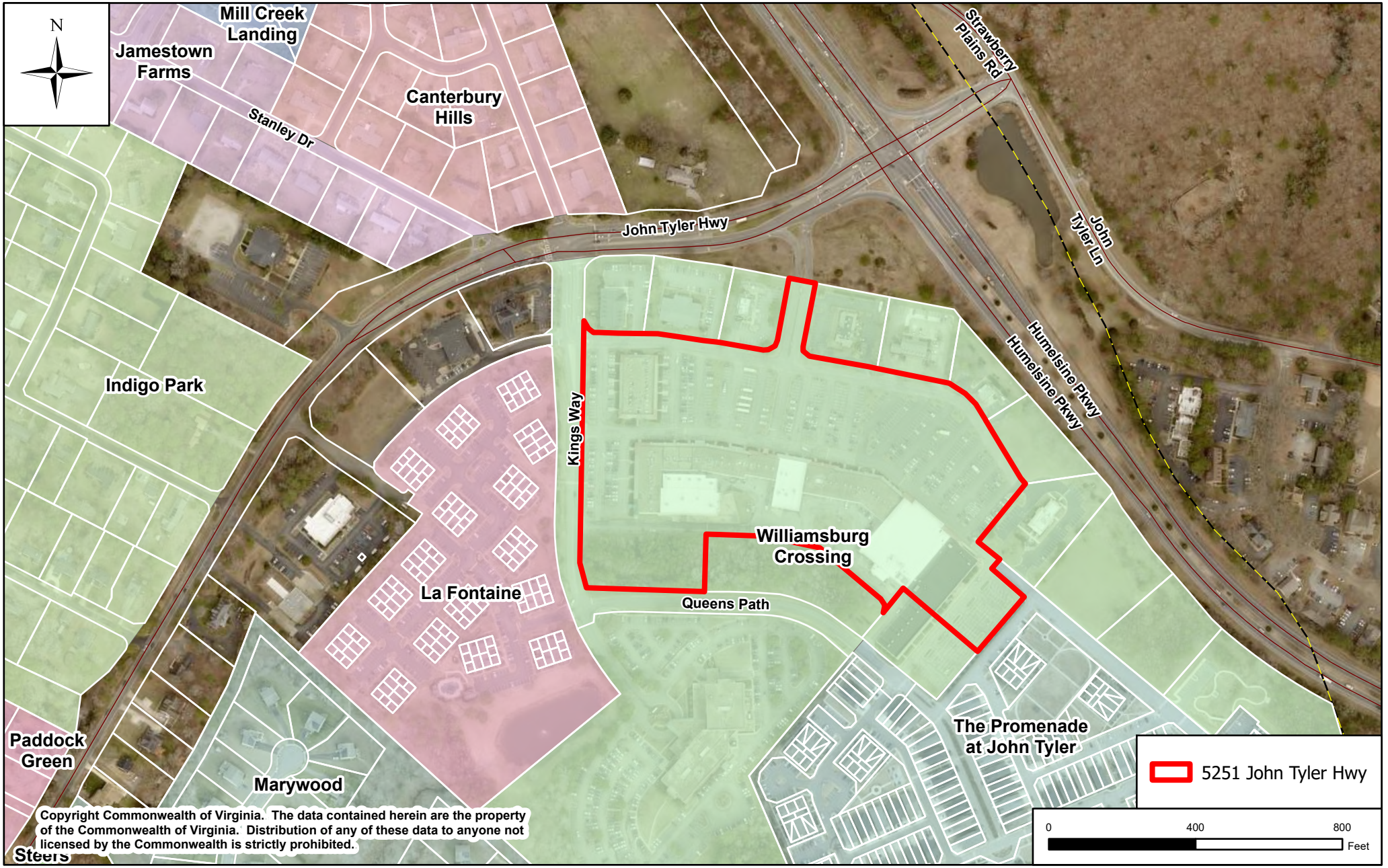
_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

SUP26-5_5251JhnTylrHwy-res

SUP-26-0005. 5251 John Tyler Hwy. Unit 24
Williamsburg Crossing Tobacco and Vape Shop



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SUP-26-0005. 5251 John Tyler Hwy. Unit 24
Williamsburg Crossing Tobacco and Vape Shop



Assalahi Site Plan

Parks
Planning & Consulting, LLC
Assalahi SUP
Master Plan

March 25, 2026
SUP-26-0005

Tenant: Abdillah Assalahi
Shopping Center Owner: WILLIAMSBURG CROSSING ASSOCIATES LLC/CO Cotswold Group
Parcel Pin: 4812200002

Kelley L. Parks, CZA ESC SWM
PO BOX 611
Cheriton, VA 23316
mkelleylewis@aol.com
(757) 442-1385





Zoning: B1
Proposed Use: "Vape/smoke shop"
Sq Ft: 1,400 (interior)
Location: Existing Shopping Center
Shop Coordinates: -76.74038; 37.25776
5251 John Tyler Highway #24

Assalahi Exterior Plan

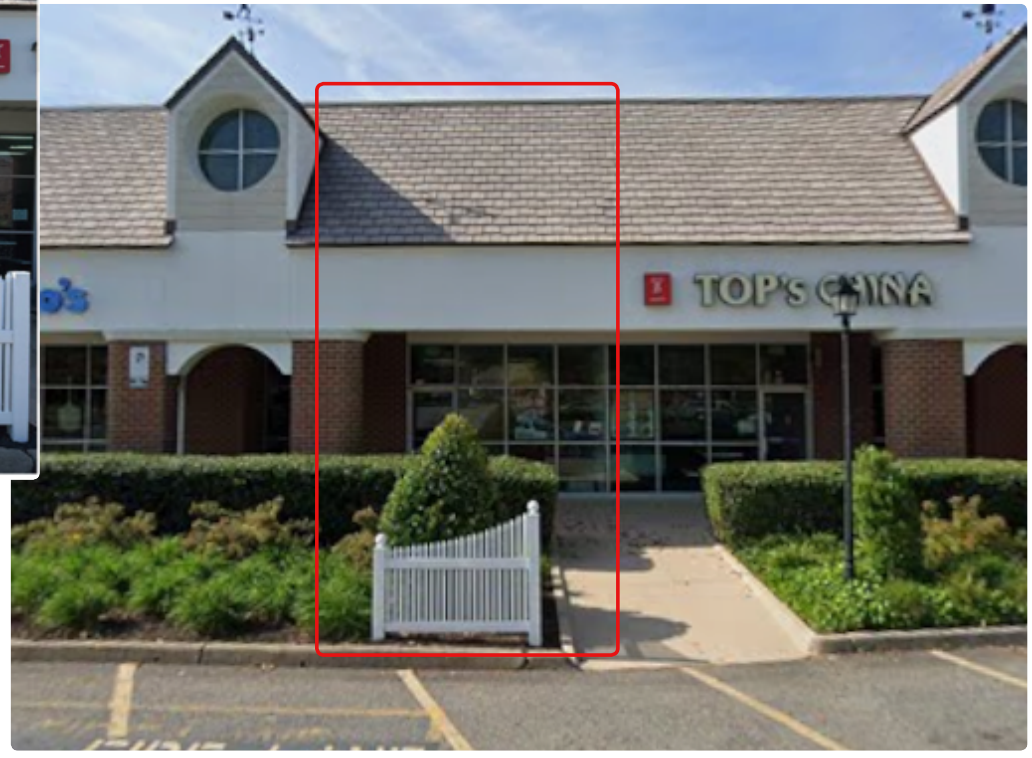
Parks
Planning & Consulting, LLC
Assalahi SUP
Master Plan

Tenant: Abdillah Assalahi
Shopping Center Owner: WILLIAMSBURG CROSSING ASSOCIATES LLC/CO Cotswold Group
Parcel Pin: 4812200002

Kelley L. Parks, CZA ESC SWM
PO BOX 611
Cheriton, VA 23316
mkelleylewis@aol.com
(757) 442-1385



← **Sign Mock-up by James River Signs**



Zoning: B1
Proposed Use: "Vape/smoke shop"
Sq Ft: 1,400 (interior)
Location: Existing Shopping Center
Shop Coordinates: -76.74038; 37.25776
5251 John Tyler Highway #24

Assalahi Community Impact Statement

Thank you for hearing this request today. The applicant is a first-time, small business owner who has invested significant time and effort into planning this shop and is committed to operating responsibly and respectfully within the community. The proposed tobacco and vape shop aims to offer a variety of authorized tobacco and vape products. While similar stores exist nearby, each business carries its own mix of brands and products, and this shop will offer items that may differ from others in the area. This is a true small business—the owner's first and only store—and he has completed nearly all of the planning independently.

The business is designed to operate with a low-impact presence. Exterior signage will be minimal and non-intrusive, and any advertising will comply with state and local regulations. A mock-up of the only exterior signage has been provided. It is not distracting and is minimalistic in nature. The business is committed to being a positive impact to surrounding businesses and the community. The shop will carry only tobacco, vape, and CBD products consistent with the zoning ordinance's definition of a vape/smoke shop. The owner understands the concerns that sometimes accompany these uses and is committed to operating responsibly and in full compliance with all regulations.

This proposal aligns with several elements of James City County's Comprehensive Plan. It supports the Economic Development Goal, which emphasizes a diverse business environment, community investment, and a balanced tax base. The shop will contribute to that tax base through tobacco taxes, business taxes, and other applicable revenues.

Public input during the Comprehensive Plan update showed strong support for attracting new businesses and jobs, with 88% of residents expressing support. Small businesses are a major part of the County's economy, employing 57% of workers in businesses with 1–4 employees. This proposal adds to that important sector. The business also supports Economic Development Strategies 1.1 and 1.2 from the Plan. Strategy 1.1 aims to "maintain an active and effective economic development strategy, which includes existing business retention and expansion, assistance to new business, new business recruitment and support to the tourism industry." Strategy 1.2: aims to develop and promote strategies and programs to encourage the creation of new and retention of existing small businesses, home-based businesses, and entrepreneurial efforts including women-owned and minority owned businesses and companies that successfully graduate from the Launchpad Business Incubator."

We respectfully request your consideration and approval. The owner is enthusiastic about opening his first shop and contributing positively to the County's economic landscape.

Waiver Requests-SUP criteria A-I

To Whom it May Concern,

Please accept this letter as our formal request for a waiver from SUP Submittal Criteria A–I. The listed requirements do not apply to this application, as the building and shopping center are already existing and established. The proposed business will not alter any site conditions or operational factors that the referenced studies are intended to evaluate.

Thanks,

Kelley L. Parks, CZA ESC SWM

Parks Planning and Consulting, LLC

Agent for Rocky Assalahi

To: James City County Board of Supervisors

James City County Planning Commission

Re: SUP 2026-05 – Smoke/Vape Shop (Williamsburg Crossing)

Date: April 2026

Roky Assalahi has applied for approval to operate a smoke/vape shop in Williamsburg Crossing. As a nearby or adjacent property/business owner, I do not object to the proposal. I support the new business and believe it will be an asset to the shopping center and the community.

Sincerely,

Tripple

The Vanilla Blunt Vill.

1. PRINT Kenneth Lindsay

SIGN [signature]

2. PRINT Erik Smith

SIGN [signature]

3. PRINT Terry Jackson

SIGN [signature]

4. PRINT Powell Alter

SIGN [signature]

5. PRINT Masinna Manoy

SIGN [signature]

Robert Wantson

[signature]

May 26, 2026

Board of Supervisors for James City County
PO Box 8784
Williamsburg, VA 23187

Re: Opposition to Special Use Permit Application SUP-26-0005; Williamsburg Crossing Tobacco and Vape Shop, 5251 John Tyler Highway, Unit 24

Dear Chairman and Members of the Board of Supervisors:

I write this letter on behalf of Greenwood Christian Academy ("Greenwood" or the "Academy") to respectfully, but vehemently, oppose the application for Special Use Permit No. SUP-26-0005 submitted by Ms. Kelley Parks from Parks Planning and Consulting, LLC, on behalf of Abdillah Assalahi, to operate a vape and smoke shop in Unit 24 of the Williamsburg Crossing Shopping Center, located at 5251 John Tyler Highway (the "Proposed Smoke/Vape Shop"). This letter is submitted in advance of the Board's scheduled public hearing, currently scheduled for June 3, 2026. We urge the Board to deny the requested SUP based on the application's incompatibility with the safety and welfare of Greenwood's students, the strong policy trend across Virginia toward separating tobacco, smoke, and vape retail from schools, and the specific land use concerns detailed below.

Greenwood Christian Academy's Presence in Williamsburg Crossing

Greenwood is one of the largest and most established businesses within the Williamsburg Crossing Shopping Center, outside of Food Lion. Greenwood operates two campuses within the same shopping center: the main campus, serving preschool through third grade, and the upper campus, serving fourth through eighth grade. The Academy originally began operations in the center in 2009 with the main campus and then expanded to the upper campus in 2022. Greenwood also provides childcare services before and after school hours. Because of Greenwood's long-standing presence and contribution to the shopping center and surrounding community, Greenwood's concerns should be given serious weight when the Board considers whether to permit a business that may negatively impact its operations, reputation, and the safety of our students and families.

The Proposed Vape Shop's Proximity to and Line of Sight with Greenwood Is Unacceptable

The Proposed Smoke/Vape Shop would be located well within 1,000 feet of Greenwood's upper campus. Additionally, and more critically, the rear entrance of the Proposed Smoke/Vape Shop is directly adjacent to (less than 100 feet from) Greenwood's playground area. The rear entrances of most businesses are typically used for receiving deliveries and discarding waste or unwanted products. Greenwood is physically integrated into the same shopping center, sharing parking areas, walkways, and common circulation patterns with the Proposed Smoke/Vape Shop, not merely

"nearby." Students, parents, and families arriving at and departing from school would share the same pedestrian and vehicular routes as customers of the vape shop, creating overlapping circulation patterns between school-age children and patrons of an adult tobacco and vape retailer throughout the school day and extended care hours. Children and families are present on both campuses throughout the day for before-school care, regular school hours, after-school care, and school-related events. Greenwood's before- and after-school program means that children are present in the shopping center from early morning through evening hours, significantly extending the window of daily exposure beyond a traditional school day. The proposed location would place a tobacco, vape, and CBD retail establishment in the direct line of sight of our school and in immediate proximity to where young children play and learn. Furthermore, smoke and vape shops tend to attract patrons who congregate outside to use their newly purchased products, which could result in loitering, secondhand smoke and vapor exposure, littering of cigarette butts and packaging, and other nuisances in the immediate vicinity of the school playground. Such activity would be disruptive to the school environment and potentially expose children to both harmful substances and inappropriate conduct.

Response to Applicant's Materials and the Staff Recommendation

The SUP process exists precisely because some otherwise legal commercial uses become incompatible in certain site-specific contexts. While a vape and smoke shop is a lawful business, its compatibility must be evaluated against the specific characteristics of the proposed location. Here, the co-location of a K-8 school within the same shopping center, with shared physical infrastructure and overlapping foot traffic, presents exactly the type of site-specific incompatibility that the SUP process was designed to identify and prevent.

We note that the staff report identifies "no unfavorable factors" and recommends approval. Most critically, the staff's impact analysis table concludes "Public Schools — No Mitigation Required." We respectfully submit that this conclusion is procedurally incomplete and substantively inadequate given that a K-8 school is not merely within the vicinity of the proposed use, but is co-located within the same shopping center, with a playground area less than 100 feet from the rear entrance of the proposed business.

If the purpose of the SUP review process is to conduct a site-specific compatibility analysis, then concluding that "No Mitigation Required" is appropriate without (a) materially analyzing the presence of an embedded K-8 school, (b) evaluating operational buffers such as location restrictions, signage limitations, visibility standards, zoning separation, or operational conditions, and (c) assessing student exposure risks in light of the substantial body of research on youth susceptibility to tobacco and vape marketing, renders the staff analysis incomplete. The City of Newport News, in adopting its 2,000 foot buffer referenced below, evaluated precisely these types of operational mitigation measures as part of its ordinance development. No comparable analysis appears in the staff report here. Moreover, the report's impact analysis states that "[a]nother vape shop use currently operates at the property with no known adverse impacts", but this comparison fails to account for the fact that the existing shop is not adjacent to the school's playground and campuses in the way Unit 24 is, which presents a fundamentally different land use scenario.

5251 John Tyler Hwy. Suite 37 Williamsburg, VA 23185

We also note that the applicant's materials frame this proposal in terms of small business entrepreneurship, reuse of a vacant commercial space, minimal signage, and local tax revenue. While we do not dispute those general characterizations, they do not constitute a compatibility analysis. Notably absent from the application materials is any meaningful (a) discussion of how the proposed use will coexist with a co-located K-8 school, (b) analysis of shared circulation, (c) proposed mitigation measures to address student proximity, and (d) acknowledgment that the rear entrance of the business opens directly adjacent to an active school playground. The question before this Board is not whether vape shops are lawful businesses deserving of support in the abstract, but whether this specific location is compatible with the specific uses already established at this site.

Studies and Examples of Problems with Local Smoke and Vape Shops

There have been multiple studies, including one published in the peer-reviewed medical journal Tobacco Induced Diseases by Wing C. Chan and Scott T. Leatherdale entitled "Tobacco retailer density surrounding schools and youth smoking behaviour: a multi-level analysis," which specifically found that adolescent smoking is related to the density and proximity of tobacco outlets and retail cigarette advertising near schools, and significant effects of tobacco retailer density near schools on tobacco use among students. Similarly, the federal government has long recognized that children deserve extra protection where they learn and play the Controlled Substances Act, the "drug-free school zone" rule uses a 1,000-foot buffer from schools as the standard for increased penalties for drug distribution. Many state and local policies mirror that 1,000-foot buffer because it is a familiar, enforceable standard already used in federal law.

Below are a couple of recent local examples of how these smoke/vape shops have been implicated in illegal activities:

- Alpha Smoke Shop & Paradise Tobacco & Vape: Following an investigation that began in July 2023, the Williamsburg Police Department executed search warrants at Alpha Smoke Shop (226 Monticello Ave) and Paradise Tobacco & Vape (1457 Richmond Road). A subsequent warrant at the owner's home on Pheasant Run in James City County uncovered pounds of synthetic opioids (tianeptine), psilocybin bars, multiple firearms (including AR-15 style rifles), and $20,000 in cash.

- King J Tobacco & Vape: The Tri-Rivers Drug Task Force and James City County Police searched King J Tobacco & Vape (4511 John Tyler Highway) following complaints of the illegal sale of high-THC products. Investigators seized several pounds of marijuana products and arrested an employee.

- Tobacco & Vape (Richmond Road): Williamsburg police searched another location at 1012 Richmond Road, seizing roughly 2,900 illegal cannabis products and arresting an employee.

These studies and real-life examples highlight why this type of element so close to a school is not proper and can potentially endanger the health and lives of Greenwood's students.

Virginia Law Expressly Authorizes Localities to Prohibit Tobacco Retail Near Schools

In 2024, the Virginia General Assembly enacted House Bill 947, codified at Virginia Code § 15.2-912.4, which provides that "[a]ny locality may by ordinance regulate the retail sale locations of tobacco products, nicotine vapor products, alternative nicotine products...or hemp products intended for smoking...and may prohibit a retail sale location on property within 1,000 linear feet of a child day center...or a public, private, or parochial school." While James City County has not yet adopted a specific distance-based ordinance under this authority, the General Assembly's decision to grant this power reflects a clear legislative judgment that tobacco and vape retailers located within 1,000 feet of schools pose a threat to the health, safety, and welfare of children that localities should be empowered to address.

The Board should consider the spirit and intent of this enabling legislation when exercising its discretion on this SUP application. Approving a new vape shop at a distance of less than 100 feet from a school playground, which is far closer than the 1,000-foot threshold the General Assembly identified as the outer boundary of concern, would be inconsistent with the policy direction established by state law.

Neighboring Virginia Localities Have Adopted Strong Separation Requirements

Across the Commonwealth, localities have moved decisively to protect children from tobacco and vape retailers near schools. The trend is clear and overwhelming. Listed below are a few key examples of ordinances adopted in the last few years:

1. City of Richmond (1,000 feet from K-12 schools, parks, libraries, places of worship, daycares, and other vape shops)
2. Henrico County (1,000 feet from schools)
3. Chesterfield County (2,000 feet from schools)
4. Hanover County (1 mile from public and private schools)
5. City of Newport News (2,000 feet from schools and child care centers)
6. City of Colonial Heights (1,000 feet from child care facilities, schools, and other recreational substance retailers)
7. City of Petersburg (1,000 feet from schools (limited to M-1 Industrial District with SUP))

The following are a list of ordinances presently under consideration:

1. City of Chesapeake (1,000 feet from schools, parks, daycares, and other vape shops)
2. Fairfax County (1,000 feet from all public, private, and parochial schools and child day centers)

The fact that every major Virginia locality to consider this issue has settled on a minimum distance of at least 1,000 feet (with some adopting wider boundaries, such as Chesterfield County and City of Newport News adopting a 2,000 foot ban and Hanover County adopting a 1-mile ban) highlights how far outside the emerging norm this application falls. Approving a smoke/vape shop in Unit 24 would place James City County dramatically out of step with the rest of the Commonwealth. These ordinances reflect a growing consensus among local officials across the political spectrum that protecting children from tobacco and vape retail near schools is a priority.

5251 John Tyler Hwy. Suite 37 Williamsburg, VA 23185

As Hanover County Supervisor Danielle Floyd stated in support of her county's ordinance: "This ordinance gives us the opportunity to keep our kids and our community as a whole safe where we're able to." Supervisor Susan Dibble added: "I just really feel our parents don't want these things near our children." Greenwood shares these sentiments and believes they are equally applicable here.

James City County Modeled Its Ordinance on the City of Williamsburg, Which Has Since Strengthened Its Regulations

In December 2022, the City of Williamsburg adopted Ordinance #22-10, removing vape/smoke shops from by-right retail status and requiring SUPs across multiple zoning districts, with staff explicitly recommending the change "[t]o protect the health, safety and general welfare of the public." It is significant that James City County's own SUP requirement for vape shops was modeled directly on the work of the adjacent City of Williamsburg. At a March 2023 Planning Commission meeting, JCC staff stated that they "would be looking to the work done by the City of Williamsburg in drafting its Ordinance since the City staff had done much of the heavy lifting in developing the Ordinance language."

Since James City County adopted its ordinance, the City of Williamsburg has moved to further tighten its regulations. In October 2025, Williamsburg City Council approved PCR 25-008, a zoning text amendment expanding oversight to require SUPs for the sale of tobacco, hemp, or vape products "in any retail or other establishment," thereby closing a loophole that allowed convenience stores and other retailers to sell these products without a permit. The clear trajectory of our neighboring jurisdiction is toward more restrictive regulation of tobacco and vape retail, not less. Approving a new vape shop less than 100 feet from a school playground would move James City County in the opposite direction from the jurisdiction that inspired its own regulatory framework.

The Board Has Broad Discretion to Deny This SUP

Under Virginia law, the grant or denial of a special use permit is a legislative function. As the Virginia Supreme Court held in *Board of Supervisors v. McDonald's Corp.*, 261 Va. 583, 589 (2001), "[w]hen a governing body of any locality reserves unto itself the right to issue special exceptions, the grant or denial of such exceptions is a legislative function." A presumption of reasonableness attaches to the Board's decision. Under the "fairly debatable" standard, if evidence supports competing views, the legislative decision must be upheld. In the context of a special use permit, the Board exercises broad discretion to balance private proposals against public welfare.

The Board is fully within its authority to conclude that siting a vape and smoke shop less than 1,000 feet from the front door of a school and less than 100 feet from a school playground is incompatible with the health, safety, and welfare of the community. A denial on these grounds would be amply supported by the record and would easily satisfy the fairly debatable standard.

5251 John Tyler Hwy. Suite 37 Williamsburg, VA 23185

Conclusion

For all of the foregoing reasons, Greenwood Christian Academy respectfully requests that the Board of Supervisors either deny Special Use Permit Application No. SUP-26-0005 or, in the alternative, defer action on the application pending a more thorough compatibility and mitigation analysis that meaningfully evaluates the impact of the proposed use on the co-located school, including consideration of operational buffers, signage, and visibility restrictions, and student exposure risks. The proposed vape and smoke shop would be located in dangerously close proximity to two school campuses serving children from preschool through eighth grade, directly adjacent to a playground area used by young students daily. Virginia law now expressly authorizes localities to prohibit this type of business within 1,000 feet of schools. Every Virginia locality to consider this issue has adopted at a minimum a 1,000-foot buffer. Public health research conclusively demonstrates the harmful effects of tobacco retail proximity to schools on youth smoking initiation and susceptibility. The Board has broad legislative discretion to deny this application, and a denial would be firmly grounded in the evidence and in the public health, safety, and welfare interests of the community.

We thank the Board for its time and careful consideration of this matter.

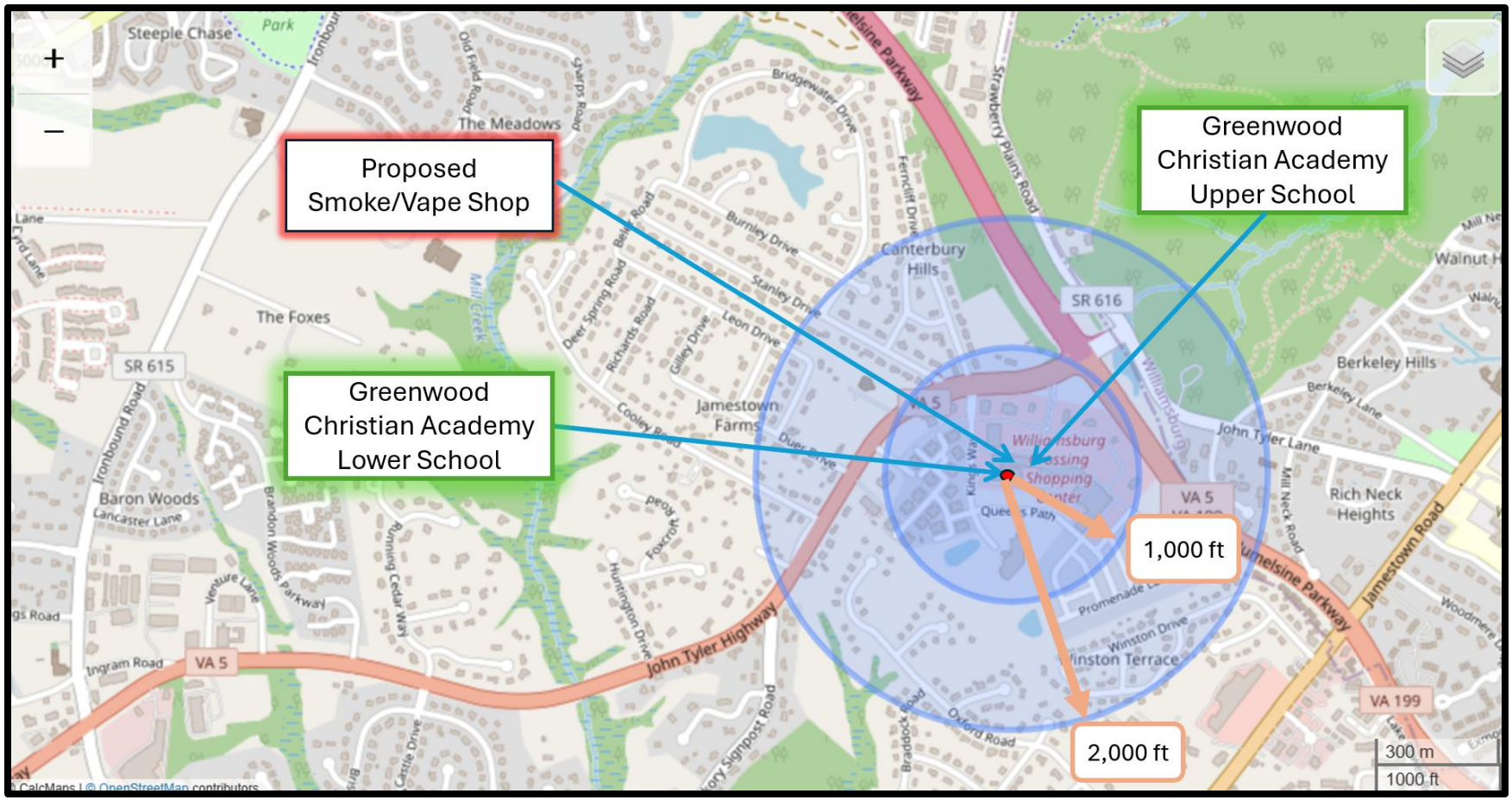
Respectfully submitted,

_____

Samantha Welcher, Principal of Greenwood Christian Academy

5251 John Tyler Hwy. Suite 37 Williamsburg, VA 23185


Greenwood Christian Academy Lower School
Proposed Vape/Smoke Shop
Greenwood Christian Academy Playground
Greenwood Christian Academy Upper School
~ 60 ft.


Proposed
Smoke/Vape Shop
Greenwood
Christian Academy
Upper School
Greenwood
Christian Academy
Lower School
1,000 ft
2,000 ft
SR 615
SR 616
VA 5
VA 199
John Tyler Highway
Jamestown Road
The Meadows
The Foxes
Canterbury
Hills
Jamestown
Farms
Baron Woods
Rich Neck
Heights
Berkeley Hills
Williamsburg
Shopping
300 m
1000 ft

Parks Planning & Consulting, LLC

To: James City County Board of Supervisors

James City County Planning Commission

From: Kelley L. Parks, CZA

Parks Planning & Consulting, LLC

Re: SUP 2026-05 Assalahi Smoke/Vape Shop

Date: May 27, 2026

Dear Members of the Board and Planning Commission:

This letter is submitted on behalf of Rocky Assalahi, owner and operator of the proposed Tobacco & Vape Shop, in response to concerns raised by Greenwood Christian Academy.

Mr. Assalahi is committed to operating this business responsibly and in a manner compatible with surrounding tenants. He is equally committed to respecting the school and ensuring that both uses can coexist appropriately at this location. We have accepted the County's proposed conditions and, to further address compatibility, offer additional conditions in this letter.

At the recommendation of County staff, we contacted the school in good faith to discuss the proposal and any concerns. During that discussion, the school identified concerns primarily related to activity outside the store, including loitering and visual impacts. Although the school did not express opposition during that conversation, its subsequent letter took a different position.

The concerns raised by the school can be addressed through reasonable operating conditions, including no-loitering signage and visibility-related conditions for the rear of the store. Assertions regarding specific patrons are speculative, unsupported, and not unique to this proposed use, particularly given that the school is located within a retail shopping center. Any patron visiting this business could just as easily visit any other business in the

center. By comparison, alcoholic beverage stores are permitted by right in this zoning district and could locate here without school input. These are comparable retail uses, yet this application is subject to additional scrutiny. Any implication that this business would operate unlawfully is unsupported and should not be given weight.

The school's concerns could be substantiated if the proposed shop were immediately adjacent to the school's principal entrance, but that is not the case. The storefront is not adjacent to the school's main entrance; rather, the main entrance is located on an opposite face of the shopping center and at least five storefronts away. The entrance to the upper school is also at least 5 storefronts away. The only area of adjacency is the rear of the store, where it abuts the playground. We have proposed conditions that directly address that circumstance because Mr. Assalahi intends to provide added precautions, act as a good neighbor, and show appropriate respect for the children and families served by the school.

Although the school is an established use at this location, it is situated within a shopping center intended to accommodate retail activity serving the surrounding community. In that setting, compatibility considerations are not one-sided. We also note that Mr. Assalahi has received support from numerous adjacent business owners, and the school was the only nearby entity to express opposition. Further, both a school and a tobacco/vape shop require a Special Use Permit in this zoning district; neither is a by-right use.

We further note that another tobacco and smoke shop was recently approved in the same shopping center and within 1,000 feet of the school. We respectfully request that this application be evaluated in a consistent manner.

With respect to the referenced ZTA, we were not aware of the proposed 1,000-foot amendment and were not informed of it until after the application had been submitted and placed on the meeting agenda. Mr. Assalahi has made a substantial financial investment in this business, and the shopping center is an appropriate location for this type of use. We respectfully ask that the timing of this application and Mr. Assalahi's reliance and investment be given due consideration.

Although the school has requested additional compatibility studies, compatibility is already a central component of the County's review of land-use applications and has already been evaluated in this case. We ask that this item not be tabled pending further studies as compatibility has already been considered.

Accordingly, we respectfully offer the following additional conditions, beyond those already included in the County staff report, and remain willing to consider any other reasonable conditions proposed by the school or the County. These conditions are intended to address the concerns raised while allowing the business to operate on terms comparable to

neighboring retail tenants. In our view, they fully and reasonably address the relevant concerns identified by the school.

1. Post no-loitering signage at the front and rear of the store.
2. Prohibit all outside storage, including behind the building.
3. Ensure that all trash is placed in fully enclosed, non-transparent receptacles so that product boxes and related waste are not visible.

Thank you for your consideration of this matter.

Sincerely,

Kelley Parks

SUMMARY FACTS

Applicants:	Mr. Mark Jakobowski of Pathmark Consulting, Mr. Stephen Romeo of VHB, Inc., and Mr. Vernon Geddy, III, of Geddy & Franck, LLP
Landowners:	Historic Virginia Land Conservancy Mr. Howard B. Hankins Hankins Land Trust No. 1
Proposal:	A request to rezone approximately 276.10 acres: approximately 219.99 acres from M-1, Limited Industrial, to MU, Mixed Use, with Proffers, and approximately 56.11 acres from M-1, Limited Business/Industrial, with Proffers, to A-1, General Agricultural. The application proposes 704 dwelling units comprised of 384 Continuing Care and Retirement Community ("CCRC") units, 178 single-family attached units, and 142 single-family detached units. The proposal also includes 24,500 square feet of commercial development which may include retail, shops, restaurants, and hotels, 22,000 square feet of office development, 6,400 square feet for an open-air place of public assembly and community gathering, and 4.8 acres set aside for public use. The request also includes a proposal for a Special Use Permit (SUP) to allow for the following uses: • the extension of public water and sewer facilities. • a resource recovery facility. • an open-air museum and accompanying visitor center.
Locations:	8196 Croaker Road 8212 Croaker Road 8220 Croaker Road
Tax Map/Parcel Nos.:	1430100039 1430100040A 1430100040
Current Zoning:	M-1, Limited Business/Industrial, with Proffers
Proposed Zoning:	A-1, General Agricultural MU, Mixed Use, with Proffers
Project Acreage:	+/- 276.10 acres
Comprehensive Plan:	Community Character Conservation, Open Space or Recreation; Mixed Use-Croaker Interchange, Southeast Quadrant
Primary Service Area (PSA):	Inside
Staff Contact:	Roberta Sulouff, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	April 1, 2026, 6:00 p.m.
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. Staff finds the proposal to be consistent with the Zoning Ordinance.

2. Staff finds that the land area percentages proposed by the Rezoning application are generally consistent with the Comprehensive Plan recommended land area/use percentages for areas designated Mixed Use, Level 2 (see Pages 20-21).

3. This proposal is consistent with recommendations regarding workforce and affordable housing found in the Comprehensive Plan (see Page 18).

4. The application is expected to have a positive cumulative fiscal impact based on analysis from the County's Fiscal Impact Model (see Pages 19-20).

5. The proposal passes the Adequate Public Schools Facilities Test (see Page 11).

6. The applicants have proffered the installation of all traffic improvements recommended by the approved TIA and thus passes the Adequate Transportation Facilities Test (see Pages 7-10).

7. The proposal is generally consistent with the Parks & Recreation Development Guidelines (see Pages 12-13).

8. The applicants have proffered the relocation and preservation of a historic house located on the property.

9. The proposal creates an opportunity to align the Zoning Designation of the Historic Virginia Land Conservancy parcel (8196 Croaker Road) with its Comprehensive Plan future land use designation.

10. The proposed water and sewer extension is within the PSA. The Comprehensive Plan recommends the extension of public facilities to areas within the PSA.

11. See Impact Analysis on Pages 7-19.

FACTORS UNFAVORABLE

1. The application is not consistent with the Comprehensive Plan land use recommendations specific to the Croaker Interchange Mixed Use Area.

2. The Croaker Road and Rochambeau Drive intersection currently operates at a Level of Service (LOS) E. With the proffered improvements the LOS is improved; however, the intersection still operates below acceptable levels of service (LOS A-C). In addition, several turning movements which would otherwise operate at acceptable levels of service become congested and failing levels of service.

3. The proposed extension of water and/or sewer facilities, while within the PSA, cannot be considered consistent with the Comprehensive Plan if it is proposed to serve a use that is inconsistent with the Comprehensive Plan (See Factor Unfavorable No. 1).

4. The applicants have proffered that at least 30% of the dwelling units permitted on the property shall be offered for sale at prices that are targeted at households earning up to 80% of the Average Median Income (AMI). This exceeds Comprehensive Plan recommendations. However, staff notes that this proffer language annually adjusts the maximum sale price of affordable units using the Mashall & Swift Building Costs Index and does not guarantee that the final price of the units will remain at or below the maximum sales price for households earning 80% or less of the

area median income as determined by the U.S. Department of Housing and Urban Development (HUD).

5. Staff finds the application is not fully consistent with the Board's adopted MU phasing policy.

6. See Impact Analysis on Pages 7-19.

PLANNING COMMISSION RECOMMENDATION

At its April 1, 2026, Regular Meeting, the Planning Commission voted 3-3 on a motion to approve the Rezoning and SUP applications subject to proposed proffers and conditions, resulting in a neutral recommendation. At the same meeting, the Commission voted 4-2 to find the extension of public utilities in substantial accordance with the adopted Comprehensive Plan, per Section 15.2-2232 of the Code of Virginia.

CHANGES MADE SINCE THE PLANNING COMMISSION MEETING

On February 24, 2026, the James City Service Authority (JCSA) Board of Directors held its Annual Retreat. At that meeting, JCSA staff presented and discussed the Wastewater Capacity Study. Given the results of the recent Wastewater Capacity Study, JCSA staff worked closely with the Hampton Roads Sanitation District (HRSD) in evaluating this application.

According to the current Regional Hydraulic Model (RHM), the existing HRSD infrastructure downstream of the proposed development lacks the wet weather capacity during larger events to handle the anticipated flows without increasing the risk of overflow. However, it should be noted that HRSD has recently made operational improvements at both its Ford's Colony and Greensprings pump stations which will likely improve capacity, but these recent improvements are not yet reflected in the RHM. Adding additional flow upstream of these HRSD stations will reduce the effectiveness of these operational improvements. In addition, the flows conveyed to the JCSA New Town pump station are nearing or at capacity, which may necessitate upgrades to the existing facility to accommodate any additional demands.

A formal assessment, requiring a Water and Sewer Master Plan, and flow-acceptance process would need to be conducted through JCSA and HRSD to determine potential flow impacts on the JCSA and HRSD pump stations, if any. Generally, as with any new development throughout the County, as existing infrastructure nears capacity, upgrades to existing facilities to accommodate any additional demands may be required, including to the pump station(s) mentioned above. Accordingly, as noted later on in this staff report, while legislative applications require the submission of Conceptual Utility Master Plan, it is not guaranteed that required service levels are available from the existing systems to support the development and it is not guaranteed that the size, location, and configuration of the water and sewer facilities shown thereon will work.

Specific to this application, staff notes that the applicants have proffered the submission of a detailed Utility Master Plan. This application further proffers that the County shall not be obligated to approve any final development plans for the property until the Water and Sewer Master Plan has been approved by JCSA and that the approved Water and Sewer Master Plan, to include the need for any required off-site improvements, shall be implemented by the developer.

SUMMARY STAFF RECOMMENDATION

Staff cannot recommend approval of these applications as the proposed rezoning is not consistent with the adopted 2045 Comprehensive Plan land use recommendations specific to the Croaker Interchange Mixed Use Area. Should the Board of

Supervisors (BOS) wish to approve these applications, staff recommends doing so subject to the attached proposed conditions and proffers.

PROJECT DESCRIPTION

Mr. Mark Jakobowski of Pathmark Consulting has applied on behalf of Mr. Howard B. Hankins, Hankins Land Trust No. 1, and the Historic Virginia Land Conservancy, to rezone an approximately 276.10-acre portion of land located at 8196, 8212, and 8220 Croaker Road. The application proposes that ± 219.99 acres of that land be rezoned from M-1, Limited Business/Industrial, to MU, Mixed Use, with Proffers. The MU development is proposed to occur in four phases across eight land bays. The application also includes requests for the following specially permitted uses in the proposed MU Zoning District as a single SUP application, should the Rezoning application be approved: the extension of water and sewer facilities to the site, a hotel, and a permit for the resource recovery facility that currently operates on-site under an SUP for the M-1 District but which would need a new SUP for the MU District.

The applicants propose to rezone 8196 Croaker Road to two separate zoning districts. The private roadway consisting of approximately five acres will be rezoned from M-1, Limited Business/Industrial to MU, Mixed Use as private roads are a permitted use. The remaining 56.11 acres, comprised of land currently owned by the Historic Virginia Land Conservancy and actively farmed, will be rezoned from M-1, Limited Business/Industrial to A-1, General Agricultural.

The subject parcels include 63.5 acres of Resource Protection Area (RPA) and 6.4 acres of areas with steep slopes outside of the RPA. The net developable area of the proposed MU development is 159.2 acres. The applications result in an overall net density of 3.9 dwelling units per acre in the proposed MU District, with each associated land bay and land use designation subject to its own density calculation and cap.

Together, the applications propose the following:

- The rezoning of the majority of 8196 Croaker Road from M-1 to A-1.

- A private entrance road from Croaker Road, traversing through the proposed A-1 parcel, to the MU development. This road will connect to a system of private roads internal to the development.

- 142 single-family detached units (Land Bay 7) and 178 single-family attached units including duplexes and townhomes (Land Bay 6). Per Proffer No. 10, the applicants are proposing that 30% of these units be offered for sale at prices that are targeted at households earning up to 80% of the AMI.

- 178,000 square feet of building area dedicated to a CCRC (Land Bay 1). The CCRC is proposed to include 78 assisted living units in an apartment style "tower," 226 independent living apartments, also located in an apartment tower, and 80 independent cottage/cluster style "hybrid-homes". Per Proffer No. 9, the CCRC will provide recreational amenities including, but not limited to, a fitness center, pool, community living room, a multi-purpose room, and landscaped grounds (including walking trails per the Master Plan).

- Recreational facilities to serve residents of Land Bays 1, 6, and 7. These facilities are in addition to those provided for residents of the CCRC. Per Proffer No. 9, the proposed recreational amenities include a shelter/pavilion with restrooms, a playground, eight racket-sport courts, two playing fields, and open space, all located in Land Bay 5. The applicants have also proffered a pool and clubhouse in Land Bay 6 to serve residents of Land Bays 1, 6, and

24,500 square feet of retail/restaurant/hotel building area (situated on ± 6.6 acres in Land Bay 2).

- 11.8 acres designated for a place of public assembly and community gathering (Land Bay 3).
- A museum and visitors center, situated on 4.9 acres located in Land Bay 4. The museum is proposed as an open-air experience featuring the presidential busts formerly displayed in Presidents Park and widely known as "The Presidents' Heads". Per Proffer No. 15, the applicants are proposing to relocate and restore a historic home currently located on the property, to serve as the visitor's center for the museum.

- 4.8 acres of land proposed for dedication to the County, along Fenton Mill Road, for a future public use site (Land Bay 8). This land bay is not accessible to any land bays interior to the development (taking access from Croaker Road).

- 22,000 square feet of building area reserved for medical offices, situated on 4.9 acres of land along Fenton Mill Road (Land Bay 9). This land bay is not accessible to any land bays interior to the development (taking access from Croaker Road).

- 20.1 acres of open space outside of the RPA.

- A 16-foot-wide golf cart and pedestrian path connecting the proposed MU development with the neighboring golf course.

- A network of approximately two miles of walking trails, in addition to/conjunction with pedestrian and bicycle facilities required by the Zoning Ordinance.

- The extension of public water and sewer facilities to the site. The applicants propose 12-inch water and sewer lines to be bored under Interstate 64 and Fenton Mill Road to connect to existing water and sewer infrastructure at the intersection of Croaker Road and Rochambeau Drive. The applicants may be required to construct additional infrastructure to create a "loop system," as triggered during site build-out, per JCSA regulations.

- The operation and subsequent phasing out of the resource recovery facility currently operating at the site. This use has an approved SUP; however, that SUP is tied to the current zoning district. Should this rezoning be approved, the existing use would need a new SUP to continue operating within the new zoning district. The applicants have proffered (Proffer No. 16) that the existing resource recovery facility will wind down and eventually cease operations in conjunction with the build-out of the proposed MU development.

PLANNING AND ZONING HISTORY

In December of 1990, the BOS approved JCC Case No. Z-0012-1990, Kiskiack-Old French Winery/Hankins. This application rezoned +/-492 acres to M-1, Limited Business/Industrial (+/-255 acres), R-5, Multifamily Residential (+/-223 acres), and A-1, General Agricultural (+/-14 acres), with the intention of creating a chateau/winery complex, hotel, and other commercial/light industrial uses. Under the 1990 rezoning, the area associated with the current proposal was rezoned M-1 and designated as light industrial on the Master Plan.

In January of 1996, the BOS approved JCC Case No. Z-0013-1995, Kiskiack (Hankins) Clubhouse/Old Dominion Winery. This application restated and amended the Adopted Proffers and rezoned an additional +/- 10 acres from R-5 to R-8, Rural Residential for the Kiskiack Golf Clubhouse.

In April of 2003, the BOS approved JCC Case No. SUP-0004-2003, which permitted the extension of water and sewer facilities to the existing, historical house on the property. The connections were never built and the SUP subsequently expired.

Activities associated with the borrow pit have occurred on the property since the early 1980s and were considered legally nonconforming for some time. Staff cannot determine when the wood and stone processing use began; however, staff started working with Mr. Hankins in 2013 to bring the activities into conformance with the Zoning Ordinance. In June 2016, the BOS approved JCC Case No. SUP-0004-2015, which permitted the resource recovery operation.

During the 2020 Comprehensive Plan update, staff reviewed two Land Use applications seeking to change the Comprehensive Plan Future Land Use designations for all subject parcels. LU-20-0028 proposed that 8212 and 8220 Croaker Road both be removed from the PSA and that they be designated as Rural Lands. This application also called for the removal of 8196 Croaker Road (the "Conservancy Property") from the PSA as well. The Board did not approve this application. Instead, the Board approved LU-20-0016, which changed the land use designation of the Conservancy Property from Mixed Use to Community Conservation, Open Space, or Recreation. This approval did not impact the PSA boundary and maintained the existing designation of Mixed Use of the two rear parcels.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	A-1, General Agricultural; R-5, Multifamily Residential; R-8, Rural Residential	Residential Uses and the Kiskiack Golf Course	Mixed Use, Rural Lands, and Community Character Conservation, Open Space or Recreation
SOUTH	A-1, General Agricultural	Acreage Lots, Agriculture, Residential and Commercial Uses	Economic Opportunity and Rural Lands
EAST	A-1, General Agricultural	Acreage Lots, Residential and Commercial Uses	Rural Lands
WEST	A-1, General Agricultural	Gas Station/Convenience Store, Church, Residential Uses	Low Density Residential, Mixed Use, Neighborhood Commercial, and Rural Lands

PUBLIC RESOURCES AND ENVIRONMENTAL IMPACTS ANALYSIS

A table summarizing the following analysis can be found on Pages 15-17.

- *Traffic/Transportation:* The scale of this proposal triggered the submittal of a Transportation Impacts Analysis ("TIA") per Section 24-23 of the Zoning Ordinance. A TIA examines the existing and projected conditions of vehicular traffic, including LOS, with a focus on the roads and intersections serving and impacted by the proposed development. The study parameters were reviewed and agreed upon by JCC staff, Virginia Department of Transportation (VDOT) staff, and traffic engineers completing the analysis on behalf of the applicants. VDOT has reviewed the completed TIA and agrees with its recommendations. Further, VDOT has agreed that the draft Proffers address these concerns.

  The TIA projects that the development would generate 945 AM peak-hour trips and 1,277 PM peak-hour trips, ultimately generating a total of approximately 13,597 new vehicle trips per day.

  The application proposes a main access to the interior of the site from Croaker Road, via the extension of Club Drive, an existing, private right-of-way. Land Bays 8 and 9 are proposed to take direct access from Fenton Mill Road. Croaker Road is a major collector roadway directly adjacent to the project site. Croaker Road is a two-lane, undivided roadway, and from Fenton Mill Road to Rochambeau Drive it is a four-lane, divided roadway. The portions of Croaker Road projected to be impacted by this application currently operates at LOS A-C and are projected to operate at a LOS A-C in 2045, as studied prior to this application.

  The TIA analyzed the following roads and intersections (see tables on Pages 8 and 9 for the LOS of studied intersections *based on different build-out scenarios, assuming no proffered traffic improvements*):

  - Croaker Road.
  - Interstate 64.
  - Croaker Road/Rochambeau Drive (signalized).
  - Croaker Road/I-64 Westbound Off-Ramp (unsignalized).
  - Croaker Road/Fenton Mill Road (unsignalized).
  - Croaker Road/Club Drive/Cedar Point Lane (unsignalized).
  - Merge movement at Croaker Road Southbound to 1-64 Westbound.
  - Weave movements at:
    - 1-64 Eastbound between I-64 Eastbound "on" loop and "off" loop.
    - Croaker Road Northbound between I-64 Eastbound "off" loop and I-64 Westbound "on" loop.
    - Croaker Road Southbound between I-64 Westbound "off" loop and I-64 Eastbound "on" loop.
  - Diverging movement at I-64 Westbound and Croaker Road Northbound.

  Staff analyzes all eligible legislative cases per the Board Adopted Adequate Transportation Facilities Test. This policy requires a proposed SUP or Rezoning to be tested during the application process to ensure that transportation facilities are adequate to mitigate traffic impacts. A proposed Rezoning or SUP application will be tested for Adequate Transportation Facilities and will pass the test if off-site improvements are required by the TIA that is approved by both the Planning Director and VDOT; or if all off-site improvements recommended by a TIA that is approved by both the Planning Director and VDOT are guaranteed in a form approved by the Planning Director and the County Attorney. Per staff evaluation, this proposal passes this test based on the latter criteria.

VDOT has reviewed the conclusions of the TIA as well as the Proffered Traffic Improvements, and has stated that those Proffered Improvements satisfy the recommendations of the Traffic Study (Proffer No. 6).

Recommended Traffic Improvements include the following:

- Croaker Road/Rochambeau Drive Intersection:
  - An eastbound left-turn lane on Rochambeau Drive with 400 feet of storage and a 200-foot taper.
  - Improved tapers (200 feet) and storage (300 feet) on both the northbound and southbound turn lanes of Croaker Road.
  - Provision of optimized signal timings.
- Croaker Road/Fenton Mill Road Intersection:
  - Improve northbound right-turn lane of Croaker Road to include 200 feet of taper and 200 feet of storage.
  - Reconstruct the intersection as a Restricted Crossing U-Turn (RCUT) intersection. The applicants propose to do so by means of constructing a channelizing island with the median opening and extending the existing median.
- Croaker Road/Club Drive/Cedar Point Lane Intersection and Entrance:
  - Construct a single-lane roundabout.

Per Proffer No. 6, these improvements shall be completed or their completion guaranteed (and all necessary permits and approvals acquired) prior to the issuance of any Certificates of Occupancy for any building on the site. If guaranteed rather than initially completed, the improvements must be completed prior to issuance of Certificates of Occupancy for any development on the site other than the museum site and associated visitor center.

Croaker Road/Rochambeau Drive Intersection *No Improvements*						
	Existing		2030 No-Build		2036 No-Build	
	AM	PM	AM	PM	AM	PM
Overall	E	E	F	E	F	E
EB	F	F	F	F	F	F
WB	E	E	E	E	E	E
NBLT	E	F	E	F	E	F
NBTH	C	D	C	D	C	D
NBRT	C	C	C	C	C	C
SBLT	E	E	E	E	E	E
SBTH	C	D	C	D	C	D
SBRT	C	D	C	D	C	D

Croaker Road/I-64 Westbound Off-Ramp *No Improvements*						
	Existing		2030 No-Build		2036 No-Build	
	AM	PM	AM	PM	AM	PM
WBRT	A	A	A	A	A	A

Croaker Road/Fenton Mill Road Intersection *No Improvements*						
	Existing		2030 No-Build		2036 No-Build	
	AM	PM	AM	PM	AM	PM
EB	B	B	B	B	B	B
WB	B	C	B	C	C	C
NBLT	A	A	A	A	A	A
SBLT	A	A	A	A	A	A

Croaker Road/Club Drive Intersection *No Roundabout*						
	Existing		2030 No-Build		2036 No-Build	
	AM	PM	AM	PM	AM	PM
EB	A	A	A	A	A	A
WB	A	B	A	B	A	B
NB	A	A	A	A	A	A
SB	A	A	A	A	A	A

The tables below show the Level of Service for each intersection studied with the proffered improvements.

Croaker Road/Rochambeau Drive Intersection:

- An eastbound left-turn lane on Rochambeau Drive with 400 feet of storage and a 200-foot taper.
- Improved tapers (200 feet) and storage (300 feet) on both the northbound and southbound turn lanes of Croaker Road.
- Provision of optimized signal timings.

Croaker Road/Rochambeau Drive Intersection				
	2030 Build		2036 Build	
	AM	PM	AM	PM
Overall	D	E	D	E
EBLT	E	E	E	E
EBTH	D	D	D	D
EBRT	D	D	D	D
WB	D	E	E	E
NBLT	E	E	E	E
NBTH	D	D	D	D
NBRT	D	D	D	D
SBLT	E	E	E	E
SBTH	D	D	E	E
SBRT	D	D	D	D

Overall, with the proffered improvements, the LOS of the Croaker Road and Rochambeau Drive intersection will have a LOS D in the AM and a LOS E in the PM.

Croaker Road/Fenton Mill Road Intersection:

- Improve northbound right-turn lane of Croaker Road to include 200 feet of taper and 200 feet of storage.
- Reconstruct the intersection as a RCUT intersection. The applicants propose to do so by means of constructing a channelizing island with the median opening and extending the existing median.

Croaker Road/Fenton Mill Road Intersection				
	2030 Build		2036 Build	
	AM	PM	AM	PM
EBRT	B	B	B	B
WBRT	B	B	B	B
NBLT	A	A	B	B
SBLT	A	A	A	A

With the proposed improvements, the Croaker Road and Fenton Mill Road intersection will operate at a LOS B or better in all lane directions.

Croaker Road/Club Drive/Cedar Point Lane Intersection and Entrance:

- Construct a single-lane roundabout.

Croaker Road/Club Drive/Cedar Point Lane Intersection				
	2030 Build		2036 Build	
	AM	PM	AM	PM
Overall	A	A	A	A
East Leg	A	A	A	A
West Leg	A	A	A	A
North Leg	A	A	A	A
South Leg	A	A	A	A

With the proposed roundabout, the Croaker Road, Club Drive/Cedar Point Lane intersection will operate at a LOS A in all lane directions.

- *Utilities:* While this site is located inside of the PSA, it is not currently served by public water or sewer. The applications propose the extension of 12-inch water and sewer mains from the intersection of Croaker Road and Rochambeau Drive, along Rochambeau Drive, and bored under I-64 to serve the site. The extension will be at the expense of the developer and is subject to attached Proffers (Attachment No. 3) and Conditions (Attachment No. 1). The proposed conditions and proffers are intended to ensure that construction impacts caused by the utility extension are mitigated and that the site is subject to the submission and approval of a detailed utility Master Plan prior to the submission of any site plans for the project.

- *Schools:* Staff analyzes all eligible legislative cases per the Board adopted Adequate Public Schools Facilities Test. A proposed Rezoning or SUP application for residential development is required to show that the schools which would serve the future development currently have adequate design capacity to accommodate the existing student population plus the additional schoolchildren generated by the development. Existing school facilities shall be deemed adequate if the projected student population does not exceed 100% of the design capacity.

  The proposed development is anticipated to generate an additional 78 students. As illustrated in the following table, the additional projected students would not cause the enrollment levels for Norge Elementary School, Toano Middle School, or Warhill High School to exceed their relative effective capacities. As such, the proposal passes the Adequate Public School Facilities Test.

Student Enrollment and School Capacity, Williamsburg-James City County (WJCC) Schools 2025-2026

School	*Effective Capacity*	*Enrollment 2025-2026*	*Projected Students Generated*	*Enrollment + Projected Students*
Norge Elementary School	809	555	+35	590
Toano Middle School	790	681	+18	699
Warhill High School	1,441	1,315	+25	1,340

- *Public Safety:* Fire Station 1 is located approximately four miles from the site. Additionally, the applicants are proffering the dedication of approximately 4.8 acres of land for use as a potential future public service site, possibly for use by the Fire or Police Departments. Staff from both the Police Department and the Fire Department reviewed these applications and did not recommend any additional conditions.
- *Nearby Properties:* Surrounding parcels are a mix of commercial, acreage lots, agriculture, and A-1 zoned residential properties. The Kiskiack Golf Course also shares a considerable length of boundary line. Additionally, parcels along Rochambeau Drive will be impacted during the construction phase of the proposed utility extension.
  - *Buffering:* Much of the site is naturally buffered by RPA. Additionally, the Zoning Ordinance requires a 15-foot by 50-foot perimeter buffer surrounding the development, dependent on the proposed use and uses on adjacent properties. These landscape elements will be required and reviewed at the development phase of the project.

- *Utility Extension:* Staff has proposed conditions (Attachment No. 1) addressing potential impacts to neighbors such as adverse construction hours, lighting, and the disturbance of existing vegetation.

- *Resource Recovery:* While this use is currently operating and subject to SUP conditions, the use must necessarily cease for the development to be built out. As such, staff is restating many of the existing conditions, with additional conditions to address the planning, phasing, and timing of the operation's termination. Proffer No. 16 also addresses the termination of operations, stating that the applicants must submit a schedule and plan for the termination of operations prior to the submission of any plan of development for the site. That proffer also states that no new development may occur on areas associated with the resource recovery operation in proposed Land Bays 1-7 prior to the termination of the operation per Virginia Department of Mines, Mineral, and Energy regulations.

- *Museum Use:* Staff is proposing conditions addressing lighting, operating hours, and excess noise.

- *Public Parks and Recreation:* Residential rezonings are subject to review for conformance with the JCC Parks & Recreation Development Guidelines. That document provides guidance on the scale and variety of recommended recreational amenities based on the number and type of residential units proposed by a given development. This proposal includes a wide mix of housing types, including a CCRC. The applicants have proffered that the CCRC residents will have access to recreational amenities associated with the larger development (Proffer No. 6). While the application does not proffer or show two playgrounds as recommended by the guidelines, the applicants are proffering (Proffer No. 6), and/or showing on the Master Plan, parkland acreage, trails, and sport courts in access of the recommendations of the guidelines for those categories. As such, Parks & Recreation staff have reviewed the application and finds the proposal generally consistent with the Parks & Recreation Development Guidelines.

James City County Parks & Recreation Development Guidelines Comparison

Facility Type	*Minimum Required*	*Proffered or Shown on the Masterplan*
Parkland Acreage	.96	7.5 acres*
Biking/Jogging Trails	.440 miles	2 miles
Playground(s)	2	1
Sports Courts or Pools	3 basketball courts and 2 tennis courts OR 2 pools	8 pickleball/tennis courts and 2 pools**
Sports Fields	2	2
CCRC Specific Amenities	A mix of age-appropriate alternative facilities	Dedicated indoor recreational areas (lobby, living room, and multipurpose room), a fitness center, landscaped grounds for passive recreation

*does not include any landscaped walking areas proposed near the CCRC, nor does this include any area associated with Land Bay 3 (Place of Public Assembly and Community Gathering Area)
**includes fitness center pool associated with the CCRC

- *Community Character:* The proposed development is not along a Community Character Corridor or within a Community Character Area. 8196 Croaker Road, proposed to rezone to A-1, General Agricultural, is, however, designated Community Character Conservation, Open Space or Recreation by the 2045 Comprehensive Plan. Per the Comprehensive Plan Mixed Use Development Guidelines specific to the Southeast Quadrant of the Croaker Interchange MU area, redevelopment must include adequate buffering of any parcels designated Community Character Conservation, Open Space or Recreation. Staff is satisfied that MU Zoning Ordinance requirements provide adequate perimeter buffering. Additionally, the development will be subject to binding commercial and residential design guidelines (Proffer No. 14) and the adopted Streetscape Policy at the development review phase.
- *Cultural/Historic:* The site is not located in an area designated as ultra- or highly sensitive on the James City Archaeological Assessment and was thus not required to submit a Phase IA Archaeological Study with this application. Much of the area has been previously disturbed in association with the resource recovery and agricultural operations. A Phase I Archaeological Study was submitted and reviewed in conjunction with a site plan for the resource recovery operation, and its recommendations were considered satisfied. Any areas subject to this proposal and not previously covered by that study will require an additional Phase I archaeology assessment unless otherwise waived by the Planning Director per criteria listed in Sec. 24-145(23) of the Zoning Ordinance. Additionally, the applicant is proffering (Proffer No. 15) to relocate and restore an existing historic home on the site in accordance with plans approved by a certified architectural historian or archaeologist and the James City County Historical Commission.
- *Stormwater/Environmental:*
    - *RPA:* The site includes 63.5 acres of land identified as RPA/wetlands. The application proposes no disturbance of the RPA. Further, currently disturbed RPA areas will be remediated to be utilized as required perimeter buffer.
    - *Watershed:* The proposed development is within the Barlow's Mill Pond subwatershed of the Skimino Creek Watershed. Development will be subject to the Board adopted Skimino Creek Watershed Management Plan and Special Stormwater Criteria (SSC) policies. Per Proffer No. 7, a Master Stormwater Management Plan (MSMP) must be submitted and approved by the Stormwater and Resource Protection Division prior to the issuance of final approval for any development plans associated with this project. Per this proffer, the plan must show stand-alone water quantity and quality controls for each section and phase of the development, and each section/phase must include at least two treatment trains. That proffer also ensures compliance with the SSC policy, specifying three of those criteria to be incorporated into the approved MSMP.

      The Skimino Creek Watershed Master Plan identifies candidate projects to restore stream reaches within the Barlow's Mill Pond subwatershed. The applicants have proffered (Proffer No. 3) stream restoration in one site identified by these recommendations and has also proffered a study for another, with restoration work as deemed necessary by that study. The proffer limits the number of residential building permits until the plan is submitted, approved and a land disturbance permit is issued on work associated with the restoration proposal(s). It further stipulates that preliminary plan

approval shall be limited to 100 dwelling units until the identified restoration work is substantially complete.

The Stormwater and Resource Protection Division has reviewed the application and is satisfied that the draft proffers and conditions address the identified concerns and provides adequate guarantees that further detailed treatments and plans will be addressed at development plan stage.

Public Resources and Environmental Impacts Analysis Summary Table

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Public Transportation: Vehicular	Mitigated	- See discussion on Pages 7-10. - *Rezoning:* With proposed and proffered improvements (Proffer No. 6), studied intersections will operate at improved LOS when compared to no build and untreated build scenarios. Furthermore, the proposed RCUT and roundabout mitigate existing crash patterns per findings of the approved TIA. All roads interior to the site are proposed to be private and thus privately maintained (Proffer No. 8). - *Waterline Extension:* Impacts to traffic will be temporary during construction of the waterline. Impacts to the Rochambeau Drive right-of-way (ROW) are addressed by proposed SUP conditions, which limit construction hours, lighting, and require ROW replanting. - *Resource Recovery:* Current entrance road related to the Resource Recovery Facility will be closed to use for MU development after the resource recovery facility ceases operation (Proffer No. 6).
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pursuant to Section 24-35 of the Zoning Ordinance, pedestrian improvements for the public and private roads are required to be shown on the Construction Plan and installed as part of the development. - The Adopted Regional Bikeways Map and Pedestrian Accommodations Map require that a multiuse path be built along Croaker Road. - The subject properties are not located within walking distance to a Williamsburg Area Transit Authority bus stop.
Public Safety	No Mitigation Required	- Fire Station 1 is located approximately 4 miles from the site. Additionally, the applicants are proffering the dedication of approximately 4.8 acres of land for use as a potential future public service site, possibly for use by the Fire or Police Departments. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- This application passes the Adequate Public School Facility Test (see Page 11).

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Public Parks and Recreation	Mitigated	- This application is generally consistent with the Parks & Recreation Development Guidelines (See Pages 12-13). - The Master Plan and proffers guarantee recreational amenities in excess of the requirements of the Parks & Recreation Development Guidelines.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	Mitigated	- The project proposes the extension of water and sewer facilities inside the PSA. The proposed 12-inch lines (both sewer and water) will connect to existing facilities at the intersection of Rochambeau Drive and Croaker Road, running new pipe down Rochambeau Drive and boring under I-64 and then split at Fenton Mill Road to serve Land Bays 8 and 9 in one direction while continuing through an easement and under a creek to serve the main body of the proposed development (see Pages 10-11). - *Rezoning:* Proffer No. 12 requires the developer to submit a Water and Sewer Utility Master Plan and to complete the installation of any required off-site improvements. - *Waterline Extension SUP:* Condition No. 4 requires the submittal and approval of Water Conservation Standards.
Watersheds, Streams, and Reservoirs Project is located in the Barlow's Mill Pond subwatershed of the Skimino Creek Watershed	Mitigated	- The Stormwater and Resource Protection Division (SRP) has reviewed this application and is satisfied that the draft proffers and conditions address identified concerns and provide adequate guarantees that further detailed treatments and plans will be addressed at development plan stage. See discussion on Pages 13-14. - *Rezoning:* o Proffer No. 7 requires the submission of a Master Stormwater Management Plan before the submission of a development plan for the property. The proffer also stipulates that the design will incorporate Special Stormwater Criteria Type/Number SSC No. 11 ("Provide 25% additional water quality treatment in the VRRM (Virginia Runoff Reduction Method)"), SSC No. 12 ("Increase the level of attenuation for the 1, 2, 10, and 25-year storms to 25% below calculated pre-development flows"), & SSC No. 13 ("Use rainfall

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
		multiplier of 1.2 for post development calculations and no multiplier for pre-development calculations"). o Proffer No. 13 guarantees plans and approvals for stream restoration sites prioritized in the Barlow's Mill Pond subwatershed recommendations of the Skimino Creek Watershed Management Plan. Plans for the identified restoration sites will be approved and substantially constructed prior to issuance of preliminary approval of 100 dwelling units.
Cultural/Historic	No Mitigation Required	- The site has been previously studied and is largely disturbed. Disturbance of any area that has not been previously disturbed or included in an approved phase 1 archaeological study will require the submittal of a phase 1 study at development plan stage, unless otherwise waived by the Director of Planning.
Nearby and Surrounding Properties	Mitigated	- This parcel is surrounded by residential, commercial, and agricultural lands. - This parcel is located adjacent to the Kiskiack Golf Course. - Perimeter buffering is required by the Zoning Ordinance. - Much of the northern, southeastern, and southwestern, and southern property lines are bounded by streams and require RPA buffers which will provide buffering from adjacent properties. - The applicants have proffered streetscape guidelines for the entrance road, which limit parking, and include landscape treatments to offset visual impacts to the Conservancy parcel. - *SUP Uses:* Conditions for all three proposed SUP uses address hours of operation/construction, noise attenuation, lighting impacts, and landscaping requirements (Attachment No. 1).
Community Character	Mitigated	- The applicants have provided design guidelines for the development in accordance with Section 24-487(b). Staff finds that the design guidelines are generally in accordance with the County's Character Design Guidelines, approved as part of the Comprehensive Plan.

NATURAL AND CULTURAL ASSETS

The site is identified as having natural and cultural assets on the Natural & Cultural Assets Plan maps and other supplemental resources such as the USDA's Natural Resources Conservation Service Web Soil Survey.

ASSET	PRESENCE	IMPACT
Habitat Core	-Present on-site (see Attachment No. 10)	-All habitat cores identified in the Natural & Cultural Assets Plan are important ecologically. -Some of the habitat core acreage is located within non-developable areas including the RPA and thus protected.
Agricultural Assets	-Present on-site (see Attachment No. 11)	-Approximately 104.4 acres or 37.8% of the total site is prime farmland. A significant portion of these soils is found on area proposed to be rezoned to A-1, General Agricultural and is being farmed. Another significant portion of these soils is actively disturbed as part of the resource recovery facility. -Parts of proposed open recreational areas, as well as the proposed place of public assembly and open-air museum are sited in areas identified as prime farmland which will reduce the overall impervious cover on these soils.

HOUSING AFFORDABILITY ANALYSIS

The Comprehensive Plan encourages inclusion of affordable and workforce dwelling units within new residential developments. Per the Comprehensive Plan recommendations, at least 20% of the development's proposed new dwellings should be offered for sale or rent at prices that are targeted at workers with incomes up to 80% of AMI level as determined by the U.S. Department of Housing and Urban Development. The applicants have proffered that at least 30% of the dwelling units located in Land Bays 6 and 7 shall be offered for sale or rent at prices that are targeted at households earning up to 80% of the AMI. staff notes that this proffer language annually adjusts the maximum sale price of affordable units using the Mashall & Swift Building Costs Index and does not guarantee that the final price of the units will remain at or below the maximum sales price for households earning 80% or less of the area median income as determined by the U.S. Department of Housing and Urban Development (HUD). The tables below provide the sales prices and monthly rents for certain percentages of AMI, which is currently $106,500.

Affordable Sales Price by AMI % (2025 AMI)

% AMI	Upper Limit of the Sales Price Affordable to this AMI Level
30%	$107,250
60%	$212,000
80%	$281,750
100%	$351,750
120%	$421,500

Affordable Rental Price, by AMI % (2025 AMI)

% AMI	Max. Rent Price for Household of 1	Max. Rent Price for Household of 2	Max. Rent Price for Household of 3	Max. Rent Price for Household of 4
30%	$559.13	$639	$718.88	$798.75
60%	$1,118.25	$1,278	$1,437.75	$1,597.50
80%	$1,491.25	$1,705	$1,917.50	$2,130
100%	$1,863.75	$2,130	$2,396.25	$2,662.50
120%	$2,236.50	$2,5560	$2,875.50	$3,195

ANALYSIS OF FINANCIAL IMPACTS ASSOCIATED WITH RESIDENTIAL DWELLING UNITS

The Comprehensive Plan includes Goals, Strategies, and Actions (GSA) LU5, which states "continue land use planning and perform development review consistent with the capacity of existing and planned public facilities and services and the County's ability to provide such facilities and services." Land Use GSA 5.3 provides guidance for the County to ensure that developments subject to Rezoning or SUP review mitigate their impacts. Information on impacts and the mitigation provided by this application are included below.

In alignment with the Comprehensive Plan, on February 28, 2023, the BOS adopted a resolution directing staff to use the County's Fiscal Impact Model to assess the following for proposed developments:

- The fiscal impact to the County (both Operating and Capital budget) for the residential and non-residential components of the project; and
- The incremental capital costs for public facilities for the residential component of the project.

Overall Impact (Capital and Operating)

Per the Fiscal Impact Model, the development is projected to result in a net fiscal impact to the County through the year 2050 that is positive $7,307,340 (see Attachment No. 10 for additional details).

Capital Costs

Per the Fiscal Impact Model, the following are projected public facility impacts attributable to the proposed residential component of the project through 2050.

Table 1 - Per Unit Fiscal Residential Impacts Information

Category	Residential Impact per DU	Mitigation Through Current Application
Roadways	SFD $88.44 SFA $67.53 MF $21.01	See Note 1
Parks & Recreation	SFD $3,609.48 SFA $2,381.97 MF $2,498.87	See Note 1
Fire and Emergency Services	SFD $963.18 SFA $635.62 MF $666.82	See Note 1
Police	SFD $6.50 SFA $4.29 MF $4.50	See Note 1
Library	SFD $460.16 SFA $303.67 MF $318.57	See Note 1
General Government	SFD $71.80 SFA $47.38 MF $49.71	See Note 1
General Services	SFD $244.37 SFA $161.26 MF $169.18	See Note 1
Courts	SFD $833.54 SFA $550.07 MF $577.07	See Note 1
Schools	SFD $17,947.17 SFA $9,429.17 MF $0.00	See Note 1
TOTAL	SFD $24,224.65 SFA $13,580.96 MF $4,305.72	See Note 1

SFD - Single-Family Detached
SFA - Single-Family Attached
MF - Age-Restricted Multifamily

Note 1: The applicants have not proffered cash contributions for community impacts to the County from the physical development and operation of the Property.

The applicants have provided a narrative on Pages 11-12 of the Community Impact Statement (Attachment No. 7) regarding the cumulative fiscal impact of the development.

Overall, staff finds that the application does not require mitigation for the fiscal impacts of the proposed development and is therefore consistent with the guidance in the Comprehensive Plan regarding the mitigation of impacts. Staff notes that while the applicant has proffered (Proffer No. 11) that no more than 50 building permits for residential lots in Land Bays 6 and 7 can be issued prior to the construction of at least one CCRC building, the proffer does not stipulate or guarantee that a percentage of commercial buildings be complete prior to approval of any number of residential dwelling units. However, the application is subject to the adopted Mixed Use Construction Phasing Policy, this is discussed in detail on Page 24 of this report.

COMPREHENSIVE PLAN

Mixed Use Area

The majority of the project site (8212 and 8220 Croaker Road) is designated as Mixed Use - Croaker Interchange on the Comprehensive Plan Land Use Map. All areas designated Mixed Use are classified into either Level 1 ("Rural or Village Center" and "Small Town or Suburban Center") or Level 2 ("Medium Town or Suburban Cetner") and subject to those broader Mixed Use Development Guidelines. These areas are also subject to specific, sub-area guidance, as each Mixed Use area and development is expected to have a unique character, often shaped by its geographical situation. The Croaker Interchange MU Area is unique in that it is further delineated into quadrants, as it is bisected by the Croaker Road/Interstate 64 interchange. The Croaker Road MU Area is classified as Level 2. This project is located within the southeast quadrant.

The Mixed Use - Croaker Interchange Southeast Quadrant includes the following guidance for the project area:

> "The principal suggested uses for new development or redevelopment include light manufacturing and office. New development or redevelopment within this quadrant is to include adequate buffering for the portion of any parcel designated for Community Character Conservation, Open Space or Recreation."

Residential development is not recommended, as a primary or secondary use, in this quadrant of the MU area. Guidance for the accompanying northeast quadrant does list moderate density residential, but only as a secondary use to office and commercial uses. Additionally, the guidelines put an emphasis on light manufacturing, office, and commercial uses as dominant features of envisioned development in this area.

While this proposal does include some office and commercial uses as suggested by the area guidelines, residential development is the largest single use on the proposed plan.

Although the proposal is not consistent with the quadrant-specific recommendations for the Croaker Interchange, it does include a mix of land uses that is generally consistent with the broader Comprehensive Plan guidance for Level 2 MU areas, as shown on the chart below.

Land Use	*Recommended Land Area Percentage*	*Proposed Land Area Percentage**
Residential Area	20-50%	64.6% (Land Bays 1, 6, and 7)
Non-residential Area	50-80%	54.4% (total developable area – Land Bays 6 and 7)
Public/Civic Areas	5%	13.5% (Land Bays 3, 4, 8)
Open Space and Recreation Area	10%	12.8% (total open space + remainder of Land Bay 5)

* Some areas, such as the CCRC, function as both residential and non-residential, and are so intertwined that they are counted in more than one category.

While the development provides more residential area and less non-residential area than the recommendations, the development provides significantly more public and civic areas, as well as open space and recreation area beyond the above recommendations.

Again, while this project is not consistent with the specific guidance for the Croaker Interchange Southeast Quadrant, it is generally consistent with the following development standards which are applicable for Mixed Use designations:

- All developments should refer to the Residential and Commercial/Industrial Development Standards, including Affordable and Workforce Housing, Enhanced Environmental Protection, and Transportation and Mobility, along with the Mixed Use Development Standards. All developments should also refer to the Character Design Guidelines for more specific guidance on development character.

  The proposed development provides affordable and workforce housing, protection of environmentally sensitive features, mitigation of stormwater runoff, water conservation standards, and binding design guidelines which are generally consistent with the Character Design Guidelines.

- Mixed Use developments should create vibrant urban/small town environments that bring compatible land uses, public amenities, and utilities together at various scales. These developments should create pedestrian-friendly, complete communities, with a variety of uses that enable people to live, work, play, and shop in one place.

  The development proposes to create a mix of housing types to attract residents in different generational demographics. It proposes amenities tailored to each of these demographics, connected by bicycle/pedestrian infrastructure and a network of sidewalks. The applicants state that it is their intent to create workforce housing for employees of the commercial and institutional uses on the site. The application also proposes pedestrian accessible retail and public gathering spaces, with a museum woven into the development.

- Mixed Use developments require nearby police and fire protection, high-capacity road access, access to public utilities, large sites, environmental features such as soils and topography suitable for intense development, and proximity or easy access to large population centers. The timing and intensity of commercial development at a particular site are controlled by the maintenance of an acceptable LOS for roads and other public services, the availability and capacity of public utilities, and the resulting mix of uses in a particular area. Master Plans are encouraged to be submitted to assist in the consideration of Mixed Use development proposals. The consideration of development proposals in Mixed Use areas should focus on the development potential of a given

area compared to the area's infrastructure and the relation of the proposal to the existing and proposed mix of land uses and their development impacts.

The transportation network and public services are adequate for the development and the Proffers will ensure that public utilities and the transportation network will be upgraded in step with the development build out to offset anticipated impacts. Additionally, the proposed development is located with almost direct access to Interstate 64, which, while not internal to the development, does provide interconnectivity to points local and beyond.

- Mixed Use developments should focus on place-making. Developments should be designed to create a sense of place and should be seen as community destinations. Focal open spaces, community-oriented gathering places, unified architectural design, and a mix of uses and design that encourages pedestrian activity are all examples of creating a sense of place.

  The development includes a public museum and large community gathering area central to all other interior land bays. The museum and commercial areas are to be constructed prior to residential development in Land Bays 6 and 7. The proposal also includes recreational amenities that are shared by Land Bays 1, 6, and 7, creating a shared sense of place amongst the wider residential areas.

- Mixed Use developments should encourage the proximity of diverse uses to make it possible to reduce vehicle trips and vehicle miles traveled, providing for a greater potential for internal capture than with typical suburban development and should provide good multimodal networks for bicycle and pedestrian uses.

  The development will include a mix of uses that could result in more trips internal to the site and will include pedestrian accommodations.

Community Character Conservation, Open Space or Recreation Area

8196 Croaker Road is currently zoned M-1, Limited Business/Industrial. Uses permitted in this zoning district are not compatible with recommended uses by the Comprehensive Plan in the Community Character Conservation, Open Space or Recreation Comprehensive Plan Land Use designation. This parcel is actively farmed and is owned by the Historic Virginia Land Conservancy. As such, staff finds that the A-1, General Agricultural district aligns with the current and future projected use of the site.

Character Design Guidelines

As part of the Comprehensive Plan, the County adopted a set of Character Design Guidelines to be applied to all developments requiring legislative approval to encourage development to be compatible with the overall character of the County. The proposed design guidelines submitted with the application are consistent with the County's Character Design Guidelines in many areas, including providing an interconnected street network, providing pedestrian accommodations, limiting the amount of street-facing garages, creating architectural variety and discrete facades among single-family attached units, and ensuring the design of commercial buildings are of a scale and intensity that is compatible with the surrounding residential development. Overall, staff finds the proposed design guidelines to be consistent with the County's Character Design Guidelines.

Goals, Strategies, and Actions

Staff reviewed the application to determine if the proposal aligns with the Comprehensive Plan's GSAs. The analysis is as follows.

Land Use

- GSA LU4 - Direct growth into designated growth areas in an efficient and low-impact manner by:
    - GSA LU4.4 - Accommodate mixed-use developments within the PSA, as further defined in the Mixed Use land use designation and development standards. Support design flexibility to promote the mixing of various types of residential and non-residential uses and structures. Encourage mixed use developments and complete communities to develop in compact nodes in well-defined locations within the PSA.

      The proposed development is within the PSA and proposed to be designated Mixed Use with a variety of residential and non-residential uses.

- GSA LU5.2 - Through the following measures, coordinate allowable densities and intensities of proposed developments with the capacities and availability of water, public roads, schools, and other facilities and services:
    - GSA LU5.2.3 - Permit higher densities and more intensive development in accordance with the Future Land Use Map where existing public facilities and services are adequately provided.

      Staff finds that, with the draft proffers and conditions, the capacities of public services and facilities will be adequate for this development and that impacts to public utilities have been mitigated.

- GSA LU5.3 - Ensure that developments are subject to zoning or special use permit review to mitigate their impacts through the following means:
    - GSA LU5.3.1 - Require sufficient documentation to determine the impacts of a proposed development, including but not limited to studies of traffic impact, capacity of public schools, historic and archaeological resources, water quality and quantity, other environmental considerations, and fiscal impact.

      The application includes documentation analyzing such features to determine potential impacts.

    - GSA LU5.3.2 - Ensure that the recommendations of such studies are adequately addressed prior to preparation of development plans, or in instances where a rezoning or Special Use Permit is required, as part of those applications.

      Staff finds that there are several proffers which ensure potential impacts have been or will be mitigated for the development.

Transportation

- GSA T1.2 - Expect new developments to follow recommended densities, intensities, and development patterns that will maintain an acceptable level of service on the surrounding roads and intersections consistent with the land use context (rural, suburban, urban) and the functional classification of the roadway. Ensure that new developments do not compromise planned transportation enhancements.

  While some intersections studied in the TIA currently operate below LOS C, the TIA found that LOS would not decrease should recommended improvements be installed as proffered.

- GSA T1.2.3 - Concentrate commercial development in compact nodes or in Mixed Use areas with internal road systems and

interconnected parcel access rather than extending development with multiple access points along existing primary and secondary roads.

The development concentrates commercial development within the urban core with interconnection to the surrounding residential development. Further, access to the bulk of the development is limited to one private road taking entrance from Croaker Road.

Housing

- GSA H 3.5 - Promote affordable senior housing options, from independent living to Continuing Care Retirement (CCRCs) and skilled care, for all.

  The proposal includes a CCRC with both assisted living and independent living units.

- GSA H2.1 - Guide new developments to incorporate high housing quality and design.

  This development provides a range of home types and prices, including open space, recreational amenities, connections between residential developments, trails, and sidewalks.

Community Character

- GSA CC3 - Preserve and enhance neighborhood and community appearance.

  - GSA CC3.3 - Continue to improve and protect the character of the County through use of the Character Design Guidelines.

    Staff finds the proposed design guidelines to be consistent with the County's Character Design Guidelines.

Parks & Recreation

- GSA PR5.3 - Encourage new developments requiring legislative review to provide public recreation facilities consistent with standards in the Parks & Recreation Master Plan. New developments should have neighborhood parks with trails, bikeways, playgrounds, practice fields, sports courts, and open spaces.

  This application is generally consistent with the Parks & Recreation Development Guidelines.

ZONING ORDINANCE

Each proposed land bay must meet base net density caps per Sec. 24-487(b) of the Zoning Ordinance. Net density is calculated by subtracting RPA, floodplain, and steep slope areas from the total acreage of the site. Base net density in the MU zoning district is specific to area designations on the proposed master plan. For example, Land Bay 7-single-family homes-is capped at a base net density. Two land bays (6 and 7) exceed their density caps. Per Section 24-487(b), the project requires two bonus density points. While the application proposes a number of items that could potentially provide the necessary density bonus points, the applicant has specified the following options which result in 2.5 bonus points:

- Bonus Item Option C: Undertaking or funding a stream restoration project or stormwater management facility retrofit within the same subwatershed, as identified by an approved watershed management plan or by the Stormwater and Resource Protection Division. (Bonus Point 1.5)

  Proffer No. 13. See Page 11 for more details. Staff finds that the intent of this bonus item option has been fulfilled and credit has been given for this density bonus item.

- Bonus Item Option E: Dedicating to the county a public use site, the developable portion of which is suitable for a public facility, as determined by the county administrator or designee.

  Proffer No. 17 guarantees conveyance of Land Bay 8 for public use.

Staff notes that the application also proffers binding design guidelines (Proffer No. 14) and commits 30% of units to the provision of affordable and workforce housing (Proffer No. 10), both of which could be counted toward density bonuses (respectively: Item Option J = 0.5 density bonus point and Item Option A=2 density bonus points).

MIXED USE PHASING POLICY

In September 2012, the Board adopted its Multi-Use Districts and Mixed-Use Construction Phasing Policy. That policy stipulates that:

- Building permits for up to 10 percent of the residential units may be issued prior to commencing any commercial construction; and
- Certificates of Occupancy (CO) must be issued for at least 25 percent of the commercial square footage as shown on the master plan prior to building permits being issued for any residential unit above 50 percent of the total proposed units as show on the master plan; and
- Prior to issuance of building permits for construction of the final 20 percent of the residential units, CO must be issued for at least 80 percent of the commercial square footage as shown on the master plan.
- If no residential development is proposed, the construction phasing shall still make assurances that all infrastructure is installed in coordination with the planned build-out.

This proposal does include phasing information and a phasing plan that indicates that the majority of retail and institutional square footage will be built in the first two phases of the plan, prior to build out of the majority of Land Bay 7. Phase 1 includes the entrance road and museum. Land Bay 6 (multifamily/single family attached) and Land Bay 1 (CCRC with independent living units) are both shown as Phase 2 development alongside the commercial/retail in Land Bay 2. The plan does not specify percentages or specific timing; therefore, staff finds the application is not consistent with the Board's adopted MU phasing policy.

FINDING OF CONSISTENCY

Section 15.2-2232 of the Code of Virginia states, in part, that no public facility be allowed unless the Planning Commission finds the location of the facility "substantially" consistent with the adopted Comprehensive Plan. The proposed location of the water and sewer mains are inside the PSA. For the Commission's consideration, consistency and inconsistency determination resolutions are included as Attachment Nos. 12 and 13. Staff does find extending water and sewer lines within the PSA consistent with the Comprehensive Plan, however, staff cannot find an extension of public facilities as associated with a the proposed rezoning consistent as the proposed rezoning is, itself, not consistent with the Adopted Plan. At its April 1, 2026, meeting, the Planning Commission voted 4-2 to find the extension of public water and sewer facilities consistent with the adopted Comprehensive Plan.

STAFF RECOMMENDATION

Staff cannot recommend approval of these applications as the proposed rezoning is not consistent with the adopted 2045 Comprehensive Plan land use recommendations specific to the Croaker Interchange Mixed Use Area. Should the Board of Supervisors wish to approve these applications, staff recommends doing so subject to the attached conditions and proffers.

RS/ap
RZ24-13_MP24-05_SUP24-33Bluffs

Attachments:
1. Proposed Resolution
2. Proposed Ordinance
3. Proposed Proffers
4. Location Map
5. Proposed Master Plan
6. Illustrative Conceptual Plan
7. Community Impact Statement
8. Proposed Design Guidelines
9. TIA
10. Fiscal Impact Analysis
11. Exhibit - Habitat Core and Corridors
12. Exhibit - Prime Farmland
13. Approved Minutes of the April 1, 2026 Planning Commission Meeting
14. Signed Resolution Finding the Application Consistent with the Comprehensive Plan, per § 15.2-2232 of the Code of Virginia
15. Level of Service Illustrative Turning Motion Maps

R E S O L U T I O N

CASE NO. SUP-24-0033. THE BLUFFS AT KISKIACK

WHEREAS, the Board of Supervisors of James City County, Virginia (the "Board"), has adopted by Ordinance specific land uses that shall be subjected to a Special Use Permit ("SUP") process; and

WHEREAS, Mr. Mark Jakobowski of Pathmark Consulting, Mr. Stephen Romeo of VHB, Inc., and Mr. Vernon Geddy, III, of Geddy & Franck, LLP, have applied for an SUP on behalf of the Historic Virginia Land Conservancy, Mr. Howard B Hankins, and Hankins Land Trust No. 1, the owners of properties located at 8196, 8212, and 8220 Croaker Road, and further identified as James City County Real Estate Tax Map Parcel Nos. 1430100039, 1430100040A, and 1430100040, respectively (the "Properties"), to allow for the extension of public water to the Properties, the operation of a resource recovery facility on the properties, the operation of a museum on the properties; and

WHEREAS, the Planning Commission, following its public hearing on April 1, 2026, offered a neutral recommendation of Case No. SUP-24-0033 by a vote of 3-3; and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. SUP-24-0033; and

WHEREAS, the Board of Supervisors of James City County, Virginia, finds this use to be consistent with good zoning practices and the Comprehensive Plan Land Use Map designation for the Property.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, after consideration of the factors in Section 24-9 of the James City County Code (the "County Code"), does hereby approve the issuance of Case No. SUP-24-0033 as described herein with the following conditions:

1) *Master Plan*. This Special Use Permit (the "SUP") shall be valid for approximately 229.1 acres of property located at 8212 and 8220 Croaker Road, further identified, respectively, as James City County Real Estate Tax Map Parcel Nos. 1430100040A and 1430100040 (collectively the "Property"). Development of the Property shall be generally in accordance with the Master Plan entitled "Proposed Master Plan for the Bluffs at Kiskiack" prepared by VHB, dated March 18, 2026 (the "Master Plan"), as supplemented by the 11-inch by 17-inch booklet entitled "The Bluffs at Kiskiack Proposed Master Plan Z-24-0013 MP-24-0005 SUP-24-0033" dated March 18, 2026, and the design guidelines entitled "Residential and Commercial Design Guidelines" prepared by Pathmark Consulting, dated October 30, 2025 (the "Design Guidelines"), with any deviations considered per Section 24-23(a)(2) of the Zoning Ordinance, as amended.

2) *Specially Permitted Uses*. This SUP shall be valid for the following specially permitted uses under the James City County Code, as amended ("County Code"):

   a) In accordance with Section 24-518 of the County Code:
      (i) A museum (see Condition No. 3);
      (ii) A resource recovery facility (see Condition No. 4); and
      (iii) Water facilities (public), and sewer facilities (public), including, but not limited to, treatment plants, pumping stations, storage facilities and transmission mains, wells and associated equipment such as pumps to be owned and operated by political jurisdictions (see Condition No. 5).

3) *Museum*

a) *Outside Display, Sale, or Storage.* Outside display, sale, or storage of merchandise shall be limited to two outside vending machines and one outside ice chest. As used for this condition, the term "merchandise" includes, but is not limited to ice, soda, candy, and/or snack machines, and souvenirs. If used, vending machines and ice chests shall be situated against an exterior wall facing interior to the site, not visible from the property line. Such display, sale, or storage must be screened with building materials similar in type and color with the site architecture to minimize visual impacts from adjacent road rights-of-way. Final screening design shall be approved by the Director of Planning as part of the initial site plan submittal.

b) *Landscape and Screening.* Land Bay 4 shall have a 30-foot-wide perimeter buffer along all areas adjacent to Land Bay 6 and Land Bay 7 in accordance with Section 24-96 of the Zoning Ordinance. Prior to site plan approval, the applicants shall submit for approval by the Director of Planning or designee, a parking lot screening plan, to include hardscape and/or landscape treatments. Landscape treatments shall include native and/or adaptive to James City County climate.

c) *Intercom and Speaker Noise.* All intercom and other speaker systems on the Property shall operate in such a manner that they shall not be audible from adjacent property lines.

d) *Lighting*. Light poles on the Property shall not exceed fifteen (15) feet in height. If used, lighting along the museum's pedestrian paths shall be limited to bollard style lighting not exceeding five (5) feet in height.

4) *Borrow Pit and Resource Recovery Facility.*

a) *Annual Reporting*. For as long as the SUP is valid and the Borrow Pit and Resource Recovery Facility is operational, a report prepared by, or verified and sealed by, a licensed engineer or surveyor shall be submitted between January 1 and January 31 of each year and include the following:
   i) The extent and depth of the area mined over the previous calendar year.
   ii) The extent and depth of the area expected to be mined over the upcoming calendar year.
   iii) A certification that no unauthorized encroachment has occurred into a Resource Protection Area (RPA), RPA buffer, the transitional screening buffer described in Section 5 below or any Natural Open Space easement.
   iv) For areas which are wooded, as of the date of issuance of this permit, a delineation of any encroachment into such wooded areas.
   v) A certification as to the amount of disturbed acreage on-site.
   vi) A certification that all fill used after the date of issuance of this permit is "inert material," as defined in Section 13 below.
   vii) A delineation of all areas that have been restored, but not yet released under the State Mining Permit. This delineation shall show final grades for the restored area as well as any stabilization and/or reforestation plan, with implementation time schedule, if applicable.
   viii) A delineation of the extent of the areas covered by the State Mining Permit.

b) *Material and Equipment Storage.* All material and equipment storage, and stone and wood processing activities shall be limited to the area identified on the Master Plan as the "Area to be used for dirt/topsoil, concrete, asphalt, stone, mulch, equipment, vehicle maintenance and storage."

c) *Borrow Pit Stock Piles.* Stockpiles associated with the mining operation shall not exceed 16 feet in height from the existing grade on the James City County Real Estate Tax Map Parcel Nos. 1430100039 and 1430100040A.

d) *Sale of Products.* No Sale of wood, wood products, stone and/or stone products shall be offered directly to the general public on the Property.

e) *Croaker Road Buffer.* A landscape buffer of 50 feet in width shall be provided adjacent to Croaker Road and the entrance drive as shown on the Master Plan for the duration of the resource recovery facility operation on the property. The existing trees in the buffer area adjacent to Croaker Road shall be retained and any open areas shall be supplemented with additional planting. The landscaping plan shall be shown as part of any site plan for this use and shall be reviewed and approved by the Director of Planning or designee.

f) *Tub Grinder/Stone Crusher Location.* The tub grinder, stone crusher, and all associated equipment shall be located so as to minimize the potential adverse impacts on adjacent properties. When in operation, this equipment shall be placed in the locations identified as "Approximate location concrete products recycling operation," and "Approximate location wood products recycling operation," on the Master Plan. Hours of operations for the tub grinder, stone crusher and all associated equipment shall be limited to 7 a.m. to 7 p.m., Monday through Saturday.

g) *Construction Mitigation Plan.* Operation of the resource recovery facility shall adhere to the approved construction mitigation plan associated with James City County Case No. Site Plan-0050-2018. Any additional development of the Property for this use shall require the submittal of an updated Construction Mitigation Plan to be reviewed and approved by the Director of Planning or designee prior to any new site plan approvals for this use. The plan shall address dust mitigation, noise mitigation, and road monitoring of Croaker Road—to include cleaning roadways of mud tracked onto Croaker Road from traffic associated with this use.

h) *Material Decomposition.* The use of chemicals to aid in the decomposition of material shall be prohibited.

i) *Burning.* No materials related to the resource recovery operation shall be burned on the Property.

j) *Reclamation.* Only "inert material" shall be used as fill during the reclamation of the Property. For the purposes of the SUP "inert material" shall be defined as "clean soil, broken concrete, broken road pavement, rocks, bricks, and broken concrete pipe:. Under no condition shall fly ash, organic waste material, pressure treated wood, or household waste be used as fill.

k) *Resource Protection Area.* No soil disturbance, parking, and/or storage of equipment and/or vehicles associated with the resource recovery operation shall occur within 15 feet of an RPA buffer.

l) *Entrances.* Access to the Property for vehicular traffic associated with the resource recovery operation shall be limited to the existing entrance from Croaker Road as shown on the Master Plan. Access to the Property from this entrance shall be prohibited at the time of cessation of the resource recovery operation. Upon cessation of the resource recovery operation, any internal connection to the access point shared with 8196 Croaker Road must be restored with plantings as part of the required perimeter buffer in that area. A planting plan for the restored area must be submitted and approved prior to final site plan approval for any building in Land Bay 1.

m) *Residence.* The existing residence on the Property may be used as living quarters for up to three individuals employed on the Property.

5) *Water and Sewer Facilities.*

a) *Use.* This SUP shall be valid for the installation of a sewer force main and water main, each no less than a diameter of 12 inches, within the Virginia Department of Transportation (VDOT) right-of-way for Rochambeau Drive and Fenton Mill Road, from the intersection of Croaker Road and Rochambeau Drive, southeast along Rochambeau Drive, under Interstate 64, splitting north along Fenton Mill Road and straight to serve the Property. This shall also permit the installation of a water main loop at a later date if required by the James City Service Authority.

b) *Construction Hours.* The hours of construction of the water and sewer facilities shall be limited to daylight hours, Monday through Friday. Limited night and weekend work may be approved by the Director of Planning if requested in advance and it is determined that such work will not negatively affect surrounding properties.

c) *Replanting.* Prior to issuance of a Land Disturbing Permit associated with the water and sewer facilities, a plan addressing the replanting of disturbed vegetation within the right-of-way shall be submitted and approved by the Director of Planning or designee. The intent of the plan is to restore the area to pre-land disturbing conditions.

d) *Lighting.* There shall be no new permanent lighting associated with the Project, unless required by VDOT or other applicable Virginia state code.

6) *Commencement of Construction.* Construction of the museum or water and sewer facilities shall commence within 60 months from the date of approval of this SUP or the SUP shall be void. Construction shall be defined as the first placement of permanent construction of a structure on the Property, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation. Construction does not include land preparation such as clearing, grading, or filling for the Museum; however, clearing, grading, digging, or drilling shall constitute the commencement of construction for the waterline and sewer extension use.

7) *Severability*. This SUP is not severable. Invalidation of any word, phrase, clause, sentence, or paragraph shall invalidate the remainder.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
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MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

RZ24-13_MP24-05_SUP24-33Bluffs

ORDINANCE NO. _____

AN ORDINANCE TO AMEND THE ZONING DISTRICT MAPS OF JAMES CITY COUNTY, VIRGINIA, TO REZONE APPROXIMATELY 276.10 ACRES AT 8196, 8212, AND 8220 CROAKER ROAD (JAMES CITY COUNTY REAL ESTATE TAX MAP PARCEL NOS. 1430100039, 1430100040A, AND 1430100040, RESPECTIVELY) FROM M-1, LIMITED BUSINESS/INDUSTRIAL, WITH PROFFERS TO A-1, GENERAL AGRICULTURAL, AND MU, MIXED USE, WITH PROFFERS, AS DESCRIBED IN CASE NO. Z-24-0013/MP-24-0005.

WHEREAS, Mr. Mark Jakobowski of Pathmark Consulting, Mr. Stephen Romeo of VHB, Inc., and Mr. Vernon Geddy, III, of Geddy & Franck, LLP, have applied for a Special Use Permit on behalf of the Historic Virginia Land Conservancy, Mr. Howard B Hankins, and Hankins Land Trust No. 1, to rezone approximately 56.11 acres from M-1, Limited Business/Industrial, with Proffers to A-1, General Agricultural, and an additional 219.99 acres from M-1, Limited Business/Industrial, with Proffers to MU, Mixed Use, with Proffers; and

WHEREAS, the properties proposed to be rezoned are located at 8196, 8212, and 8220 Croaker Road and further identified as James City County Real Estate Tax Map Parcel Nos. 1430100039, 1430100040A, and 1430100040, respectively, and are shown on the on the exhibit entitled "Proposed Master Plan for the Bluffs at Kiskiack" prepared by VHB, dated March 18, 2026 (the "Master Plan"), as supplemented by the 11-inch by 17-inch booklet entitled "The Bluffs at Kiskiack Proposed Master Plan Z-24-0013 MP-24-0005 SUP-24-0033" dated March 18, 2026; and

WHEREAS, the Planning Commission, following its public hearing on April 1, 2026, forwarded a neutral recommendation to the Board of Supervisors on a motion to recommend approval of Case No. Z-24-0013/MP-24-0005 subject to proffers and conditions by a vote of 3-3; and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. Z-24-0013/MP-24-0005; and

WHEREAS, the Board of Supervisors of James City County, Virginia, finds Case No. Z-24-0013/MP-24-0005 to promote the health, safety, convenience, and general welfare of the public and further accomplish the objectives of zoning.

NOW, THEREFORE, BE IT ORDAINED that the Board of Supervisors of James City County, Virginia, that Case No. Z-24-0013/MP-24-0005 is hereby approved as described therein and the voluntary proffers are accepted.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
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LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

RZ24-13_MP24-05_SUP24-33Bluffs-ord

Prepared by: Vernon M. Geddy, III (VSB#21902)
Geddy, Harris, Franck & Hickman, LLP
1177 Jamestown Road
Williamsburg, Virginia 23185

Tax Parcels: 1430100040 and 1430100040A

THE BLUFFS OF KISKIAK

PROFFERS

This PROFFERS are made this 23 day of April, 2026 by **DONALD N. PATTEN,** as Successor Trustee of Hankins Land Trust No. 1, and **HOWARD B. HANKINS** (collectively, together with their successors in title to the Property, the "Owner") to be indexed as Grantor, and **JAMES CITY COUNTY, VIRGINIA**, a political subdivision of the Commonwealth of Virginia (the "County), to be indexed as Grantee.

RECITALS

A. Owner is the owner of the real property with an address of 8220 Croaker Road, Parcel ID# 1430100040 and 8212 Croaker Road, Parcel ID# 1430100040A, containing approximately 229.1 acres, which property is more particularly described on Exhibit A (the "Property").

B. The Property is designated Mixed Use on the County's Comprehensive Plan Land Use Map and is now zoned M-1, Limited Business/Industrial, with proffers. The Property is subject to Amended and Restated Proffers dated October 25, 1995 recorded in the Clerk's Office for the Circuit Court of James City County and the City of Williamsburg in James City Deed Book 762 at page 405 (the "Existing Proffers") and an approved Master Plan entitled Development Plan dated March 1, 1991 prepared by AES and on file with the County (the "Existing Master Plan").

C. Owner has applied to rezone the Property from M-1, Limited Business/Industrial, with proffers, to MU, Mixed Use, with proffers, and in connection

therewith has submitted to the County a master plan entitled "Proposed Master Plan for the Bluffs of Kiskiak" prepared by VHB dated November, 2025 and consisting of a cover page and four sheets, as supplemented by an 11" by 17" Booklet entitled "The Bluffs of Kiskiak Proposed Master Plan Z-24-0013 MP-24-0005 SUP-24-0033" dated November, 2025 consisting of a cover, table of contents and 11 numbered pages, copies of which are on file with the James City County Planning Department (collectively, the "Master Plan") in accordance with the County Zoning Ordinance and (ii) replace the Existing Proffers applicable to the Property and offer new Proffers to offer to the County certain revised conditions on the development of the Property not generally applicable to land zoned MU.

NOW, THEREFORE, for and in consideration of the approval of the requested rezoning, and pursuant to Section 15.2-2303 of the Code of Virginia, 1950, as amended, and the County Zoning Ordinance, Owner agrees that it shall meet and comply with all the following conditions in developing the Property. If the requested rezoning is not granted by the County, these Proffers shall be null and void and the Existing Proffers applicable to the Property shall remain unchanged, in full force and effect.

1. **Existing Proffers**. The Existing Proffers as they apply to the Property are hereby terminated and replaced by these Proffers.

2. **Master Plan**. The Existing Master Plan as it applies to the Property is hereby terminated and replaced by the Master Plan. The Property shall be developed generally as shown and set out on the Master Plan. Development Plans may vary from the Master Plan to the extent permitted by Section 24-516 of the Zoning Ordinance.

3. **Density**. (a) There shall be no more than 384 dwelling units comprised of independent living units and assisted living units consisting of up to four beds (each a "dwelling unit") on the portion of the Property designated on the Master Plan as Land Bay 1, of which no more than 306 shall be independent dwelling units, at least 78 shall be AL units (defined below). The term "assisted living" (an "AL Unit") shall mean a non-medical residential dwelling unit in the assisted living facility area of the independent and assisted living community licensed in accordance with Sections 63.2-1800 et seq. of the Virginia Code and Sections 22 VAC 40-73 et seq. of the Virginia Administrative Code where adults who are aged, infirm or disabled are provided personal and health care services and 24-hour supervision and assistance. An AL Unit must meet the standards set forth in 22 VAC 40-73-750 and 900.

(b) All dwelling units developed on Land Bay 1 of the Property shall be occupied by persons eighteen (18) years of age or older in accordance with applicable federal and state laws and regulations, including but not limited to: the Fair Housing Act, 42 U.S.C. 3601 et seq. and the exemption therefrom provided by 42 U.S.C. 3607(b)(2)(C) regarding discrimination based on familial status; the Housing for Older Persons Act of 1995, 46 U.S.C. 3601 et seq.; the Virginia Fair Housing Law Va. Code 36-96.1 et seq.; any regulations adopted pursuant to the foregoing; any judicial decisions arising thereunder; any exemptions and/or qualifications thereunder; and any amendments to the foregoing as now or may hereafter exist. Specific provisions of the age restriction described above and provisions for enforcement of same shall be set forth in a recorded document which shall be subject to the review and approval of the County Attorney prior to issuance of the first building permit for dwelling units on Land Bay 1 of the Property.

(c) There shall be no more than a total of 320 independent living dwelling units on the portion of the Property designated on the Master Plan as Land Bays 6 and 7.

4. **Owners Association.** There shall be organized an owner's association for the residential portion of the development (the "Association") in accordance with Virginia law in which all residential property owners in the development, by virtue of their property ownership, shall be members. The articles of incorporation, bylaws and restrictive covenants (together, the "Governing Documents") creating and governing the Association shall be submitted to and reviewed by the County Attorney for consistency with this Proffer prior to approval of the first subdivision plat for the Property. The Governing Documents shall require that the Association adopt an annual maintenance budget, which shall include a reserve for capital components, and all other common areas (including open spaces) under the jurisdiction of the Association, shall require each purchaser of a lot to make a capital contribution to the Association for reserves and shall require that the Association (i) assess all members for the maintenance of all properties owned or maintained by the Association and (ii) file liens on members' properties for non-payment of such assessments.

5. **Water Conservation.** The Owner shall be responsible for developing water conservation standards to be submitted to and approved by the James City Service Authority ("JCSA") and subsequently for enforcing these standards. The standards shall address such water conservation measures as limitations on the installation and use of irrigation systems and irrigation wells, the use of drought resistant native and other adopted low water use landscaping materials and warm season turf on common areas in areas with appropriate growing conditions for such turf and the use of

water conserving fixtures and appliances to promote water conservation and minimize the use of public water resources. The standards shall be approved by the JCSA prior to the first subdivision or site plan approval.

6. **Entrance; Traffic Improvements**. (a). At the entrance into the Property at the intersection of Croaker Road, Club Drive and Cedar Point Lane, a single lane roundabout shall be constructed.

(b) The Croaker Road – Fenton Mill Road intersection shall be reconstructed as a Restricted Crossing U-Turn intersection by restricting eastbound and westbound left turns and through traffic on Fenton Mill Road. This modification will be achieved by constructing a channelizing island within the median opening and extending the existing median located within the gore area on Croaker Road along the frontage of Tax Parcel 1430100037. The northbound right turn lane shall be improved to provide 200 feet of storage and a 200-foot taper.

(c) At the Croaker Road – Rochambeau Drive signalized intersection, an eastbound left turn lane on Rochambeau Drive with 400 feet of storage and a 200-foot taper shall be constructed. Optimized signal timings shall be provided. In addition, the existing northbound and southbound lanes along Croaker Road shall be improved to provide 300 feet of storage and a 200-foot taper.

(d) The improvements listed in paragraph (a), (b) and (c) shall be completed or all required permits and plans for such approvals shall have been approved by all necessary governmental agencies and their completion guaranteed in form satisfactory to the County Attorney prior to the issuance of any certificates of occupancy for any building on the Property. All such improvements shall be completed before the County

is obligated to issue certificates of occupancy for any development on the Property other than for the relocation and restoration of the historic house and the President's Walk museum shown on the Master Plan. The improvements proffered hereby shall be constructed in accordance with VDOT standards.

(e) Owner may continue to use the existing private road now serving its Resource Recovery and Mining operation on the Property only in connection with the operation of the Resource Recovery and Mining operation. All new development on the Property shall use Club Drive as shown on the Master Plan for access to and from the Property and Croaker Road.

7 **Master Stormwater Management Plan**. Owner shall submit to the County a master stormwater management plan at least three months before the initial site or development plan submittal for the Property, to include the stormwater management BMPs, for review and approval by the Stormwater and Resource Protection Division ("SRPD"). The master stormwater management plan shall show stand alone water quantity and water quality controls compliance for each section/phase of the overall development and each section/phase of the overall development must include a minimum of two treatment trains. In anticipation of use of BMP YR005 situated on the Kiskiack Golf Course, which the Owner retained drainage rights to, the Owner acknowledges that such will require upgrades to the BMP for compliance with 9VAC25-870-65 and 9VAC25-870-66. Additionally, in anticipation of use of BMP YR005, the Owner acknowledges the requirements of 4VAC50-20-54 for Dam # 09532. In recognition of the SRPD Administrative Guidelines for Special Stormwater Criteria, adopted by the Board of Supervisors on April 8, 2025, stormwater management design

for The Bluffs of Kiskiack project will incorporate Special Stormwater Criteria Type/Number SSC #11 Provide 25% additional water quality treatment in the VRRM (Virginia Runoff Reduction Method), SSC #12 Increase the level of attenuation for the 1, 2, 10, and 25-year storms to 25% below calculated pre-development flows, & SSC #13 Use rainfall multiplier of 1.2 for post development calculations and no multiplier for pre-development calculations. Forested Open Space (the "FOS") land use category may be used to account for a maximum of 25% of the required water quality associated with the proposed development of any individual phase/ section, conditioned upon FOS or Mixed Open meeting the criteria set forth in the Virginia Stormwater Management Handbook if used in the VRRM calculations. The Owner acknowledges that the purchase of offsite nutrient credits toward needed water quality associated with the project will not be allowed. The Owner acknowledges that quantity only dry ponds will not be accepted. The master stormwater management plan may be revised and/or updated during the development of the Property with prior approval of the Stormwater and Resource Protection Division. The County shall not be obligated to approve any final development plans for the Property until the master stormwater management plan has been approved by SRPD. The master stormwater management plan, as revised and/or updated, shall be implemented in all development plans for the Property.

8. **Private Streets**. Any streets on the Property may be private in accordance with Section 24-62 of the Zoning Ordinance. Owner shall submit assurances satisfactory to the County Attorney that a property owner's community association or similar organization or other mechanism has been legally established under which the lots within the Property will be assessed for the cost of maintaining

private streets and that such assessments shall constitute a pro rata lien upon the individual lots.

9. Recreation. The portion of the Property designated as Land Bay 1 on the Master Plan shall include, but shall not be limited to, the following amenities: main lobby and living room; dining room; fitness center with pool; multipurpose room and landscaped grounds. The portion of the Property designated as Land Bay 5 on the Master Plan shall include the following amenities: a pavilion with restrooms, a playground, eight sport courts, two playing fields and open space, all generally as shown on the Master Plan. There shall also be approximately two miles of walking and biking paths generally as shown on the Master Plan. These amenities shall be installed prior to the County being obligated to issue more than 100 certificates of occupancy for dwelling units on the Property. The amenities located in Land Bay 5 shall be open to all residents, owners and occupants within the Property. The portion of the Property designated as Land Bay 6 shall include a clubhouse and pool generally as shown on the Master Plan. The clubhouse and pool shall be installed prior to the County being obligated to issue more than 150 certificates of occupancy for dwelling units on the Property. All amenities for which there are construction standards in the County's Parks and Recreation Master Plan shall be constructed in accordance with such standards. The exact recreational facilities provided and their location may be changed with the prior approval of the Development Review Committee.

10. Housing Opportunity. At least thirty percent of the dwelling units permitted on the Property located within Land Bays 6 and 7 shall be offered for sale at prices or offered for rent at rents that are targeted at households earning 80% or less of

the Area Median Income as determined by the U.S. Department of Housing and Urban Development ("AMI"), to include Tunnels to Towers, the Wounded Warrior Project and Habitat for Humanity. The maximum sale price for such a unit sold in 2026 shall be Two Hundred Eighty-One Thousand Seven Hundred and Fifty Dollars ($281,750.00). The per unit maximum sale price in any subsequent year shall consist of the maximum price specified above plus any adjustments included in the Marshall and Swift Building Costs Index, Section 98, Comparative Cost Multipliers, Regional City Averages (the "Index") from 2026 to the year the sale is closed. The per unit maximum sale price shall be adjusted once a year with the January supplement of the Index of the sale year. In no event shall the per unit maximum sale price be adjusted to a sum less than the maximum price specified above. If the Index is not available, a reliable government or other independent publication evaluating information heretofore used in determining the Index (approved in advance by the County Manager of Financial Management Services) shall be relied upon in establishing an inflationary factor for purposes of increasing the per unit maximum sale price to approximate the rate of annual inflation in the County. Maximum rents shall be determined annually by the County's Neighborhood Development department based on payment of 30 percent (30%) of household income toward housing costs. Unless otherwise approved by the Neighborhood Development department, sales of all targeted for-sale units shall include a soft second deed of trust for the benefit of the County securing a shared appreciation note in an amount equal to the difference between the sale price of a comparable market rate unit and the sale price of the proffered unit and with a term of seven years. The original note and deed of trust and a copy of the settlement statement shall be delivered to the Neighborhood

Development department after each closing. If down-payment assistance loans are authorized by the Neighborhood Development department, the soft second deed of trust may be recorded in third priority. Rental units shall be made available at the targeted rents for a period of twenty (20) years. With respect to rental units provided pursuant to this proffer, if any, Owner shall submit an annual report for each year of the required 20-year term to the County Director of Planning on or before January 30 of the current year identifying the location of the units and the rental rates charged demonstrating such rates are within the specified income range. All affordable units provided pursuant to this Proffer shall be rented or sold to persons whose incomes fall within the qualifying income range used to determine the prices/rental rates by the County's Neighborhood Development department.

11. **Project Phasing.** The County shall not be obligated to issue building permits for more than a total of 50 dwelling units in the portions of the Property designated on the Master Plan as Land Bays 6 and 7 until the County has issued building permits for construction of at least one building on the portion of the Property designated on the Master Plan as Land Bay 1 (the "Facility") and construction has commenced. Construction having commenced shall mean foundations have been poured.

12. **Master Water and Sanitary Sewer Plan.** Owner shall submit to the County an updated water and sewer master plan at least three months before the initial site or development plan submittal for the Property for review and approval by the JCSA. The water and sewer master plan may be revised and/or updated during the development of the Property with prior approval of the JCSA. The County shall not be obligated to

approve any final development plans for the Property until the water and sewer master plan has been approved by the JCSA. The water and sewer master plan, as revised and/or updated, shall be implemented in all development plans for the Property at the time required to serve the Property.

13. **Stream Channel Restoration**. a. The Owner shall prepare stream restoration construction plans for BMP-A2 within the Barlow's Run subwatershed of Skimino Creek as identified in the Skimino Creek Watershed Management Plan. The Owner shall have BMP-A3 within the Barlow's Run subwatershed of Skimino Creek as identified in the Skimino Creek Watershed Management Plan evaluated by its environmental consultant to determine if stream restoration is warranted and submit such evaluation to SRPD for its review. If, based on the evaluation, SRPD determines no restoration work is warranted, Owner shall have no further obligations with respect to BMP-A3. If, based on the evaluation, SRPD determines restoration work is warranted, Owner shall prepare stream restoration construction plans for BMP-A3. The construction plans are hereinafter referred to as the "Plans." The County shall not be obligated to issue building permits for more than a total of 50 dwelling units on the Property until the Plans have been approved by SRPD and work pursuant to the approved Plans has commenced as evidenced by issuance of a land disturbance permit. The County shall not be obligated to issue preliminary plan approval for more than a total of 100 dwelling units on the Property until the restoration work identified by this Proffer undertaken by Owner is substantially complete.

14. **Design Guidelines and Review**. Owner has submitted commercial design review guidelines prepared by Pathmark Consulting and Design dated October

30, 2025 and residential design review guidelines dated July 20, 2025 to the County setting forth design and architectural standards for the development of the Property (the "Guidelines"), which Guidelines shall be kept on file in the Planning Department. Once approved as a part of the rezoning, the Guidelines may not be amended without the approval of the Director of Planning. There shall be constituted a Design Review Board (the "DRB") for the development of the Property consisting of three persons. Owner shall have the right to appoint all of the members of the DRB until such time as 100% of the Property has been sold to others. When Owner has sold 100% of the Property, The Association shall have the right to appoint one member of the DRB. The Owner shall have the right to assign it's right to appoint DRB members to any owner of any portion of the Property Of the members of the DRB, two such members must be a professional in one of the following fields: architecture; engineering; land planning; environmental consulting or landscape architecture. Members of the DRB serve at the pleasure of the person or entity that appointed them. The DRB may establish and charge reasonable fees for review of applications and plans. The DRB shall review all landscaping plans, architectural plans and elevations for the Property for consistency with the Guidelines and shall render a decision on such plans. In reviewing applications, the DRB shall consider the factors set forth in the Guidelines. The DRB may approve development plans that do not strictly comply with the Guidelines if circumstances, including but not limited to topography, natural obstructions, hardship, economic conditions or aesthetic or environmental considerations warrant a variance. All structures and improvements shall be constructed in accordance with the approved plans and specifications. The procedures for the design review process, including submission requirements and time

frames shall be set forth in rules to be adopted by the DRB with the approval of the Owner. All applicants will be advised by the DRB of either (i) the DRB's approval of their submission or (ii) the areas or features of the submission which were deemed by the DRB to be inconsistent with the Guidelines, the reasons for such finding and suggestions for curing the inconsistencies.

15. **Historic House**. Owner shall relocate the historic house located on the Property from Land Bay 2 to Land Bay 4 and undertake the restoration and preservation of the historic house in accordance with plans approved by a certified architectural historian or archaeologist and the James City County Historical Commission. Upon the completion of the relocation and restoration and preservation work, the certified architectural historian or archaeologist who approved the plans and the James City County Historical Commission shall inspect the work to insure compliance with the approved plans. If such inspection reveals any failure to comply with the approved plans, Owner shall promptly cure the non-compliance.

16. **Resource Recovery and Mining Operation**. Owner shall submit a schedule for the termination of operation of its Resource Recovery Facility and Mining activities on the Property to the County Director of Planning prior to the submission of the first development or subdivision plan for the Property and updated with every subsequent development or subdivision plan. The termination of operation of said Resource Recovery Facility and Mining activities on the property shall comply with the pertinent Virginia Department of Energy regulations. No new development shall take place on any portion of the Property used in the Resource Recovery Facility and Mining operation until such use has terminated in accordance with Virginia Department of

Energy regulations.

17. **Public Use Site**. Owner shall convey to the County, without consideration, the portion of the Property shown on the Master Plan as Land Bay 8 containing approximately 4.8 acres for use as a police, fire, or emergency medical services station. The conveyance of Land Bay 8 to the County pursuant to this Condition 17 shall be upon the request of the County Administrator after the County has adopted a capital improvements program including funding for facilities on the sites. Within 45 days of the receipt of such a request Owner shall cause to be prepared and submitted to the County any required subdivision plat. The actual conveyance shall be made within five business days of final approval of the subdivision plat. If no subdivision is required, such conveyance shall be made within 30 days of the receipt of the request from the County Administrator.

WITNESS the following signatures and seals:

OWNER:

By: Donald N Patten
DONALD N. PATTEN, as Successor Trustee of
Hankins Land Trust No. 1

STATE OF Virginia
CITY/COUNTY OF James City County, to-wit:

The foregoing instrument was acknowledged before me this 23rd day of April, 2026 by DONALD N. PATTEN, as Successor Trustee of Hankins Land Trust No. 1.

Yolanda James Bryant
NOTARY PUBLIC

My commission expires: 05/31/2028
Registration No.: 7666079



OWNER:

HOWARD B. HANKINS

STATE OF Virginia
CITY/COUNTY OF James City County to-wit:

The foregoing instrument was acknowledged before me this 23rd day of April, 2026 by HOWARD B. HANKINS

NOTARY PUBLIC

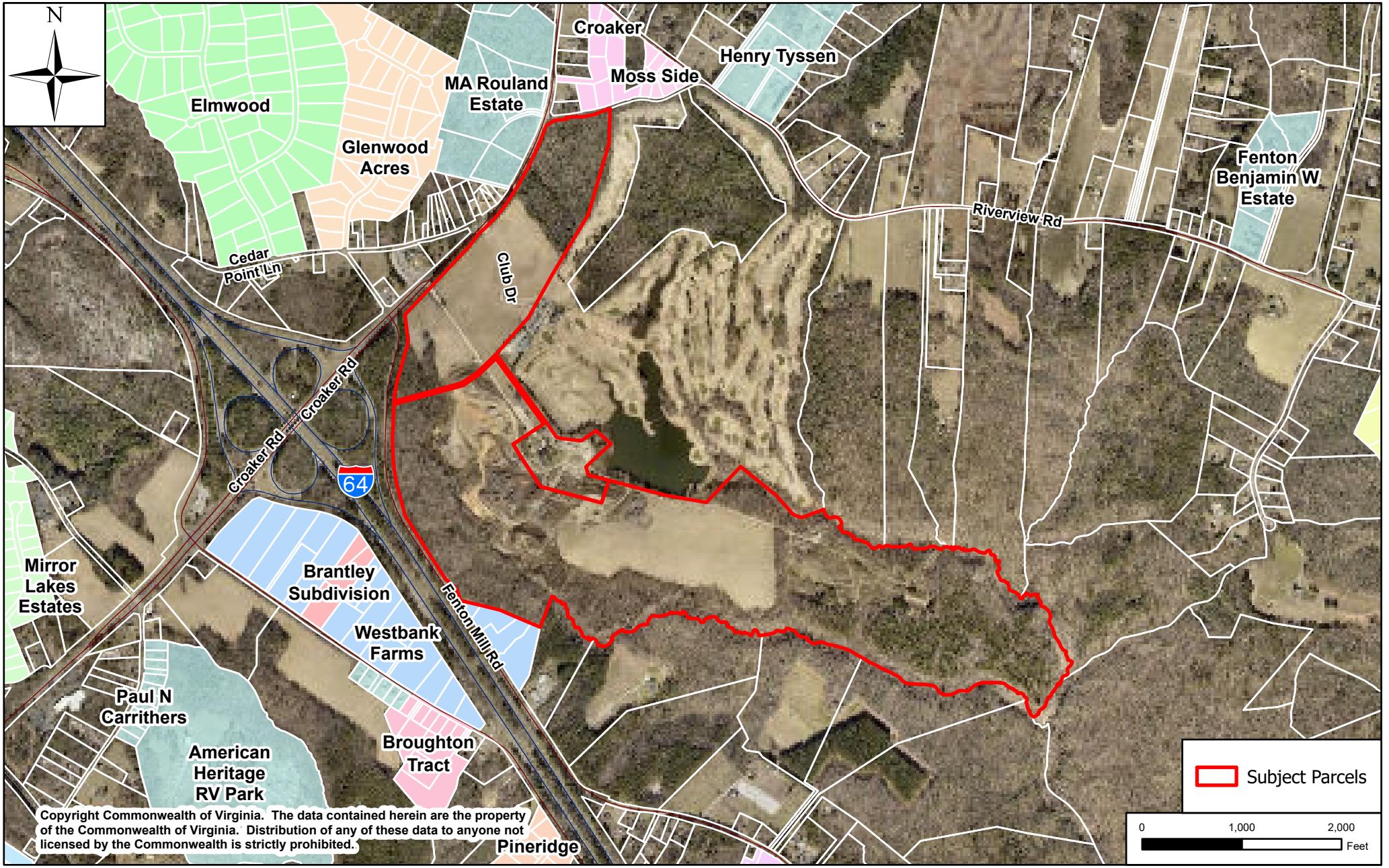
My commission expires: 05/31/2028
Registration No.: 7666079

YOLANDA JAMES-BRYANT NOTARY PUBLIC REG# 7666079 MY COMMISSION EXPIRES 05/31/2028 COMMONWEALTH OF VIRGINIA

Exhibit A

Property Description

Z-24-0013/MP-24-0005/SUP-24-0033.
The Bluffs of Kiskiack Rezoning



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PROPOSED MASTER PLAN

FOR

THE BLUFFS OF KISKIACK

JAMES CITY COUNTY, VIRGINIA

DEVELOPMENT TEAM

Howard Hankins	Property Owner
Mark M. Jakobowski, Assoc. AIA, M.ASCE	Director of Development- PATHMARK Consulting & Design, LLC
Stephen Romeo, LS **Stephen Talley,** PLA **Gregory Alban,** LA	Land Planning and Design- VHB- Vanasse Hangen Brustlin, Inc.
Vernon M. Geddy, III	Project Attorney- Geddy, Harris, Frank & Hickman, LLC
John Thomas **Christy Keeler** **Tiffany Reeves**	Marketing Team- "1440 Brand"

INDEX OF SHEETS:

SHEET NO.	SHEET DESCRIPTION
Z-24-0013 Land Use Master Plan	1
Mining Resource Plan	2
Master Water Plan	3
Master Sewer Plan	4

SITE DATA:

Parcel Address: 8220 Croaker Road, Williamsburg VA 23188

Parcel ID (PIN): 1430100040

Current Zoning: Limited Business/Industrial (M1)

Comprehensive Plan Land Use Designation: Mixed Use (MU)

Proposed Zoning: Mixed Use (MU)

Hydrologic Unit Code (HUC) Watershed: 020801070104 Skimino Creek-York River

Gross Site Area: 229.1 Ac



VICINITY MAP
SCALE: 1" = 5,000'

Z-24-0013 MP-24-0005 SUP-24-0033

LEGEND:

- Steep Slopes Outside RPA
- Open Space
- RPA

Historic Virginia Land Conservancy Zoned A1 61.1071 Ac

Club Dr

Croaker Rd

Entry Road Zoned MU +/- 5 Ac Part of 61.1071 Ac

Historic Virginia Land Conservancy Zoned A1 61.1071 Ac

Kiskiack Golf Club

Maintenance Bldg

16' Wide Dedicated Golf Cart Path

Driving Range

Gated Emergency Entrance

Tower Apartments

Private Roads

Potential S.W.M. Location

OS 1.6 Ac

OS .7 Ac

Hybrid Home Apartments

Land Bay 1 CCRC Apartments

Land Bay 2 Retail, Shops, Restaurants, & Hotel

OS 1.8 Ac

Lake

Golf Course

Stream

OS .6 Ac

Land Bay 8 Fire/EMS/Police

Pavilion

OS 7.5 Ac

Land Bay 5 Recreation Fields

OS 1.1 Ac

Land Bay 3 Public Place of Assembly & Community Gathering Area

Clubhouse & Pool

OS 1.2 Ac

Land Bay 6 Muliti Family

Land Bay 4 President's Walk Musuem

OS .3 Ac

Property Line

Land Bay 9 Medical Office

Fenton Mill Rd

Single Family

Wooded Area

Mixed

Vacant

Walkout Basement Style Homes at Steep Slope Locations

Sewer Pump Station

Land Bay 7 Single Family

OS 2.8 Ac

Center of Stream

100' RPA

INTERSTATE 64

Master Plan Summary

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RPA & Wetlands:	63.5 ac
Floodplain (outside the RPA):	0 ac (per floodplain map #51095C0063D)
>25% Slope outside the RPA	6.4 ac
Net Site Area (Developable Area):	**159.2 ac**
Open Space Required (10% of net):	15.92 ac
Open Space Provided:	**20.1 +/- ac**
Proposed Dwelling Units (excluding assisted living):	626
Proposed Assisted Living Units:	78
Total Proposed Dwelling Units:	**704**
Total Commercial Building Area:	24,500 sf
Total Office Building Area:	22,000 sf
Total Institutional Building Area:	139,400 sf
Total Industrial Building Area:	0 sf
Total Misc. Non Residential Building Area:	79,000 sf
Total Non-Residential Building Area:	**264,900 sf**

Master Plan Data by Land Bay

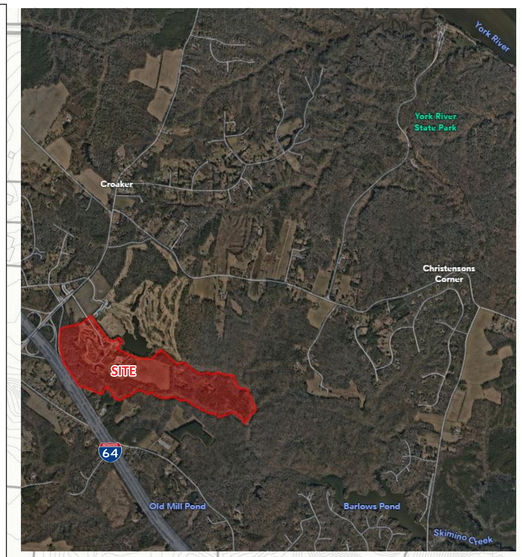
Land Bay	1 - CCRC Apartments (age restricted)	2 - Retail, Shops, Restaurants & Hotel	3 - Public Place of Assembly & Community Gathering Area	4 - President's Walk Museum	5 - Recreation Fields	6 - Multi Family	7 - Single Family	8 - Fire/EMS/Police (For dedication of public use site)	9 - Medical Office	Totals
Phase [1]	2	2	4	1 [2]	3	2	3	1 [2,3]	3	
Building Floors	tower apartments - 3 floors, hybrid home apartments - 2 floors	1 or 2 floors Hotel - 4 floors	open air pavilion & stage - 1 floor	visitors center & museum - 2 floors [14]	open air pavilion 1 floor	residential clubhouse - 1 floor		1 floor	1 floor	
Area Designation(s)	D, I	E	I	I	J	B,C	A	I	G	
Net (Developable) Area (+/- ac)	34	6.6	11.8	4.9	10.4	34.7	47.1	4.8	4.9	**159.2**
Open Space (ac)	2.9	1.8	0.7	0.3	7.5	3.4	3.5	0	0	**20.1**
Residential Unit Count										
Assisted Living (Tower Apartments)	78	----	----	----	----	----	----	----	----	78
Independent Living (Tower Apartments)	226	----	----	----	----	----	----	----	----	226
Independent Living (Hybrid Home Apartments)	80	----	----	----	----	----	----	----	----	80
Multi-Family Units	----	----	----	----	----	178	----	----	----	178
Single Family Units	----	----	----	----	----	----	142	----	----	142
Total Units	**384**	**0**	**0**	**0**	**0**	**178 [12]**	**142 [12]**	**0**	**0**	**704**
Density										
Permitted Base Density	9 du/ac	----	----	----	----	5-6 du/ac	3 du/ac	----	----	
With Density Bonus Points	----	----	----	----	----	6.65-7.98 du/ac	3.99 du/ac	----	----	
Proposed Density	9.0 du/ac [4]	n/a	n/a	n/a	n/a	5.13 du/ac	3.01 du/ac	n/a	n/a	3.9 du/ac [13]
Non-Residential Building Area (sf)										
Commercial Building Area	----	24,500 [7]	----	----	----	----	----	----	----	24,500
Office Building Area	----	----	----	----	----	----	----	----	22,000	22,000
Institutional Building Area	110,000 [5]	----	6,400 [8]	3,000 [9]	----	----	----	20,000	----	139,400
Other Non-Residential Building Area	68,000 [6]	----	----	----	6,000 [10]	5,000 [11]	----	----	----	79,000
Total Building Area	**178,000**	**24,500**	**6,400**	**3,000**	**6,000**	**5,000**	**0**	**20,000**	**22,000**	**264,900**

Notes:

[1] Existing resource recovery operations will be phased out during development as proffered.
[2] Phase 1 will also include the extension of Club Drive from Croaker Road to President's Walk Museum as well as construction of the emergency access road from Club Drive to Fenton Mill Road.
[3] Land Bay 8 to be transferred to James City County during Phase 1 for the County to develop as funds are available.
[4] Assisted Living Units are not included in density calculations
[5] Assisted Living
[6] Common area/community space
[7] May include up to 2,500 sf of commercial non-income space.
[8] Open air stage & pavilion
[9] Museum & visitor's center with museum gift shop
[10] Open air pavilion
[11] Residential clubhouse
[12] Count includes units identified in Proffer #10 Housing Opportunity. Land Bay 6 and 7 being subject to affordable housing of 30%.
[13] Overall project density, Assisted Living Units are not included in overall density calculation
[14] Historical home to be relocated and restored from Land Bay 2 to Land Bay 4.

Density Bonus Points

Bonus Item	Bonus Points
C - Stream channel restoration (see Proffer #13)	1.5
E - Land dedicated for public use (see Proffer #17)	1
Total:	2.5



VICINITY MAP

SCALE: 1" = 5,000'

PERMITTED USE TYPE KEY

Area Designations	Type of Development
A	Single Family
B	Attached structures containing two to four dwelling units
C	Attached structures containing more than four dwelling units
D	Attached structures of three or more stories containing more than four dwelling units
E	Commercial Uses
F *(N/A)*	Wholesale and warehouse
G	Office Uses
H *(N/A)*	Light Industrial Uses
I	Institutional or Public Uses
J	Areas of common open space, with recreation areas as noted

Z-24-0013 LAND USE MASTER PLAN

PROPOSED MASTER PLAN

THE BLUFFS OF KISKIACK | JAMES CITY COUNTY | VIRGINIA

0' 250' 500'

PATHMARK consulting & design

vhb

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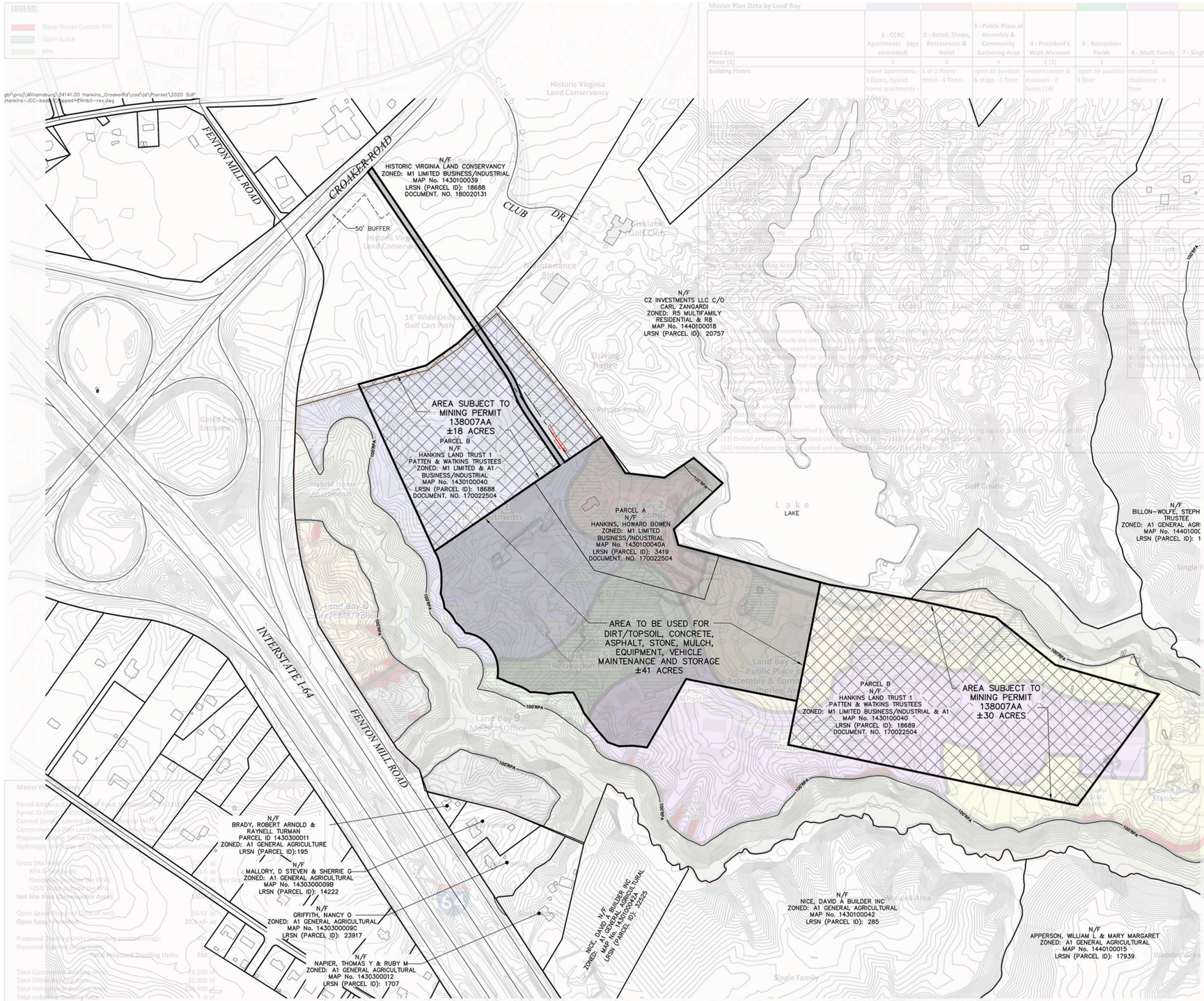
March, 2026



VICINITY MAP
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PERMITTED USE TYPE KEY

Area Designations	Type of Development
A	Single Family
B	Attached structures containing two to four dwelling units
C	Attached structures containing more than four dwelling units
D	Attached structures of three or more stories containing more than four dwelling units
E	Commercial Uses
F (NAI)	Wholesale and warehouse
G	Office Uses
H (NAI)	Light Industrial Uses
I	Institutional or Public Uses
J	Areas of common open space, with recreation areas as noted

MINING RESOURCE PLAN

PROPOSED MASTER PLAN

THE BLUFFS OF KISKIACK | JAMES CITY COUNTY | VIRGINIA

0' 250' 500'

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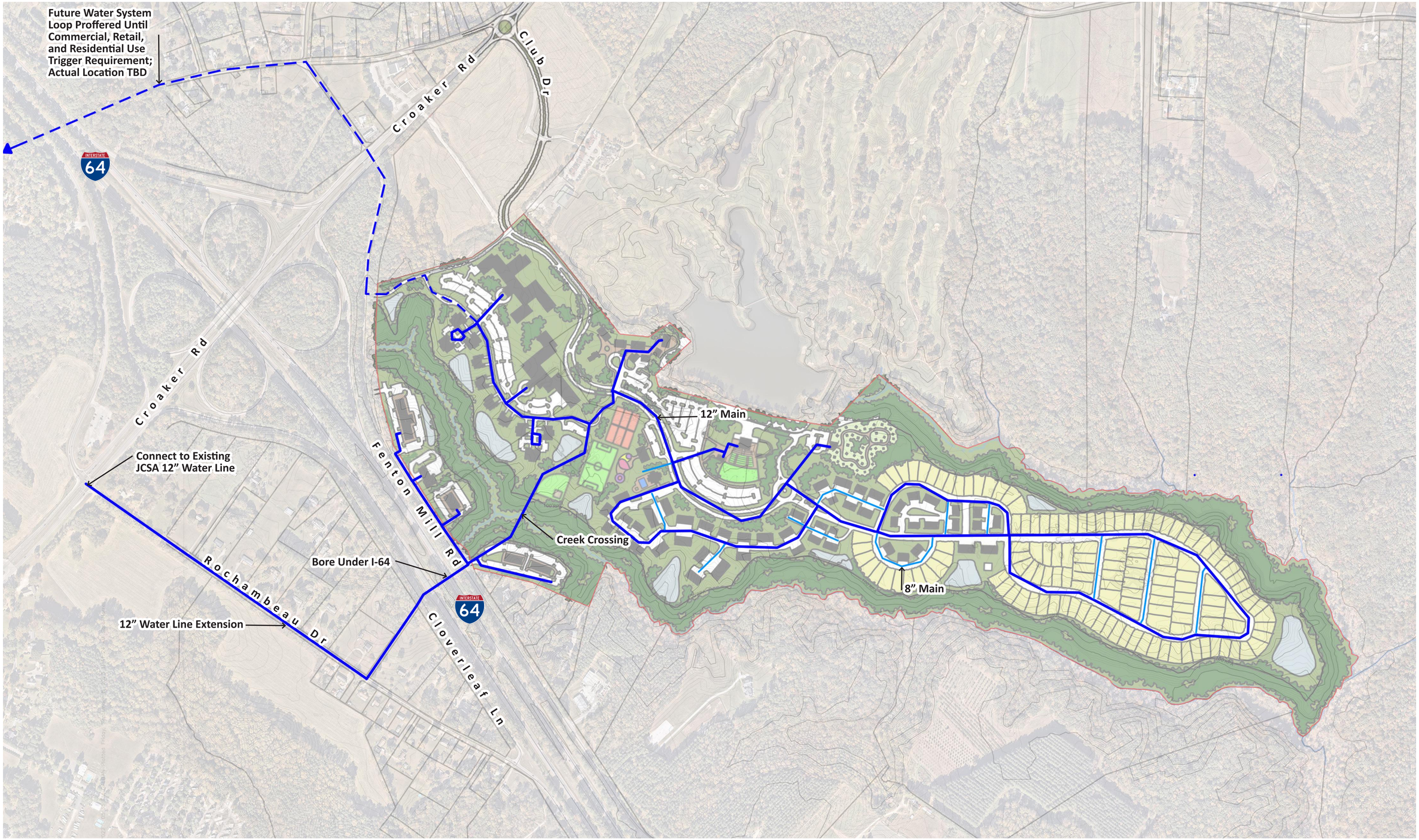

THE BLUFFS OF KISKIACK

MASTER WATER PLAN

PROPOSED MASTER PLAN

0’ 300’ 600’

THE BLUFFS OF KISKIACK | JAMES CITY COUNTY | VIRGINIA

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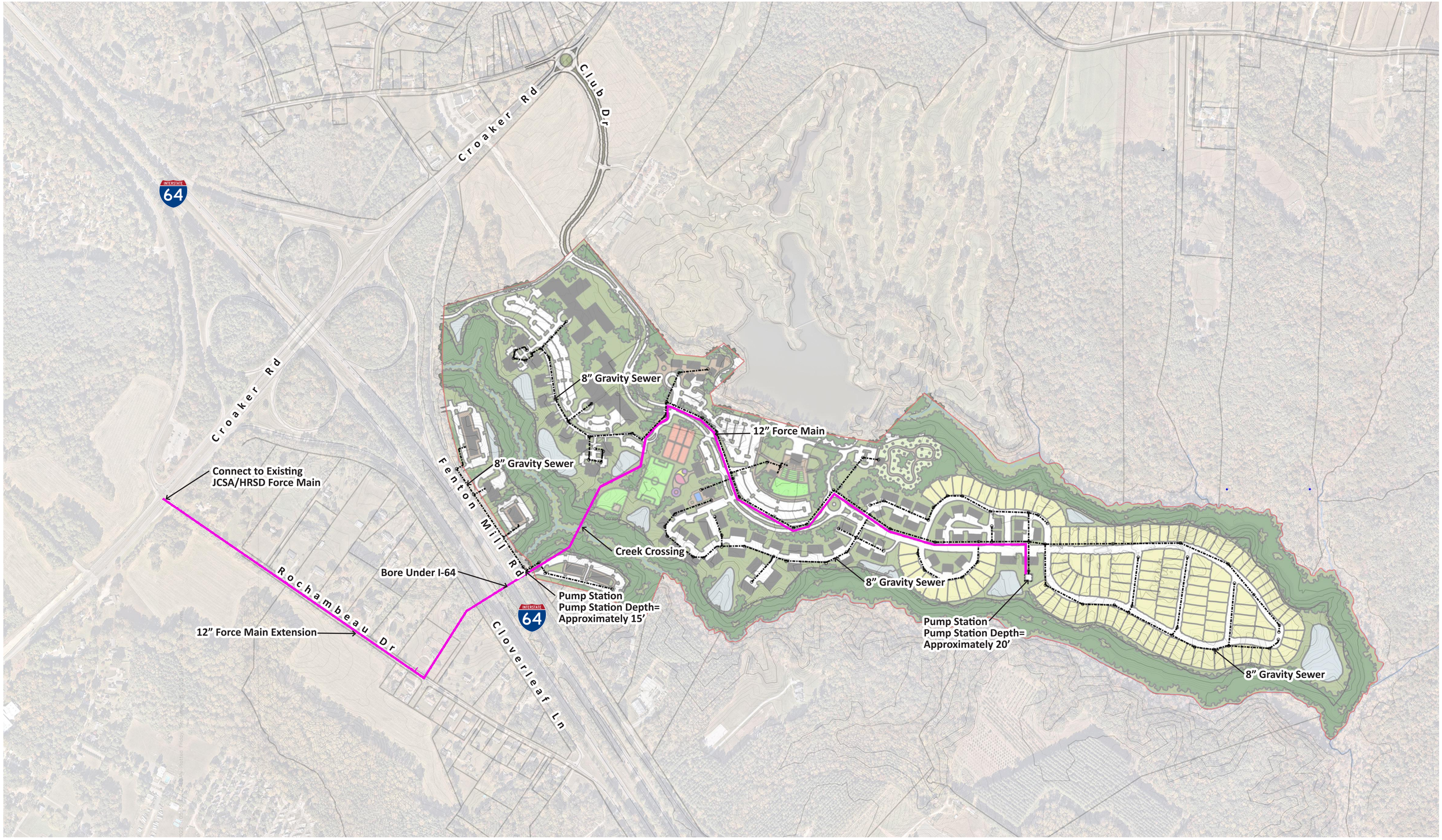

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THE BLUFFS OF KISKIACK

Proposed Master Plan

Z-24-0013 MP-24-0005 SUP-24-0033

PATHMARK consulting & design

vhb

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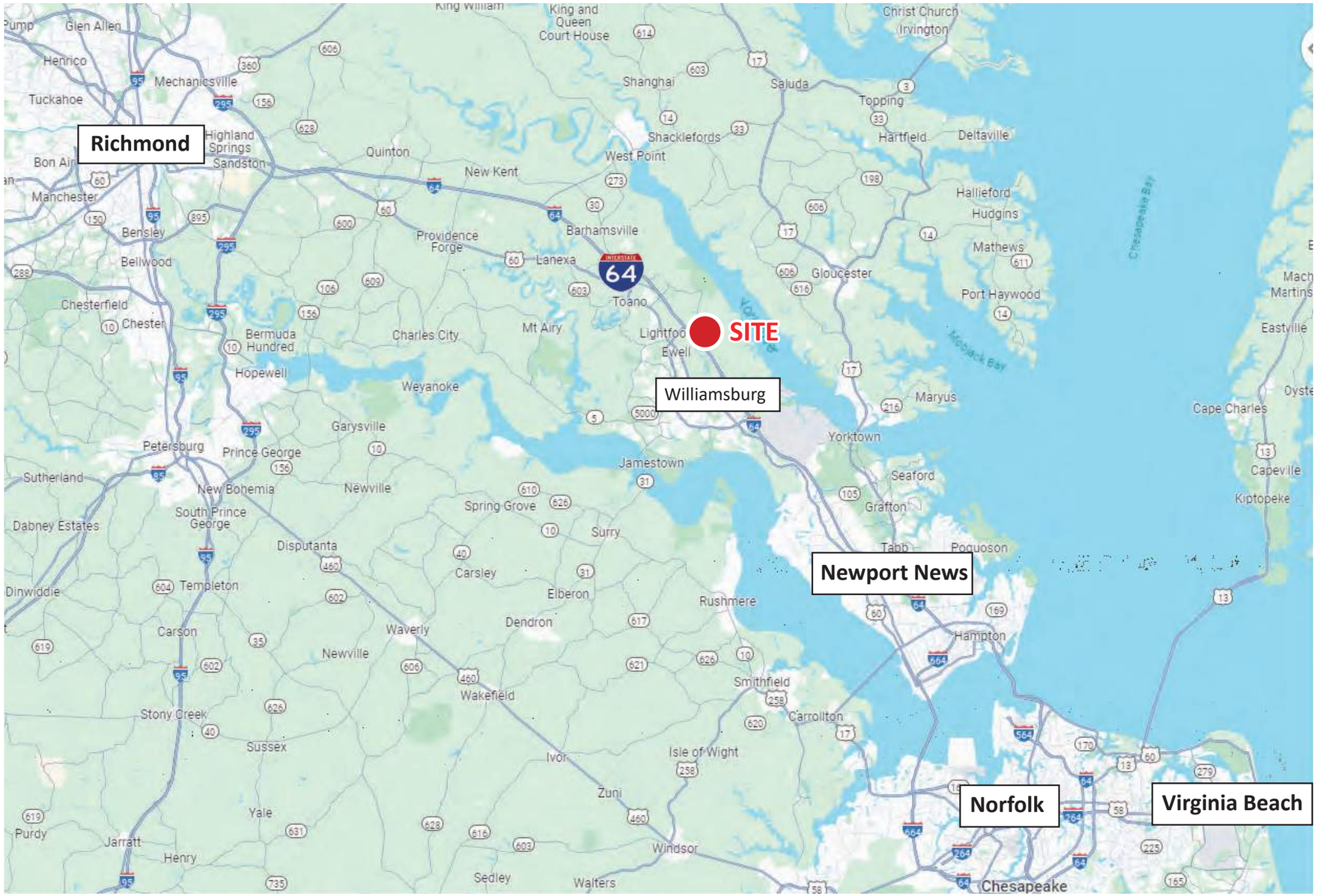
Rendered Master Plan & Phasing Plan	7
Conceptual Trail and Sidewalk Plan	8
Master Water Plan	9
Master Sewer Plan	10
Development Team	11

Historical Map c1860



In 1657, an Englishman named John Hankins received a land grant in the New World, in the colony of Virginia from King Charles II. His land was near the southwest end of the Chesapeake Bay along the York River. He moved his family there and learned to farm. In the late 1600's the property grew several hundred more acres and was farmed by family members into the 1700's. The property has remained in the same family to this day, over 360 years later.



SITE LOCATION

Addresss- 8212 Croaker Rd, Williamsburg, VA 23188

Location- Interstate I-64, Exit 231B, Westbound, State Rt.607, Croaker Road.

The site is 5.4 miles from Sentara Williamsburg Regional Medical Center and 3.9 miles from York County Fire Station 5 with paramedic and ambulance transport services.

Richmond International Airport is 36 miles west on I-64 and Colonial Williamsburg is 10 miles south.

Norfolk International Airport is 51 miles south on I-64.

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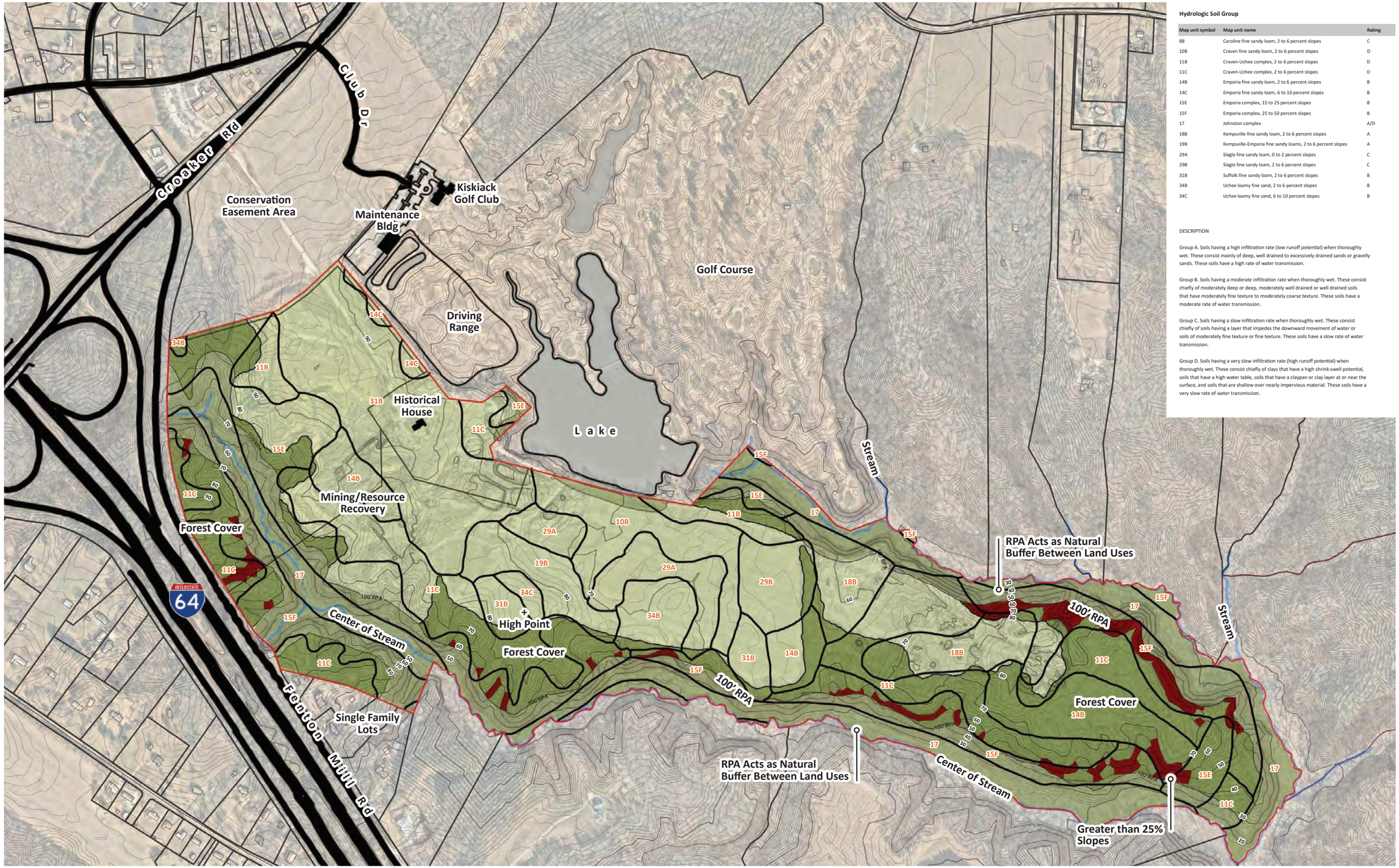

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating
8B	Caroline fine sandy loam, 2 to 6 percent slopes	C
10B	Craven fine sandy loam, 2 to 6 percent slopes	D
11B	Craven-Uchee complex, 2 to 6 percent slopes	D
11C	Craven-Uchee complex, 2 to 6 percent slopes	D
14B	Emporia fine sandy loam, 2 to 6 percent slopes	B
14C	Emporia fine sandy loam, 6 to 10 percent slopes	B
15E	Emporia complex, 15 to 25 percent slopes	B
15F	Emporia complex, 25 to 50 percent slopes	B
17	Johnston complex	A/D
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	A
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	A
29A	Slagle fine sandy loam, 0 to 2 percent slopes	C
29B	Slagle fine sandy loam, 2 to 6 percent slopes	C
31B	Suffolk fine sandy loam, 2 to 6 percent slopes	B
34B	Uchee loamy fine sand, 2 to 6 percent slopes	B
34C	Uchee loamy fine sand, 6 to 10 percent slopes	B

DESCRIPTION

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

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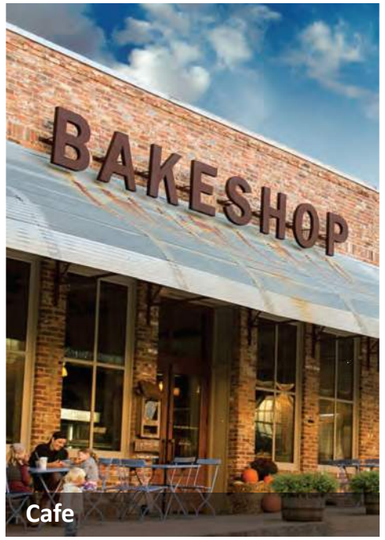

Cafe


Healthcare (CCRC)


Public Place of Assembly & Community Gathering Area


Presidents Walk Museum


Restaurant



Medical / Office

COMMERCIAL DEVELOPMENT

1. **HEALTHCARE (39.2 acres)**
   a. Life Plan Community (34 acres).
   b. Medical / Dental Office, Clinic, and pharmacy services (5.2 acres).

2. **RESTAURANTS / RETAIL / HOTEL (4.6 acres)**
   a. Casual dining overlooking the golf course.
   b. Retail spaces available for lease.
   c. Hotel overlooking the lake and golf course.
   d. EV Charging.

3. **Public Place of Assembly & Community Gathering Area**

4. **“Presidents Walk” – Open-air walk-through museum featuring forty-two busts of our nation’s past presidents (4.9 acres).**

5. **James City County – Property for Fire/EMS/Police expansion (5.2 acres).**

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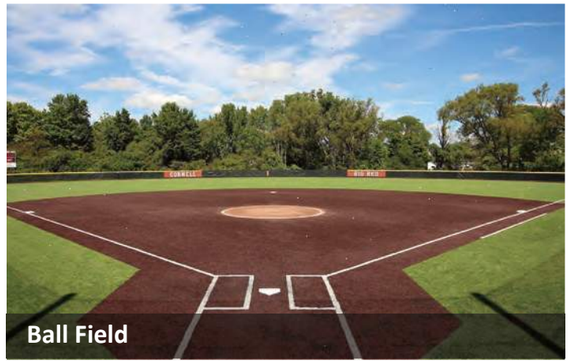
Single Family Homes


Pavilion


Ball Field


Townhomes


Playground


Tennis & Pickleball Courts

RESIDENTIAL DEVELOPMENT

1. Proposed market – Police, Fire service, Teachers & Healthcare workers etc.
2. Water and sewer services extended to the residential parcels by the developer.
3. Residential development – 85.8 acres
4. Lot frontages ranging from 26 – 70 feet wide.
5. Housing mix of Townhouses, Duplexes, Detached and Cottage / Cluster Homes.
6. Parks and recreation facilities shared with Residential, Healthcare / Senior Living development.

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LEGEND:

- Steep Slopes Outside RPA
- Open Space
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OS 7.5 Ac

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Pavilion

Land Bay 4 President's Walk Musuem

OS 3 Ac

OS 7 Ac

Land Bay 5 Recreation Fields

OS 11 Ac

Land Bay 3 Public Place of Assembly & Community Gathering Area

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Land Bay 9 Medical Office

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Fenton Mill Rd

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Single Family

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Single Family

Property Line

Single Family

Stream

Wooded Area

Walkout Basement Style Homes at Steep Slope Locations

Potential S.W.M. Location

Private Roads

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Potential S.W.M. Location

Land Bay 7 Single Family

Stream

Vacant

Wooded Area

OS 2.8 Ac

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Center of Stream

100' RPA

Stream

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Open Space (ac)	2.9	1.8	0.7	0.3	7.5	3.4	3.5	0	0	**20.1**
Residential Unit Count										
Assisted Living (Tower Apartments)	78	----	----	----	----	----	----	----	----	78
Independent Living (Tower Apartments)	226	----	----	----	----	----	----	----	----	226
Independent Living (Hybrid Home Apartments)	80	----	----	----	----	----	----	----	----	80
Multi-Family Units	----	----	----	----	----	178	----	----	----	178
Single Family Units	----	----	----	----	----	----	142	----	----	142
Total Units	**384**	**0**	**0**	**0**	**0**	**178 [12]**	**142 [12]**	**0**	**0**	**704**
Density										
Permitted Base Density	9 du/ac	----	----	----	----	5-6 du/ac	3 du/ac	----	----	
With Density Bonus Points	----	----	----	----	----	6.65-7.98 du/ac	3.99 du/ac	----	----	
Proposed Density	9.0 du/ac [4]	n/a	n/a	n/a	n/a	5.13 du/ac	3.01 du/ac	n/a	n/a	3.9 du/ac [13]
Non-Residential Building Area (sf)										
Commercial Building Area	----	24,500 [7]	----	----	----	----	----	----	----	24,500
Office Building Area	----	----	----	----	----	----	----	----	22,000	22,000
Institutional Building Area	110,000 [5]	----	6,400 [8]	3,000 [9]	----	----	----	20,000	----	139,400
Other Non-Residential Building Area	68,000 [6]	----	----	----	6,000 [10]	5,000 [11]	----	----	----	79,000
Total Building Area	**178,000**	**24,500**	**6,400**	**3,000**	**6,000**	**5,000**	**0**	**20,000**	**22,000**	**264,900**

Notes:

[1] Existing resource recovery operations will be phased out during development as proffered.
[2] Phase 1 will also include the extension of Club Drive from Croaker Road to President's Walk Museum as well as construction of the emergency access road from Club Drive to Fenton Mill Road.
[3] Land Bay 8 to be transferred to James City County during Phase 1 for the County to develop as funds are available.
[4] Assisted Living Units are not included in density calculations
[5] Assisted Living
[6] Common area/community space
[7] May include up to 2,500 sf of commercial non-income space.
[8] Open air stage & pavilion
[9] Museum & visitor's center with museum gift shop
[10] Open air pavilion
[11] Residential clubhouse
[12] Count includes units identified in Proffer #10 Housing Opportunity. Land Bay 6 and 7 being subject to affordable housing of 30%.
[13] Overall project density, Assisted Living Units are not included in overall density calculation
[14] Historical home to be relocated and restored from Land Bay 2 to Land Bay 4.

Density Bonus Points

Bonus Item	Bonus Points
C - Stream channel restoration (see Proffer #13)	1.5
E - Land dedicated for public use (see Proffer #17)	1
Total:	2.5



VICINITY MAP

SCALE: 1" = 5,000'

PERMITTED USE TYPE KEY

Area Designations	Type of Development
A	Single Family
B	Attached structures containing two to four dwelling units
C	Attached structures containing more than four dwelling units
D	Attached structures of three or more stories containing more than four dwelling units
E	Commercial Uses
F *(N/A)*	Wholesale and warehouse
G	Office Uses
H *(N/A)*	Light Industrial Uses
I	Institutional or Public Uses
J	Areas of common open space, with recreation areas as noted

Z-24-0013 LAND USE MASTER PLAN

PROPOSED MASTER PLAN

THE BLUFFS OF KISKIACK | JAMES CITY COUNTY | VIRGINIA

0' 250' 500'

PATHMARK consulting & design

vhb

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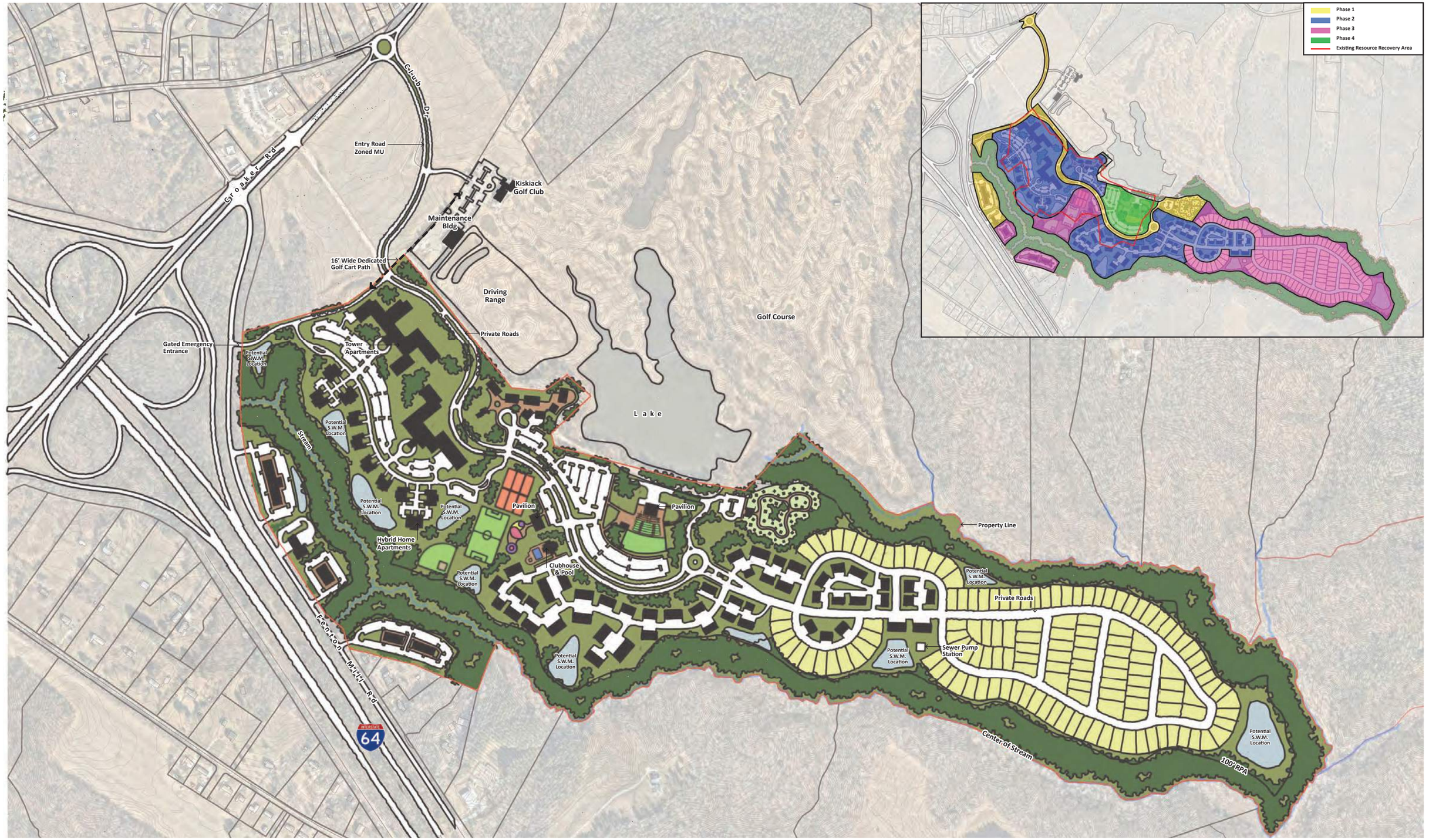

RENDERED MASTER PLAN & PHASING PLAN

PROPOSED MASTER PLAN

0' 250' 500'

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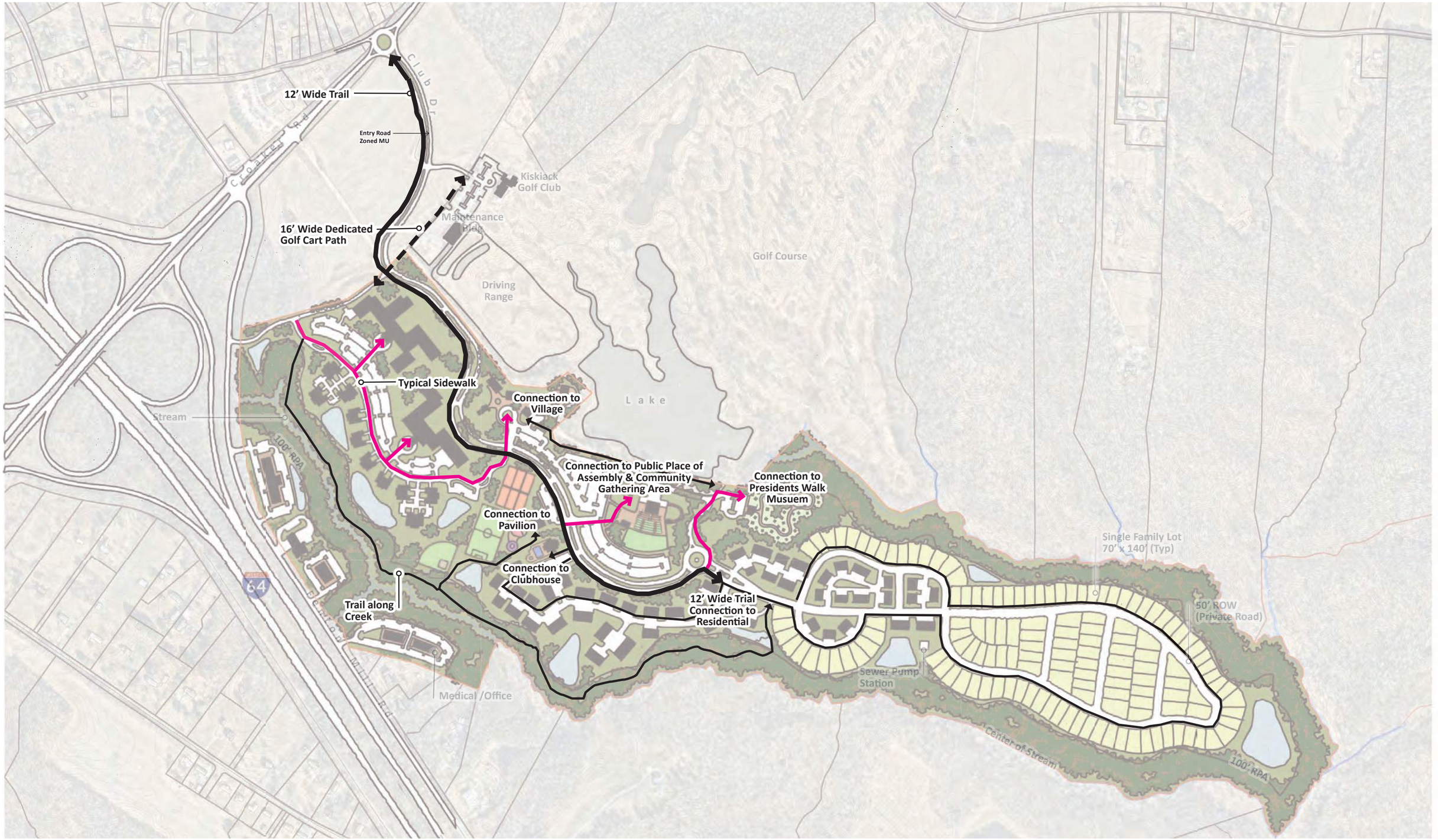

CONCEPTUAL TRAIL AND SIDEWALK PLAN

PROPOSED MASTER PLAN

0’ 250’ 500’

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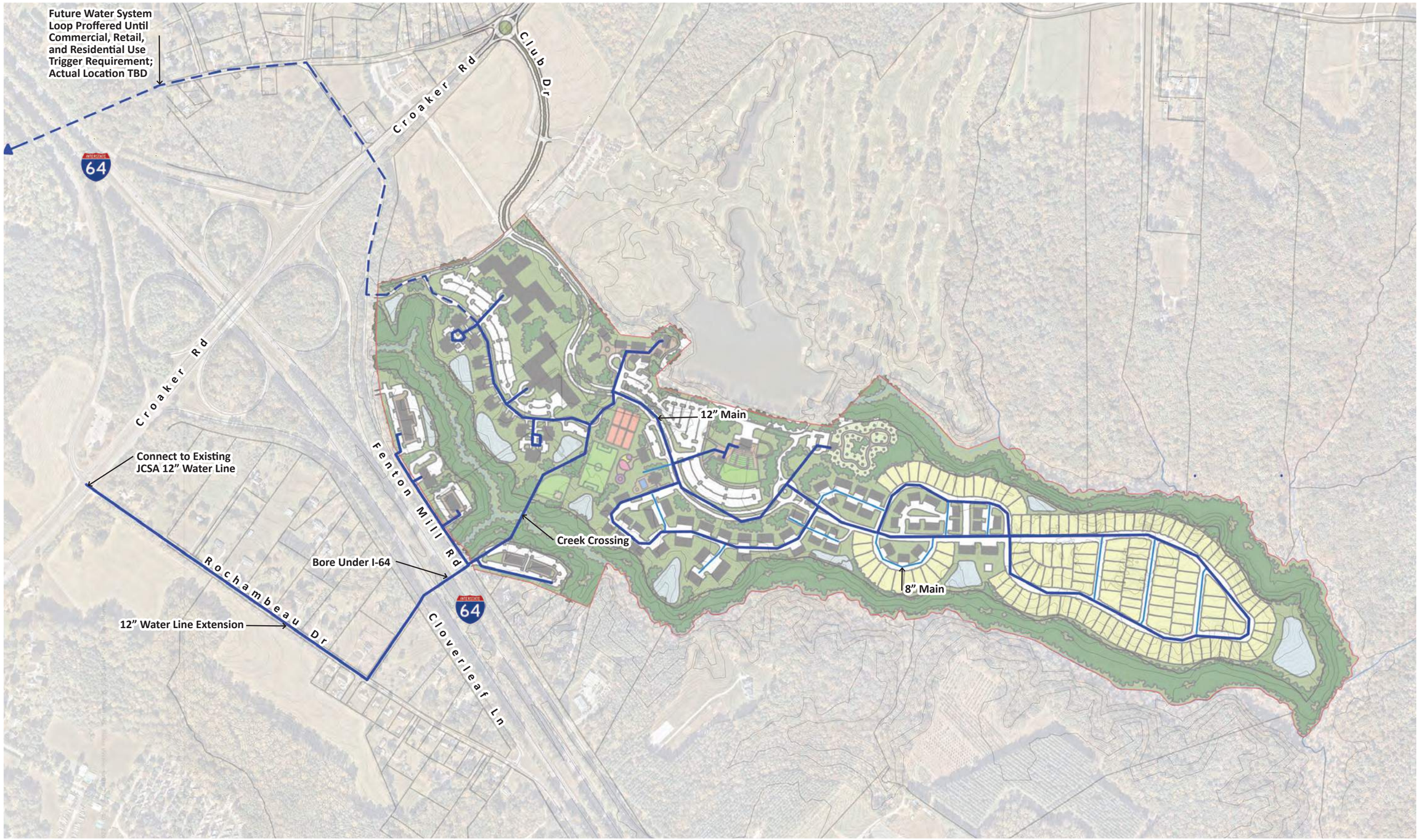

MASTER WATER PLAN

PROPOSED MASTER PLAN

0’ 300’ 600’

THE BLUFFS OF KISKIACK | JAMES CITY COUNTY | VIRGINIA

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DEVELOPMENT TEAM

Howard Hankins	Property Owner
Mark M. Jakobowski, Assoc. AIA, M.ASCE	Director of Development- PATHMARK Consulting & Design, LLC
Stephen Romeo, LS **Stephen Talley,** PLA **Gregory Alban,** LA	Land Planning and Design- VHB- Vanasse Hangen Brustlin, Inc.
Vernon M. Geddy, III	Project Attorney- Geddy, Harris, Frank & Hickman, LLC
John Thomas **Christy Keeler** **Tiffany Reeves**	Marketing Team- “1440 Brand”

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COMMUNITY IMPACT STATEMENT

THE BLUFFS OF KISKIACK



PREPARED BY

PATHMARK consulting & design

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1450 Quarterpath Rd., 5A
Williamsburg, VA 23185
757.449.8419

PREPARED BY

vhb

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March 7, 2025

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1) *INTRODUCTION & PROJECT DESCRIPTION*

PATHMARK Consulting and Design, LLC, proposes a master planned community nestled along a ridge of a natural bluff in Williamsburg. The vision is to create a mixed-use community that includes a Life Plan Community, medical offices, Fire, EMS, and Police services, restaurant and retail village, the "Presidents Walk" Museum, a public place of assembly and community gathering area, single family homes, townhomes, and parks and recreation facilities shared with residential and senior living development. The master plan covers 230 acres located off Croaker Road and Fenton Mill Rd located adjacent to Kiskiack Golf Club with convenient access to Interstate 64.

2) *PROJECT TEAM*

The organizations that participated in the preparation of the information provided with this submission are as follows:

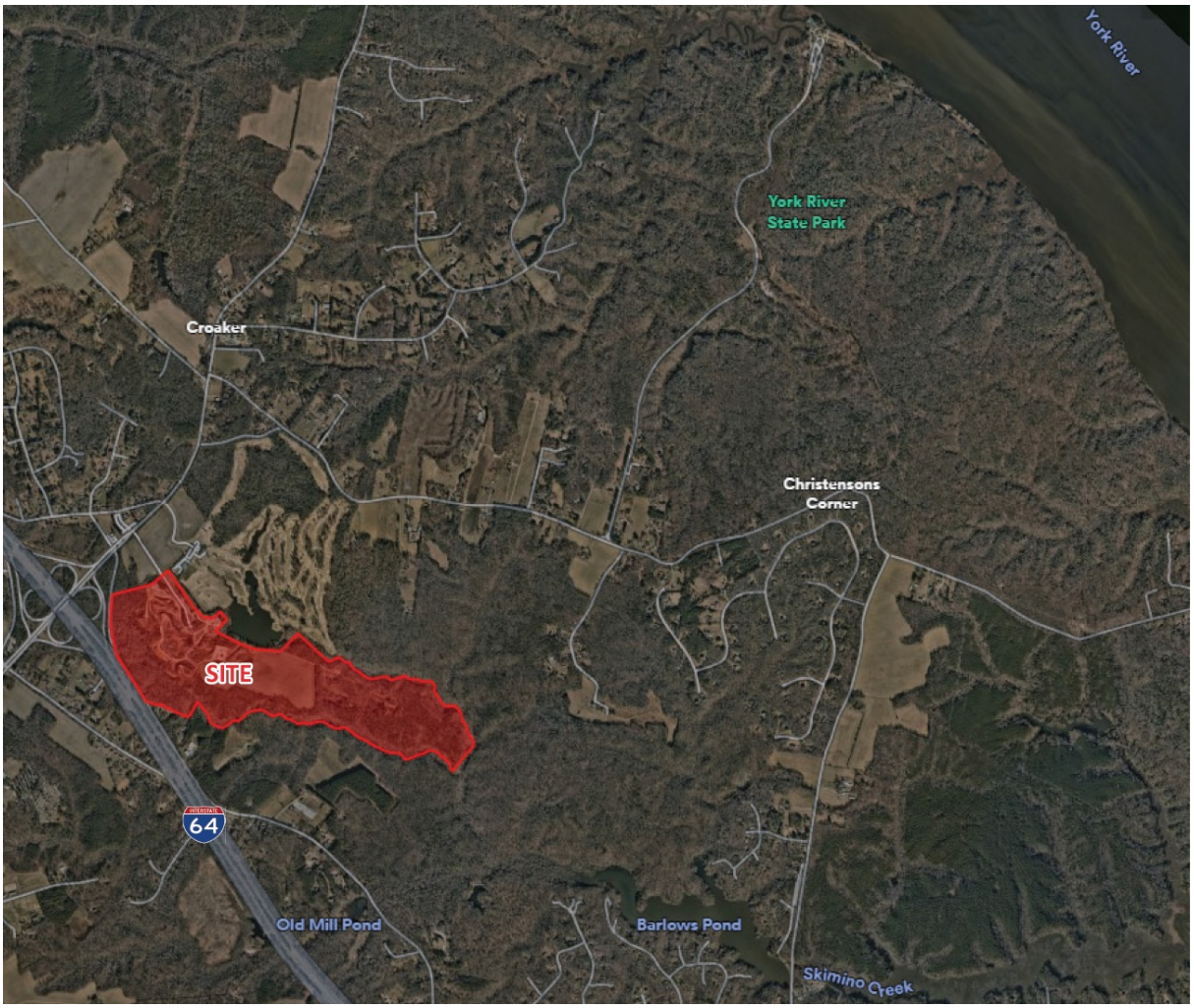
- Developer - PATHMARK Consulting & Design, LLC
- Property Owner - Howard Hankins
- Civil Engineering - VHB
- Traffic - VHB
- Land Planning - VHB
- Attorney - Geddy, Harris, Franck & Hickman, LLC

PATHMARK Consulting & Design is an experienced land planning, development, design, and construction management firm that specializes in healthcare planning, facilities management and mixed-use project development. PATHMARK provides construction planning, cost analysis and management services that creates successful development teams by integrating clients with experienced engineering and architectural firms, marketing firms and creative designers. PATHMARK has provided property and building condition assessments for commercial real estate firms, developers, and federal, state, and local governments and is experienced in historic rehabilitation and the repurposed use of existing historic properties.

- A partial list of clients and projects includes: Centra Healthcare, Lynchburg Virginia, UVA and Sentara Health in Charlottesville Virginia, VCU, Richmond Virginia, Verena at the Reserve Retirement Community, Williamsburg Virginia, and Genesis Development in Richmond Virginia. We were the Owners Representative for the Norfolk State University Brown Hall building complex development and performed cost estimation, design and value engineering consulting for Venture Development on the $350 million mixed-use Atlantic Park project in Virginia Beach.

3) *EXISTING CONDITIONS*

Site Location:



Master Plan Sheet 3 contains information on existing site conditions. Preliminary site analysis yields approximately 159.2 acres of developable land, as indicated below:

100’ RPA:	63.5 acres
Developable:	159.2 acres
Subtotal	**223 acres**

4) PLANNING CONSIDERATIONS

A. Land Use

The proposed land use for The Bluffs will require rezoning from M1 Limited Business/Industrial & A1 General Agriculture to Mixed Use (MU) for the Master Plan. The surrounding land uses are golf course to the northeast, Croaker Road to the west, Fenton Mill Road and additional property owned by Mr. Hankins to the southeast. The MU density provides for 320 units within the 80-acre residential plan which equates to 4 units per acre. (See Land Use Master Plan Sheet #2 and page #6 in the Supplemental Plan Book for detailed information).

Access to the project will be by a private road extending from Croaker Rd. to the property line of the development and Historic Virginia Land Conservancy, (HVLC) property as shown on the Proposed Master Plan sheet #2. HLVC has agreed to the rezoning of the roadbed of the private road from M1 to MU (approximately 5 acres) and the remainder of their property to A1. There is a second access road for emergency ingress and egress on Fenton Mill Rd. north of the dedicated Fire/EMS/Police public use site (shown as Land Bay 8 on sheet #2 of the proposed plan).

There are 6.6 acres planned for Restaurant & Retail Development located adjacent to the CCRC, 10.4 acres of Recreation Facilities with an open-air pavilion to be used by all residents of the community, an 11.8-acre Public Place of Assembly and Community Gathering area with a covered stage overlooking the lake along with a 4.9-acre museum site for the final resting place of the Presidents Bust sculptures currently stored on-site. The historic Hankins family home will be relocated to Land Bay 4 where it will be historically restored and repurposed as the museum building. The museum will tell the story of the sculptures, the history of James City County and display numerous historic items.

The residential community is envisioned as a mix of single-family detached homes, and townhomes with 30% planned as affordable housing. This will be a place where teachers, healthcare workers, fire and law enforcement personnel, and County employees will live, work, and play. The residential community and the Life Plan Community will share the extensive recreational amenities which will enrich the lives of both communities. The community is designed as a place for the entire spectrum of the population, from young first-time homebuyers to 55+ Active Adults to those who require assisted living or potentially higher levels of care.

B. Environmental

An environmental site analysis was conducted on the property and most of the site consists of forest, resource protection areas (RPA), a mining/ resource recovery area and some upland farmland. The site is bound by streams and RPA to the south and northeast, acting as a natural buffer between adjacent properties. The northwest boundary is adjacent to the existing Kiskiack Golf Course lake, and the western boundary is property conveyed to the HVLC by Mr. Hankins.

Parks and Recreation

Designed as a true "Live, Work and Play" community, The Bluffs development team will provide passive and active recreational amenities for the entire community. We have three sets of amenities, those within the CCRC, those in the residential community, and over 10 acres of Recreation Area to include an open-air pavilion, open fields, and playground equipment that will be accessible to all users and abilities. There will also be a covered pavilion with picnic-type tables as part of the Recreation Area for use at community and family gatherings.

We are providing for over 2 miles of both hard and soft surface walking trails and sidewalks as shown on Sheet 8. The residential area will have a pool and community center building with walking access to the parks and amenities on site.

The 11.8-acre Public Place of Assembly and Community Gathering area is also planned for use from within the community and organizations outside of the community for small concerts, patriotic events, etc.

5) *ANALYSIS OF IMPACTS TO PUBLIC FACILITIES AND SERVICES*

The subject property is located within the Primary Service Area of James City County. Land development within the Primary Service Area are required to connect to public water and sanitary sewer service provided by the James City Service Authority (JCSA). The site's proposed use will consist of the mixed-use portion along Fenton Mill Road and Croaker Road, as well as a residential portion within the property. The mixed-use community will consist of healthcare buildings, restaurant, retail, an open air "Presidents Walk" museum, parks, EMS/Fire/Police services, and community spaces. The residential component of the development will include a mix of townhomes, duplexes, and single-family residential homes. Sheets 9 and 10 of the Master Plan indicate preliminary proposed master water and sewer plans to support the development of the project.

A. Public Water Facilities

There is no existing waterline infrastructure on the site. The closest waterline stub is located at the intersection of Rochambeau Drive and Croaker Road, which is across interstate I-64. Therefore, a waterline extension, as depicted on the Master Water Plan, will be necessary as part of this development to serve the residents and tenants throughout the property. The proposed waterline extension will be a 12" main and connect directly to the existing 12" James City Service Authority (JCSA) waterline that exists in Croaker Road. This extension will be brought south-east along Rochambeau Drive, then eventually turn north-east through an existing easement before finally boring under interstate I-64 and reaching the property.

The proposed waterline will then split, with lateral lines servicing the EMS/Fire/Police buildings along Fenton Mill Road. The main will continue under the creek to the main site. From there it will continue north-east following along the main drive aisle. The water main will continue south-east towards the residential section, with lateral lines branching off to service the medical offices, restaurants, and retail buildings. As the main continues into the residential area, there are several connections to service the townhomes, duplexes, and single-family homes proposed in the area.

Given the possibility that The Bluffs waterline extension may render the adjacent Kiskiack Golf Course a legally non-conforming use as it is operating with well water and is within the JCSA Primary Service Area (PSA), it may be beneficial to further extend The Bluffs waterline to the Golf Course for service limited to the Clubhouse (kitchen, bathrooms, fire protection) if the Golf Course owner agrees.

Water Demands:

The following table was created using square footage and unit estimates of the proposed development and determining flow demands based on the James City Service Authority's design criteria. Fire flow for each structure type was also determined using the ISO guidelines.

Dwelling Type	Design Units (DU)	Number of DUs	Flow of Demand (GPD/DU)*	Demand Duration (hours)*		Average Demand (GPD)	Max Day Demand (GPD)	Average Demand (gpm)	Peak Hour Demand (gpm)**	Approx. Fire Flow Demand (gpm)***
Single Family	Per Home	320	310	24		99200	168640	68.9	275.6	1250
Townhome	Per Unit	178	310	24		55180	93806	38.3	153.3	1250
Office	Per SF	32000	0.1	12		3200	5440	4.4	17.8	1000
Retail	Per SF	34000	0.3	16		10200	17340	10.6	42.5	1000
Medical Center	Per SF	1132000	0.25	12		283000	481100	393.1	1572.2	3500
Fire/EMS/Police	Per SF	20000	0.1	24		2000	3400	1.4	5.6	1000
					Total:	**452780**	**769726**	**516.7**	**2066.9**	**3500**
*Compiled from James City Service Authority Design and Acceptance Criteria (2021)										
**Peak Factor of (4) per JCSA Design and Acceptance Criteria (2021)							**Average Demand=**		**516.7**	**gpm**
***Approximated from the ISO Needed Fire Flow Guidelines							**Max Demand=**		**3500.0**	**gpm**

The table shows the average demand for the development is roughly 520 gpm. With a peak demand of 2070 gpm and fire flow demand of 3500 gpm.

A recent fire flow test was provided from JSCA, dated 4/9/2024. This flow test provided fire flow measurements at hydrants located at the intersection of Croaker Road and Maxton Lane, roughly 1500 feet from the proposed connection point. The flow test resulted in a static and residual pressure of 50 psi and 44 psi respectively at the gauge hydrant. With flows of 791 gpm and 876 gpm at the flow hydrants, totaling 1667 gpm. This flow rate in the existing water line, in addition to the length of the extension to the site, there may be concerns about pressure of the system when it comes to proposed peak and fire flows. A loop in the water supply system is in place to address increased flow demands.

B. Public Sewer Facilities

As there is also currently no public sanitary sewer adjacent to or on this site, the existing HRSD force main at the intersection of Rochambeau Drive and Croaker Road will be extended as depicted on the Master Sewer Plan. Wastewater will be collected around the site into 8" gravity sewer mains. These mains will flow to a pump station in the southeast portion of the site, where the natural low point is located. The depth of the gravity sewer in this location will be roughly 20' deep. A 12" force main will leave the pump station and follow parallel to the water main under the creek, under I-64, along Rochambeau, until it will ultimately tie into the existing HRSD force main at the intersection of Rochambeau Drive and Croaker Road. A second, but smaller pump station will be needed where the EMS/Police/Fire station building's gravity sewers will connect the 12" force main. The depth of the gravity sewer in this location is roughly 15' deep.

Given the possibility that The Bluffs sanitary sewer system extension may render the adjacent Kiskiack Golf Course a legally non-conforming use as it is operating with a septic drain field and is within the JCSA Primary Service Area (PSA), it may be beneficial to further extend The Bluffs sanitary sewer system to the Golf Course for service limited to the Clubhouse (kitchen, bathrooms) if the Golf Course owner agrees.

Sewer Demand:

The following table was created using square footage and unit estimates of the proposed development and determining sewer demands based on the James City Service Authority's design criteria.

ʒ Type	Design Units (DU)	Number of DUs	Flow of Demand (GPD/DU) *	Demand Duration (hours)*		Average Demand (GPD)	Max Day Demand (GPD)	Average Demand (gpm)	Peak Hour Demand (gpm)**	
Single Family	Per Home	320	310	24		99200	168640	68.9	172.2	
Townhome	Per Unit	178	310	24		55180	93806	38.3	95.8	
Office	Per SF	32000	0.1	12		3200	5440	4.4	13.3	
Retail	Per SF	34000	0.3	16		10200	17340	10.6	31.9	
Medical Center	Per SF	1132000	0.25	12		283000	481100	393.1	1179.2	
Fire/EMS/Police	Per SF	20000	0.1	24		2000	3400	1.4	4.2	
					Total:	**452780**	**769726**	**516.7**	**1496.6**	
*Compiled from James City Service Authority Design and Acceptance Criteria (2021)										
**Peak Factors detrermined per JCSA Design and Acceptance Criteria (2021)							**Average Demand=**		**516.7**	**gpm**
							Peak Demand=		**1496.6**	**gpm**

From the table the average sewer demand was determined to be roughly 520 gpm, with a peak demand of roughly 1500 gpm. A peak factor of 2.5 was applied to residential demands, while a peak factor of 3 was applied to all other development demands.

C. Fire Protection and Emergency Services

There are currently five fire stations providing fire protection and Emergency Medical Services (EMS) to James City County. The closest fire station to the subject site is Station #1 located at Forge Road and RT. 60 approximately 3.8 miles west of this project. According to the James City County Deputy Fire Marshal, the official response time is based on the arrival of both fire and EMS personnel. Currently, EMS services are available from both Station #1 and the next closest fire station to the subject site, which is Station #4 on Olde Towne Road. From Station #1 an estimated response time would be eight minutes. From Station #4 an estimated response time would be thirteen minutes.

When completed, the CCRC will have medical first responders, as well as CPR and First Aid certified personnel, on staff. Limited medical facilities are onsite in the main CCRC and the Assisted Living buildings. The site may also be served by the York County station at Lightfoot.

The project is providing a 5.2-acre site on Fenton Mill Road for future expansion of Fire, EMS and Police services in the county. A facility similar to that at Station #2 near Grove would allow not only quick access to the community but faster access to the Interstate in the event of a motor vehicle accident.

D. Solid Waste

All solid waste services are intended to be private (i.e. CCRC, Retail, and Residential will have their own private collection.) Recyclable materials will also be collected by a reputable contractor in each section of the community.

E. Utility Service Providers

Virginia Natural Gas, Dominion Energy, Verizon, and Cox Communications provide, respectively, natural gas, electricity, cable TV service, and telephone service to this area. The current policy of these utility service providers is to extend service to the development at no cost to the developer when positive revenue is identified. James City County requires all new utilities to be placed underground.

F. Schools

The Bluffs is located within the Norge Elementary School, Toano Middle School, and Warhill High School districts. Contracts with the residential builders require them to provide a maximum of 15 lots per quarter (60 per year) which equates to an approximate 6-year completion, managing and minimizing the numbers of school age children. The Life Care Planned community will not provide for school age children as residents.

6) ANALYSIS OF ENVIRONMENTAL IMPACTS

A. Preliminary Wetland Information

A desktop review of potential wetlands was performed using National Wetlands Inventory and current James City County GIS data. Temporary impacts to wetlands or streams may be required to provide utility crossings and stormwater outfalls. The development avoids any major impacts to, or filling of wetlands.

B. Resource Protection Areas

The property contains Resource Protection Areas (RPA) buffers which are shown on Master Plan Sheet 3 – Site Analysis. These buffers were located using available James City County GIS information. Wetland delineation and RPA determination will be performed prior to site plan development. Steep slopes up to and exceeding 25% are present in several areas where residential construction with walkout basements are proposed adjacent to the RPA areas.

C. Soils

The Natural Resource Conservation Service (NRCS) Web Soil Survey of James City County shows several soil types within the property boundary. This property is predominantly situated on poorly drained soils of Craven-Uchee and Johnston Complex soil types, along with the well-drained soils of Emporia Complex (15-25% slope) and Emporia Complex (25-50% slope) soil types. (See Environmental Inventory Sheet 3 for detailed information).

7) ANALYSIS OF STORMWATER MANAGEMENT

The entire property falls within the Skimino Creek Watershed. A preliminary stormwater management analysis and design has been performed as a component of the planning for this proposed project. The purpose of the stormwater management plan is to address the Department of Environmental Quality (DEQ) requirements for water quality and quantity control of flow generated by the proposed development. A preliminary estimate using version 4.1 of the Virginia Runoff Reduction Redevelopment spreadsheet suggests the development will need to remove approximately 84 pounds of phosphorus per year with our current envisioned design. In evaluating stormwater management solutions on the subject site, unique site characteristics were considered. Preliminary site investigation identified the following site characteristics to be considered in stormwater management planning:

- The entire project is situated within the Skimino Creek Watershed of the York River. The upper reach of Skimino Creek bisects the property.
- A large swath of the property is currently a mining operation, covered with bare dirt, stone, gravel roads, concrete storage yards, and other existing impervious or poorly drained cover. For this analysis, 6.5 acres of existing impervious were estimated and the remaining approximately 32 acres bare earth of disturbed, lightly vegetated areas were counted as turf. The remainder of the site was counted as forested open space.

- Portions of the property drain to the existing Kiskiack Golf Course retention BMP (YR005). This BMP does not meet the 2011 Virginia BMP Clearinghouse specifications and can only be utilized for quantity control purposes.
- Due to the extent of the proposed development and the site being bisected by a natural channel, quantity control BMPs will be required for nearly every outfall. Each use area will likely drain to a common wet pond BMP (Healthcare, Residential, Commercial (Retail, Restaurant, etc.), and the emergency response and medical parcels along Fenton Mill Road).
- Some treatment trains will be required to achieve the required phosphorus removal. Additional in-line BMP measures include potential green roofs on the large healthcare buildings, permeable surfaces and pavement for the Presidents Walk Museum and retail areas and manufactured hydrodynamic separator devices for the Fenton Mill sites.
- In addition to these treatment train BMP scenarios, the Skimino Creek Watershed Management Plan lists a portion of Skimino Creek downstream of the healthcare use and upstream of the emergency response uses as a channel in need of stream restoration. A regenerative stormwater conveyance BMP could be constructed to treat both the healthcare site and offsite impervious and turf runoff from the VDOT right-of-way.

In summary, with the preliminary analysis of *The Bluffs at Kiskiack,* the stormwater management plan proposed will protect overall downstream water quality, help preserve the natural hydrology of the watershed and reduce the tendency of development to cause downstream erosion to receiving channels.

8) *ANALYSIS OF IMPACTS TO TRAFFIC*

A traffic impact analysis was completed by VHB in December 2024. A scoping meeting was held with the development team, James City County, and VDOT, to discuss assumptions to include study area roadways and intersections, trip generation by land use type, travel patterns, growth rates, and analysis requirements.

Within the study area there is one traffic signal located at Croaker Road and Rochambeau Drive along with four unsignalized intersections. The main access is provided via Croaker Road on Clubhouse Drive to the Residential, Recreational, Commercial, and CCRC portion of the site. A secondary access is provided via Fenton Mill Road, which will support the medical / dental office and a fire station. There will be an additional access point to the main development on Fenton Mill Road that will be used for emergency access only.

The proposed Bluffs of Kiskiack development will increase traffic volumes within the study area. Given its proximity to I-64, a significant portion of the development is destined to and from the interchange. VDOT recently began construction on the I-64 Gap between Hampton Roads and Richmond which will significantly increase capacity. This capacity increase can accommodate the regional growth as well as the traffic generated by the proposed development.

The impacts along Croaker Road can be mitigated with the following recommendations:

Croaker Road / Rochambeau Drive (signalized intersection)
- Construct eastbound left-turn lane with 300' storage and 200' taper and provide protected/permissive phasing via a flashing yellow arrow for the eastbound approach.
- Provide optimized signal timings.

Croaker Road / I-64 WB Off Ramp
- Maintain existing laneage.

Croaker Road / Fenton Mill Road
- Construct channelizing island within the median.
- Restrict left-turns and through traffic along Fenton Mill Road.

Croaker Road / Club Drive / Cedar Point Lane
- Construct a one lane roundabout.
- Construct a northbound right turn lane to allow the unsignalized intersection to provide acceptable operations to support the development of 320 residential units or land uses with equivalent trip generation in the interim of the roundabout construction.

9) *FISCAL IMPACT STUDY*

The Fiscal Impact Analysis worksheet provided by the County has been completed and is attached to this document.

10) *CONCLUSIONS*

The Community Impact Statement for the rezoning and subsequent development of The Bluffs provides the following conclusions and public benefits:

- This project will provide a significant financial benefit to James City County; with the addition of hundreds of jobs ranging from senior healthcare management to physicians, skilled nursing, therapists and caregivers, security and skilled facilities management at the CCRC and medical offices alone. There will be additional opportunities for employment in the retail operations and at the museum.
- There is a 5.2-acre parcel provided to the county on Fenton Mill Road for the potential construction of a future Fire/EMS/Police Field Station or to be used otherwise at the discretion of the county.

- The rezoning is consistent with the intended land use designated on the current Comprehensive Plan for this area. Further, the proposed portion of residential development for workforce housing is an integral component of our “Live, Work, and Play “community and will provide for a vital housing component for First Responders, Teachers, Healthcare workers and County employees currently missing from our residential market.
- The walking trails, recreation areas, covered pavilion and Public Place of Gathering exceed current recommendations and provide a “connection” to include everyone who resides in the community or those who take part of a public event.
- There is adequate capacity in the system of roads serving this project and the developer is maintaining streets, sidewalks and traffic improvements within the project. A “roundabout” entry is being installed at Croaker Road and Club Drive which will provide for traffic control on Croaker Road and establish entrance access and signage for the community.
- Adequate public services (water and sewer, fire) and utility services (gas, electricity, cable television, and telephone) will be available for the development and the Kiskiack Golf Course will have the opportunity to become compliant within the PSA by connecting to the water and sewer system provided.
- Stormwater management requirements will either meet or exceed County requirements.

Fiscal Impact Study

Application Number/Name: The Bluffs of Kiskiack - Z-24-0013MP / 240005 /SUP 24-0033

Scenario Name (see instructions for master plan amendments and flexible master plans above, please name each version accordingly): _____

Residential Component

Type of housing units	Total number of units	Number of Years to Build Out	Start Year	Estimated number of units absorbed per year	Estimated assessed value per unit
Single family detached	122	6	2027	24	$506,000
Single family attached	178	6	2026	36	$412,000
Mobile Home					
Triplex					
Age-Restricted Single Family					
Age-Restricted Multifamily	384	4	2027	96	$565,000
Total Units	704				
CHARITABLE DONATION	20 Lots	6.5	2027	3	$150,000/lot

Non-Residential Development Component

Land Use Type	Total square feet	Number of Years to Build Out	Start Year	Estimated number of square feet absorbed per year	Estimated assessed value (per square foot)
Retail	24,500	3	2026	8,200	$310.00
Office MEDICAL	22,000	3	2027	7,400	$275.00
Industrial					
Other/Institutional (Tax Exempt)	20,000	2	2027	10,000	JCC - FIRE/EMS POLICE STATION
Lodging					
Other (specify) HISTORIC BLDG. (to be re-purposed as a museum)	3,000	1	2026	3,000	$395.00
Other (specify) OPEN-AIR STAGE/PAVILION	6,400	2	2027	3,200	$155.00
Other (specify) PAVILION AT RECREATION FIELDS	6,000	1	2027	6,000	$90.00
Other (specify) _____					
Total square feet	81,900				

The Bluffs of Kiskiack

Commercial Design Guidelines - October 30, 2025

Commercial Design at The Bluffs of Kiskiack project will emphasize an engaging visual presence that will create a lively and unique streetscape. Key guidelines will include architectural variation that will differ from a colonial style to a more contemporary, mid-century, and craftsman appearance utilizing low maintenance elements and sustainable pract**ices** to ensure a high-quality product and a public sense of place with defined, welcoming and well-used outdoor areas.

Based on the Master Plan of the designed community, the commercial portions of the project consist of a Life Plan Community (formerly CCRC), medical offices and a phase of retail development to support both the commercial and residential communities. The developers of these individual commercial entities will use the noted guidelines as a basis for the design of their buildings and pedestrian spaces in order to provide for a pleasing visual and functional architectural continuity within the overall project.

Site and architectural design

- **Street-level presence** to create an active and attractive street edge.
- **Building articulation** utilizing variations in materials, architectural features, and projections or recesses horizontally and vertically to break up large, flat walls.
- **Innovative use of materials** for front facing facades and facades facing streets shall feature high quality innovative use of materials such as curtain wall and store front glazing systems, masonry veneers, cementitious siding, wood, or stucco that complement local surrounding architecture. The use of metal panels will be minimal and limited to accent material.
- **Live, Work, and Play** concept to develop attractive designs with functional outdoor areas for public use, creating a sense of place, continuity, and enclosure that distinguishes public and private spaces.
- **Building and site design** shall be consistent with the James City County Character Design Guidelines, pages 43-53, as applicable to the type of proposed commercial land uses (Neighborhood commercial or Local commercial)

Sustainability and performance

- **High-performance buildings** that will focus on energy efficiency, sustainable materials, and other performance-based criteria.
- **Eco-friendly practices** Plans for EV charging and promotion of responsible waste disposal to minimize environmental impact.

Accessibility and user experience

- **User-centric design** will provide accessible and comfortable spaces for all users, including features like ample open recreation spaces, accessible playground equipment, sidewalks and natural walking trails.

Movement and legibility

- **Easy movement** around and throughout the Community Gathering Area, Recreation Fields, Retail areas and the Presidents Walk Museum locations. The design will facilitate easy movement throughout the site and will connect seamlessly within the various phases of neighborhood.
- **Legibility** in the design will provide clear paths, sidewalks, landmarks, and signage in each phase of the community to make the urban environment easy to navigate and understand.
- **Landscape and Hardscape** elements such as a mixture of shrubs and trees with a balance of evergreen and deciduous trees and shrubs will define the borders and accent each phase of commercial development. There will be hardscaped areas with benches and accent bed plantings at the retail and museum areas, and screening will be installed at stormwater management locations to provide for a natural appearance.

The Bluffs of Kiskiack

Residential Design Guidelines - July 20, 2025

Generally: The Bluffs of Kiskiack is to be developed using traditional neighborhood development standards as a mixed-use community. These Residential Design Guidelines are intended to supplement the approved rezoning requirements of The Bluffs of Kiskiack and the Mixed Use requirements of the James City County Zoning Ordinance. Wherever there is a conflict between these guidelines and the above referenced items, a more restrictive rule will apply.

1. Lot Development Standards
    a. Minimum Required Improvements
        i. Paved Driveway and Front Walk: All homes in The Bluffs of Kiskiack will include a paved driveway and a walk to the front door and will provide access to a community sidewalk.
        ii. Equipment Screening: Exterior HVAC equipment shall be screened from view from all streets and public common areas.
        iii. Finished Landscape Yard: Every improved lot shall be landscaped in accordance with landscape standards in this document. Required landscaping will include trees, shrubs, sod and irrigation in all yard areas. Specific landscape standards will be created with full requirements.
    b. House Siting Requirements: Front, side and rear yard set-back distances will comply with the James City County Mixed-Use Zoning Ordinance at a minimum. The County has the authority to increase or decrease setbacks beyond the guidelines set forth in this document in certain instances with certain lots to maintain the design intent within a given area or to avoid excessive clearing and or grading.
    c. Orientation to the Road: In general, houses shall face the road with the front façade facing the street. Where site conditions or the design intent make this unnecessarily difficult or undesirable the developer may request an alternative site orientation.
    d. Relationship to other Houses: In part, house orientation and location will be judged on the basis of its relationship to adjacent houses. Where house designs or lot conditions result in direct views from house fronts into living areas of adjoining property, or similar breaches of privacy, screening of these views or revisions to the design may be requested by the developer for an alternative site orientation.
    e. Accessory Structures: Siting of Accessory Structures must follow the same general guidelines as the primary structure.
    f. Swimming Pools, Hot Tubs, Spas: Swimming Pools, Hot Tubs, Spas and similar items are subject to future Homeowners Association (HOA) documents and approvals. If approved they must be located to the rear elevation of the primary structure not visible from the front street or sidewalk, must meet the same setback requirements and must be screened from view to a height of 6’ from adjacent properties and common areas.

g. Landscaping: A Landscape Plan shall be submitted and approved for each lot. All landscaping shall meet or exceed the requirements of this document. The use of native species and drought tolerant plantings is encouraged. All plants shown on the approved landscape plan shall be installed prior to the issuance of a final certificate of occupancy.
    i. Yard Areas: All yard areas will be sodded and irrigated, in landscaped planting beds or will be planted with an appropriate ground cover from the approved plant list.
    ii. Foundation Planting: Foundation planting is required along the front façade of the house and any side elevation facing a street, and along other areas as designated by the James City County Landscape/Zoning Ordinance such as decks, fenced enclosures, garages or pavement areas. Foundation beds shall be a minimum of 2' wide from the foundation.
    iii. Trees: Street trees shall be required within the tree lawn on the approved site plan and shall meet the requirements of the James City County Landscape/Zoning Ordinance. Yard Trees shall be planted as appropriate on individual lots to complement the street trees. Yard tree varieties shall be selected to be appropriate to the space available and overall design of the landscape plan.

h. Mailboxes: Group mailboxes shall be placed at locations convenient to the general layout of the multi-family townhouse/duplex sections of the neighborhood and shall be installed in a permanent structure designed to complement the overall architectural style of the community. Individual mailboxes will be placed near the driveway apron at the community sidewalk at each single-family home and will complement the overall architectural style of the community.

i. Flags and Flag Poles: Individual residents are permitted to fly decorative flags and sovereign flags (USA, Virginia, etc.) flown from flag standards of 6' or less in length, mounted on the house. Vertical flag poles may be installed at the development entrances and on common property by the developer.

j. Signs: In the residential area of the community, no signs other than one real estate/construction sign are permitted on any lot. Appropriate holiday signs and flags are allowed seasonally only. Future HOA documents will further define the use of holiday decorations.

a. Pavements: All homes in The Bluffs of Kiskiack will include a paved driveway and a sidewalk to the front door. The driveway will provide access from the front door of each residence to a community sidewalk. Pavement will conform to the following criteria: a) Driveways may be constructed of concrete or approved alternative materials, such as hardscape pavers, to reduce the impervious surface requirements of the development plan approval. b) Front walks shall extend from the front steps to the adjacent driveways. The front sidewalks may be paved with concrete or approved alternative materials, such as hardscape pavers, to reduce the impervious surface requirements of the development plan approval.

b. Exterior Lighting and Fixtures: Exterior light fixtures will be limited to lights at entrances and garage doors. Light fixtures shall be compatible in style with the style of the house. Landscape and walkway path lighting will be subject to future HOA documents and approval.
c. Fences and Walls: Fences are permitted subject to future HOA documents and approval. Fencing between multi-family/townhome lots must be 6' in height and in a material to match the exterior construction of the home. All fencing will not extend beyond the rear elevation of each home. Side and front yard fencing is not permitted. Chain link, barbed wire, metal post and wire and wood stockade fences are not permitted. All fences shall be constructed so that the rails, pickets or other finished surfaces face out from the yard.

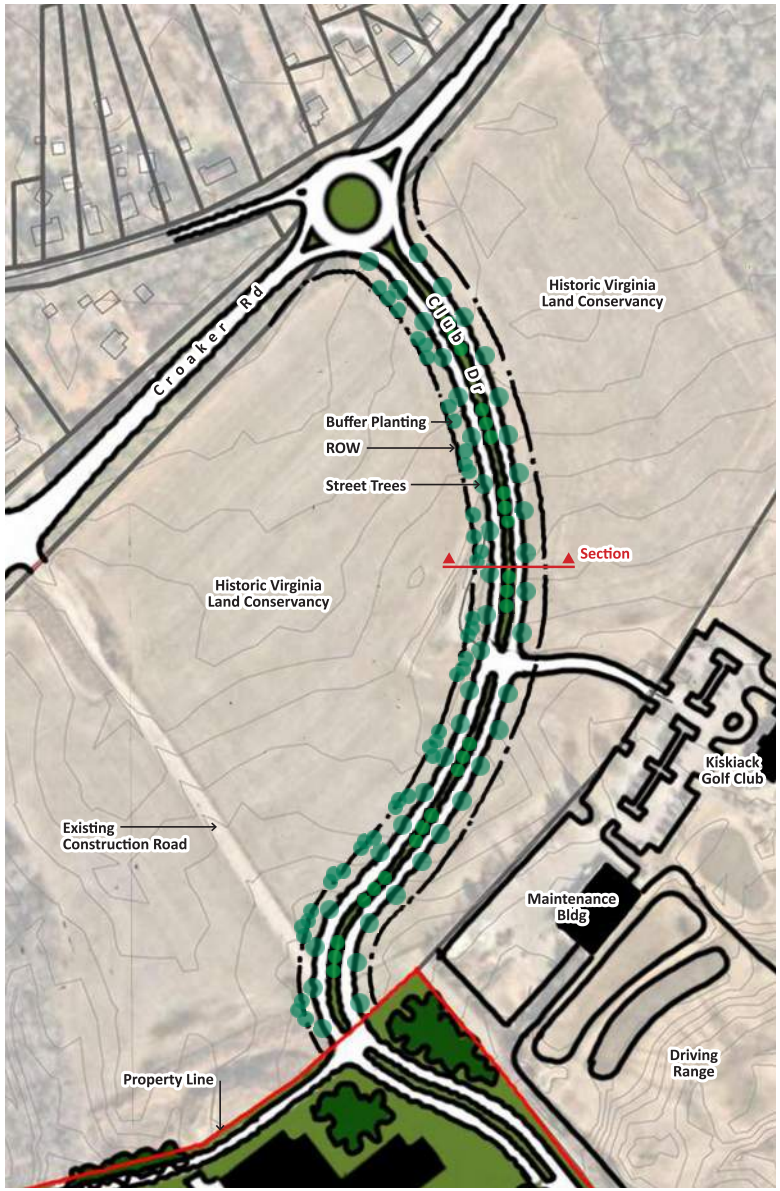
2. Architectural Standards – General: Homes will be of an architectural style that is compatible with the low-country, colonial, and craftsman architectural styles as represented in the Revised Master Plan Rezoning document.
    a. Type of Residence: Single-family homes and one family attached townhomes and duplexes are permitted in The Bluffs of Kiskiack.
    b. Minimum Floor Areas: Single family homes 2000 SF. Townhomes and duplexes 1200 SF.
    c. Heights:
        i. The two-story single-family residences and the multi-family townhomes and duplexes will be a maximum of forty feet (40') in height.
    d. Massing and Form:
        i. Foundations - Houses shall be built on continuous foundations over a crawl space or slab. Lots identified with steep slopes in the Revised Master Plan Rezoning document may have homes constructed on them with "walk-out" basements.
        ii. Exterior Facades – Exterior wall planes and masses shall be of a residential scale with adequate windows and offsets.
        iii. Roof Slopes – Houses shall have a minimum roof slope of 6/12.
        iv. Dormers shall be of an appropriate style and scale for the architectural style.
        v. Ceiling heights shall be minimum 8' for the first and second floor.
    e. Garages/Parking: Adequate on and off-street parking shall be provided within the community for all homes.
3. Architectural Guidelines – Construction
    a. Foundations and Masonry: All visible portions of exterior foundation walls shall be constructed of brick, stone, or stucco. Foundation vents will be of a size and style appropriate to the architectural style of the home. Masonry and mortar colors will be coordinated with the overall colors of the home.
    b. Fireplaces, Chimneys and Flues: Direct vent fireplaces may not be exhausted from the front elevation of the home. Metal flues shall be a maximum size of 8" diameter, located only on the rear or side roof planes shall be painted black.
    c. Exterior Siding – Houses shall be faced with one or more of the following materials: brick, stone, synthetic stucco, or cementitious plank or board and batten siding.

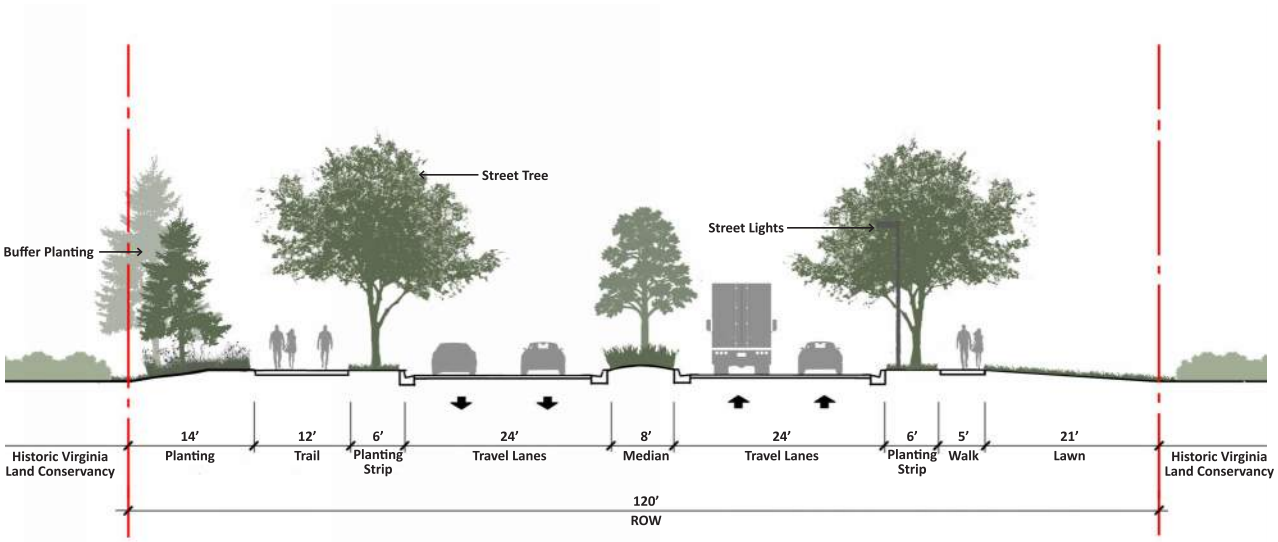
d. Exterior Trim: Exterior architectural detailing shall be consistent with the overall design theme of the home. All exterior trim will be sized appropriately to the scale of the home. Acceptable materials include wood, brick, stone, cast stone, PVC and aluminum wrapped trim.
e. Windows: Windows must be of a style, scale and placement consistent with the architectural style of the house. Windows are required on all elevations of the house. Vinyl or metal clad windows are permitted provided the profile and trim are similar to traditional wood windows.
f. Doors: Front doors with sidelights and transoms are encouraged. Storm Doors are permitted but must not be excessively ornamental and the color must match the trim of the front door.
g. Trellises must be an appropriate style and color and be compliant with the architecture of the home.
h. Window Trim and Shutters: Windows will have traditional built-up moldings or shutters. The windows on the rear and sides of the homes will be of similar quality and style to the front of the home.
i. Garage Doors will be consistent with the architectural style of the home.
j. Bay Windows: Windows must be wide enough to fit each bay façade without filling and siding, siding or trim below the windows should be consistent with emphasizing the architectural feature.
k. Roofs and Roof Accessories
    i. Roof materials will be an architectural dimensional shingle at a minimum.
    ii. Gutters and Downspouts shall be prefinished to match the adjacent building material colors. Ground gutters are acceptable where appropriate.
    iii. Roof Vents shall be ridge vents or other low-profile design and painted to match the roof color. No roof penetrations shall be located on the front roof plane of the house.
    iv. Dormers shall be consistent with the architectural style of the house.
    v. Skylights and Solar Tubes must be located on the rear roof plane.
    vi. Solar Collectors may be considered where they are integrated into the design of the structure, and none will be located at the visible front elevation roof plane.
l. Porches, Stoops, Patios and Terraces
    i. Front porches and stoops will be constructed of masonry materials with brick or concrete paver flooring. Country porches made of pressure treated or synthetic lumber may be permitted if consistent with the architectural style of the home and constructed on brick piers with decorative screening to grade.
    ii. Rails and columns shall be of a size and style consistent with the architecture of the home.
    iii. Patios and decks are allowed at the rear elevation. Second story balconies or decks are permitted consistent with the architecture of the home.

4. Architectural Standards – Color: A variety of colors are encouraged for the home exteriors; however excessively bright or bold colors are not permitted. Generally, colors should be selected from or similar to the Benjamin Moore Williamsburg or Historical Color Collection or the Sherwin Williams Colors of Historic Charleston Collection. The same or similar color schemes may not be used on adjacent or other residences within six structures on the same street.

5. Accessory Buildings: Accessory buildings are permitted and must be of a consistent architectural style and color scheme with the main house. All accessory buildings must be constructed on a permanent foundation with exterior materials compatible the main house. Architectural details such as windows, roof, trim and doors must be consistent with the main house.

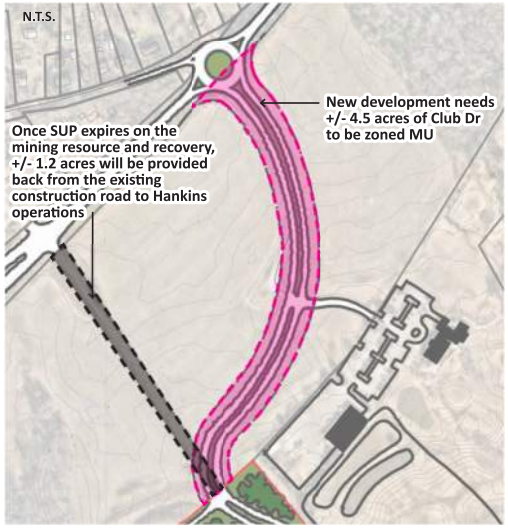
6. Other Standards
    a. Property Maintenance: Front, side and rear yards of the multi-family portion of the subdivision will be maintained by the Residential HOA of The Bluffs of Kiskiack. Single-family homeowners will be responsible for maintenance of the front, side and rear yards to include lawns, trees and landscape planted areas. Exterior maintenance is the responsibility of the owner for the single-family homes, townhomes and duplexes.
    b. Common Areas: All common areas within the subdivision will be maintained by the Residential HOA of The Bluffs of Kiskiack.
    c. Storage: Commercial vehicles are not permitted to be parked overnight in the residential subdivision or the commercial areas of The Bluffs of Kiskiack. This will create additional signage for the promotion of businesses within the development which will not be allowed .





CLUB DRIVE PROPOSED SECTION

N.T.S.



The Bluffs of Kiskiack

James City County, Virginia

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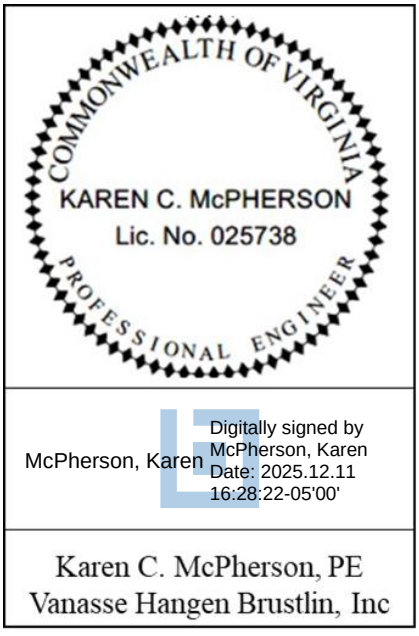

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Executive Summary

The proposed Bluffs of Kiskiack development is located in James City County, directly north of the Croaker Road and I-64 interchange. The 230-acre proposed mixed-use development will be comprised of a wide range of land uses to include 320 Residential units, 15.2 acres of recreational use, 34 KSF of retail / commercial use, and a continued care retirement community (CCRC) consisting of 832 units and 566 KSF of support facilities.

A scoping meeting was held with the development team, James City County, and VDOT, to discuss assumptions to include study area roadways and intersections, trip generation by land use type, travel patterns, growth rates, and analysis requirements.

Within the study area there is one traffic signal located at Croaker Road and Rochambeau Drive along with four unsignalized intersections. The main access is provided via Croaker Road on Clubhouse Drive to the Residential, Recreational, Commercial, and CCRC portion of the site. A secondary access is provided via Fenton Mill Road, which will support the medical / dental office and a fire station. There will be an additional access point to the main development on Fenton Mill Road that will be used for emergency access only. To mitigate the impacts associated with the proposed development the following improvements are recommended to occur prior to traffic being generated by the site:

Croaker Road (N/S) / Rochambeau Drive (E/W) (signalized intersection)

- Extend Croaker Road northbound right-turn lane to provide 200' storage and 200' taper
- Extend Croaker Road northbound left-turn lane to provide 250' storage and 75' taper
- Extend Croaker Road southbound right-turn lane to provide 300' storage and 200' taper
- Construct Rochambeau Drive eastbound left-turn lane with 400' storage and 200' taper
- Provide optimized signal timings.

Croaker Road (N/S) / I-64 WB Off Ramp

- Maintain existing laneage.

Croaker Road (N/S) / Club Drive (W) / Cedar Point Lane (E)

- Construct a one lane roundabout

Croaker Road (N/S) / Fenton Mill Road (E/W)

- Extend existing northbound right-turn lane to provide 200' storage and 200' taper
- Construct proposed RCUT (Restricted Crossing U-Turn) per timeline below

The Croaker Road and Fenton Mill RCUT is not required *until any one* of the following conditions occurs:

1. Certificate of occupancy (CO) of 320 residential units
2. Combination of any of land use development that generates more than 190 AM peak hour trips and 240 PM peak hour trips
3. Construction begins on any one of the parcels along Fenton Mill
    - Construct an RCUT within the median to restrict EB and WB left-turns and through traffic from Fenton Mill Road
    - Extended the median to the Liberty Church Frontage to encourage use of the roundabout and limit the potential for U-turns.

The Bluffs of Kiskiack development will increase traffic volumes within the study area. Given its proximity to I-64, a significant portion of the development is destined to and from the interchange. VDOT recently began construction on the I-64 Gap between Hampton Roads and Richmond which will significantly increase capacity. This capacity increase can accommodate the regional growth as well as the traffic generated by the proposed development.

1

Introduction

1.1. Project History and Background

The proposed Bluffs of Kiskiack development is located in James City County, in the northeast quadrant of the Interstate 64 (I-64) and Croaker Road interchange, immediately north of Fenton Mill Road. **Figure 1** shows the site location within James City County.

The proposed 230-acre development is currently zoned M-1: Limited Business / Industrial and A-1: Agricultural, and will be rezoned to PUD-C, Mixed Use, and PUD-R, Residential, to support the proposed uses.

The property has been in the same family for over 360 years and the proposed development is anticipated to include healthcare, restaurants, retail, and public spaces to include the Presidents Walk. Additionally, the development will be a planned residential development with a mix of housing types as well as public facilities along Fenton Mill Road to provide future police facilities or a fire station along with some office space as illustrated in **Figure 2**.

Given the size and various land uses included within the development, the site has been broken up into 5 analysis zones based on land use. The approach allows unique trip generation and distribution (i.e., travel patterns) to vary by zone, as illustrated in **Figure 3**.

The proposed development will be served by two entrances that are not connected by an internal roadway. Traffic generated by Zones 1 through 4 will access the site via the Croaker Road / Club Drive intersection and traffic generated by Zone 5 will access the site via Croaker Road / Fenton Mill Road.

Vanasse Hangen Brustlin, Inc (VHB) was retained by Pathmark to perform a traffic impact analysis for the proposed development. This report has been prepared for submittal to James City County to evaluate existing and future traffic conditions and make recommendations to mitigate the impacts of the proposed development, if necessary. Additionally, based on the size of the proposed development, daily traffic volumes meet Chapter 527 requirements criteria set forth by the Virginia Department of Transportation (VDOT). As such, this report has been prepared based on criteria outlined in the Chapter 527 guidelines. Assumptions regarding the study area, count data, traffic generation, and trip distribution patterns were discussed with James City County staff and VDOT during the Scoping Meeting, which is provided in the technical **Appendix.**

Figure 1: Site Location

The Bluffs of Kiskiack | James City County, VA

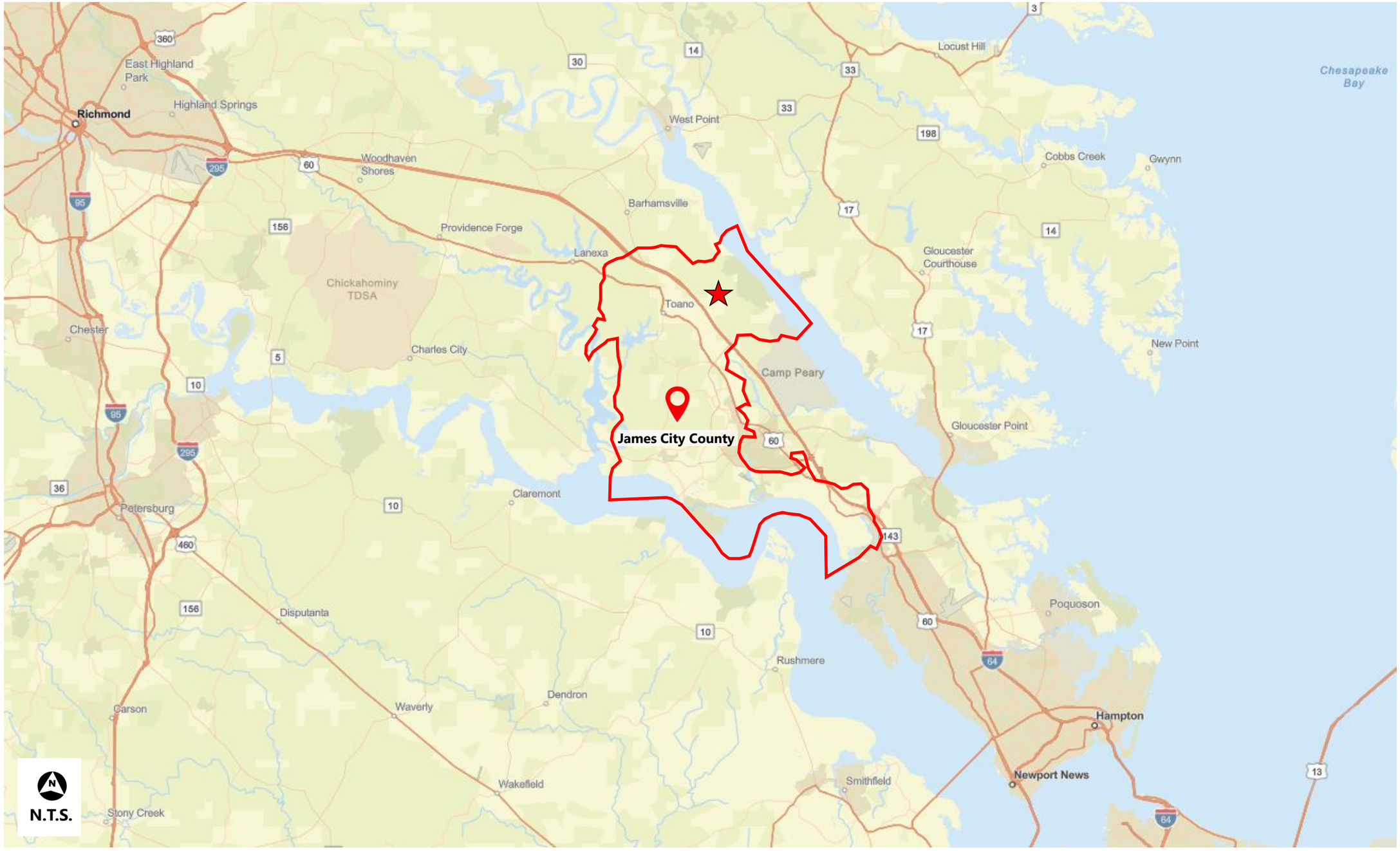


Figure 2: Site Plan

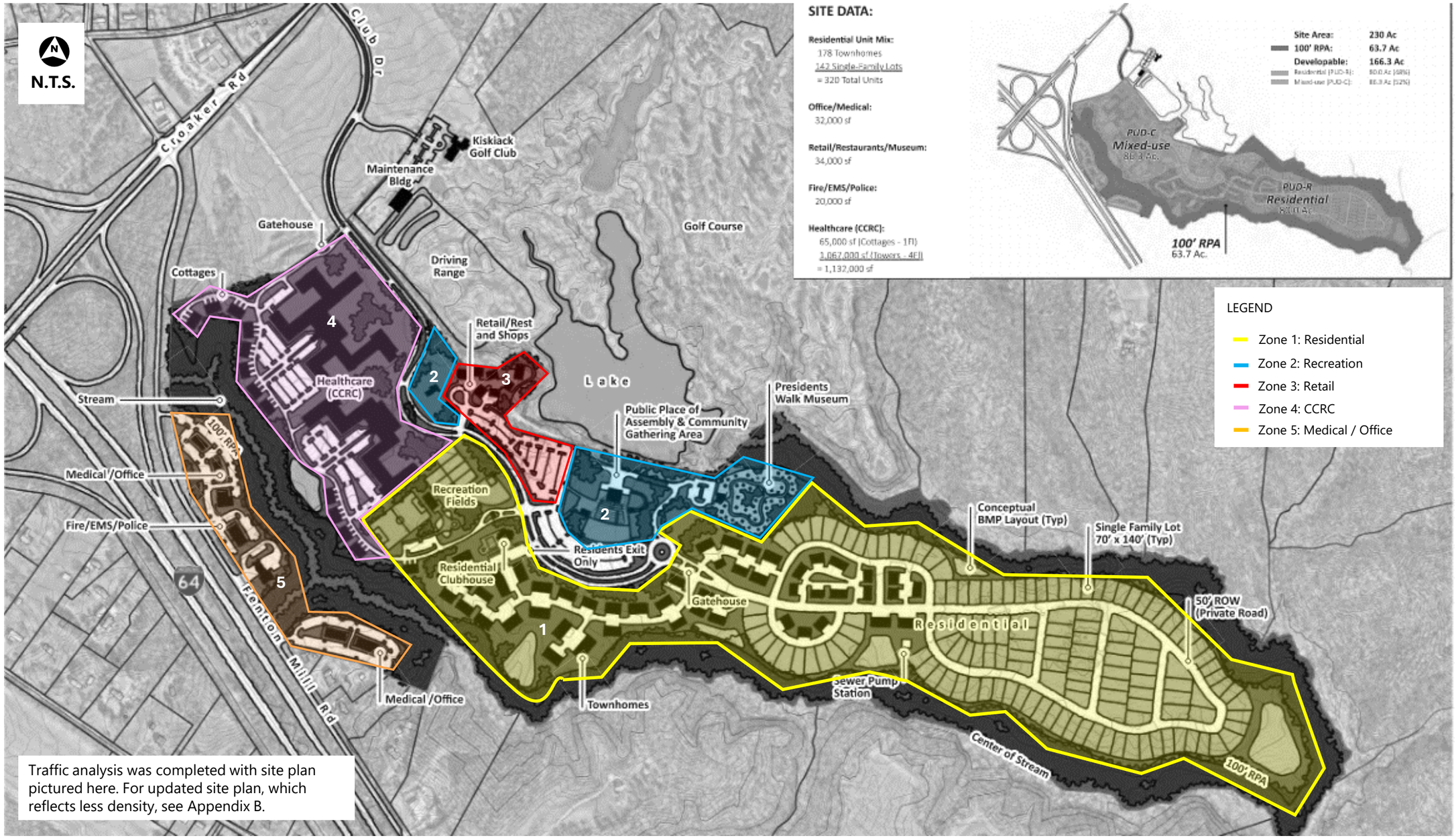
The Bluffs of Kiskiack | James City County, VA



Traffic analysis was completed with site plan pictured here. For updated site plan, which reflects less density, see Appendix B.

Figure 3: Analysis Zones

The Bluffs of Kiskiack | James City County, VA



Traffic analysis was completed with site plan pictured here. For updated site plan, which reflects less density, see Appendix B.

2

Existing Conditions

2.1. Study Area

Study area roadways, intersections, and interchange analysis points were identified during the scoping meeting held on June 26th and agreed upon by James City County staff and VDOT. **Figure 4** illustrates the study area intersections, existing roadway laneages, operations, and storage lane lengths. For the purposes of this study, Croaker Road runs in a north/south direction and I-64 with all cross streets run in an east/west direction. This study includes the following roadways and intersections:

Roadways

- Croaker Road
- I-64

Intersections

- Croaker Road / Rochambeau Drive (signalized)
- Croaker Road / I-64 WB Off Ramp (unsignalized)
- Croaker Road / Fenton Mill Road (unsignalized)
- Croaker Road / Club Drive / Cedar Point Lane (unsignalized)

Additionally, during the scoping meeting VDOT requested that movements within the I-64 interchange that will support site traffic be included as outlined below and illustrated in **Figure 5**:

Merge

- Croaker Road SB to I-64 WB

Weave

- I-64 EB between I-64 EB On Loop and I-64 EB Off Loop
- Croaker Road NB between I-64 EB Off Loop and I-64 WB On Loop
- Croaker Road SB between I-64 WB Off Loop and I-64 EB On Loop

Diverge

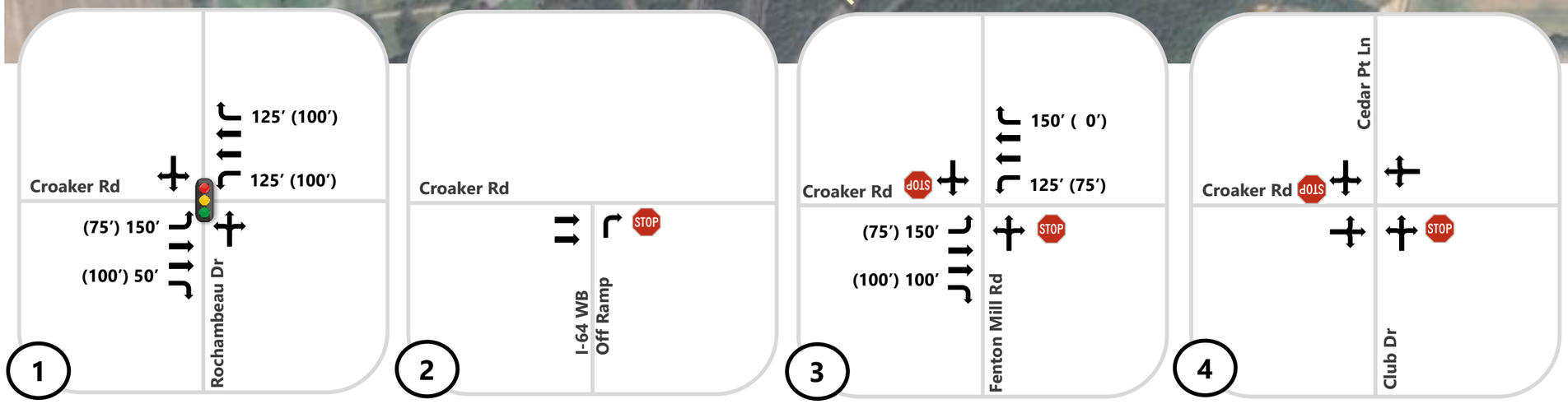
- I-64 WB to Croaker Road NB

Current development plans include access along Croaker Road via Club Drive for zones 1 through 4 and a secondary access via Fenton Mill Road for zone 5. There will be a third gated access for emergency vehicles only along Fenton Mill Road.

Figure 4: Study Intersections / Existing Lane Configurations

The Bluffs of Kiskiack | James City County, VA

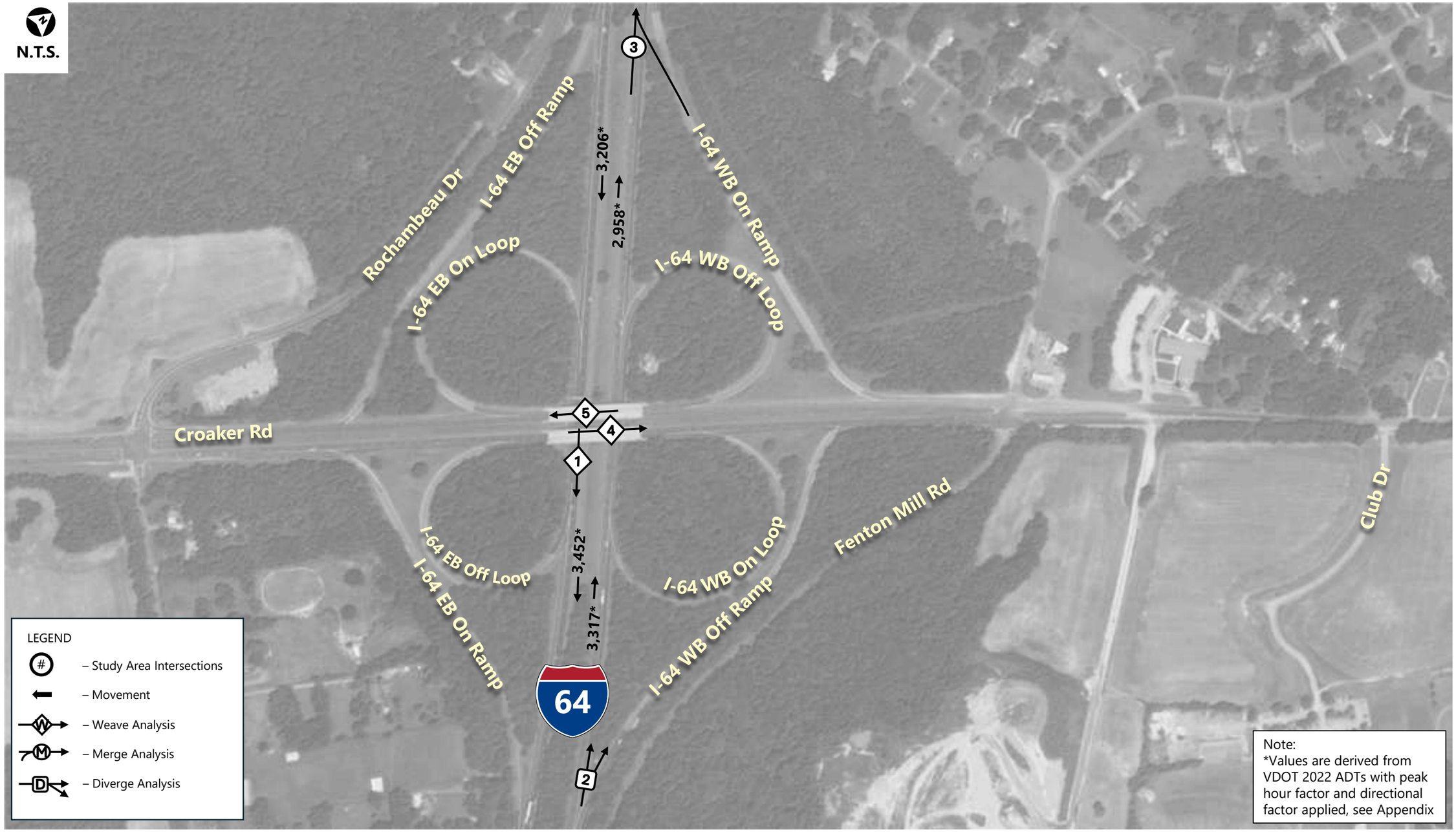




*** Storage and taper lengths measured using online aerial imagery and rounded to nearest 25'**

Figure 5: Interchange Analysis Points

The Bluffs of Kiskiack | James City County, VA



2.2. Existing Land Use

The Bluffs of Kiskiack development is currently zoned M-1: Limited Business / Industrial and A-1: Agricultural. Land uses in the study area include various residential developments and farmland.

2.3. Existing Roadway and Programmed Improvements

Croaker Road and I-64 are the primary roadways providing access to the Bluffs of Kiskiack development. North of the development, Croaker Road terminates at its intersection with York River. Croaker Road extends to the south where it terminates at its intersection with Richmond Road.

The following provides a short description of each roadway:

- Croaker Road - is a four-lane divided major collector roadway within the study area between the intersection of Croaker Road with Rochambeau Drive to the intersection of Croaker Road with Fenton Mill Road. North of its intersection with Fenton Mill Road, Croaker Road is a two-lane undivided major collector roadway. Croaker Road is oriented north/south, providing connectivity to numerous residential areas with a direct connection to interstate 64. The posted speed limit in the vicinity of the site is 55 mph to the south of the intersection of Croaker Road and Fenton Mill and 45 mph to the north of this intersection with a 2022 VDOT average daily traffic (ADT) volume count of 13,496 vpd.
- I-64 is a four-lane divided interstate that provides access to Richmond to the west and Hampton Roads to the east. The posted speed limit in the vicinity of the site is 70 mph with a 2022 VDOT average daily traffic (ADT) volume count of 62,267 vpd.

Figure 4 illustrates the existing roadway conditions, laneages, storage lengths, speed limits, and traffic control at the four study area intersections.

VDOT broke ground on the I-64 Gap Widening Project between Richmond and Hampton Roads which will add a third lane in both the East and West directions. The widening is scheduled to be completed in Fall of 2027; therefore, the additional lanes are considered to be in place for 2030 and 2036 Background and Build scenario interchange analysis.

3

Analysis of Existing Conditions

3.1. Capacity Analysis at Critical Points

Intersection turning movement counts (TMC) were used in conjunction with the number of lanes and traffic operations at each study intersection to determine existing and future levels of service. Level of Service (LOS) describes traffic conditions—the amount of traffic congestion—at an intersection or on a roadway. **Table 1** shows the LOS and delay range for signalized and unsignalized intersections.

Table 1 Levels of Service and Ranges of Delay

LOS	Delay per Vehicle (seconds per vehicle)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

3.2. Turning Movement Counts (TMCs)

Turning movement counts (TMC) were collected by Data Collection Group during the AM (5:30 – 9:30) and PM (2:30 – 6:30) peak periods on August 20, 2024, at the following study intersections:

- Croaker Road and Rochambeau Drive
- Croaker Road and Fenton Mill Road
- Croaker Road and Club Drive and Cedar Point Lane

3.3. Average Daily Traffic (ADT) Counts

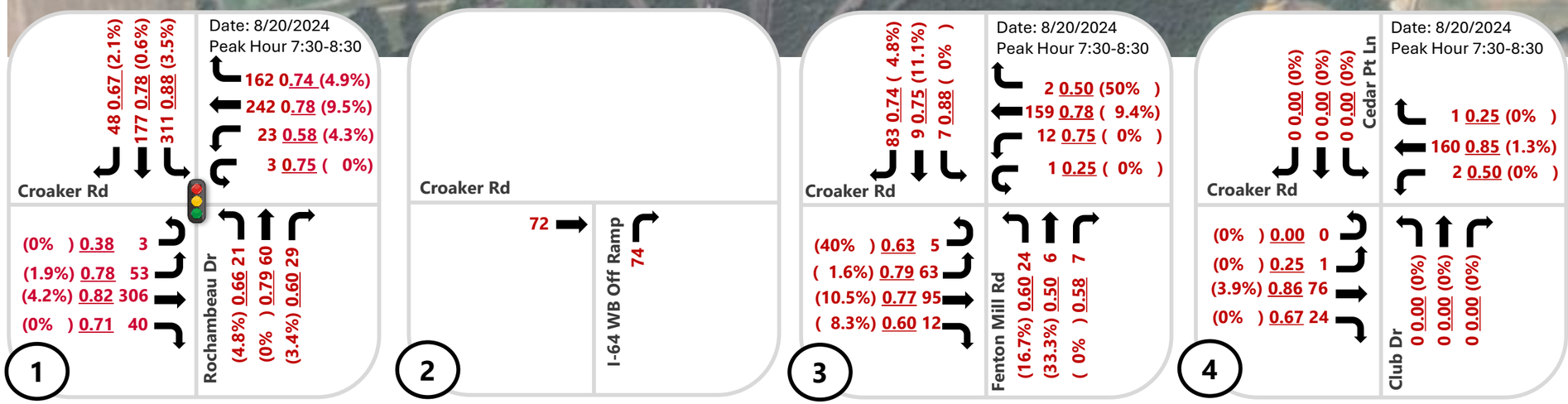
Historical ADT counts were taken from the *2022 VDOT Annual Average Daily Traffic (AADT) Report for James City County)* for daily traffic volumes along Croaker Road and I-64. Peak Hour I-64 volumes were generated by applying direction and peak hour factors provided in the VDOT 2022 AADT data for these roadways. Detailed data is included in the **Appendix.**

Additionally, 24-hour ADT counts were collected on August 20, 2024, at all four ramps and all four loops within the I-64 interchange with Croaker Road. TMC and ADT data is illustrated in **Figures 6 and 7** for all study area intersections and **Figure 8** for interchange points, respectively. Detailed count data is included in the **Appendix.**

Figure 6: Existing 2024 Volumes - AM

The Bluffs of Kiskiack | James City County, VA





Note:
See Figure 8 for interchange volumes

Figure 7: Existing 2024 Volumes - PM

The Bluffs of Kiskiack | James City County, VA



1

Date: 8/20/2024
Peak Hour 4:45-5:45

Croaker Rd: 67 0.88 (0%) | 129 0.85 (0%) | 190 0.93 (2.1%)

Rochambeau Dr: 334 0.88 (0.3%) | 380 0.92 (0.8%) | 21 0.75 (0%) | 1 0.25 (0%)

Croaker Rd: (0%) 0.25 1 | (0%) 0.78 100 | (1.4%) 0.77 288 | (0%) 0.80 48

Rochambeau Dr: (0%) 0.60 72 | (1.1%) 0.84 179 | (0%) 0.69 25

2

Croaker Rd: 160

I-64 WB Off Ramp: 110

3

Date: 8/20/2024
Peak Hour 3:30-4:30

Croaker Rd: 85 0.71 (1.2%) | 1 0.25 (0%) | 12 0.60 (0%)

Fenton Mill Rd: 4 0.50 (0%) | 147 0.94 (8.2%) | 12 0.43 (0%) | 3 0.75 (0%)

Croaker Rd: (9.1%) 0.55 11 | (1.1%) 0.78 93 | (7.2%) 0.78 153 | (14.3%) 0.58 14

Fenton Mill Rd: (2.5%) 0.83 40 | (0%) 0.75 15 | (0%) 0.72 26

4

Date: 8/20/2024
Peak Hour 5:00-6:00

Croaker Rd: 0 0.00 (0%) | 0 0.00 (0%) | 0 0.00 (0%)

Cedar Pt Ln: 0 0.00 (0%) | 100 0.78 (1%) | 0 0.00 (0%)

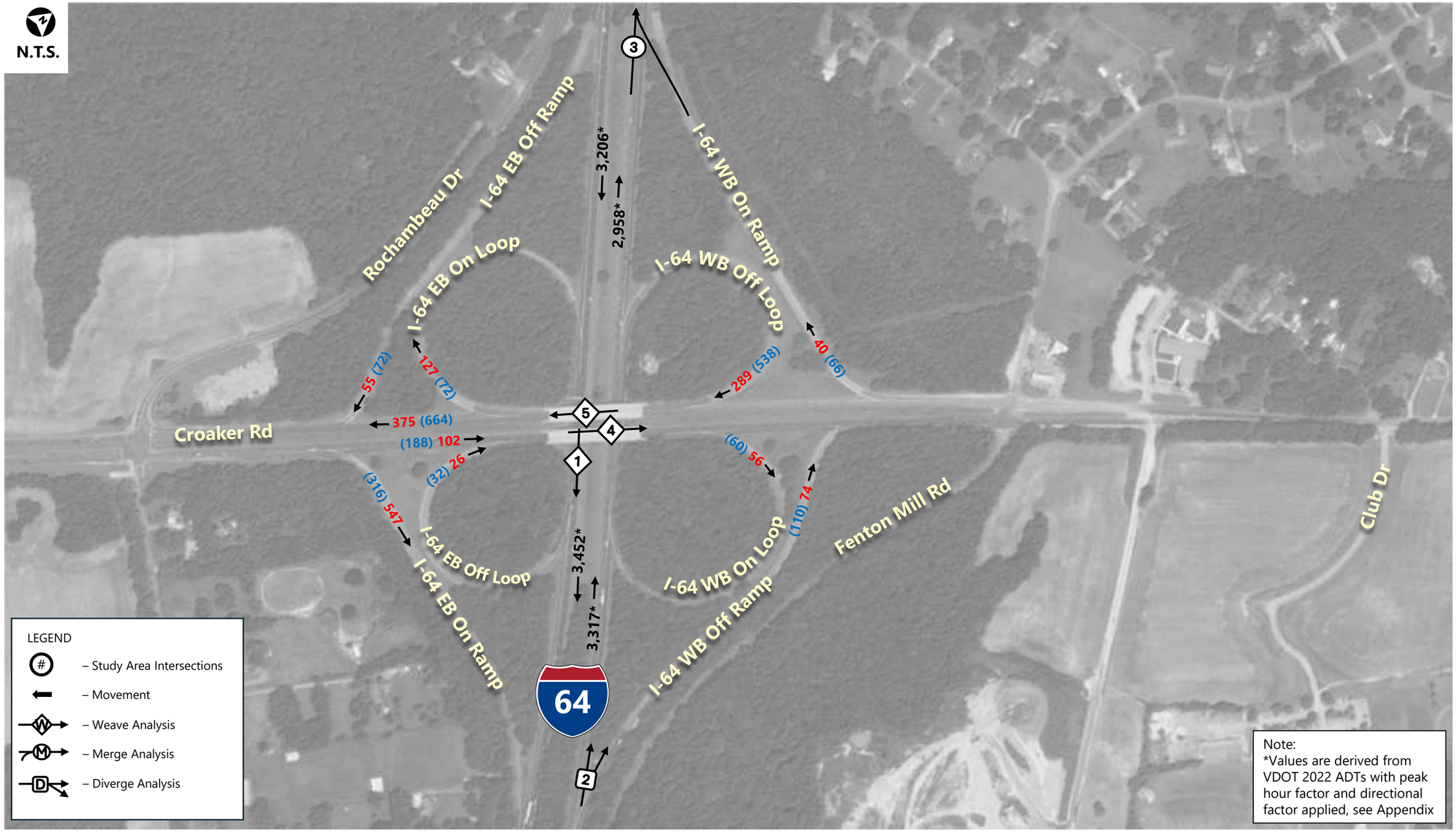
Croaker Rd: (0%) 0.25 1 | (0%) 0.25 1 | (0%) 0.92 180 | (0%) 0.50 10

Club Dr: (0%) 0.57 41 | (0%) 0.00 0 | (0%) 0.50 2

Note:
See Figure 8 for interchange volumes

Figure 8: Existing 2024 Interchange Volumes

The Bluffs of Kiskiack | James City County, VA



4

Future Conditions Without Development

4.1. Approved Developments

No approved developments were identified by either James City County or VDOT to be included in background traffic.

4.2. Background Traffic Volumes

Background traffic growth is the increase in traffic volumes due to usage increases and non-specific growth throughout an area. One method of determining reasonable growth rates for an area is to research past traffic counts for a roadway or intersection and review historical data or use knowledge of the surrounding area. Based on a review of online VDOT traffic data over a 5-year period and discussion during the scoping meeting with James City County and VDOT, a 1% annual growth rate was used to generate background traffic volumes applied to all movements within the study area. Using a 1% growth rate, results in a growth factor of 1.06 for 2030 and 1.13 for 2036.

The following figures illustrate Background traffic for the AM and PM peaks for all study area intersections and interchange points for both the build-out year, 2030, and the horizon year, 2036:

- **Figure 9** – 2030 Background: AM and PM Peak Hour Volumes (intersections)
- **Figure 10** – 2030 Background: AM and PM Peak Hour Volumes (interchange)
- **Figure 11** – 2036 Background: AM and PM Peak Hour Volumes (intersections)
- **Figure 12** – 2036 Background: AM and PM Peak Hour Volumes (interchange)

Detailed data is included in the **Appendix.**

Figure 9: 2030 Background Volumes - Intersections

The Bluffs of Kiskiack | James City County, VA



Note:
See Figure 10 for interchange volumes

Figure 10: 2030 Background Volumes - Interchange

The Bluffs of Kiskiack | James City County, VA

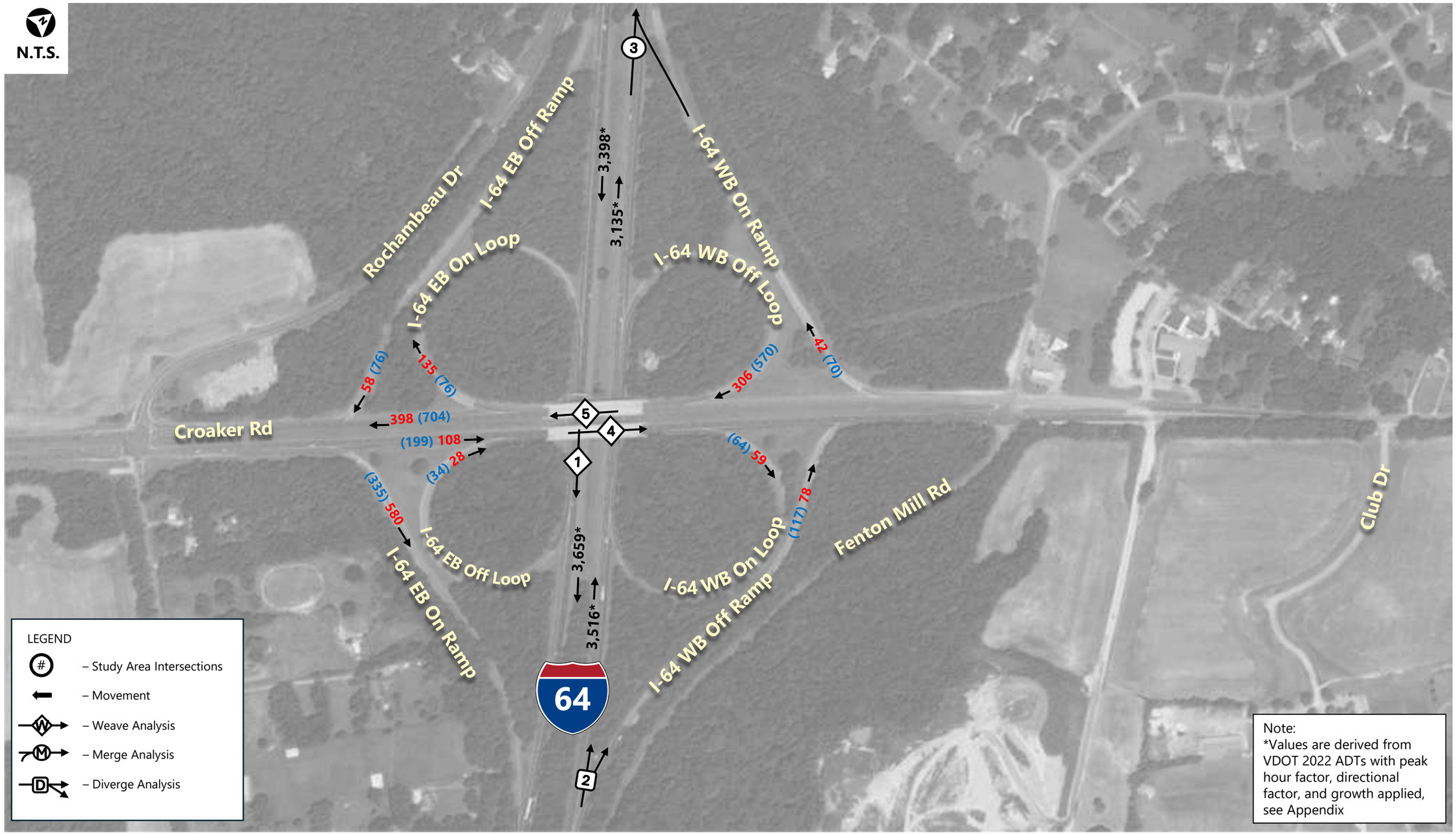


Figure 11: 2036 Background Volumes - Intersections

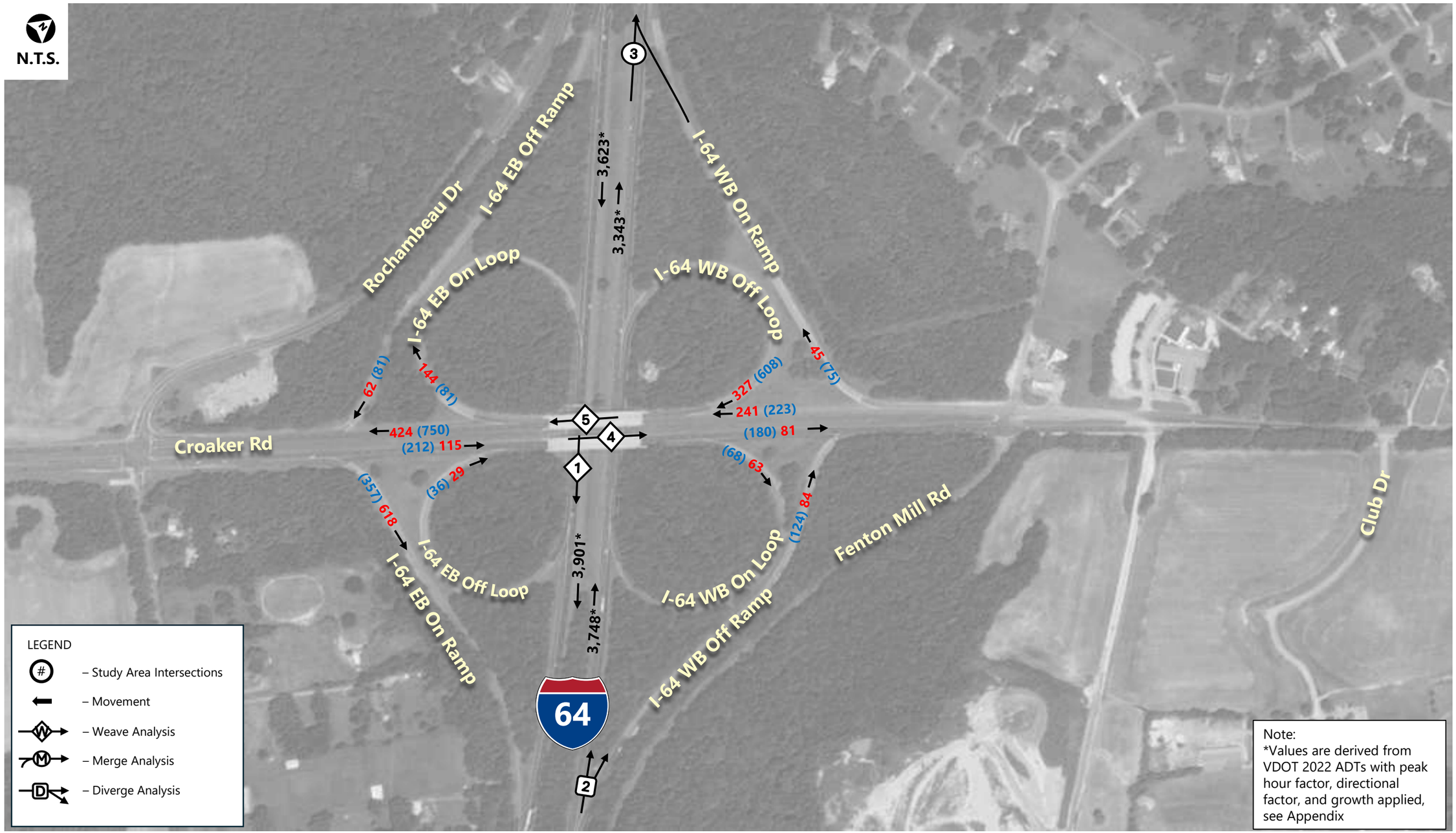
The Bluffs of Kiskiack | James City County, VA



Note:
See Figure 12 for interchange volumes

Figure 12: 2036 Background Volumes - Interchange

The Bluffs of Kiskiack | James City County, VA



5

Proposed Development

Traffic generated by the proposed development was determined using trip generation methodology contained in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition, 2022. Based on the available date, the land use trip generation was determined using either the trip rate or equation as outlined in the VDOT Administrative Guidelines for the Traffic Impact Analysis Regulations. For those land use types without specific data, alternative trip generation assumptions were discussed and agreed upon as outline below.

5.1. Trip Generation

Given the significant size of the development, the site was divided into five internal "zones," each with a unique land use type. Each zone evaluated various land use scenarios and selected an option that generated higher traffic volumes comparatively to ensure conservative estimates. Therefore, as each zone develops, the traffic impacts evaluated in this TIA have created a buffer to allow for a wide range of alternatives to occur within the parameters of this study. Each zone and land use type were discussed in detailed and agreed upon during the scoping meeting.

Table 2 summarizes the trip generation for the proposed development to include the 5 major land use types to include residential, recreational, commercial, continued care facilities and office.

Table 2 Proposed Trip Generation

Zone	Land Use	Quantity		Daily		AM Peak		PM Peak	
				In	Out	In	Out	In	Out
1	Residential Total	320	Units	1350	1349	48	141	148	93
2	Recreation Total	22.2	Acre	500	500	10	10	50	50
3	Retail/Commercial Total	34	KSF	1,385	1,384	114	89	151	117
4	CCRC Total	1132	KSF	2,881	2,881	282	155	223	308
Northern Entrance Total				6,116	6,114	454	395	572	568
5	Fenton Mill Office Total	32	KSF	684	683	71	25	41	96

Table 2 indicates that the proposed development has the potential to generate approximately 13,597 total trips per day with 945 and 1,277 peak hour trips during the AM and PM peaks, respectively.

Given the unique nature of the proposed recreational uses, these trip generations were discussed and agreed upon by VDOT to provide a conservative estimate. Additionally, the proposed trip generation for land use code 575 (Fire/EMS/Police) is only available for the PM peak hour. To be conservative, the same trip generation was used for the AM Peak period and the daily volumes were estimated using a K factor of 0.10.

Detailed land use codes for each zone are included in the **Appendix** as part of the Scoping Documents.

5.2. Trip Distribution and Assignment

The directional distribution and assignment for trips generated by the proposed development are based on a review of previous studies performed within the study area, existing intersection and roadway volumes, and an understanding of travel patterns. All distribution assumptions were agreed upon by James City County and VDOT during the scoping meeting held on June 26th. The proposed development trips are assumed to access the site with the following trip distribution as illustrated in **Figure 13:**

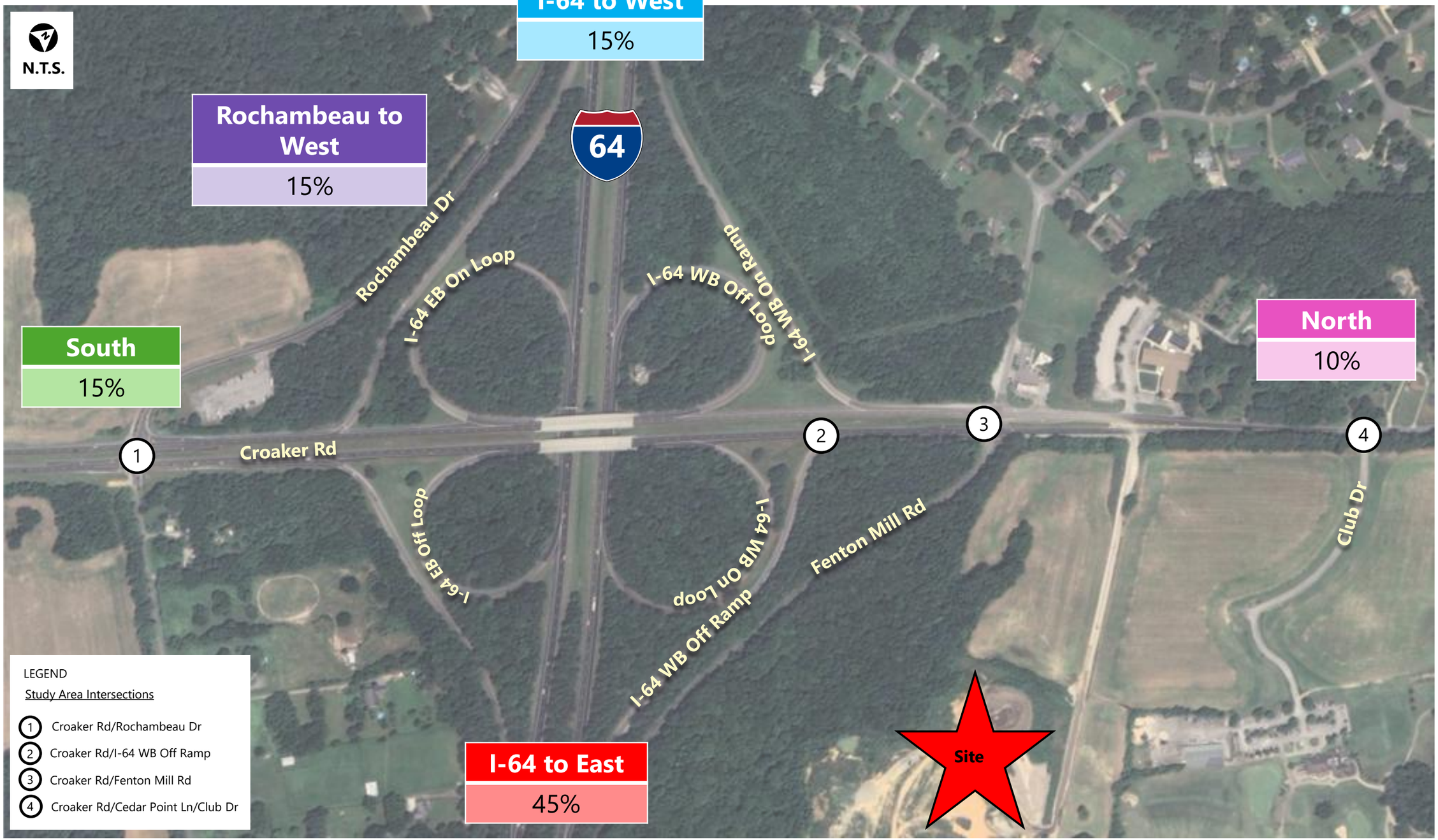
- 10% to/from the north via Croaker Road
- 90% to/from the south Via Croaker Road
    - 45% to/from the east via I-64 (toward Newport News)
    - 15% to/from the west via I-64 (toward Richmond)
    - 15% to/from the west via Rochambeau Drive
    - 15% to/From the south on Croaker Road

The trip distribution percentages for the primary entrance along Club Drive were applied to the proposed trip generation for zones 1 through 4 outlined in **Table 2**. The same general distribution percentages were applied for the secondary entrance at Fenton Mill Road for the proposed trip generation for zone 5.

Detailed distributions and assignments for the two site entrances are located in the **Appendix** with the total assignment illustrated in **Figure 14** for the AM and PM peak periods.

Figure 13: External Distribution

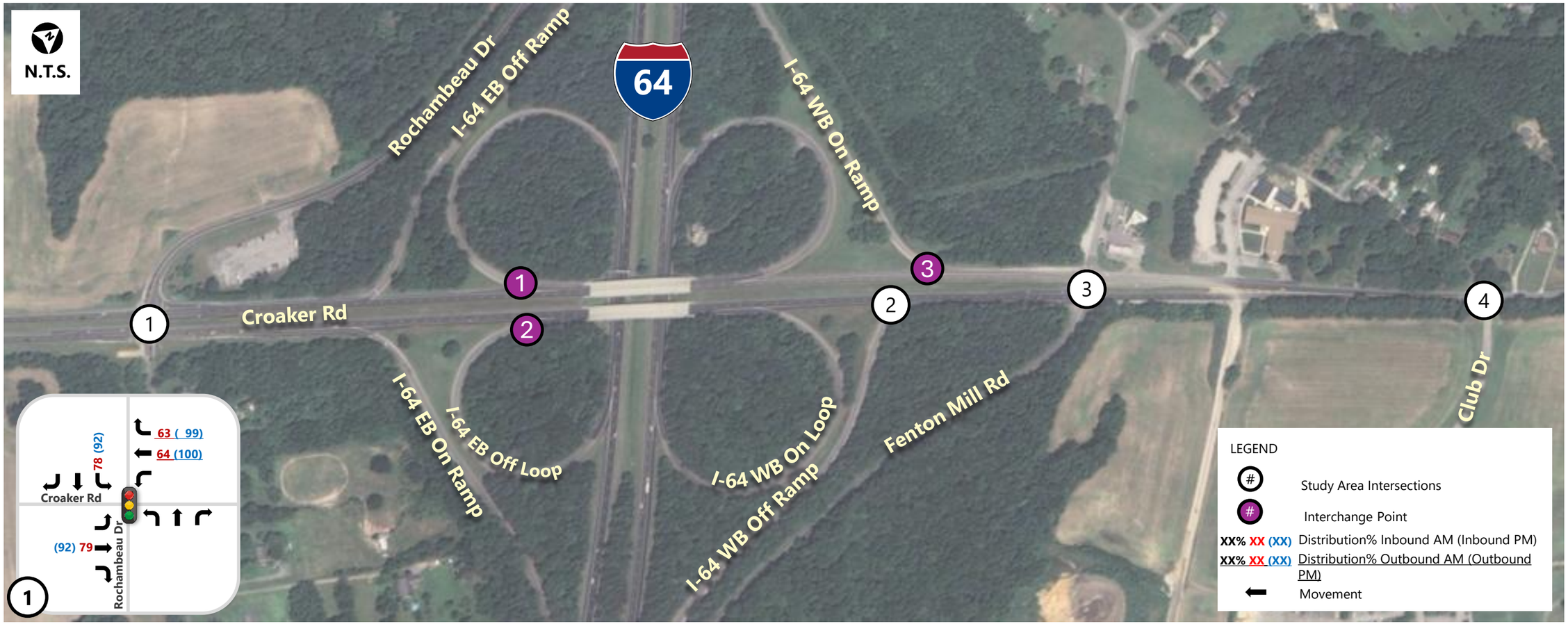
The Bluffs of Kiskiack | James City County, VA

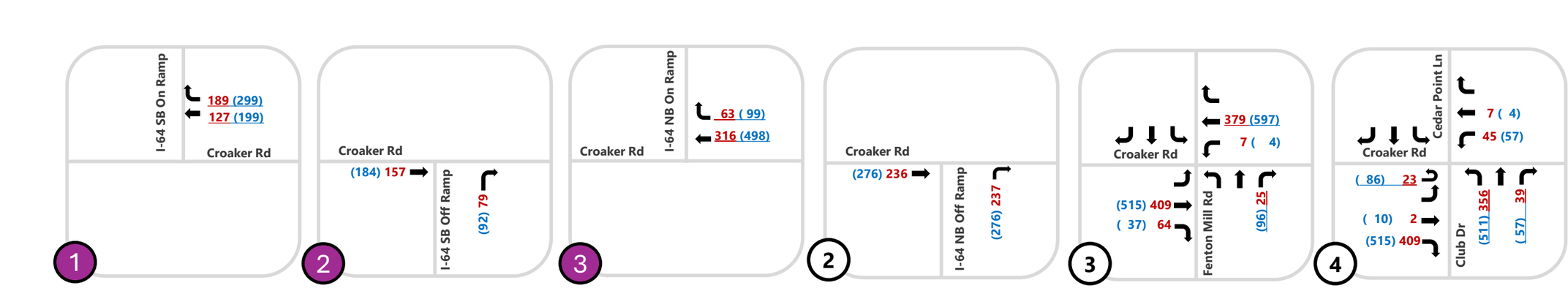


10/29/24

Figure 14: Trip Assignment: Total

The Bluffs of Kiskiack | James City County, VA





6

Future Conditions with Development

6.1. Future Traffic Volumes

Total future traffic volumes represent the addition of traffic generated by the proposed Bluffs of Kiskiack development in addition to the Background traffic volumes. These resulting volumes are also referred to as Build volumes. The 2030 Build volumes are as follows:

- **Figure 15** – 2030 Build Volumes: AM Peak (intersections)
- **Figure 16 –** 2030 Build Volumes: AM Peak (interchange)
- **Figure 17 –** 2030 Build Volumes: PM Peak (intersections)
- **Figure 18 –** 2030 Build Volumes: PM Peak (interchange)

Future Build conditions for 2036 were generated similarly to the 2030 volumes by adding site generated traffic to the 2036 background volumes, and are illustrated as follows:

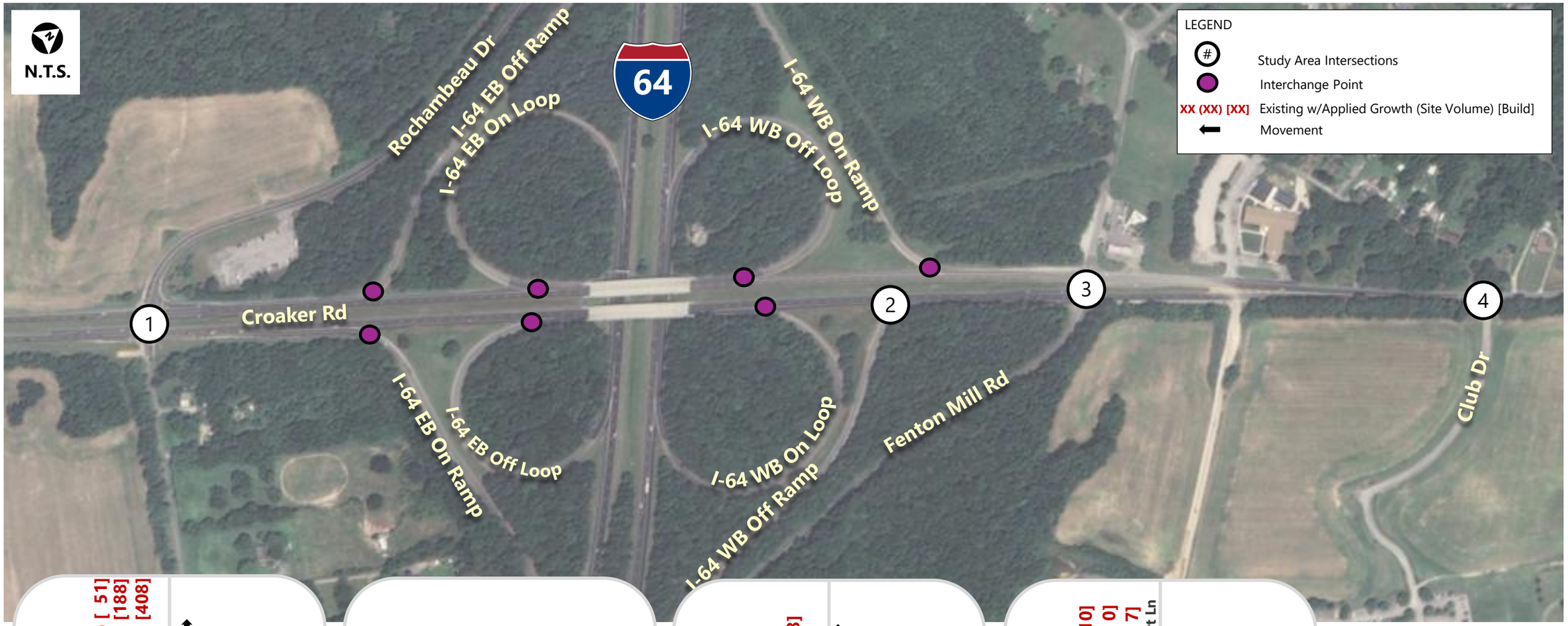
- **Figure 19** – 2036 Build Volumes: AM Peak (intersections)
- **Figure 20 –** 2036 Build Volumes: AM Peak (interchange)
- **Figure 21** – 2036 Build Volumes: PM Peak (intersections)
- **Figure 22 –** 2036 Build Volumes: PM Peak (interchange)

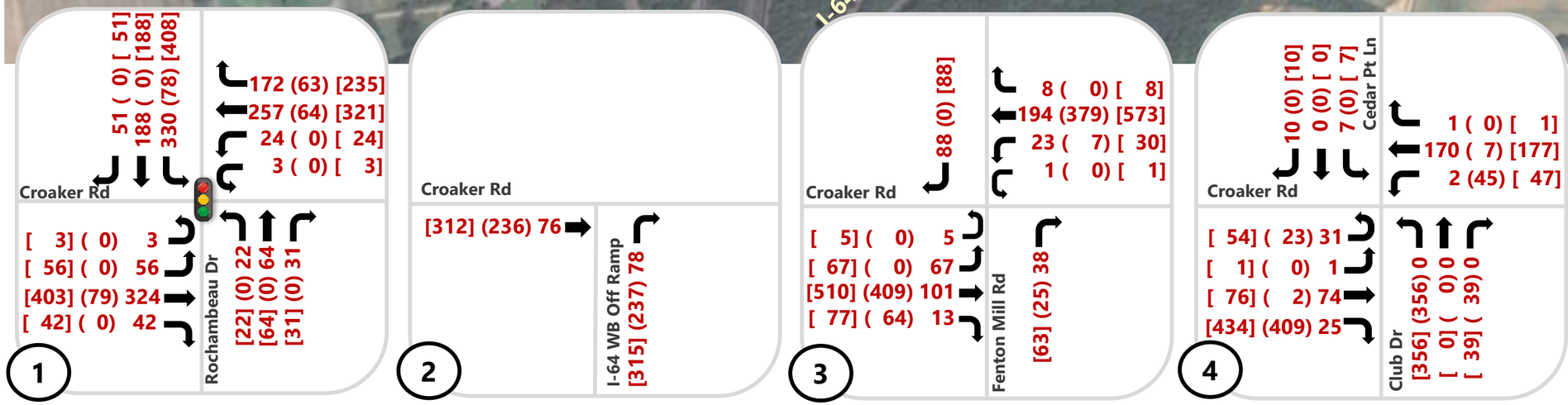
In the Build scenario, the intersection of Croaker Road with Fenton Mill is assumed to allow right turns only out of Fenton Mill Road at both the east and west legs of the intersection.

This recommendation is based on an evaluation of existing and future conditions and is outlined in detailed in **section 6.2.1**. With the proposed modification, the existing intersection traffic at movements that are restricted in the Build scenarios have been relocated to the allowed movements to the adjacent roadway network. This relocation of existing traffic and subsequent heavy vehicle percentages is illustrated in the **Appendix.**

Figure 15: 2030 Build Volumes: AM Peak - Intersections

The Bluffs of Kiskiack | James City County, VA





Note:
See Figure 15 for interchange volumes

Figure 16: 2030 Build Volumes: AM Peak - Interchange

The Bluffs of Kiskiack | James City County, VA

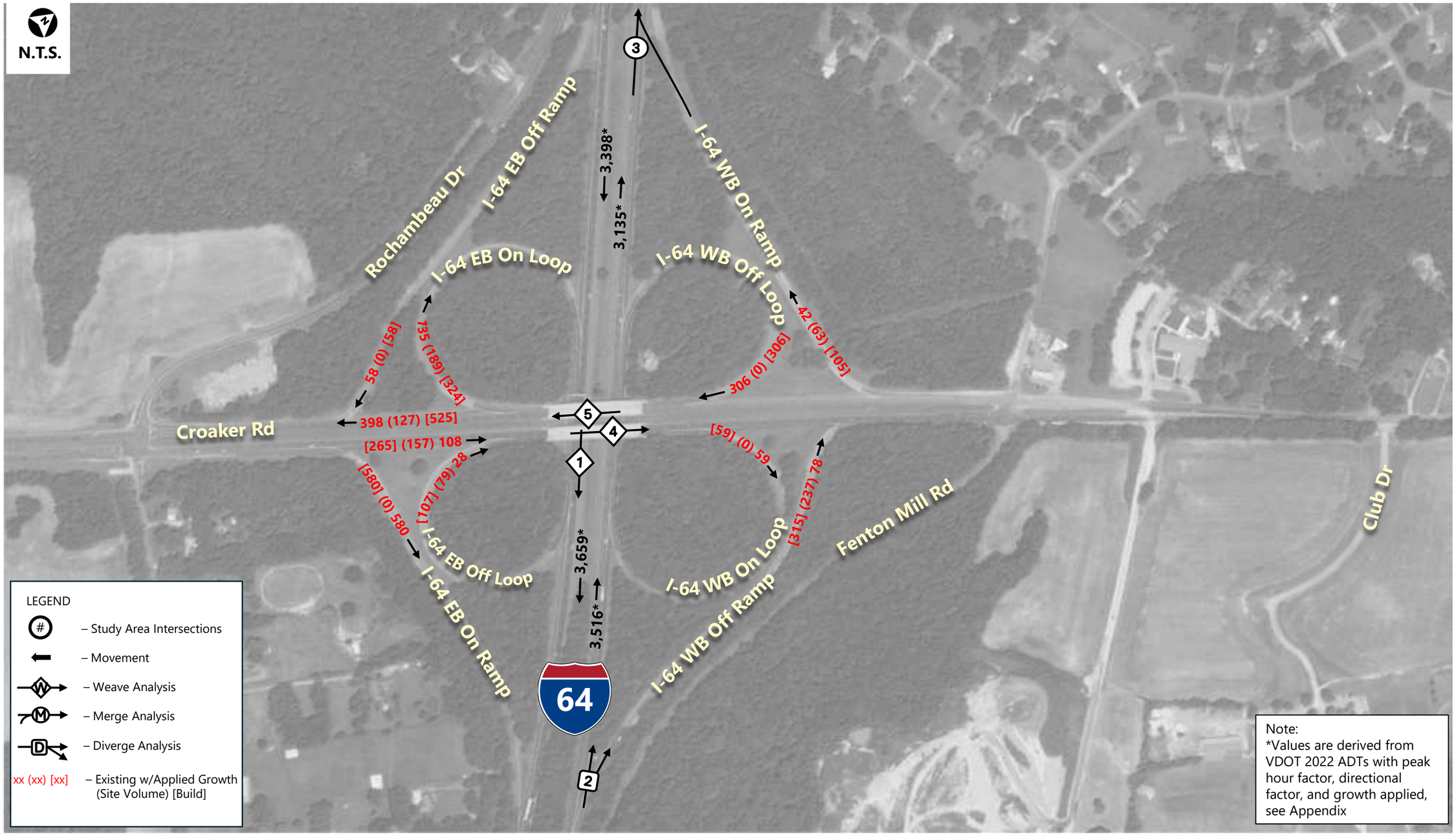
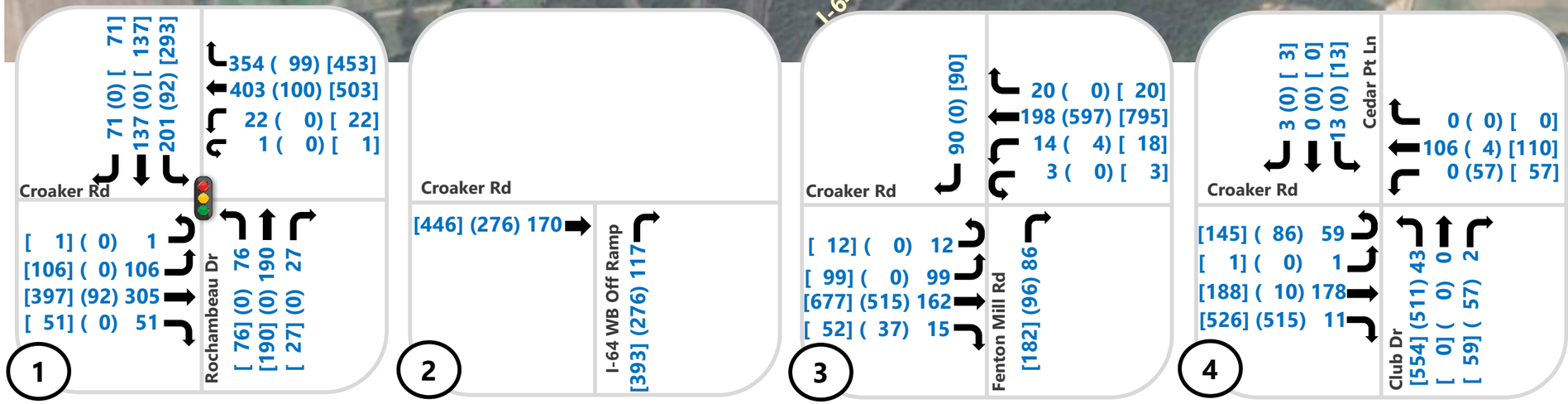


Figure 17: 2030 Build Volumes: PM Peak - Intersections

The Bluffs of Kiskiack | James City County, VA





Note:
See Figure 18 for interchange volumes

Figure 18: 2030 Build Volumes: PM Peak - Interchange

The Bluffs of Kiskiack | James City County, VA

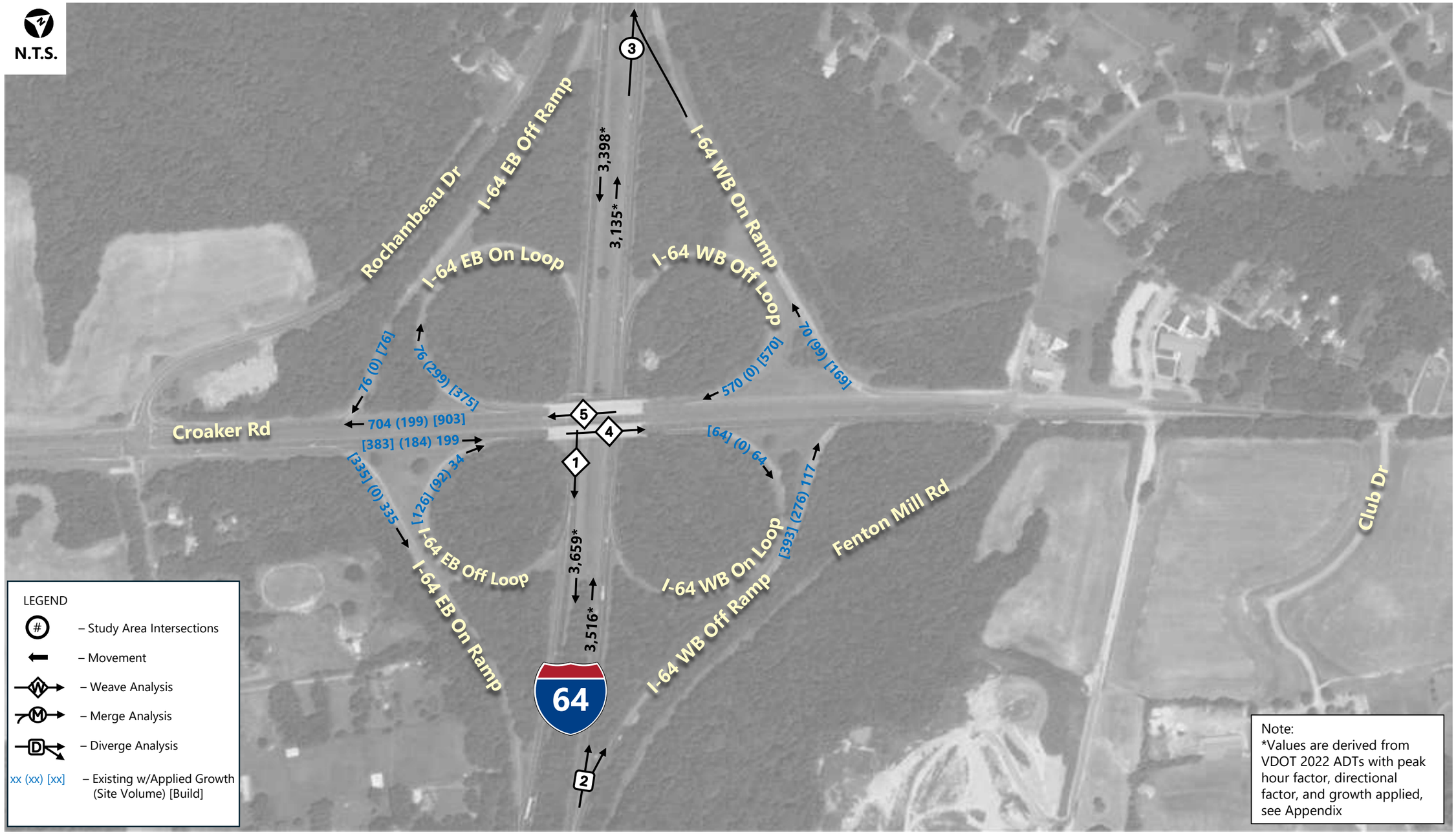
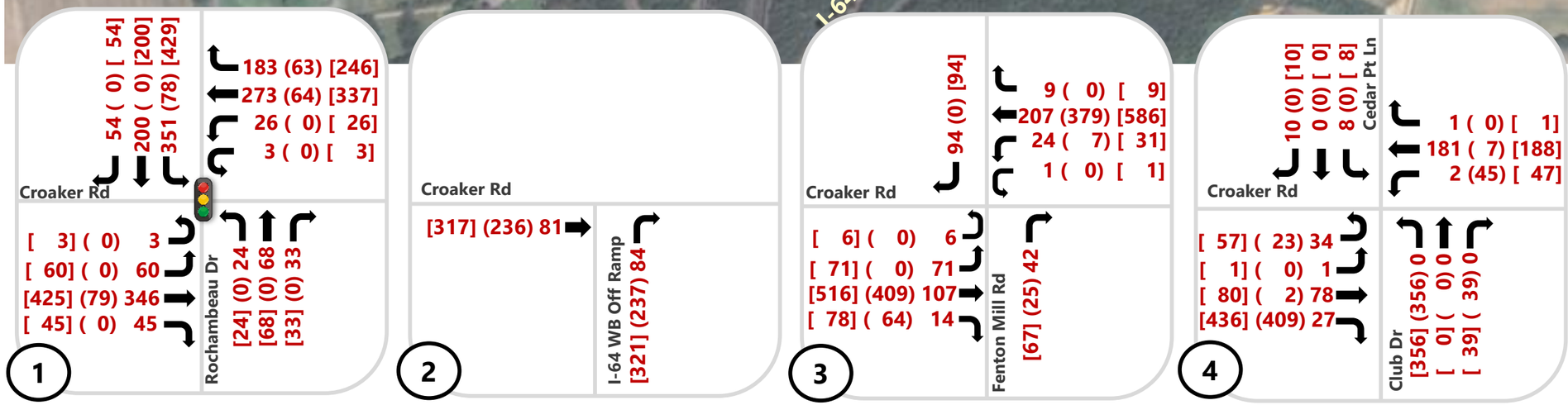


Figure 19: 2036 Build Volumes: AM Peak - Intersections

The Bluffs of Kiskiack | James City County, VA





Note:
See Figure 20 for interchange volumes

Figure 20: 2036 Build Volumes: AM Peak - Interchange

The Bluffs of Kiskiack | James City County, VA

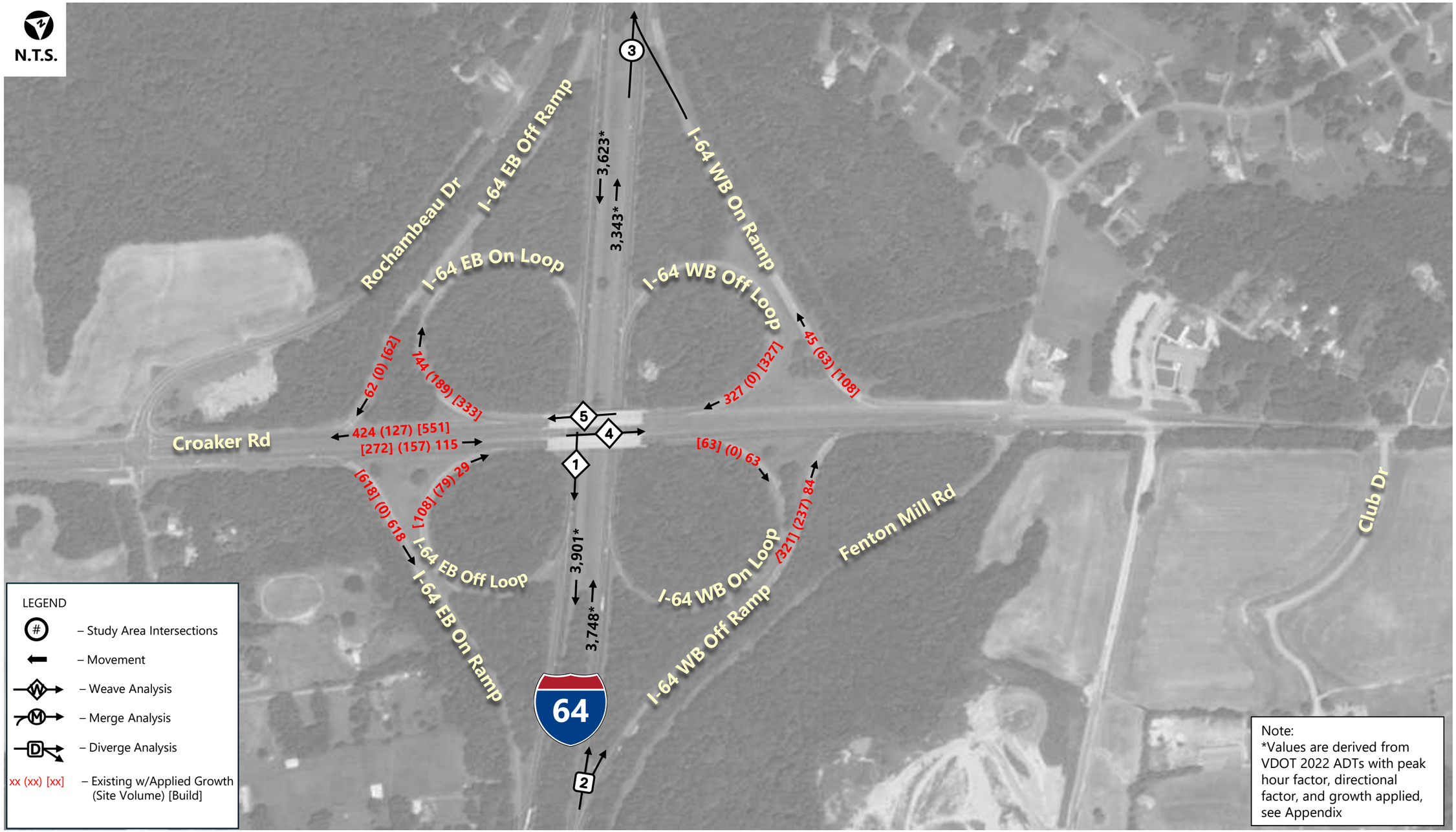
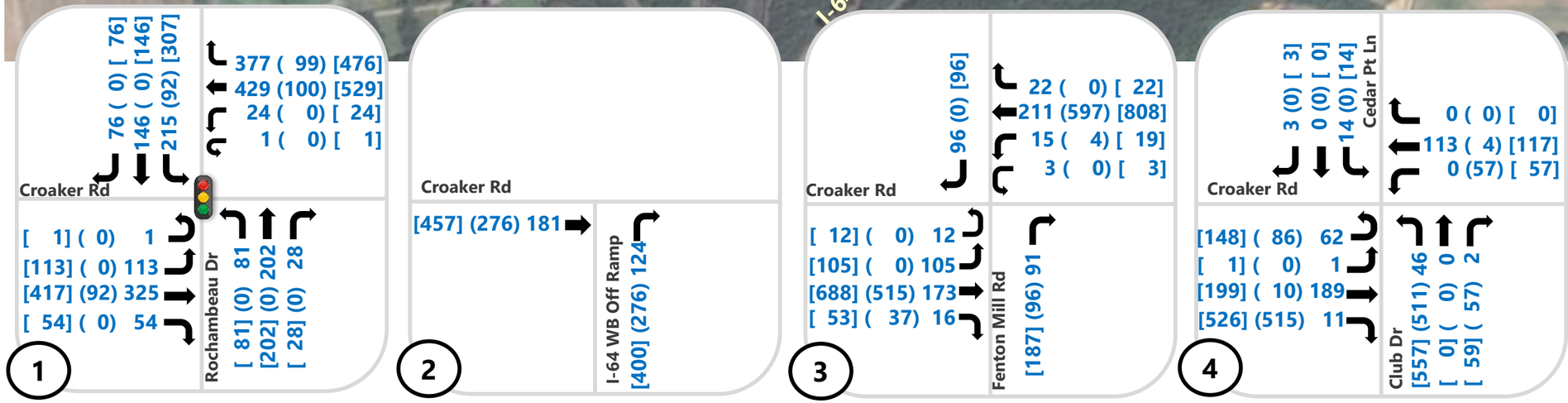


Figure 21: 2036 Build Volumes: PM Peak - Intersections

The Bluffs of Kiskiack | James City County, VA

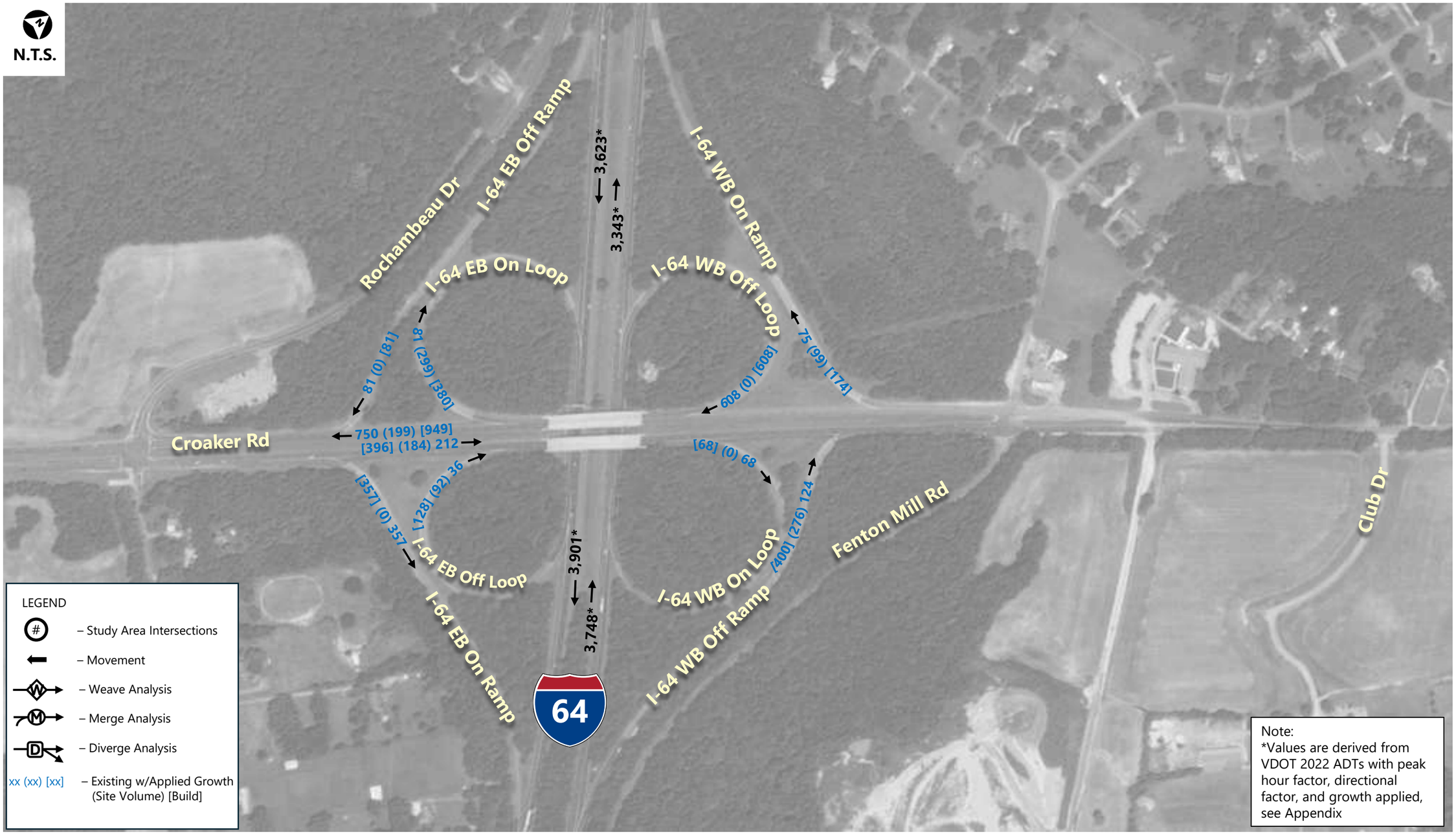




Note:
See Figure 22 for interchange volumes

Figure 22: 2036 Build Volumes: PM Peak - Interchange

The Bluffs of Kiskiack | James City County, VA



6.2. Capacity and Level of Service Analysis at Critical Points

Capacity analyses for the study area intersections in the AM and PM peak hours were performed for no build and build conditions. Analyses were completed to determine the operating characteristics of the study area intersections and roadways using *Synchro Professional 11.0 with SimTraffic,* which uses methodologies contained in the *2000 Highway Capacity Manual (HCM).* Additionally, *SIDRA 9* was utilized to analyze operating characteristics of the proposed roundabout at the intersection of Croaker Road with Club Drive.

To compare operations among various scenarios, detailed analyses are illustrated in **Tables 3 – 8** to provide a side-by-side comparison for the following five conditions:

- Existing 2024 Conditions
- 2030 No Build Conditions
  - (1% annual growth for 6 years)
- 2030 Build Conditions
  - (2030 No Build plus generated site traffic)
- 2036 No Build Conditions
  - (1% annual growth for 12 years)
- 2036 Build Conditions
  - (2036 No Build plus generated site traffic)

6.2.1 Croaker Road / Rochambeau Drive Intersection

This signalized intersection currently provides the following laneage:

- Croaker Road (northbound) – one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.
- Croaker Road (southbound) – one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.
- Rochambeau Drive (eastbound) – one shared left-through-right-turn lane.
- Rochambeau Drive (westbound) – one shared left-through-right-turn lane.

Table 3 illustrates the delay and LOS results for the Croaker Road and Rochambeau Drive intersection for the scenarios listed above. Detailed analysis is included in the **Appendix**.

Table 3 Croaker Road / Rochambeau Drive Signalized Intersection Level of Service

Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach [sec/veh] (Level of Service)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
Existing	79.5 (E)	157.8 (F)			55.0 (E)			60.2 (E)	30.9 (C)	27.3 (C)	59.1 (E)	31.2 (C)	29.5 (C)
								34.6 (C)			32.3 (C)		
2030 No Build	89.3 (F)	182.7 (F)			55.4 (E)			60.7 (E)	31.1 (C)	27.4 (C)	59.2 (E)	31.4 (C)	26.6 (C)
								34.9 (C)			32.4 (C)		
2030 Build	61.8 (E)	84.6 (F)			66.2 (E)			69.2 (E)	46.9 (D)	39.1 (D)	69.3 (E)	47.7 (D)	43.1 (D)
								48.9 (D)			46.8 (D)		
2036 No Build	104.0 (F)	222.0 (F)			56.0 (E)			62.9 (E)	31.8 (C)	27.8 (C)	60.2 (E)	32.1 (C)	30.2 (C)
								35.7 (D)			33.1 (C)		
2036 Build	69.9 (E)	105.7 (F)			68.2 (E)			70.5 (E)	48.1 (D)	39.5 (D)	69.8 (E)	48.7 (D)	43.7 (D)
								50.0 (D)			47.7 (D)		
PM Peak Hour													
Existing	57.7 (E)	87.5 (F)			72.9 (E)			93.5 (F)	36.4 (D)	32.8 (C)	68.0 (E)	41.4 (D)	39.1 (D)
								49.3 (D)			41.2 (D)		
2030 No Build	61.4 (E)	102.5 (F)			73.5 (E)			98.0 (F)	36.8 (D)	33.1 (C)	68.5 (E)	42.1 (D)	39.7 (D)
								50.5 (D)			41.8 (D)		
2030 Build	66.7 (E)	97.6 (F)			72.7 (E)			67.9 (E)	45.7 (D)	38.8 (D)	70.1 (E)	60.1 (E)	57.8 (E)
								49.3 (D)			59.3 (E)		
2036 No Build	68.8 (E)	130.4 (F)			76.6 (E)			107.9 (F)	37.9 (D)	33.7 (C)	69.5 (E)	43.5 (D)	40.7 (D)
								53.5 (D)			43.0 (D)		
2036 Build	75.0 (E)	123.7 (F)			74.5 (E)			69.8 (E)	47.2 (D)	39.7 (D)	71.4 (E)	64.9 (E)	63.5 (E)
								50.9 (D)			64.4 (E)		

This signalized intersection currently operates at a LOS of E in the AM and PM peak periods with the largest delay experienced at the eastbound and westbound approaches. Optimized timings to include changes to green time only were modeled in build scenarios to balance overall delay, while still prioritizing the mainline.

This intersection is nearing capacity during peak commuting hours, therefore, with the minor increase in site traffic (17% of total traffic in the AM and 18% in the PM), it results in an overall LOS E and an eastbound approach LOS F in the build and horizon years.

To mitigate the impacts associated with the site traffic as well as enhance the overall intersection operations, it is recommended that the eastbound approach be widened to include the following:

- Rochambeau Drive (eastbound) – one exclusive left-turn lane and one shared through-right-turn lane.

With these improvements, this intersection will operate at an improved LOS in both the AM and PM peaks in the build and horizon years which is illustrated in Table 4.

Table 4 Croaker Road / Rochambeau Drive Signalized Intersection Level of Service

Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach [sec/veh] (Level of Service)									
		Eastbound			Westbound	Northbound			Southbound		
		LT	TH	RT	LT-TH-RT	LT	TH	RT	LT	TH	RT
AM Peak Hour											
2030 Build	45.8 (D)	55.9 (E)	36.7 (D)		54.3 (D)	64.4 (E)	42.1 (D)	35.2 (D)	65.2 (E)	42.8 (D)	39.2 (D)
		48.8 (D)				44.1 (D)			42.3 (D)		
2036 Build	47.5 (D)	58.3 (E)	36.7 (D)		57.2 (E)	66.8 (E)	43.8 (D)	36.2 (D)	66.6 (E)	44.4 (D)	40.2 (D)
		50.3 (D)				45.8 (D)			43.8 (D)		
PM Peak Hour											
2030 Build	55.1 (E)	73.6 (E)	53.9 (D)		57.3 (E)	69.2 (E)	44.1 (D)	37.7 (D)	71.5 (E)	56.6 (E)	49.0 (D)
		65.1 (E)				48.4 (D)			53.4 (D)		
2036 Build	57.5 (E)	76.1 (E)	54.9 (D)		63.3 (E)	70.8 (E)	45.2 (D)	38.3 (D)	72.4 (E)	59.4 (E)	50.3 (D)
		66.9 (E)				49.5 (D)			55.4 (E)		

With improvements the intersection operates at a LOS E with up to 58 seconds of delay in the PM peak period in both the build and horizon build years, which is just slightly above the LOS D threshold of 55.0 seconds/delay.

The additional eastbound left-turn lane provides the ability to reallocate green time to other movements and results in a delay reduced by more than 50% in the 2036 AM peak period (104.0 to 47.5 seconds/delay), and over 15% in the 2036 PM peak period (68.8 to 58.0 seconds/delay).

Despite the implementation of proposed improvements, this intersection still experiences an overall delay up to 58 seconds, however, the implementation of proposed improvements reduces overall delay compared to no build scenarios and provides acceptable LOS during peak periods.

6.2.2 Croaker Road / I-64 WB Off Ramp

This unsignalized intersection currently provides the following laneage.

- Croaker Road (northbound) – Two through Lanes
- I-64 WB Off Ramp (westbound) - one exclusive right-turn lane

Table 5 illustrates the delay and LOS results for the Croaker Road and I-64 WB Off Ramp intersection for the scenarios listed above. Detailed analysis is included in the **Appendix**.

Table 5 Croaker Road / I-64 WB Off Ramp Unsignalized Intersection Level of Service

Scenario	Delay per Lane Group by Approach [sec/veh] (Level of Service)	
	Westbound	Northbound
	RT	TH
AM Peak Hour		
Existing	8.8 (A)	-
2030 No Build	8.9 (A)	-
2030 Build	12.5 (B)	-
2036 No Build	8.9 (A)	-
2036 Build	12.7 (B)	-
PM Peak Hour		
Existing	9.4 (A)	-
2030 No Build	9.4 (A)	-
2030 Build	16.8 (C)	-
2036 No Build	9.5 (A)	-
2036 Build	17.3 (C)	-
- Indicates Free Movement		

This unsignalized intersection operates at an overall LOS A in both the AM and PM peak periods in all scenarios. Trips associated with the Bluffs of Kiskiack development have minimal impacts to delay at this intersection.

6.2.3 Croaker Road / Fenton Mill Road

This unsignalized intersection currently provides the following laneage.

- Croaker Road (northbound) – one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.
- Croaker Road (southbound) – one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.
- Fenton Mill Road (eastbound) – one shared left-turn-through-right-turn lane.
- Fenton Mill Road (westbound) - one shared left-turn-through-right-turn lane.

Table 6 illustrates the delay and LOS results for the Croaker Road and Fenton Mill Road intersection for the scenarios listed above. Detailed analysis is included in the **Appendix**.

Table 6 Croaker Road / Fenton Mill Road Unsignalized Intersection Level of Service

Scenario	Delay per Lane Group by Approach [sec/veh] (Level of Service)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour												
Existing	10.3 (B)			14.6 (B)			7.8 (A)	-	-	7.5 (A)	-	-
2030 No Build	10.4 (B)			14.9 (B)			7.8 (A)	-	-	7.5 (A)	-	-
2030 Build	18.2 (C)			90.0 (F)			9.0 (A)	-	-	9.0 (A)	-	-
2036 No Build	10.6 (B)			15.7 (C)			7.8 (A)	-	-	7.5 (A)	-	-
2036 Build	19.0 (C)			110.5 (F)			9.1 (A)	-	-	9.0 (A)	-	-
PM Peak Hour												
Existing	10.2 (B)			16.0 (C)			7.7 (A)	-	-	7.6 (A)	-	-
2030 No Build	10.3 (B)			16.5 (C)			7.8 (A)	-	-	7.6 (A)	-	-
2030 Build	24.6 (C)			845.9 (F)			9.6 (A)	-	-	9.5 (A)	-	-
2036 No Build	10.5 (B)			17.8 (C)			7.8 (A)	-	-	7.7 (A)	-	-
2036 Build	27.7 (D)			1,002.9 (F)			9.7 (A)	-	-	9.6 (A)	-	-
- Indicated Free Movement												

This intersection connects the secondary site access to the mainline, Croaker Road. This unsignalized intersection operates at an overall LOS A in existing and background scenarios, however an

alternative intersection is recommended to improve safety at this location and will maintain full access within the corridor.

As part of the existing conditions analysis, a crash evaluation was performed that identified safety concerns at this location. This is discussed in greater detail in **Section 6.5.** The operations at this intersection were evaluated in conjunction with the Club Drive access to consider alternative intersection configurations, which is discussed as part of the Club Drive intersection.

In order to mitigate the existing crash pattern and impacts associated with the site traffic it is recommended that allowed movements at the eastbound and westbound approaches include the following:

- Fenton Mill Road (eastbound) – one exclusive right-turn lane
- Fenton Mill Road (westbound) – one exclusive right-turn lane

Additionally, as site traffic is assigned to the northbound right-turn movement, it is recommended that the existing substandard northbound right-turn lane be extended to provide 200' storage and 200' taper.

With these improvements, this intersection will operate at an acceptable LOS in both the AM and PM peaks in the build and horizon years which is illustrated in Table 7.

Table 7 Croaker Road / Fenton Mill Road Unsignalized Intersection Level of Service

Scenario	Delay per Lane Group by Approach [sec/veh] (Level of Service)							
	Eastbound	Westbound	Northbound			Southbound		
	RT	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour								
2030 Build	11.4 (B)	10.9 (B)	9.2 (A)	-	-	9.1 (A)	-	-
2036 Build	11.6 (B)	11.0 (B)	9.3 (A)	-	-	9.1 (A)	-	-
PM Peak Hour								
2030 Build	12.5 (B)	13.8 (B)	10.4 (B)	-	-	9.5 (A)	-	-
2036 Build	12.7 (B)	13.5 (B)	10.6 (B)	-	-	9.5 (A)	-	-

Additionally, right and left-turn lane warrants were evaluated at the entrance to the proposed commercial portion of the site fronting Fenton Mill Road. Neither a right or left-turn lane is warranted and detailed warrant analyses are located in the **Appendix**.

6.2.4 Croaker Road / Club Drive / Cedar Point Lane

This unsignalized intersection currently provides the following laneage.

- Croaker Road (northbound) – one shared left-through-right-turn lane.
- Croaker Road (southbound) – one shared left-through-right-turn lane.
- Club Drive (eastbound) - one shared left-through-right-turn lane.
- Cedar Point Lane (westbound) – one shared left-through-right-turn lane.

With the development, side street delay at the Club Drive approach will significantly increase with volumes projected at over 500 during the peak periods. As part of the study, a Signal Justification Report (SJR) was performed and identified a roundabout as the preferred solution with full build out of the development. The detailed analysis is included in the **Appendix.**

Table 8 illustrates the delay and LOS results for the Coaker Road / Club Drive intersection for existing and Background Scenarios. Detailed analysis is included in the **Appendix**.

In the Build scenarios, the intersection of Croaker Road with Club Drive is modeled to operate as a roundabout. **Table 9** illustrates the delay and LOS results for the Coaker Road / Club Drive proposed roundabout for the build scenarios.

Table 8 Croaker Road / Club Drive / Cedar Point Lane Unsignalized Intersection Level of Service

Scenario	Delay per Lane Group by Approach [sec/veh] (Level of Service)			
	Eastbound	Westbound	Northbound	Southbound
	LT - TH - RT	LT - TH - RT	LT - TH - RT	LT - TH - RT
AM Peak Hour				
Existing	0.0 (A)	0.0 (A)	0.1 (A)	0.1 (A)
2030 No Build	0.0 (A)	0.0 (A)	0.1 (A)	0.1 (A)
2030 Build	0.0 (A)	128.4 (F)	0.0 (A)	2.3 (A)
2036 No Build	0.0 (A)	0.0 (A)	0.1 (A)	0.1 (A)
2036 Build	0.0 (A)	142.3 (F)	0.0 (A)	2.2 (A)
PM Peak Hour				
Existing	8.8 (A)	11.1 (B)	0.0 (A)	0.0 (A)
2030 No Build	8.9 (A)	11.3 (B)	0.0 (A)	0.0 (A)
2030 Build	8.9 (A)	594.7 (F)	0.0 (A)	3.9 (A)
2036 No Build	8.9 (A)	11.6 (B)	0.0 (A)	0.0 (A)
2036 Build	8.9 (A)	634.8 (F)	0.0 (A)	3.8 (A)

This unsignalized intersection operates at a LOS A in existing and Background scenarios. However, delay degrades to an E and F in the AM and PM peak periods respectively in the 2036 Build scenario.

In order to mitigate the impacts associated with the site traffic as well as enhance the overall intersection operations, it is recommended to construct a roundabout at the intersection of Croaker Road and Club Drive.

With these improvements, this intersection will operate at an improved LOS in both the AM and PM peaks in the build and horizon years which is illustrated in Table 9.

Table 9 Croaker Road / Club Drive / Cedar Point Lane Roundabout Intersection Level of Service

Scenario	Control Type	Peak Period	Overall LOS	Level of Service by Approach Leg			
				Croaker Rd	Croaker Rd	Club Dr	Cedar Point Ln
				North Leg	South Leg	East Leg	West Leg
2030 Build		AM	A (3.7)	A (4.0)	A (1.9)	A (5.7)	A (6.3)
		PM	A (5.4)	A (7.0)	A (2.6)	A (8.7)	B (10.3)
2036 Build		AM	A (3.7)	A (4.0)	A (2.0)	A (5.8)	A (6.6)
		PM	A (5.6)	A (7.1)	A (2.6)	A (9.1)	B (10.6)

This roundabout analysis for the build and horizon year scenarios was performed using SIDRA 9. The proposed one-lane roundabout intersection operates at an overall LOS of A in all build and horizon year scenarios.

6.3. HCS Analysis

HCS analyses were conducted for the I-64 and Croaker Road interchange for the same five scenarios for the AM and PM peak periods outline above. Analyses were completed to determine the overall performance for the merge, weave, and diverge segments using HCS (version 7.3), which uses methodologies contained in the *2010 Highway Capacity Manual (HCM)*. **Tables 10** and **11** show the Level of Service (LOS) criteria based on the output from the HCS software relative to the density of the roadway for merge/diverge areas as well as weave segments.

Table 10 Levels of Service Criteria for Merge/Diverge Segments

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10 - 20
C	> 20 - 28
D	> 28 - 35
E	> 35
F	v/c > 1.0

Table 11 Levels of Service Criteria for Weave Segments

LOS	Density (pc/mi/ln)	
	Freeway Weaving Segments	Weaving Segments on Multi Lane Highways or C-D Roadways
A	≤ 10	≤ 10
B	> 10 - 20	> 12 - 24
C	> 20 - 28	> 24 - 32
D	> 28 - 35	> 32 - 36
E	> 35	> 36
F	v/c > 1.0	v/c > 1.0

In the project area, I-64 is referred to as an east/west facility and Croaker Road is a north/south facility. The I-64 / Croaker Road interchange geometry is a full clover interchange. Today, I64 is a 4-lane divided facility with two-lanes in both directions. By fall of 2027, I64 shall be widened to a 6-lane facility with three lanes in each direction. This improvement is modeled in the future scenarios.

Croaker Road is a four-lane divided facility under all scenarios with two-lanes in each direction.

For this analysis, volumes along Croaker Road, northbound and southbound within the interchange, were balanced with the Croaker Road and Rochambeau Drive intersection.

The results of the analysis for the five scenarios for the I-64 interchange are illustrated in **Table 12** with detailed analysis and assumptions provided in the **Appendix**.

Table 12 Croaker Road / I-64 Interchange HCS Analysis

LOS (Density pc/mi/ln)						
Point Number	Movement	2024 Existing	2030 No Build	2030 Build	2036 No Build	2036 Build
AM Peak						
Eastbound - I-64 East						
1	Weave	D (28.4)	D (30.4)	C (21.4)	D (32.8)	C (22.9)
Westbound - I-64 West						
2	Diverge	D (28.7)	D (30.6)	C (20.1)	D (32.7)	C (21.3)
3	Merge	C (23.5)	C (25.1)	B (14.6)	C (26.8)	B (15.6)
Northbound - Croaker Road						
4	Weave	A (1.2)	A (1.2)	A (3.4)	A (1.3)	A (3.5)
Southbound - Croaker Road						
5	Weave	A (5.0)	A (5.3)	A (8.8)	A (5.7)	A (9.2)
PM Peak						
Eastbound - I-64 East						
1	Weave	C (27.7)	D (29.6)	C (22.0)	D (31.9)	C (23.5)
Westbound - I-64 West						
2	Diverge	D (28.7)	D (30.6)	C (20.2)	D (32.7)	C (21.4)
3	Merge	C (23.8)	C (25.3)	B (15.1)	C (27.1)	B (16.1)
Northbound - Croaker Road						
4	Weave	A (2.0)	A (2.1)	A (4.7)	A (2.3)	A (4.9)
Southbound - Croaker Road						
5	Weave	A (7.6)	A (8.1)	B (14.0)	A (8.7)	B (14.6)

Under existing AM and PM Peak periods, there are several movements along 1-64 that operate at an LOS D. In future scenarios, the widening of I-64 is included with the addition of a third through lane, resulting in an improved LOS in build scenarios. Under the 2030 and 2036 build scenarios, all points that will support the proposed site generated traffic, have acceptable LOS with the I-64 improvements.

All segments along Croaker Road operate at a LOS B or better in all existing and future scenarios. The Bluffs of Kiskiack development will have minor impacts along Croaker Road with acceptable LOS maintained through future scenarios.

6.4. Queueing Analysis

To further evaluate the potential impacts of the Bluffs of Kiskiack development, queuing analysis was performed for the study area intersections using SimTraffic software. The maximum queue lengths in feet (ft) are generated from ten (10) simulation runs and are summarized for the 2036 AM and PM peak periods in **Figure 23** with detailed queueing reports in the **Appendix**.

Based on the queuing analysis the following improvements were identified to contain the maximum queues associated with the 2036 Build scenario:

Croaker Road and Rochambeau Drive:

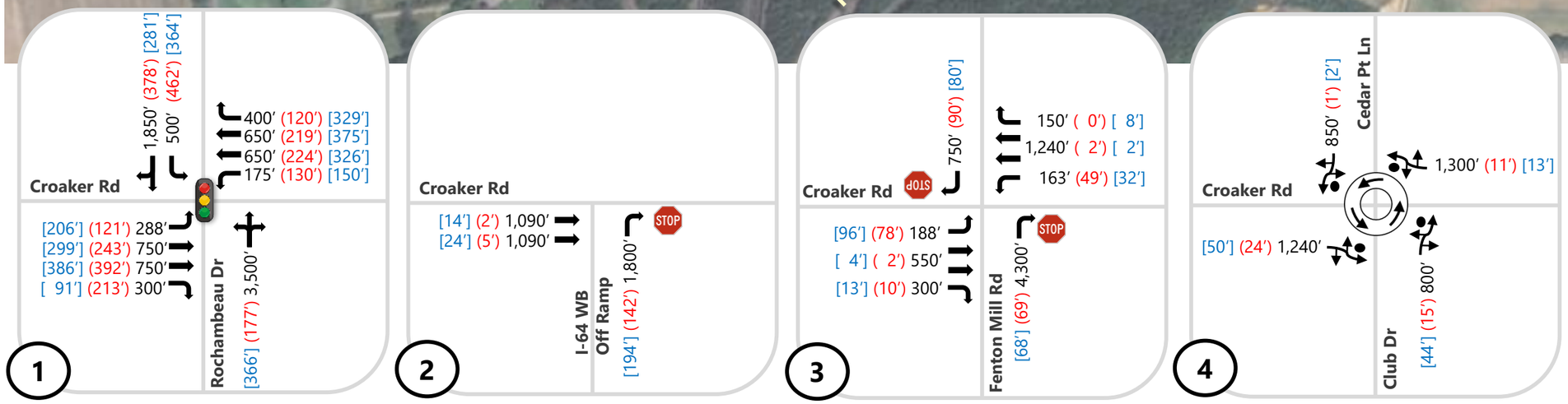
- Extend Croaker Road northbound right-turn lane to provide 200′ storage and 200′ taper
- Extend Croaker Road northbound left-turn lane to provide 250′ storage and 75′ taper
- Extend Croaker Road southbound right-turn lane to provide 300′ storage and 200′ taper
- Construct Rochambeau Drive eastbound left-turn lane with 400′ storage and 200′ taper

With the proposed intersection improvements, the impacts associated with the site traffic are mitigated in addition to a reduction in the significant delays associated with regional and background traffic.

Figure 23: 2036 Build Queuing

The Bluffs of Kiskiack | James City County, VA





*** Storage and taper lengths measured using online aerial imagery and rounded to nearest 25′**

6.5. Safety Analysis – Study Area Crash Data

In addition to the traditional analysis for a TIA, a crash analysis was performed along Croaker Road within the study area. The crash data was obtained from the VDOT Crash Analysis Tool, a public website, from 2019 through 2023 and is illustrated in **Figure 24**.

As shown in **Figure 24,** the Croaker Road and Fenton Mill Road unsignalized intersection has the highest number of crashes at 17 over the course of five years, including one head on collision with severe injury. Additionally, there have been 15 angle crashes indicating crashes have occurred from cars turning left from Fenton Mill onto southbound Croaker Road. Cars making this left turn must cross 4 lanes with a 45-mph speed limit. Additionally, there is limited sight-distance for vehicles merging onto Croaker Road northbound from the I-64 westbound off Ramp. These physical elements contribute to a large number of crashes at this unsignalized intersection.

The development will be served by two access points, with primary access via the proposed roundabout controlled intersection at Croaker Road and Club Drive and the second entrance at the unsignalized intersection, Croaker Road at Fenton Mill Road.

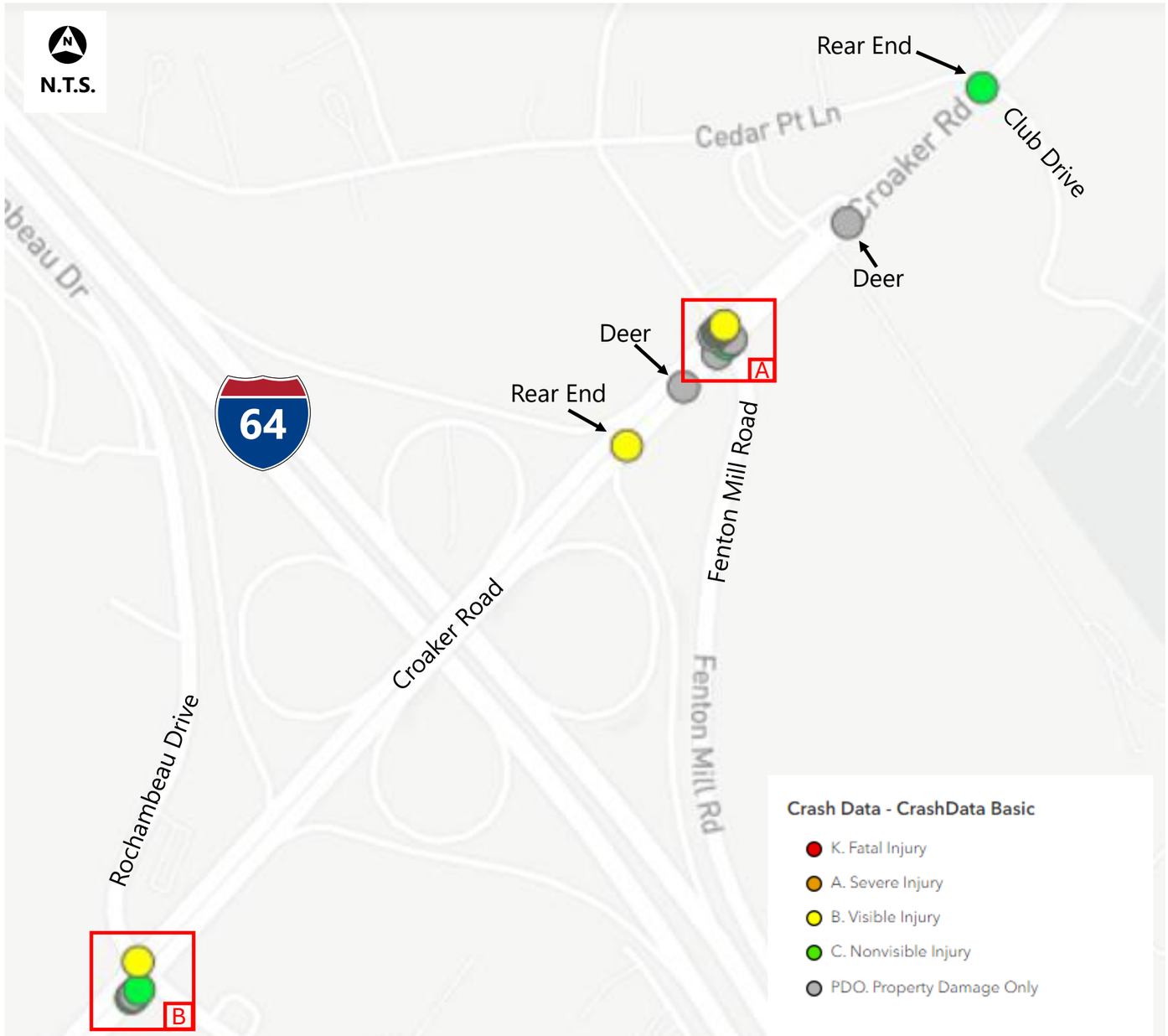
As part of the comprehensive solution to reduce safety concerns and mitigate the preexisting crash patterns at this intersection, it is recommended that the Croaker Road and Fenton Mill Road intersection be restricted to prohibit side street left turns and through movements.

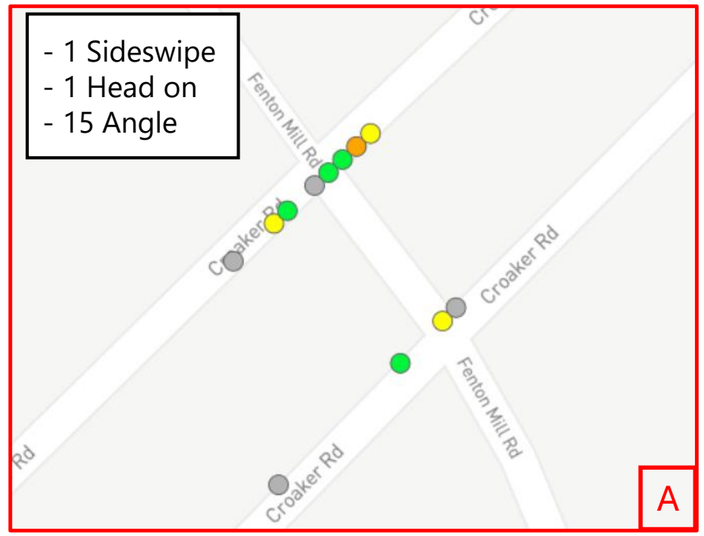
This will improve safety by eliminating the potential for angle crashes. The restricted movements can be easily accommodated with minor re-routing. The eastbound left-turn and through movements will be directed to Club Drive to make a U-turn within the roundabout to head south on Croaker Road.

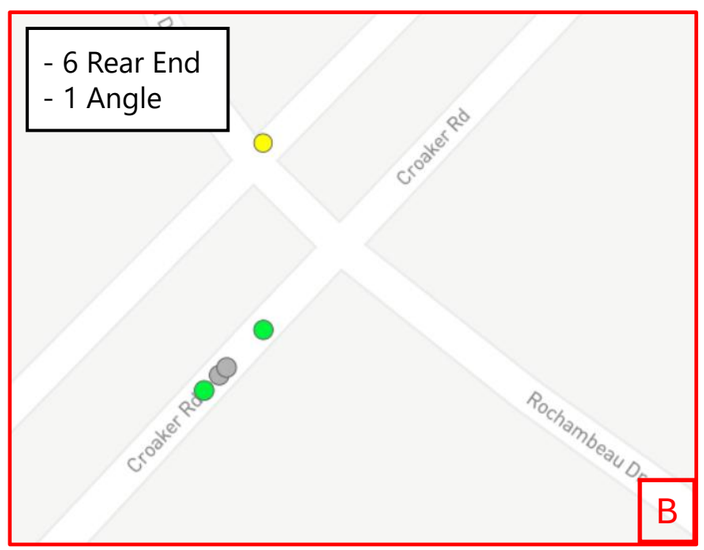
The westbound left-turn can stay on Fenton Mill and access Croaker Road via Cedar Point Lane. Through movements can access Croaker Road via Cedar Point Lane, make a right turn, and access Fenton Mill southbound via the existing right-turn lane. Detailed graphics illustrating how traffic was relocated within the study area to accommodate this recommendation are located in the **Appendix.**

Figure 24: Crash Data Analysis

The Bluffs of Kiskiack | James City County, VA







7

Conclusions and Recommendations

The proposed Bluffs of Kiskiack development is located in James City County, directly north of the Croaker Road and I-64 interchange. The 230-acre proposed mixed-use development will be comprised of a wide range of land uses to include 320 Residential units, 15.2 acres of recreational use, 34 KSF of retail / commercial use, and a continued care retirement community (CCRC) consisting of 832 units and 566 KSF of support facilities.

A scoping meeting was held with the development team, James City County, and VDOT, to discuss assumptions to include study area roadways and intersections, trip generation by land use type, travel patterns, growth rates, and analysis requirements.

Within the study area there is one traffic signal located at Croaker Road and Rochambeau Drive along with four unsignalized intersections. The main access is provided via Croaker Road on Clubhouse Drive to the Residential, Recreational, Commercial, and CCRC portions of the site. A secondary access is provided via Fenton Mill Road, which will support the medical / dental office and a fire station. There will be an additional access point to the main development on Fenton Mill Road that will be used for emergency access only. To mitigate the impacts associated with the proposed development the following improvements are recommended to occur prior to traffic being generated by the site:

Croaker Road (N/S) / Rochambeau Drive (E/W) (signalized intersection)

- Extend Croaker Road northbound right-turn lane to provide 200' storage and 200' taper
- Extend Croaker Road northbound left-turn lane to provide 250' storage and 75' taper
- Extend Croaker Road southbound right-turn lane to provide 300' storage and 200' taper
- Construct Rochambeau Drive eastbound left-turn lane with 400' storage and 200' taper
- Provide optimized signal timings.

Croaker Road (N/S) / I-64 WB Off Ramp

- Maintain existing laneage.

Croaker Road (N/S) / Club Drive (W) / Cedar Point Lane (E)

- Construct a one lane roundabout

Croaker Road (N/S) / Fenton Mill Road (E/W)

- Extend Croaker Road northbound right-turn lane to provide 200' storage and 200' taper
- Construct proposed RCUT (Restricted Crossing U-Turn) per timeline below

The Croaker Road and Fenton Mill RCUT is not required *until any one* of the following conditions occurs:

4. Certificate of occupancy (CO) of 320 residential units
5. Combination of any of land use development that generates more than 190 AM peak hour trips and 240 PM peak hour trips
6. Construction begins on any one of the parcels along Fenton Mill
    - Construct an RCUT within the median to restrict EB and WB left-turns and through traffic from Fenton Mill Road
    - Extended the median to the Liberty Church Frontage to encourage use of the roundabout and limit the potential for U-turns.

The Bluffs of Kiskiack development will increase traffic volumes within the study area. Given its proximity to I-64, a significant portion of the development is destined to and from the interchange. VDOT recently began construction on the I-64 Gap between Hampton Roads and Richmond which will significantly increase capacity. This capacity increase can accommodate the regional growth as well as the traffic generated by the proposed development, thus no additional improvements are required along I-64.

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Building Safety & Permits 757-253-6626
Neighborhood Development 757-253-6640
Planning 757-253-6685
Zoning 757-253-6671

March 23, 2026

Mr. Mark Jakobowski
Pathmark Consulting and Design, LLC
1490-5A Quarterpath Road, Unit 154
Williamsburg, Virginia 23185

RE: Z-24-0013/SUP-24-0033/MP-24-0005, The Bluffs of Kiskiack

Dear Mr. Jakobowski,

Thank you for the opportunity to review the above-referenced special use permit application. Staff has begun review of your application and offers the following comments as guidance. These comments reflect the issues or areas of concern that staff will consider in making a recommendation of approval or denial of your application to the Planning Commission and Board of Supervisors.

Planning:

1. *Fiscal Impact Analysis.* Fiscal Impact Analysis. In alignment with the 2045 Comprehensive Plan, on February 28, 2023, the Board of Supervisors adopted a resolution directing staff to use the County's Fiscal Impact Model to assess proposed developments. To that end, staff has taken the information provided by the applicant in the fiscal input form dated 3/7/2026 and used the County's model to analyze fiscal impacts.

    a. Overall fiscal impact (capital and operating costs). The fiscal model output information is below – this includes the model standard assessed values based on average data for the applicable fiscal analysis zone within the County (Attachment A).

    b. Capital Expenditures. This amount represents impacts to County facilities and services attributable to this proposed development. This amount is shown in Attachment A and is further broken out below by type of capital expenditure and by unit type (Attachment B).

    For item (a), this information, using the standard/default assessed values, will be included in the staff report. Staff has also run the model using the unit assessed values provided in the fiscal input form submitted by the applicant (Attachment C). The applicant could include this information in the CIS or other submittal document if desired.

    For item (b), the staff report will include an assessment of this application's consistency with the 2045 Comprehensive Plan which provides guidance for the County to ensure that developments subject to zoning or special use permit review mitigate their impacts. If the applicant feels there are components of the application that the County should consider in making this assessment, the applicant can provide a narrative describing these components for staff review and inclusion with the packet.

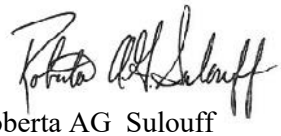
2. *Projected School Enrollment.* For your use in the Community Impact Statement, the current County methodology projects 78 students based on the number and types of residential units. The projected numbers at the different school levels would be 35 elementary students, 18 middle school students, and 25 high school

students. This information will be provided in the staff report, together with an assessment of the capacity of the schools.

Important Note: In future submittals of this application, if any of the input data changes (number or type of unit, estimated assessed values, etc.), the applicant team will need to submit an updated version of the Fiscal Impact Analysis Data Sheet and staff will re-run the model. Should that occur, the results from the model would be different than what is shown in this letter and the referenced attachments.

Please do not hesitate to contact me at (757)253-6693 or roberta.sulouff@jamescitycountyva.gov should you have any questions or concerns.

Respectfully,



Roberta AG Sulouff
Senior Planner

Attachments
Attachment A
Attachment B
Attachment C

Attachment A

NET FISCAL IMPACT	The Bluffs of Kiskiack - Default Values	%
PROJECTED REVENUES		
General Property Taxes	$32,417,720	75%
Other Local Taxes	$7,339,754	17%
Licenses, Permits & Fees	$323,478	1%
Fines & Forfeitures	$51,498	0%
Use of Money & Prop	$0	0%
Commonwealth	$0	0%
Federal Government	$0	0%
Charges for Services	$2,943,623	7%
Miscellaneous	$0	0%
Total General Fund Revenues	$43,076,074	100%
Schools Revenues (Non-County)	$10,646,614	
GRAND TOTAL REVENUES	**$53,722,688**	
PROJECTED EXPENDITURES		
Operating Expenditures		
General Adminstration	$130,064	0%
Court Services	$191,530	0%
Public Safety	$7,050,415	18%
Financial Administration	$350,514	1%
Info Resources Management	$78,014	0%
Community Development	$86,072	0%
General Services	$1,426,292	4%
Parks & Recreation	$286,942	1%
Other Contributions And Transfers To Other Funds^	$5,216,919	13%
Total General Fund Expenditures	$14,816,762	38%
School Operating Expenditures	$24,444,898	62%
GRAND TOTAL OPERATING EXPENDITURES	**$39,261,660**	**100%**
Capital Expenditures		
Non-Schools Capital	$3,276,448	46%
Schools Capital	$3,877,240	54%
GRAND TOTAL OPERATING EXPENDITURES	**$7,153,688**	**100%**
GRAND TOTAL EXPENDITURES	**$46,415,348**	
CUMULATIVE NET FISCAL IMPACT	**$7,307,340**	
Average Annual Net Fiscal Impact	*$292,294*	

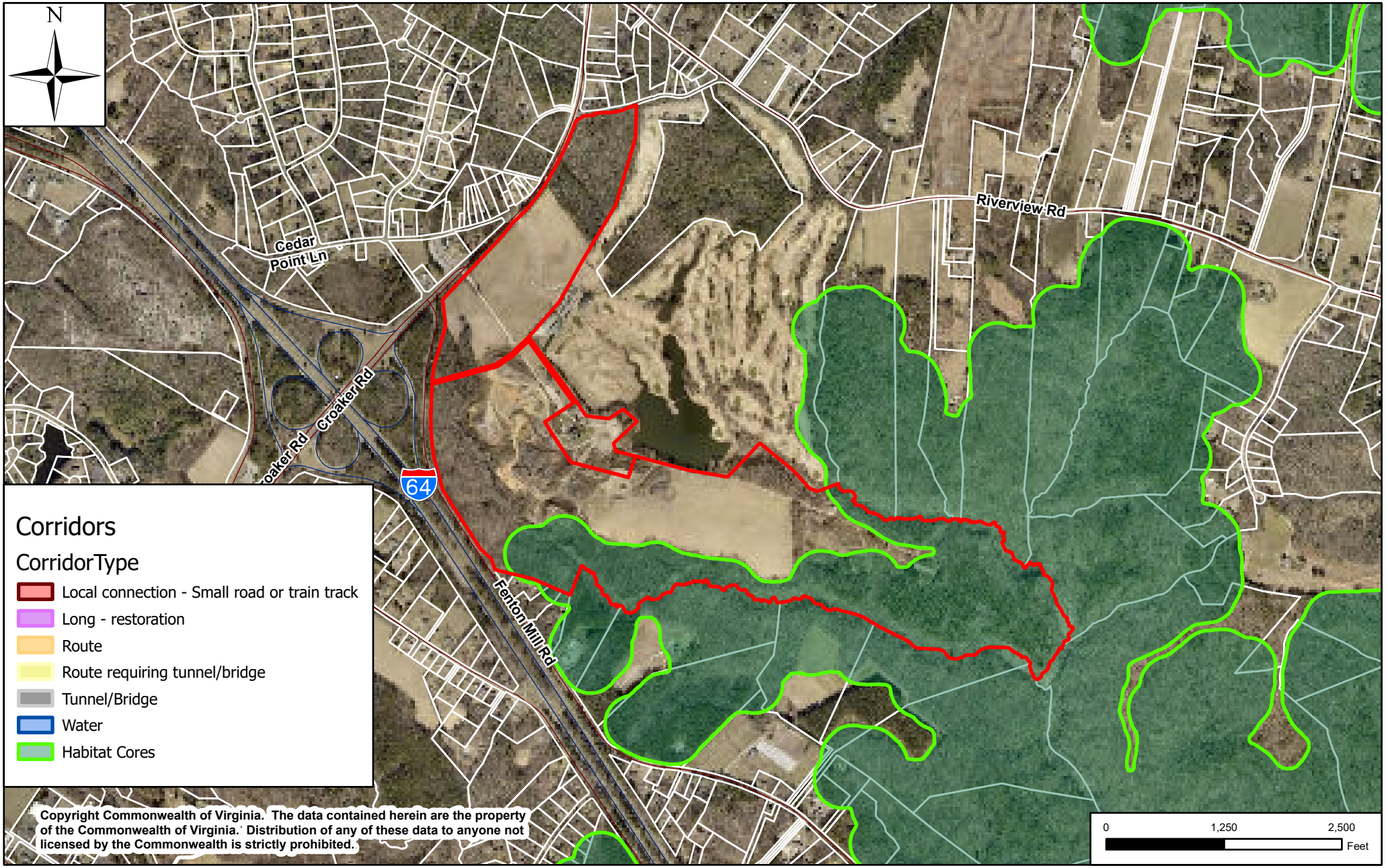
Attachment B

CAPITAL IMPACTS PER UNIT	The Bluffs of Kiskiack - Default Values
Transportation	
Single Family Detached	$88.44
Single Family Attached	$67.53
Age-Restricted MultiFamily	$21.01
Parks and Recreation	
Single Family Detached	$3,609.48
Single Family Attached	$2,381.97
Age-Restricted MultiFamily	$2,498.87
Fire and Emergency Services	
Single Family Detached	$963.18
Single Family Attached	$635.62
Age-Restricted MultiFamily	$666.82
Police	
Single Family Detached	$6.50
Single Family Attached	$4.29
Age-Restricted MultiFamily	$4.50
Library	
Single Family Detached	$460.16
Single Family Attached	$303.67
Age-Restricted MultiFamily	$318.57
General Government	
Single Family Detached	$71.80
Single Family Attached	$47.38
Age-Restricted MultiFamily	$49.71
General Services	
Single Family Detached	$244.37
Single Family Attached	$161.26
Age-Restricted MultiFamily	$169.18
Courts	
Single Family Detached	$833.54
Single Family Attached	$550.07
Age-Restricted MultiFamily	$577.07
Schools	
Single Family Detached	$17,947.17
Single Family Attached	$9,429.17
Age-Restricted MultiFamily	$0.00
TOTAL	
Single Family Detached	**$24,224.65**
Single Family Attached	**$13,580.96**
Age-Restricted MultiFamily	**$4,305.72**

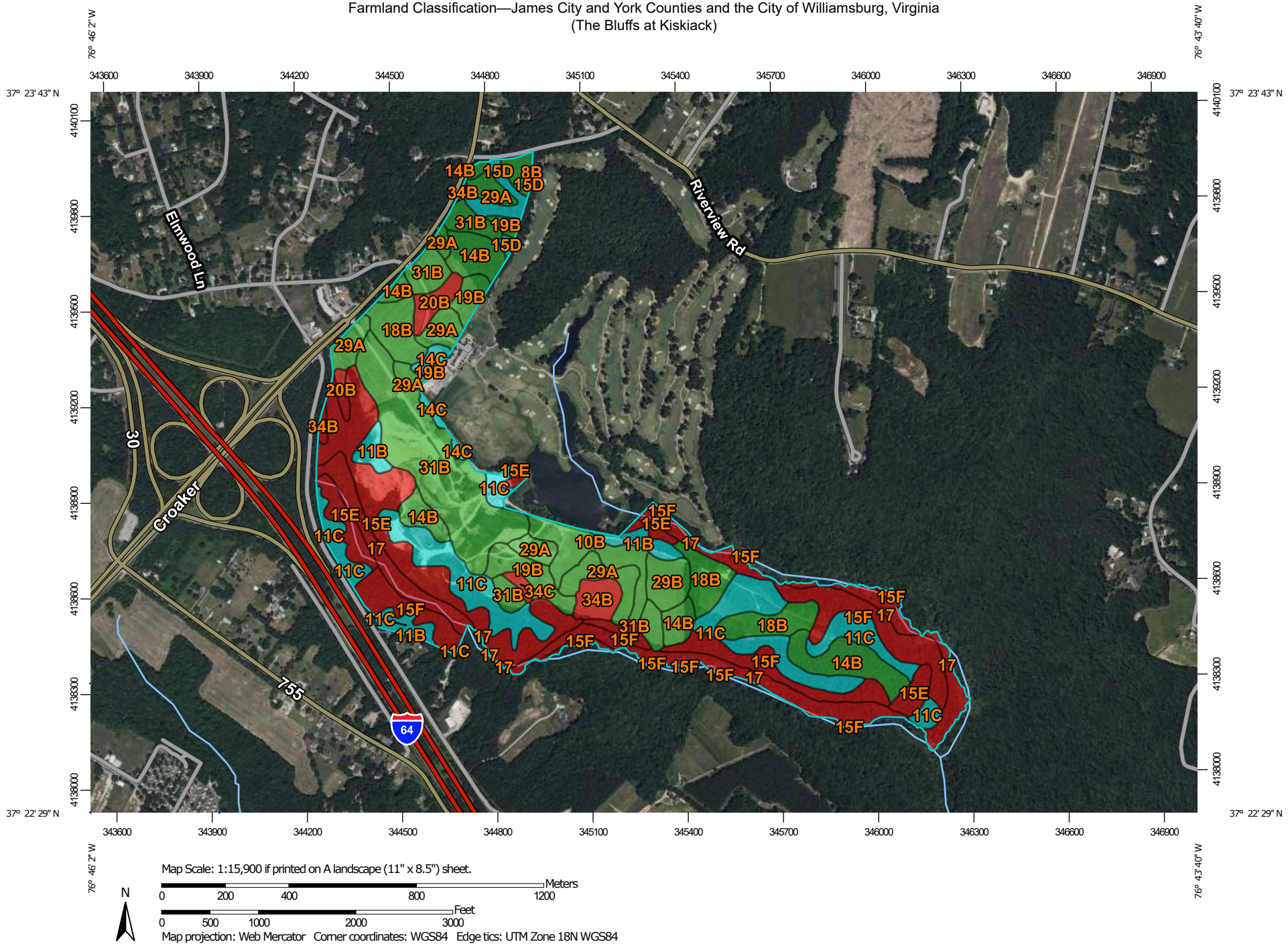
Attachment C

NET FISCAL IMPACT	The Bluffs of Kiskiack - Developer Values	%
PROJECTED REVENUES		
General Property Taxes	$79,084,448	86%
Other Local Taxes	$8,821,838	10%
Licenses, Permits & Fees	$903,312	1%
Fines & Forfeitures	$50,855	0%
Use of Money & Prop	$0	0%
Commonwealth	$0	0%
Federal Government	$0	0%
Charges for Services	$2,917,525	3%
Miscellaneous	$0	0%
Total General Fund Revenues	$91,777,977	100%
Schools Revenues (Non-County)	$10,933,182	
GRAND TOTAL REVENUES	**$102,711,159**	
PROJECTED EXPENDITURES		
Operating Expenditures		
General Adminstration	$128,553	0%
Court Services	$189,137	0%
Public Safety	$6,999,925	18%
Financial Administration	$346,743	1%
Info Resources Management	$78,014	0%
Community Development	$85,146	0%
General Services	$1,424,148	4%
Parks & Recreation	$283,357	1%
Other Contributions And Transfers To Other Funds^	$5,153,107	13%
Total General Fund Expenditures	$14,688,129	37%
School Operating Expenditures	$25,101,663	63%
GRAND TOTAL OPERATING EXPENDITURES	**$39,789,791**	**100%**
Capital Expenditures		
Non-Schools Capital	$3,275,168	46%
Schools Capital	$3,877,240	54%
GRAND TOTAL OPERATING EXPENDITURES	**$7,152,407**	**100%**
GRAND TOTAL EXPENDITURES	**$46,942,199**	
CUMULATIVE NET FISCAL IMPACT	**$55,768,961**	
Average Annual Net Fiscal Impact	*$2,230,758*	

Natural and Cultural Assets Plan



Farmland Classification—James City and York Counties and the City of Williamsburg, Virginia
(The Bluffs at Kiskiack)



Map Scale: 1:15,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 200 400 800 1200

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

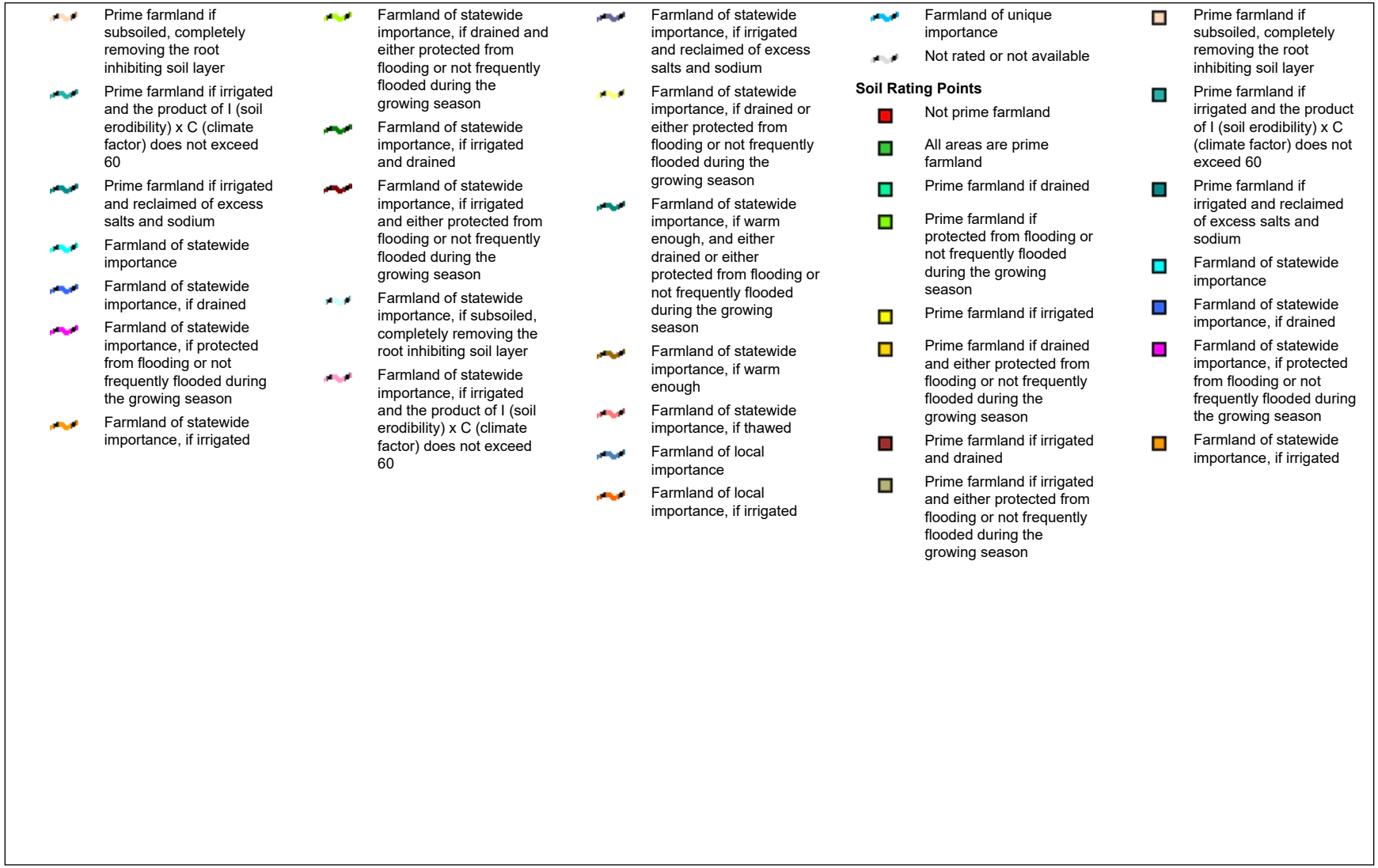
Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season


Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: James City and York Counties and the City of Williamsburg, Virginia
Survey Area Data: Version 23, Sep 8, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 21, 2022—Jul 13, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8B	Caroline fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland	2.0	0.7%
10B	Craven fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland	9.4	3.3%
11B	Craven-Uchee complex, 2 to 6 percent slopes	Farmland of statewide importance	5.5	1.9%
11C	Craven-Uchee complex, 6 to 10 percent slopes	Farmland of statewide importance	39.5	13.7%
14B	Emporia fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland	22.0	7.7%
14C	Emporia fine sandy loam, 6 to 10 percent slopes	Farmland of statewide importance	2.4	0.8%
15D	Emporia complex, 10 to 15 percent slopes	Farmland of statewide importance	4.1	1.4%
15E	Emporia complex, 15 to 25 percent slopes	Not prime farmland	36.2	12.6%
15F	Emporia complex, 25 to 50 percent slopes	Not prime farmland	29.9	10.4%
17	Johnston complex	Not prime farmland	32.9	11.4%
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland	17.5	6.1%
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	All areas are prime farmland	9.7	3.4%
20B	Kenansville loamy fine sand, 2 to 6 percent slopes	Not prime farmland	4.5	1.6%
29A	Slagle fine sandy loam, 0 to 2 percent slopes	All areas are prime farmland	18.4	6.4%
29B	Slagle fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland	5.0	1.7%
31B	Suffolk fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland	42.4	14.7%
34B	Uchee loamy fine sand, 2 to 6 percent slopes	Not prime farmland	5.0	1.7%
34C	Uchee loamy fine sand, 6 to 10 percent slopes	Not prime farmland	1.0	0.3%
Totals for Area of Interest			**287.3**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

MINUTES
JAMES CITY COUNTY PLANNING COMMISSION
REGULAR MEETING
COUNTY GOVERNMENT CENTER BOARD ROOM
101 MOUNTS BAY ROAD, WILLIAMSBURG, VA 23185
April 1, 2026
6:00 PM

A. CALL TO ORDER

Dr. Allman called the meeting to order at 6 p.m.

B. ROLL CALL

Planning Commissioners Present:
Kira Allman, Chair
Jack Haldeman
Frank Polster
Steve Rodgers
Jay Everson
Vincent Passero

Staff Present:
Susan Istenes, Director of Planning
Liz Parman, Deputy County Attorney
Tom Leininger, Principal Planner
Roberta Sulouff, Senior Planner
Will Albiston, Planner
Linda Titus, Administrative Coordinator
Hannah Hunnicutt, Administrative Coordinator

Planning Commissioners Absent:
Crystal Haskins

C. PUBLIC COMMENT

Dr. Allman opened Public Comment.

As no one wished to speak, Dr. Allman closed the Public Comment.

D. REPORTS OF THE COMMISSION

Dr. Allman stated that the Development Review Committee (DRC) and Policy Committee did not meet in March.

E. CONSENT AGENDA

1. Minutes of the March 4, 2026, Regular Meeting

2. Minutes of the March 16, 2026, Organizational Meeting

Mr. Everson stated he would abstain from voting on the March 16, 2026, Organizational Meeting minutes as he was absent from the meeting.

On a voice vote, the Commission voted to approve the minutes of the March 4 and March 16 meetings. (6-0)

F. PUBLIC HEARING(S)

1. SUP-26-0001. 147 Whiting Avenue Short Term Rental

Mr. Will Albiston, Planner, addressed the Commission stating that Mr. George B. Buskey had applied on behalf of his wife, Ms. Sonya D. Savedge, for a Special Use Permit (SUP) to allow for the short-term rental of up to two bedrooms in the three-bedroom single-family home at 147 Whiting Avenue. Mr. Albiston noted that the property was zoned R-2, General Residential, designated Low Density Residential on the Comprehensive Plan Land Use Map, and was located inside of the Primary Service Area (PSA).

Mr. Albiston stated that Condition No. 3 limits this SUP to only allow for the short-term rental of up to two bedrooms, with the applicant and owner living in the third bedroom. Mr. Albiston noted that the owner-occupied nature of this short-term rental allowed for active monitoring of guest activity and behavior. Mr. Albiston stated that staff found this to be a favorable factor of the application and consistent with one of the four recommendations for short-term rentals provided in the Comprehensive Plan. Mr. Albiston stated that the application was not consistent with the other three standards, making staff unable to recommend approval of the application. Mr. Albiston noted that if the Planning Commission recommended approval of the application, staff had provided Proposed Conditions for consideration.

Mr. Passero asked what was considered “short term” in terms of a rental.

Mr. Albiston answered, stating less than 30 days was considered short term.

Mr. Haldeman asked if a condition had been included to require the owner to live on the property.

Mr. Albiston stated that it had not been added, but the Planning Commission could adopt that condition in the resolution.

Mr. Rodgers asked for clarification on the unfavorable standards.

Mr. Albiston stated that the standards were not met because the property was designated as Low Density Residential on the Land Use map, was internal to a subdivision, and was not located on a major road.

Dr. Allman opened the Public Hearing.

Mr. George Buskey, 147 Whiting Avenue, gave a presentation to the Commission to request a recommendation of approval.

Mr. Everson asked why the Notice of Violation that had been mailed to Mr. Buskey's home came back as undeliverable.

Mr. Buskey stated that it had been delivered to the wrong address.

Mr. Rodgers asked if neighbors had been notified about the application.

Mr. Buskey stated that his neighbors were in support of the application, and some were present at the meeting.

Mr. Rodgers asked why the property was still listed online as a three-bedroom rental.

Mr. Buskey stated that he had changed the number of bedrooms available to two recently.

Mr. Rodgers asked if Mr. Buskey was currently operating the short-term rental.

Mr. Buskey stated that he was currently operating.

Mr. Polster asked where the neighbors who were in favor of the application but unable to attend the meeting lived in relation to Mr. Buskey's house.

Mr. Buskey stated that one neighbor lived next door and the other lived two houses down from his house.

Mr. Glen Carter, 130 Jackson Street, spoke to the Commission in favor of the proposed project.

Rev. Dr. Carlon Lassiter, 1363 Government Road, spoke to the Commission in favor of the proposed project.

Dr. Allman closed the Public Hearing.

Mr. Haldeman gave an explanation of the four standards the Commission used to evaluate short-term rental applications and explained that the goal was to protect the character of residential areas. Mr. Haldeman noted that SUPs run with the land, and if Mr. Buskey were to sell this property, then the next owner could utilize the SUP.

Mr. Polster stated that due to the positive remarks and support from the neighbors, he would also be in support of the application. Mr. Polster then asked if Mr. Buskey would agree to add the condition stating that the owners would reside in the home.

Mr. Buskey agreed to the condition.

Mr. Polster explained that in five years, the Board of Supervisors could review the SUP application again to ensure that the property owner was abiding by the conditions.

Mr. Passero stated that he was in support of the application.

Mr. Rodgers stated that he had concerns about how often short-term rental SUPs were granted despite not meeting the four standards used to evaluate the applications. Mr. Rodgers suggested that the Commission reconsider the criteria.

Mr. Passero expressed concerns about the criteria and stated that it restricted many property owners from being able to operate short-term rentals.

Discussion ensued.

Mr. Everson stated he would not be in support of the application because it was of commercial use in a residential area.

Mr. Polster stated that it was up to the Commission to evaluate these applications on a case-by-case basis.

Dr. Allman stated she would be in support of the project and commended the applicant for his presentation.

Mr. Polster made a motion to recommend approval of SUP-26-0001. 147 Whiting Avenue Short Term Rental with Conditions to the Board of Supervisors.

On a roll call vote, the Commission voted to recommend approval. (5-1)

2. Z-24-0013/SUP-24-0033/MP-24-0005. Bluffs at Kiskiack

Ms. Roberta Sulouff, Senior Planner, presented to the Commission stating that Mr. Mark Jakobowski of Pathmark Consulting and Design, LLC, had applied on behalf of Mr. Howard B. Hankins, Hankins Land Trust No. 1, and the Historic Virginia Land Conservancy, to rezone an approximately 276.10-acre portion of land located at 8196, 8212, and 8220 Croaker Road. Ms. Sulouff explained that the application included an SUP request for the extension of public water and sewer to the site, an SUP for an open-air museum, and an SUP for the existing resource recovery operation. Ms. Sulouff stated that the properties were currently zoned M-1, Limited Business/Industrial, with Proffers, and were inside the PSA.

Ms. Sulouff noted that 8196 Croaker Road, or The Conservancy Property, was designated as Community Character Conservation, Open Space, or Recreation on the Comprehensive Plan, while the remaining parcels were designated Mixed Use.

Ms. Sulouff explained that the application requested to rezone approximately 56 acres of land on the Conservancy property from M-1 to A-1, General Agricultural, with the remaining approximately 220 acres of the site being rezoned from M-1 to MU, Mixed Use.

Ms. Sulouff stated that the Board of Directors for the Historic Virginia Land Conservancy issued a resolution stating that they felt the private road and proposed

rezoning protected the conservation values of the property. Ms. Sulouff explained that the parcel was the subject of a Land Use designation change approval during the Comprehensive Plan process. Ms. Sulouff stated that the Board approved a redesignation of the property from Mixed Use to its current designation of Community Character Conservation, Open Space, or Recreation. Ms. Sulouff explained that staff viewed this request as bringing the zoning of the property into conformance with its Land Use Designation.

Ms. Sulouff stated that the remaining 220 acres, including approximately five acres of the Conservancy property, was proposed to be rezoned from M-1, Limited Business/Industrial to MU, Mixed Use with Proffers. Ms. Sulouff noted that the proposed Mixed Use Development, titled The Bluffs of Kiskiack, was divided into nine land bays to be developed in four phases.

Ms. Sulouff gave the Commission an explanation of land bays 1, 6, and 7, with uses including a maximum of 704 residential dwellings, comprised of 384 Continuing Care and Retirement Community (CCRC) units, 178 single-family attached units, and 142 single-family detached units which corresponded to a proposed residential density of 3.99 units per developable acre. Ms. Sulouff stated that the applicant had proffered that 30% of the non-CCRC dwelling units would be made affordable for those making up to 80% of the Area Median Income (AMI).

Ms. Sulouff explained that two land bays exceeded Zoning Ordinance density caps for their use type. Ms. Sulouff stated that the application required two density bonus points, which the applicant was achieving by proffering a stream restoration project in the Skimino Creek Watershed Management Plan. Ms. Sulouff noted that the proffered affordable housing offered was not being used toward density bonus points.

Ms. Sulouff stated that land bays 2, 3, 4, 5, 8, and 9 housed the proposed non-residential uses, including 24,500 square feet of commercial development for retail, and potentially a hotel; 22,000 square feet of office development-specifically medical offices; 5.2 acres for an open-air museum and visitor's center, shown on the plan as the President's Walk Museum; 12.5 acres for an open-air place of public assembly and community gathering; and 4.8 acres set aside for dedication of a future public use site.

Ms. Sulouff explained the phasing plan and proffers included in the application, stating that the traffic improvements, dedication of the public use site, and the President's Walk Museum, were all planned for Phase 1 of the development. The CCRC, commercial, and multifamily/single family attached were all planned for the second of four phases of development, with the remaining uses for the third and fourth phases.

Ms. Sulouff stated that staff reviewed the proposal and associated studies, such as the Fiscal Impact Analysis and the Virginia Department of Transportation (VDOT) approved the Traffic Impact Analysis (TIA) and found that the applicant had addressed possible rezoning development impacts through both plan design and proffers.

Ms. Sulouff explained that staff also found that the rezoning proposal was consistent with the Zoning Ordinance and adopted policies, such as the Skimino Creek Watershed Master Plan, and exceeded the recommendations of the Parks & Recreation Development Guidelines and workforce and affordable housing recommendations found in the Comprehensive Plan.

Ms. Sulouff explained that this proposal was located in the southeast quadrant of the Croaker Interchange area. Ms. Sulouff noted that recommendations for the southeast quadrant did not include commercial or residential uses as either principal or secondary recommended uses.

Ms. Sulouff stated that the applicant had also requested SUPs to extend water/sewer facilities to the site, to permit the operation of the proposed museum and to permit the operation of the existing resource recovery facility. Ms. Sulouff explained that staff included conditions to offset impacts to adjacent properties during the construction of the water/sewer facilities, as well as conditions to address potential impacts of the museum via screening, hours of operation, noise, and site design.

Ms. Sulouff stated that staff could not recommend approval of these applications as the proposed rezoning was not consistent with the Comprehensive Plan land use recommendations specific to the Croaker Interchange Mixed Use Area, meaning staff could not recommend a finding of consistency for the proposed public facilities extension to serve the non-conformant use. Ms. Sulouff then explained the new proffers that were given to the Commissioners, stating that the majority of the changes were to the Stormwater Development Master Plan and the language related to the tennis courts had changed to be more inclusive of other activities.

Mr. Polster commended Ms. Sulouff for the Housing Affordability Analysis included in the staff report.

Mr. Polster asked if the major change in the new proffers was elaborating on the specific work needed on BMP YR005.

Ms. Sulouff stated that there were a few other additions to the Special Stormwater Criteria (SSCs) but otherwise a majority of the change did come from Stormwater and Resource Protection (SRP) Division explaining the work needed on the Best Management Practive (BMP).

Mr. Everson asked if Proffer No. 10, stating that “sales of all targeted for-sale units shall include a soft second deed of trust for the benefit of the County” was in relation to the Community Land Trust (CLT).

Ms. Sulouff explained that this application had been submitted before the Board had approved the CLT, and that this was the standard operating procedure for proffering affordable housing.

Discussion ensued.

Mr. Haldeman read from the Comprehensive Plan and stated that the suggested use for development of the southeast quadrant of the Croaker Road interchange included light manufacturing and office but did not mention residential. Mr. Haldeman continued reading from the Comprehensive Plan, stating that areas noted under the median town or suburban center were intended to maximize the economic development potential of the area by providing for more intensive office and commercial development with ancillary residential uses to make a complete community.

Mr. Haldeman noted that the residential uses were permitted but not specifically in the Croaker Road southeast quadrant.

Discussion ensued.

Mr. Haldeman asked where CCRCs fit into the Comprehensive Plan.

Ms. Sulouff explained that CCRCs were seen as a combination of institutional and residential uses, with independent living counting toward the density cap and assisted living being an institutional use.

Mr. Haldeman stated that he did not see CCRCs under Mixed Use in the Comprehensive Plan.

Ms. Sulouff explained that providing a variety of housing for specific populations was stated under Mixed Use.

Mr. Everson asked if the new proffers required the applicant to construct the regenerative stormwater conveyance BMP as stated in the Community Impact Statement.

Ms. Sulouff stated that the proffer language allowed flexibility in how the BMP would be constructed if it was required.

Mr. Haldeman asked if the construction phases were binding and to what extent was construction considered complete before moving to the next phase.

Ms. Sulouff stated she did not know the level of completion the construction would need to be.

Mr. Haldeman asked if pouring foundations would be considered enough to move to the next construction phase.

Ms. Sulouff stated that this would be correct based on the purpose of the proffer.

Discussion ensued.

Mr. Passero expressed concerns about the proposed project, specifically with the traffic on Fenton Mill Road, access to the emergency entrance, and the effects on Barlows Pond in York County.

Ms. Sulouff stated that when SRP gave its approval of the proffers, it did so having reviewed impacts to the Barlows Pond subwatershed.

Mr. Passero asked what type of commercial businesses would exist in the proposed development.

Ms. Sulouff stated that restaurants, retail, and hotel were proposed, but ultimately referred to the applicant for details.

Ms. Sulouff explained the process of the TIA and how the studies had been agreed upon by VDOT and the Planning Division. Ms. Sulouff noted that the highway project on Interstate 64 had affected traffic and the impact on service roads but that those impacts were clearly associated with construction and not long term, meaning they could not be included in the parameters of the TIA studies. Ms. Sulouff explained that VDOT had no objection to the emergency entrance, and that the goal was to keep Croaker Road running smoothly as possible with the proposed location of the entrance and exit. Ms. Sulouff explained that there was no other location to access the interior of the development without cutting through other owners' properties.

Discussion ensued.

Mr. Haldeman pointed out a discrepancy between the number of CCRC units in the staff report and the TIA.

Ms. Sulouff stated that she believed that it might be a typo and confirmed that the correct number of CCRC units was 384.

Mr. Haldeman discussed the rising rate of inflation and cost of building materials and expressed concerns that building affordable housing might not be possible.

Discussion continued.

Mr. Haldeman asked about the gated access to the development.

Ms. Sulouff explained that the road was private but open to the public to non-residential areas. Ms. Sulouff noted that gating the residential areas was not stated in the proffers.

Dr. Allman asked for any disclosures from the Commissioners.

Mr. Polster and Mr. Haldeman stated they had met with the applicant.

Dr. Allman opened the Public Hearing.

Mr. Mark Jakobowski, of Pathmark Consulting and Design, LLC, 1450 Quarterpath Road, Williamsburg, VA, gave a presentation to the Commission requesting a recommendation of approval.

Mr. Polster asked if the hybrid houses for the CCRC would be located in land bay 1.

Mr. Jakobowski stated that this was correct.

Mr. Passero asked what percentage of the development would be assisted living.

Mr. Jakobowski stated that 39.2 acres were dedicated to healthcare.

Mr. Passero asked about Mr. Jakobowski's suggestion to put a fire station on the lot the development was dedicating to the County.

Mr. Jakobowski stated that an additional fire station might be necessary to serve the new development, but ultimately the County could decide what to do with the lot.

Discussion ensued.

Mr. Passero expressed concerns about the volume of cars and traffic on Fenton Mill Road.

Mr. Jakobowski stated that the intersection on Fenton Mill Road would be modified to accommodate the development's entrance and exit.

Mr. Passero asked what the population projection would be for the proposed development.

Ms. Sulouff explained that the application did not have a population projection stated.

Discussion continued.

Mr. Passero stated his concerns with growth and development in the County to the Commissioners.

Mr. Bill Apperson, 4900 Fenton Mill Road, expressed concerns to the Commission regarding the proposed project.

Mr. Steve Mallory, 4650 Fenton Mill Road, expressed concerns to the Commission about the proposed project.

Mr. Carl Zangardi, 112 Heathery, spoke to the Commission in favor of the proposed development.

Mr. James Gordon, 5101 Riverview Road, expressed concerns to the Commission about the proposed project.

Dr. Allman closed the Public Hearing.

Mr. Polster explained the Comprehensive Plan process and noted that the goal was to confine development into the PSA and that the Board had made a decision to designate the Croaker Road interchange as Mixed Use to accommodate growth.

Mr. Polster explained how the proposed development did not affect the Rochambeau Drive and Croaker Road intersection. Mr. Polster commended the applicant for proffering the required SSCs and maintenance for the BMPs and RPA surrounding Skimino Creek and for including the affordable housing in the second phase of construction.

Mr. Everson shared that he was in support of the development, and spoke favorably about the proposed museum, hotel, and CCRC and the applicant's commitment to maintaining the BMPs and RPA.

Mr. Passero stated that he was not in support of the proposed development being located in the northern part of the County.

Mr. Rodgers stated he was in support of the development, stating he was in favor of new developments within the PSA and the affordable housing that the project proposed.

Mr. Haldeman stated the location was suitable for a mixed-use development but noted that the primary residential use of the proposed project was not in accordance with the Comprehensive Plan. Mr. Haldeman expressed concerns with the construction phasing plan and the cumulative impact on schools and traffic.

Dr. Allman commended the applicant for the emphasis on affordable housing, the multi-generational aspect of the community, and the commitment to the mitigation strategies for the environmental factors. Dr. Allman shared that she was bothered that several people spoke about not being aware of the project and stressed the importance of developers reaching out to the adjacent property owners.

Mr. Rodgers agreed with Dr. Allman and reminded the Commissioners that their role was to provide a recommendation and advised citizens to attend the Board of Supervisors' meeting.

Discussion ensued.

Mr. Everson made a motion to find Z-24-0013/SUP-24-0033/MP-24-0005. Bluffs at Kiskiack substantially in accordance with the Comprehensive Plan.

On a roll call vote, the Commission voted to find the application substantially in accordance with the Comprehensive Plan. (4-2)

Mr. Polster made a motion to recommend approval of Z-24-0013/SUP-24-0033/MP-24-0005. Bluffs at Kiskiack with Proffers and Conditions to the Board of Supervisors.

On a roll call vote, the Commission voted 3-3 on the motion, resulting in a neutral recommendation.

G. PLANNING COMMISSION CONSIDERATIONS

Mr. Polster requested to post signs on the properties that were subject to a public hearing.

Mr. Haldeman requested that the Commissioners be notified of what cases were being presented prior to the Agenda being published.

Mr. Polster discussed the decisions that were made in the Comprehensive Plan regarding keeping residential growth within the PSA in the northern part of the County.

Discussion ensued.

The Commissioners discussed the process of updating the Comprehensive Plan.

H. PLANNING DIRECTOR'S REPORT

1. Planning Director's Report - April 2026

Ms. Istenes stated she had no additions to the report.

I. PLANNING COMMISSION DISCUSSION AND REQUESTS

Dr. Allman stated that Mr. Polster would be representing the Commission at the May 12, 2026, Board of Supervisors meeting.

Dr. Allman reminded the Commissioners of the upcoming Policy Committee and DRC meetings.

Discussion ensued.

Dr. Allman thanked Mr. Polster and Mr. Everson for agreeing to Chair the DRC and Policy Committee.

J. ADJOURNMENT

Dr. Allman asked for a motion to adjourn.

Mr. Polster made a motion to adjourn.

The meeting was adjourned at approximately 8:45 p.m.

_____ _____

Susan Istenes, Secretary Dr. Kira Allman, Chair

RESOLUTION

VIRGINIA CODE § 15.2-2232 ACTION ON

CASE NO. SUP-24-0033. THE BLUFFS OF KISKIACK WATER AND SEWER EXTENSION

WHEREAS, in accordance with § 15.2-2232 of the Code of Virginia, public utilities shall not be constructed, established, or authorized, unless and until the general location or approximate location, character, and extent thereof has been submitted to and approved by the Planning Commission as being substantially in accord with the adopted Comprehensive Plan or part thereof; and

WHEREAS, Mr. Mark Jakobowski has applied on behalf of Hankins Land Trust 1, 2, 3 and Howard and George Hankins for a Special Use Permit (SUP) to allow for the extension of public water and sewer to properties located at 8220 and 8212 Croaker Road and further identified as James City County Real Estate Tax Map Parcel Nos. 1430100040 and 1430100040A, respectively (collectively, the "Properties"), as shown on the master plan entitled "Proposed Master Plan for the Bluffs at Kiskiack" prepared by VHB, dated March 18, 2026 (the "Master Plan"), as supplemented by the 11' by 17" booklet entitled "The Bluffs at Kiskiack Proposed Master Plan Z-24-0013 MP-24-0005 SUP-24-0033" dated March 18, 2026; and

WHEREAS, in accordance with § 15.2-2204 of the Code of Virginia and Section 24-9 of the James City County Zoning Ordinance, a public hearing was advertised, adjacent property owners notified, and a hearing scheduled for Case No. SUP-24-0033.

NOW, THEREFORE, BE IT RESOLVED that the Planning Commission of James City County, Virginia, for the reasons expressed in the written minutes which shall be transmitted to the Board of Supervisors, finds that the general or approximate location, character, and extent of the public utilities applied for in Case No. SUP-24-0033 are substantially in accord with the Comprehensive Plan and applicable parts thereof.

Kira Allmann
Chair, Planning Commission

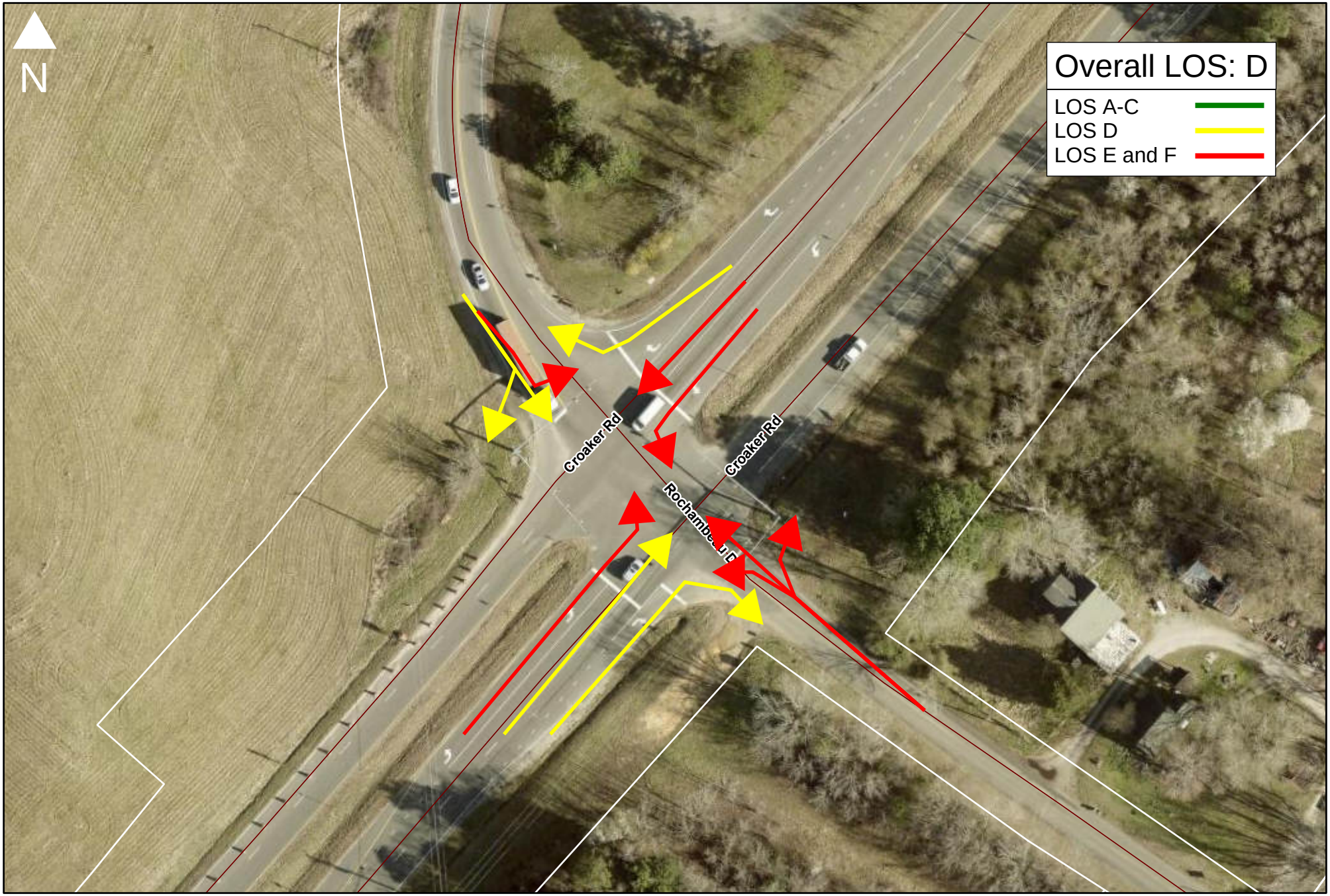
ATTEST:

Susan Istenes, Secretary

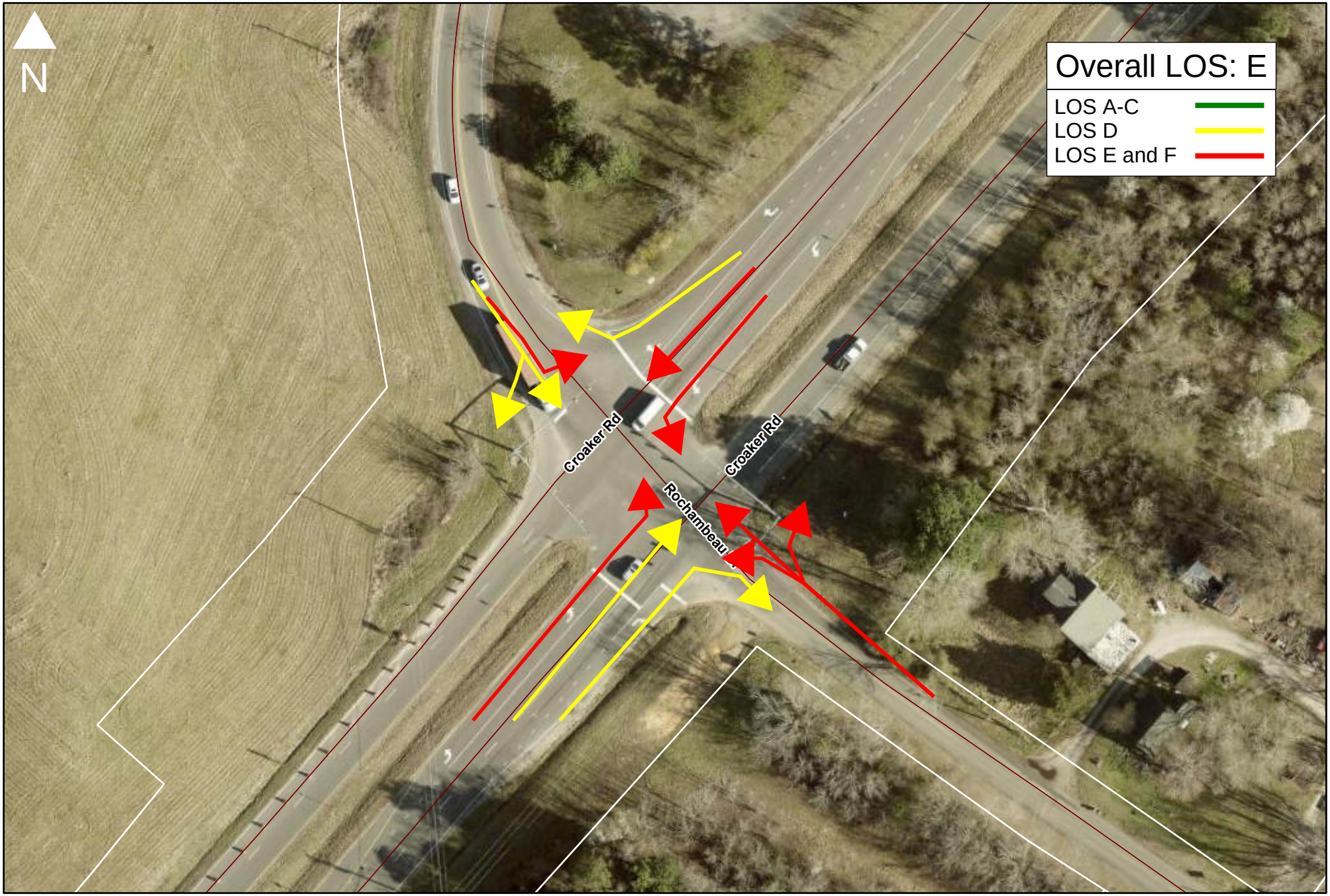
Adopted by the Planning Commission of James City County, Virginia, this 1st day of April, 2026.

SUP24-033-BluffsConsent-res

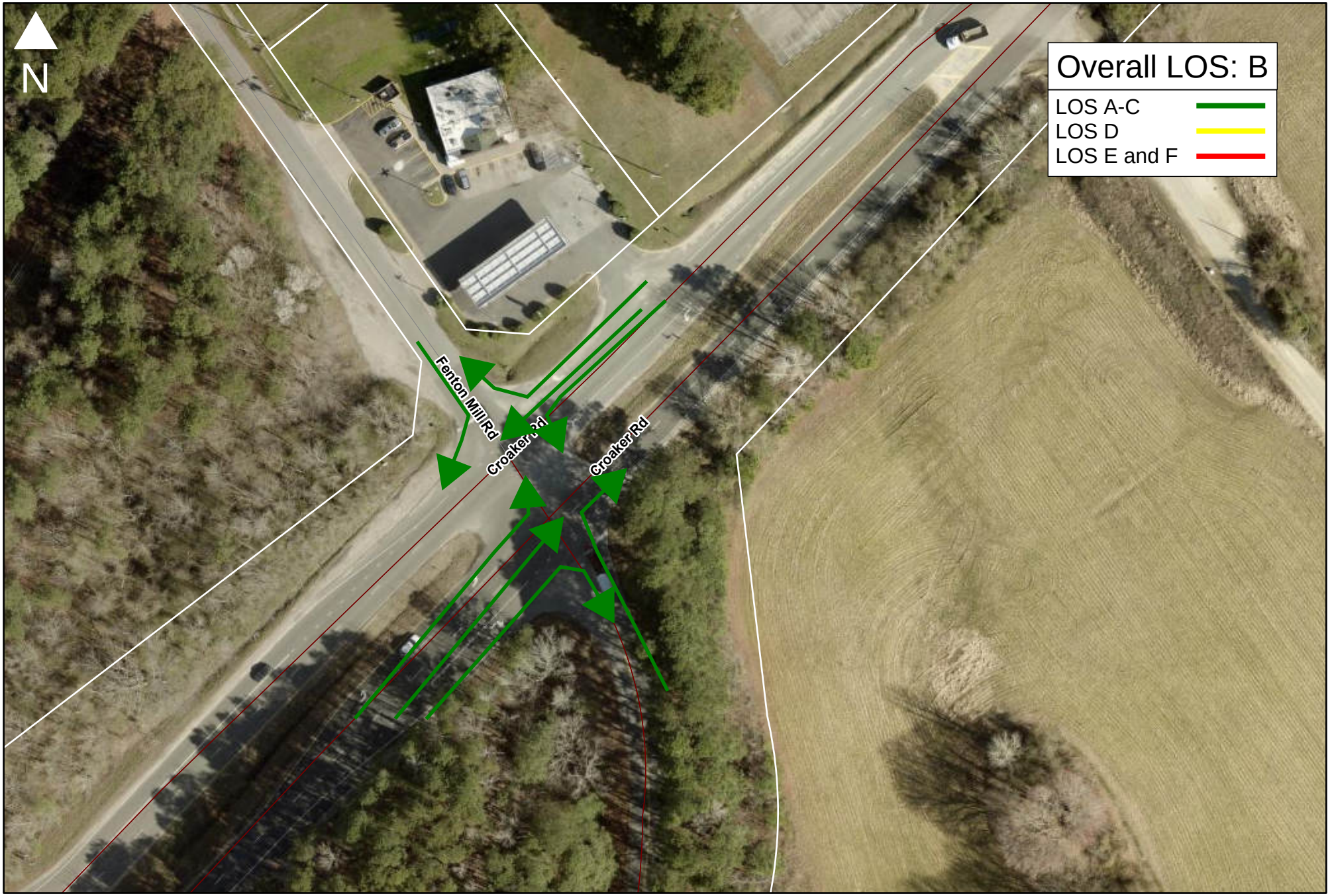
2036 Build Level of Service: AM Peak Hour
Croaker Road/Rochambeau Drive Intersection



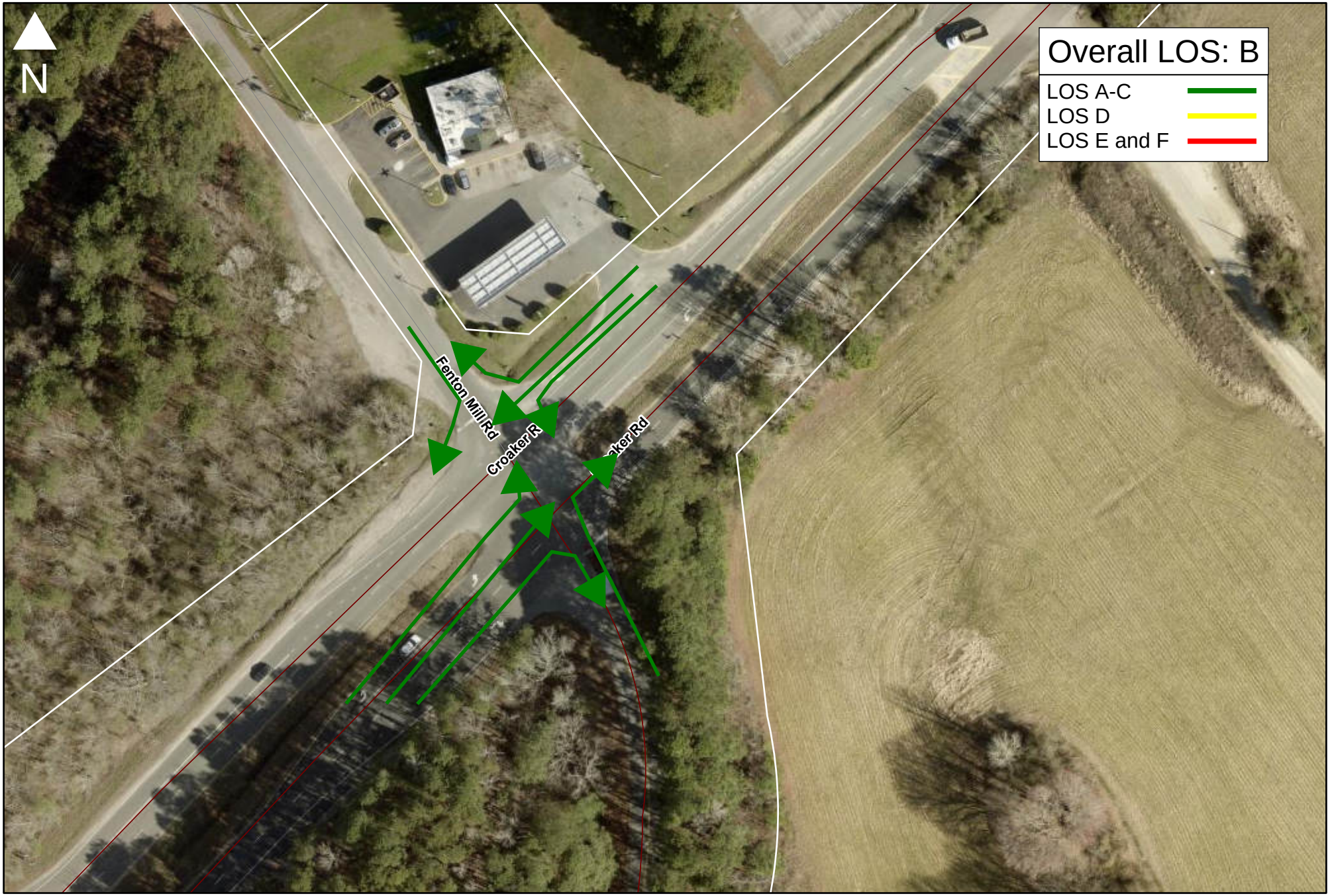
2036 Build Level of Service: PM Peak Hour
Croaker Road/Rochambeau Drive Intersection



2036 Build Level of Service: AM Peak Hour
Croaker Road/Fenton Mill Road Intersection



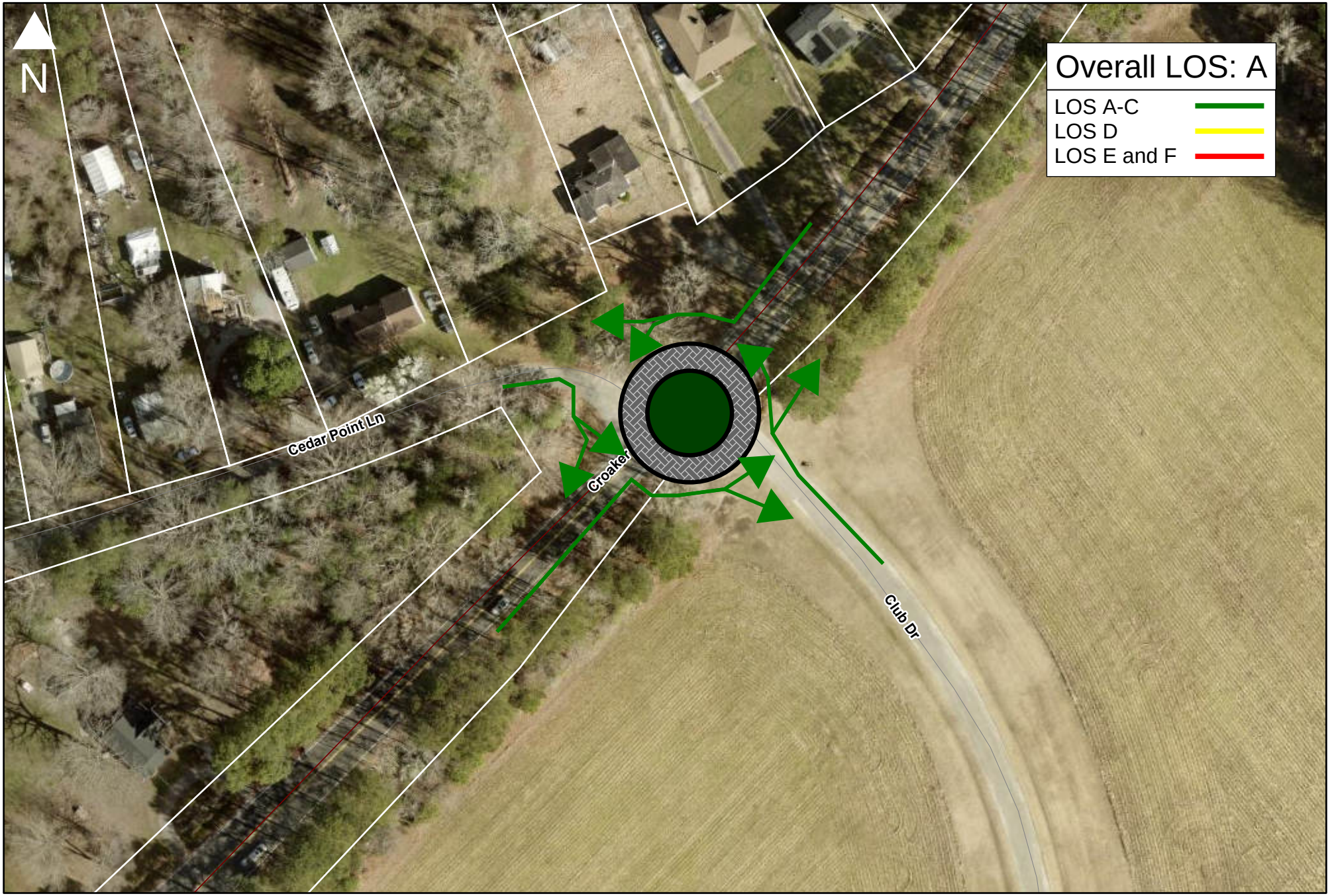
2036 Build Level of Service: PM Peak Hour
Croaker Road/Fenton Mill Road Intersection



2036 Build Level of Service: AM Peak Hour
Croaker Road/Club Drive/Cedar Point Lane Intersection



2036 Build Level of Service: PM Peak Hour
Croaker Road/Club Drive/Cedar Point Lane Intersection



SUMMARY FACTS

Applicants:	Mr. Jason Grimes, AES Consulting Engineers, and Mr. Vernon Geddy, III, Geddy, Harris, Franck & Hickman, LLP
Landowner:	Commonwealth of Virginia Eastern State Hospital
Proposal:	Rezoning of approximately 79.56 acres from PL, Public Lands to PUD-R, Planned Unit Development Residential, with Proffers, to allow for up to 155 residential dwellings consisting of 82 single-family detached units and 73 single-family attached and multifamily units, and up to 24,000 square feet of commercial uses.
Location:	A portion of 4601 Ironbound Road
Tax Map/Parcel No.:	A portion of 3910100152
Current Zoning:	PL, Public Lands
Proposed Zoning:	PUD-R, Planned Unit Development Residential, with Proffers
Project Acreage:	+/- 79.56 acres
Comprehensive Plan:	Mixed Use - Eastern State
Primary Service Area:	Inside
Staff Contact:	Morgan Risinger, Senior Planner

PUBLIC HEARING DATES

Planning Commission:	April 2, 2025, 6:00 p.m.
Board of Supervisors:	October 14, 2025, 5:00 p.m. (Postponed) February 10, 2026, 5:00 p.m. (Postponed) April 14, 2026, 5:00 p.m. (Postponed) May 12, 2026, 5:00 p.m. (Postponed) June 9, 2026, 5:00 p.m. July 14, 2026, 5:00 p.m. (Tentative)

POSTPONEMENT REQUEST

At its meeting on May 12, 2026, the Board of Supervisors postponed action on this application until its June 9, 2026, Regular Meeting. The applicants have requested a deferral of this case until the July 14, 2026, Board of Supervisors Regular Meeting to allow for revisions to be incorporated into the application (see Attachment No. 1). Staff recommends the Board of Supervisors defer this application to its July 14, 2026, Regular Meeting.

MR/tm
RZ23-04-MP23-01WstPk-rev

Attachment:
1. Deferral Request

Morgan Risinger

From: Vernon Geddy <vgeddy@geddyfranck.com>
Sent: Thursday, May 21, 2026 11:26 AM
To: Paul Holt III
Cc: Morgan Risinger
Subject: [External]Westwood - Z-23-0004/MP-23-0001

Paul, I am writing on behalf of the applicant to request that the Board of Supervisors further defer this application to its July 14, 2026 meeting. We will be submitting revisions to the application shortly. Thanks, Vernon

Vernon M. Geddy, III
Geddy & Franck, LLP
1177 Jamestown Road
Williamsburg, Virginia 23185
(757) 220-6500
vgeddy@geddyfranck.com

Please note our new firm name and email address

M E M O R A N D U M

DATE: June 9, 2026

TO: The Board of Supervisors

FROM: Terry Costello, Senior Open Space Planner II

SUBJECT: Case No. LU-20-0003. Eastern State (Parcels A, B, and D) - Land Use Designation Change

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At its May 12, 2026, Regular Meeting, the Board of Supervisors postponed action on this item until the June 9, 2026, Regular Meeting. Materials from the May 12, 2026, meeting are available using the following link: https://jamescitycova.portal.civicclerk.com/event/1534/overview.

One modification to the proposed land use description since the May 12, 2026, Board of Supervisors meeting, was the removal of the paragraph pertaining to the portion of the Eastern State Property located directly north of New Town and abutting Route 199. This paragraph - and only this paragraph was previously adopted as part of Case No. LU-20-0002, Eastern State Parcel C.

Staff has provided the Eastern State Mixed Use Area description which is applicable to the portion of the Eastern State property encompassing LU-20-0003 below.

"Mixed Use Area No. 15 Eastern State. UDA: Medium Town or Suburban Center"

"The eastern portion of this site is to be developed as a master planned community that harmoniously blends the Eastern State Hospital campus with the adjacent New Town community, though this development is expected to have its own mixture of uses and design expectation. This community should employ careful site orientation, landscaping, and buffering and transportation network connectivity to connect these areas, while also allowing for proper land use separation where appropriate.

The two guiding principles for mitigating impacts regarding the redevelopment of this site are: a) the preservation and protection of environmentally sensitive features and b) the protection and expected enhancement of the immediate transportation network. Natural ravines, topography, Resource Protection Area (RPA) features and wooded areas are to provide buffering of the site and be protected from disturbance, and stormwater facilities are to be integrated seamlessly as low impact, "green infrastructure" within the site. Controlled ingress/egress points will direct traffic solely to intersections with suitable capacity and traffic calming infrastructure.

The master planned community is to be centered on passive and active open spaces and associated amenities. These open spaces are to be interconnected via pedestrian, bicycling, and vehicular travel networks and are to serve as the central and perimeter congregational and buffer areas for the development. This development is to be clustered and strategically situated adjacent to natural conservation areas and topographic features.

This community is to be integrated into the existing transportation networks. Sidewalks, bike paths, and vehicular connections are to be designed to facilitate community residents' enjoyment of parks and amenities internal to the development, but to permit residents to walk, bike, or drive to nearby schools, recreational areas, restaurants, and shops.

In combination with the Eastern State Hospital complex and employment center, this community is to provide a mixed use area consisting of residential, institutional, medical, commercial/office, and civic uses.

Each of these uses are to be appropriately interconnected to blend and support one another. The residential development will provide housing opportunities for the adjacent employment centers and will be located in close proximity to the civic uses, allowing convenient pedestrian mobility.

~~*For the portion of the Eastern State property located directly north of New Town and abutting Route 199, the principal suggested uses are a mixture of commercial, office, residential, and limited industrial. It is of critical importance that environmentally sensitive features such as topography, RPA features and wooded areas be protected and permanently preserved, where possible. New development or redevelopment in this area should follow consistent design guidelines and strive to integrate uses. The design, scale, and development pattern shall complement the existing New Town development located to the south.*~~

The portion of the Eastern State parcel located west of Route 199 should be conserved as open space, meaning no development is recommended for this portion. Furthermore, no vehicular access is recommended for this portion.

Staff Recommendation

As a rezoning application has been submitted and is on the Board's Agenda, staff recommends the Board of Supervisors approve the attached resolution to approve the land use designation change to Mixed Use - Eastern State, as well as the proposed description language listed above.

TC/tm
LU-20-03EstnState-rev-mem

Attachments:
1. Resolution

R E S O L U T I O N

CASE NO. LU-20-0003. EASTERN STATE (PARCELS A, B, AND D) -

LAND USE DESIGNATION CHANGE

WHEREAS, at its October 26, 2021, meeting, the Board of Supervisors of James City County adopted the James City County Comprehensive Plan *Our County, Our Shared Future: James City County 2045 Comprehensive Plan*; and

WHEREAS, at its September 28, 2021, October 26, 2021, April 12, 2022, and April 11, 2023, meetings, the Board of Supervisors postponed a component of the Comprehensive Plan, a land use designation change request submitted as Case No. LU-20-0003. Eastern State, located at a portion of 4601 Ironbound Road and 1001 Galt Lane, further identified as James City County Real Estate Tax Map Parcel Nos. 3910100152 and 3910100161; and

WHEREAS, the request was to change a portion of the property located at 4601 Ironbound Road, and the entire property located at 1001 Galt Lane, from the Federal, State, or County Land use designation to the Mixed-Use land use designation; and

WHEREAS, at its March 22, 2021, meeting, the Planning Commission Working Group voted 6-1 to recommend approval of Case No. LU-20-0003. Eastern State; and

WHEREAS, at its June 24, 2021, meeting, the Planning Commission voted 5-2 to adopt the Comprehensive Plan, including accepting the recommendation of approval of the Planning Commission Working Group for Case No. LU-20-0003.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby approves Case No. LU-20-0003. Eastern State, Parcels A, B, and D, and associated Mixed Use description language and directs that the James City County Comprehensive Plan Future Land Use Map and Land Use Chapter description be updated accordingly.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June 2026.

LU-20-03EstnState-rev-res

SUMMARY FACTS

Applicants:	Mr. Tim Trant, Kaufman & Canoles, P.C., Mr. John Zaszewski, Timmons Group, Mr. Mark Richardson, Timmons Group, Mr. Steve Schmidt, Timmons Group, Mr. Ryan Bolton, D.R. Horton, Inc., Mr. Rob Loftis, D.R. Horton, Inc.
Landowners:	Commonwealth of Virginia - Eastern State Hospital Colonial Community Services, LLC
Proposal:	Rezoning of approximately 365.6 acres from PL, Public Lands to MU, Mixed Use, with Proffers, to allow for up to 1,006 residential dwellings consisting of 309 single-family detached units, 247 single-family attached units, 450 apartments, up to 162,000 square feet of commercial use, and approximately 40.6 acres for public use.
Locations:	A portion of 4601 Ironbound Road 1001 Galt Lane
Tax Map/Parcel Nos.:	3910100152 3910100161
Current Zoning:	PL, Public Lands
Proposed Zoning:	MU, Mixed Use, with Proffers
Project Acreage:	+/- 365.6 acres
Comprehensive Plan:	Federal, State, or County Lands
Primary Service Area (PSA):	Inside
Staff Contact:	Terry Costello, Open Space Planner III

PUBLIC HEARING DATES

Planning Commission:	December 3, 2025, 6:00 p.m.
Board of Supervisors:	June 9, 2026, 5:00 p.m.

FACTORS FAVORABLE

1. Staff finds the proposal to be consistent with the Zoning Ordinance and all but one most adopted policies.

2. Staff finds the proposal to be consistent with the Comprehensive Plan and the Mixed Use - Eastern State designation as recommended by the Planning Commission (see Pages 22-29).

3. The proposal requires a minimum of four density points and the applicants have offered four and a half density points. Staff finds that the applicants have satisfied the requirements to achieve the density requested (see Pages 4-5).

4. The application is expected to have a positive cumulative fiscal impact based on analysis from the County's Fiscal Impact Model (see Pages 25-27).

5. The proposal passes the Adequate Public Schools Facilities Test (see Pages 13-14).

6. The proposal passes the Adequate Transportation Facilities Test (see Pages 6-13).

7. The application is consistent with the Parks & Recreation Development Guidelines (see Page 14).

8. The proposal aligns with the recommendations on workforce and affordable housing as stated in the 2045 Comprehensive Plan (see Page 5).

9. See Impact Analysis on Pages 20-21.

10. See Comprehensive Plan Analysis on Pages 22-29.

FACTORS UNFAVORABLE

1. The proposal is not consistent with the Board of Supervisors adopted policy - Multiple Use Districts and Mixed-Use Construction Phasing Policy (see Page 15).

2. While the proposal passes the Adequate Transportation Facilities Test with the achievement of an overall Level of Service "C" on adjacent roadways/intersections, there are some turning lanes that do not achieve the Level of Service "C".

3. The major components of the Traffic Impact Analysis (TIA) have been reviewed by the Virginia Department of Transportation (VDOT) and a third party consultant. However, final approval of the TIA has not been received by VDOT.

4. See Impact Analysis on Pages 20-21.

5. See Comprehensive Plan Analysis on Pages 22-29.

PLANNING COMMISSION RECOMMENDATION

At its December 3, 2025, Regular Meeting, the Planning Commission recommended approval of this application by a vote of 4-2.

CHANGES MADE SINCE THE PLANNING COMMISION MEETING

Minor changes were made to the proffers that included changes to Proffer Nos. 6, 9, and 13. The creation of a Community Development Authority was also removed.

On February 24, 2026, the James City Service Authority (JCSA) Board of Directors held its Annual Retreat. At that meeting, JCSA staff presented and discussed the Wastewater Capacity Study. Given the results of the recent Wastewater Capacity Study, JCSA staff worked closely with the Hampton Roads Sanitation District (HRSD) in evaluating this application.

According to the current Regional Hydraulic Model (RHM), the existing HRSD infrastructure downstream of the proposed development lacks the wet weather capacity during larger events to handle the anticipated flows without increasing the risk of overflow. However, it should be noted that HRSD has recently made operational improvements at both its Ford's Colony and Greensprings pump stations which will likely improve capacity, but these recent improvements are not yet reflected in the RHM. Adding additional flow upstream of these HRSD stations will reduce the effectiveness of these operational improvements. In addition, the flows conveyed to the JCSA New Town pump station are nearing or at capacity, which may necessitate upgrades to the existing facility to accommodate any additional demands.

A formal assessment, requiring a Water and Sewer Master Plan, and flow-acceptance process would need to be conducted through JCSA and HRSD to determine potential flow impacts on the JCSA and HRSD pump stations, if any. Generally, as with any new development throughout the County, as existing infrastructure nears capacity, upgrades to existing facilities to accommodate any additional demands may be required, including to the pump station(s) mentioned above. Accordingly, as noted later on in this staff report, while

legislative applications require the submission of Conceptual Utility Master Plan, it is not guaranteed that required service levels are available from the existing systems to support the development and it is not guaranteed that the size, location, and configuration of the water and sewer facilities shown thereon will work.

Specific to this application, staff notes that the applicants have proffered the submission of a detailed Utility Master Plan. This application further proffers that the County shall not be obligated to approve any final development plans for the property until the Water and Sewer Master Plan has been approved by JCSA and that the approved Water and Sewer Master Plan, to include the need for any required off-site improvements, shall be implemented by the developer.

SUMMARY STAFF RECOMMENDATION

The application is not consistent with the Board of Supervisors adopted Mixed Use Districts and Mixed-Use Construction Phasing Policy. However, staff finds the application to be generally consistent with the County's Zoning Ordinance and the 2045 Comprehensive Plan. Staff recommends that Board of Supervisors approve this application, subject to the proposed proffers.

PROJECT DESCRIPTION

Mr. Tim Trant of Kaufman & Canoles, P.C., on behalf of D.R. Horton, Inc., has applied to rezone an approximately 365.6-acre portion of land located at 4601 Ironbound Road and 1001 Galt Lane from PL, Public Lands, to MU, Mixed Use, with Proffers. This application includes the following:

- The proposal is for 1,006 residential dwellings, with 309 single-family detached, 247 multifamily units (townhomes), and 450 apartments. The proposal also includes up to 162,000 square feet of commercial uses, as well as approximately 40.6 acres of public uses.
- The parcel has approximately 127.69 acres of non-developable area which includes 127.2 acres of Resource Protection Area (RPA) and wetlands, and .49 acres of floodplain areas (outside the RPA). The net developable area of the parcel is approximately 237.9 acres.
- The proposal includes a total of 77.3 acres of open space including 51.3 acres of non-developable area and 26 acres of developable land.
- Based on the developable acreage of the parcel, this project proposes a density of up to 4.3 units per acre. In accordance with Section 24-519(b) of the Zoning Ordinance, the project requires four density bonus points to be provided.
- The applicants are proposing pedestrian connections to connect with existing pedestrian facilities along Galt Lane and DePue Drive, as well as pedestrian facilities on both sides of the proposed public roads. Additionally, connections will be made between the commercial and residential portions of the development, as well as to the public use site. There is also a connection proposed to the Westwood Park Development, should that development receive approval.
- There is approximately a 10-acre area designated on the Master Plan preserved as Mature Forest. There is approximately 11.94 acres of 100-foot buffers surrounding the edge of the RPA buffer preserved for added protection.
- Binding design guidelines have been provided and approved as part of the application.
- The proposal meets the Parks & Recreation Master Plan guidelines by providing (1) approximately 12.9 acres of park land, (2) two clubhouses, (3) two swimming pools, one 25-meter competition pool, and one leisure pool (less than 25 meters), (4)

one multiuse field, (5) two basketball courts and one tennis court, (6) two playgrounds with at least five activities, (7) trail connections to the public use site and the multiuse trail, (8) 7,500 feet of on-street bike paths, and 10,000 feet of multiuse trails.

- At least 20% of the dwelling units permitted on the property shall be offered for sale or rent at prices targeted at households whose annual income is equal to or less than 80% of the Area Median Income (AMI).

- The proposal includes modifications to the roundabouts the County is constructing at the intersection of Longhill Road/DePue Drive and DePue Drive/Ashbury Lane as follows:

  - The DePue Drive/Ashbury Lane roundabout will be modified to become a dual-lane roundabout. (Phase I)

  - The Longhill Road/DePue Drive roundabout will be modified to include the fourth leg (northbound approach) and a second southbound approach lane. (Phase 4)

  - The section of Longhill Road/DePue Drive between the roundabouts will be widened to a four-lane section. (Phase 4)

- The application proposes eight stormwater management facilities to be completed by the developer, cash contributions to the County to be used for a stream channel restoration project, and compliance with the most updated Special Stormwater Criteria (SSC) for consistency with the Powhatan Creek Watershed Master Plan.

- A public use site has been dedicated to the County that is approximately 40.6 acres.

- The commercial site, known as the "Market District" shall be conveyed to James City County without monetary consideration.

- The approximately 14.13-acre site where Colonial Behavioral Health has been conveyed to James City County and then transferred to Colonial Behavioral Health.

Density Bonuses

Based on developable acreage, the proposed development of 1,006 residential dwelling units corresponds to a density of 4.3 units per developable acre. Per Section 24-519(b), the project requires four bonus density points which have been proposed by the following options:

- Bonus Item Option E: Dedicating to the county a public use site the developable portion of which is suitable for a public facility, as determined by the county administrator or designee. (Bonus Point 1)

  The project includes an approximately 40.6-acre site east of Humelsine Parkway (Route 199) and on the most western portion of the proposed development. Credit has been given for this density bonus point.

- Bonus Item Option G: Preserving a single area of healthy, mature, mixed hardwood forestland at least two acres in size within the developable portion of the site. (Bonus Point 1)

  There is an area on the west of Humelsine Parkway that is noted on the Master Plan as the "Mature Forest Preservation." The applicants have been provided documentation that the area conforms to these conditions. Credit has been given for this density bonus.

- Bonus Point Option H: Preserving 100-foot buffers around non-RPA wetland features (isolated wetland), intermittent streams, or from floodplain zones A or AE (where not already part of the RPA), or from the edge of the RPA buffer. This item must

constitute at least 5% of the developable area of the site. (Bonus Point 1)

The Master Plan (Page 3) includes areas on the western side of Humelsine Parkway, as well as two areas, one east of the public use site, and the other behind the single-family homes towards the entrance of the development. These areas are labelled as "Additional 100-foot buffer beyond 100-foot RPA." Five percent of the developable area is 11.90 acres, and 11.94 acres have been provided. Credit has been given for this density bonus.

- Bonus Point Option I: Providing pedestrian accommodations on one side of all internal roadways, where this would exceed the requirements set forth in Section 24-35 of the Zoning Ordinance. (Bonus Point 1)

  Sidewalks will be provided on both sides of all internal roadways. Credit has been given for this density bonus.

- Bonus Point Option J: Developing binding design guidelines for the development that include superior architectural and design standards. Design guidelines shall be reviewed and approved by the Planning Director. (Bonus Point 0.5)

  The design guidelines submitted have been reviewed and approved by the Director of Planning. Credit has been given for this density bonus.

No density bonus is allowed for improvement, designs, or actions that are otherwise required by County, State, or Federal Law.

Housing Affordability Analysis

The 2045 Comprehensive Plan encourages inclusion of affordable and workforce units within new residential developments. Per the Comprehensive Plan recommendations, at least 20% of the development's proposed new dwellings should be offered for sale or rent at prices that are targeted at workers with incomes up to 80% of AMI level as determined by the U.S. Department of Housing and Urban Development. The applicants have proffered (Proffer No. 9) that at least 20% (up to 202) of the dwelling units shall be offered for sale at prices targeted at households whose annual gross income is equal to or less than 80% of the annual AMI, or offered for rent at a rate that does not exceed 30% of the annual gross income for individuals and families that are targeted at households earning up to 80% of the AMI, which is currently $106,500. As proffered, this does meet the recommendations of the 2045 Comprehensive Plan.

Affordable Sales Price by AMI % (2025 AMI)

% AMI	Upper Limit of the Sales Price Affordable to this AMI Level
30%	$107,250
60%	$212,000
80%	$281,750
100%	$351,750
120%	$421,500

Affordable Rental Price by AMI % (2025 AMI)

% AMI	Max. Rent Price for Household of 1	Max. Rent Price for Household of 2	Max. Rent Price for Household of 3	Max. Rent Price for Household of 4
30%	$559.13	$639.00	$718.88	$798.75
60%	$1,118.25	$1,278.00	$1,437.75	$1,597.50
80%	$1,491.25	$1,705.00	$1,917.50	$2,130.00
100%	$1,863.75	$2,130.00	$2,396.25	$2,662.50
120%	$2,236.50	$2,560.00	$2,875.50	$3,195.00

Public Transportation: Vehicular

The scale of this proposal requires the submittal of a Transportation Impact Analysis (TIA). The TIA examines the existing conditions of vehicular traffic, including Level of Service (LOS), with a focus on the roads and intersections serving and impacted by the proposed development. The study projects that the development would generate 1,424 A.M. peak hour trips, 1,300 P.M. peak hour trips and approximately 17,010 daily trips.

Access to the development will be provided via two (2) external site entrances off of DePue Drive (one opposite of Longhill Road and the other opposite of Ashbury Lane), and multiple internal site entrances along Galt Lane and Ashbury Lane extended. The portion of DePue Road which will receive traffic from this development currently operates at LOS A-C and is projected to continue to operate at LOS A-C in 2045. The portion of Longhill Road which receives traffic from this development currently operates at LOS A-C and is projected to operate at LOS D in 2045.

The TIA analyzed the following intersections:

- Longhill Road/Route 199 SB Ramps (Signalized)
- Longhill Road/Route 199 NB Ramps (Signalized)
- DePue Drive/Longhill Road (Unsignalized)
- DePue Drive/Ashbury Lane (Unsignalized)
- Ironbound Road/DePue Drive (Signalized)
- Ironbound Road/Schmidt Road (Unsignalized)
- Schmidt Road/Roster Road (Unsignalized)
- Ashbury Lane/Foster Road (Unsignalized)
- Schmidt Road/Galt Lane (Unsignalized)
- Ashbury Lane/Galt Lane (Unsignalized)
- Ashbury Lane/Commercial Entrance (Unsignalized)

The analysis also included the Route 199/Longhill Road interchange mainline, diverge, and merge sections. It is assumed that proposed intersection improvements at DePue Drive/Ashbury Lane and DePue Drive/Longhill Road/Proposed Access would be implemented by 2028.

The tables on Pages 6-11 show the LOS of the studied intersections based on various scenarios analyzed in the TIA.

Longhill Road (E-W) at Route 199 SB Ramps										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Overall	A	A	B	A	B	B	B	A	B	B
EBTH	B	A	B	B	B	B	B	B	B	B
EBR	A	A	A	A	A	A	A	A	A	A
EB Appr	A	A	A	A	A	A	A	A	B	B
WBL	C	C	C	C	C	C	C	C	C	C
WBTH	A	A	A	A	A	A	A	A	A	A
WB Appr	A	A	A	A	B	B	A	A	B	B
SBL	C	B	B	B	B	B	B	B	C	C
SBL Thru	C	B	B	B	B	B	B	B	C	C
SBR	B	B	B	B	B	B	B	B	B	B
SB Appr	C	B	B	B	B	B	B	B	C	C

Eastbound (EB) traffic along Longhill Road and is traveling towards the development.

Westbound (WB) traffic along Longhill Road is traveling towards Olde Towne Road.

Southbound (SB) traffic is utilizing the on and off-ramps from Route 199.

Longhill Road (E-W) at Route 199 NB Ramps

	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Overall	B	B	B	B	B	B	B	B	B	C
EBTH	B	B	B	C	B	C	B	C	C	C
EBR	A	A	A	A	A	A	A	A	A	A
EB Appr	B	B	B	B	B	C	B	C	C	C
WBL	C	D	C	C	C	C	C	C	D	D
WBTH	A	A	A	A	A	A	A	A	A	A
WB Appr	A	B	B	B	B	B	B	B	B	C
NBL	B	C	B	C	C	D	B	C	C	D
NBR	A	A	A	A	A	A	A	A	A	A
NB Appr	B	B	B	B	B	C	B	B	B	C

Eastbound (EB) traffic along Longhill Road is traveling towards the proposed development.

Westbound (WB) traffic along Longhill Road is traveling towards Olde Towne Road.

Northbound (NB) traffic is utilizing the off-ramp from Route 199.

Longhill Road (E-W) at DePue Drive (Future Access)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Overall			A	A	A	A	A	A	A	B
EBL	A	B								
EB Thru	A	A								
EBL Thru			A	A	A	A	A	A	A	B
EB Thru			A	A	A	A	A	A		
EB Thru-R									A	B
EB Appr	A	A	A	A	A	A	A	A	A	B
WB Thru			A	A	A	A	A	A		
WBL Thru									A	B
WBT Right	A	A	A	A	A	A	A	A	A	B
WB Appr	A	A	A	A	A	A	A	A	A	B
NBL									A	B
NBT Right									A	A
NB Appr									A	B
SBL Thru									A	C
SBL	E	F								
SBR	B	C							A	B
SB LR			A	D	A	D	A	C		
SB Appr	B	C	A	D	A	C	A	C	A	B

Eastbound (EB) traffic along Longhill Road is traveling towards the proposed development at the DePue Drive/Ashbury Lane entrance.
Westbound (WB) traffic along DePue Drive is traveling towards Route 199.

Northbound (NB) traffic is traveling from the proposed development (commercial entrance) towards Longhill Road.

Southbound (SB) traffic is traveling along Longhill Road towards Route 199.

DePue Drive (E-W) at Ashbury Lane (N-S)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Overall			A	C	A	A	A	B	A	A
EBL Thru					A	A			A	A
EBL	A	A								
EBT Right	A	A			A	A			A	A
EB L-T-R			A	A			A	B		
EB Appr	A	A	A	A	A	A	A	B	A	A
WBL	A	A								
WB Thru	A	A								
WBR	A	A								
WBL Thru					A	A			A	A
WBT Right					A	A			A	A
WB L-T-R			A	C			A	A		
WB Appr	A	A	A	C	A	A	A	A	A	A
NB L-T-R	C	E	A	A	A	A	A	A	B	B
NB Appr	C	E	A	A	A	A	A	A	B	B
SB L-T-R	B	D	A	B	A	B	A	B	A	B
SB Appr	B	D	A	B	A	B	A	B	A	B

Eastbound (EB) traffic along DePue Drive is traveling towards Ironbound Road.

Westbound (WB) traffic along DePue Drive traveling towards Longhill Road and Route 199.

Northbound (NB) traffic along Ashbury Lane is traveling towards the proposed development.

Southbound (SB) traffic along Ashbury Lane is traveling towards the proposed development.

DePue Drive (N-S) at Ironbound Road/Galt Lane (E-W)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Overall	C	C	C	C	C	C	C	C	C	C
EB L-T-R	D	C	C	C	D	D	C	C	D	D
EB Appr	D	C	C	C	D	D	C	C	D	D
WBL	C	D	C	D	C	D	C	D	D	E
WB Thru	C	C	C	C	C	C	C	C	C	C
WB Right	A	A	A	A	A	A	A	A	A	A
WB Appr	C	C	C	C	C	C	C	C	C	C
NBL	E	C	F	C	E	D	F	C	D	D
NB Thru	C	C	B	D	C	D	B	D	C	D
NBR	A	A	A	A	A	A	A	A	A	A
NB Appr	B	C	B	C	B	C	B	C	C	C
SBL	C	C	D	D	D	D	E	D	D	D
SB Thru R	B	C	B	C	B	C	B	C	C	C
SB Appr	C	C	C	C	C	C	C	C	C	C

Eastbound (EB) traffic along Galt Lane is leaving Eastern State Hospital.

Westbound (WB) traffic along Ironbound Road is traveling towards Eastern State Hospital.

Northbound (NB) traffic along Ironbound Road is traveling towards DePue Drive.

Southbound (SB) traffic along DePue Drive is traveling towards Ironbound Road.

Schmidt Road (E) at Ironbound Road (N-S)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
EB L-R	B	B	B	B			B	B		
EB Appr	B	B	B	B			B	B		
NBL	A	A	A	A			A	A		
NB Thru	A	A	A	A			A	A		
NB Appr	A	A	A	A			A	A		
SBL Thru	A	A	A	A			A	A		
SB Thru	A	A	A	A			A	A		
SB Appr	A	A	A	A			A	A		

Eastbound (EB) traffic along Schmidt Road is leaving Colonial Behavioral Health.

Northbound (NB) traffic along Ironbound Road is traveling towards DePue Drive.

Southbound (EB) traffic along DePue Drive is traveling towards Ironbound Road.

Foster Road (E-W) at Schmidt Road(N-S)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
EB L-T-R	A	A	A	A			A	A		
EB Appr	A	A	A	A			A	A		
WB L-T-R	A	A	A	A			A	A		
WB Appr	A	A	A	A			A	A		
NB L-T-R	A	A	A	A			A	A		
NB Appr	A	A	A	A			A	A		
SB L-T-R	A	A	A	A			A	A		
SB Appr	A	A	A	A			A	A		

Eastbound (EB) traffic along Foster Road is traveling towards the proposed development.

Westbound (WB) traffic along Foster Road is traveling away from the proposed development.

Northbound (NB) traffic along Schmidt Road is traveling away from Colonial Behavioral Health.

Southbound (SB) traffic along Schmidt Road is traveling to Colonial Behavioral Health.

Foster Road (E-W) at Ashbury Lane(N-S)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
EB L-T-R	A	A	A	A			A	A		
EB L Thru					A	A			A	A
EB Appr	A	A	A	A	A	A	A	A	A	A
WB L-T-R	A	A	A	A			A	A		
Wb Thru R					A	A			A	A
WB Appr	A	A	A	A	A	A	A	A	A	A
NB L-T-R	A	A	A	A			A	A		
NB Appr	A	A	A	A			A	A		
SB L-T-R	A	A	A	A			A	A		
SB LR					B	B			B	B
SB Appr	A	A	A	A	B	B	A	A	B	B

Eastbound (EB) traffic along Foster Road is traveling away from the proposed development.

Westbound (WB) traffic along Foster Road is traveling towards the proposed development.

Northbound (NB) traffic along Ashbury Lane and is traveling towards DePue Drive.

Southbound (SB) traffic along Ashbury Lane is traveling towards the development.

Galt Lane (E-W) at Schmidt Road (N-S)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
EB L-T-R	A	A	A	A			A	A		
EB Appr	A	A	A	A			A	A		
WB L-T-R	A	A	A	A			A	A		
WB Appr	A	A	A	A			A	A		
NB -L-T-R	A	A	A	A			A	A		
NB Appr	A	A	A	A			A	A		
SB L-T-R	A	A	A	A			A	A		
SB Appr	A	A	A	A			A	A		

Eastbound (EB) traffic along Galt Lane is traveling towards Ironbound Road.

Westbound (EB) traffic along Galt Lane is traveling towards the proposed development.

Northbound (NB) traffic along Schmidt Road is traveling away from Colonial Behavioral Health.

Southbound (SB) traffic along Schmidt Road is traveling towards Colonial Behavioral Health.

Galt Lane (E-W) at Ashbury Lane (N)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
EB L-Thru	A	A	A	A			A	A		
EB L-T-R					A	A			A	A
EB Appr	A	A	A	A	A	A	A	A	A	A
WB Thru R	A	A	A	A			A	A		
WB L-T-R					A	A			A	A
WB Appr	A	A	A	A	A	A	A	A	A	A
NB L-T-R					A	A			A	A
NB Appr					A	A			A	A
SB L-R	A	A	A	A			A	A		
SB L-T-R					B	B			B	B
SB Appr	A	A	A	A	B	A	A	A	B	B

Eastbound (EB) traffic along Galt Lane is traveling towards Ironbound Road.

Westbound (WB) traffic along Galt Lane is traveling towards the proposed development.

Northbound (NB) traffic along Ashbury Lane is traveling away from Colonial Behavioral Health.

Southbound (SB) traffic along Ashbury Lane is traveling towards Colonial Behavioral Health.

Ashbury Lane (N-S) at Commercial Entrance(W)										
	Existing		2028 No-Build		2028 Build		2032 No-Build		**2032 Build**	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
EB L-R									A	B
EB Appr									A	B
NB L Thru									A	A
NB Appr									A	A
SB Thru R									A	A
SB Appr									A	A

Eastbound (EB) is traveling away from the commercial development towards Ashbury Lane.

Northbound (NB) is traffic along Ashbury Lane away from the commercial development

Southbound (SB) is traffic along Ashbury Lane traveling towards the commercial development.

The County adopted the Adequate Transportation Facilities Test by resolution on August 14, 2018. This policy requires a proposed Special Use Permit (SUP) or Rezoning to be tested during the application process to ensure that transportation facilities are adequate to mitigate traffic impacts. A proposed Rezoning or SUP application will be tested for Adequate Transportation Facilities and will pass the test if:

- No off-site improvements are required by the TIA that is approved by both the Planning Director and the Virginia Department of Transportation (VDOT); or

- All off-site improvements recommended by a TIA that are approved by both the Planning Director and VDOT are guaranteed in a form approved by the Planning Director and the County Attorney.

As shown in the tables above, all intersections will operate at a LOS of C or better, however, some individual lane movements would be a LOS D or worse.

As noted in the TIA, with the development of the James City County Government Complex, the County will construct a dual-lane roundabout at the intersections of Longhill Road/DePue Drive intersection and a single-lane roundabout at the DePue Drive/Ashbury Lane intersection. These improvements will be in place by 2028.

Transportation improvements recommended by the TIA proffered by the applicants include modifying the roundabouts the County is constructing at the intersections of Longhill Road/DePue Drive and DePue Drive/Ashbury Lane. The section of Longhill Road/DePue Drive between the roundabouts is also proposed to be widened to a four-lane section (second southbound approach). The improvements at DePue Drive/Ashbury Lane will be constructed with Phase 1 (2028, and the other improvements will be constructed in Phase 4 (2032 - projected complete build-out) of the site. According to the TIA, no further improvements were needed to accommodate the site traffic.

Schools

The County adopted the Adequate Public Schools Facilities Test by resolution on June 23, 1998. A proposed rezoning or SUP application for residential development is required to show that the schools which would serve the future development currently have adequate design capacity to accommodate the existing student population plus the additional schoolchildren generated by the development. The schools shall be deemed adequate if the projected student population does not exceed 100% of the design capacity.

However, if the affected public schools currently exceed design capacity, but the schools' student population will be brought under design capacity within three years of the time of the application's review through either physical improvements programmed in the Capital Improvement Program (CIP), and/or through a redistricting plan that was approved by the School prior to application, then the application will be deemed to have passed the test.

The proposed development is anticipated to generate an additional 223 students. As illustrated in the following table, the 223 students projected from the development would not cause the enrollment levels for Clara Byrd Baker Elementary School, James Blair Middle School, or Lafayette High School to exceed effective capacity. Thus, this proposal passes the Adequate Public Schools Facilities Test.

There is a Rezoning application currently on schedule to be reviewed by the Board of Supervisors in July 2026 that is on the same property as the Cardinal Ridge project. Should both applications be approved, the total enrollment number plus projected students will exceed the effective capacity by 10 students. However, as noted below, the current enrollment includes Pre-Kindergarten (Pre-K) students. There is a project underway that will house the Pre-K students in another building at the same location as Clara Byrd Elementary School. The Pre-K buildings are currently expected to open in time for the 2027-2028 school year. With the new addition, and the related school district rezoning process, staff believes that this proposal does pass the Adequate Public Schools Facilities Test.

Student Enrollment and School Capacity, Williamsburg-James City County (WJCC) Schools Fall 2025

School	*Effective Capacity*	*Enrollment 2025-26*	*Projected Students Generated*	*Enrollment + Projected Students*
Clara Byrd Baker Elementary School	618	502*	+105	607
James Blair Middle School	608	465	+50	515
Lafayette High School	1,514**	1,211	+68	1,279

**Figure includes Pre-Kindergarten enrollment*
***New Effective Capacity*
Source: WJCC Staff Correspondence

Parks & Recreation

This proposal includes up to 1,006 residential units. As illustrated in the following table on Page 7, the applicants are proffering to meet the development guidelines provided within the James City County Parks & Recreation Development Guidelines.

James City County Parks & Recreation Development Guidelines Comparison

Minimum Requirement (units)	*Minimum Required*	*Proffered or Shown on Master Plan*
Parkland Acreage	2.82 acres	12.9 acres
Biking/Jogging Trails	3,907.20 square feet	7,500 square feet of biking, 10,000 square feet of multiuse trails
Playground	2	2
Sport Court or Pool	2	2 pools, 2 basketball, and 1 tennis court
Multiuse Field	1	1

James City Service Authority

JCSA has reviewed the proposal and determined that while the development is within the PSA and can be served by the public water and sewer systems, it is not guaranteed that required service levels are available from the existing systems to support the development and that the size, location, and configuration of the water and sewer facilities shown on the Conceptual Utility Master Plan are not approved. A detailed Utility Master Plan, including Hydraulic Analysis, are required to be submitted to and approved by JCSA prior to the submission of development plans.

Accordingly, the applicants have proffered the submission of a detailed Utility Master Plan depicting the proposed public water and sewer systems as well as any required off-site improvements for the systems which shall be shown on the development plans for the project and completed by the applicants.

Powhatan Creek Watershed Master Plan

The proposed development is located within Subwatershed 208 of the Powhatan Creek Watershed. On September 26, 2023, the Board of Supervisors adopted the updated Powhatan Creek Watershed Master Plan providing goals and recommended strategic actions for the watershed as well as identifying candidate site of improvements within each subwatershed.

The Watershed Master Plan identifies recommended strategic actions related to SSC measures including that they should be expanded to apply to any new development within County watersheds. The application has proffered the submission of a Master Stormwater Management Plan (MSMP), including that stormwater management facility outlet protection shall be designed for 100-year storm events based on post-development conditions. The application has also proffered that the development of the property shall be in accordance with the most updated SSC, dated March 2025, which are being considered by the Board of Supervisors for adoption.

The Watershed Master Plan also identifies three candidate projects to restore stream reaches, one candidate project to stabilize the outfall of an existing stormwater management facility, and three candidate projects to retrofit existing stormwater facilities. The application has proffered cash contributions to the County for the County to undertake stream restoration projects on or near the property.

The Stormwater and Resource Protection Division has reviewed the application and found it to be generally consistent with the Powhatan Creek Watershed Master Plan.

Construction Phasing

Construction within Mixed-Use developments shall be sequenced in accordance with the Multiple Use Districts and Mixed-Use Construction Phasing Policy that was adopted by the Board of Supervisors on September 11, 2012. As a guideline, project proposals that adhere to the following sequencing requirements will be considered consistent with the objectives of the phasing plan:

- Building permits for up to 10% of the residential units may be issued prior to commencing any commercial construction;

- Certificates of Occupancy (CO) must be issued for at least 25% of the commercial square footage as shown on the Master Plan prior to building permits being issued for any residential unit above 50% of the total proposed units as shown on the Master Plan;

- Prior to issuance of building permits for construction of the final 20% of the residential units, COs must be issued for at least 80% of the commercial square footage as shown on the Master Plan; and

- If no residential development is proposed, the construction phasing shall still make assurances that all infrastructure is installed in coordination with the planned build-out of the development.

The applicants have proffered that the commercial section of the proposed development be conveyed to the County without monetary consideration. There is no guarantee in the proffers that ensures that the recommendations of the phasing policy are adhered to.

Proffers

Voluntary proffers have been offered by the applicants to mitigate the development's impact on County resources. Staff has reviewed these proffers for enforceability and for their effectiveness in mitigating the impacts. Comments are provided in italics.

- Proffer Nos. 1 and 3 Design and Property Owners Association. The Property shall be developed generally in accordance with the Master Plan and Design Guidelines. The Owner shall form one or

more Property Owners' Association, in accordance with Virginia Law, with the preparation and execution of Declaration of Covenants, Conditions and Restrictions. The Declaration shall provide that all material improvements (and all material changes to improvements) to the Residential and Commercial Properties shall be subject to review and approval by the Design Review Board for consistency with the Design Guidelines prior to construction of any applicable improvements (or any applicable changes to improvements) on the Residential and Commercial Properties. Evidence of such Design Review Board approval must be provided to the County prior to issuance of a building permit for construction of any applicable improvements (or any applicable changes to improvements) on the Residential and Commercial Properties. The Association and/or Design Review Board may not amend or modify the Design Guidelines without the prior written approval of the County Community Development Director.

This proffer is linked to Density Bonus Item Option J: Developing Binding Design Guidelines. The proffer would ensure that the design guidelines submitted with this application are adhered to, with any amendments requiring approval by the Director of Planning. The proffer also requires that final building plans or elevations are reviewed for consistency with the design guidelines by the Association's Design Review Board.

- Proffer No. 6 Transportation. The construction, installation, and/or implementation of the following improvements shall be completed or guaranteed in accordance with Section 15.2-2299 of the Virginia Code (or such successor provision) and the applicable provisions of the County Code of Ordinances (such performance assurances to be herein referred to as a "Guarantee" or "Guarantees") as provided below. The timing of these improvements are based on when the intersections exceeds a certain trip generation as determined by the most recent edition of the Institute of Transportation Engineers Trip Generation Manual.
    - Intersection 1 (Longhill Connector Road and Longhill Road) - (1) one of (i) a roundabout and associated intersection improvements if such does not exist, (ii) improvements/modifications to any existing roundabout and intersection improvements to include a fourth leg (northbound approach) and two circulating lanes throughout the roundabout, or (iii) alternative traffic control approved by VDOT, and (2) widening of Longhill Road between Intersection 1 and Intersection 2, to a four-lane section.
    - Intersection 2 (Longhill Connector Road and Ashbury Lane - one (i) a roundabout and associated intersection improvements if such does not exist, (ii) improvements/modifications to any existing roundabout and intersection improvements to include two circulating lanes throughout the roundabout, (iii) alternative traffic control approved by VDOT.
    - The portion of Galt Lane, which is not located on the Property, shall be improved to the applicable VDOT standards in effect as of the date of the approval of the applications associated with the proffers.

    This proffer ensures that all traffic improvements suggested by the TIA are installed and guaranteed in order to mitigate the impacts of the proposed development.

- Proffer No. 7 Water and Sewer Master Plans. The Owner shall submit to the County as updated water and sewer Master Plan, including a hydraulic analysis and identifying any required off-site improvements necessary to serve the Property, at least three months before the initial Development Plan submittal for the Property for review and approval by JCSA. The water and sewer Master Plan may be revised and/or updated during the development of the Property with prior approval of the JCSA. The County shall not be obligated to approve any final development

plans for the Property until the water and sewer Master Plan has been approved by the JCSA. The water and sewer Master Plan, as revised and/or updated, shall be implemented in all development plans for the Property at the time required to serve the Property.

This proffer ensures that the applicants will provide a detailed Utility Master Plan for the proposed public water and sewer systems to JCSA prior to the submission of development plans. It also ensures that off-site improvements which may be required for the public water and sewer systems will be included with development plans for the property and the work will be completed by the applicants.

- Proffer No. 8 Public Use Sites. The portion of the Property shown generally on the Master Plan as "Hope Family Village Site" shall be conveyed without monetary consideration to Hope Family Corporation or an affiliate thereof or such other comparable organization approved by the County. The portion of the property shown as the "Public Use Site" shall be conveyed to the County without monetary consideration.

  The site for Colonial Behavioral Health was initially listed in this proffer but has already been conveyed to Colonial Community Services, Inc. Construction has already begun on a 14,000-square-foot building that is permitted by-right with the current zoning. When the public use site is developed, the County will be responsible for installing all infrastructure necessary for the applicable use (not including the transportation improvements proffered by the applicants).

- Proffer No. 9 Housing Opportunities. At least 120 of the dwelling units permitted on the Property shall be offered for rent at prices that are targeted at households' income for individuals or families whose gross income is equal to or less than 80% of the annual Area Median Income for the County. This amount shall not exceed 30% of the annual gross income.

  The applicants have proffered that at least 20% (up to 202) of the dwelling units shall be offered for sale at prices targeted at households whose annual gross income is equal to or less than 80% of the annual AMI, or offered for rent at a rate that does not exceed 30% of the annual gross income for individuals and families that are targeted at households earning up to 80% of the AMI, which is currently $106,500. As proffered, this does meet the recommendations of the 2045 Comprehensive Plan.

- Proffer No. 11 Recreation. The County shall not be obligated to issue building permits for more than a total of 503 Residential Units on the Residential Property until the recreational facilities shown and described on Page 4 of the Master Plan as (a) Significant Locations 1-8, and (b) the Multiuse trails located on the Residential Property are completed. All recreational facilities within the Property shall be completed in accordance with the construction standards, as applicable, contained in the version of the County Parks & Recreation Master Plan in effect at the time of approval of the applications associated with the proffers.

  The proffer ensures that recreational facilities are provided before building permits are issued for more than 503 dwelling units. The amount of amenities proffered exceed the recommendations of the Parks & Recreation Development Guidelines; therefore, staff finds the application consistent.

- Proffer No. 12 Commercial Site. The Owner shall convey without monetary consideration, to the County, the portion of the Property known as Market Place District (the "Commercial Site").

  According to the James City County's Multiple Use Districts and Mixed-Use Construction Phasing Policy, construction within mixed-use developments shall be sequenced in accordance with a project build-out schedule submitted for review as part of the initial application and approved by the Board of Supervisors. There is no information provided as to whether this would occur; therefore, it does not meet the intent of the County's Phasing

Policy. The infrastructure required for this section of the development will be completed by whomever develops the property.

- Proffer No. 14 Infrastructure Removal and Stream Channel Restoration. The owner shall make a contribution to the County in the amount of $1,250,000 ("Stream Channel Restoration Amount") for stream channel restoration to be conducted by the County on or in the immediate vicinity of the Property. The amount shall be paid in increments of $1,068.75 per Residential Unit developed on the Property, excluding the "Affordable Units" and Hope Family Village ("Per Unit Stream Restoration Contribution"). It shall be paid at the time of issuance of a final Certificate of Occupancy for each unit. The Stream Channel Restoration Amount and the Per Unit Stream Restoration Contribution shall be adjusted annually beginning January 1, 2027, to reflect any increase or decrease for the preceding year in the Marshall and Swift Cost Index. Any unpaid balance of the Stream Channel Restoration Amount shall be paid to the County in full on or before the date which is five years after the date of final approval by the County of the first site plan or subdivision plan for development of the Property pursuant to the Master Plan.

  The proffer commits the applicants to contribute to a stormwater restoration project. This project is identified in the Powhatan Creek Watershed Master Plan.

  Regarding the stream restoration proffer: the proffers have been made with the concept that the County would undertake the stream restoration project itself, and not the developer. Under this scenario, it would be the County who would ultimately fund, design, permit, construct, and complete the restoration project. Further, the proffers have been made with the concept that, in order to fully fund the project, proffered funds from this application, if approved, would be combined with proffered funds from the other Eastern State development application, if approved. Those combined proffered funds would then be leveraged for a future Stormwater Local Assistance Fund (SLAF) grant application to the state. If that grant application is approved, staff estimates the three sources of funding would come close to fully covering expected costs for the stream restoration project, as the stream exists today.

  Without funding coming from all three of these sources (i.e., the two Eastern State development applications and from the state via a competitive SLAF grant application), staff notes that expected costs for the full stream restoration, as identified in the adopted Watershed Master Plan report, would exceed available funding. Alternatives would then need to be developed and considered.

- Proffer No. 15 Master Stormwater Management Plan. The Owner shall submit to the County a Master Stormwater Management Plan at least three months before the initial development plan submittal for the Property, to include the stormwater management Best Management Practices, for review and approval by the Stormwater and Resource Protection Division. The MSMP shall include a requirement that all outlet protection be sized for the 100-year, post-development storm and shall show the location of stream restoration/improvements needed in Powhatan Creek, Sub watershed 208. The MSMP may be revised and/or updated during the development of the Property with prior approval of the Stormwater and Resource Protection Division. The County shall not be obligated to approve any final development plans for the Property until the MSMP has been approved by the Stormwater and Resource Protection Division. The MSMP, as revised and/or updated, shall be implemented in all development plans for the Property. All development plans for the Property shall implement the County's SSC criteria dated March 2025.

  The proffer ensures that a MSMP is submitted at least 90 days in advance of the first development plan of the property and that the MSMP shall be approved prior to approval of development plans.

The proffer also ensures that enhanced outlet protection will be included for stormwater management facilities as well as that all development plans will adhere to the most current version of the SSC.

PLANNING AND ZONING HISTORY

The property was originally zoned R-3, General Residential, until 1992 when the R-3 Zoning District was redesignated to the R-2, General Residential Zoning District. The property was rezoned to PL, Public Lands, upon the creation of the Zoning District in 2007.

The property has been owned by the Commonwealth of Virginia and the location of the Eastern State Hospital facility for decades.

During the Engage 2045 Comprehensive Plan update process, two Land Use (LU) applications were submitted requesting to change the LU designations of portions of the property from Federal, State, or County Lands to Mixed Use - Eastern State. Specifically, LU-20-0003 aligns with the project area of this application. The Board of Supervisors deferred consideration of the LU applications to allow for the LU designation to be considered concurrently with proposals to rezone the property.

SURROUNDING ZONING AND DEVELOPMENT

- The following table lists information on the parcels adjacent to the property:

	ZONING DESIGNATION	EXISTING LAND USE	FUTURE LAND USE DESIGNATION
NORTH	R-2, General Residential; R-5, Multifamily Residential; LB, Limited Business; and PL, Public Lands	Residential and commercial uses, and the JCC Recreation Center	Low Density Residential; Moderate Density Residential; and Federal, State, or County Lands, Community Character Conservation Open Space or Recreation
SOUTH	Mixed Use and M-1, Limited Business/Industrial	New Town, Commercial, and Industrial Uses	Mixed Use and Limited Industry
EAST	JCC: PL, Public Lands City of Williamsburg: RS-3, Single-Family Dwelling District	The College of William & Mary Facilities and Residential Uses	JCC: Federal State or County Lands City of Williamsburg: Medium-Density Single-Family Detached Residential
WEST	R-4, Residential Planned Community	Ford's Colony	Low Density Residential

IMPACT ANALYSIS

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Please note the information in the Status column indicated below does not include information from the Financial Impacts of Residential Units section of this staff report.		
Public Transportation: Vehicular	Mitigated	- See discussion on Pages 6-13.
Public Transportation: Pedestrian/Bicycle	No Mitigation Required	- Pursuant to Section 24-35 of the Zoning Ordinance, pedestrian improvements for the public and private roads are required to be shown on the Construction Plan and installed as part of the development. - Portions of this proposed development are not within walking distance to existing WATA bus stops.
Public Safety	No Mitigation Required	- Fire Station 4 at 5312 Olde Towne Road serves this area of the County and is approximately 2 miles from this property. - The proposal does not generate impacts that require mitigation to the County's emergency services or facilities.
Public Schools	No Mitigation Required	- See discussion on Pages 13-14.
Public Parks and Recreation	Mitigated	- See discussion on Page 14.
Public Libraries and Cultural Centers	No Mitigation Required	- The proposal does not generate impacts that require mitigation to public libraries or cultural centers.
Groundwater and Drinking Water Resources	Mitigated	- The JCSA has reviewed and approved this conceptual proposal on the Master Plan, as well as the projected water and sewer flows within the CIS. - JCSA regulations require the submittal of Water Conservation Standards to be reviewed and approved by the JCSA prior to any development on the property. **Proffers** - Proffer No. 4 requires the submittal and approval of Water Conservation Standards for the development. - Proffer No. 7 requires the submittal of an overall master water and sanitary sewer plan for the property, to be reviewed and approved by JCSA prior to any subdivision or development on the property.

Impacts/Potentially Unfavorable Conditions	**Status** *(No Mitigation Required/Mitigated/Not Fully Mitigated)*	**Considerations/Proposed Mitigation of Potentially Unfavorable Conditions**
Please note the information in the Status column indicated below does not include information from the Financial Impacts of Residential Units section of this staff report.		
Watersheds, Streams, and Reservoirs	Mitigated	- The Master Plan shows a conceptual layout for stormwater management facilities, which includes Best Management Plans. The property is located within the Powhatan Creek watershed, which does have a currently adopted Watershed Management Plan. **Proffers** - Proffer No. 5 requires Nutrient Management Plans for all turf areas proposed for development. - Proffer No. 14 proposes cash contributions to the County to be used for a stream restoration project on or near the property. - Proffer No. 15 requires the submission of a Master Stormwater Management Plan before the submission of a development plan for the property. The proffer also requires enhanced stormwater management facility outlet protection and that the MSMP will adhere to the most recent version of the SSC.
Cultural/Historic	No Mitigation required	- Per the County's Geographic Information System, this property is not identified as an ultra or highly sensitive area on the James City County archaeological assessment, meaning no archaeological study is required for this application as part of the legislative submittal. Per Section 19-27 of the Subdivision Ordinance, an archaeological study and natural resource inventory will be required at the development plan stage.
Community Character	Mitigated	- The applicants have offered design guidelines for all development on the property in accordance with Section 24-519, Density. These guidelines have been reviewed and approved by the Planning Director. - The project offers a minimum of 10 acres that shall be preserved as hardwood forest as shown on the Master Plan. - The project provides sidewalks on both sides of all public rights-of-way.

NATURAL AND CULTURAL ASSETS

The site is identified as having natural and cultural assets on the Natural & Cultural Assets Plan maps (and/or other supplemental resources such as Virginia Lands and Energy Navigator (VaLEN)) as follows:

ASSET	PRESENCE	IMPACT
Habitat Core	Present on-site (see Attachment No. 8)	-All habitat cores identified in the Natural & Cultural Assets Plan are important ecologically. Of the 1-5 ranking system used in the Plan, the core on this property is ranked in the 3 category (with 1 being the lowest priority). -The portion of this parcel identified as habitat core is approximately 180 acres. Approximately 38.5 acres will be part of the residential portion of the development, and 40.6 acres as the public use site as being within the habitat core. -Some of the habitat core acreages are located within the RPA and thus protected.
Corridors	Present on-site (see Attachment No. 8)	-The portions of habitat corridors shown on the property are aligned with the RPA on the property and thus protected.
Agricultural Assets	-Present on-site (see Attachment No. 9)	-Approximately 91.40 acres or 25% of the property is rated prime farmland, and 111.85 or 30% of the property is rated farmland of statewide importance.

2045 COMPREHENSIVE PLAN

The property is currently designated as Federal, State, or County Lands on the Comprehensive Plan Land Use Map and is adjacent to properties designated as Mixed Use and Mixed Use - Eastern State to the south (New Town Mixed Use Area) and Low Density Residential to the west (Ford's Colony). The following general guidance is stated for the Federal, State, or County Lands Designation:

> "Publicly owned lands included in this category are Eastern State Hospital, military installations, County offices and facilities, and larger utility sites such as the Hampton Roads Sanitation District treatment plant. Development in these areas should follow applicable development standards listed in the charts."

While the proposed development of residential and commercial uses is not consistent with the Federal, State or County Lands designation, a LU application LU-20-0003, was submitted during the Engage 2045 Comprehensive Plan update process to change the designation of the project area to Mixed Use - Eastern State. On June 24, 2021, the Planning Commission voted to recommend approval of the draft 2045 Comprehensive Plan, including LU-20-0003. The Board of Supervisors considered the draft 2045 Comprehensive Plan including LU-20-0003 at its July 13, 2021, September 28, 2021, and October 26, 2021, meetings, and ultimately deferred consideration of LU-20-0003 so that the proposed designation could be considered concurrently with an application to rezone the property for development.

Accordingly, staff has reviewed the application pursuant to the draft language for the Mixed Use - Eastern State Designation. Specifically, the draft language includes the following guidance for the project area:

"The eastern portion of this site is to be developed as a Master Planned community that harmoniously blends the Eastern State Hospital campus with the adjacent New Town community, though this development is expected to have its own mixture of uses and design

expectations The two guiding principles for mitigating impacts regarding the redevelopment of this site are: a) the preservation and protection of environmentally sensitive features; and b) the protection and expected enhancement of the immediate transportation network. In combination with the Eastern State Hospital complex and employment center, this community is to provide a mixed-use area consisting of residential, institutional, medical, commercial/office, and civic uses. Each of these uses are to be appropriately interconnected to blend and support one another. The residential development will provide housing opportunities for the adjacent employment centers and will be located in close proximity to the civic uses, allowing convenient pedestrian mobility. The portion of the Eastern State parcel located west of Route 199 should be conserved as open space, meaning no development is recommended for this portion. Furthermore, no vehicular access is recommended for this portion."

Staff finds that the application adheres to the principal suggested uses, improves environmentally sensitive areas, provides housing opportunities for the adjacent employment centers, and protects the area west of Route 199 as open space so as to discourage development for this portion.

Further, the Mixed Use - Eastern State designation is proposed to follow the Mixed-Use Designation, Descriptions, and Development Standards for the Level 2, Medium Town or Suburban Center category. Recommended land allocations are as follows:

Land Use	*Recommended Land Area Percentage*	*Proposed Land Area Percentage*
Residential Area	20-50%	56%
Non-residential Area	50-80%	12%
Public/Civic Area	5%	12%
Open Space and Recreation Areas	10%	20%

While the development provides more residential area (56%) than the recommendation, and less non-residential area (12%), the development provides more area for public use (12%) and open space (20%).

Densities and intensities should be generally as follows but variability may be allowed if alternative densities and intensities can be shown to better meet the land use objectives of this designation. The recommended densities are:

Land Use	*Recommended Densities and Intensities*	*Proposed Densities and Intensities*
Non-residential Floor to Area Ratio (FAR)	0.3-1	0.11
Residential Density (units/developable acre)	6-12	4.3
Multi-family Residential Building Stories	2-5	2-3 (townhomes) 2-4 (apartments)
Office Building Stories	2-6	1-2
Retail and Service Commercial Building Stories	1-2	1-2

The proposed net residential density of 4.3 and the proposed non-residential Floor Area Ratio (FAR) of 0.11 does not meet the recommendations listed above. However, staff finds that the proposed scale and intensity of the development is appropriate for the location. The proposal also includes townhomes with two- to three-stories, and retail/commercial with one- and two-story buildings, which is also recommended.

The Comprehensive Plan's Land Use Development Standards are to be used in conjunction with the land use descriptions when considering any new development. The following development standards are applicable for Mixed Use designations:

- All developments should refer to the Residential and Commercial/Industrial Development Standards, including Affordable and Workforce Housing, Enhanced Environmental Protection, and Transportation and Mobility, along with the Mixed-Use Development Standards. All developments should also refer to the Character Design Guidelines for more specific guidance on development character.

  The proposed development provides affordable and workforce housing, protection of environmentally sensitive features, mitigation of stormwater runoff, water conservation standards, multimodal transportation options, and binding design guidelines which are generally consistent with the Character Design Guidelines.

- Mixed-Use developments should create vibrant urban/small town environments that bring compatible land uses, public amenities, and utilities together at various scales. These developments should create pedestrian-friendly, complete communities, with a variety of uses that enable people to live, work, play, and shop in one place.

  The development proposes to create an urban core providing a mix of residential unit types, commercial development, and amenities which will be interconnected with pedestrian and bike accommodations.

- Mixed-Use developments require nearby police and fire protection, high-capacity road access, access to public utilities, large sites, environmental features such as soils and topography suitable for intense development, and proximity or easy access to large population centers. The timing and intensity of commercial development at a particular site are controlled by the maintenance of an acceptable LOS for roads and other public services, the availability and capacity of public utilities, and the resulting mix of uses in a particular area. Master Plans are encouraged to be submitted to assist in the consideration of Mixed-Use development proposals. The consideration of development proposals in Mixed Use areas should focus on the development potential of a given area compared to the area's infrastructure and

the relation of the proposal to the existing and proposed mix of land uses and their development impacts.

Public services are adequate for the development. Transportation improvements proffered include improvements to the roundabouts that will be installed due to the James City County Government Complex project.

- The Mixed-Use developments should focus on place-making. Developments should be designed to create a sense of place and should be seen as community destinations. Focal open spaces, community-oriented gathering places, unified architectural design, and a mix of uses and design that encourages pedestrian activity are all examples of creating a sense of place.

  The development will consist of residential and commercial uses and amenities which will serve as a focal point for the development. These amenities include passive and active recreational areas, along with an on-street bike path, multiuse paths, and sidewalks on both sides of the streets internal to the development.

- Mixed-Use developments should allow for compact development that create more efficient buildings and spaces, which can be less of a burden on the environment, creating a more sustainable community.

  The development is a compact development that includes single-family detached, single-family attached, multifamily dwelling units, and commercial uses while protecting much of the environmentally sensitive areas.

- Mixed-Use developments should encourage the proximity of diverse uses to make it possible to reduce vehicle trips and vehicle miles traveled, providing for a greater potential for internal capture than with typical suburban development and should provide good multimodal networks for bicycle and pedestrian uses.

  The development will include a mixture of residential uses and provides a network of on-street bike and pedestrian accommodations. The majority of the commercial is separated from the residential by wetlands and the RPA, which could result in less trips internal to the residential portion of the site.

Character Design Guidelines

As part of the Comprehensive Plan, the County adopted a set of Character Design Guidelines to be applied to all developments requiring legislative approval to encourage development to be compatible with the overall character of the County. The proposed design guidelines submitted with the application are consistent with the County's Character Design Guidelines in many areas, including providing an interconnected street network, providing pedestrian accommodations, limiting the amount of street-facing garages, creating architectural variety and discrete facades among single-family attached units, and ensuring the design of commercial buildings are of a scale and intensity that is compatible with the surrounding residential development. Overall, staff finds the proposed design guidelines to be consistent with the County's Character Design Guidelines.

Financial Impacts of Residential Units

The Comprehensive Plan includes Goals, Strategies and Actions (GSA) LU5, which states "continue land use planning and perform development review consistent with the capacity of existing and planned public facilities and services and the County's ability to provide such facilities and services." Land Use GSA 5.3 provides guidance for the County to ensure that developments subject to rezoning or special use permit review mitigate their impacts.

Information on impacts and the mitigation provided by this application are included below.

In alignment with the Comprehensive Plan, on February 28, 2023, the Board of Supervisors adopted a resolution directing staff to use the County's Fiscal Impact Model to assess the following for proposed developments:

- The fiscal impact to the County (both Operating and Capital budget) for the residential and non-residential components of the project; and

- The incremental capital costs for public facilities for the residential component of the project.

Overall Impact (Capital and Operating)

Per the Fiscal Impact Model, the development is projected to result in a net fiscal impact to the County through the year 2050 that is positive $20,905,543 (see Attachment No. 7 for additional details).

Capital Costs

Per the Fiscal Impact Model, the following are projected public facility impacts attributable to the proposed residential component of the project through 2050.

Table 1-Per Unit Fiscal Residential Impacts Information

Category	Residential Impact	Mitigation through current application
Roadways	SFD $33.41 SFA $25.51 MF $16.09	See Note 1
Parks and Recreation	SFD $3,154.78 SFA $2,081.90 MF $2,184.08	See Note 1 & 2
Fire and Emergency Services	SFD $987.72 SFA $651.82 MF $683.81	See Note 1 & 2
Police	SFD $324.28 SFA $214.00 MF $224.50	See Note 1 & 2
Library	SFD $460.15 SFA $303.66 MF $318.56	See Note 1 & 2
General Government	SFD $222.24 SFA $146.66 MF $153.86	See Note 1 & 2
General Services	SFD $210.06 SFA $138.62 MF $145.42	See Note 1 & 2
Courts	SFD $836.89 SFA $552.28 MF $579.39	See Note 1 & 2
Schools	SFD $17,654.89 SFA $9,275.61 MF $7,046.44	See Note 1 & 2
TOTAL	SFD $23,884.40 SFA $13,390.05 MF $11,352.13	See Note 1 & 2

SFD - Single-Family Detached MF - Multifamily
SFA - Single-Family Attached

Note 1: The applicants have not proffered cash contributions for community impacts to the County from the physical development and operation of the Property.

Note 2: The applicants have proffered a dedication of approximately 40.6 acres of land shown on the Master Plan to James City County for public use.

The applicants have provided a comparative revenue analysis. (Attachment No. 12)

Overall, staff finds that the application does not require mitigation for the fiscal impacts of the proposed development and is therefore consistent with the guidance in the Comprehensive Plan regarding the mitigation of impacts.

Goals, Strategies, and Actions

Staff reviewed the application to determine if the proposal aligns with the Comprehensive Plan's GSAs. The analysis is as follows.

Land Use

- GSA LU4 - Direct growth into designated growth areas in an efficient and low-impact manner by:
    - GSA LU4.4 - Accommodate mixed-use developments within the PSA, as further defined in the Mixed-Use land use designation and development standards. Support design flexibility to promote the mixing of various types of residential and non-residential uses and structures. Encourage mixed developments and complete communities to develop in compact nodes in well-defined locations within the PSA.

      The proposed development is within the PSA and proposed to be designated Mixed Use with a variety of residential and non-residential uses. While there is a mixture of uses, the proposal lacks structures that share a mixture of different uses (such as residential and commercial) within the same building.

- GSA LU2 - Promote pedestrian, bicycle, and automotive linkages between adjacent land uses where practical.

  The proposed development will have a multiuse path connecting the residential portion to the commercial site as well as the public use site. There is also a connection to Hope Family Village and Parcel C. Sidewalks on both sides of all internal public rights-of-way are also proposed. There will be an internal on-street bike path network.

- GSA LU5.2 - Through the following measures, coordinate allowable densities and intensities of proposed developments with the capacities and availability of water, public roads, schools, and other facilities and services:
    - GSA LU5.2.3 - Permit higher densities and more intensive development in accordance with the Future Land Use Map where existing public facilities and services are adequately provided.

      Staff finds that the capacities of public services and facilities are adequate for this development and that impacts to public utilities have been mitigated.

- GSA LU5.3 - Ensure that developments are subject to zoning or special use permit review to mitigate their impacts through the following means:
    - GSA LU5.3.1 - Require sufficient documentation to determine the impacts of a proposed development, including but not limited to studies of traffic impact, capacity of public schools, historic and archaeological resources, water quality

and quantity, other environmental considerations, and fiscal impact.

- *The application includes documentation analyzing such features to determine potential impacts.*

- GSA LU5.3.2 - Ensure that the recommendations of such studies are adequately addressed prior to preparation of development plans, or in instances where a rezoning or Special Use Permit is required, as part of those applications.

  Staff finds that there are several proffers which ensure potential impacts have been or will be mitigated for the development.

Transportation

- GSA T1.2 - Expect new developments to follow recommended densities, intensities, and development patterns that will maintain an acceptable level of service on the surrounding roads and intersections consistent with the land use context (rural, suburban, urban) and the functional classification of the roadway. Ensure that new developments do not compromise planned transportation enhancements.

  The applicants have proffered to install and guarantee the improvements suggested in the TIA. There were no additional improvements needed to accommodate the traffic generated by this proposed development. At full build-out, including the new County Government Complex and the proposed development on Parcel C, all intersections that were studied will be at a LOS of "C" or better.

- GSA T1.2.2 - Provide a high degree of interconnectivity within new developments, adjoining new developments, and existing developments.

  There are pedestrian connections, sidewalks, and trails proposed. There is also an on-street bike path as part of the development.

Housing

- GSA H2.1 - Guide new developments to incorporate high housing quality and design.

  - GSA H2.1.1 - Promote residential development that provides a range of home types and prices, includes open space and recreational amenities, and permits walking and biking.

    This development provides a range of home types and prices, including open space, recreational amenities, bike accommodations, trails, and sidewalks.

  - GSA H2.1.6 - Locate moderate density residential development, including developments within areas of appropriate Mixed-Use designations, in proximity to employment centers and service destinations.

    This development is within a mile of the New Town Development, the College of William & Mary, the James City County Recreation Center, the new James City County Government Center, and the new branch of the Williamsburg Regional Library.

Community Character

- GSA CC3 - Preserve and enhance neighborhood and community appearance.
  - GSA CC3.3 - Continue to improve and protect the character of the County through use of the Character Design Guidelines.

    Staff finds the proposed design guidelines to be consistent with the County's Character Design Guidelines

Parks & Recreation

- GSA PR5.3 - Encourage new developments requiring legislative review to provide public recreation facilities consistent with standards in the Parks and Recreation Master Plan. New developments should have neighborhood parks with trails, bikeways, playgrounds, practice fields, sports courts, and open spaces.

  This proposal includes a number of recreational amenities, and it is fully consistent with the Parks & Recreation Development Guidelines.

STAFF RECOMMENDATION

The application is not consistent with the Board of Supervisors Adopted Mixed Use Districts and Mixed-Use Construction Phasing Policy. However, staff finds the application to be generally consistent with the County's Zoning Ordinance and the 2045 Comprehensive Plan. Staff recommends that the Board of Supervisors approve the application, subject to the proposed proffers.

TC/ap
RZ23-8CardinalRdg-rev2

Attachments:
1. Proposed Ordinance
2. Proposed Proffers
3. Location Map
4. Proposed Master Plan
5. Community Impact Statement
6. Proposed Design Guidelines
7. TIA
8. Transportation Level of Service Maps
9. Fiscal Impact Analysis
10. Exhibit - Habitat Core and Corridors
11. Exhibit - Prime Farmland
12. Comparative Revenue Analysis - provided by applicants
13. Approved Minutes from the December 3, 2025, Planning Commission Meeting
14. Citizen Comments

ORDINANCE NO._____

AN ORDINANCE TO AMEND THE ZONING DISTRICT MAPS OF JAMES CITY COUNTY, VIRGINIA, TO REZONE APPROXIMATELY 365.6 ACRES AT 4601 IRONBOUND ROAD and 1001 GALT LANE (JAMES CITY COUNTY REAL ESTATE TAX MAP PARCEL NOS. 3910100152 AND 3910100161) FROM PL, PUBLIC LANDS TO MU, MIXED USE DEVELOPMENT, WITH PROFFERS AS DESCRIBED IN CASE NO. Z-23-0008.

WHEREAS, Mr. Tim Trant of Kaufman & Canoles, P.C. has applied to rezone approximately 365.6 acres from PL, Public Lands to MU, Mixed Use Development, with Proffers; and

WHEREAS, the area proposed to be rezoned is a portion of the property located at 4601 Ironbound Road and 1001 Galt Lane in its entirety, further identified as James City County Real Estate Tax Map Parcel Nos. 3910100152 and 3910100161, and is shown on the Master Plan titled "Cardinal Ridge Rezoning and Master Plan Submittal" dated November 15, 2023, and revised December 9, 2025 (the "Master Plan"); and

WHEREAS, the Planning Commission, following its public hearing on December 3, 2025, recommended approval of Case No. Z-23-0008 by a vote of 4-2; and

WHEREAS, a public hearing was advertised, adjoining property owners notified, and a hearing conducted on Case No. Z-23-0008; and

WHEREAS, the Board of Supervisors of James City County, Virginia, finds Case No. Z-23-0008 to promote the health, safety, convenience, and general welfare of the public and further accomplish the objectives of zoning.

NOW, THEREFORE, BE IT ORDAINED that the Board of Supervisors of James City County, Virginia, that Case No. Z-23-0008 is hereby approved as described therein and the voluntary proffers are accepted.

_____
John J. McGlennon
Chair, Board of Supervisors

ATTEST:

_____
Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
WAINWRIGHT	____	____	____	____
NULL	____	____	____	____
ICENHOUR	____	____	____	____
LARSON	____	____	____	____
MCGLENNON	____	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 9th day of June, 2026.

RZ23-8CardinalRdg-ord

Parcel Identification Numbers: 3910100161 and a portion of 3910100152

CARDINAL RIDGE PROFFERS

D.R. HORTON, INC.

May ___, 2026

Prepared by:
Kaufman & Canoles, P.C.
4801 Courthouse Street, Suite 300
Williamsburg, Virginia 23188

CARDINAL RIDGE PROFFERS

THESE PROFFERS ("Proffers") are made this ____ day of May, 2026, by and between the **COMMONWEALTH OF VIRGINIA, DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENTAL SERVICES**; the **COMMONWEALTH OF VIRGINIA, DEPARTMENT OF GENERAL SERVICES**; **COLONIAL COMMUNITY SERVICES, INC.**, a Virginia non-stock corporation (collectively, together with their successors in title to the Property, the "Owner"); and **D.R. HORTON, INC.**, a Delaware corporation ("Developer"), (to be indexed as grantor), and **THE COUNTY OF JAMES CITY, VIRGINIA**, a political subdivision of the Commonwealth of Virginia ("County") (to be indexed as grantee), provides as follows:

RECITALS

R-1. Owner is the owner of certain real property located in James City County, Virginia, being more particularly described on EXHIBIT A attached hereto and made a part hereof (the "Property"). Developer is the contract purchaser of the Property less and except that portion of the Property owned by Colonial Community Services, Inc.

R-2. The Property is now zoned Public Land - PL. The Property is designated Public Lands on the County's Comprehensive Plan Future Land Use Map.

R-3. While property owned by Commonwealth of Virginia is not subject to local zoning jurisdiction, Owner, solely for the benefit of Colonial Community Services, Inc., as an owner of a portion of the Property, and Developer, as a prospective purchaser of the remainder of the Property, (i) has permitted the Developer to apply to rezone the Property from Public Land – PL to Mixed Use – MU with proffers, and (ii) has signed these Proffers solely for the purpose of acknowledging such permission. The rezoning of the Property to Mixed Use - MU, with proffers, is consistent both with the land use designation for the Property in the County Comprehensive Plan and the statement of intent for the mixed use zoning district set forth in Section 24-514 of

the County Zoning Ordinance, Section 24-1 *et seq.* of the County Code of Ordinances, in effect on the date hereof (the "Zoning Ordinance").

R-4. A community impact study ("Community Impact Study") entitled "Community Impact Statement for Cardinal Ridge James City County, Virginia" prepared by Timmons Group, dated October 7, 2025, has been submitted to the County Planning Director for review by the County in connection with this proposed rezoning. The Community Impact Study is on file in the office of the County Planning Director.

R-5. Developer has submitted to the County a traffic impact study with enclosed exhibits and technical appendix ("Traffic Impact Study") entitled "Cardinal Ridge James City County, Virginia Chapter 527 Traffic Impact Analysis" prepared by Timmons Group, dated March 2023, revised April 13, 2026 which has been prepared to address traffic associated with the development of the Property. The Traffic Study is on file in the office of the County Planning Director.

R-6. Developer has submitted to the County a conceptual plan of development ("Master Plan") entitled "Cardinal Ridge Rezoning and Master Plan Submittal", dated Rev. December 9, 2025, prepared by Land Planning Solutions, for the Property in accordance with the County Zoning Ordinance. The Master Plan is on file in the office of the County Planning Director.

R-7. Developer has submitted to the County design guidelines for the proposed improvements to the Property ("Design Guidelines") entitled "Cardinal Ridge Design Guidelines", dated December 9, 2025, prepared by Land Planning Solutions. The Design Guidelines are on file in the office of the County Planning Director.

R-8. The County constitutes a high-growth locality as defined by Section 15.2-2298 of the Virginia Code.

R-9. The provisions of the Zoning Ordinance, Section 24-1, *et seq.,* may be deemed inadequate for protecting and enhancing orderly development of the Property. Accordingly,

Owner, in furtherance of the above-described application for rezoning, desires to proffer certain conditions which are limited solely to those set forth herein in addition to the regulations provided for by the Zoning Ordinance for the protection and enhancement of the development of the Property, in accordance with the provisions of Sections 15.2-2303 and 15.2-2303.4(D)(1) of the Code of Virginia, as amended (the "Virginia Code"), Ordinance Number 31A-346 adopted by the James City County Board of Supervisors on October 8, 2019, and Sec 24-16 of the Zoning Ordinance.

NOW, THEREFORE, for and in consideration of the approval by the Board of Supervisors of the County of the rezoning set forth above and the Master Plan, and pursuant to Sections 15.2-2303 and 15.2-2303.4(D)(1) of the Virginia Code, and Section 24-16 of the Zoning Ordinance, it is agreed that all of the following conditions shall be met and satisfied in developing the Property.

PROFFERS:

1. **Design**. The Property shall be developed generally in accordance with the Master Plan and Design Guidelines with only changes thereto that the County or its duly authorized designee determines do not alter the basic concept or character of the development in accordance with Section 24-23(a)(2)(f) of the Zoning Ordinance in effect on the date hereof; provided, however, such development shall be expressly subject to such changes in configuration, composition and location as required by all other governmental authorities having jurisdiction over such development.

2. **Density**. There shall be no more than 1,006 residential dwellings (the "Residential Units") constructed on the Property, of which no more than 450 of the Residential Units shall be apartments, no more than 262 of the Residential Units shall be multi-family, and no more than 321 of the Residential Units shall be single-family detached. The non-residential development within the portion of the Property designated Commercial on the Master Plans shall not exceed 100,000 square feet of floor area.

3. **Property Owners Association**.

a. Residential Property Owners Association. The Owner shall form one or more Property Owners' Associations and/or a Condominium Unit Owners Associations (each an "Association"), which may include separate or sub-associations, in accordance with Virginia law, with the preparation and execution of a Declaration of Covenants, Conditions and Restrictions or Declaration of Condominium, as applicable (a "Declaration") with the members thereof being the owners of the portions of the Property listed immediately under the "Residential" heading in the "TABULATION" shown on page 2 of the Master Plan (the "Residential Property"). The Declaration for the Residential Property shall provide for, among other things, design review by a design review board, and the conveyance from the Owner of all of the common areas, open spaces, green areas, recreation areas and facilities and the stormwater management system associated with the Residential Property to an Association. The Declaration for the Residential Property shall provide that all material improvements (and all material changes to improvements) to the Residential Property shall be subject to review and approval by the design review board for consistency with the Design Guidelines prior to construction (or material change) of any such improvements. Evidence of such Residential Property design review board approval must be provided to the County prior to issuance of a building permit for construction of any applicable improvements (or any applicable changes to improvements) on the Residential Property. The Residential Property Association and/or design review board may not amend or modify the Design Guidelines without the prior written approval of the County Planning Director. Each Residential Unit owner within the Residential Property shall be a voting member of an Association and be subject to assessments as set forth in the Declaration for the Residential Property. The Residential Property Declaration shall be subject to the approval of the County Attorney for consistency with this proffer and upon approval shall be duly recorded in the Clerk's Office for the Circuit Court of James City County. The Residential Property Declaration shall be recorded in

connection with the recordation of the first subdivision (or condominium) plat for the Residential Units on the Property.

b. Commercial Property Owners Association. The Owner shall form one or more Associations, which may include separate or sub-associations, in accordance with Virginia law, with the preparation and execution of a Declaration with the members thereof being the owners of the portion of the Property shown as the "Marketplace District" on the Master Plan (the "Commercial Property"). The Declaration for the Commercial Property shall provide for, among other things, design review by a design review board, and the conveyance from the Owner of all of the common areas, open spaces, green areas, recreation areas and facilities and the stormwater management system associated with the Commercial Property to an Association. The Declaration for the Commercial Property shall provide that all material improvements (and all material changes to improvements) to the Commercial Property shall be subject to review and approval by the design review board for consistency with the Design Guidelines prior to construction (or material change) of any such improvements. Evidence of such Commercial Property design review board approval must be provided to the County prior to issuance of a building permit for construction of any applicable improvements (or any applicable changes to improvements) on the Commercial Property. The Commercial Property Association and/or design review board may not amend or modify the Design Guidelines without the prior written approval of the County Planning Director. Each property owner within the Commercial Property shall be a voting member of an Association and be subject to assessments as set forth in the Declaration for the Commercial Property. The Commercial Property Declaration shall be subject to the approval of the County Attorney for consistency with this proffer and upon approval shall be duly recorded in the Clerk's Office for the Circuit Court of James City County. The Commercial Property Declaration shall be recorded in connection with the recordation of the first subdivision (or condominium) plat for development of the Commercial Property.

4. **Water Conservation**. Water conservation standards for the Property shall be developed and submitted to and approved by the James City Service Authority ("JCSA") for general consistency with the terms of this Proffer prior to final site plan or final subdivision plan (each a "Development Plan") approval for the first development of the Property following approval of the application associated with these Proffers. The standards shall address such customary and reasonable water conservation measures as limitations on use of irrigation systems and irrigation wells, the use of approved landscaping materials and the use of water conserving fixtures and appliances to promote water conservation and minimize the use of public water resources. Design features, including the use of drought tolerant grasses and plantings, a water conservation plan, and drought management plan shall be implemented to accomplish the limitation on use of public water and groundwater.

5. **Nutrient Management Plan**. The Owner of any portion of the Property proposed for development shall be responsible for coordinating with an agent of the Colonial Soil and Water Conservation District ("CSWCD") or, if a CSWCD agent is unavailable, a soil scientist licensed in the Commonwealth of Virginia, or other qualified professional approved by the County Planning Director, to conduct soil tests and to develop, based upon the results of the soil tests, customized nutrient management plans (the "Nutrient Plans") for all turf areas within the portions of the Property proposed for development. A Nutrient Plan for each portion of the Property proposed for development shall be submitted to the County Stormwater & Resource Protection Director for review and approval prior to the issuance of a Certificate of Occupancy for any improvements on such portion of the Property. Upon approval, the owner of such portion of the Property shall be responsible for ensuring that any nutrients applied to the turf areas on such portion of the Property be applied in accordance with the applicable Nutrient Plan or any updates or amendments thereto as may be approved by the County Stormwater & Resource Protection Director.

6. **Transportation.** The construction, installation, and/or implementation of the following improvements shall be completed or guaranteed in accordance with Section 15.2-2299 of the Virginia Code (or such successor provision) and the applicable provisions of the County Code of Ordinances (such performance assurances to be herein referred to as a "Guarantee" or "Guarantees") as provided below:

a. Intersection 1 (Longhill Connector Road and Longhill Road). Prior to final approval of one or more Development Plans showing an amount of development within the areas of the Property shown on the Master Plan as "Commercial (Market Place District)" or "Public Use Site" (collectively, the "Intersection 1 Property") that would result in 250 new PM peak hour trips (the "Intersection 1 Trip Trigger") as determined by the most recent edition of the Institute of Transportation Engineers Trip Generation Manual (the "ITE Manual") at the intersection of Longhill Connector Road and Longhill Road ("Intersection 1"), the Owner shall show on such Development Plan exceeding the Intersection 1 Trip Trigger the following transportation improvements and post a Guarantee for the completion of same: one of (i) a roundabout and associated intersection improvements if such doesn't exist, (ii) improvements/modifications to any existing roundabout and intersection improvements to include a fourth leg (northbound approach) and two circulating lanes throughout the roundabout, or (iii) alternative traffic control approved by VDOT, at Intersection 1 (the "Intersection 1 Improvements"). Prior to the issuance of certificates of occupancy for development within the Intersection 1 Property that would be projected to exceed the Intersection 1 Trip Trigger, Owner shall complete the Intersection 1 Improvements.

b. Intersection 2 (Longhill Connector Road and Ashbury Drive). Prior to final approval of one or more Development Plans showing an amount of development within the areas of the Property shown on the Master Plan as "Residential" (the "Intersection 2 Property") that would result in 250 new PM peak hour trips (the "Intersection 2 Trip Trigger") as determined by the ITE Manual at the intersection of Longhill Connector Road and Longhill Road ("Intersection

2"), the Owner shall show on such Development Plan exceeding the Intersection 2 Trip Trigger the following transportation improvements and post a Guarantee for the completion of same: (1) one of (i) a roundabout and associated intersection improvements if such doesn't exist, (ii) improvements/modifications to any existing roundabout and intersection improvements to include two circulating lanes throughout the roundabout, or (iii) alternative traffic control approved by VDOT, at Intersection 2, and (2) widening of Longhill Road between Intersection 1 and Intersection to 2 to a four lane section (collectively, the "Intersection 2 Improvements"). Prior to the issuance of certificates of occupancy for development within the Intersection 2 Property that would be projected to exceed the Intersection 2 Trip Trigger, Owner shall complete the Intersection 2 Improvements.

c. Owner shall provide, as a separate supplemental document with each Development Plan for any development within the Property, the projected peak hour vehicle trip generation associated with the development (1) proposed by the corresponding Development Plan submission, and (2) which has previously received final Development Plan approval from the County (and any Development Plans for development within the Property then under review) in a form reasonably acceptable to the County Planning Director to permit the accurate tracking of the progression of the development of the Property in accordance with these Proffers.

d. The portion of Galt Lane shown on the Master Plan which is not located on the Property, shall be improved to the applicable Virginia Department of Transportation ("VDOT") standards in effect as of the date of the approval of the applications associated with these Proffers (the "Galt Lane Improvements"). The Galt Lane Improvements shall be completed prior to issuance of building permits for more than 503 Residential Units on the Residential Property.

e. No building permits shall be issued for the construction of Residential Units on the Residential Property in a subsequent phase (as shown on the phasing plan contained within the Master Plan) until all of the building permits for Residential Units within the preceding

phase(s) of the Residential Property have been issued, unless the Owner provides an updated traffic impact analysis satisfactory to the County Planning Director confirming that the construction of such Residential Units on the Residential Property in a subsequent phase will not materially alter the traffic impacts and sequencing of associated traffic improvements modeled in the Traffic Study.

f. Notwithstanding any other provision of this Proffer 6, (i) none of the foregoing transportation improvements shall be required to be constructed unless and until such improvements are determined by VDOT, as applicable, to be warranted and justified and VDOT notifies Owner in writing of same and authorizes such improvements to be constructed; (ii) the foregoing triggers for the completion of transportation improvements shall, as applicable, be deemed automatically extended (and certificates of occupancy shall continue to be issued) until such time as VDOT determines the subject transportation improvement(s) to be warranted and justified and notifies Owner in writing and authorizes such improvements to be constructed; and (iii) certificates of occupancy shall continue to be issued while the subject transportation improvement(s) are being designed and constructed, provided such design and construction does not exceed eighteen (18) months following VDOT's determination that the subject transportation improvement(s) are warranted and justified and written notification to Owner of same and authorization of such improvements to be constructed.

g. Any streets within the Property may be private. Pursuant to Section 24-62 of the Zoning Ordinance, private streets within the Property shall be maintained by an Association. Owner or an Association shall make a one-time deposit (the "Private Street Maintenance Amount") into a maintenance fund to be managed by such Association in the amount of $6.65 per linear foot (the "Private Street Maintenance Rate") of private street constructed on the Property. The County shall be provided evidence of the deposit of the allocable portion of such Private Street Maintenance Amount prior to issuance of a certificate of occupancy by the County for any

development on the Property that is served by a private street. The allocable portion of such Private Street Maintenance Amount shall (i) for Residential Units, be equal to the number of linear feet of private streets shown on the corresponding subdivision plat for such Residential Unit multiplied by the Private Street Maintenance Rate and then divided by the number of Residential Units served by such private street(s), or (ii) for commercial uses, be equal to the number of linear feet of private streets shown on the corresponding subdivision plat for such commercial use multiplied by the Private Street Maintenance Rate and then divided by the number of commercial square feet served by such private street(s) and then multiplied by the number of commercial square feet proposed for certificate of occupancy. The Private Street Maintenance Rate shall be adjusted annually beginning January 1, 2027 to reflect any increase or decrease for the preceding year in the Marshall and Swift Building Cost Index, Section 98, Comparative Cost Multipliers, Regional City Averages (the "MSI")

7. **Water and Sewer Master Plans**. Owner shall submit to the County an updated water and sewer master plan, including a hydraulic analysis and identifying any required off-site improvements necessary to serve the Property, at least three months before the initial Development Plan submittal for the Property for review and approval by JCSA. The water and sewer master plan may be revised and/or updated during the development of the Property with prior approval of JCSA. The County shall not be obligated to approve any final Development Plans for the Property until the water and sewer master plan has been approved by the JCSA. The water and sewer master plan, as revised and/or updated, shall be implemented in all Development Plans for the Property at the time required to serve the Property.

8. **Public Use Sites**.

a. Prior to final Development Plan approval for development of any portion of the Property (which shall not be deemed to include the County's approval of a subdivision plat creating the hereinafter described parcels), the portion of the Property shown generally on the

Master Plan as "Hope Family Village Site" shall be conveyed without monetary consideration to Hope Family Village, Corporation or an affiliate thereof or such other comparable organization approved by the County. The foregoing conveyance shall be subject to the County's final approval of one or more subdivision plats creating the foregoing area as an individual parcel(s) separate and apart from the remainder of the Property and subject to such reasonable easements, covenants, and restrictions as may be necessary or desirable to develop the Property.

b. Upon receipt by Owner of a written request from the County Administrator, but not sooner than the transfer of any portion of the Residential Property to a private party, Owner shall convey without monetary consideration, to the County the portion of the Property shown generally on the Master Plan as "Public Use Site" (the "Public Use Site"), subject to the County's final approval of the subdivision plat establishing the Public Use Site as a parcel separate and apart from the Property, and subject to such easements as may be necessary to develop the Property but do not unreasonably restrict the County's use and development of the Public Use Site. The Public Use Site shall not be used for residential uses, publicly owned solid waste container sites, resource recovery facilities, and solid waste transfer stations.

9. **Housing Opportunities**. At least twenty percent of the Residential Units constructed on the Property shall be either: (a) initially offered for sale at prices targeted at households whose annual gross household income at the time of initial qualification is equal to or less than 80% of the annual Area Median Income for the County (such Area Median Income being that which is determined on an annual basis by the U.S. Department of Housing and Urban Development and adjusted by family size, the "AMI") (the "For Sale Affordable Units"), or (b) offered to residents for rent for a period of at least 20 years from the time of issuance of the initial certificate of occupancy for such Residential Unit at an aggregate 12-month rental rate that does not to exceed 30% of the annual gross household income for individuals or families whose gross

household income at the time of initial qualification is equal to or less than 80% of the AMI (the "For Rent Affordable Units", which together with the For Sale Affordable Units are, collectively, referred to in these Proffers as the "Affordable Units"). Accordingly, the maximum initial sale price for a For Sale Affordable Unit sold in 2025 shall be Two Hundred Eighty-One Thousand Seven Hundred and Fifty Dollars ($281,750.00). The per unit maximum initial sale price for any For Sale Affordable Unit shall be adjusted annually beginning January 1, 2026 to reflect any increase or decrease from the preceding year in the AMI. In no event shall the maximum initial sale price for any For Sale Affordable Unit be adjusted to a sum less than the maximum initial sale price for any For Sale Affordable Unit sold in 2025 specified above. If the AMI is not available, a reliable government or other independent publication evaluating information heretofore used in determining the AMI (approved in advance by the County Manager of Financial Management Services) shall be relied upon in establishing an inflationary factor for purposes of increasing the per unit maximum initial sale price to approximate the rate of annual inflation in the County. Unless otherwise approved by the Neighborhood Development Department, the initial sale of each For Sale Affordable Unit shall include a second priority lien deed of trust for the benefit of the County securing a shared appreciation note in an amount equal to the difference between the sale price of a comparable market rate Residential Unit and the sale price of the proffered Affordable For Sale Unit and with a term of seven years. Such original note and deed of trust and a copy of the settlement statement shall be delivered to the Neighborhood Development Department after each initial closing on the sale of a For Sale Affordable Unit. If down-payment assistance loans are authorized by the Neighborhood Development Department, the second priority lien deed of trust shall become a third priority lien deed of trust. For the For Rent Affordable Units, Owner shall submit an annual report for each year of the required 20-year term to the County Zoning Administrator on or before January 30 of the current year identifying the location of the For Rent Affordable Units and current rental rate information necessary to confirm

compliance with this Proffer. The residents of each For Rent Affordable Unit shall be permitted to utilize the pool and clubhouse facilities serving the single family and multifamily (townhome) Residential Units within the Residential Property.

10. **Energy Efficiency**. Each Residential Unit constructed on the Property shall at the time of issuance of the initial certificate of occupancy include the following:

a. Energy Star certified dishwasher (or such other appliance or comparable certification approved by the County);

b. Low E windows (or such other comparably energy efficient windows approved by the County);

c. Minimum R-49 rated insulation in the ceiling and minimum R-15 rated insulation in the walls (or such other comparable insulation approved by the County); and

d. House wrap (or such other comparable system approved by the County).

11. **Recreation**. The County shall not be obligated to issue building permits for more than a total of 503 Residential Units on the Residential Property until the recreational facilities shown and described on page 4 of the Master Plan as (a) Significant Locations 1 – 8, and (b) the Multi-use trails located on the Residential Property are completed. All recreational facilities within the Property shall be completed in accordance with the construction standards, as applicable, contained in the version of the County Parks and Recreation Master Plan in effect at the time of approval of the applications associated with these Proffers.

12. **Commercial Property**. Upon receipt by Owner of a written request from the County Administrator, but not sooner than the transfer of any portion of the Residential Property to a private party, Owner shall convey without monetary consideration, to the County the Commercial Property, subject to the County's final approval of the subdivision plat establishing the Commercial Property as a parcel separate and apart from the remainder of the Property, and

subject to such easements as may be necessary to develop the Property but do not unreasonably restrict the County's use and development of the Commercial Property.

13. **Access to Open Space West of Rt. 199**. If the open space within the portion of the Property located west of Rt. 199 (the "Western Open Space") is ever proposed for recreational use by the Owner, then the Owner shall construct a connecting sidewalk from the Williamsburg West/Longhill Road intersection to the Western Open Space prior to final Development Plan approval for such recreational use of the Western Open Space. The Western Open Space is deemed open space which counts towards the requirements of Section 24-520 of the Zoning Ordinance for the Property.

14. **Infrastructure Removal and Stream Channel Restoration**.

a. The Owner shall make a contribution to the County in the amount of $1,250,000.00 (the "Stream Channel Restoration Amount") for stream channel restoration to be conducted by the County on or in the immediate vicinity of the Property, which Stream Channel Restoration Amount shall be paid in increments of $1,608.75 per Residential Unit developed on the Property excluding the Affordable Units and any Residential Units developed on the Hope Family Village Site (as shown on the Master Plan) (the "Per Unit Stream Restoration Contribution"). The Per Unit Stream Restoration Contribution shall be payable for each Residential Unit developed on the Property (excluding the Affordable Units and the Hope Family Village Site) at the time of issuance of a final Certificate of Occupancy for such Residential Unit. The County shall utilize these monies for the restoration of stream channels located on or in the immediate vicinity of the Property.

b. The Stream Channel Restoration Amount and the Per Unit Stream Restoration Contribution (the "Proffered Amounts") shall be adjusted annually beginning January 1, 2027 to reflect any increase or decrease for the preceding year in the MSI. In no event shall the Proffered Amounts be adjusted to a sum less than the amount initially established by these

Proffers. In the event a substantial change is made in the method of establishing the MSI, then the Proffered Amounts shall be adjusted based upon the figure that would have resulted had no change occurred in the manner of computing the MSI. In the event that the MSI is not available, a reliable government or other independent publication evaluating information heretofore used in determining the MSI (approved in advance by the County Manager of Financial Management Services) shall be relied upon in establishing an inflationary factor for purposes of increasing the Proffered Amounts to approximate the rate of annual inflation in the County.

c. Notwithstanding the foregoing, any unpaid balance of the Stream Channel Restoration Amount shall be paid to the County in full on or before the date which is five years after the date of final approval by the County of the first Development Plan for development of the Property pursuant to the Master Plan.

d. At the request of the County, Owner shall provide one or more access easements over and across the Property in a form acceptable to the County Attorney and in a location acceptable to the Director of Stormwater and Resource Protection from public right of way to the stream channels located within or adjacent to the Property sufficient to allow the County to perform the stream channel restoration work and any maintenance thereof. The location of the easement(s) shall be shown on the first Development Plan for development on the Residential Property.

e. The Owner shall remove all abandoned infrastructure ("Abandoned Infrastructure") from the Resource Protection Areas on the Property. If not sooner removed, such Abandoned Infrastructure shall be removed incrementally with each incremental phase of development of the Property and a proportionate amount of the Guarantee associated with such phase of the development shall not be released until the Abandoned Infrastructure located in the Resource Protection Area within such phase has been removed from the Resource Protection Area. Notwithstanding the foregoing, the Owner shall not be required to remove the large

reinforced concrete pipe located on the Property, but shall instead be required to cap or seal-off such pipe.

15. **Master Stormwater Management Plan**. Owner shall submit to the County a master stormwater management plan at least three months before the initial Development Plan submittal for the Property, to include the stormwater management BMPs, for review and approval by the Stormwater and Resource Protection Division. The master stormwater management plan shall include a requirement that all outlet protection be sized for the 100-year, post-development storm and shall show the location of stream restoration/improvements needed in Powhatan Creek, Sub-watershed #208. The master stormwater management plan may be revised and/or updated during the development of the Property with prior approval of the Stormwater and Resource Protection Division. The County shall not be obligated to approve any final Development Plans for the Property until the master stormwater management plan has been approved by the Stormwater and Resource Protection Division. The master stormwater management plan, as revised and/or updated, shall be implemented in all Development Plans for the Property. All development plans for the Property shall implement the County's SSC criteria dated March, 2025.

16. **Headings**. All section headings and subheadings of these Proffers are for convenience only and shall not be read as a part of these Proffers or utilized in interpretation thereof.

17. **Delegation of Subsequent Approvals**. The County Board of Supervisors by accepting these Proffers is exercising its legislative function. While these Proffers provide for subsequent approvals by the County or by its duly authorized designees appointed by the County, such subsequent approvals by any duly authorized designee of the County shall not include the exercise of any legislative function.

18. **Severability**. In the event that any clause, sentence, paragraph, section or subsection of these Proffers shall be adjudged by any court of competent jurisdiction to be invalid or unenforceable for any reason, including a declaration that it is contrary to the Constitution of the Commonwealth of Virginia or of the United States, or if the application thereof to any owner of any portion of the Property or to any government agency is held invalid, such judgment or holding shall be confined in its operation to the clause, sentence, paragraph, section or subsection hereof, or the specific application thereof directly involved in the controversy in which the judgment or holding shall have been rendered or made, and shall not in any way affect the validity of any other clause, sentence, paragraph, section or provision hereof.

19. **Successors and Assigns**. These Proffers shall be binding upon and shall inure to the benefit of the parties hereto, and their respective heirs, successors and/or assigns; provided, however once a party ceases to own any portion of the Property, such party shall have no continuing liability hereunder.

20. **Void if Rezoning Not Approved**. In the event that any of the proposed rezoning sought by the applications associated with these Proffers is not approved by the County as submitted or is overturned by subsequent judicial determination, these Proffers shall be null and void.

21. **Reasonable Proffers**. The Owner, as evidenced by its signature below, deems these proffers to be reasonable and appropriate.

[SIGNATURES APPEAR ON THE FOLLOWING PAGES]

[COUNTERPART SIGNATURE PAGE TO PROFFERS]

WITNESS the following signatures, thereunto duly authorized:

DEVELOPER:

D.R. HORTON, INC., a Delaware corporation

By: _____

Name: Kyle Schnaufer

Title: Division President

COMMONWEALTH /STATE OF Virginia
CITY/COUNTY OF Chesterfield, to wit:

The foregoing Proffers were acknowledged before me this 2 day of June 2026, by Kyle Schnaufer, acting in his/her capacity as Div President of D.R. Horton, Inc.

My registration no. 00391195
My commission expires: 9/30/29

BRIAN WHITNEY
NOTARY PUBLIC
REGISTRATION # 00391195
COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES 9/30/29

_____
Notary Public

[COUNTERPART SIGNATURE PAGE TO PROFFERS]

OWNER:

COMMONWEALTH OF VIRGINIA,
DEPARTMENT OF BEHAVIORAL HEALTH AND
DEVELOPMENTAL SERVICES

By: _____

Name: _____

Title: _____

COMMONWEALTH OF VIRGINIA
CITY OF RICHMOND, to wit:

The foregoing Proffers were acknowledged before me this _____ day of _____ 20__, by _____, acting in his/her capacity as _____ of the Commonwealth of Virginia, Department of Behavioral Health and Developmental Services.

My registration no._____
My commission expires: _____

_____
Notary Public

[COUNTERPART SIGNATURE PAGE TO PROFFERS]

OWNER:

COMMONWEALTH OF VIRGINIA,
DEPARTMENT OF GENERAL SERVICES

By: _____
Name: Joseph F. Damico
Title: Director

COMMONWEALTH OF VIRGINIA
CITY OF RICHMOND, to wit:

The foregoing Proffers were acknowledged before me this _____ day of _____ 20__, by Joseph F. Damico, acting in his capacity as Director of the Commonwealth of Virginia, Department of General Services, on behalf of Seller.

My registration no._____
My commission expires: _____

_____
Notary Public

[COUNTERPART SIGNATURE PAGE TO PROFFERS]

APPROVED AS TO FORM:
OFFICE OF THE ATTORNEY GENERAL

By: _____
Assistant Attorney General

RECOMMEND APPROVAL:
DEPARTMENT OF GENERAL SERVICES

By: _____
Joseph F. Damico, Director

APPROVED BY THE GOVERNOR:

Pursuant to Section 2.2-1156 of the Code of Virginia (1950), as amended, as the official designee of the Governor of Virginia, as authorized and designated by Executive Order 88(01), dated December 21, 2001, I hereby approve these Proffers and the execution of this instrument for, on behalf of, and in the stead of the Governor of Virginia.

_____
Secretary of Administration Date

[COUNTERPART SIGNATURE PAGE TO PROFFERS]

OWNER:

COLONIAL COMMUNITY SERVICES, INC.

By: _____
Name: David Coe
Title: President

COMMONWEALTH OF VIRGINIA
CITY OF RICHMOND, to wit:

The foregoing Proffers were acknowledged before me this _____ day of _____ 20__, by David Coe, acting in his capacity as President of Colonial Community Services, Inc.

My registration no._____
My commission expires: _____

_____
Notary Public

EXHIBIT A

PARCEL DESCRIPTION
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENTAL SERVICES
PARCEL 1 (PART A)
BEING A PORTION OF TAX PARCEL NO. 3910100152

BEGINNING AT A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF LONGHILL ROAD, SAID POINT MARKING THE INTERSECTION OF THE SOUTHERLY RIGHT-OF-WAY LINE OF HUMELSINE PARKWAY, STATE ROUTE 199 AND THE SOUTHERLY RIGHT-OF-WAY LINE OF LONGHILL ROAD;

THENCE, BEARING S 84°15'49" E A DISTANCE OF 134.97 FEET TO A POINT;
THENCE, BEARING S 7°19'06" W A DISTANCE OF 332.65 FEET TO A POINT;
THENCE, BEARING S 80°16'35" E A DISTANCE OF 300.00 FEET TO A POINT;
THENCE, BEARING N 7°37'10" E A DISTANCE OF 163.41 FEET TO A POINT;

THENCE, ALONG A NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 180.00 FEET AN ARC LENGTH OF 224.82 FEET, BEARING N 60°07'24" E ALONG THE CHORD A DISTANCE OF 210.49 FEET TO A POINT;

THENCE, BEARING N 24°20'31" E A DISTANCE OF 29.26 FEET TO A POINT;
THENCE, ALONG A NON-TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 698.94 FEET, AN ARC LENGTH OF 375.01 FEET, BEARING S 47°44'15" E ALONG THE CHORD A DISTANCE OF 370.53 FEET TO A POINT;
THENCE, BEARING S 33°37'09" E A DISTANCE OF 228.74 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 823.94 FEET, AN ARC LENGTH OF 275.96 FEET, BEARING S 41°57'40" E ALONG THE CHORD A DISTANCE OF 274.67 FEET TO A POINT;

THENCE, BEARING S 60°37'41" E A DISTANCE OF 107.59 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 813.94 FEET, AN ARC LENGTH OF 159.82 FEET, BEARING S 64°40'52" E ALONG THE CHORD A DISTANCE OF 159.56 FEET TO A POINT;

THENCE, BEARING S 71°22'53" E A DISTANCE OF 106.91 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 818.94 FEET, AN ARC LENGTH OF 53.60 FEET, BEARING S 79°40'52" E ALONG THE CHORD A DISTANCE OF 53.59 FEET TO A POINT;

THENCE, BEARING S 88°13'07" E A DISTANCE OF 124.39 FEET TO A POINT;
THENCE, BEARING S 83°27'53" E A DISTANCE OF 84.18 FEET TO A POINT;

THENCE, BEARING N 84°00'09" E A DISTANCE OF 108.30 FEET TO A POINT;
THENCE, BEARING S 0°20'01" E A DISTANCE OF 572.28 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 330.00 FEET, AN ARC LENGTH OF 249.19 FEET, BEARING S 21°17'56" W ALONG THE CHORD A DISTANCE OF 243.31 FEET TO A POINT;

THENCE, ALONG A NON-TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 475.00 FEET, AN ARC LENGTH OF 170.38 FEET, BEARING S 26°57'57" E ALONG THE CHORD A DISTANCE OF 169.47 FEET TO A POINT;

THENCE, BEARING S 80°56'53" W A DISTANCE OF 427.65 FEET TO A POINT;
THENCE, BEARING S 9°03'07" E A DISTANCE OF 1,701.29 FEET TO A POINT;
THENCE, BEARING S 9°03'07" E A DISTANCE OF 60.00 FEET TO A POINT;
THENCE, BEARING S 80°56'55" W A DISTANCE OF 147.45 FEET TO A POINT;
THENCE, BEARING S 80°56'55" W A DISTANCE OF 47.60 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 385.18 FEET, AN ARC LENGTH OF 267.95 FEET, BEARING N 79°07'13" W ALONG THE CHORD A DISTANCE OF 262.58 FEET TO A POINT;

THENCE, BEARING S 30°48'30" W A DISTANCE OF 71.27 FEET TO A POINT;
THENCE, BEARING N 80°43'20" W A DISTANCE OF 213.48 FEET TO A POINT;
THENCE, BEARING N 46°26'41" W A DISTANCE OF 79.02 FEET TO A POINT;
THENCE, BEARING N 25°43'18" W A DISTANCE OF 69.61 FEET TO A POINT;
THENCE, BEARING S 82°10'28" W A DISTANCE OF 945.12 FEET TO A POINT;
THENCE, BEARING S 9°25'56" E A DISTANCE OF 90.71 FEET TO A POINT ON THE CENTERLINE OF CHISEL RUN; THENCE, ALONG A SURVEY TIE LINE, THE TRUE PROPERTY LINE BEING THE CENTER OF CHISEL RUN,
THENCE, BEARING N 87°45'54" W A DISTANCE OF 244.00 FEET TO A POINT;
THENCE, BEARING S 67°49'58" W A DISTANCE OF 358.06 FEET TO A POINT;
THENCE, BEARING N 75°23'47" W A DISTANCE OF 441.76 FEET TO A POINT;
THENCE, BEARING N 33°40'31" W A DISTANCE OF 272.59 FEET TO A POINT;
THENCE, BEARING N 43°51'44" W A DISTANCE OF 305.04 FEET TO A POINT;
THENCE, BEARING N 5°30'12" W A DISTANCE OF 350.65 FEET TO A POINT;
THENCE, BEARING N 54°15'54" W A DISTANCE OF 283.73 FEET TO A POINT;
THENCE, BEARING N 62°34'36" W A DISTANCE OF 243.34 FEET TO A POINT;
THENCE, BEARING N 85°41'31" W A DISTANCE OF 231.65 FEET TO A POINT;
THENCE, BEARING N 60°20'38" W A DISTANCE OF 208.58 FEET TO A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF HUMELSINE PARKWAY, STATE ROUTE 199;

THENCE, LEAVING THE CENTER OF CHISEL RUN, ALONG SAID RIGHT-OF-WAY LINE OF HUMELSINE PARKWAY, ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 4,459.66 FEET, AN ARC LENGTH OF 2,142.26 FEET, BEARING N 28°39'06" E ALONG THE CHORD A DISTANCE OF 2,121.72 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 472.96 FEET, AN ARC LENGTH OF 384.63 FEET, BEARING N 65°42'39" E ALONG THE CHORD A DISTANCE OF 374.12 FEET TO A POINT;

THENCE, BEARING N 89°00'30" E A DISTANCE OF 100.00 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 672.96 FEET, AN ARC LENGTH OF 607.24 FEET, BEARING N 63°09'28" E ALONG THE CHORD A DISTANCE OF 586.85 FEET TO A POINT;

THENCE, BEARING N 37°18'27" E A DISTANCE OF 395.33 FEET TO THE POINT OF BEGINNING;

CONTAINING 10,787,503 SQUARE FEET OR 247.647, ACRES MORE OR LESS (AREA CALCULATED TO THE CENTERLINE OF CHISEL RUN).

PARCEL DESCRIPTION
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENTAL SERVICES
PARCEL 1 (PART B)
BEING A PORTION OF TAX PARCEL NO. 3910100152

BEGINNING AT A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF LONGHILL ROAD, SAID POINT MARKING THE INTERSECTION OF THE NORTHERLY RIGHT-OF-WAY LINE OF HUMELSINE PARKWAY, STATE ROUTE 199 AND THE SOUTHERLY RIGHT-OF-WAY LINE OF LONGHILL ROAD;

THENCE, BEARING S 29°3'57" W A DISTANCE OF 142.00 FEET TO A POINT;
THENCE, BEARING N 60°56'03" W A DISTANCE OF 98.00 FEET TO A POINT;
THENCE, BEARING S 29°3'57" W A DISTANCE OF 132.00 FEET TO A POINT;
THENCE, BEARING S 11°41'13" W A DISTANCE OF 348.73 FEET TO A POINT;
THENCE, BEARING S 43°45'36" W A DISTANCE OF 293.60 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 4,773.66 FEET, AN ARC LENGTH OF 1,568.84 FEET, BEARING S 34°20'42" W ALONG THE CHORD A DISTANCE OF 1,561.79 FEET TO A POINT;

THENCE, BEARING N 79°36'11" W A DISTANCE OF 216.64 FEET TO A POINT;
THENCE, BEARING S 21°48'18" W A DISTANCE OF 434.77 FEET TO A POINT;
THENCE, BEARING S 70°41'42" E A DISTANCE OF 210.00 FEET TO A POINT;

THENCE, ALONG A NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 4,773.66 FEET, AN ARC LENGTH OF 260.36 FEET, BEARING S 17°44'33" W ALONG THE CHORD A DISTANCE OF 260.33 FEET TO A POINT;

THENCE, BEARING N 73°49'12" W A DISTANCE OF 210.00 FEET TO A POINT;
THENCE, BEARING S 14°18'18" W A DISTANCE OF 326.12 FEET TO A POINT;
THENCE, BEARING S 45°59'36" E A DISTANCE OF 248.58 FEET TO A POINT;

THENCE, ALONG A NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 4,773.66 FEET, AN ARC LENGTH OF 575.79 FEET, BEARING S 7°24'43" W ALONG THE CHORD A DISTANCE OF 575.44 FEET TO A POINT;

THENCE, BEARING S 3°57'24" W A DISTANCE OF 206.64 FEET TO A POINT;
THENCE, BEARING N 42°24'59" W A DISTANCE OF 333.73 FEET TO A POINT;
THENCE, BEARING S 86°51'01" W A DISTANCE OF 344.82 FEET TO A POINT;
THENCE, BEARING N 79°56'59" W A DISTANCE OF 284.64 FEET TO A POINT;
THENCE, BEARING N 52°09'50" W A DISTANCE OF 461.69 FEET TO A POINT;
THENCE, BEARING N 35°45'07" W A DISTANCE OF 241.60 FEET TO A POINT;
THENCE, BEARING N 3°42'46" W A DISTANCE OF 468.24 FEET TO A POINT;
THENCE, BEARING N 7°26'46" W A DISTANCE OF 437.10 FEET TO A POINT;
THENCE, BEARING N 15°50'01" E A DISTANCE OF 184.98 FEET TO A POINT;
THENCE, BEARING S 62°59'45" E A DISTANCE OF 359.37 FEET TO A POINT;
THENCE, BEARING S 85°36'45" E A DISTANCE OF 725.75 FEET TO A POINT;
THENCE, BEARING N 30°23'51" E A DISTANCE OF 257.56 FEET TO A POINT;
THENCE, BEARING N 47°35'59" E A DISTANCE OF 347.35 FEET TO A POINT;
THENCE, BEARING N 37°29'52" E A DISTANCE OF 634.48 FEET TO A POINT;
THENCE, BEARING N 17°54'02" E A DISTANCE OF 660.88 FEET TO A POINT;
THENCE, BEARING N 42°12'26" E A DISTANCE OF 353.23 FEET TO A POINT;
THENCE, BEARING N 82°32'50" E A DISTANCE OF 254.09 FEET TO A POINT;
THENCE, BEARING N 46°56'51" E A DISTANCE OF 302.90 FEET TO A POINT;
THENCE, BEARING N 43°29'16" E A DISTANCE OF 339.91 FEET TO A POINT;
THENCE, BEARING N 28°36'12" E A DISTANCE OF 95.38 FEET TO A POINT;
THENCE, BEARING S 60°56'03" E A DISTANCE OF 232.31 FEET TO THE POINT OF BEGINNING;

CONTAINING 3,090,197 SQUARE FEET OR 70.941 ACRES MORE OR LESS

LESS AND EXCEPT THAT CERTAIN PARCEL IDENTIFIED AS LIFT STATION, TAX MAP #3810100003;
CONTAINING 10,000 SQUARE FEET OR 0.229 ACRES MORE OR LESS.

PARCEL DESCRIPTION
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENTAL SERVICES
PARCEL 4
TAX PARCEL NO. 3910100161

All that certain piece, parcel, or tract of land lying, being, and situate in the Jamestown Magisterial District of James City County, Virginia, and being shown as "PARCEL 4 615,531 SF 14.131 AC" on that certain plat entitled "SUBDIVISION OF PROPERTY OF COMMONWEALTH OF VIRGINIA DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENT SERVICES", dated April 2, 2025, prepared by Timmons Group, which plat is recorded in the James City County Circuit Court Clerk's Office as Instrument Number 202507383.

PARCEL DESCRIPTION
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENTAL SERVICES
PARCEL 5
BEING A PORTION OF TAX PARCEL NO. 3910100152

BEGINNING AT A POINT ON THE WESTERLY RIGHT-OF-WAY LINE OF IRONBOUND ROAD, STATE ROUTE 615, SAID POINT MARKING A CORNER COMMON TO THE PARCEL HEREIN DESCRIBED AND THE PROPERTY OF DUMONT HOLDING, LLC.;

THENCE, BEARING S 76°37'56" W A DISTANCE OF 2,628.00 FEET TO A POINT ON THE CENTERLINE OF CHISEL RUN; THENCE, ALONG A SURVEY TIE LINE, THE TRUE PROPERTY LINE BEING THE CENTER OF CHISEL RUN,

THENCE, N 53°55'59" W A DISTANCE OF 304.32 FEET TO A POINT;
THENCE, N 17°40'57" W A DISTANCE OF 206.23 FEET TO A POINT;
THENCE, N 0°29'58" E A DISTANCE OF 370.95 FEET TO A POINT;
THENCE, LEAVING THE CENTERLINE OF CHISEL RUN, BEARING N 9°25'56" W A DISTANCE OF 90.71 FEET TO A POINT;
THENCE, BEARING N 82°10'28" E A DISTANCE OF 945.12 FEET TO A POINT;
THENCE, BEARING S 25°43'18" E A DISTANCE OF 69.61 FEET TO A POINT;
THENCE, BEARING S 46°26'41" E A DISTANCE OF 79.02 FEET TO A POINT;
THENCE, BEARING S 80°43'20" E A DISTANCE OF 213.48 FEET TO A POINT;
THENCE, BEARING N 30°48'30" E A DISTANCE OF 71.27 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 385.18 FEET, AN ARC LENGTH OF 267.95 FEET, BEARING S 79°07'13" E ALONG THE CHORD A DISTANCE OF 262.58 FEET TO A POINT;

THENCE, BEARING N 80°56'55" E A DISTANCE OF 47.60 FEET TO A POINT;
THENCE, BEARING S 24°30'15" W A DISTANCE OF 232.16 FEET TO A POINT;
THENCE, BEARING S 16°00'48" W A DISTANCE OF 328.45 FEET TO A POINT;
THENCE, BEARING N 76°37'56" E A DISTANCE OF 1531.91 FEET TO A POINT;
THENCE, BEARING S 2°31'13" W A DISTANCE OF 51.99 FEET TO THE POINT OF BEGINNING;

CONTAINING 1,158,906 SQUARE FEET OR 26.605 ACRES, MORE OR LESS
(AREA CALCULATED TO THE CENTERLINE OF CHISEL RUN).

PARCEL DESCRIPTION
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF BEHAVIORAL HEALTH AND DEVELOPMENTAL SERVICES
PARCEL 6
BEING A PORTION OF TAX PARCEL NO. 3910100152

BEGINNING AT A POINT ON THE WESTERLY RIGHT-OF-WAY LINE OF IRONBOUND ROAD, STATE ROUTE 615, SAID POINT MARKING A CORNER COMMON TO THE PARCEL HEREIN DESCRIBED AND PARCEL 1 (PART A);

THENCE, N 84°00'9" E A DISTANCE OF 42.45 FEET TO A POINT;
THENCE, N 89°42'47" E A DISTANCE OF 94.59 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 718.94 FEET, AN ARC LENGTH OF 146.25 FEET, BEARING S 84°27'33" E ALONG THE CHORD A DISTANCE OF 146.00 FEET TO A POINT;

THENCE, S 68°56'22" E A DISTANCE OF 140.31 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 708.94 FEET, AN ARC LENGTH OF 232.00 FEET, BEARING S 58°00'24" E ALONG THE CHORD A DISTANCE OF 230.97 FEET TO A POINT;

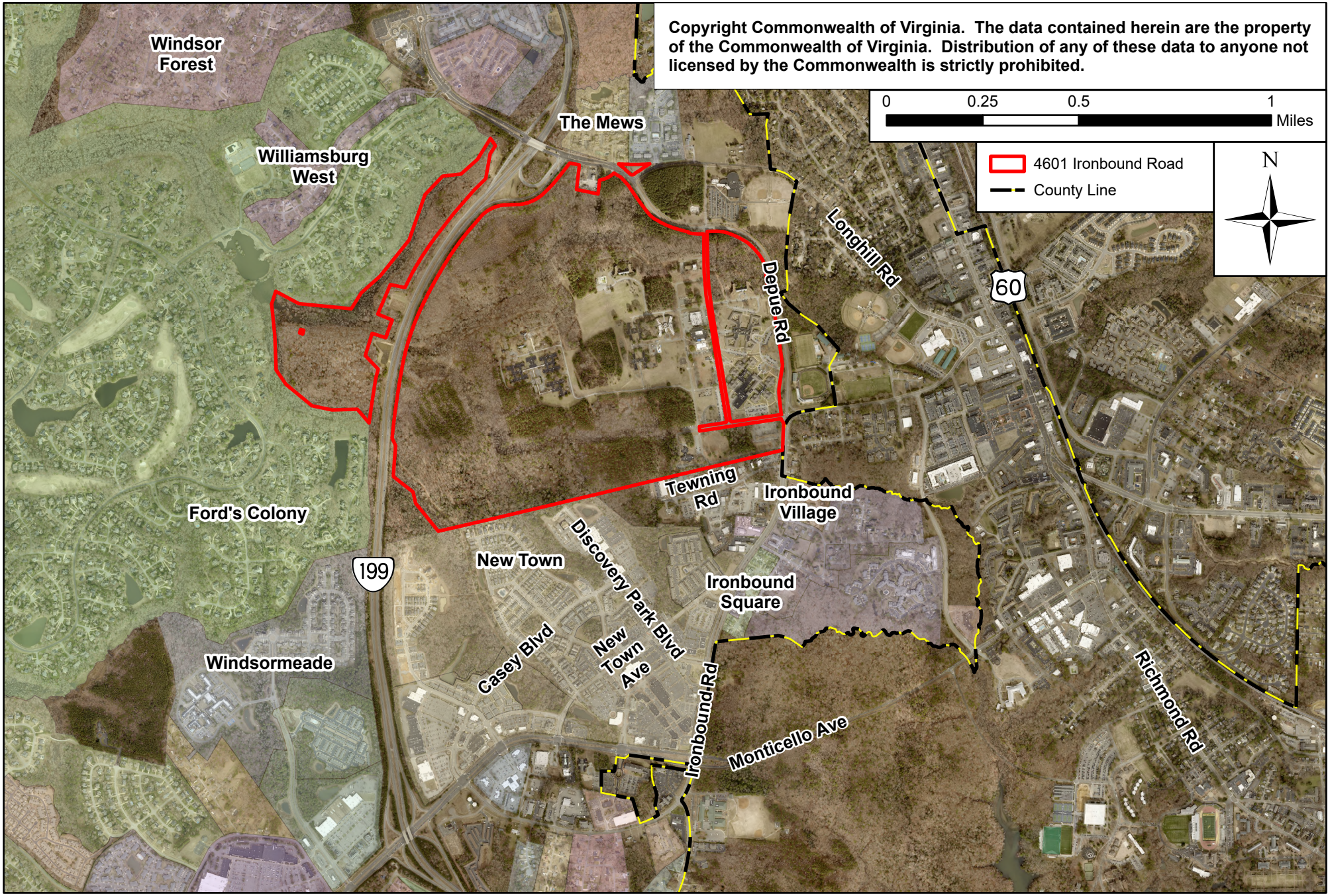
THENCE, S 45°03'00" E A DISTANCE OF 139.56 FEET TO A POINT;
THENCE, S 36°40'45" E A DISTANCE OF 93.85 FEET TO A POINT;

THENCE, ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 718.94 FEET, AN ARC LENGTH OF 141.16 FEET, BEARING S 24°15'24" E ALONG THE CHORD A DISTANCE OF 140.94 FEET TO A POINT;

THENCE, S 3°00'49" E A DISTANCE OF 108.08 FEET TO A POINT ON THE CENTERLINE OF CHISEL RUN;
THENCE, ALONG A SURVEY TIE LINE, THE TRUE PROPERTY LINE BEING THE CENTER OF CHISEL RUN, N 64°21'07" W A DISTANCE OF 128.21 FEET TO A POINT;
THENCE, S 78°16'43" W A DISTANCE OF 164.16 FEET TO A POINT;
THENCE, N 69°15'8" W A DISTANCE OF 83.87 FEET TO A POINT;
THENCE, N 29°41'16" W A DISTANCE OF 136.88 FEET TO A POINT;
THENCE, N 67°48'36" W A DISTANCE OF 226.96 FEET TO A POINT;
THENCE, S 62°07'58" W A DISTANCE OF 126.45 FEET TO A POINT;
THENCE, N 45°22'48" W A DISTANCE OF 113.87 FEET TO A POINT;
THENCE, LEAVING THE CENTERLINE OF CHISEL RUN, N 0°20'01" W A DISTANCE OF 314.91 FEET TO THE POINT OF BEGINNING;

CONTAINING 285,138 SQUARE FEET OR 6.546 ACRES MORE OR LESS
(AREA CALCULATED TO THE CENTERLINE OF CHISEL RUN).

JCC Z-23-0008 Cardinal Ridge (Eastern State) Rezoning (PL to MU)



Cardinal Ridge

Rezoning and Master Plan Submittal

James City County, Virginia

Rev. December 9, 2025

SHEET #	*SHEET NAME*
1	Conceptual Master Plan
2	Land Use Plan
3	Density Bonus Plan
4	Open Space Plan
5	Conceptual Street Network
6	Phasing Plan
7	Environmental Constraints
8	Master Stormwater Plan
9	Conceptual Master Utility & Drainage Plan

Prepared for:

D·R·HORTON®
America's Builder

Prepared by:

LAND PLANNING SOLUTIONS
5857 HARBOUR VIEW BLVD. STE. 202
SUFFOLK VA. 23435-2657
O 757.935.9014 F 757.935.9015
www.landplanningsolutions.com

TIMMONS GROUP

NOTES:
1.Plans are conceptual in nature and final locations and alignments shall be determined at final site plan.

Cardinal Ridge

Conceptual Master Plan

James City County, Virginia

Rev. December 9, 2025

1 of 9

SITE DATA:

PIN #:	3910100152
Property Address:	4601 IRONBOUND ROAD
Current Zoning:	PL Public Lands

Gross Site Area:	+/-365.6 ac.
RPA & Wetlands:	+/-127.2 ac.
Flood Plains (Outside RPA)	+/-0.49 ac.
Net Site Area:	+/-237.9 ac.
Open Space Required:	10% of Net or 23.8 ac.
Open Space Provided:	+/-46.9 ac.
Overall Density Proposed:	4.3 du/ac

LEGEND:
- Wetlands
- RPA
- Proposed SWM
- Forested Area to remain
- Bike Path/Trails

TRAIL FROM WILLIAMSBURG WAY INTERSECTION TO WESTERN OPEN SPACE IF SUCH OPEN SPACE IS EVER PROPOSED FOR RECREATIONAL USE.
ADDITIONAL 100' BUFFER BEYOND 100' RPA (1.29 AC)
ADDITIONAL 100' BUFFER BEYOND 100' RPA (1.00 AC)
ADDITIONAL 100' BUFFER BEYOND 100' RPA (0.2 AC)
ADDITIONAL 100' BUFFER BEYOND 100' RPA (0.54 AC)
ADDITIONAL 100' BUFFER BEYOND 100' RPA (6.93 AC)
PRESERVED MATURE MIXED HARDWOOD FOREST (10 AC)
50' C.C.C. BUFFER
HUMELSINE PKWY.
PUBLIC USE SITE 40.6 AC.
ADDITIONAL 100' BUFFER BEYOND 100' RPA (1.56 AC)
ADDITIONAL 100' BUFFER BEYOND 100' RPA (0.42 AC)
EXISTING MULTI-USE TRAIL
MARKET PLACE DISTRICT
ASHBURY LN.
ENTRY FEATURE
GATED ENTRY
FOSTER RD.
DEPUE DR.
S.W.M.
TRAIL
RPA
ENTRY PARK
TRAIL TO PUBLIC USE SITE
PEDESTRIAN BRIDGE
PARK & PLAYGROUND
PARK
AFFORDABLE APARTMENTS 3 & 4 STORY
CENTRAL PARK
CLUBHOUSE & POOL
4 STORY APARTMENTS
25' BUFFER WITH BERM
APARTMENT CLUBHOUSE & POOL
SCHMIDT RD.
GATE LN.
IRONBOUND RD
COLONIAL BEHAVIORAL HEALTH SITE 14 AC.
HOPE FAMILY VILLAGE SITE 25 AC.

VICINITY MAP

SCALE: 1"=2000'



TABULATION:

Residential:	
Affordable Apartments:	202
Apartments:	248
Multifamily (Townhomes 20'x42' rear load):	207
Multifamily (Townhomes 24'x42' front load):	28
50' Rear Load Single Family:	84
60' Front/Side Load Single Family:	210
Total:	979 units*

**Note: Not including Hope Family Village; see below*

Marketplace District:	+/- 33.2 ac.
Commercial Building Area:	100,000 s.f. max.
Hope Family Village Site Area:	+/- 27.7 ac.
27 attached or detached homes & clubhouse	
Colonial Behavioral Health Site Area:	+/- 14.2 ac.
Commercial Building Area:	62,000 s.f. max.
Public Use Site:	+/- 40.6 ac.

NOTES:
1. *Residential units within hope family village shall be a total of 27 single-family homes or townhomes. The final distribution of each unit type and front or rear loaded configurations shall be determined at the time of final site plan.*
2. *James City County will determine the design of the public use site.*
3. *The layout of the Market Place District is conceptual in nature. Final users will determine the layout in accordance with the design guidelines and the zoning ordinance.*
4. *While stormwater management areas can be logically placed during the conceptual planning of the project, further engineering studies may result in revisions to the layout.*
5. *For illustrative proposes only. Plans are conceptual in nature and final location and alignment shall be determined at final site plan.*

0 250 500 750
SCALE: 1"=250'

N
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O:\Projects\DR Horton\DRH001 - Eastern State\Cadd\Prelim\DRH001 - Rezoning Master.dwg, Plotted By: Eric-PC, Plotted: Dec 09, 2025 - 8:51am

Cardinal Ridge

Land Use Plan

James City County, Virginia

Rev. December 9, 2025

2 of 9

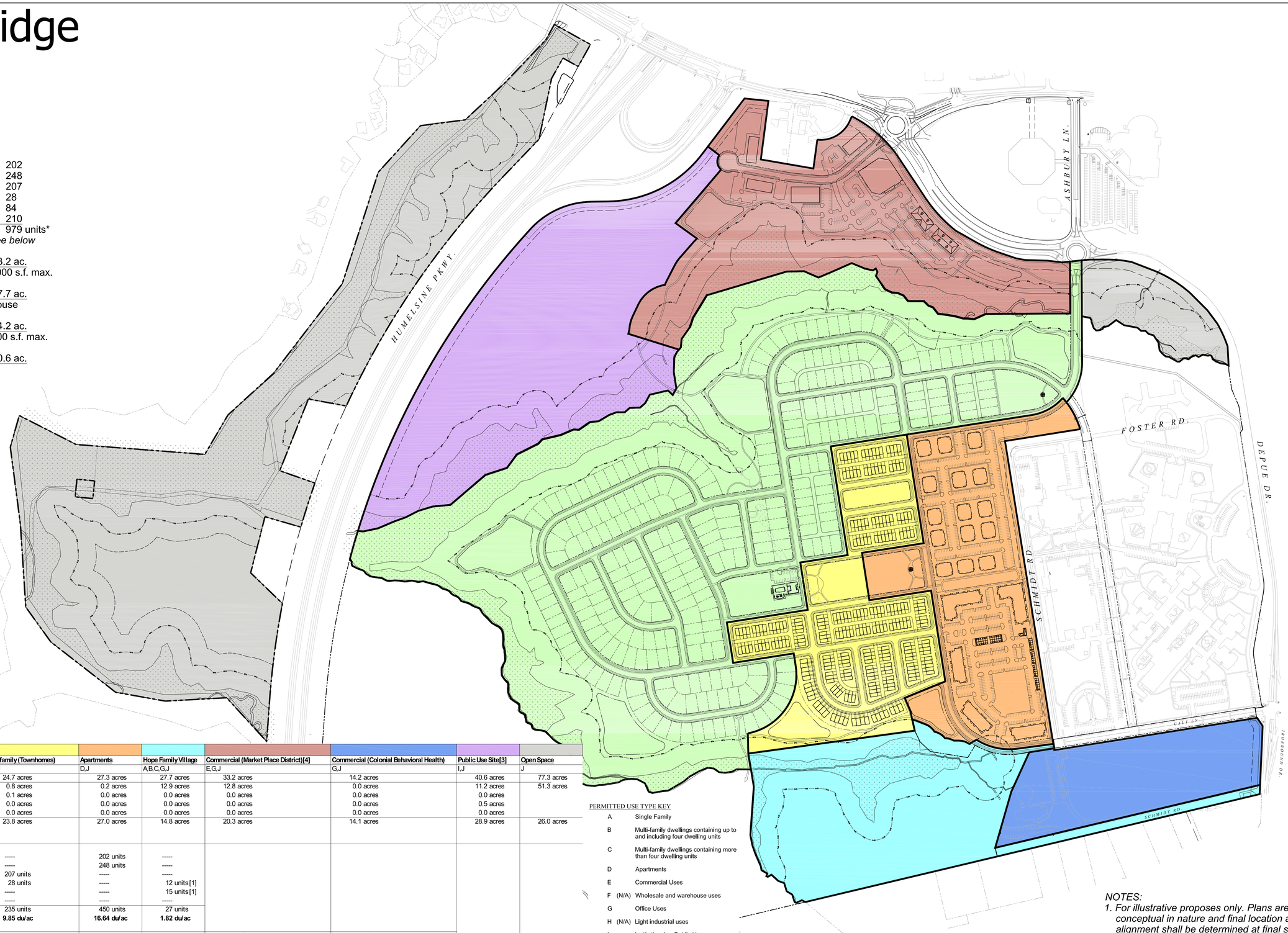
TABULATION:

Residential:	
Affordable Apartments:	202
Apartments:	248
Multifamily (Townhomes 20'x42' rear load):	207
Multifamily (Townhomes 24'x42' front load):	28
50' Rear Load Single Family:	84
60' Front/Side Load Single Family:	210
Total:	979 units*

**Note: Not including Hope Family Village; see below*

Marketplace District:	+/- 33.2 ac.
Commercial Building Area:	100,000 s.f. max.
Hope Family Village Site Area:	+/- 27.7 ac.
27 attached or detached homes & clubhouse	
Colonial Behavioral Health Site Area:	+/- 14.2 ac.
Commercial Building Area:	62,000 s.f. max.
Public Use Site:	+/- 40.6 ac.

Overall Density Proposed: 4.3 du/ac



	Single Family	Multifamily (Townhomes)	Apartments	Hope Family Village	Commercial (Market Place District)[4]	Commercial (Colonial Behavioral Health)	Public Use Site[3]	Open Space
Permitted Uses	A, J	B,C,J	D,J	A,B,C,G,J	E,G,J	G,J	I,J	J
Gross Acreage [2]	120.7 acres	24.7 acres	27.3 acres	27.7 acres	33.2 acres	14.2 acres	40.6 acres	77.3 acres
RPA	37.5 acres	0.8 acres	0.2 acres	12.9 acres	12.8 acres	0.0 acres	11.2 acres	51.3 acres
Wetlands outside RPA	0.4 acres	0.1 acres	0.0 acres	0.0 acres	0.0 acres	0.0 acres	0.0 acres	
Flood Zone Outside RPA	0.0 acres	0.0 acres	0.0 acres	0.0 acres	0.0 acres	0.0 acres	0.5 acres	
>25% Slopes over 1,000 s.f. outside RPA	0.0 acres	0.0 acres	0.0 acres	0.0 acres	0.0 acres	0.0 acres	0.0 acres	
Developable Area[2]	82.9 acres	23.8 acres	27.0 acres	14.8 acres	20.3 acres	14.1 acres	28.9 acres	26.0 acres
Tabulation								
Residential								
Affordable Apartments	-----	-----	202 units	-----				
Apartments	-----	-----	248 units	-----				
Multifamily (Rear Load Townhomes)	-----	207 units	-----	-----				
Multifamily (Front Load Townhomes)	-----	28 units	-----	12 units [1]				
Single Family (Rear Load)	84 units	-----	-----	15 units [1]				
Single Family (Front/Side Load)	210 units	-----	-----	-----				
Total	294 units	235 units	450 units	27 units				
Net Density	**3.55 du/ac**	**9.85 du/ac**	**16.64 du/ac**	**1.82 du/ac**				
Commercial Building Area					100,000 s.f. max.	62,000 s.f. max		
Floor Area Ratio					**0.113177**	**0.100642**		

Table ANotes:

[-] 100% of Flood Zone AE and X within RPA area

[1] Residential units within hope family village shall be a total of 27 single-family homes or townhomes. The final distribution of each unit type and front or rear loaded configurations shall be determined at the time of final site plan.

[2] The acreage of each use is based on a conceptual design and may change when site/subdivision plans are submitted due to engineering constraints.

[3] James City County will determine the design of the public use site.

[4] The layout of the Market Place District is conceptual in nature. Final users will determine the layout in accordance with the design guidelines and the zoning ordinance.

PERMITTED USE TYPE KEY

A		Single Family
B		Multi-family dwellings containing up to and including four dwelling units
C		Multi-family dwellings containing more than four dwelling units
D		Apartments
E		Commercial Uses
F	(N/A)	Wholesale and warehouse uses
G		Office Uses
H	(N/A)	Light industrial uses
I		Institutional or Public Uses
J		Areas of common open space, with recreation areas as noted
M	(N/A)	Structures containing a mixture of uses
X	(N/A)	Other structures, facilities or amenities

NOTES:

1. For illustrative proposes only. Plans are conceptual in nature and final location and alignment shall be determined at final site plan.

0 250 500 750

SCALE: 1"=250'

N

NAD83

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Cardinal Ridge

Density Bonus Plan

James City County, Virginia

Rev. December 9, 2025

3 of 9

DENSITY BONUS:

(Note: Letter designations correspond with zoning ordinance)

E. Dedicating to the county a public use site, the developable portion of which is suitable for a public facility, as determined by the county administrator or designee.
1 POINT

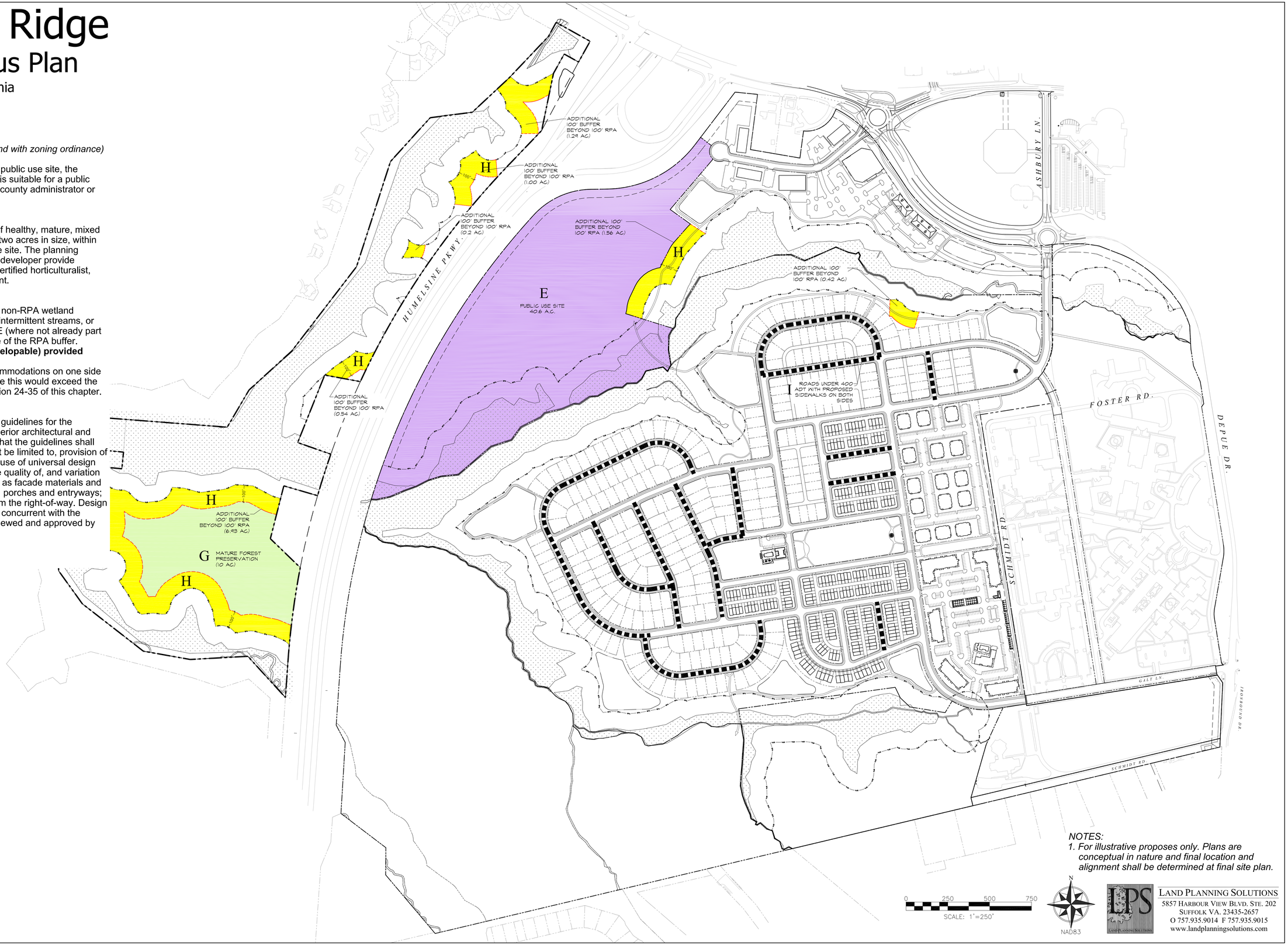
G. Preserving a single area of healthy, mature, mixed hardwood forestland at least two acres in size, within the developable portion of the site. The planning director may request that the developer provide confirmation, prepared by a certified horticulturalist, that these qualities are present.
1 POINT

H. 1. 100 foot buffers around non-RPA wetland features (isolated wetlands), intermittent streams, or from floodplain zones A or AE (where not already part of the RPA), or from the edge of the RPA buffer.
1 POINT - 11.94 ac. (5% developable) provided

I. Providing pedestrian accommodations on one side of all internal roadways, where this would exceed the requirements set forth in section 24-35 of this chapter.
1 POINT

✓ J. Developing binding design guidelines for the development that include superior architectural and design standards. Elements that the guidelines shall address include, but need not be limited to, provision of rear or side loading garages; use of universal design concepts; and attention to the quality of, and variation in, elements of the units such as facade materials and colors; windows, roof pitches, porches and entryways; and heights and setbacks from the right-of-way. Design guidelines shall be submitted concurrent with the master plan, and shall be reviewed and approved by the planning director.
0.5 POINTS

TOTAL POINTS: 4.5



NOTES:
1. For illustrative proposes only. Plans are conceptual in nature and final location and alignment shall be determined at final site plan.

0 250 500 750
SCALE: 1"=250'

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Cardinal Ridge

Open Space Plan

James City County, Virginia

Rev. December 9, 2025

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SITE DATA:

PIN #:	3910100152
Property Address:	4601 IRONBOUND ROAD
Current Zoning:	PL Public Lands
Gross Site Area:	+/-365.6 ac.
RPA & Wetlands:	+/-127.2 ac.
Flood Plains (Outside RPA)	+/-0.49 ac.
Net Site Area:	+/-237.9 ac.
Open Space Required:	10% of Net or 23.8 ac.
Open Space Provided:	+/-46.9 ac.

TRAIL FROM WILLIAMSBURG WAY INTERSECTION TO WESTERN OPEN SPACE IF SUCH OPEN SPACE IS EVER PROPOSED FOR RECREATIONAL USE.

HUMELSINE PKWY.

ASHBURY LN.

FOSTER RD.

DEPUE DR.

SCHMIDT RD.

GAGE LN.

IRONBOUND DR.

OPEN SPACE 4.1 AC

OPEN SPACE 0.6 AC

OPEN SPACE 0.3 AC

OPEN SPACE 17 AC

OPEN SPACE 9.5 AC

OPEN SPACE 2.4 AC

OPEN SPACE 3.7 AC

OPEN SPACE 1.5 AC

OPEN SPACE 0.9 AC

OPEN SPACE 0.8 AC

OPEN SPACE 0.8 AC

OPEN SPACE 9.3 AC

OPEN SPACE 1.4 AC

OPEN SPACE 3.8 AC

OPEN SPACE 1.0 AC

OPEN SPACE 1.3 AC

LEGEND:

- 1 — Significant Locations and Features
- On-street bike path
- Multi-use trail
- Useable Open Space
- Wetlands, RPA, and green areas
- Ponds
- Clubhouses

SIGNIFICANT LOCATIONS:

1 - Central Park
- To include a multiuse field (150'x300' min)

2 - Clubhouse, pool, & amenities
- To include 2 basketball courts & 1 tennis court
- Pool to be a minimum of 25 meters long

3 - Pocket park with trail connection to public use site & playground with 5 activities minimum

4 - Entry park

5 - Passive recreation park with seating area

6 - Apartment park with multiuse trail connections & playground

7 - Apartment clubhouse & leisure pool (less than 25 meters, for apartment residents only)

8 - Wetlands and RPA

NOTES:

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SCALE: 1"=250'

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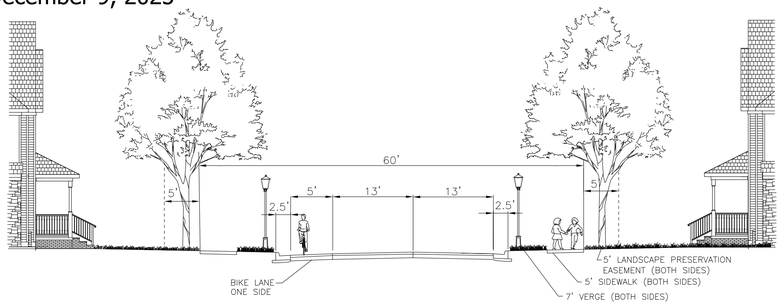
Cardinal Ridge

Conceptual Street Network

James City County, Virginia

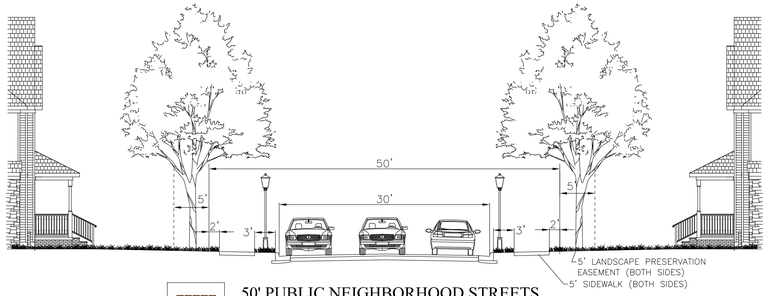
Rev. December 9, 2025

5 of 9



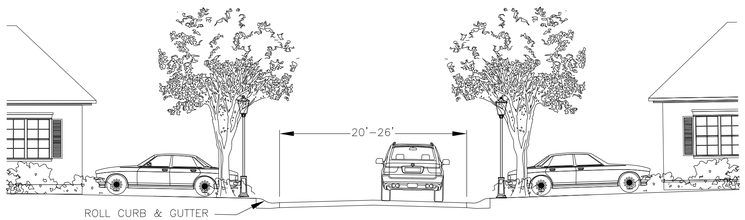
60' PUBLIC NEIGHBORHOOD STREETS WITH BIKE LANE

NOT TO SCALE
PARALLEL PARKING ONE SIDE



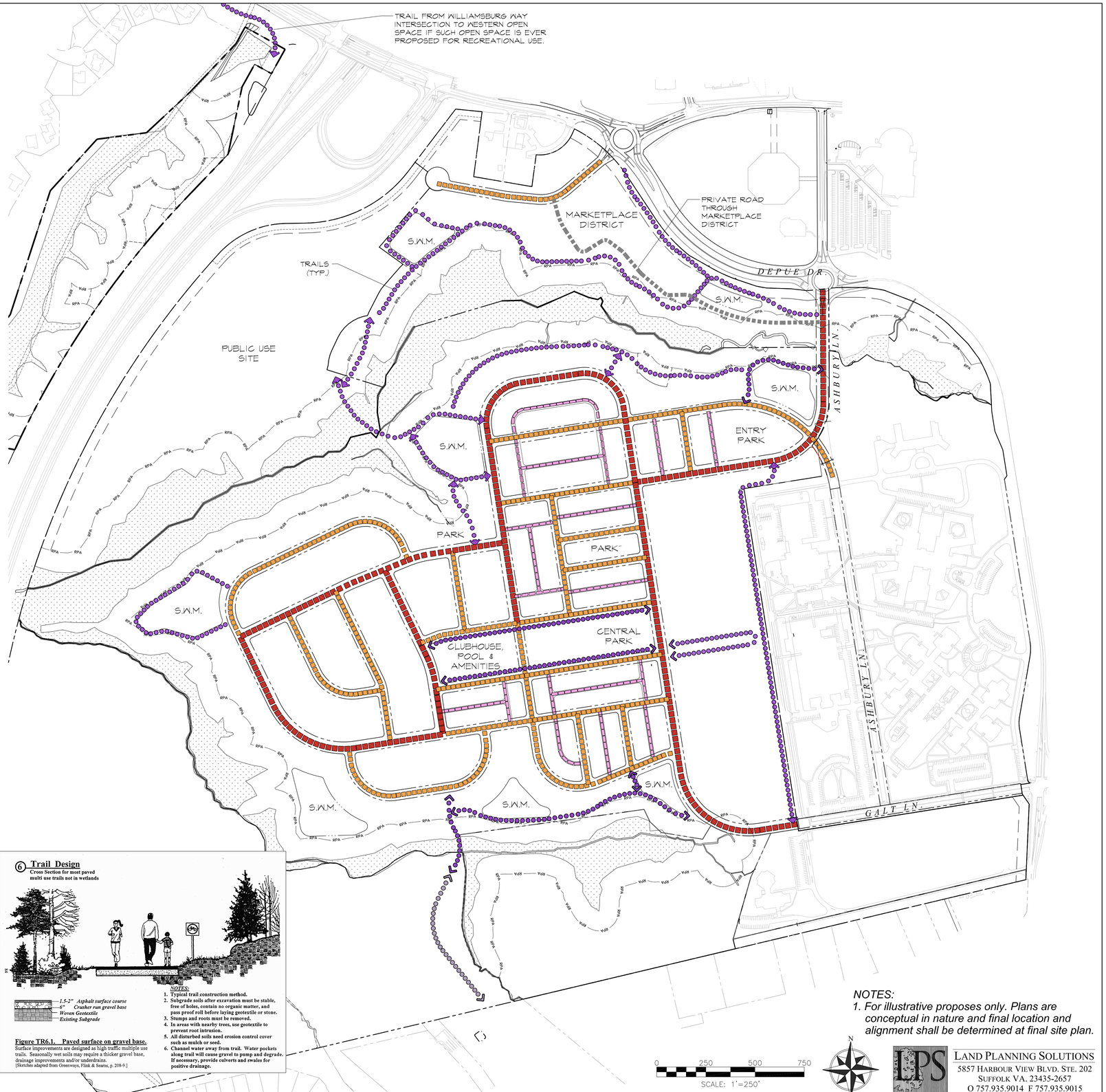
50' PUBLIC NEIGHBORHOOD STREETS

PARALLEL PARKING ON ONE SIDE
NOT TO SCALE



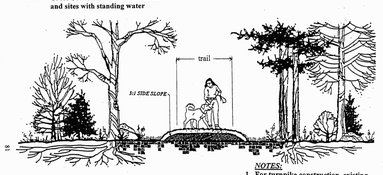
TYPICAL PRIVATE 20-26' ALLEY SECTION

WIDTH VARIES BASED ON REQUIRED FIRE ACCESS
NOT TO SCALE



3 Trail Design

Cross Section for trails in wetlands and sites with standing water



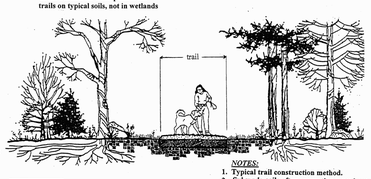
3" Mulched surface
6" Crusher run or 22-B gravel base
Woven geotextile
Existing Subgrade

Figure TR3.1. Natural surface on gravel base.
Surface improvements are primarily limited to denuded trail sections, seasonally wet soils, or sensitive areas requiring turnpike construction. Stable trail sections will employ Option #2.
[Sketches adapted from Greenways, Flink & Searns, p. 208-9.]

NOTES:
1. **For turnpike construction, existing soils must be stable, free of holes, and not contain excess organic matter.**
2. **Stumps and roots must be removed.**
3. **Side slopes must not exceed 3:1 and must be compacted to remain stable.**
4. **All disturbed soils need erosion control cover such as mulch or seed.**
5. **Channel water away from trail. Water pockets along trail will cause gravel to pump and become soft. If necessary, provide cross drainage using culverts under gravel.**

4 Trail Design

Cross Section for most pedestrian trails on typical soils, not in wetlands



3-4" Gravel fines surface
4-6" Crusher run gravel base
Woven geotextile or soil cement
Existing Subgrade

Figure TR4.1. Crusher fines on gravel base.
Surface improvements using gravel are for high traffic multiple use trails. Gravel should be compacted. Gravel fines should be replaced when the base course comes to the surface.
[Sketches adapted from Greenways, Flink & Searns, p. 208-9.]

NOTES:
1. **Typical trail construction method.**
2. ***Subgrade* soils after excavation must be stable, free of holes, contain no organic matter, and pass proof roll before laying geotextile or stone.**
3. **Stumps and roots must be removed.**
4. **In areas with nearby trees, use geotextile to prevent root intrusion.**
5. **All disturbed soils need erosion control cover such as mulch or seed.**
6. **Channel water away from trail. Water pockets along trail will cause gravel to pump and degrade. If necessary, provide culverts and swales for positive drainage.**

6 Trail Design

Cross Section for most paved multi use trails not in wetlands

1.5-2" Asphalt surface course
6" Crusher run gravel base
Woven Geotextile
Existing Subgrade

Figure TR6.1. Paved surface on gravel base.
Surface improvements are designed as high traffic multiple use trails. Seasonally wet soils may require a thicker gravel base, drainage improvements and/or underdrains.
[Sketches adapted from Greenways, Flink & Searns, p. 208-9.]

NOTES:
1. **Typical trail construction method.**
2. **Subgrade soils after excavation must be stable, free of holes, contain no organic matter, and pass proof roll before laying geotextile or stone.**
3. **Stumps and roots must be removed.**
4. **In areas with nearby trees, use geotextile to prevent root intrusion.**
5. **All disturbed soils need erosion control cover such as mulch or seed.**
6. **Channel water away from trail. Water pockets along trail will cause gravel to pump and degrade. If necessary, provide culverts and swales for positive drainage.**

TRAILS

NOTES:
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0 250 500 750

SCALE: 1"=250'

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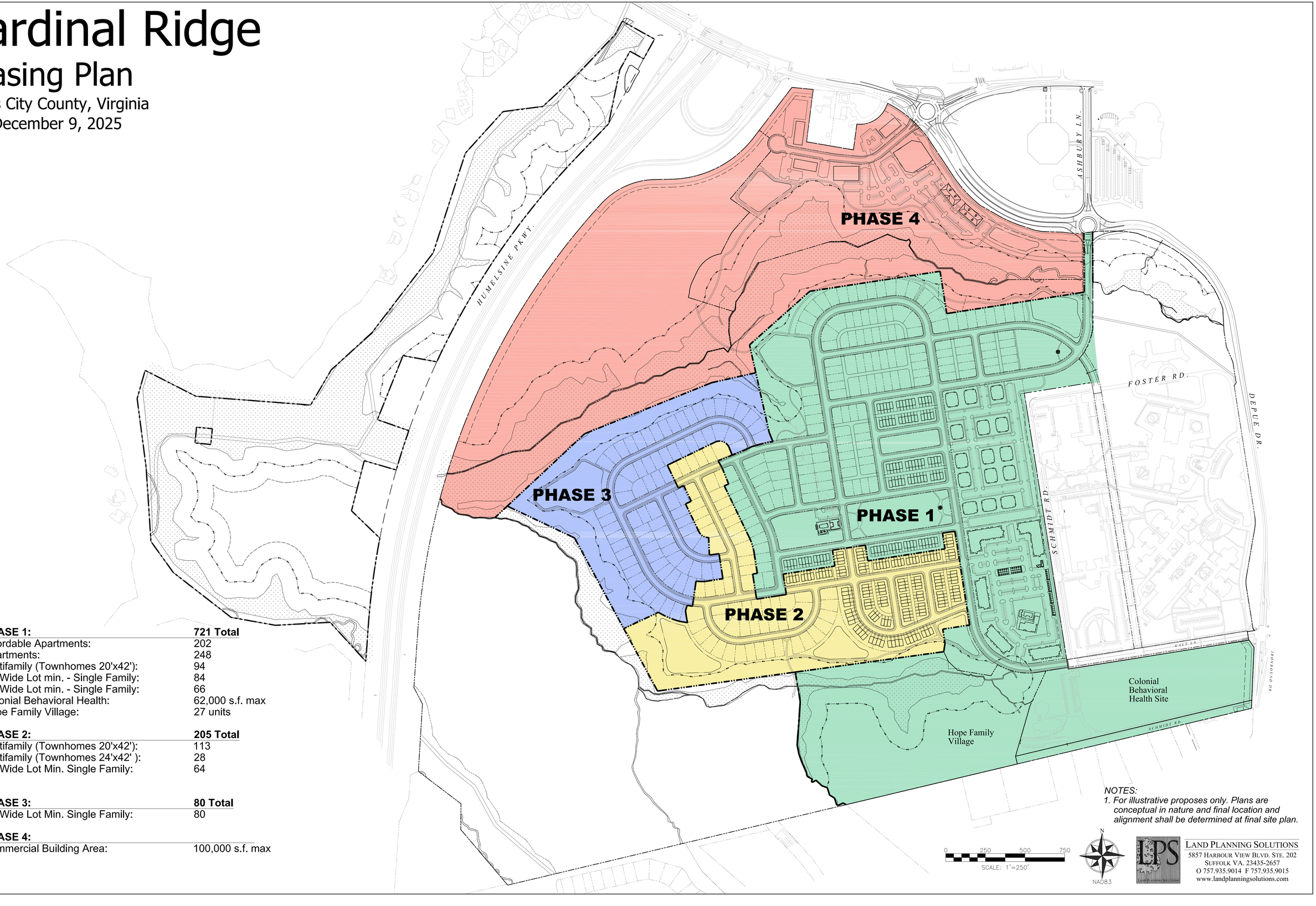
Cardinal Ridge

Phasing Plan

James City County, Virginia

Rev. December 9, 2025

6 of 9



PHASE 1:	721 Total
Affordable Apartments:	202
Apartments:	248
Multifamily (Townhomes 20'x42'):	94
50' Wide Lot min. - Single Family:	84
60' Wide Lot min. - Single Family:	66
Colonial Behavioral Health:	62,000 s.f. max
Hope Family Village:	27 units

PHASE 2:	205 Total
Multifamily (Townhomes 20'x42'):	113
Multifamily (Townhomes 24'x42'):	28
60' Wide Lot Min. Single Family:	64

PHASE 3:	80 Total
60' Wide Lot Min. Single Family:	80

PHASE 4:	
Commercial Building Area:	100,000 s.f. max

NOTES:

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SCALE: 1"=250'

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LEGEND

- RPA
- SOIL BOUNDARY
- PERENNIAL STREAM
- INTERMITTENT STREAM
- EPHEMERAL STREAM
- WETLANDS
- STEEP SLOPE (>25%)
- FLOODZONE AE
- FLOODZONE A
- FLOODZONE X
- WILDLIFE CORRIDOR
- WILDLIFE CORE

SOILS TABLE:

MAP UNIT SYMBOL	MAP UNIT NAME
5	BERTHERA SILT LOAM
10C	CRAVEN FINE SANDY LOAM, 6 TO 10 PERCENT SLOPES
11C	CRAVEN-UCHEE COMPLEX, 6 TO 10 PERCENT SLOPES
14B	EMPORIA FINE SANDY LOAM, 2 TO 6 PERCENT SLOPES
14C	EMPORIA FINE SANDY LOAM, 6 TO 10 PERCENT SLOPES
15D	EMPORIA COMPLEX, 10 TO 15 PERCENT SLOPES
15E	EMPORIA COMPLEX, 15 TO 25 PERCENT SLOPES
15F	EMPORIA COMPLEX, 25 TO 50 PERCENT SLOPES
17	JOHNSTON COMPLEX
18B	KEMPSVILLE FINE SANDY LOAM, 2 TO 6 PERCENT SLOPES
19B	KEMPSVILLE-EMPORIA FINE SANDY LOAMS, 2 TO 6 PERCENT SLOPES
20B	KENANSVILLE LOAMY FINE SAND, 2 TO 6 PERCENT SLOPES
29A	SLAGLE FINE SANDY LOAM, 0 TO 2 PERCENT SLOPES
29B	SLAGLE FINE SANDY LOAM, 2 TO 6 PERCENT SLOPES
31B	SUFFOLK FINE SANDY LOAM, 2 TO 6 PERCENT SLOPES
34B	UCHEE LOAMY FINE SAND, 2 TO 6 PERCENT SLOPES
34C	UCHEE LOAMY FINE SAND, 6 TO 10 PERCENT SLOPES
35	UDORTHENTS, LOAMY
37	URBAN LAND
W	WATER

ENVIRONMENTAL CONSTRAINTS

43654 - Cardinal Ridge - October 7, 2025

SCALE 1"=300'

0 300' 600'

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

LEGEND

POTENTIAL AREA TO SHEETFLOW TO CONSERVED OPEN SPACE

AREAS OF 'A' OR 'B' SOILS THAT MAY INCLUDE INFILTRATION BMPS

AREAS OF CONCERN FOR POTENTIAL STREAM RESTORATION

WET POND

CONCEPTUAL STORM PIPES

(A) WET POND - LEVEL 1 OR LEVEL 2 (TO BE DETERMINED DURING DESIGN)

(B) POND OUTFALL (MAY BE SIZED FOR 100-YEAR STORM WITH ENHANCED PROTECTION TO MEET SSC #8)

(C) POTENTIAL LOCATION FOR BMP IN PARK/OPEN SPACES*

(D) POTENTIAL LOCATION FOR BMP IN PARKING LOTS*

* = ALTERNATE/ADDITIONAL BMPS TO BE IMPLEMENTED MAY INCLUDE HYDRODYNAMIC MTDS, FILTER MTDS, WET SWALES, BIORETENTION, DRY SWALES, PERMEABLE PAVEMENT, OR OTHERS AS APPROVED BY VADEQ

NOTES

1) ALL STORMWATER PRACTICES TO MEET QUALITY AND SSC REQUIREMENTS ARE CONCEPTUAL AND MAY BE RESOLVED DIFFERENTLY DURING DESIGN PROCESS. MEASURES SHOWN ON THIS EXHIBIT ARE INTENDED TO DEMONSTRATE FEASIBILITY OF THIS PROJECT TO SATISFY ALL REGULATIONS ON-SITE.

2) ANY BMPS PROVIDED TO MEET SSC CRITERIA (SSC #6 OR SSC #7) SHALL BE IN EXCESS OF STORMWATER QUALITY REQUIREMENTS AND WILL NOT COUNT TOWARD VRRM CALCULATIONS.

3) SSC #13 MAY BE IMPLEMENTED IN WHICH POST-DEVELOPMENT CALCULATIONS SHALL USE A 1.2 MULTIPLIER, AND NO MULTIPLIER SHALL BE USED FOR PRE-DEVELOPMENT CALCULATIONS. BY DISCRETION OF SRP STAFF, THIS MULTIPLIER MAY BE REMOVED WHEN CALCULATING SPREAD DURING THE DESIGN PROCESS.

EXISTING STREAM TO BE REROUTED TO PROPOSED BMP TO MITIGATE DOWNSTREAM CONDITIONS

RPA

Post-Development Project (Treatment Volume and Loads)

Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	
Forest (acres) -- undisturbed, protected forest or reforested land			8.88		8.88	*
Mixed Open (acres) -- undisturbed/infrequently maintained grass or shrub land					0.00	
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed			72.76		72.76	
Impervious Cover (acres)			130.16		130.16	
					211.80	

** Forest and Mixed Open areas must be protected in accordance with the Virginia Runoff Reduction Method*

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	111.55

MASTER STORMWATER PLAN

43654 - Cardinal Ridge - October 7, 2025

N

SCALE 1"=300'

0 300' 600'

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UTILITY LEGEND:

PROPOSED WATER MAIN

PROPOSED GRAVITY SANITARY SEWER MAIN

EXISTING 16" WATER MAIN — 16"W

EXISTING GRAVITY SANITARY SEWER MAIN

DRAINAGE LEGEND:

PROPOSED STORM PIPE

POND #8

POND #1

POND #2

POND #7

POND #6

POND #5

POND #4

POND #3

PROPOSED WATER MAIN (TYP.)

EXISTING SANITARY SEWER MAIN (TYP.)

PROPOSED SANITARY SEWER MAIN (TYP.)

PROPOSED STORM PIPE (TYP.)

EXISTING FIRE HYDRANT FH140031

EXISTING 16" WATER MAIN (TYP.)

CONCEPTUAL MASTER UTILITY AND DRAINAGE PLAN

43654 - Cardinal Ridge - October 7, 2025

SCALE 1"=300'

0 300' 600'

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COMMUNITY IMPACT STATEMENT

FOR

CARDINAL RIDGE
JAMES CITY COUNTY, VIRGINIA

OCTOBER 7, 2025

PREPARED FOR:

D.R. HORTON SOUTHERN VIRGINIA
2820 WATERFORD LAKE DR, STE 100
MIDLOTHIAN, VA 23112
(804) 944-2015

PREPARED BY:

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

2901 S Lynnhaven Road, Suite 200
Virginia Beach, Virginia 23452
757.213.6679
www.timmons.com

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Project Narrative & Description

The applicant, D.R. Horton, proposes to rezone approximately 365.6 acres at Eastern State Hospital from PL (Public Lands) to MU (Mixed Use). Proposed residential uses would include a total of 450 apartments, 235 townhomes, and 294 single-family lots with multiple amenities and parks. Future residential development includes Hope Family Village containing an additional 27 residential units. Neighborhood Commercial uses would include the Marketplace District with a maximum of 100,000 square feet of floor area and Colonial Behavioral Health with a maximum of 62,000 square feet. A Public Use site of 40.6 acres is being provided. 10 acres of mature, hardwood forestland is being preserved by this project.

The Site has been determined to be 65% developable with the remaining 35% delineated as undeveloped area. Use percentages of the developable land are as follows: 56% Residential, 12% Commercial, 12% Public, and 20% Open Space. Shared parking will be provided in the commercial areas and on-street parking will be provided on the residential streets.

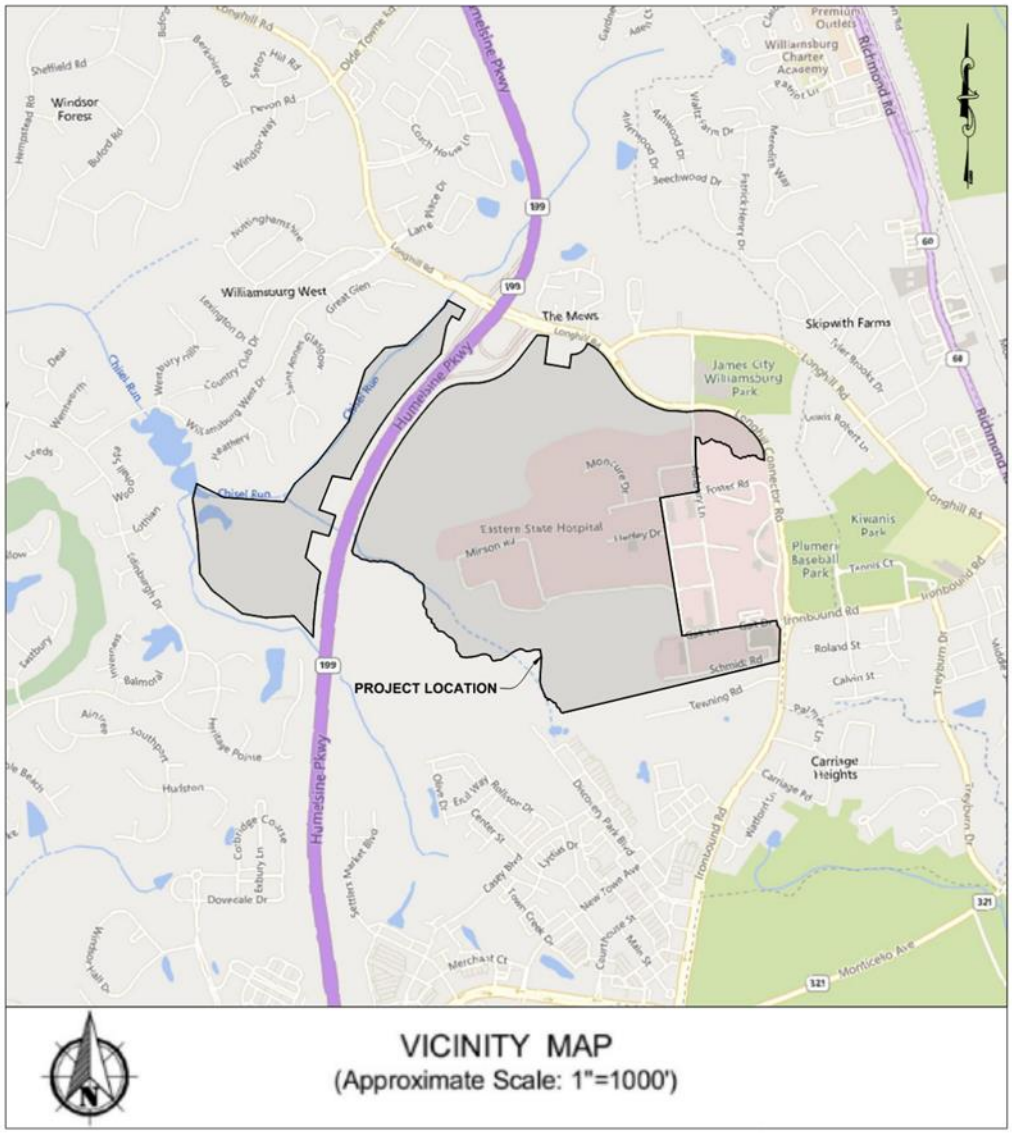
Community improvements will include the construction of a public primary loop road connecting to Ironbound Road to the southeast and Depue Dr. to the north with a 60' ROW, along with public streets to serve the subdivision area, retail/commercial space, and multi-family areas. The streets within the multi-family development will be public. Additional community improvements will include public water upgrades and extension of the existing public gravity sewer.

Existing Conditions Site Data:

Gross Site Area	**+/- 365.6 AC**
RPA & Wetlands	+/- 127.2 AC
Floodplain (Outside RPA)	+/- 0.49 AC
Net Site Area	**+/- 237.9 AC**

The Site is bounded by Longhill Road/Depue Drive to the north, Eastern State Hospital Campus to the east, Route 199 to the west, and commercial properties to the south along Tewning Road. The portion of the site to the west of Route 199 abutting Fords Colony will remain as open space. (See Figure 1 below.)

Figure 1



VICINITY MAP
for
CARDINAL RIDGE
James City County, Virginia

Adequate Public Facilities

Public Water

The Cardinal Ridge Project is located within the JCSA PSA. An existing JCSA 16" water main runs along Ironbound Road, DePue Drive, and Longhill Road, these roadways bound the eastern and northern portions of the Site. This development proposes to provide 3 connections to the existing 16" water main, (1) at Ironbound Road near Fire Hydrant ID FHJ140023, (2) at DePue near Fire Hydrant ID FHJ140031, and (3) near the Longhill Road and DePue Drive intersection. A new 12" water main (trunk) will be provided within the proposed loop road public right-of-way between the Ironbound Road (#1) and DePue Drive connection (#2). Additional 8" water main branches will extend from this trunk line to service the residential subdivision, apartment, and townhome areas, as well as the Hope Family Village, and the Colonial Behavioral Health Site. The third connection (#3) will provide a 12" water main extension to service the retail/commercial area, as well as the public land use space. Hydrants will be provided to meet JCSA minimum standards and as otherwise directed by the Fire Marshall.

A fire hydrant flow test was conducted on August 30, 2023 and the results of the test indicate approximately 4,840 gpm of flow at 20 psi. The results of the flow test have been incorporated into a water model created to analyze volume and pressures throughout the projected water system for the development.

Using the JCSA Design Criteria for Water Distribution Systems' multiple variations of water demands were projected, including Average Demand, Max Day Demand, and Peak Hour Demand. The total average day demand of the completed development is projected to be approximately 380,110 GPD (288.6 GPM). Using a max day factor of 1.663 and a peak hour factor of 4.0, the anticipated max demand and peak hour demand for the development are 481 GPM and 1,157 GPM, respectively.

Irrigation demands will be met using on-site BMPs or irrigation wells as the water source. JCSA water will not be used for irrigation purposes.

Fire flow demands are specified by the JCC Fire Department and are based on zoning, use and type of construction. For this development fire flow demands are as follows:

- Single-Family (detached): 1,000 GPM
- Apartments/Townhomes: 2,500 GPM
- Commercial (Light)/Public Land Use: 2,500 GPM

Combining the peak hour demand for the entire development and fire flow demand at the multi-family apartments (1,157 GPM + 2,500 GPM = 3,657 GPM) is still below the available demand in the system @ 20 psi per the hydrant flow test; therefore, there is adequate volume in the system for fire-fighting purposes.

The water model hydraulic analysis was performed for three (3) different scenarios. (1) Average Day Demand, (2) Peak Hour Demand and (3) Peak Hour plus Fire Flow Demand. The analysis shows the worst-case scenario is a variation of Scenario #3, Peak Hour Demand for all buildings other than the multi-family apartment building where Fire Flow Demand is applied. This happens to be the most remote of the multi-family buildings nearest to US HWY 199 to the north of The Site (near Junction J-68). The

results of this scenario indicate all pressures within the system are above 20 psi during fire-fighting activities.

The following assumptions were made during the development of the water model:

1. Hydrants were only placed at critical nodes for purposes of analysis. The actual locations will be decided during the design phase.
2. Public water mains were assumed to be DIP with a Hazen Williams C of 110.
3. Private water mains were assumed to be PVC with a Hazen Williams C of 130.
4. Node elevations were estimated by using existing ground elevations for each node.

For detailed information about the water demand breakdown and water model inputs, map, and/or results, see Appendix A.

Conclusion:
Based on the data provided with the hydrant flow test, along with volume and pressure analysis from projected demands and detailed water modeling, there is adequate volume and pressure available for the development during daily demand and emergency situations.

Public Sewer

The proposed development will collect and convey sewage by means of existing and proposed gravity sewer systems to Hampton Roads Sanitation District (HRSD) Pump Station NS-PS-231-1. HRSD has evaluated this pumps station and determined that it is adequate for the anticipated flows from the project.

Existing Conditions:

The existing peak flow rates at various points within the existing system are as shown in the following tables:

Description	Existing Peak Flow (GPD)
Library Storage Meter	110.42
Offices Meter	425.35
Stadium Meter	519.42
MH 15405D	86,807
MH 15405	1,521,772.7
MH 15317	624,163.7
MH 15315	17,825
MH 15314	106,950
MH 15305	220,242
MH 15300	24,800

Proposed Projected Flows:

The proposed development has a total area of 365.6 acres and includes a total of 979 residential units. The development plan also includes 27 residential units for Hope Family Village, Colonial Behavioral Health Site (62,000 sf), undeveloped public land use (28.9 ac developable), and commercial space

(100,000 sf). The projected peak flow is 984,475 GPD for the proposed development area. See Appendix A for calculations and assumptions.

AREA	UNIT TYPE	Number	Flow Duration (HRS)	Flow Demand (GPD)	Avg. Flow (GPD)	Avg. Flow (GPM)	Peak Factor	Peak Flow (GPD)	Peak Flow (GPM)
Apartments and Townhomes	Unit	685	24	310	212,350	147.5	2.5	530,875	368.7
Single Family Detached	Unit	294	24	310	91,140	63.3	2.5	227,850	158.2
Hope Family Village – Residential Units	Unit	27	24	310	8,370	5.8	2.5	20,925	14.5
Clubhouses	Unit	3	24	1550	4,650	3.2	2.5	11,625	8.1
Colonial Behavioral Health Site	SF	62,000	12	0.25	15,500	21.5	3.0	46,500	64.6
Public Land Use - Undeveloped, Non-Residential (1,000 GPD/AC)	AC	28.9*	24	1000	28,900	19.5	3.0	84,300	58.5
Commercial	SF	100,000	12	0.2	20,000	27.8	3.0	60,000	83.3
Total					**380,910**	**289.2**		**984,475**	**757.6**

*Developable Area

Hydraulic Calculations:

Using the GIS and flow rate information provided by JCSA and the calculated peak flow rate for the proposed development, a hydraulic analysis was performed for the proposed Cardinal Ridge development.

The results of the analysis show that the proportional flow of the entire system will be below 100%. With a pipe capacity of 3.69 MGD and a peak flow of 3.343 MGD through the pipe, there is 0.35 MGD capacity remaining in the system. Therefore, the existing pipes have adequate capacity to support the proposed development.

Conclusion:

Based on the data provided, the existing sewer system is not at its full capacity and can support the proposed development. Therefore, no changes of the existing system are required.

HRSD has confirmed that the downstream pump station has capacity for the project.

Fire & EMS

There are currently five fire stations serving the County. There is also a cooperation agreement between JCC, York County, and the City of Williamsburg. The closest station to this project is JCC Fire Station #4 on Olde Towne Road. It is approximately 2 miles away with a 5 minute anticipated response time. JCC Fire Station #3 on John Tyler Highway is approximately 3.1 miles away with an anticipated response time of 10 minutes. Additionally, the City of Williamsburg Fire Station on Lafayette Street is approximately 2.5 miles away with an anticipated response time of 9 minutes.

Libraries

A new public library is planned at the Municipal Complex across Depue Drive.

Electricity

Dominion Power will provide electrical service for the development. All new utilities will be placed underground per JCC requirements.

Solid Waste

The Site has a variety of land uses within the master planned development that will generate solid wastes requiring collection and disposal in an appropriate manner. Multiple dumpster locations will be provided on-site for the apartments and commercial areas where trash and recycling can be stored for transport to a solid waste transfer station. For the single-family units and townhomes, the developer will contract with solid waste haulers to ensure waste is picked up and disposed of in accordance with local health standards.

Parks & Recreation Guidelines

D.R. Horton has proposed recreation space and amenities designed to satisfy the JCC Recreational Facility Development Guidelines. These amenities, as outlined in the Master Plan, shall include clubhouses, pool areas, multiple park areas with basketball and tennis courts, and pedestrian/biking connectivity throughout the development including walking trails through the RPA. Approximate total lengths of these on-street bike lanes and trails are 7,500 and 10,000 linear feet, respectively. Additional facilities may be provided during future phases of the Public Use area.

Open Space

The development will have approximately 46.9 acres of provided open space (23.8 acres required) throughout the community. Approximately 127.7 acres will remain undisturbed within the RPA, Floodplains, and the RPA setback.

Adequate Public Schools Facilities Assessment

The development is proposed to generate 108 elementary students to Clara Byrd Baker Elementary School, 52 middle school students to James Blair Middle School, and 70 high school students to Lafayette High School. Clara Byrd Baker and James Blair will both have available capacity after counting students from the project. The currently published effective capacity of Lafayette HS is 1,314. As part of this upcoming fiscal year (i.e., 7/1/2025-6/30/2026), WJCC intends to formally update and publish the new effective capacity, based on recent improvements, following a formal determination by the architect. In the interim, WJCC, by email, have stated that the estimated 2025 effective capacity will be 1,514. See Appendix F for additional information.

Student Generation Rates Provided by County

Student Generation Rates	Elementary	Middle	High	Total
Single Family Detached	0.156	0.083	0.122	0.361

Single Family Attached	0.091	0.044	0.055	0.19
Apartment	0.077	0.03	0.036	0.143

Projected Students Generated by Project

Type of Unit	Number of Units	# of Elementary Students	# of Middle School Students	# of High School Students	Total
Single Family Detached	321	51	27	40	118
Single Family Attached	235	22	11	13	46
Apartment	450	35	14	17	66
Total	1006	108	52	70	230

Capacity Analysis

School	Existing Enrollment - Fall 2024	Effective Capacity	Current Available Capacity	# of Students from Project	Available Capacity with Project Students
Clara Byrd Baker Elementary	457	599	142	108	34
James Blair Middle	506	608	102	52	50
Lafayette High	1251	1514	263	70	193

Environmental Constraints Analysis

The following documents are provided for reference in Appendix D:

- Document ID #1: Existing Conditions
- Document ID #2: USACOE Confirmation
- Document ID #3: Habitat Cores and Corridors Map
- Document ID #4: Small Whorled Pogonia Survey
- Document ID #5: Tree Verification Survey
- Document ID #6: RPA Final

There are existing wetlands and associated Resource Protection Area (RPA) buffers on-site. These wetland resources are tributaries to Chisel Run and are connected and contiguous to this resource that is listed as a perennial feature. The Site is within the Lower James HUC code 02080206 and is located in the Powhatan Creek Watershed JL31. The limits of the wetlands and RPA are shown on the Environmental Inventory Sheet. Both the wetlands limits and RPA features were delineated by Timmons Group in October/November 2022 and was confirmed by the USACE in June 2024. JCC has approved the RPA limits. There are both wetland impacts and RPA buffer encroachments that will be necessary

for this project and will require permits from the USACE and locality for RPA encroachments. Perennial and intermittent streams exist on the site and connect off-site to Chisel Run.

The Site contains steep slopes up to 25 percent, and all soils information and types can be found on the Environmental Inventory Sheet. Development has been placed in such a manner to minimize steep slope impacts. Erosion and Sediment Control plans will be submitted during the site plan process conforming to State and Local regulations.

Existing vegetation being preserved is shown on the Master Plan. A large portion of the existing Eastern State site was previously developed. Care has been taken to preserve as much area within the existing Wildlife Areas as practical.

The Site contained 3 hits for threatened and endangered species.

- Northern Long-Eared Bat was determined to potentially be on site and coordination with USFWS will need to be conducted during permitting for the project. Northern Long-Eared bats will be coordinated during the permitting process due to the amount of tree clearing needed for the project

- Two plant species were listed as potentially being on site to include New Jersey Rush, listed by DCR in watershed, and Small Whorled Pogonia, listed in DCR watershed and USFWS. A field survey was conducted in June 2025 for the Small Whorled Pogonia and no evidence was found. New Jersey Rush was not observed on site. A copy of the SWP study is attached in Appendix D.

The only cultural resource listed on site was the Eastern State Hospital itself and was deemed as not eligible by DHR staff; therefore, no cultural resources of value are onsite.

This site lies within the Powhattan Creek Watershed, sub-watersheds 207 & 208. There are currently 23.4 acres of impervious cover that is not treated by any water quality or quantity facilities. See Stormwater Management Section for additional Powhattan Creek information.

Traffic Analysis

Timmons Group has prepared a VDOT Chapter 527 Traffic Impact Analysis (TIA) for the proposed development. The TIA has been submitted to both VDOT and the County for review which is ongoing at this time.

For additional details, see the Traffic Impact Study, under separate cover.

Stormwater Management

Water Quantity:

The Site's stormwater management system will be designed for compliance with the Virginia Stormwater Management Handbook set forth by the State of Virginia. For purposes of stormwater analysis, the Site has been represented solely as that which lies to the west of US HWY 199 as demonstrated by conceptual development in Appendix A. The various ponds scattered throughout the site will be designed with control systems that attenuate flows to meet Channel and Flood protection guidelines. Post-development runoff will be captured in various curb- and yard-inlets throughout the development. Storm piping will then convey to the designed stormwater management facilities that ultimately discharge to the existing wetlands to the west. It is anticipated that impacts in RPA buffers will be limited to only disturbance necessary to install stormwater outfalls.

Water Quality:

This development will utilize the Virginia Runoff Reduction Method (VRRM) version 4.1 to determine the stormwater quality requirements for the project. For purposes of a conceptual and conservative solution to meeting stormwater quality requirements, VRRM indicates The Site as entirely "New Development" with a simplified BMP approach. To aid this estimation, the soil type on the Site is "assumed" to be comprised of HSG soil type C. This approximation is conservative in nature and is thereby solely intended to prove that VRRM requirements are able to be met in a feasible manner on-site. The provided solution is thus subject to the use of alternative BMPs that shall be determined during site plan review. Additionally, the VRRM approach shall be subject to change at time of site plan review per JCC discretion including, but not limited to, 1) the appropriate use of the "New Development" and "Redevelopment" spreadsheets, and 2) reflect accurate site soil conditions, to ensure all stormwater quality requirements are met within each phase of the project.

Based on proposed land cover projections, this project proposes a final impervious area of approximately 130.5 acres. For this development with the aforementioned assumptions, the VRRM calculates 111.64 lb/yr of phosphorus load reduction is required. The Master Stormwater Plan provided in the Master Plan shows multiple locations of wet pond style BMPs, which will adhere to either Level 1 or Level 2 DEQ specifications, and it is anticipated that these BMPs will be designed to provide water quality treatment for the site. Other BMPs to be implemented may include hydrodynamic MTDs, filter MTDs, wet swales, infiltration, bioretention, dry swales, permeable pavement, or sheetflow to conserved open space.

To prove the feasibility of VRRM compliance, a conceptual solution has been provided. In this solution 90% of the developable area would be conveyed through a Level 2 wet pond followed by a hydrodynamic separator before discharging to the RPA, while the remaining 10% would sheet flow directly to the RPA (conserved open space). This method would achieve 115.87 lb/yr of phosphorus removal, thereby exceeding the estimate for the required reduction. Resultantly, this analysis concludes that stormwater quality requirements can be met on-site.

Additional Low Impact Design features may be deployed upstream of the wet ponds to meet VRRM compliance. The features will not count toward the SSC measures.

For additional details regarding the VRRM, land cover calculations, and exhibits for both Pre-Development and Post-Development, see Appendix C. For the Master Stormwater Plan, see the submitted Master Plan documentation.

Powhattan Creek Watershed:

This Site falls within the Powhatan Creek Watershed Therefore, additional watershed management measures are being provided to further protect and enhance the natural resource of the watershed.

- The Site currently has 23.4 acres of impervious cover that is not treated by any water quality or water quantity facilities. Cardinal Ridge will reduce the amount of untreated impervious cover within the watershed by 23.4 acres and protect against further stream channel erosion from this site.
- A stream restoration contribution is proffered with this project.
- The number and type of SSC measures will be provided based on the ordinance requirements at the time of site plan submittal. These measures will be in addition to the State Stormwater Regulations and should further enhance the quality of stormwater runoff.
- This project protects, to the greatest extent practical existing forested areas, including forested areas outside the RPA and flood plain.
- The developer will remove historic remnants of previous development within the wetlands/RPA.

Conclusion

The applicant is proposing a master-planned development that is consistent with the surrounding land use designations of the area and roadway corridors. The project will also provide additional Public Land for future County use, active and passive recreational amenities, substantial upgrades to the public utilities to serve the project, intersection improvements to serve the development, looped bikeways with the 60’ right-of-way, and multiple BMP devices to provide stormwater management for the development and reduce downstream runoff before releasing it back into the downstream waterway.

Appendix A – Water System Hydraulic Analysis & Data

JAMES CITY SERVICE AUTHORITY

Fire Hydrant Flow Test Worksheet

Location: Ironbound Road - Eastern State
Date: 8/30/2023
Time: 1:25:00 PM
Weather: 85-F; Overcast
Performed by: Karlyn Owens, Mike Youshock, Chris Courson

FH Number FHI140031	Pressure (psi)
Static P_1	72
Residual P_2	63

FH Number	Pitot Pressure (psi)	Flow (gpm)
FHJ140073	30	924
FHJ140023	32	954
Total		1,878

Fire Flow Available using:

$$Q_r = Q_f \times (h_r/h_f)^{0.54}$$

Where:

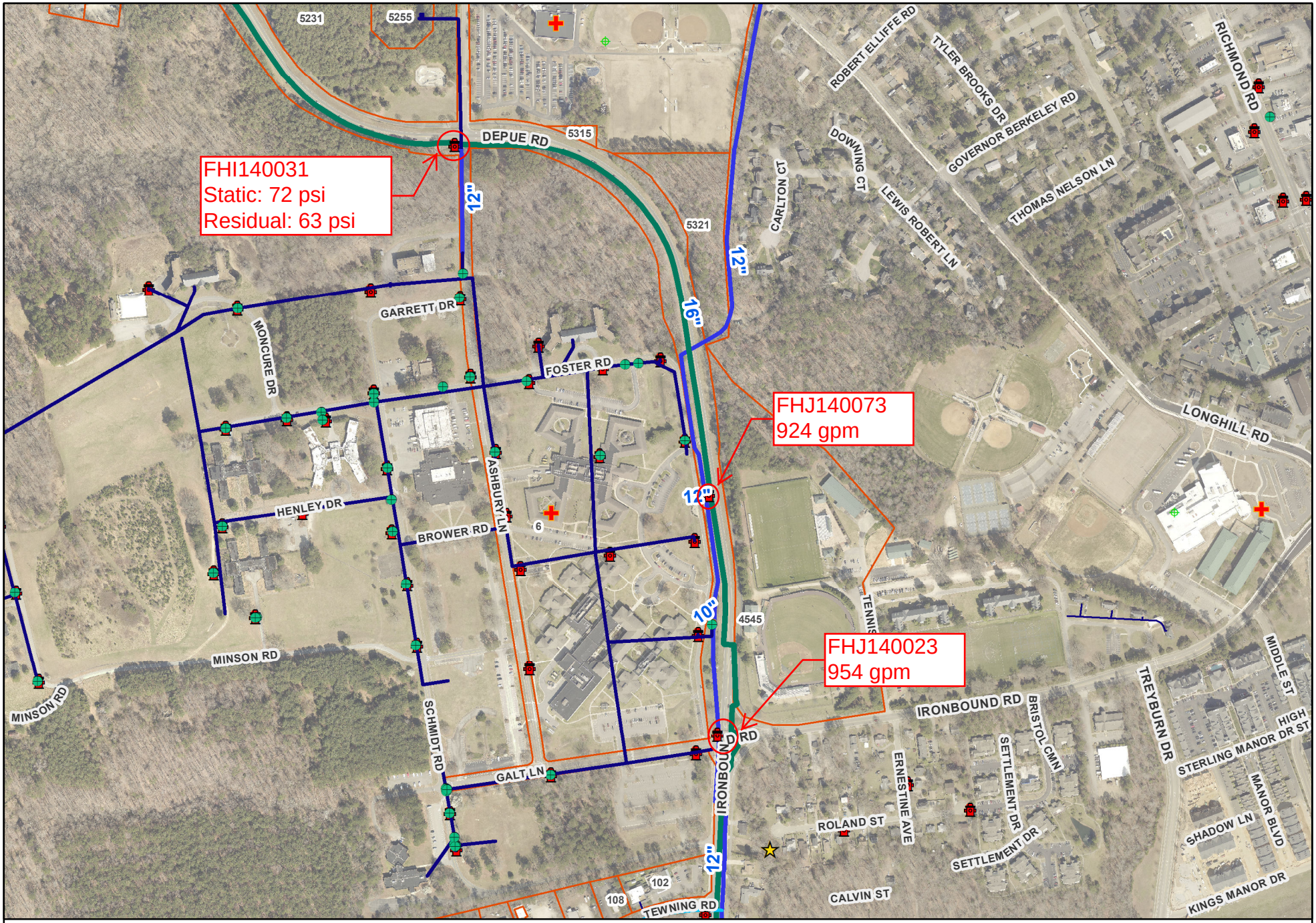
Q_r = Flow at desired Pressure (gpm)
Q_f = Total Test Flow (gpm)
h_r = Static Pressure minus desired Residual Pressure (psi)
h_f = Staic Pressure minus Residual Pressure (psi)

Q_{20}	=	4,842	gpm

Q_{10}	=	5,325	gpm

Note: The above fire hydrant flow test was performed at a time when irrigation was minimal and the water distribution system was at optimal performance. Adjustments of at least **12 psi** reduction to the observed static pressure is required to account for daily and seasonal fluctuations when designing fire suppression systems using the public water supply. This fire hydrant flow test is not meant to infer a guarantee or warranty of any water pressure or flow at all times or under all conditions.

8/30/2023

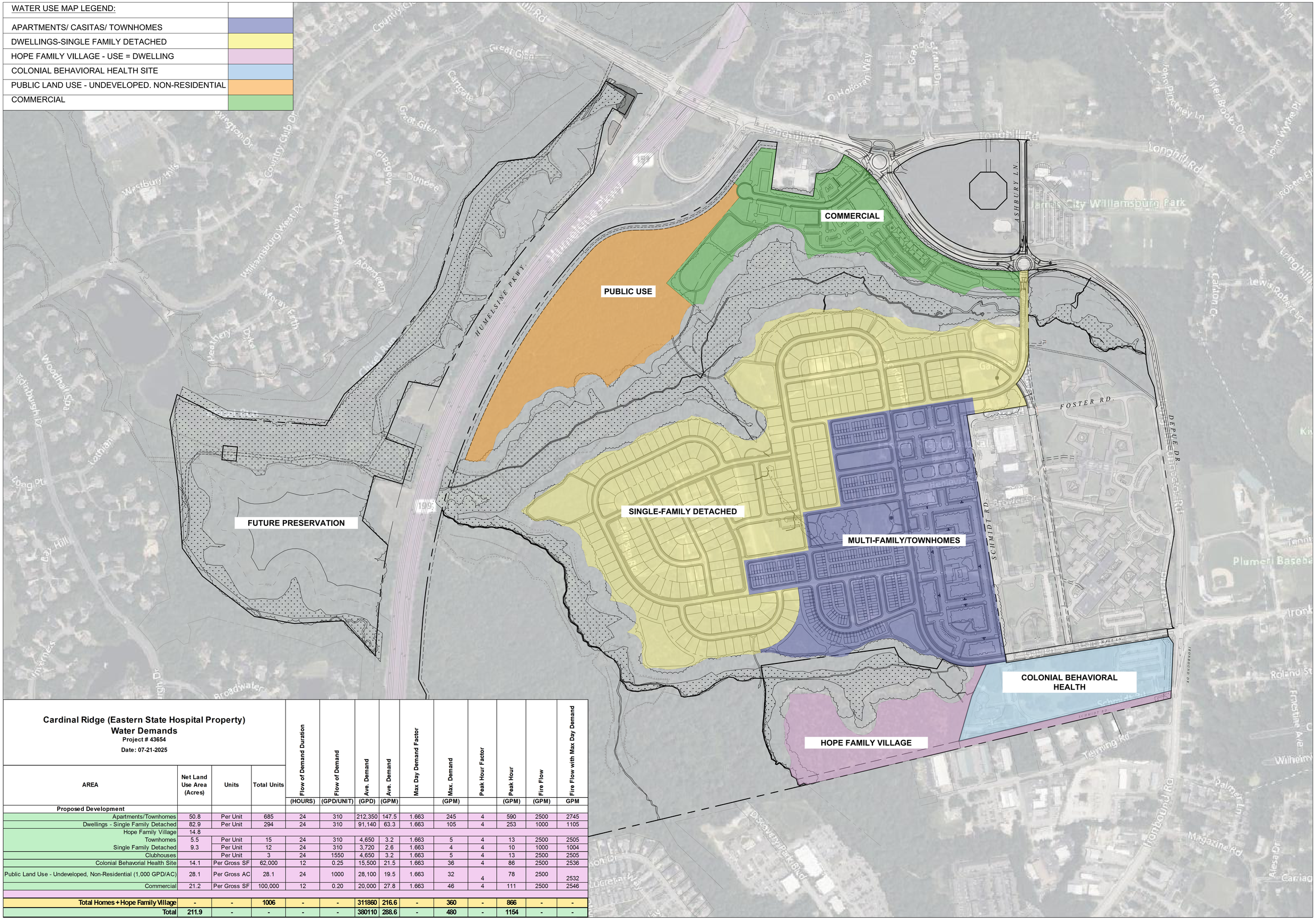


This drawing is neither a legally recorded map nor a survey and is not intended to be used as such. James City Service Authority is not responsible for its accuracy or how current it may be.

0 650 1,300 2,600 Feet

JCSA JAMES CITY SERVICE AUTHORITY

WATER USE MAP LEGEND:	
APARTMENTS/ CASITAS/ TOWNHOMES	
DWELLINGS-SINGLE FAMILY DETACHED	
HOPE FAMILY VILLAGE - USE = DWELLING	
COLONIAL BEHAVIORAL HEALTH SITE	
PUBLIC LAND USE - UNDEVELOPED. NON-RESIDENTIAL	
COMMERCIAL	



Cardinal Ridge (Eastern State Hospital Property)
Water Demands
Project # 43654
Date: 07-21-2025

AREA	Net Land Use Area (Acres)	Units	Total Units	Flow of Demand Duration (HOURS)	Flow of Demand (GPD/UNIT)	Ave. Demand (GPD)	Ave. Demand (GPM)	Max Day Demand Factor	Max. Demand (GPM)	Peak Hour Factor	Peak Hour (GPM)	Fire Flow (GPM)	Fire Flow with Max Day Demand GPM
Proposed Development													
Apartments/Townhomes	50.8	Per Unit	685	24	310	212,350	147.5	1.663	245	4	590	2500	2745
Dwellings - Single Family Detached	82.9	Per Unit	294	24	310	91,140	63.3	1.663	105	4	253	1000	1105
Hope Family Village	14.8												
Townhomes	5.5	Per Unit	15	24	310	4,650	3.2	1.663	5	4	13	2500	2505
Single Family Detached	9.3	Per Unit	12	24	310	3,720	2.6	1.663	4	4	10	1000	1004
Clubhouses		Per Unit	3	24	1550	4,650	3.2	1.663	5	4	13	2500	2505
Colonial Behavorial Health Site	14.1	Per Gross SF	62,000	12	0.25	15,500	21.5	1.663	36	4	86	2500	2536
Public Land Use - Undeveloped, Non-Residential (1,000 GPD/AC)	28.1	Per Gross AC	28.1	24	1000	28,100	19.5	1.663	32	4	78	2500	2532
Commercial	21.2	Per Gross SF	100,000	12	0.20	20,000	27.8	1.663	46	4	111	2500	2546
Total Homes + Hope Family Village	**-**	**-**	**1006**	**-**	**-**	**311860**	**216.6**	**-**	**360**	**-**	**866**	**-**	**-**
Total	**211.9**	**-**	**-**	**-**	**-**	**380110**	**288.6**	**-**	**480**	**-**	**1154**	**-**	**-**

CARDINAL RIDGE

Water Use Map Exhibit - July 21, 2025

SCALE 1"=200'
0 200' 400'

N

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Cardinal Ridge (Eastern State Hospital Property)
Water Demands

Project # 43654

Date: 10-07-2025

AREA	Net Land Use Area (Acres)	Units	Total Units	Flow of Demand Duration (HOURS)	Flow of Demand (GPD/UNIT)	Ave. Demand (GPD)	Ave. Demand (GPM)	Max Day Demand Factor	Max. Demand (GPM)	Peak Hour Factor	Peak Hour (GPM)	Fire Flow (GPM)	Fire Flow with Max Day Demand GPM
Proposed Development													
Apartments/Townhomes	50.8	Per Unit	685	24	310	212,350	147.5	1.663	245	4	590	2500	2745
Dwellings - Single Family Detached	82.9	Per Unit	294	24	310	91,140	63.3	1.663	105	4	253	1000	1105
Hope Family Village	14.8												
Townhomes	5.5	Per Unit	15	24	310	4,650	3.2	1.663	5	4	13	2500	2505
Single Family Detached	9.3	Per Unit	12	24	310	3,720	2.6	1.663	4	4	10	1000	1004
Clubhouses		Per Unit	3	24	1550	4,650	3.2	1.663	5	4	13	2500	2505
Colonial Behavorial Health Site	14.1	Per Gross SF	62,000	12	0.25	15,500	21.5	1.663	36	4	86	2500	2536
Public Land Use - Undeveloped, Non-Residential (1,000 GPD/AC)	28.9	Per Gross AC	28.9	24	1000	28,900	20.1	1.663	33	4	80	2500	2533
Commercial	20.3	Per Gross SF	100,000	12	0.20	20,000	27.8	1.663	46	4	111	2500	2546
Total Homes + Hope Family Village	**-**	**-**	**1006**	**-**	**-**	**311860**	**216.6**	**-**	**360**	**-**	**866**	**-**	**-**
Total	**211.8**	**-**	**-**	**-**	**-**	**380910**	**289.2**	**-**	**481**	**-**	**1157**	**-**	**-**

Assumptions

Net Land Use Area is based on the Master Plan prepared by Land Planning Solutions on 05/21/2025
Residential unit count is based on the Master Plan prepared by Land Planning Solutions on 05/21/2025
Hope Family Village residential count (12 single family detached/15 townhome) is based on coordination with D.R. Horton.
Hope Family Village assumed to include 1 clubhouse.
Clubhouse demand is assumed as 1 clubhouse = 5 townhomes in calculations. Land use area is not included since it's already included in residential areas.
62,000 SF of Colonial Behavioral Health Site building area is based on the Master Plan prepared by Land Planning Solutions on 05/21/2025
Undeveloped Public Land Use Non-Residential from JCSA Design Handbook = 1000 gpd/acre.
100,000 SF of commercial building area is based on the Master Plan prepared by Land Planning Solutions on 05/21/2025

Cardinal Ridge (Eastern State Hospital Property)

Water Demands: Per Model Node

Node ID	Elevation (NAVD 88)	Units per Node	Ave. Demand (GPM)	Max. Demand (GPM)	Peak Hour (GPM)	Fire Flow Needed (When Active) (GPM)	Fire Flow with Max Day Demand (GPM)
J-2	84						
J-3	84						
J-4	80						
J-5	80						
J-6	88						
J-7	88	*See Note 3*	*20.1*	*33.4*	*80.4*	*2,500*	*2,533*
J-8	90						
J-9	83						
J-10	88						
J-12	85	*See Note 4*	*27.8*	*46.2*	*111.2*	*2,500*	*2,546*
J-14	78						
J-15	82						
J-16	84						
J-17	77	*See Note 1*	*21.5*	*35.8*	*86.0*	*2,500*	*2,536*
J-18	75	*See Note 2*	*5.8*	*9.6*	*23.2*	*2,500*	*2,510*
J-19	76						
J-20	65						
J-21	80						
J-22	84	36	7.8	12.9	31.0	2,500	2,513
J-23	83	144	31.0	51.6	124.0	2,500	2,552
J-24	80	39	8.4	14.0	33.6	2,500	2,514
J-26	80	11	2.4	3.9	9.5	2,500	2,504
J-27	78	37	8.0	13.2	31.9	2,500	2,513
J-28	79	17	3.7	6.1	14.6	2,500	2,506
J-29	67	18	3.9	6.4	15.5	1,000	1,006
J-30	71	8	1.7	2.9	6.9	2,500	2,503
J-31	71	10	2.2	3.6	8.6	1,000	1,004
J-32	81	45	9.7	16.1	38.8	1,000	1,016
J-33	75	10	2.2	3.6	8.6	1,000	1,004
J-34	84						
J-35	86	12	2.6	4.3	10.3	1,000	1,004
J-36	85	16	3.4	5.7	13.8	1,000	1,006
J-37	88	6	1.3	2.1	5.2	1,000	1,002
J-38	68						
J-39	71						
J-40	69	12	2.6	4.3	10.3	1,000	1,004
J-41	69	11	2.4	3.9	9.5	1,000	1,004
J-42	80	40	8.6	14.3	34.4	1,000	1,014
J-43	80	16	3.4	5.7	13.8	2,500	2,506
J-44	74	7	1.5	2.5	6.0	2,500	2,503
J-45	72						
J-46	75	7	1.5	2.5	6.0	1,000	1,003
J-47	75	6	1.3	2.1	5.2	1,000	1,002
J-48	72	13	2.8	4.7	11.2	1,000	1,005
J-49	79	6	1.3	2.1	5.2	1,000	1,002
J-50	82	6	1.3	2.1	5.2	1,000	1,002
J-51	71	18	3.9	6.4	15.5	1,000	1,006
J-52	78	19	4.1	6.8	16.4	1,000	1,007
J-53	78	11	2.4	3.9	9.5	1,000	1,004
J-54	79	32	6.9	11.5	27.6	2,500	2,511
J-56	79	32	6.9	11.5	27.6	2,500	2,511
J-57	85	24	5.2	8.6	20.7	2,500	2,509
J-58	90	48	10.3	17.2	41.3	2,500	2,517
J-59	*95*	*24*	5.2	8.6	20.7	2,500	2,509
J-60	100	24	5.2	8.6	20.7	2,500	2,509
J-61	*91*	*3*	0.6	1.1	2.6	1,000	1,001
J-62	*94*	*10*	2.2	3.6	8.6	1,000	1,004
J-63	98	15	3.2	5.4	12.9	1,000	1,005
J-64	*100*						
J-65	90	48	10.3	17.2	41.3	2,500	2,517
J-66	90	138	29.7	49.4	118.8	2,500	2,549
J-67	*90*						
Total Homes + HFV =		1006					

Note:

1. Colonial Behavorial Health Site

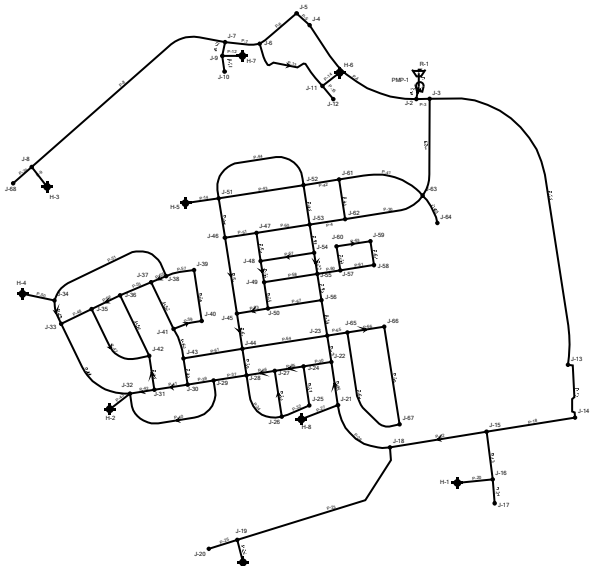
2. Hope Family Village (HFV)

Demands were summed between townhomes and single family detached lots from the overall Demands sheet. The worst case scenario fire flow with max day demand was taken from the overall demands sheet.

3. Public Land Use Area

4. Commercial Area

Scenario: Peak Hour Plus Fire Flow



Cardinal Ridge Water Model
Scenario: Average Day

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure Head (ft)	Pressure (psi)
J-2	84.00	0	253.19	169.19	73
J-3	84.00	0	253.19	169.19	73
J-63	98.00	0	253.18	155.18	67
J-62	94.00	0	253.18	159.18	69
J-53	78.00	0	253.18	175.18	76
J-54	79.00	0	253.17	174.17	75
J-23	83.00	0	253.17	170.17	74
J-22	84.00	0	253.17	169.17	73
J-28	79.00	4	253.17	174.17	75
J-29	67.00	4	253.16	186.16	81
J-30	71.00	3	253.16	182.16	79
J-42	80.00	3	253.15	173.15	75
J-45	72.00	4	253.17	181.17	78
J-40	69.00	7	253.15	184.15	80
J-41	69.00	3	253.15	184.15	80
J-36	85.00	3	253.15	168.15	73
J-35	86.00	5	253.15	167.15	72
J-33	75.00	9	253.15	178.15	77
J-38	68.00	4	253.15	185.15	80
J-61	91.00	1	253.18	162.18	70
J-52	78.00	1	253.18	175.18	76
J-4	80.00	0	253.19	173.19	75
J-5	80.00	0	253.19	173.19	75
J-7	88.00	0	253.19	165.19	71
J-13	78.00	0	253.18	175.18	76
J-15	82.00	0	253.17	171.17	74
J-17	77.00	35	253.14	176.14	76
J-18	75.00	0	253.17	178.17	77
J-19	76.00	7	253.17	177.17	77
J-6	88.00	0	253.19	165.19	71
J-11	85.00	36	253.15	168.15	73
J-32	81.00	5	253.15	172.15	74
J-16	84.00	0	253.15	169.15	73
J-8	90.00	0	253.19	163.19	71
J-34	84.00	0	253.15	169.15	73
J-51	71.00	0	253.18	182.18	79
J-14	78.00	0	253.18	175.18	76
J-12	85.00	0	253.15	168.15	73
J-9	83.00	0	253.19	170.19	74
J-10	88.00	0	253.19	165.19	71
J-55	79.00	0	253.17	174.17	75
J-56	79.00	0	253.17	174.17	75
J-21	80.00	0	253.17	173.17	75
J-64	100.00	0	253.18	153.18	66
J-20	65.00	0	253.17	188.17	81
J-46	75.00	0	253.17	178.17	77
J-47	75.00	0	253.17	178.17	77
J-48	72.00	0	253.17	181.17	78
J-49	79.00	0	253.17	174.17	75
J-50	82.00	0	253.17	171.17	74
J-57	85.00	0	253.17	168.17	73
J-58	90.00	0	253.17	163.17	71
J-59	95.00	0	253.17	158.17	68
J-60	100.00	0	253.17	153.17	66
J-39	71.00	0	253.15	182.15	79
J-37	88.00	0	253.15	165.15	71
J-31	71.00	0	253.15	182.15	79
J-43	80.00	0	253.16	173.16	75
J-44	74.00	0	253.17	179.17	78
J-67	90.00	0	253.17	163.17	71
J-66	90.00	0	253.17	163.17	71
J-65	90.00	0	253.17	163.17	71
J-27	78.00	0	253.17	175.17	76
J-24	80.00	0	253.17	173.17	75
J-25	80.00	0	253.17	173.17	75
J-26	80.00	0	253.17	173.17	75
J-68	0.00	0	253.19	253.19	110

Cardinal Ridge Water Model

Scenario: Average Day

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Status (Calculated)	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss (Minor) (ft)
P-1	106	PMP-1	R-1	Open	72.0	150.0	-133	0.01	0.00	0.00
P-2	103	PMP-1	J-2	Open	16.0	110.0	133	0.21	0.00	0.00
P-3	105	J-2	J-3	Open	16.0	110.0	96	0.15	0.00	0.00
P-4	287	J-62	J-53	Open	12.0	110.0	26	0.07	0.00	0.00
P-52	254	J-36	J-35	Open	8.0	110.0	3	0.02	0.00	0.00
P-48	271	J-35	J-33	Open	8.0	110.0	1	0.01	0.00	0.00
P-5	140	J-4	J-5	Open	16.0	110.0	36	0.06	0.00	0.00
P-22	782	J-15	J-18	Open	12.0	110.0	12	0.03	0.00	0.00
P-19	385	J-15	J-16	Open	8.0	110.0	35	0.22	0.02	0.00
P-21	192	J-16	J-17	Open	8.0	110.0	35	0.22	0.01	0.00
P-20	283	H-1	J-16	Open	6.0	110.0	0	0.00	0.00	0.00
P-9	201	H-3	J-8	Open	6.0	110.0	0	0.00	0.00	0.00
P-50	262	H-4	J-34	Open	6.0	110.0	0	0.00	0.00	0.00
P-14	269	H-5	J-51	Open	6.0	110.0	0	0.00	0.00	0.00
P-18	718	J-14	J-15	Open	12.0	110.0	46	0.13	0.01	0.00
P-23	1,555	J-18	J-19	Open	8.0	110.0	7	0.04	0.00	0.00
P-17	478	J-13	J-14	Open	16.0	110.0	46	0.07	0.00	0.00
P-16	2,763	J-3	J-13	Open	16.0	110.0	46	0.07	0.01	0.00
P-4	1,100	J-2	J-4	Open	16.0	110.0	36	0.06	0.00	0.00
P-13	729	J-6	J-11	Open	8.0	110.0	36	0.23	0.04	0.00
P-14	175	J-11	H-6	Open	6.0	110.0	0	0.00	0.00	0.00
P-15	136	J-11	J-12	Open	8.0	110.0	0	0.00	0.00	0.00
P-6	385	J-5	J-6	Open	12.0	110.0	36	0.10	0.00	0.00
P-7	278	J-6	J-7	Open	12.0	110.0	0	0.00	0.00	0.00
P-10	112	J-7	J-9	Open	8.0	110.0	0	0.00	0.00	0.00
P-11	126	J-9	J-10	Open	8.0	110.0	0	0.00	0.00	0.00
P-12	160	J-9	H-7	Open	8.0	110.0	0	0.00	0.00	0.00
P-8	1,936	J-7	J-8	Open	12.0	110.0	0	0.00	0.00	0.00
P-29	786	J-3	J-63	Open	12.0	110.0	50	0.14	0.01	0.00
P-30	666	J-63	J-62	Open	12.0	110.0	26	0.07	0.00	0.00
P-31	228	J-53	J-54	Open	12.0	110.0	31	0.09	0.00	0.00
P-32	171	J-54	J-55	Open	12.0	110.0	28	0.08	0.00	0.00
P-33	212	J-55	J-56	Open	12.0	110.0	27	0.08	0.00	0.00
P-34	289	J-56	J-23	Open	12.0	110.0	25	0.07	0.00	0.00
P-29	213	J-23	J-22	Open	12.0	110.0	13	0.04	0.00	0.00
P-26	603	J-18	J-21	Open	12.0	110.0	5	0.01	0.00	0.00
P-28	348	J-21	J-22	Open	12.0	110.0	5	0.01	0.00	0.00
P-27	314	J-21	H-8	Open	6.0	110.0	0	0.00	0.00	0.00
P-43	204	J-32	H-2	Open	6.0	110.0	0	0.00	0.00	0.00
P-40	252	J-64	J-63	Open	12.0	110.0	0	0.00	0.00	0.00
P-41	721	J-63	J-61	Open	12.0	110.0	24	0.07	0.00	0.00
P-42	288	J-61	J-52	Open	12.0	110.0	23	0.07	0.00	0.00
P-43	688	J-52	J-51	Open	12.0	110.0	8	0.02	0.00	0.00
P-44	1,031	J-52	J-51	Open	8.0	110.0	2	0.01	0.00	0.00
P-45	319	J-61	J-62	Open	8.0	110.0	1	0.00	0.00	0.00
P-46	320	J-52	J-53	Open	12.0	110.0	12	0.03	0.00	0.00
P-24	186	J-19	H-9	Open	6.0	110.0	0	0.00	0.00	0.00
P-25	237	J-19	J-20	Open	8.0	110.0	0	0.00	0.00	0.00
P-49	319	J-51	J-46	Open	8.0	130.0	10	0.06	0.00	0.00
P-50	432	J-53	J-47	Open	8.0	110.0	7	0.04	0.00	0.00
P-51	255	J-47	J-46	Open	8.0	110.0	1	0.01	0.00	0.00
P-52	614	J-46	J-45	Open	8.0	110.0	11	0.07	0.00	0.00
P-53	229	J-47	J-48	Open	8.0	110.0	6	0.04	0.00	0.00
P-54	171	J-48	J-49	Open	8.0	110.0	9	0.05	0.00	0.00
P-55	213	J-49	J-50	Open	8.0	110.0	10	0.06	0.00	0.00
P-67	433	J-50	J-56	Open	8.0	110.0	-2	0.01	0.00	0.00
P-57	434	J-48	J-54	Open	8.0	110.0	-3	0.02	0.00	0.00
P-58	431	J-49	J-55	Open	8.0	110.0	-1	0.01	0.00	0.00
P-63	252	J-45	J-50	Open	8.0	110.0	-12	0.07	0.00	0.00
P-60	185	J-55	J-57	Open	8.0	110.0	0	0.00	0.00	0.00
P-61	273	J-57	J-58	Open	8.0	110.0	0	0.00	0.00	0.00
P-62	194	J-58	J-59	Open	8.0	110.0	0	0.00	0.00	0.00
P-63	275	J-59	J-60	Open	8.0	110.0	0	0.00	0.00	0.00
P-64	195	J-60	J-57	Open	8.0	110.0	0	0.00	0.00	0.00
P-51	1,124	J-38	J-34	Open	8.0	110.0	1	0.01	0.00	0.00
P-49	199	J-34	J-33	Open	6.0	130.0	1	0.01	0.00	0.00
P-58	412	J-40	J-39	Open	8.0	110.0	1	0.01	0.00	0.00
P-57	229	J-39	J-38	Open	8.0	110.0	1	0.01	0.00	0.00
P-55	128	J-38	J-37	Open	8.0	110.0	-4	0.02	0.00	0.00
P-53	269	J-37	J-36	Open	8.0	110.0	2	0.02	0.00	0.00
P-44	848	J-33	J-32	Open	8.0	110.0	-6	0.04	0.00	0.00
P-47	689	J-35	J-42	Open	8.0	110.0	-3	0.02	0.00	0.00
P-54	538	J-36	J-42	Open	8.0	110.0	-3	0.02	0.00	0.00
P-46	276	J-42	J-31	Open	8.0	110.0	-10	0.06	0.00	0.00
P-41	269	J-31	J-30	Open	8.0	110.0	-13	0.08	0.00	0.00
P-42	199	J-32	J-31	Open	8.0	110.0	-3	0.02	0.00	0.00
P-40	1,054	J-32	J-29	Open	8.0	110.0	-8	0.05	0.00	0.00
P-56	414	J-37	J-41	Open	8.0	110.0	-6	0.04	0.00	0.00
P-59	236	J-41	J-40	Open	8.0	110.0	8	0.05	0.00	0.00
P-60	252	J-41	J-43	Open	8.0	110.0	-17	0.11	0.00	0.00
P-45	212	J-43	J-30	Open	8.0	110.0	4	0.03	0.00	0.00
P-39	209	J-30	J-29	Open	8.0	110.0	-12	0.08	0.00	0.00
P-61	477	J-43	J-44	Open	8.0	110.0	-21	0.13	0.01	0.00

Cardinal Ridge Water Model

Scenario: Average Day

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Status (Calculated)	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss (Minor) (ft)
P-38	215	J-44	J-28	Open	8.0	110.0	10	0.07	0.00	0.00
P-62	285	J-45	J-44	Open	8.0	110.0	19	0.12	0.00	0.00
P-37	267	J-29	J-28	Open	8.0	110.0	-24	0.16	0.01	0.00
P-68	790	J-67	J-66	Open	8.0	110.0	0	0.00	0.00	0.00
P-66	299	J-66	J-65	Open	8.0	110.0	0	0.00	0.00	0.00
P-65	163	J-65	J-23	Open	8.0	110.0	0	0.00	0.00	0.00
P-64	686	J-44	J-23	Open	8.0	110.0	-13	0.08	0.01	0.00
P-69	972	J-65	J-67	Open	8.0	110.0	0	0.00	0.00	0.00
P-36	229	J-28	J-27	Open	8.0	110.0	-11	0.07	0.00	0.00
P-35	232	J-27	J-24	Open	8.0	110.0	-11	0.07	0.00	0.00
P-30	226	J-24	J-22	Open	8.0	110.0	-18	0.11	0.00	0.00
P-31	317	J-24	J-25	Open	8.0	110.0	7	0.04	0.00	0.00
P-32	238	J-25	J-26	Open	8.0	110.0	7	0.04	0.00	0.00
P-34	515	J-26	J-28	Open	8.0	110.0	7	0.05	0.00	0.00
P-33	370	J-26	J-27	Open	8.0	110.0	0	0.00	0.00	0.00
P-70	197	J-8	J-68	Open	12.0	130.0	0	0.00	0.00	0.00

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Flow (Out net) (gpm)	Flow (In net) (gpm)
R-1	85.00	85.00	133	-133

Pump Table - Time: 0.00 hours

Label	Elevation (ft)	Status (Initial, Transient)	Pump Definition	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	84.00	On	Flow Test - FHI-140031	85.00	253.19	133	168.19

Cardinal Ridge Water Model
Scenario: Peak Hour

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure Head (ft)	Pressure (psi)
J-2	84.00	0	244.80	160.80	70
J-3	84.00	0	244.73	160.73	70
J-63	98.00	13	243.85	145.85	63
J-62	94.00	9	243.64	149.64	65
J-53	78.00	10	243.55	165.55	72
J-54	79.00	28	243.45	164.45	71
J-23	83.00	124	243.32	160.32	69
J-22	84.00	31	243.34	159.34	69
J-28	79.00	15	243.21	164.21	71
J-29	67.00	16	243.13	176.13	76
J-30	71.00	7	243.12	172.12	74
J-42	80.00	34	243.08	163.08	71
J-45	72.00	0	243.36	171.36	74
J-40	69.00	10	243.09	174.09	75
J-41	69.00	10	243.10	174.10	75
J-36	85.00	14	243.08	158.08	68
J-35	86.00	10	243.08	157.08	68
J-33	75.00	9	243.08	168.08	73
J-38	68.00	0	243.09	175.09	76
J-61	91.00	3	243.64	152.64	66
J-52	78.00	16	243.57	165.57	72
J-4	80.00	0	244.76	164.76	71
J-5	80.00	0	244.76	164.76	71
J-7	88.00	70	244.69	156.69	68
J-13	78.00	0	244.41	166.41	72
J-15	82.00	0	244.02	162.02	70
J-17	77.00	20	244.01	167.01	72
J-18	75.00	22	243.69	168.69	73
J-19	76.00	0	243.69	167.69	73
J-6	88.00	0	244.70	156.70	68
J-11	85.00	0	244.38	159.38	69
J-32	81.00	39	243.09	162.09	70
J-16	84.00	0	244.01	160.01	69
J-8	90.00	0	244.69	154.69	67
J-34	84.00	0	243.08	159.08	69
J-51	71.00	16	243.55	172.55	75
J-14	78.00	0	244.36	166.36	72
J-12	85.00	111	244.32	159.32	69
J-9	83.00	0	244.69	161.69	70
J-10	88.00	0	244.69	156.69	68
J-55	79.00	0	243.39	164.39	71
J-56	79.00	28	243.36	164.36	71
J-21	80.00	0	243.47	163.47	71
J-64	100.00	0	243.85	143.85	62
J-20	65.00	0	243.69	178.69	77
J-46	75.00	6	243.48	168.48	73
J-47	75.00	5	243.48	168.48	73
J-48	72.00	11	243.44	171.44	74
J-49	79.00	5	243.40	164.40	71
J-50	82.00	5	243.37	161.37	70
J-57	85.00	21	243.32	158.32	68
J-58	90.00	41	243.31	153.31	66
J-59	95.00	21	243.31	148.31	64
J-60	100.00	21	243.31	143.31	62
J-39	71.00	0	243.09	172.09	74
J-37	88.00	5	243.09	155.09	67
J-31	71.00	9	243.09	172.09	74
J-43	80.00	14	243.12	163.12	71
J-44	74.00	6	243.25	169.25	73
J-67	90.00	0	243.14	153.14	66
J-66	90.00	119	243.10	153.10	66
J-65	90.00	41	243.18	153.18	66
J-27	78.00	32	243.22	165.22	71
J-24	80.00	34	243.24	163.24	71
J-25	80.00	0	243.23	163.23	71
J-26	80.00	10	243.22	163.22	71
J-68	0.00	0	244.69	244.69	106

Cardinal Ridge Water Model

Scenario: Peak Hour

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Status (Calculated)	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss (Minor) (ft)
P-1	106	PMP-1	R-1	Open	72.0	150.0	-1,066	0.08	0.00	0.00
P-2	103	PMP-1	J-2	Open	16.0	110.0	1,066	1.70	0.10	0.00
P-3	105	J-2	J-3	Open	16.0	110.0	885	1.41	0.07	0.00
P-4	287	J-62	J-53	Open	12.0	110.0	276	0.78	0.09	0.00
P-52	254	J-36	J-35	Open	8.0	110.0	3	0.02	0.00	0.00
P-48	271	J-35	J-33	Open	8.0	110.0	-9	0.06	0.00	0.00
P-5	140	J-4	J-5	Open	16.0	110.0	181	0.29	0.01	0.00
P-22	782	J-15	J-18	Open	12.0	110.0	319	0.91	0.33	0.00
P-19	385	J-15	J-16	Open	8.0	110.0	20	0.13	0.01	0.00
P-21	192	J-16	J-17	Open	8.0	110.0	20	0.13	0.00	0.00
P-20	283	H-1	J-16	Open	6.0	110.0	0	0.00	0.00	0.00
P-9	201	H-3	J-8	Open	6.0	110.0	0	0.00	0.00	0.00
P-50	262	H-4	J-34	Open	6.0	110.0	0	0.00	0.00	0.00
P-14	269	H-5	J-51	Open	6.0	110.0	0	0.00	0.00	0.00
P-18	718	J-14	J-15	Open	12.0	110.0	339	0.96	0.34	0.01
P-23	1,555	J-18	J-19	Open	8.0	110.0	0	0.00	0.00	0.00
P-17	478	J-13	J-14	Open	16.0	110.0	339	0.54	0.06	0.00
P-16	2,763	J-3	J-13	Open	16.0	110.0	339	0.54	0.32	0.00
P-4	1,100	J-2	J-4	Open	16.0	110.0	181	0.29	0.04	0.00
P-13	729	J-6	J-11	Open	8.0	110.0	111	0.71	0.32	0.01
P-14	175	J-11	H-6	Open	6.0	110.0	0	0.00	0.00	0.00
P-15	136	J-11	J-12	Open	8.0	110.0	111	0.71	0.06	0.00
P-6	385	J-5	J-6	Open	12.0	110.0	181	0.51	0.06	0.01
P-7	278	J-6	J-7	Open	12.0	110.0	70	0.20	0.01	0.00
P-10	112	J-7	J-9	Open	8.0	110.0	0	0.00	0.00	0.00
P-11	126	J-9	J-10	Open	8.0	110.0	0	0.00	0.00	0.00
P-12	160	J-9	H-7	Open	8.0	110.0	0	0.00	0.00	0.00
P-8	1,936	J-7	J-8	Open	12.0	110.0	0	0.00	0.00	0.00
P-29	786	J-3	J-63	Open	12.0	110.0	546	1.55	0.88	0.00
P-30	666	J-63	J-62	Open	12.0	110.0	273	0.77	0.21	0.00
P-31	228	J-53	J-54	Open	12.0	110.0	326	0.92	0.10	0.00
P-32	171	J-54	J-55	Open	12.0	110.0	276	0.78	0.05	0.00
P-33	212	J-55	J-56	Open	12.0	110.0	188	0.53	0.03	0.00
P-34	289	J-56	J-23	Open	12.0	110.0	183	0.52	0.04	0.00
P-29	213	J-23	J-22	Open	12.0	110.0	-153	0.43	0.02	0.00
P-26	603	J-18	J-21	Open	12.0	110.0	298	0.84	0.22	0.00
P-28	348	J-21	J-22	Open	12.0	110.0	298	0.84	0.13	0.00
P-27	314	J-21	H-8	Open	6.0	110.0	0	0.00	0.00	0.00
P-43	204	J-32	H-2	Open	6.0	110.0	0	0.00	0.00	0.00
P-40	252	J-64	J-63	Open	12.0	110.0	0	0.00	0.00	0.00
P-41	721	J-63	J-61	Open	12.0	110.0	260	0.74	0.21	0.00
P-42	288	J-61	J-52	Open	12.0	110.0	246	0.70	0.07	0.00
P-43	688	J-52	J-51	Open	12.0	110.0	82	0.23	0.02	0.00
P-44	1,031	J-52	J-51	Open	8.0	110.0	23	0.14	0.02	0.00
P-45	319	J-61	J-62	Open	8.0	110.0	12	0.08	0.00	0.00
P-46	320	J-52	J-53	Open	12.0	110.0	124	0.35	0.02	0.00
P-24	186	J-19	H-9	Open	6.0	110.0	0	0.00	0.00	0.00
P-25	237	J-19	J-20	Open	8.0	110.0	0	0.00	0.00	0.00
P-49	319	J-51	J-46	Open	8.0	130.0	89	0.57	0.07	0.00
P-50	432	J-53	J-47	Open	8.0	110.0	65	0.41	0.07	0.00
P-51	255	J-47	J-46	Open	8.0	110.0	-10	0.06	0.00	0.00
P-52	614	J-46	J-45	Open	8.0	110.0	74	0.47	0.12	0.00
P-53	229	J-47	J-48	Open	8.0	110.0	69	0.44	0.04	0.00
P-54	171	J-48	J-49	Open	8.0	110.0	81	0.51	0.04	0.00
P-55	213	J-49	J-50	Open	8.0	110.0	60	0.38	0.03	0.00
P-67	433	J-50	J-56	Open	8.0	110.0	22	0.14	0.01	0.00
P-57	434	J-48	J-54	Open	8.0	110.0	-22	0.14	0.01	0.00
P-58	431	J-49	J-55	Open	8.0	110.0	16	0.10	0.00	0.00
P-63	252	J-45	J-50	Open	8.0	110.0	-32	0.21	0.01	0.00
P-60	185	J-55	J-57	Open	8.0	110.0	103	0.66	0.07	0.00
P-61	273	J-57	J-58	Open	8.0	110.0	41	0.26	0.02	0.00
P-62	194	J-58	J-59	Open	8.0	110.0	0	0.00	0.00	0.00
P-63	275	J-59	J-60	Open	8.0	110.0	-21	0.13	0.01	0.00
P-64	195	J-60	J-57	Open	8.0	110.0	-41	0.26	0.01	0.00
P-51	1,124	J-38	J-34	Open	8.0	110.0	7	0.04	0.00	0.00
P-49	199	J-34	J-33	Open	6.0	130.0	7	0.08	0.00	0.00
P-58	412	J-40	J-39	Open	8.0	110.0	11	0.07	0.00	0.00
P-57	229	J-39	J-38	Open	8.0	110.0	11	0.07	0.00	0.00
P-55	128	J-38	J-37	Open	8.0	110.0	4	0.03	0.00	0.00
P-53	269	J-37	J-36	Open	8.0	110.0	21	0.13	0.01	0.00
P-44	848	J-33	J-32	Open	8.0	110.0	-11	0.07	0.00	0.00
P-47	689	J-35	J-42	Open	8.0	110.0	3	0.02	0.00	0.00
P-54	538	J-36	J-42	Open	8.0	110.0	4	0.02	0.00	0.00
P-46	276	J-42	J-31	Open	8.0	110.0	-28	0.18	0.01	0.00
P-41	269	J-31	J-30	Open	8.0	110.0	-54	0.34	0.03	0.00
P-42	199	J-32	J-31	Open	8.0	110.0	-17	0.11	0.00	0.00
P-40	1,054	J-32	J-29	Open	8.0	110.0	-33	0.21	0.05	0.00
P-56	414	J-37	J-41	Open	8.0	110.0	-22	0.14	0.01	0.00
P-59	236	J-41	J-40	Open	8.0	110.0	22	0.14	0.00	0.00
P-60	252	J-41	J-43	Open	8.0	110.0	-53	0.34	0.03	0.00
P-45	212	J-43	J-30	Open	8.0	110.0	18	0.12	0.00	0.00
P-39	209	J-30	J-29	Open	8.0	110.0	-42	0.27	0.01	0.00
P-61	477	J-43	J-44	Open	8.0	110.0	-85	0.54	0.12	0.00

Cardinal Ridge Water Model

Scenario: Peak Hour

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Status (Calculated)	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss (Minor) (ft)
P-38	215	J-44	J-28	Open	8.0	110.0	66	0.42	0.04	0.00
P-62	285	J-45	J-44	Open	8.0	110.0	106	0.68	0.11	0.00
P-37	267	J-29	J-28	Open	8.0	110.0	-90	0.58	0.08	0.00
P-68	790	J-67	J-66	Open	8.0	110.0	33	0.21	0.04	0.00
P-66	299	J-66	J-65	Open	8.0	110.0	-86	0.55	0.08	0.00
P-65	163	J-65	J-23	Open	8.0	110.0	-160	1.02	0.14	0.00
P-64	686	J-44	J-23	Open	8.0	110.0	-51	0.33	0.07	0.00
P-69	972	J-65	J-67	Open	8.0	110.0	33	0.21	0.04	0.00
P-36	229	J-28	J-27	Open	8.0	110.0	-23	0.15	0.01	0.00
P-35	232	J-27	J-24	Open	8.0	110.0	-50	0.32	0.02	0.00
P-30	226	J-24	J-22	Open	8.0	110.0	-114	0.73	0.10	0.00
P-31	317	J-24	J-25	Open	8.0	110.0	31	0.20	0.01	0.00
P-32	238	J-25	J-26	Open	8.0	110.0	31	0.20	0.01	0.00
P-34	515	J-26	J-28	Open	8.0	110.0	16	0.10	0.01	0.00
P-33	370	J-26	J-27	Open	8.0	110.0	5	0.03	0.00	0.00
P-70	197	J-8	J-68	Open	12.0	130.0	0	0.00	0.00	0.00

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Flow (Out net) (gpm)	Flow (In net) (gpm)
R-1	85.00	85.00	1,066	-1,066

Pump Table - Time: 0.00 hours

Label	Elevation (ft)	Status (Initial, Transient)	Pump Definition	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	84.00	On	Flow Test - FHI-140031	85.00	244.90	1,066	159.90

Cardinal Ridge Water Model
Scenario: Peak Hour Plus Fire Flow
Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure Head (ft)	Pressure (psi)
J-2	84.00	0	178.32	94.32	41
J-3	84.00	0	178.24	94.24	41
J-63	98.00	13	177.30	79.30	34
J-62	94.00	9	177.07	83.07	36
J-53	78.00	10	176.97	98.97	43
J-54	79.00	28	176.86	97.86	42
J-23	83.00	124	176.72	93.72	41
J-22	84.00	31	176.73	92.73	40
J-28	79.00	15	176.61	97.61	42
J-29	67.00	16	176.53	109.53	47
J-30	71.00	7	176.52	105.52	46
J-42	80.00	34	176.48	96.48	42
J-45	72.00	0	176.77	104.77	45
J-40	69.00	10	176.49	107.49	47
J-41	69.00	10	176.50	107.50	47
J-36	85.00	14	176.48	91.48	40
J-35	86.00	10	176.48	90.48	39
J-33	75.00	9	176.48	101.48	44
J-38	68.00	0	176.49	108.49	47
J-61	91.00	3	177.08	86.08	37
J-52	78.00	16	177.00	99.00	43
J-4	80.00	0	172.37	92.37	40
J-5	80.00	0	171.24	91.24	39
J-7	88.00	80	155.56	67.56	29
J-13	78.00	0	177.84	99.84	43
J-15	82.00	0	177.33	95.33	41
J-17	77.00	86	177.17	100.17	43
J-18	75.00	23	177.04	102.04	44
J-19	76.00	0	177.04	101.04	44
J-6	88.00	0	161.73	73.73	32
J-11	85.00	0	161.41	76.41	33
J-32	81.00	39	176.49	95.49	41
J-16	84.00	0	177.23	93.23	40
J-8	90.00	0	118.80	28.80	12
J-34	84.00	0	176.48	92.48	40
J-51	71.00	16	176.97	105.97	46
J-14	78.00	0	177.76	99.76	43
J-12	85.00	111	161.35	76.35	33
J-9	83.00	0	155.56	72.56	31
J-10	88.00	0	155.56	67.56	29
J-55	79.00	0	176.80	97.80	42
J-56	79.00	28	176.77	97.77	42
J-21	80.00	0	176.84	96.84	42
J-64	100.00	0	177.30	77.30	33
J-20	65.00	0	177.04	112.04	48
J-46	75.00	6	176.90	101.90	44
J-47	75.00	5	176.90	101.90	44
J-48	72.00	11	176.85	104.85	45
J-49	79.00	5	176.81	97.81	42
J-50	82.00	5	176.78	94.78	41
J-57	85.00	21	176.74	91.74	40
J-58	90.00	41	176.72	86.72	38
J-59	95.00	21	176.72	81.72	35
J-60	100.00	21	176.72	76.72	33
J-39	71.00	0	176.49	105.49	46
J-37	88.00	5	176.49	88.49	38
J-31	71.00	9	176.49	105.49	46
J-43	80.00	14	176.52	96.52	42
J-44	74.00	6	176.65	102.65	44
J-67	90.00	0	176.54	86.54	37
J-66	90.00	119	176.50	86.50	37
J-65	90.00	41	176.58	86.58	37
J-27	78.00	32	176.62	98.62	43
J-24	80.00	34	176.64	96.64	42
J-25	80.00	0	176.63	96.63	42
J-26	80.00	10	176.62	96.62	42
J-68	0.00	0	118.80	118.80	51

Cardinal Ridge Water Model

Scenario: Peak Hour Plus Fire Flow

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Status (Calculated)	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss (Minor) (ft)
P-1	106	PMP-1	R-1	Open	72.0	150.0	-3,644	0.29	0.00	0.00
P-2	103	PMP-1	J-2	Open	16.0	110.0	3,644	5.81	0.96	0.00
P-3	105	J-2	J-3	Open	16.0	110.0	953	1.52	0.08	0.00
P-4	287	J-62	J-53	Open	12.0	110.0	287	0.81	0.10	0.00
P-52	254	J-36	J-35	Open	8.0	110.0	4	0.02	0.00	0.00
P-48	271	J-35	J-33	Open	8.0	110.0	-10	0.06	0.00	0.00
P-5	140	J-4	J-5	Open	16.0	110.0	2,692	4.29	1.13	0.38
P-22	782	J-15	J-18	Open	12.0	110.0	300	0.85	0.29	0.00
P-19	385	J-15	J-16	Open	8.0	110.0	86	0.55	0.11	0.00
P-21	192	J-16	J-17	Open	8.0	110.0	86	0.55	0.05	0.00
P-20	283	H-1	J-16	Open	6.0	110.0	0	0.00	0.00	0.00
P-9	201	H-3	J-8	Open	6.0	110.0	-2,500	28.37	15.40	4.38
P-50	262	H-4	J-34	Open	6.0	110.0	0	0.00	0.00	0.00
P-14	269	H-5	J-51	Open	6.0	110.0	0	0.00	0.00	0.00
P-18	718	J-14	J-15	Open	12.0	110.0	386	1.09	0.43	0.01
P-23	1,555	J-18	J-19	Open	8.0	110.0	0	0.00	0.00	0.00
P-17	478	J-13	J-14	Open	16.0	110.0	386	0.62	0.07	0.00
P-16	2,763	J-3	J-13	Open	16.0	110.0	386	0.62	0.41	0.00
P-4	1,100	J-2	J-4	Open	16.0	110.0	2,692	4.29	5.95	0.10
P-13	729	J-6	J-11	Open	8.0	110.0	111	0.71	0.32	0.01
P-14	175	J-11	H-6	Open	6.0	110.0	0	0.00	0.00	0.00
P-15	136	J-11	J-12	Open	8.0	110.0	111	0.71	0.06	0.00
P-6	385	J-5	J-6	Open	12.0	110.0	2,692	7.64	9.52	1.21
P-7	278	J-6	J-7	Open	12.0	110.0	2,580	7.32	6.17	0.62
P-10	112	J-7	J-9	Open	8.0	110.0	0	0.00	0.00	0.00
P-11	126	J-9	J-10	Open	8.0	110.0	0	0.00	0.00	0.00
P-12	160	J-9	H-7	Open	8.0	110.0	0	0.00	0.00	0.00
P-8	1,936	J-7	J-8	Open	12.0	110.0	2,500	7.09	36.75	0.27
P-29	786	J-3	J-63	Open	12.0	110.0	567	1.61	0.95	0.00
P-30	666	J-63	J-62	Open	12.0	110.0	284	0.80	0.22	0.00
P-31	228	J-53	J-54	Open	12.0	110.0	340	0.97	0.11	0.00
P-32	171	J-54	J-55	Open	12.0	110.0	289	0.82	0.06	0.00
P-33	212	J-55	J-56	Open	12.0	110.0	202	0.57	0.04	0.00
P-34	289	J-56	J-23	Open	12.0	110.0	200	0.57	0.05	0.00
P-29	213	J-23	J-22	Open	12.0	110.0	-134	0.38	0.02	0.00
P-26	603	J-18	J-21	Open	12.0	110.0	277	0.79	0.19	0.00
P-28	348	J-21	J-22	Open	12.0	110.0	277	0.79	0.11	0.00
P-27	314	J-21	H-8	Open	6.0	110.0	0	0.00	0.00	0.00
P-43	204	J-32	H-2	Open	6.0	110.0	0	0.00	0.00	0.00
P-40	252	J-64	J-63	Open	12.0	110.0	0	0.00	0.00	0.00
P-41	721	J-63	J-61	Open	12.0	110.0	270	0.77	0.22	0.00
P-42	288	J-61	J-52	Open	12.0	110.0	255	0.72	0.08	0.00
P-43	688	J-52	J-51	Open	12.0	110.0	85	0.24	0.02	0.00
P-44	1,031	J-52	J-51	Open	8.0	110.0	24	0.15	0.02	0.00
P-45	319	J-61	J-62	Open	8.0	110.0	12	0.08	0.00	0.00
P-46	320	J-52	J-53	Open	12.0	110.0	130	0.37	0.03	0.00
P-24	186	J-19	H-9	Open	6.0	110.0	0	0.00	0.00	0.00
P-25	237	J-19	J-20	Open	8.0	110.0	0	0.00	0.00	0.00
P-49	319	J-51	J-46	Open	8.0	130.0	93	0.60	0.07	0.00
P-50	432	J-53	J-47	Open	8.0	110.0	68	0.43	0.07	0.00
P-51	255	J-47	J-46	Open	8.0	110.0	-10	0.07	0.00	0.00
P-52	614	J-46	J-45	Open	8.0	110.0	77	0.49	0.13	0.00
P-53	229	J-47	J-48	Open	8.0	110.0	73	0.46	0.04	0.00
P-54	171	J-48	J-49	Open	8.0	110.0	85	0.54	0.04	0.00
P-55	213	J-49	J-50	Open	8.0	110.0	63	0.40	0.03	0.00
P-67	433	J-50	J-56	Open	8.0	110.0	25	0.16	0.01	0.00
P-57	434	J-48	J-54	Open	8.0	110.0	-23	0.15	0.01	0.00
P-58	431	J-49	J-55	Open	8.0	110.0	16	0.10	0.01	0.00
P-63	252	J-45	J-50	Open	8.0	110.0	-33	0.21	0.01	0.00
P-60	185	J-55	J-57	Open	8.0	110.0	103	0.66	0.07	0.00
P-61	273	J-57	J-58	Open	8.0	110.0	41	0.26	0.02	0.00
P-62	194	J-58	J-59	Open	8.0	110.0	0	0.00	0.00	0.00
P-63	275	J-59	J-60	Open	8.0	110.0	-21	0.13	0.01	0.00
P-64	195	J-60	J-57	Open	8.0	110.0	-41	0.26	0.01	0.00
P-51	1,124	J-38	J-34	Open	8.0	110.0	7	0.04	0.00	0.00
P-49	199	J-34	J-33	Open	6.0	130.0	7	0.08	0.00	0.00
P-58	412	J-40	J-39	Open	8.0	110.0	11	0.07	0.00	0.00
P-57	229	J-39	J-38	Open	8.0	110.0	11	0.07	0.00	0.00
P-55	128	J-38	J-37	Open	8.0	110.0	4	0.03	0.00	0.00
P-53	269	J-37	J-36	Open	8.0	110.0	21	0.13	0.01	0.00
P-44	848	J-33	J-32	Open	8.0	110.0	-11	0.07	0.00	0.00
P-47	689	J-35	J-42	Open	8.0	110.0	3	0.02	0.00	0.00
P-54	538	J-36	J-42	Open	8.0	110.0	4	0.02	0.00	0.00
P-46	276	J-42	J-31	Open	8.0	110.0	-28	0.18	0.01	0.00
P-41	269	J-31	J-30	Open	8.0	110.0	-54	0.34	0.03	0.00
P-42	199	J-32	J-31	Open	8.0	110.0	-17	0.11	0.00	0.00
P-40	1,054	J-32	J-29	Open	8.0	110.0	-33	0.21	0.05	0.00
P-56	414	J-37	J-41	Open	8.0	110.0	-22	0.14	0.01	0.00
P-59	236	J-41	J-40	Open	8.0	110.0	22	0.14	0.00	0.00
P-60	252	J-41	J-43	Open	8.0	110.0	-53	0.34	0.03	0.00
P-45	212	J-43	J-30	Open	8.0	110.0	19	0.12	0.00	0.00
P-39	209	J-30	J-29	Open	8.0	110.0	-42	0.27	0.01	0.00
P-61	477	J-43	J-44	Open	8.0	110.0	-86	0.55	0.13	0.00

Cardinal Ridge Water Model

Scenario: Peak Hour Plus Fire Flow

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Status (Calculated)	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Headloss (Minor) (ft)
P-38	215	J-44	J-28	Open	8.0	110.0	68	0.44	0.04	0.00
P-62	285	J-45	J-44	Open	8.0	110.0	110	0.70	0.12	0.00
P-37	267	J-29	J-28	Open	8.0	110.0	-90	0.57	0.08	0.00
P-68	790	J-67	J-66	Open	8.0	110.0	33	0.21	0.04	0.00
P-66	299	J-66	J-65	Open	8.0	110.0	-86	0.55	0.08	0.00
P-65	163	J-65	J-23	Open	8.0	110.0	-160	1.02	0.14	0.00
P-64	686	J-44	J-23	Open	8.0	110.0	-50	0.32	0.07	0.00
P-69	972	J-65	J-67	Open	8.0	110.0	33	0.21	0.04	0.00
P-36	229	J-28	J-27	Open	8.0	110.0	-22	0.14	0.00	0.00
P-35	232	J-27	J-24	Open	8.0	110.0	-48	0.31	0.02	0.00
P-30	226	J-24	J-22	Open	8.0	110.0	-111	0.71	0.10	0.00
P-31	317	J-24	J-25	Open	8.0	110.0	30	0.19	0.01	0.00
P-32	238	J-25	J-26	Open	8.0	110.0	30	0.19	0.01	0.00
P-34	515	J-26	J-28	Open	8.0	110.0	15	0.09	0.01	0.00
P-33	370	J-26	J-27	Open	8.0	110.0	5	0.03	0.00	0.00
P-70	197	J-8	J-68	Open	12.0	130.0	0	0.00	0.00	0.00

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Hydraulic Grade (ft)	Flow (Out net) (gpm)	Flow (In net) (gpm)
R-1	85.00	85.00	3,644	-3,644

Pump Table - Time: 0.00 hours

Label	Elevation (ft)	Status (Initial, Transient)	Pump Definition	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	84.00	On	Flow Test - FHI-140031	85.00	179.28	3,644	94.28

Hydrant Table - Time: 0.00 hours

ID	Label	Hydrant Status	Emitter Coefficient (gpm/psi^n)	Include Hydrant Lateral Loss?	Length (Hydrant Lateral) (ft)	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
206	H-1	Closed	0.000	False	20	84.00	0	177.23	40
211	H-2	Closed	0.000	False	20	70.00	0	176.49	46
217	H-3	Closed	0.000	False	20	90.00	2,500	103.40	6
224	H-4	Closed	0.000	False	20	78.00	0	176.48	43
229	H-5	Closed	0.000	False	20	69.00	0	176.97	47
253	H-6	Closed	0.000	False	20	90.00	0	161.41	31
266	H-7	Closed	0.000	False	20	0.00	0	155.56	67
281	H-8	Closed	0.000	False	20	90.00	0	176.84	38
292	H-9	Closed	0.000	False	20	90.00	0	177.04	38

Appendix B – Gravity Sewer Hydraulic Analysis

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Technical Memorandum

TO: James Canning | James City Service Authority (JCSA)
FROM: Jessica Kwiatkowski, P.E. | Timmons Group
John Zaszewski, P.E. | Timmons Group
Kenneth Turner, P.E. | Timmons Group
DATE: October 7, 2025
RE: Cardinal Ridge Hydraulic Analysis Technical Memo

INTRODUCTION/BACKGROUND

The proposed Cardinal Ridge development is located at the existing Eastern State Hospital site on Ironbound Road in Williamsburg, Virginia. The proposed development includes residential units, commercial property, and open space.

Timmons Group was tasked to analyze the data provided by the James City Service Authority (JCSA) to evaluate the adequacy of the existing gravity sewer system between the proposed project site and the Hampton Roads Sanitation District (HRSD) Pump Station NS-PS-231-1, which ultimately receives the flow from the development. HRSD has evaluated the pump station to be adequate for the anticipated flow and determined that the pump station has adequate capacity and further analysis of the pump station is not required.

The purpose of this memo is to summarize our analysis of the sewer capacity of the existing downstream public sewer infrastructure.

EXISTING CONDITIONS

Using GIS data provided by JCSA, an exhibit ***(Attachment A)*** was created to show the location of the existing sewer infrastructure and peak flow rates. The following table summarizes the existing peak flow rates coming into the sewer main at certain manholes:

Description	Existing Peak Flow (GPD)
Library Storage Meter	110.42
Offices Meter	425.35
Stadium Meter	519.42
MH 15405D	86,807
MH 15405	1,521,772.7
MH 15317	624,163.7
MH 15315	17,825
MH 15314	106,950
MH 15305	220,242
MH 15300	24,800

Current existing pipes within the site vary from 15" to 24". The pipe materials include Ductile Iron Pipe (DIP), Fiberglass Reinforce Plastic (FRP) Flextran Pipe, Polyvinyl Chloride (PVC) Pipe, and Reinforce Plastic Mortar (RPM) Pipe.

PROJECT FLOWS FOR PROPOSED DEVELOPMENT

The proposed development has a total area of 365.6 acres and includes a total of 979 residential units. The development plan also includes a Hope Family Village (12 single family detached, 15 townhomes), a Colonial Behavioral Health site (62,000 sf), undeveloped public land use (28.9 ac), and commercial space (100,000 sf). See ***Attachment B*** for the development conceptual plan. The projected peak flow is 984,475 GPD for the proposed development area. See ***Attachment C*** for a detailed Cardinal Ridge flow rate calculation. The calculation is based on the HRSD sanitary sewer flow rate of 310 GPD per residential unit with a peak factor of 2.5.

HYDRAULIC CALCULATIONS

Using the GIS and flow rate information provided by JCSA and the calculated peak flow rate for the proposed development, a hydraulic analysis was performed for the proposed Cardinal Ridge development. The flow data provided by JCSA (***Attachment A***) shows the peak flow entering to the system. Therefore, a peak factor of 1 is being used in the Hydraulic Analysis (***Attachment D***).

As shown on ***Attachment A***, the proposed Cardinal Ridge development enters the existing public sewer system at MH15405D. The flow at MH15405D is calculated using the calculated flow for the Cardinal Ridge development (984,475 GPD) plus the flow from the stadium meter (519.42 GPD), the library storage meter (110.42 GPD), offices meter (425.35 GPD), and the existing flow at MH15405D (86,807 GPD). The following table summarizes the projected peak flow rates in the sewer main after the Eastern State Hospital site is replaced with the proposed Cardinal Ridge development:

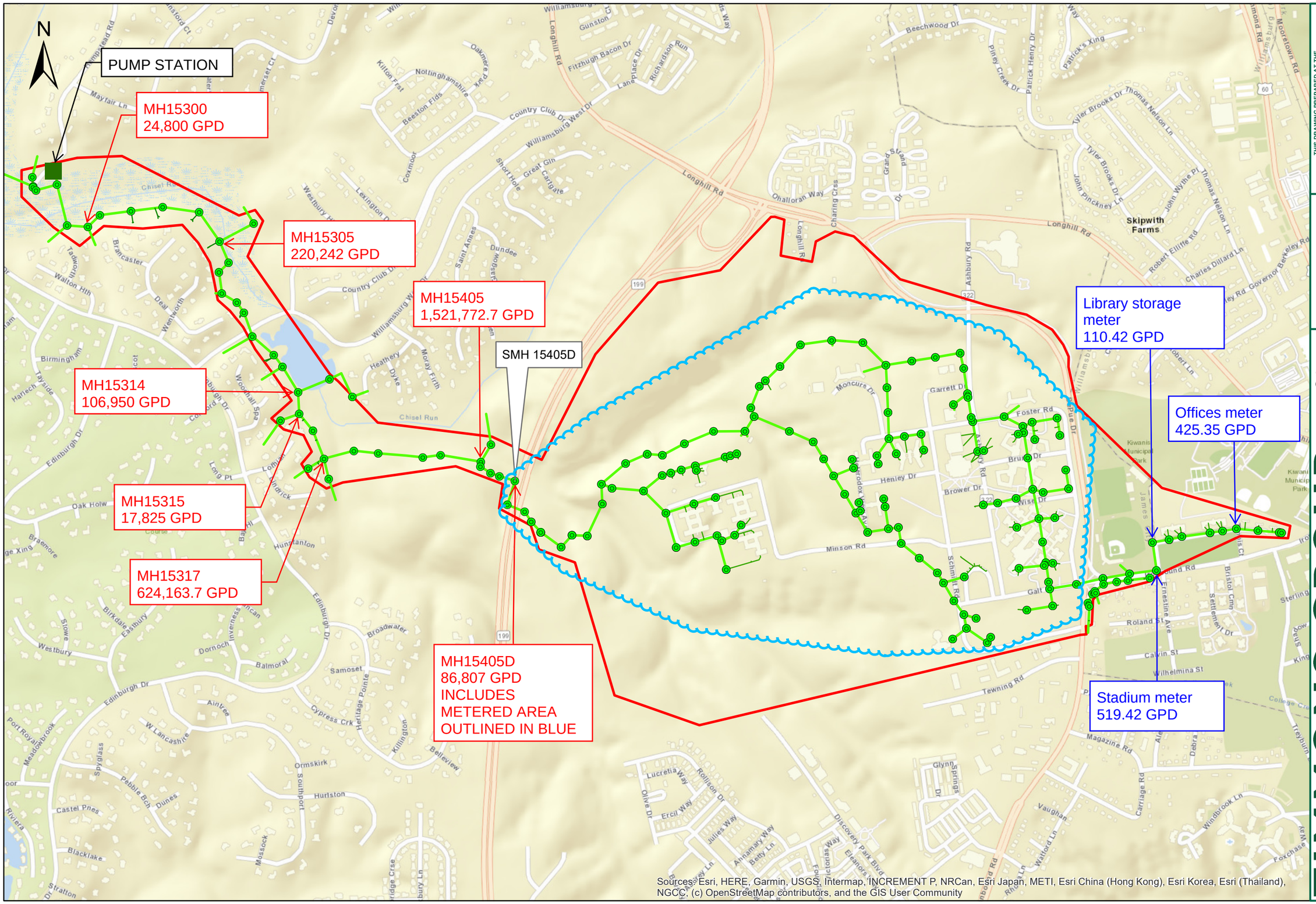
Description	Proposed Peak Flow (GPD)
MH 15405D	1,072,337
MH 15405	2,594,110
MH 15317	3,218,274
MH 15315	3,236,099
MH 15314	3,343,049
MH 15305	3,563,290
MH 15300	3,588,091

The detailed sewer analysis is provided in ***Attachment D***. As shown, the proportional flow of the entire system will be below 100%. Manholes 15312 and 15311 are the critical points of the system. With a pipe capacity of 3.69 MGD and a peak flow of 3.343 MGD through the pipe, there is 0.35 MGD capacity remain in the system. Therefore, the existing pipes have adequate capacity to support the proposed development.

CONCLUSION

Timmons has evaluated the proposed sewer conditions. Based on the data provided, the existing sewer system is not at its full capacity and can support the proposed development. Therefore, no changes of the existing system are required.

ATTACHMENT A



THIS DRAWING PREPARED AT THE
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Site Development | Residential | Infrastructure | Technology | Environmental

DATE	REVISION DESCRIPTION

TIMMONS GROUP

EASTERN STATE
JAMES CITY COUNTY, VIRGINIA

SANITARY SEWER MAP

DATE 4/24/2023
DRAWN BY SM
DESIGNED BY --------
CHECKED BY --------
SCALE 1" = XXX'

JOB NUMBER 43654
SHEET NO. 1 OF 1

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ATTACHMENT B

UTILITY LEGEND:

PROPOSED WATER MAIN

PROPOSED GRAVITY SANITARY SEWER MAIN

EXISTING 16" WATER MAIN — 16"W

EXISTING GRAVITY SANITARY SEWER MAIN

DRAINAGE LEGEND:

PROPOSED STORM PIPE

POND #8

POND #1

POND #2

POND #7

POND #6

POND #5

POND #4

POND #3

PROPOSED WATER MAIN (TYP.)

EXISTING SANITARY SEWER MAIN (TYP.)

PROPOSED SANITARY SEWER MAIN (TYP.)

PROPOSED STORM PIPE (TYP.)

EXISTING FIRE HYDRANT FH140031

EXISTING 16" WATER MAIN (TYP.)

CONCEPTUAL MASTER UTILITY AND DRAINAGE PLAN

43654 - Cardinal Ridge - October 7, 2025

SCALE 1"=300'

0 300' 600'

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S:\10\143654-Eastern State\DWG\Sheet\Exhibit\43654 - Master Plan.dwg | Plotted on 10/22/2025 12:08 PM | by Asheton Vodila

ATTACHMENT C

Cardinal Ridge Sewer Demands Project # 43654 Date: 10/07/2025					FLOW DURATION	FLOW DEMAND	AVG. FLOW	AVG FLOW	PEAK FLOW FACTOR	PEAK FLOW	PEAK FLOW
AREA	**FROM**	**TO**	**UNIT TYPE**	**NUMBER**	**(HOURS)**	**(GPD)**	**(GPD)**	**(GPM)**		**(GPD)**	**(GPM)**
Apartments/Townhomes	-	-	Unit	685	24	310	212,350	147.5	2.5	530,875	368.7
Dwellings - Single Family Detached	-	-	Unit	294	24	310	91,140	63.3	2.5	227,850	158.2
Hope Family Village - Single Family Detached/Townhomes			Unit	27	24	310	8,370	5.8	2.5	20,925	14.5
Clubhouses	-	-	Unit	3	24	1550	4,650	3.2	2.5	11,625	8.1
Colonial Behavorial Health Site			SF	62000	12	0.25	15,500	21.5	3.0	46,500	64.6
Public Land Use - Undeveloped, Non-Residential (1,000 GPD/AC)	-	-	AC	28.9	24	1000	28,900	20.1	3.0	86,700	60.2
Commercial (Market Place District)	-	-	SF	100000	12	0.2	20,000	27.8	3.0	60,000	83.3
Total							**380,910**	**289.2**		**984,475**	**757.6**

Assumptions Made:

Residential unit count is based on Master Plan prepared by Land Planning Solutions on 05/21/2025

Residential unit count is based on Master Plan prepared by Land Planning Solutions on 05/21/2025

Hope Family Village residential count (12 single family detached/15 townhome) is based on coordination with D.R. Horton.

Clubhouse demand assumed as 1 clubhouse = 5 townhomes in calculations. Land use area is not included since it's already included in residential areas.

62,000 SF of Colonial Behavioral Health Site building area is based on the Master Plan prepared by Land Planning Solutions on 05/21/2025

Undeveloped Public Land Use Non-Residential from JCSA Design Handbook = 1000 gpd/acre.

100,000 SF of commercial building area is based on Master Plan prepared by Land Planning Solutions on 05/21/2025

ATTACHMENT D

SANITARY SEWER HYDRAULIC ANALYSIS

Project Number: 43654.002 | Project Name: Cardinal Ridge
Designed by: J. Steckline | Checked by: J.Kwiatkowski | Date: 07-Oct-25

PIPE MATEIRAL	MH #		FLOW DETERMINATION				MGD				PIPE RUN				PIPE CAPACITY (full)			Proportional Flow	Proportional Depth (inches)	Proportional Velocity	ELEVATIONS					REMARKS
	From	To	By Area		By Buildings		Incr.	Total Avg.	1.00	Peak Flow	Length	Dia. (in.)	Slope (%)	Manning's "n"	MGD	CFS	Vel. (FPS)				Upper (Inv. Out)	Fall (Pipe Run)	Lower (Inv. In)	MH Drop	MH Top	
			Incr. Area	GPD / Acre	# of Units	GPD / Unit			Peak Factor																	
DIP	15405D	15405C			1	1072337.19	1.072				152.81	15	0.15%	0.012	1.76	2.72	2.2		15.0	0.0	35.84	0.23	35.61			
DIP	15405C	15405B			1	0		1.072	1.0	1.072	87.79	15	1.40%	0.012	5.37	8.31	6.8	20%	15.0	1.4	35.56	1.23	34.33			
DIP	15405B	15405A			1	0		1.072	1.0	1.072	114.17	15	1.44%	0.012	5.43	8.41	6.9	20%	15.0	1.4	34.28	1.64	32.64			
DIP	15405A	15405			1	0		1.072	1.0	1.072	46.14	15	5.01%	0.012	10.15	15.70	12.8	11%	15.0	1.4	32.59	2.31	30.28			
FRP Flextran	15405	15404			1	1521772.7	1.522	1.072	1.0	1.072	386.25	18	0.18%	0.009	4.18	6.48	3.7	26%	18.0	0.9	30.28	0.70	29.58			
FRP Flextran	15404	15403			1	0		2.594	1.0	2.594	169.51	18	0.14%	0.009	3.62	5.60	3.2	72%	18.0	2.3	29.58	0.23	29.35			
FRP Flextran	15403	15401			1	0		2.594	1.0	2.594	424.09	18	0.17%	0.009	3.99	6.18	3.5	65%	18.0	2.3	29.35	0.70	28.65			
PVC	15401	15400			1	0		2.594	1.0	2.594	230.63	18	0.21%	0.009	4.53	7.01	4.0	57%	18.0	2.3	28.63	0.49	28.14			
DIP	15400	15317			1	0		2.594	1.0	2.594	292.83	18	0.22%	0.012	3.45	5.33	3.0	75%	18.0	2.3	28.01	0.64	27.37			
DIP	15317	15316			1	624163.7	0.624	2.594	1.0	2.594	283.44	18	0.24%	0.012	3.61	5.59	3.2	72%	18.0	2.3	27.33	0.68	26.65			
PVC	15316	15315			1	0		3.218	1.0	3.218	205.70	18	0.20%	0.009	4.42	6.83	3.9	73%	18.0	2.8	26.65	0.41	26.24			
RPM	15315	15314			1	17825	0.018	3.218	1.0	3.218	205.46	18	0.31%	0.0105	4.69	7.26	4.1	69%	18.0	2.8	26.24	0.64	25.60			
RPM	15314	15313			1	106950	0.107	3.236	1.0	3.236	280.65	18	0.30%	0.0084	5.76	8.91	5.0	56%	18.0	2.8	25.60	0.84	24.76			
RPM	15313	15312			1	0		3.343	1.0	3.343	137.99	18	0.27%	0.0084	5.50	8.51	4.8	61%	18.0	2.9	24.76	0.38	24.38			
RPM	15312	15311			1	0		3.343	1.0	3.343	268.66	18	0.12%	0.0084	3.69	5.71	3.2	91%	18.0	2.9	24.38	0.33	24.05			
PVC	15311	15310			1	0		3.343	1.0	3.343	234.04	18	0.42%	0.009	6.34	9.80	5.5	53%	18.0	2.9	24.05	0.97	23.08			
DIP	15310	15309			1	0		3.343	1.0	3.343	118.73	18	1.12%	0.012	7.79	12.06	6.8	43%	18.0	2.9	23.08	1.33	21.76			
PVC	15309	15308			1	0		3.343	1.0	3.343	164.62	18	0.34%	0.009	5.73	8.87	5.0	58%	18.0	2.9	21.80	0.56	21.24			
PVC	15308	15307			1	0		3.343	1.0	3.343	203.53	18	0.30%	0.009	5.37	8.31	4.7	62%	18.0	2.9	21.12	0.61	20.51			
PVC	15307	15306			1	0		3.343	1.0	3.343	127.50	18	0.39%	0.009	6.10	9.44	5.3	55%	18.0	2.9	20.51	0.49	20.02			
PVC	15306	15305			1	0		3.343	1.0	3.343	216.95	18	0.33%	0.009	5.61	8.69	4.9	60%	18.0	2.9	20.02	0.71	19.31			
PVC	15305	15304			1	220242	0.220	3.343	1.0	3.343	337.55	24	0.20%	0.009	9.37	14.50	4.6	36%	24.0	1.6	19.31	0.66	18.65			
DIP	15304	15303			1	0		3.563	1.0	3.563	346.21	24	0.10%	0.012	5.06	7.84	2.5	70%	24.0	1.8	18.65	0.35	18.30			
RPM	15303	15302			1	0		3.563	1.0	3.563	303.01	24	0.12%	0.0084	7.86	12.17	3.9	45%	24.0	1.8	18.30	0.36	17.94			
RPM	15302	15301			1	0		3.563	1.0	3.563	297.56	24	0.10%	0.0084	7.07	10.94	3.5	50%	24.0	1.8	17.94	0.29	17.65			
PVC	15301	15300			1	0		3.563	1.0	3.563	158.00	24	0.16%	0.009	8.39	12.98	4.1	42%	24.0	1.8	17.65	0.25	17.40			
PVC	15300	15100			1	24800	0.025	3.563	1.0	3.563	196.46	24	0.13%	0.009	7.61	11.78	3.8	47%	24.0	1.8	17.40	0.25	17.15			
PVC	15100	NPS-231-267			1	0		3.588	1.0	3.588	397.86	24	0.05%	0.009	4.93	7.64	2.4	73%	24.0	1.8	17.15	0.22	16.93			
DIP	NPS-231-267	NS-PS-231-1			1	0		3.588	1.0	3.588	169.39	24	0.45%	0.012	10.71	16.57	5.3	34%	24.0	1.8	16.77	0.77	16.00			

Appendix C – Stormwater Management & VRRM

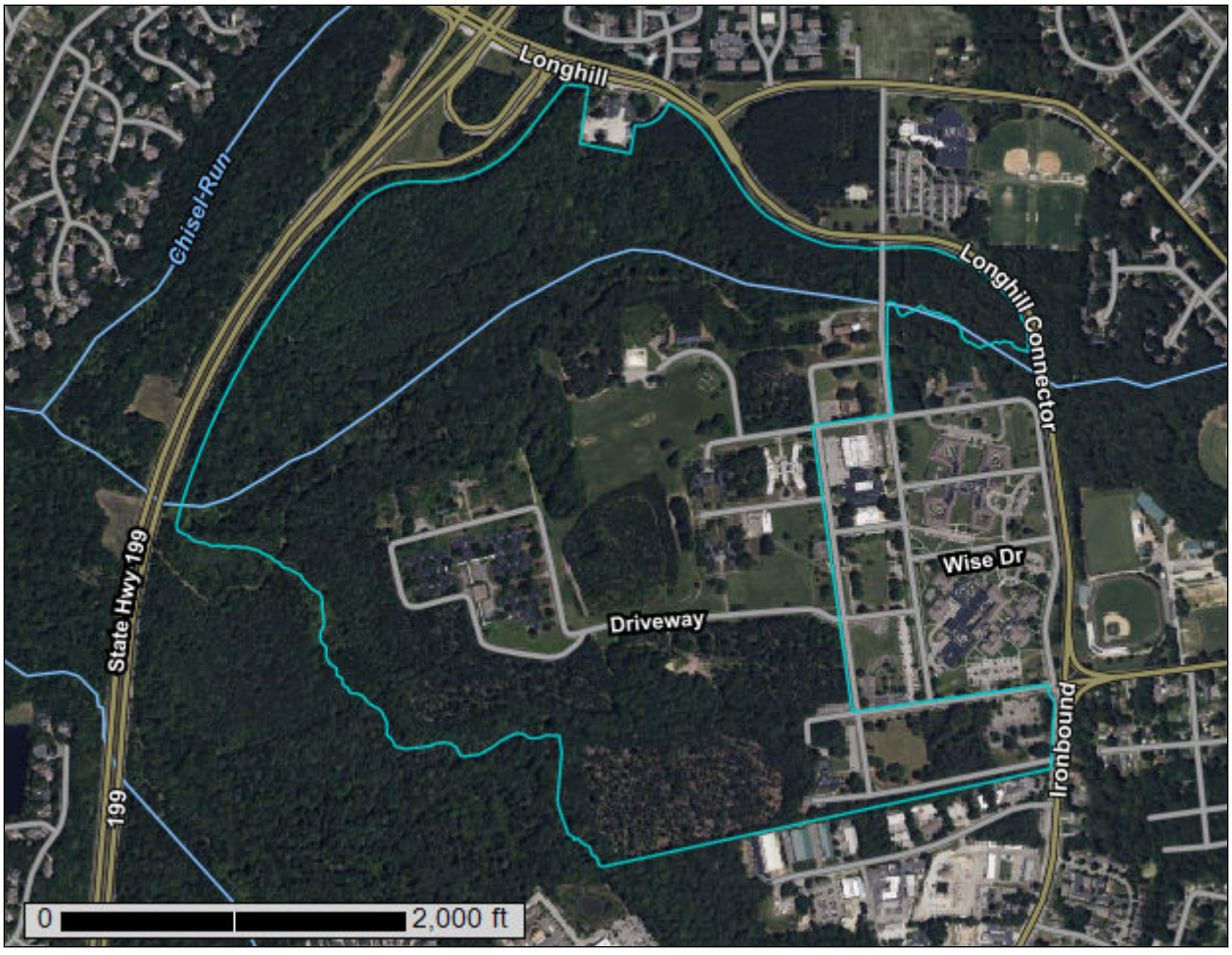
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for James City and York Counties and the City of Williamsburg, Virginia



September 22, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Longhill
Chisel Run
199
Wise Dr
Ironbound
18B
11C
31B
15D
17
29B
14B
15E
37
19B
W
76° 45' 26" W
76° 43' 42" W
37° 17' 58" N
37° 17' 4" N
344300
344500
344700
344900
345100
345300
345500
345700
345900
346100
346300
346500
346700
4129500
4129300
4129100
4128900
4128700
4128500
4128300
4128100
4127900
Map Scale: 1:11,700 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: James City and York Counties and the City of Williamsburg, Virginia
Survey Area Data: Version 20, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 21, 2022—Jul 13, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
11C	Craven-Uchee complex, 6 to 10 percent slopes	73.9	24.8%	D
14B	Emporia fine sandy loam, 2 to 6 percent slopes	15.2	5.1%	B
15D	Emporia complex, 10 to 15 percent slopes	40.3	13.5%	B
15E	Emporia complex, 15 to 25 percent slopes	30.4	10.2%	B
17	Johnston complex	30.7	10.3%	A/D
18B	Kempsville fine sandy loam, 2 to 6 percent slopes	8.1	2.7%	A
19B	Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes	40.4	13.6%	A
29B	Slagle fine sandy loam, 2 to 6 percent slopes	4.1	1.4%	C
31B	Suffolk fine sandy loam, 2 to 6 percent slopes	19.1	6.4%	B
37	Urban land	33.6	11.3%	
W	Water	1.7	0.6%	
Totals for Area of Interest		**297.4**	**100.0%**	

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

James City and York Counties and the City of Williamsburg, Virginia

11C—Craven-Uchee complex, 6 to 10 percent slopes

Map Unit Setting

National map unit symbol: 41pq
Elevation: 0 to 700 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Craven and similar soils: 36 percent
Uchee and similar soils: 34 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Craven

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 53 inches: clay
H3 - 53 to 80 inches: sandy clay loam

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Uchee

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Marine deposits

Typical profile

H1 - 0 to 24 inches: loamy fine sand
H2 - 24 to 56 inches: sandy clay loam
H3 - 56 to 65 inches: sandy loam

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Hydric soil rating: No

14B—Emporia fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 41pt
Elevation: 20 to 150 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Emporia and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Emporia

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 58 inches: loam

H3 - 58 to 75 inches: sandy clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 36 to 54 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

15D—Emporia complex, 10 to 15 percent slopes

Map Unit Setting

National map unit symbol: 41pw
Elevation: 20 to 150 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Emporia and similar soils: 75 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Emporia

Setting

Landform: Marine terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 58 inches: loam
H3 - 58 to 75 inches: sandy clay loam

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 36 to 54 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Johnston

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

15E—Emporia complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 41px
Elevation: 20 to 150 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: Not prime farmland

Map Unit Composition

Emporia and similar soils: 75 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Emporia

Setting

Landform: Marine terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 58 inches: loam

H3 - 58 to 75 inches: sandy clay loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 36 to 54 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Johnston

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

17—Johnston complex

Map Unit Setting

National map unit symbol: 41q0
Elevation: 0 to 150 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: Not prime farmland

Map Unit Composition

Johnston and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Johnston

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 34 inches: silt loam
H2 - 34 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: FrequentNone
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Bohicket

Percent of map unit: 5 percent
Landform: Salt marshes
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Nimmo

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Levy

Percent of map unit: 5 percent
Landform: Salt marshes
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Tomotley

Percent of map unit: 5 percent
Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

Axis

Percent of map unit: 5 percent
Landform: Salt marshes
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

18B—Kempsville fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 41q1
Elevation: 100 to 400 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Kempsville and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kempsville

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 55 inches: sandy clay loam
H3 - 55 to 68 inches: fine sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

19B—Kempsville-Emporia fine sandy loams, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 41q2
Elevation: 20 to 400 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Kempsville and similar soils: 50 percent
Emporia and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kempsville

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 55 inches: sandy clay loam
H3 - 55 to 68 inches: fine sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Emporia

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 58 inches: loam
H3 - 58 to 75 inches: sandy clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 36 to 54 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

29B—Slagle fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2sgy1
Elevation: 70 to 330 feet
Mean annual precipitation: 32 to 51 inches
Mean annual air temperature: 47 to 70 degrees F
Frost-free period: 158 to 206 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Slagle and similar soils: 83 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Slagle

Setting

Landform: Marine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Riser, tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bt - 8 to 51 inches: sandy clay loam
C - 51 to 70 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Myatt

Percent of map unit: 3 percent
Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

31B—Suffolk fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 41qk
Elevation: 30 to 150 feet
Mean annual precipitation: 40 to 55 inches

Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Suffolk and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Suffolk

Setting
Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Marine deposits

Typical profile
H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 40 inches: sandy clay loam
H3 - 40 to 64 inches: fine sandy loam

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

37—Urban land

Map Unit Setting
National map unit symbol: 41qs
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 0 inches to cemented horizon
Runoff class: Very high
Depth to water table: About 24 to 79 inches

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

W—Water

Map Unit Setting

National map unit symbol: 41r1
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 165 to 193 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

References

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LEGEND

MANAGED TURF

IMPERVIOUS COVER

	A Soils	B Soils	C Soils	D Soils	Totals
Forest (acres) -- undisturbed, protected forest or reforested land			151.77		151.77
Mixed Open (acres) -- undisturbed/infrequently maintained grass or shrub land					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed			36.68		36.68
Impervious Cover (acres)			23.35		23.35
					211.80

EXISTING LAND COVER

43654 - Cardinal Ridge - October 7, 2025

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SCALE 1"=300'

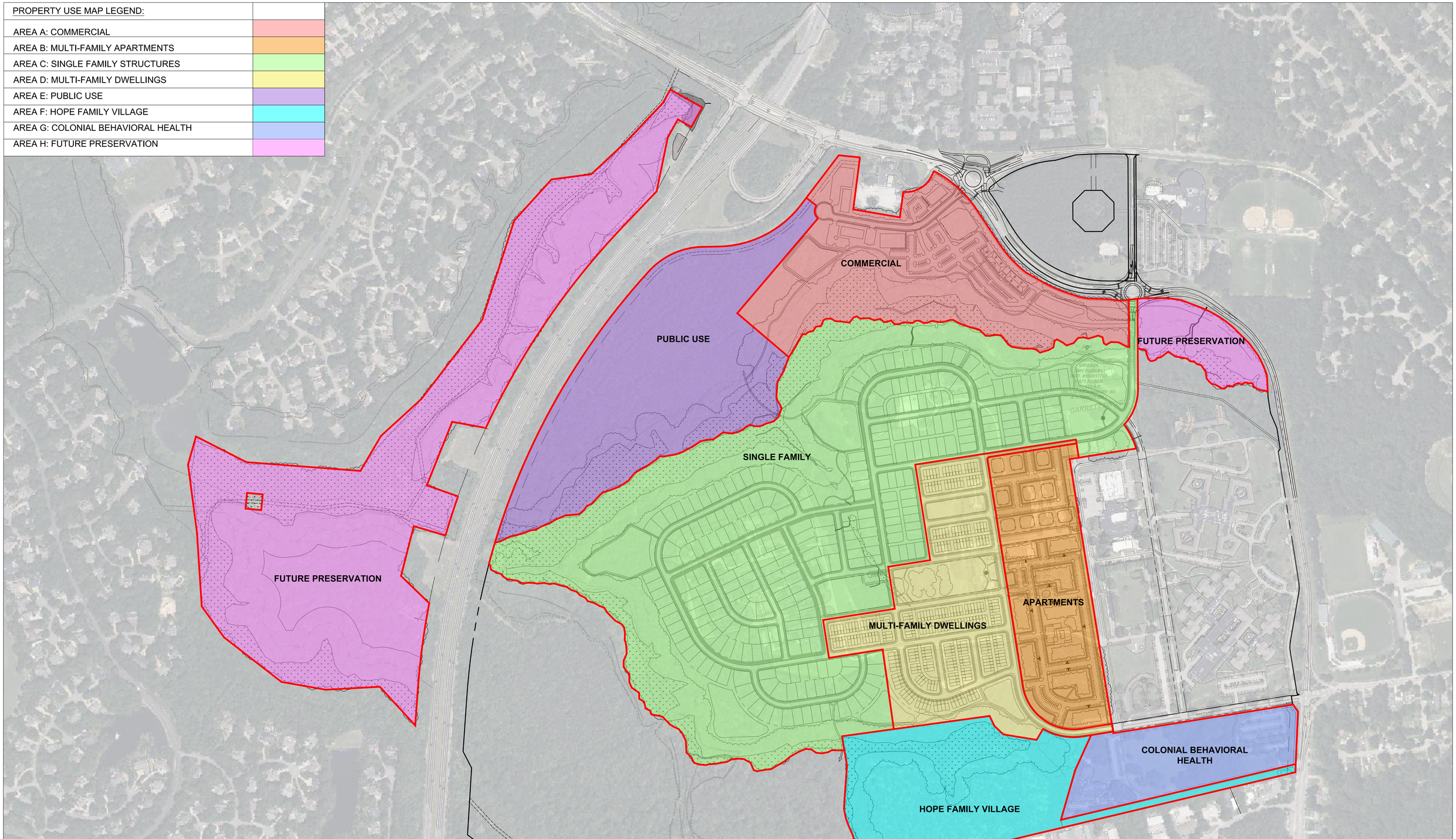
0 300' 600'

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

S:\10143654-Eastern State\DWG\Sheet\Exhibit\43654 - Pre-development Land Cover.dwg | Plotted on 10/22/2025 12:30 PM | by Asheton Vodila

PROPERTY USE MAP LEGEND:	
AREA A: COMMERCIAL	
AREA B: MULTI-FAMILY APARTMENTS	
AREA C: SINGLE FAMILY STRUCTURES	
AREA D: MULTI-FAMILY DWELLINGS	
AREA E: PUBLIC USE	
AREA F: HOPE FAMILY VILLAGE	
AREA G: COLONIAL BEHAVIORAL HEALTH	
AREA H: FUTURE PRESERVATION	



LAND COVER SUMMARY

* PLEASE NOTE THAT HYDROLOGIC SOIL GROUP "C" WAS ASSUMED FOR THE ENTIRE SITE

DA ID#	POA #	Total Gross Area	Soils	Farmstead (1) acre	Residential > 1/2 ac.	Residential => 10,000 sf or 1/4 acre	Residential < 10,000 sf or 1/4 acre	Residential Multi-Family - Apartments/Townhouses	Parks, Lawn, Open Space, etc.	Dedicated Open Space	Industrial/ Commercial	Public Use Land Parcel	Known Impervious	Retention/Detention Easements	Undevelopable Area	Gross Land Use Percentage	Weighted C	Weighted CN	Impervious %	Impervious Area
		AC	HSG	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	%			%	AC
AREA A: COMMERCIAL		33.2	C								20.3				12.9	6	0.58	86	52.0	17.3
AREA B: MULTI-FAMILY/ APARTMENTS		27.3	C					27.0							0.3	7	0.70	90	64.3	17.6
AREA C: SINGLE FAMILY STRUCTURES		120.7	C			82.9									37.8	23	0.37	84	41.2	49.7
AREA D: MULTI-FAMILY DWELLINGS		24.7	C					23.8							0.9	7	0.69	89	62.6	15.5
AREA E: PUBLIC USE		40.6	C									28.9			11.7	8	0.51	83	35.6	14.5
AREA F: HOPE FAMILY VILLAGE		27.7	C		14.8										12.9	4	0.33	77	13.4	3.7
AREA G: COLONIAL BEHAVIORAL HEALTH		14.2	C								14.1				0.1	4	0.75	94	84.4	12.0
AREA H: FUTURE PRESERVATION		77.3	C							26.0					51.3	7	0.30	74	0.0	0.0
Total Site Area		365.7		0	14.8	82.9	0.0	50.8	0.0	26.0	34.4	28.9	0.0	0.0	127.9	65	0.45	82	35.6	130.2
Percent Land Use of Developable Area				0%	6%	35%	0%	21%	0%	11%	14%	12%	0%	0%	35%					

PROPOSED LAND USE SUMMARY

43654 - Cardinal Ridge - October 7, 2025

SCALE 1"=200'
0 200' 400'

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TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Land Cover Summary - Post Development Overall

Project Name: Cardinal Ridge - Post Overall Land Cover
Timmons Group Project No.: 43654
Date: 10/07/2025
Calculated By: A. Vodila

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Land Use Category	Land Cover Factors		
	C	CN	Imp %
Farmettes (3) acre	0.30	76	0.14
Residential > 1/2 ac	0.35	80	0.25
Residential => 10,000 sf or 1/4 acre	0.40	88	0.6
Residential < 10,000 sf or 1/4 acre	0.45	88	0.6
sidential Multi-Family - Apartments & Townhou	0.70	90	0.65
Parks, Lawn, Open Space, etc.	0.20	74	0.5
Dedicated Open Space	0.30	74	0
Industrial/ Commercial	0.75	94	0.85
Public Land Use Parcel	0.60	86	0.5
Retention/Detention Easements	0.90	98	1
Known Impervious	0.90	98	1
Undisturbed Area	0.30	74	0

LAND COVER SUMMARY

DA ID#	POA #	Total Gross Area	Soils	Farmettes (3) acre	Residential > 1/2 ac	Residential => 10,000 sf or 1/4 acre	Residential < 10,000 sf or 1/4 acre	Residential Multi-Family - Apartments/Townhouses	Parks, Lawn, Open Space, etc.	Dedicated Open Space	Industrial/ Commercial	Public Use Land Parcel	Known Impervious	Retention/Detention Easements	Undevelopable Area	Gross Land Use Percentage	Weighted C	Weighted CN	Impervious %	Impervious Area
		AC	HSG	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC	%			%	AC
AREA A: COMMERCIAL		33.2	C								20.3				12.9	6	0.58	86	52.0	17.3
AREA B: MULTI-FAMILY/ APARTMENTS		27.3	C					27.0							0.3	7	0.70	90	64.3	17.6
AREA C: SINGLE FAMILY STRUCTURES		120.7	C			82.9									37.8	23	0.37	84	41.2	49.7
AREA D: MULTI-FAMILY DWELLINGS		24.7	C					23.8							0.9	7	0.69	89	62.6	15.5
AREA E: PUBLIC USE		40.6	C									28.9			11.7	8	0.51	83	35.6	14.5
AREA F: HOPE FAMILY VILLAGE		27.7	C		14.8										12.9	4	0.33	77	13.4	3.7
AREA G: COLONIAL BEHAVIORAL HEALTH		14.2	C								14.1				0.1	4	0.75	94	84.4	12.0
AREA H: FUTURE PRESERVATION		77.3	C							26.0					51.3	7	0.30	74	0.0	0.0
Total Site Area		**365.7**		**0**	**14.8**	**82.9**	**0.0**	**50.8**	**0.0**	**26.0**	**34.4**	**28.9**	**0.0**	**0.0**	**127.9**	**65**	**0.45**	**82**	**35.6**	**130.2**
Percent Land Use of Developable Area				**0%**	**6%**	**35%**	**0%**	**21%**	**0%**	**11%**	**14%**	**12%**	**0%**	**0%**	**35%**					

DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - **Version 4.1**

Project Name:	**Cardinal Ridge**
Date:	**10/7/2025**

BMP Design Specifications List: **2024 Stds & Specs**

CLEAR ALL *(Ctrl+Shift+R)*

data input cells
constant values
calculation cells
final results

Site Information

Post-Development Project (Treatment Volume and Loads)

Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest (acres) -- undisturbed, protected forest or reforested land			8.88		8.88 *
Mixed Open (acres) -- undisturbed/infrequently maintained grass or shrub land					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed			72.76		72.76
Impervious Cover (acres)			130.16		130.16
					211.80

** Forest and Mixed Open areas must be protected in accordance with the Virginia Runoff Reduction Method*

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	**111.55**

LAND COVER SUMMARY -- POST DEVELOPMENT

Land Cover Summary

Forest Cover (acres)	8.88
Weighted Rv (forest)	0.04
% Forest	4%
Mixed Open (acres)	0.00
Weighted Rv (mixed open)	0.00
% Mixed Open	0%
Managed Turf Cover (acres)	72.76
Weighted Rv (turf)	0.22

Treatment Volume and Nutrient Loads

Treatment Volume (acre-ft)	11.6679
Treatment Volume (cubic feet)	508,252
TP Load (lb/yr)	166.62
TN Load (lb/yr)	2,194.71

% Managed Turf	34%
Impervious Cover (acres)	130.16
Rv (impervious)	0.95
% Impervious	61%
Site Area (acres)	**211.80**
Site Rv	**0.66**

Drainage Area A

VRRM 4.1, 2024

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P	Composite Loading N
Forest (acres)			8.88		8.88	0.04	0.08	1.41
Mixed Open (acres)			0.00		0.00	0.00	0.00	0.00
Managed Turf (acres)			72.76		72.76	0.22	0.75	7.93
Impervious Cover (acres)			130.16		130.16	0.95	0.86	12.33
				Total	211.80			

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr)	165.88
Post Development Treatment Volume in D.A. A (ft^3)	506,963

Stormwater Best Management Practices (RR = Runoff Reduction)

--Select from dropdown lists--

Practice	Runoff Reduction Credit (%)	Mixed Open Credit Area (acres)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft^3)	Runoff Reduction (ft^3)	Remaining Runoff Volume (ft^3)	Total BMP Treatment Volume (ft^3)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed	Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
1. Vegetated Roof (RR)															**1. Vegetated Roof (RR)**				
1.a. Vegetated Roof #1 (P-FIL-02)	45					0	0	0	0		0.00	0.00	0.00		0		0.00	0.00	0.00
1.b. Vegetated Roof #2 (P-FIL-02)	60					0	0	0	0		0.00	0.00	0.00		0		0.00	0.00	0.00
2. Rooftop Disconnection (RR)															**2. Rooftop Disconnection (RR)**				
2.a. Simple Disconnection to A/B Soils (P-FIL-01)	50				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.b. Simple Disconnection to C/D Soils (P-FIL-01)	25				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (P-FIL-08)	50				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.d. To Dry Well or French Drain #1, Micro-Infilration #1 (P-FIL-04)	50				0	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
2.e. To Dry Well or French Drain #2, Micro-Infiltration #2 (P-FIL-04)	90				0	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
2.f. To Rain Garden #1, Micro-Bioretention #1 (P-FIL-05)	40				0	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
2.g. To Rain Garden #2, Micro-Bioretention #2 (P-FIL-05)	80				0	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
2.h. To Rainwater Harvesting (P-BAS-04)	0				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.i. To Stormwater Planter, Urban Bioretention (P-FIL-05)	40				0	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
3. Permeable Pavement (RR)															**3. Permeable Pavement (RR)**				
3.a. Permeable Pavement #1 (P-FIL-03)	45				0	0	0	0	25	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
3.b. Permeable Pavement #2 (P-FIL-03)	75					0	0	0	25		0.00	0.00	0.00		25		0.00	0.00	0.00
4. Grass Channel (RR)															**4. Grass Channel (RR)**				
4.a. Grass Channel A/B Soils (P-CNV-01)	20				0	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
4.b. Grass Channel C/D Soils (P-CNV-01)	10				0	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
4.c. Grass Channel with Compost Amended Soils as per specs (P-FIL-08)	20				0	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
5. Dry Swale (RR)															**5. Dry Swale (RR)**				
5.a. Dry Swale #1 (P-CNV-02)	40				0	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
5.b. Dry Swale #2 (P-CNV-02)	60				0	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
6. Bioretention (RR)															**6. Bioretention (RR)**				
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (P-FIL-05)	40				0	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
6.b. Bioretention #2 or Micro-Bioretention #2 (P-FIL-05)	80				0	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
7. Infiltration (RR)															**7. Infiltration (RR)**				
7.a. Infiltration #1 (P-FIL-04)	50				0	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
7.b. Infiltration #2 (P-FIL-04)	90				0	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
8. Extended Detention Pond (RR)															**8. Extended Detention Pond (RR)**				
8.a. ED #1 (P-BAS-03)	0				0	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
8.b. ED #2 (P-BAS-03)	15				0	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
9. Sheetflow to Filter/Open Space (RR)															**9. Sheetflow to Filter/Open Space (RR)**				

9.a. Sheetflow to Conservation Area, A/B Soils (P-FIL-07)	75				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
9.b. Sheetflow to Conservation Area, C/D Soils (P-FIL-07)	50		7.28	13.02	0	25,348	25,348	50,696	0	0.00	16.59	8.29	8.29		0	0.00	218.22	109.11	109.11
9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec P-FIL-07 & P-FIL-08)	50				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
10. Regenerative Stormwater Conveyance															**10. Regenerative Stormwater Conveyance**				
10.a. Regenerative Stormwater Conveyance (P-CNV-04)	0				0	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
10.b. Regenerative Stormwater Conveyance (P-CNV-04)	0				0	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
11. Tree BMP															**11. Tree BMP**				
11.a. Trees over Pervious, A/B (P-FIL-09)	16				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
11.b. Trees over Pervious, C/D (P-FIL-09)	12				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
11.c. Trees over Impervious (P-FIL-09)	3.5				0	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00

TOTAL IMPERVIOUS COVER TREATED (ac)	13.02	AREA CHECK: OK.
TOTAL MIXED OPEN TREATED (ac)	0.00	AREA CHECK: OK.
TOTAL MANAGED TURF AREA TREATED (ac)	7.28	AREA CHECK: OK.
TOTAL RUNOFF REDUCTION IN D.A. A (ft^3)	25,348	
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	165.88	
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	8.29	
TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	157.59	

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

TOTAL RUNOFF REDUCTION IN D.A. A (ft^3)	25,348
NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	109.11

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

12. Wet Swale (no RR)															**12. Wet Swale (Coastal Plain) (no RR)**				
12.a. Wet Swale #1 (P-CNV-03)	0				0	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
12.b. Wet Swale #2 (P-CNV-03)	0				0	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
13. Filtering Practices (no RR)															**13. Filtering Practices (no RR)**				
13.a.Filtering Practice #1 (P-FIL-06)	0				0	0	0	0	60	0.00	0.00	0.00	0.00		30	0.00	0.00	0.00	0.00
13.b. Filtering Practice #2 (P-FIL-06)	0				0	0	0	0	65	0.00	0.00	0.00	0.00		45	0.00	0.00	0.00	0.00
14. Constructed Wetland (no RR)															**14. Constructed Wetland (no RR)**				
14.a.Constructed Wetland #1 (P-BAS-01)	0				0	0	0	0	50	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
14.b. Constructed Wetland #2 (P-BAS-01)	0				0	0	0	0	75	0.00	0.00	0.00	0.00		55	0.00	0.00	0.00	0.00
15. Wet Ponds (no RR)															**15. Wet Ponds (no RR)**				
15.a. Wet Pond #1 (P-BAS-02)	0				0	0	0	0	50	0.00	0.00	0.00	0.00		30	0.00	0.00	0.00	0.00
15.b. Wet Pond #1 (Coastal Plain) (P-BAS-02)	0				0	0	0	0	45	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
15.c. Wet Pond #2 (P-BAS-02)	0				0	0	0	0	75	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
15.d. Wet Pond #2 (Coastal Plain) (P-BAS-02)	0		65.48	117.14	0	0	456,267	456,267	65	0.00	149.30	97.04	52.25	16.a. MTD - Hydrodynamic	30	0.00	1964.01	589.20	1374.81
16. Manufactured Treatment Devices (no RR)															**16. Manufactured BMP (no RR)**				
16.a. Manufactured Treatment Device-Hydrodynamic	0				456,267	0	456,267	456,267	20	52.25	0.00	10.45	41.80		0	1,374.81	0.00	0.00	1374.81
16.b. Manufactured Treatment Device-Filtering	0				0	0	0	0	50	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
16.c. Manufactured Treatment Device-Generic	0				0	0	0	0	20	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00

TOTAL IMPERVIOUS COVER TREATED (ac)	130.16	AREA CHECK: OK.
TOTAL MIXED OPEN TREATED (ac)	0.00	AREA CHECK: OK.
TOTAL MANAGED TURF AREA TREATED (ac)	72.76	AREA CHECK: OK.
TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	111.55	
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	165.88	
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	107.49	
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	8.29	

TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr)	115.79
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr)	50.10

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	109.11
NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	589.20
TOTAL NITROGEN REMOVED IN D.A. A (lb/yr)	698.32

Site Results (Water Quality Compliance) VRRM 4.1, 2024

Area Checks

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST (ac)	8.88	0.00	0.00	0.00	0.00	OK.
MIXED OPEN AREA (ac)	0.00	0.00	0.00	0.00	0.00	OK.
MIXED OPEN AREA TREATED (ac)	0.00	0.00	0.00	0.00	0.00	OK.
MANAGED TURF AREA (ac)	72.76	0.00	0.00	0.00	0.00	OK.
MANAGED TURF AREA TREATED (ac)	72.76	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER (ac)	130.16	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED (ac)	130.16	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	

Site Treatment Volume (ft^3)	508,252

Runoff Reduction Volume and TP By Drainage Area

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
RUNOFF REDUCTION VOLUME ACHIEVED (ft^3)	25,348	0	0	0	0	25,348
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	165.88	0.00	0.00	0.00	0.00	165.88
TP LOAD REDUCTION ACHIEVED (lb/yr)	115.79	0.00	0.00	0.00	0.00	115.79
TP LOAD REMAINING (lb/yr)	50.10	0.00	0.00	0.00	0.00	50.10
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	698.32	0.00	0.00	0.00	0.00	698.32

Total Phosphorus

FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	166.62
TP LOAD REDUCTION REQUIRED (lb/yr)	111.55
TP LOAD REDUCTION ACHIEVED (lb/yr)	115.79
TP LOAD REMAINING (lb/yr):	50.83
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.00

** TARGET TP REDUCTION EXCEEDED BY 4.23 LB/YEAR **

Total Nitrogen (For Information Purposes)

POST-DEVELOPMENT LOAD (lb/yr)	2194.71
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	698.32
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	1496.40

Appendix D – Environmental Impacts/Constraints



EXISTING CONDITIONS SURVEY PROVIDED BY THE STATE OF VIRGINIA. WORK PERFORMED BY OTHERS.

EASTERN STATE HOSPITAL

Existing Conditions - March 3, 2025

SCALE 1"=200'

0 200' 400'

N

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

June 4, 2024

PRELIMINARY JURISDICTIONAL DETERMINATION

Southern Virginia Regulatory Section
NAO-2023-00436 (Chisel Run)

Bob Evans
DR Horton, Inc.
2820 Waterford Lake Drive, Suite 100
Midlothian, VA 23112

Dear Mr. Evans:

This letter is in regard to your request for a preliminary jurisdictional determination of the aquatic resources (e.g., wetlands, streams, and ponds), on an approximately 386.7-acre property located at 4601 Ironbound Road, known as Cardinal Ridge (Eastern State Hospital) in James City County, Virginia (tax map parcel 3910100152) hereinafter referred to as project area.

The map entitled “Cardinal Ridge (Eastern State Hospital) James City County, Virginia – Figure 4: Wetlands and Waters Delineation Map”, Sheets 1-13 by Timmons Group dated December 13, 2022, last revised January 12, 2024 and received by the U.S. Army Corps of Engineers (Corps) on June 3, 2024 (copy enclosed) provides the locations of the aquatic resources within the project area referenced above. This letter is not confirming the Cowardin classifications of these aquatic resources.

These aquatic resources exhibit wetland criteria as defined in the 1987 Corps of Engineers Wetland Delineation Manual and the Atlantic and Gulf Coastal Plain Regional Supplement. This site also contains aquatic resources with an ordinary high-water mark.

This preliminary jurisdictional determination and associated aquatic resource delineation map may be submitted with a permit application.

Please note we are providing information under 1 and 2 below based on the preliminary data you submitted to the us relative to project boundaries and plans. Consequently, these findings and recommendations are subject to change if the project scope changes, new information becomes available, or new species are added.

1. A search of the Virginia Department of Historic Resources data revealed that:

☐ No known historic properties are located on the property.

☒ Tribal consultation may be required.

☒ The following known architectural resources are located on the property:

- 047-0094
- 047-0094-0008
- 047-0094-0009
- 047-0094-0007
- 047-0094-0010
- 047-0094-0011
- 047-0094-0012
- 047-0094-0006
- 047-0094-0013
- 047-0094-0023
- 047-0094-0014
- 047-0094-0005
- 047-0094-0003
- 047-0094-0004
- 047-0094-0022
- 047-0094-0024
- 047-0094-0002
- 047-0094-0025
- 047-0094-0001

☒ The following known archaeological resources are located on the property:

- 44JC0365
- 44JC0450
- 44JC0449
- 44JC0362
- 44JC0456
- 44JC0454
- 44JC0455
- 44JC0364
- 44JC0848
- 44JC0363

☐ The following known historic resources are located in the vicinity of the property (potential for effects to these resources from future development):

2. A search of the data supplied by the U.S. Fish & Wildlife Service, the Virginia Department of Conservation and Recreation and the Virginia Department of

Wildlife Resources revealed that:

☐ No known populations of threatened or endangered species are located on or within the vicinity of the subject property.

☒ The following federally-listed species may occur within the vicinity of the subject property:

- Northern Long-eared bat
- Tricolored Bat
- Small Whorled Pogonia

☐ The following state-listed (or other) species may occur within the vicinity of the subject property:

Please be aware that you may be required to obtain a Corps permit for any discharge of dredged and/or fill material, either temporary or permanent, into a water of the U.S. In addition, you may be required to obtain a Corps permit for certain activities occurring within, under, or over a navigable water of the U.S. subject to the Section 10 of the Rivers and Harbors Act. Furthermore, you may be required to obtain state and local authorizations, including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC), and/or a permit from your local wetlands board.

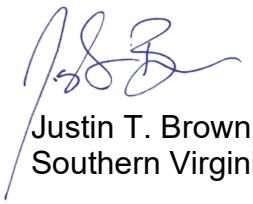
This delineation and preliminary jurisdictional determination may not be valid for the Wetland Conservation Provisions of the Food Security Act of 1985, as amended. Therefore, if you or your tenant are US Department of Agriculture (USDA) program participants, or anticipate participation in USDA programs, you should discuss the applicability of a certified wetland determination with the local USDA service center, prior to starting work.

This is a preliminary jurisdictional determination and is not a legally binding determination regarding whether Corps jurisdiction applies to the aquatic resources in question. To determine Corps' jurisdiction, you may request and obtain an approved jurisdictional determination.

This delineation of aquatic resources can be relied upon for no more than five years from the date of this letter. New information may warrant revision. Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to the Corps, either by email justin.t.brown@usace.army.mil or by standard mail to Attn: Justin Brown, U.S. Army Corps of Engineers, Norfolk District, CENAO-WR-R, 9100 Arboretum Parkway, Suite 235, Richmond, Virginia 23236.

If you have any questions, please contact the office either by telephone at (804) 839-0574 or by email at justin.t.brown@usace.army.mil.

Sincerely,



Justin T. Brown
Southern Virginia Regulatory Section

Enclosures

cc: Timmons Group
DEQ
James City County

BACKGROUND INFORMATION

A. **REPORT COMPLETION DATE FOR PJD:** 04-JUN-2024

B. **NAME AND ADDRESS OF PERSON REQUESTING PJD:**

Bob Evans
DR Horton, Inc.
2820 Waterford Lake Drive, Suite 100
Midlothian, VA 23112

C. **DISTRICT OFFICE, FILE NAME, AND NUMBER:**
NAO, Cardinal Ridge (Eastern State Hospital) Williamsburg / James City, NAO-2023-00436

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: VA County/parish/borough: James City County City: Williamsburg
Center coordinates of site (lat/long in degree decimal format):
Lat.: 37.2913° Long.: -76.74484°
Universal Transverse Mercator: 18
Name of nearest waterbody: Chisel Run

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s): 21-NOV-2023

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
A	37.292982	-76.74694	27.1512 acres	Wetland	Section 404
A2	37.294469	-76.736186	331 feet	Non-wetland waters	Section 404
B	37.294639	-76.739853	0.0169 acres	Wetland	Section 404
B2	37.294244	-76.735005	240 feet	Non-wetland waters	Section 404
C	37.295326	-76.739401	0.0077 acres	Wetland	Section 404
C2	37.295076	-76.735837	413 feet	Non-wetland waters	Section 404
D	37.294967	-76.739341	0.008 acres	Wetland	Section 404
D2	37.294348	-76.735516	127 feet	Non-wetland waters	Section 404
E	37.292369	-76.743766	0.0234 acres	Wetland	Section 404
F	37.291514	-76.743057	0.2427 acres	Wetland	Section 404
G	37.291002	-76.742551	0.2043 acres	Wetland	Section 404
H	37.287789	-76.741091	6.2403 acres	Wetland	Section 404
I	37.293584	-76.746003	2710 feet	Non-wetland waters	Section 404
J	37.295382	-76.741469	1893 feet	Non-wetland waters	Section 404
K	37.287784	-76.746905	333 feet	Non-wetland waters	Section 404
L	37.287827	-76.739834	1473 feet	Non-wetland waters	Section 404

[1] Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

M	37.293902	-76.744308	289 feet	Non-wetland waters	Section 404
N - EPH	37.292182	-76.743831	49 feet	Non-wetland waters	Section 404
N - INT	37.292671	-76.74425	809 feet	Non-wetland waters	Section 404
O	37.294922	-76.739756	97 feet	Non-wetland waters	Section 404
P	37.296053	-76.740317	465 feet	Non-wetland waters	Section 404
Q	37.287616	-76.739789	278 feet	Non-wetland waters	Section 404
R	37.287469	-76.739364	144 feet	Non-wetland waters	Section 404
S	37.291803	-76.743646	156 feet	Non-wetland waters	Section 404
T	37.291169	-76.743034	185 feet	Non-wetland waters	Section 404
U	37.294867	-76.742758	121 feet	Non-wetland waters	Section 404
V - PEM	37.299121	-76.747171	0.5092 acres	Wetland	Section 404
V - PFO	37.299203	-76.747666	0.5056 acres	Wetland	Section 404
W	37.292983	-76.753839	27.4439 acres	Wetland	Section 404
X	37.298799	-76.748171	354 feet	Non-wetland waters	Section 404
Y	37.29931	-76.747083	34 feet	Non-wetland waters	Section 404
Z	37.294651	-76.736222	1.4027 acres	Wetland	Section 404

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.
2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the.JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there “may be” waters of the U.S. and/or that there “may be” navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

[1] Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

_X_ Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: "Cardinal Ridge (Eastern State Hospital) James City County, Virginia – Figure 4: Wetlands and Waters Delineation Map", Sheets 1-13 by Timmons Group dated December 13, 2022, last revised January 12, 2024 and received by the U.S. Army Corps of Engineers (Corps) on June 3, 2024.
_X_ Data sheets prepared/submitted by or on behalf of the PJD requestor.
_X_ Office concurs with data sheets/delineation report.
___ Office does not concur with data sheets/delineation report. Rationale: _____.
___ Data sheets prepared by the Corps: _____.
___ Corps navigable waters' study: _____.
___ U.S. Geological Survey Hydrologic Atlas: _____.
___ USGS NHD data.
___ USGS 8 and 12 digit HUC maps.
___ U.S. Geological Survey map(s). Cite scale & quad name: _____.
_X_ Natural Resources Conservation Service Soil Survey. Citation: SSURGO.
___ National wetlands inventory map(s). Cite name: _____.
___ State/local wetland inventory map(s): _____.
___ FEMA/FIRM maps: _____
___ 100-year Floodplain Elevation is: _____. (National Geodetic Vertical Datum of 1929)
___ Photographs: ___ Aerial (Name & Date): _____.
___ or ___ Other (Name & Date): _____.
___ Previous determination(s). File no. and date of response letter: _____.
_X_ Other information (please specify): USGS - LiDAR.

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

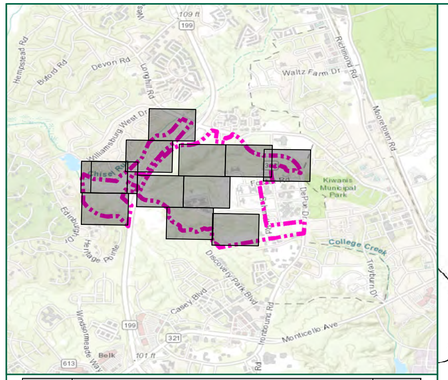
04-JUN-2024

Signature and date of Regulatory staff member completing PJD

Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]

[1] Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

Received by USACE June 3, 2024



Resource Identification	Confirmation								Resource Description Notes*
	PFO (sq ft)	PSS (sq ft)	PEM (sq ft)	POW (sq ft)	R3 (lf)	R4 (lf)	R6 (lf)	Stream (sq ft)	
A	1,182,708								NT/V
B			734						NT/V
C			334						NT/V
D			347						NT/V
E	1,018								NT/V
F	10,573								NT/V
G	8,898								NT/V
H	271,827								NT/V
I					2,710			21,890	NT/NV
J					1,893			16,544	NT/NV
K					333			2,192	NT/NV
L					1,473			8,721	NT/NV
M						289		1,157	NT/NV
N						809	49	2,916	NT/NV
O						97		480	NT/NV
P						465		1,863	NT/NV
Q						278		1,266	NT/NV
R						144		402	NT/NV
S							156	445	NT/NV
T							185	370	NT/NV
U							121	768	NT/NV
V	22,025		22,181						NT/V
W	1,195,457								NT/V
X					354			7,165	NT/NV
Y							34	52	NT/NV
Z	61,100								NT/V
A2					331			2,679	NT/NV
B2						240		1,033	NT/NV
C2							413	1,409	NT/NV
D2						127		366	NT/NV
Total	2,753,606	0	23,596	0	7,094	2,449	958	71,718	
Total Wetland Area =	**2,777,202 sq ft**				**63.76 ac**				
Total Stream Area =	**71,718 sq ft**				**1.65 ac**				
Total Stream Length =	**10,501 lf**								

* T=Tidal; NT=Non-tidal; V=Vegetated; NV=Non-Vegetated; PFO=Palustrine Forested Wetland; PSS=Palustrine Scrub-Shrub Wetland; PEM=Palustrine Emergent Wetland; POW= Palustrine Open Water; R3= Upper Perennial Streams; R4=Intermittent Streams; R6 = Ephemeral Streams

Legend

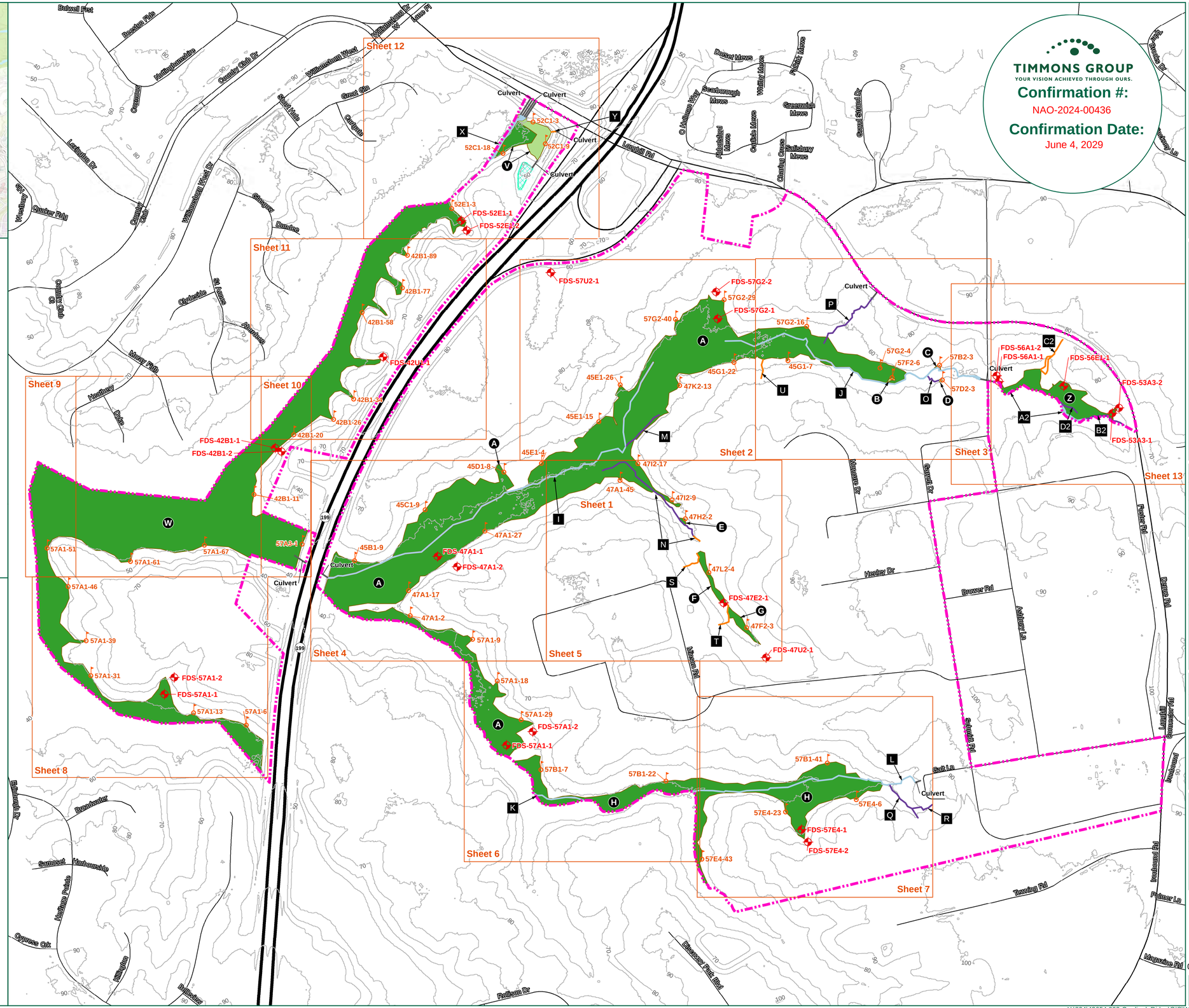
- Project Study Limits - 386.7 Acres
- Stream Identifier
- Wetland Identifier
- Flag
- Field Data Station
- Culvert
- Perennial Stream (R3)
- Intermittent Stream (R4)
- Ephemeral Stream (R6)
- Palustrine Emergent (PEM) Wetland
- Palustrine Forested (PFO) Wetland

Topographic Contours

- Major - 10ft
- Minor - 1ft

Stormwater Control Features

- Stormwater Basin
- RipRap



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
TEL 804.200.6500
www.timmons.com

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Confirmation #:
NAO-2024-00436

Confirmation Date:
June 4, 2029

PROJECT NAME & LOCATION
CARDINAL RIDGE
(EASTERN STATE HOSPITAL)
JAMES CITY COUNTY - VIRGINIA

DATE: 12/13/2022
PROJECT NUMBER: 43654.002
PROJECT NAME: CARDINAL RIDGE
DESIGNED BY / DRAWN BY: C. LEATON

1. Wetlands and waters within the project study limits have been located using submeter, Bluetooth GPS antennas by Timmons Group.
2. Wetlands and waters have not been confirmed by the U.S. Army Corps of Engineers until stamped.
3. Project limits are approximate.
4. Topography based on USGS LiDAR.
5. Cowardin Stream Classifications are based on NC DWQ Stream Identification form version 4.11.

These plans and associated documents are the exclusive property of TIMMONS GROUP and may not be reproduced in whole or in part and shall not be used for any purpose whatsoever, inclusive, but not limited to construction, bidding, and/or construction staking without the express written consent of TIMMONS GROUP.

REVISIONS

#	MM/DD/YY	DESCRIPTION
1	01/05/23	Additional 76.68 Acres
2	05/13/24	UPDATED PER COE COMMENTS

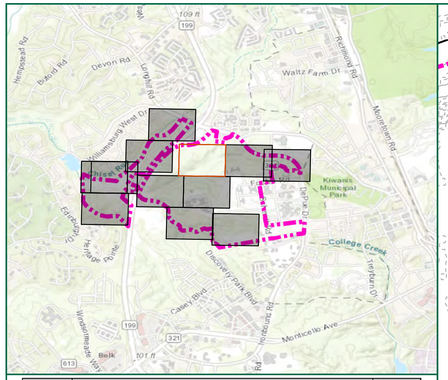
DRAWING DESCRIPTION
FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

SCALE (FEET)
0 300 600
PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE: H:1 " = 300 '
SHEET NUMBER: 1 OF 13

Y:\804\43654.002-Cardinal_Ridge\GIS\WTDM\43654.002-JD-WTDM.mxd

Received by USACE June 3, 2024



Resource Identification	Confirmation								Resource Description Notes*
	PFO (sq ft)	PSS (sq ft)	PEM (sq ft)	POW (sq ft)	R3 (lf)	R4 (lf)	R6 (lf)	Stream (sq ft)	
A	1,182,708								NT/V
B			734						NT/V
C			334						NT/V
D			347						NT/V
E	1,018								NT/V
F	10,573								NT/V
G	8,898								NT/V
H	271,827								NT/V
I					2,710			21,890	NT/NV
J					1,893			16,544	NT/NV
K					333			2,192	NT/NV
L					1,473			8,721	NT/NV
M						289		1,157	NT/NV
N						809	49	2,916	NT/NV
O						97		480	NT/NV
P						465		1,863	NT/NV
Q						278		1,266	NT/NV
R						144		402	NT/NV
S							156	445	NT/NV
T							185	370	NT/NV
U							121	768	NT/NV
V	22,025		22,181						NT/V
W	1,195,457								NT/V
X					354			7,165	NT/NV
Y							34	52	NT/NV
Z	61,100								NT/V
A2					331			2,679	NT/NV
B2						240		1,033	NT/NV
C2							413	1,409	NT/NV
D2						127		366	NT/NV
Total	**2,753,606**	**0**	**23,596**	**0**	**7,094**	**2,449**	**958**	**71,718**	
Total Wetland Area =	**2,777,202 sq ft**				**63.76 ac**				
Total Stream Area =	**71,718 sq ft**				**1.65 ac**				
Total Stream Length =	**10,501 lf**								

* T=Tidal; NT=Non-tidal; V=Vegetated; NV=Non-Vegetated; PFO=Palustrine Forested Wetland; PSS=Palustrine Scrub-Shrub Wetland; PEM=Palustrine Emergent Wetland; POW= Palustrine Open Water; R3= Upper Perennial Streams; R4=Intermittent Streams; R6 = Ephemeral Streams

Legend

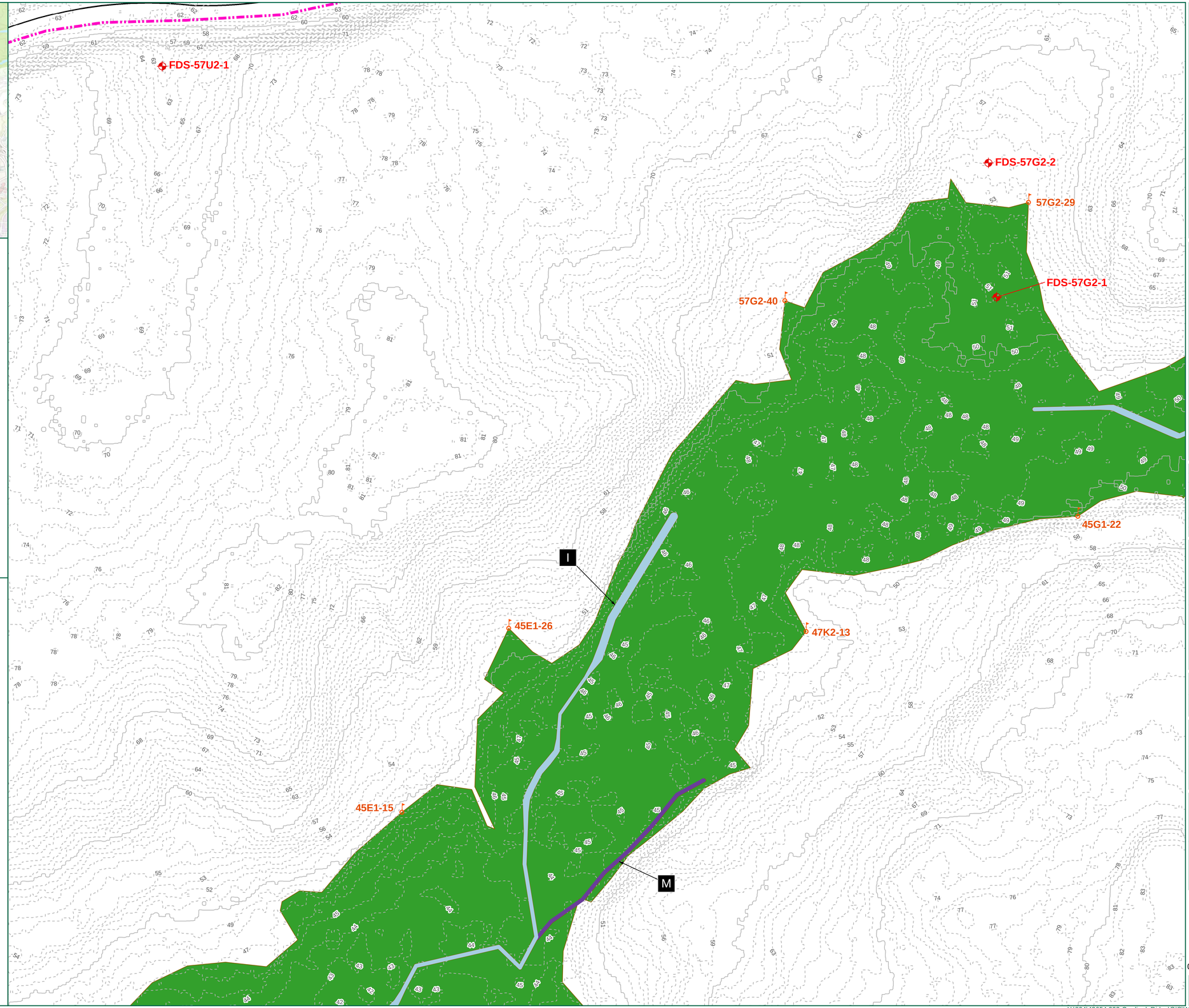
- Project Study Limits - 386.7 Acres
- Stream Identifier
- Wetland Identifier
- Flag
- Field Data Station
- Culvert
- Perennial Stream (R3)
- Intermittent Stream (R4)
- Ephemeral Stream (R6)
- Palustrine Emergent (PEM) Wetland
- Palustrine Forested (PFO) Wetland

Topographic Contours

- Major - 10ft
- Minor - 1ft

Stormwater Control Features

- Stormwater Basin
- RipRap



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PROJECT NAME & LOCATION

CARDINAL RIDGE (EASTERN STATE HOSPITAL)

JAMES CITY COUNTY - VIRGINIA

DATE: 12/13/2022

PROJECT NUMBER: 43654.002

PROJECT NAME: CARDINAL RIDGE

DESIGNED BY / DRAWN BY: C. LEATON

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REVISIONS

#	MM/DD/YY	DESCRIPTION
1	01/05/23	Additional 76.88 Acres
2	01/12/24	UPDATED PER COE COMMENTS

DRAWING DESCRIPTION

FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

SCALE (FEET)

0 60 120

PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE: H:1 " = 60 '

SHEET NUMBER: 2 OF 13

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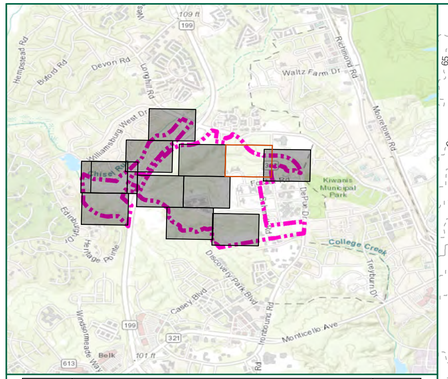
Received by USACE June 3, 2024



Resource Identification	Confirmation								Resource Description Notes*
	PFO (sq ft)	PSS (sq ft)	PEM (sq ft)	POW (sq ft)	R3 (lf)	R4 (lf)	R6 (lf)	Stream (sq ft)	
A	1,182,708								NT/V
B			734						NT/V
C			334						NT/V
D			347						NT/V
E	1,018								NT/V
F	10,573								NT/V
G	8,898								NT/V
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Z	61,100								NT/V
A2					331			2,679	NT/NV
B2						240		1,033	NT/NV
C2							413	1,409	NT/NV
D2						127		366	NT/NV
Total	**2,753,606**	**0**	**23,596**	**0**	**7,094**	**2,449**	**958**	**71,718**	
Total Wetland Area =	**2,777,202 sq ft**				**63.76 ac**				
Total Stream Area =	**71,718 sq ft**				**1.65 ac**				
Total Stream Length =	**10,501 lf**								

* T=Tidal; NT=Non-tidal; V=Vegetated; NV=Non-Vegetated; PFO=Palustrine Forested Wetland; PSS=Palustrine Scrub-Shrub Wetland; PEM=Palustrine Emergent Wetland; POW= Palustrine Open Water; R3= Upper Perennial Streams; R4=Intermittent Streams; R6 = Ephemeral Streams

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- Project Study Limits - 386.7 Acres
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- Major - 10ft
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- Stormwater Basin
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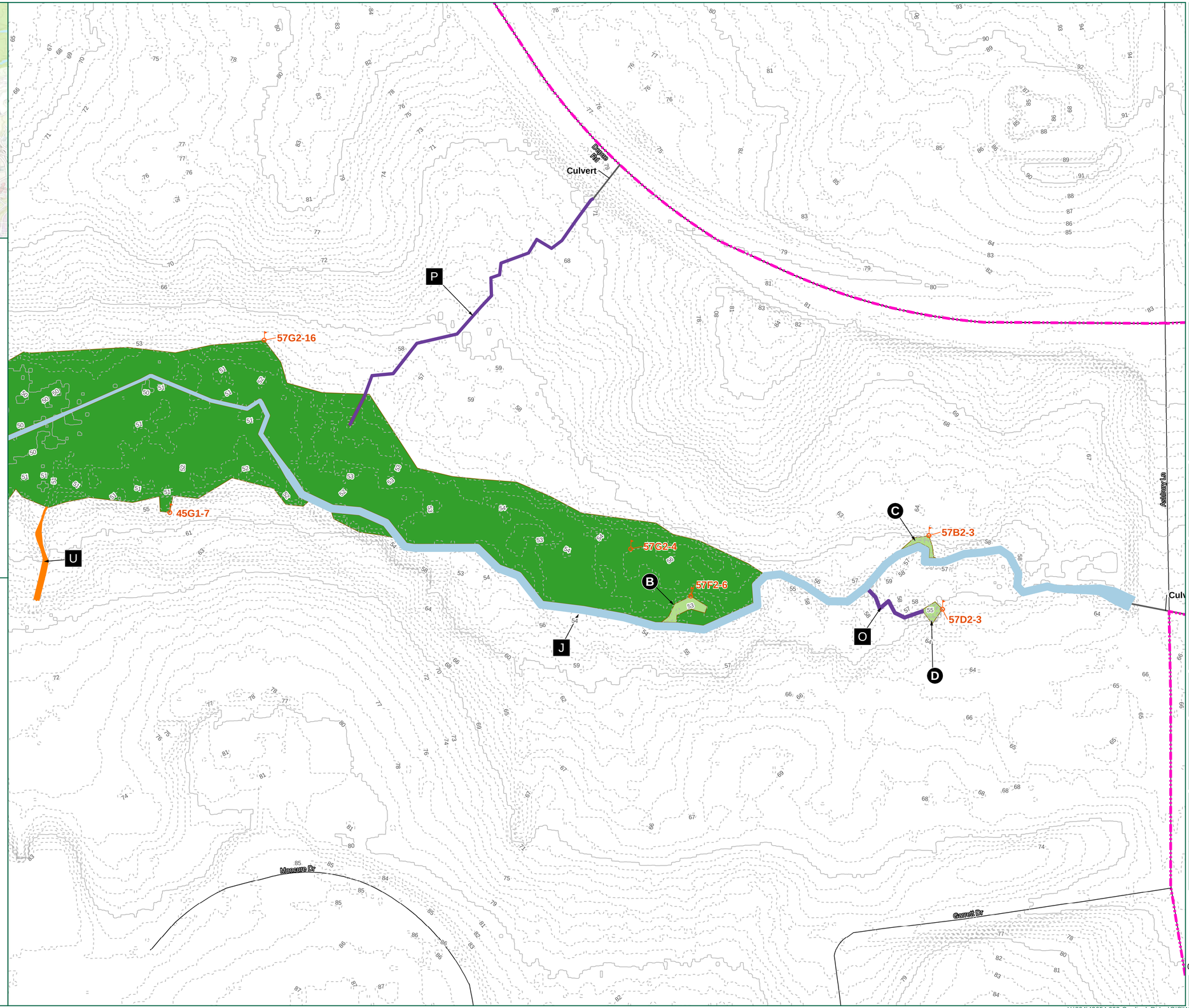

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PROJECT NAME & LOCATION

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(EASTERN STATE HOSPITAL)
JAMES CITY COUNTY - VIRGINIA

DATE 12/13/2022

PROJECT NUMBER 43654.002

PROJECT NAME CARDINAL RIDGE

DESIGNED BY / DRAWN BY C. LEATON

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REVISIONS

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1	01/05/23	Additional TLSE Acres
2	01/12/24	UPDATED PER COE COMMENTS

DRAWING DESCRIPTION

FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

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PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE H:1 " = 60 '

SHEET NUMBER 3 OF 13

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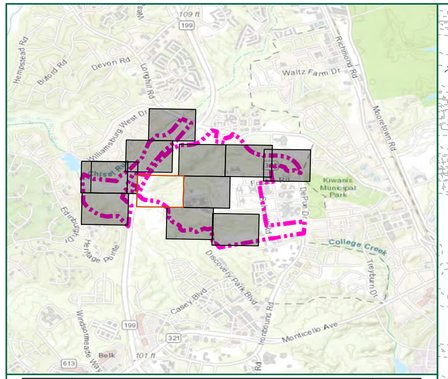

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Legend

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- Wetland Identifier
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- Field Data Station
- Culvert
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Topographic Contours

- Major - 10ft
- Minor - 1ft

Stormwater Control Features

- Stormwater Basin
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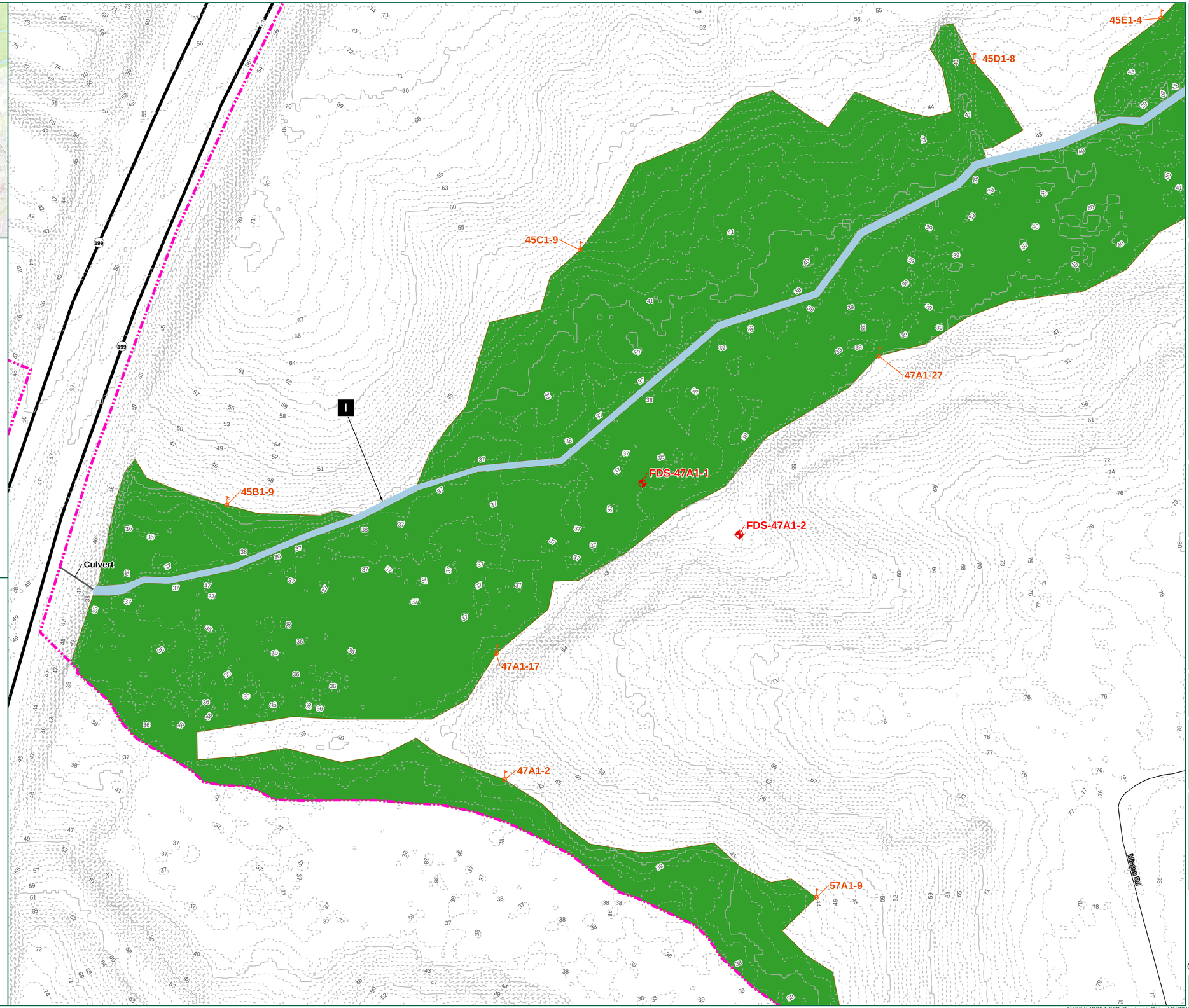

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PROJECT NAME & LOCATION

CARDINAL RIDGE
(EASTERN STATE HOSPITAL)
JAMES CITY COUNTY - VIRGINIA

DATE: 12/13/2022

PROJECT NUMBER: 43654.002

PROJECT NAME: CARDINAL RIDGE

DESIGNED BY / DRAWN BY: C. LEATON

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REVISIONS

#	MM/DD/YY	DESCRIPTION
1	01/05/23	Additional 76.68 Acres
2	01/12/24	UPDATED PER COE COMMENTS

DRAWING DESCRIPTION

FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

SCALE (FEET)
0 60 120
PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE: H:1 " = 60 '

SHEET NUMBER: 4 OF 13

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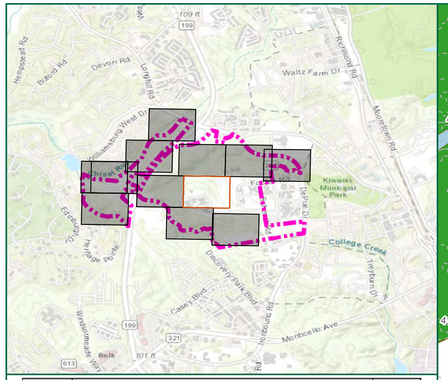

Resource Identification	Confirmation								Resource Description Notes*
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Legend

- Project Study Limits - 386.7 Acres
- Stream Identifier
- Wetland Identifier
- Flag
- Field Data Station
- Culvert
- Perennial Stream (R3)
- Intermittent Stream (R4)
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- Palustrine Emergent (PEM) Wetland
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Topographic Contours

- Major - 10ft
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Stormwater Control Features

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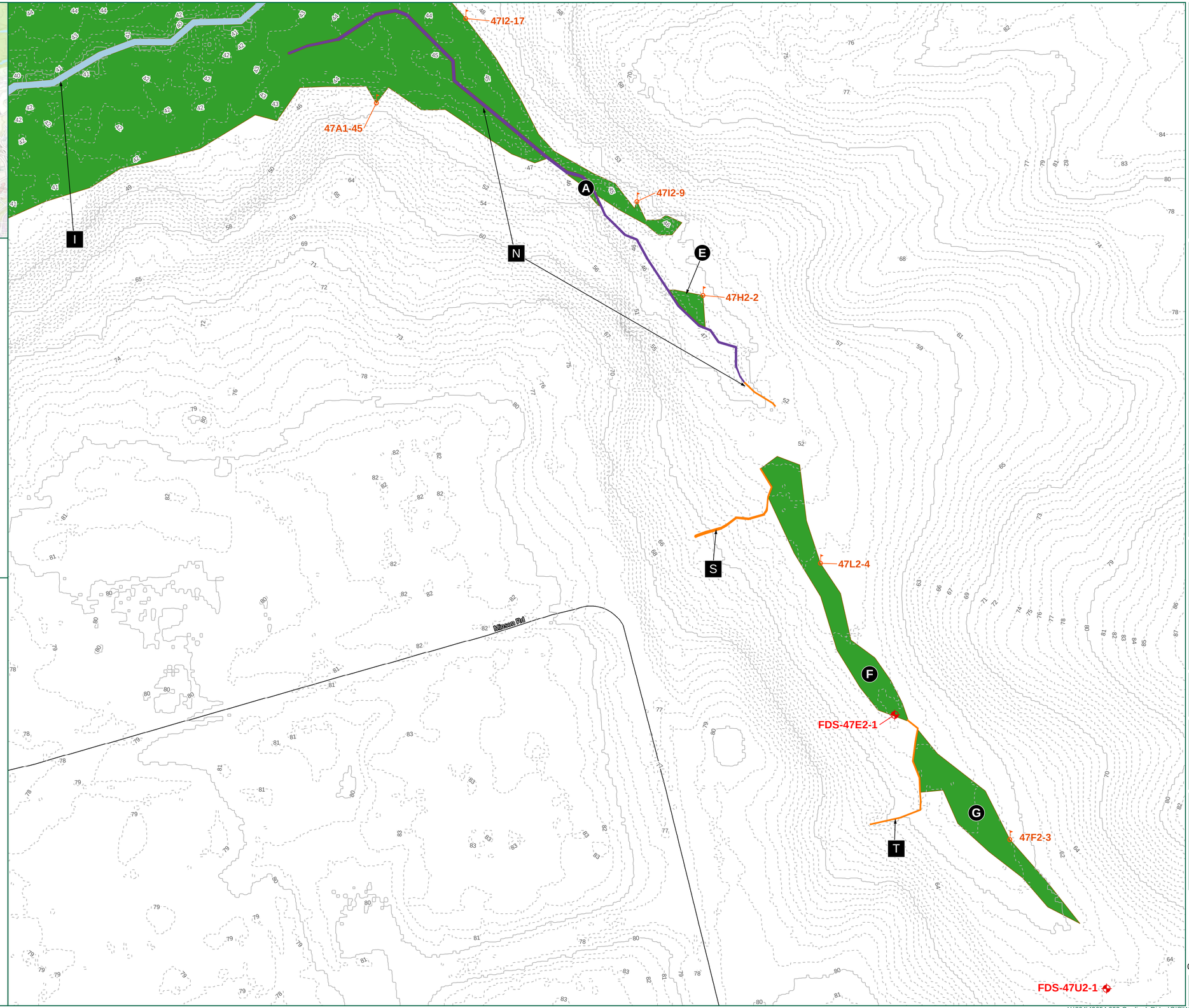
- RipRap



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PROJECT NAME & LOCATION

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JAMES CITY COUNTY - VIRGINIA

DATE: 12/13/2022

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REVISIONS

#	MM/DD/YY	DESCRIPTION
1	5/25/23	Additional 76 BE Acres
2	01/12/24	UPDATED PER COE COMMENTS

DRAWING DESCRIPTION

FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

SCALE (FEET)

0 60 120

PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE: H:1 " = 60 '

SHEET NUMBER: 5 OF 13

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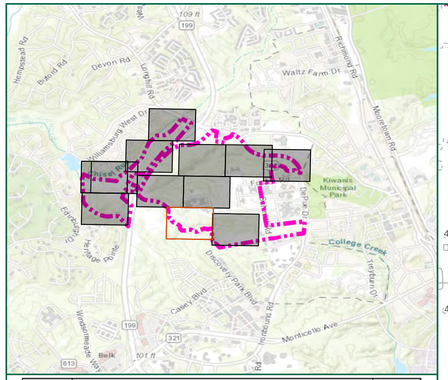

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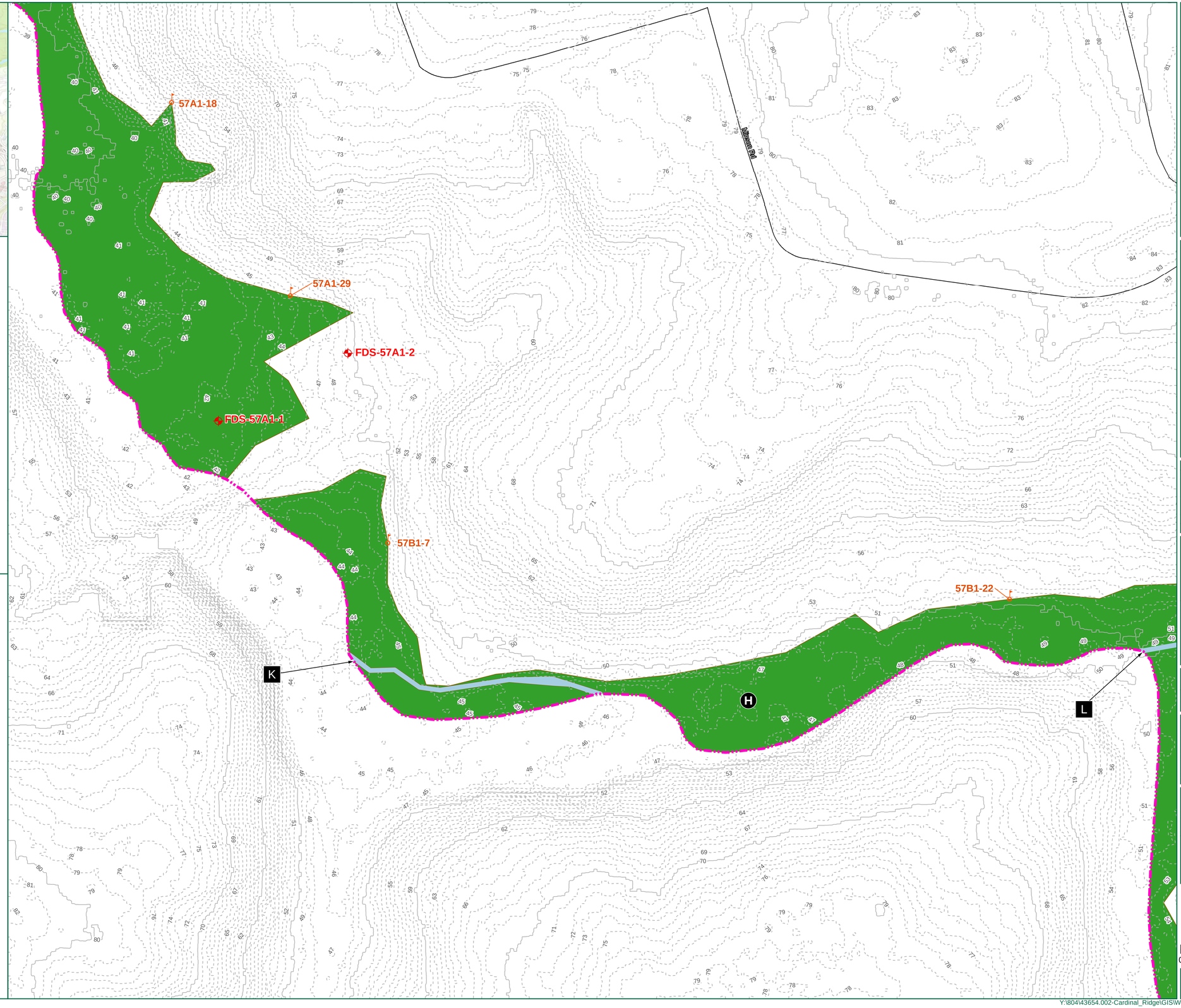

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JAMES CITY COUNTY - VIRGINIA

DATE 12/13/2022

PROJECT NUMBER 43654.002

PROJECT NAME CARDINAL RIDGE

DESIGNED BY / DRAWN BY C. LEATON

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DRAWING DESCRIPTION
FIGURE 4:
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PLANS PRINTED AS 11X17 ARE HALF SCALE

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SHEET NUMBER 6 OF 13

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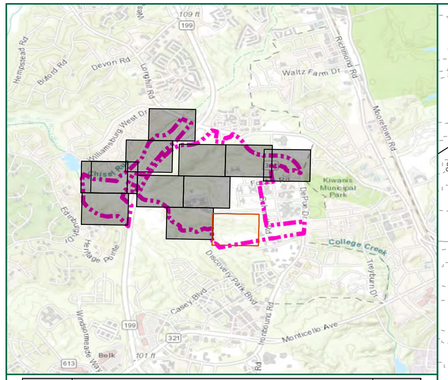

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* T=Tidal; NT=Non-tidal; V=Vegetated; NV=Non-Vegetated; PFO=Palustrine Forested Wetland; PSS=Palustrine Scrub-Shrub Wetland; PEM=Palustrine Emergent Wetland; POW= Palustrine Open Water; R3= Upper Perennial Streams; R4=Intermittent Streams; R6 = Ephemeral Streams

Legend

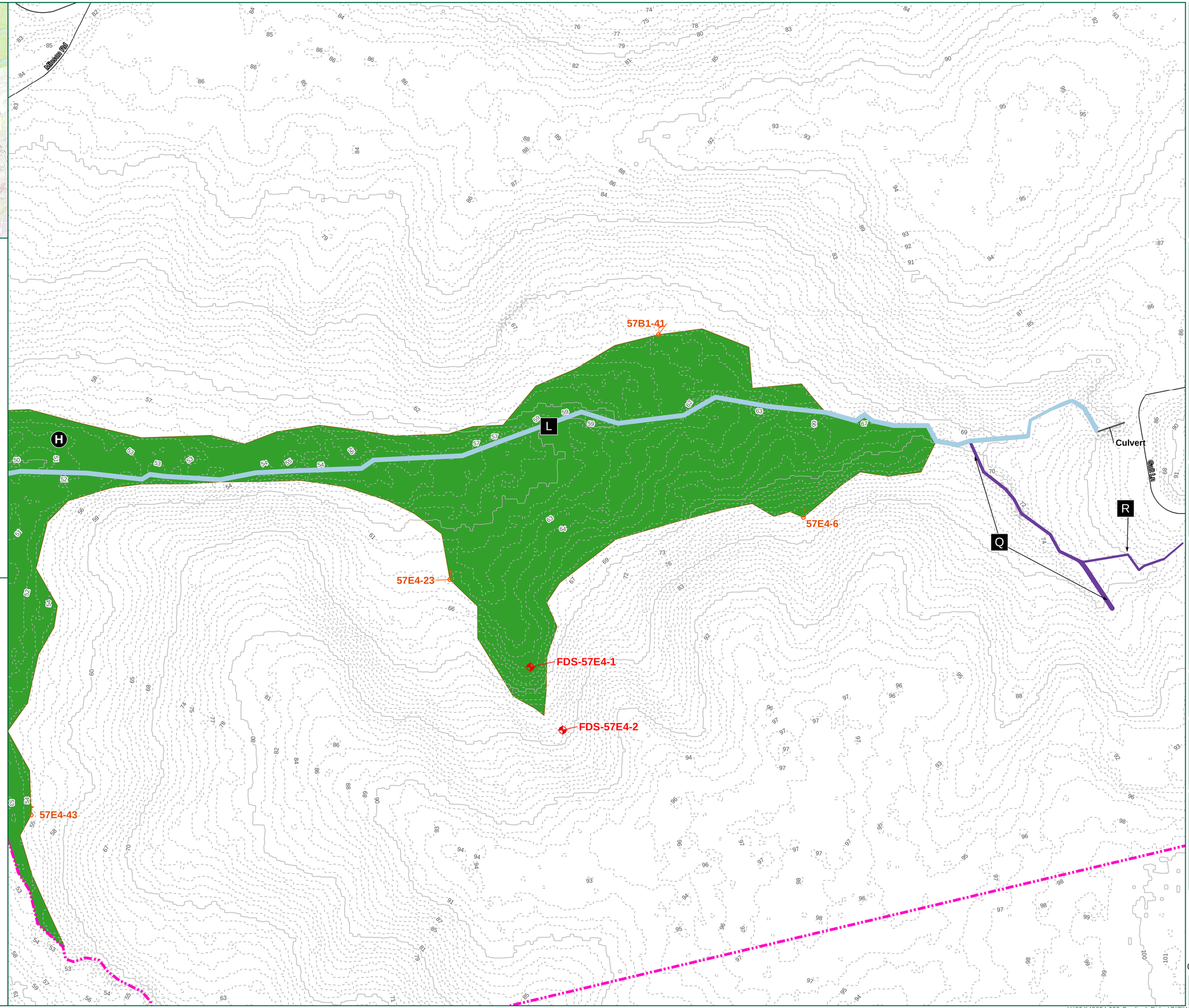
- Project Study Limits - 386.7 Acres
- Stream Identifier
- Wetland Identifier
- Flag
- Field Data Station
- Culvert
- Perennial Stream (R3)
- Intermittent Stream (R4)
- Ephemeral Stream (R6)
- Palustrine Emergent (PEM) Wetland
- Palustrine Forested (PFO) Wetland

Topographic Contours

- Major - 10ft
- Minor - 1ft

Stormwater Control Features

- Stormwater Basin
- RipRap



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PROJECT NAME & LOCATION

CARDINAL RIDGE (EASTERN STATE HOSPITAL)

JAMES CITY COUNTY - VIRGINIA

DATE: 12/13/2022

PROJECT NUMBER: 43654.002

PROJECT NAME: CARDINAL RIDGE

DESIGNED BY / DRAWN BY: C. LEATON

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REVISIONS

#	MM/DD/YY	DESCRIPTION
1	5/25/23	Additional 78.88 Acres
2	01/12/24	UPDATED PER COE COMMENTS

DRAWING DESCRIPTION

FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

SCALE (FEET)

0 60 120

PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE: H:1 " = 60 '

SHEET NUMBER: 7 OF 13

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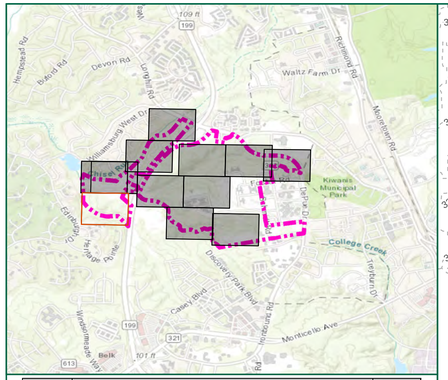

Resource Identification	Confirmation								Resource Description Notes*
	PFO (sq ft)	PSS (sq ft)	PEM (sq ft)	POW (sq ft)	R3 (lf)	R4 (lf)	R6 (lf)	Stream (sq ft)	
A	1,182,708								NT/V
B			734						NT/V
C			334						NT/V
D			347						NT/V
E	1,018								NT/V
F	10,573								NT/V
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Z	61,100								NT/V
A2					331			2,679	NT/NV
B2						240		1,033	NT/NV
C2							413	1,409	NT/NV
D2						127		366	NT/NV
Total	**2,753,606**	**0**	**23,596**	**0**	**7,094**	**2,449**	**958**	**71,718**	
Total Wetland Area =	**2,777,202 sq ft**				**63.76 ac**				
Total Stream Area =	**71,718 sq ft**				**1.65 ac**				
Total Stream Length =	**10,501 lf**								

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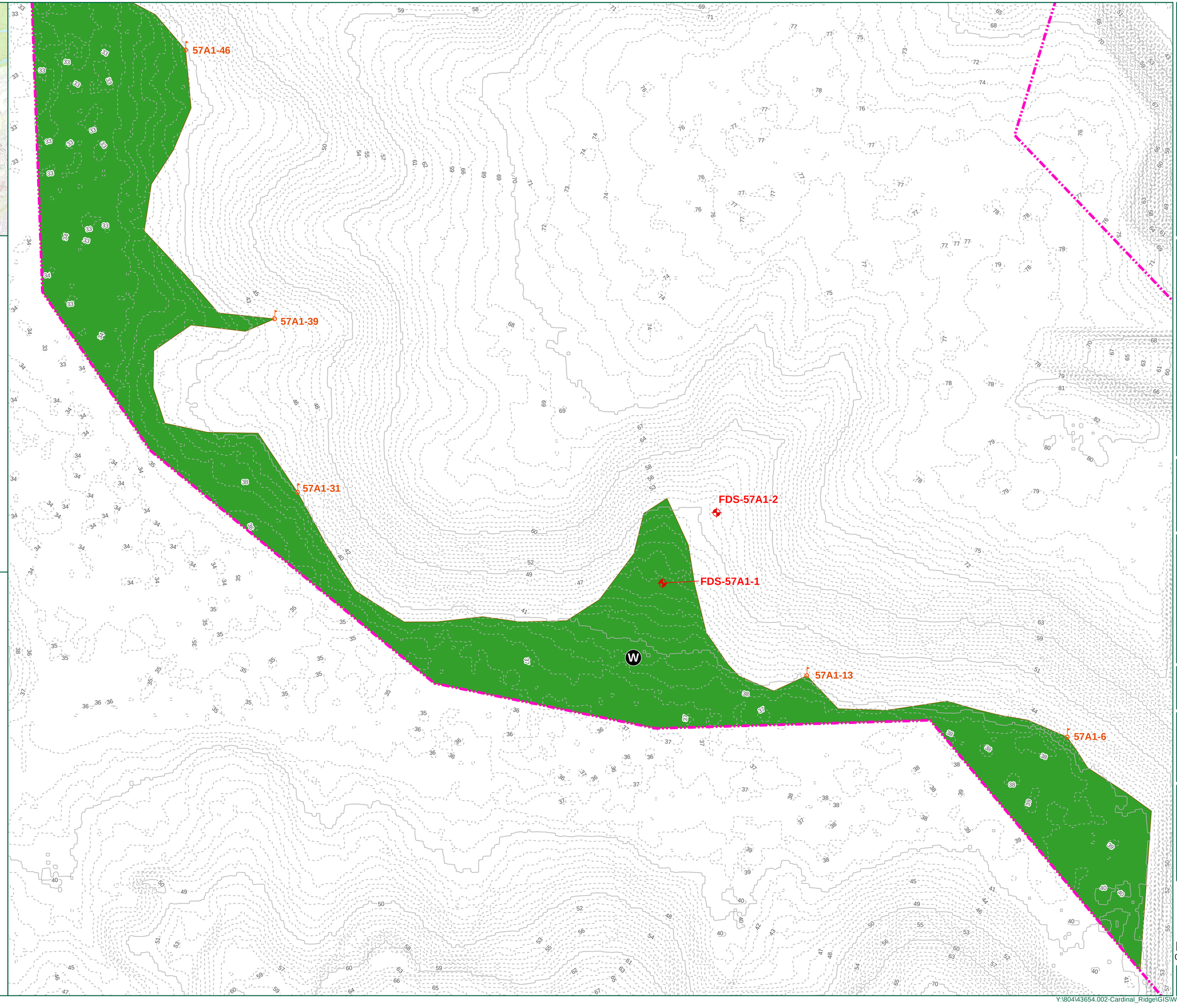

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REVISIONS

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DRAWING DESCRIPTION:

FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

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SCALE: H:1 " = 60 '

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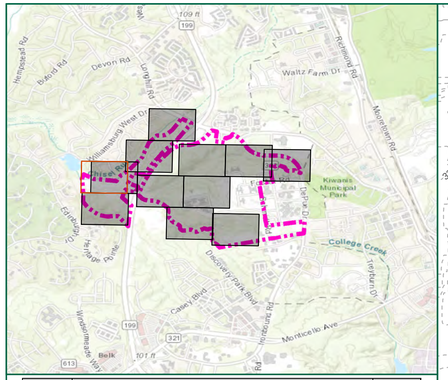

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JAMES CITY COUNTY - VIRGINIA

DATE
12/13/2022

PROJECT NUMBER
43654.002

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DESIGNED BY / DRAWN BY
C. LEATON

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PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE
H:1 " = 60 '

SHEET NUMBER
9 OF 13

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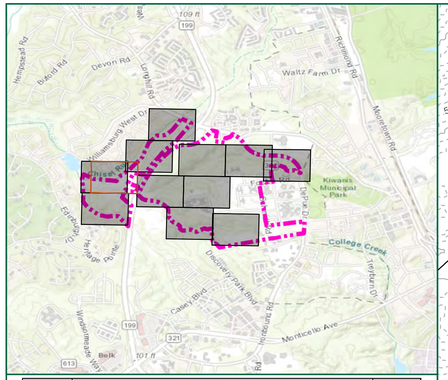

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- Wetland Identifier
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Topographic Contours

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Stormwater Control Features

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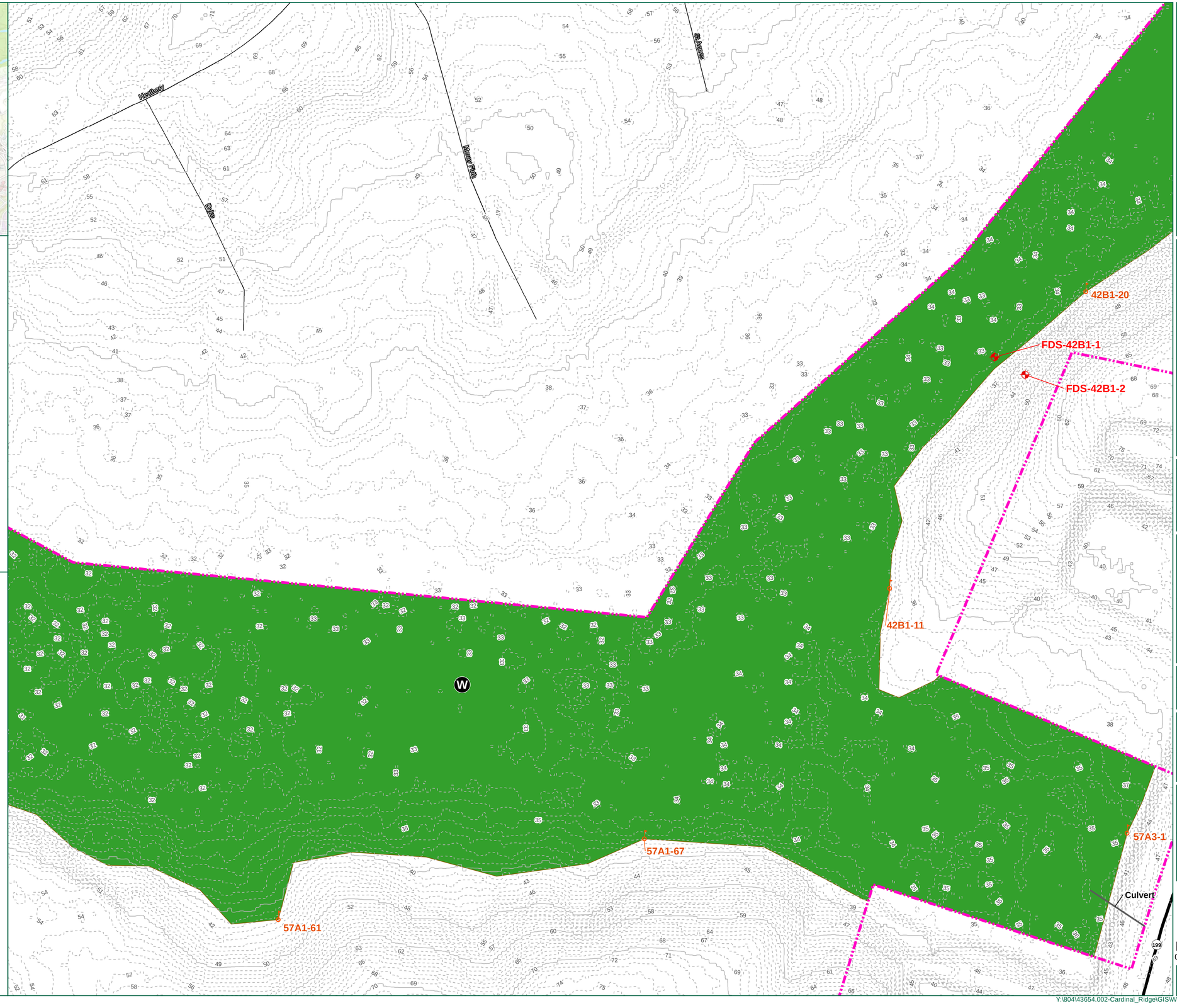

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FIGURE 4:
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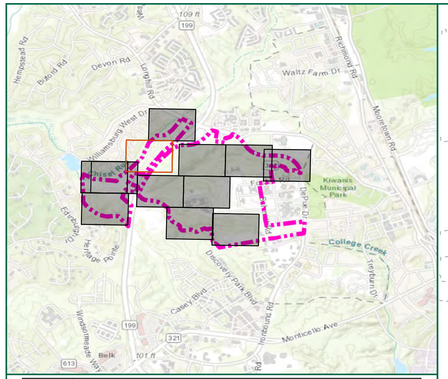

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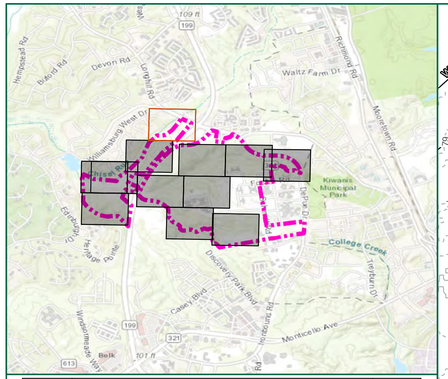

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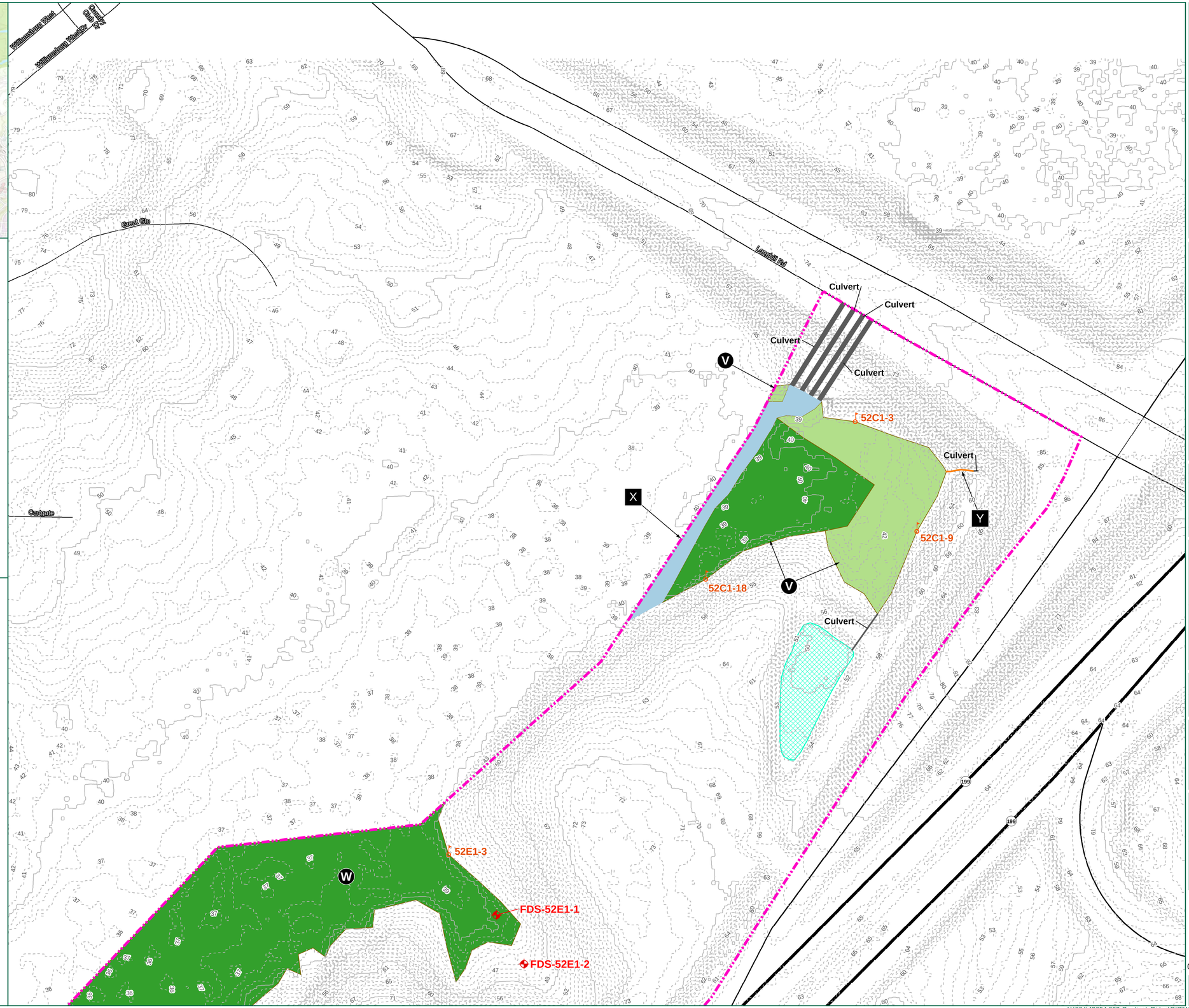
- RipRap



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TEL 804.200.6500
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PROJECT NAME & LOCATION
CARDINAL RIDGE
(EASTERN STATE HOSPITAL)
JAMES CITY COUNTY - VIRGINIA

DATE 12/13/2022
PROJECT NUMBER 43654.002
PROJECT NAME CARDINAL RIDGE
DESIGNED BY / DRAWN BY C. LEATON

1. Wetlands and waters within the project study limits have been located using submeter, Bluetooth GPS antennas by Timmons Group.
2. Wetlands and waters have not been confirmed by the U.S. Army Corps of Engineers until stamped.
3. Project limits are approximate.
4. Topography based on USGS LIDAR.
5. Cowardin Stream Classifications are based on NC DWQ Stream Identification form version 4.11.

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REVISIONS

#	MM/DD/YY	DESCRIPTION
1	5/20/23	Additional 76.88 Acres
2	01/12/24	UPDATED PER COE COMMENTS

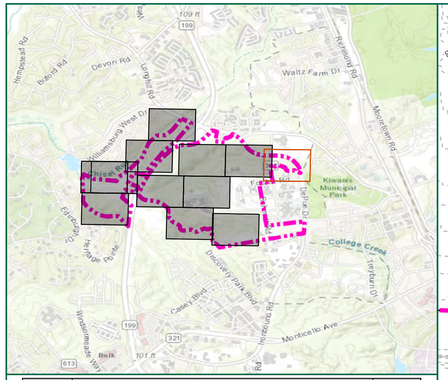
DRAWING DESCRIPTION
FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

SCALE (FEET)
0 60 120
PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE H:1 " = 60 '
SHEET NUMBER 12 OF 13

Y:\804\43654.002-Cardinal_Ridge\GIS\WTDM\43654.002-JD-WTDM.mxd

Received by USACE June 3, 2024



Resource Identification	Confirmation								Resource Description Notes*
	PFO (sq ft)	PSS (sq ft)	PEM (sq ft)	POW (sq ft)	R3 (lf)	R4 (lf)	R6 (lf)	Stream (sq ft)	
A	1,182,708								NT/V
B			734						NT/V
C			334						NT/V
D			347						NT/V
E	1,018								NT/V
F	10,573								NT/V
G	8,898								NT/V
H	271,827								NT/V
I					2,710			21,890	NT/NV
J					1,893			16,544	NT/NV
K					333			2,192	NT/NV
L					1,473			8,721	NT/NV
M						289		1,157	NT/NV
N						809	49	2,916	NT/NV
O						97		480	NT/NV
P						465		1,863	NT/NV
Q						278		1,266	NT/NV
R						144		402	NT/NV
S							156	445	NT/NV
T							185	370	NT/NV
U							121	768	NT/NV
V	22,025		22,181						NT/V
W	1,195,457								NT/V
X					354			7,165	NT/NV
Y							34	52	NT/NV
Z	61,100								NT/V
A2					331			2,679	NT/NV
B2						240		1,033	NT/NV
C2							413	1,409	NT/NV
D2						127		366	NT/NV
Total	**2,753,606**	**0**	**23,596**	**0**	**7,094**	**2,449**	**958**	**71,718**	
Total Wetland Area =	**2,777,202 sq ft**				**63.76 ac**				
Total Stream Area =	**71,718 sq ft**				**1.65 ac**				
Total Stream Length =	**10,501 lf**								

* T=Tidal; NT=Non-tidal; V=Vegetated; NV=Non-Vegetated; PFO=Palustrine Forested Wetland; PSS=Palustrine Scrub-Shrub Wetland; PEM=Palustrine Emergent Wetland; POW= Palustrine Open Water; R3= Upper Perennial Streams; R4=Intermittent Streams; R6 = Ephemeral Streams

Legend

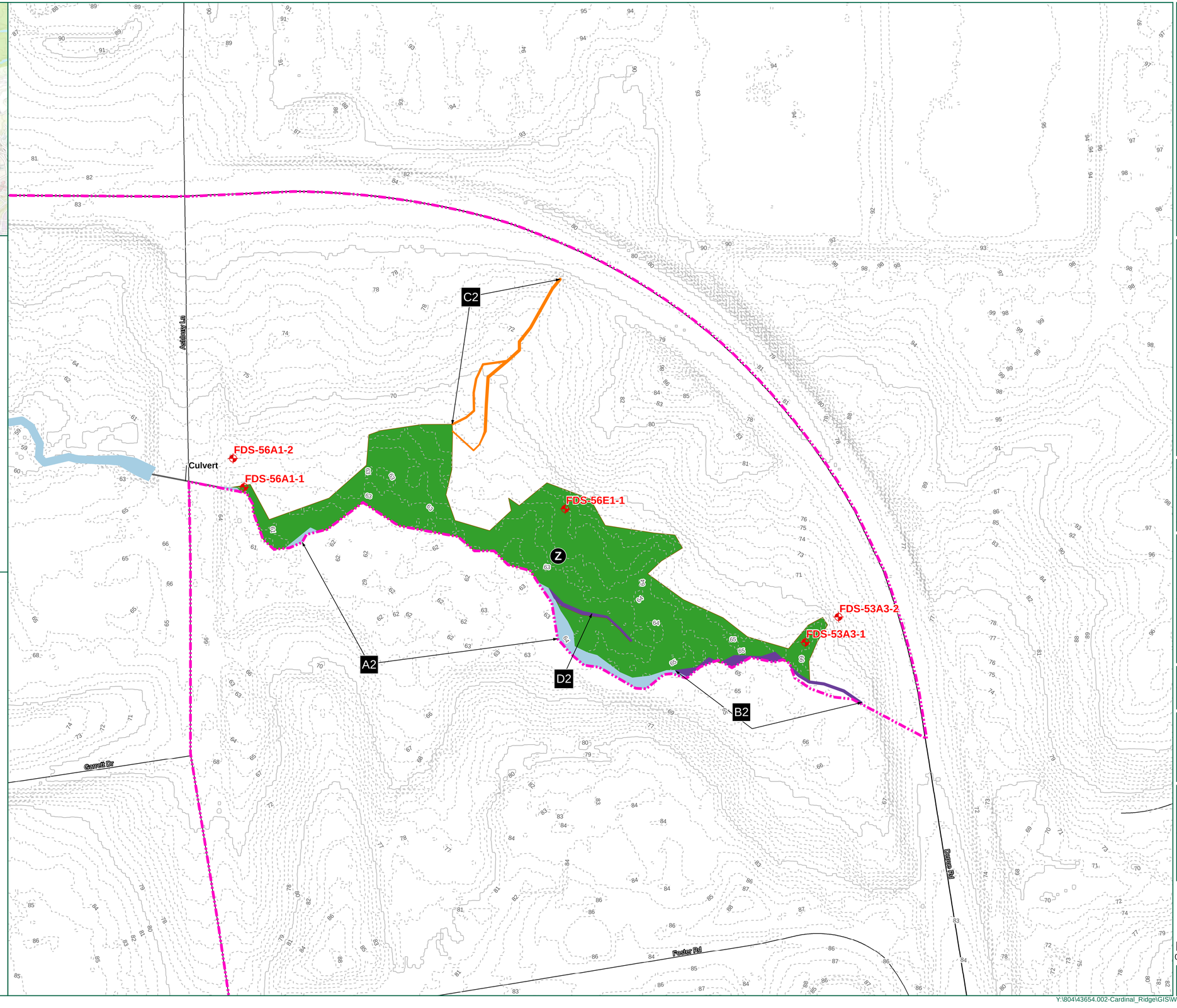
- Project Study Limits - 386.7 Acres
- Stream Identifier
- Wetland Identifier
- Flag
- Field Data Station
- Culvert
- Perennial Stream (R3)
- Intermittent Stream (R4)
- Ephemeral Stream (R6)
- Palustrine Emergent (PEM) Wetland
- Palustrine Forested (PFO) Wetland

Topographic Contours

- Major - 10ft
- Minor - 1ft

Stormwater Control Features

- Stormwater Basin
- RipRap



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REVISIONS

#	MM/DD/YY	DESCRIPTION
1	01/05/23	Additional 76.68 Acres
2	01/12/24	UPDATED PER COE COMMENTS

DRAWING DESCRIPTION:

FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP

SCALE (FEET)
0 60 120
PLANS PRINTED AS 11X17 ARE HALF SCALE

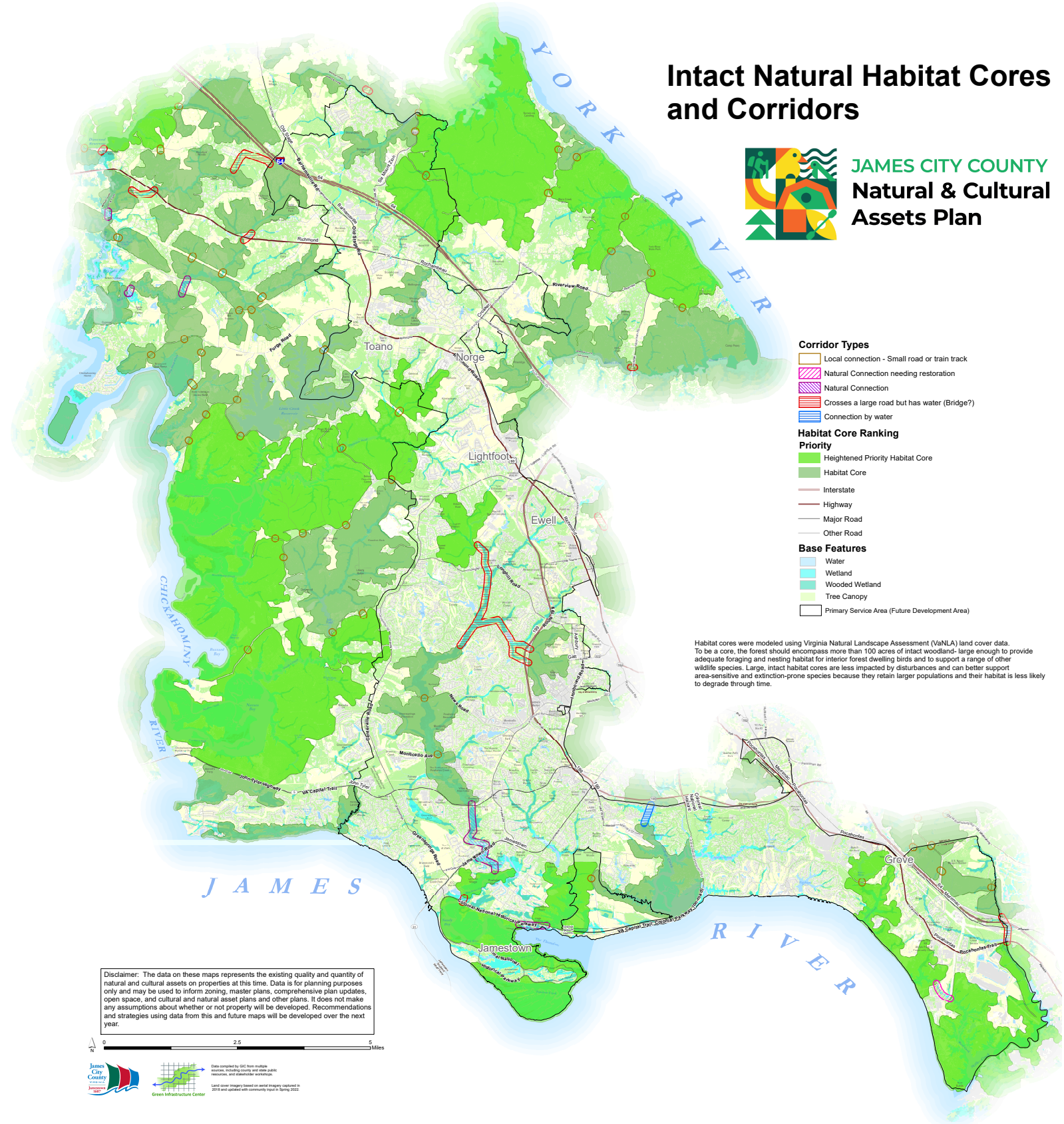
SCALE: H:1 " = 60 '

SHEET NUMBER: 13 OF 13

Y:\804\43654.002-Cardinal_Ridge\GIS\WTDM\43654.002-JD-WTDM.mxd

Intact Natural Habitat Cores and Corridors

JAMES CITY COUNTY
Natural & Cultural Assets Plan


YORK RIVER
CHICKAHOMINY RIVER
JAMES RIVER
Toano
Norge
Lightfoot
Ewell
Jamestown
Grove
Richmond Road
Forge Road
Riverview Road
Lightfoot Road
Ironbound Road
Monticello Ave
John Tyler Highway
VA Capital Trail
Jamestown Road
Colonial National Historical Parkway
Pocahontas Trail
Rochambeau Drive
Barhamsville Road
Old Stage Road
Centerville Road
Longhill Road
Mooretown Road
Croaker Road
Richmond Rd
Jamestown Rd
Colonial Parkway
Jamestown Island
Historic Jamestowne
Greensprings Road
Mooretown Rd
Monticello Ave
Pocahontas Trail
Rochambeau Rd
Barhamsville Rd
Old Stage Rd
Centerville Rd
Longhill Rd
Ironbound Rd
Lightfoot Rd
Riverview Rd
Forge Rd
Richmond Rd
Croaker Rd
Norge Rd
Toano
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Rochambeau
Barhamsville
Old Stage
Centerville
Longhill
Ironbound
Mooretown
Monticello Ave
John Tyler Highway
VA Capital Trail
Jamestown Road
Colonial National Historical Parkway

SMALL WHORLED POGONIA SURVEY



at

4601 Ironbound Road
Williamsburg, Virginia

Prepared for:

TIMMONS GROUP

2901 South Lynnhaven Road
Virginia Beach, Virginia 23452

Prepared by:

Integrity Environmental, Inc.
206 North Avenue
Newport News, Virginia 23601

June 2025

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1.0 EXECUTIVE SUMMARY

This report presents the results of the field survey for the presence of the state endangered, and federally threatened species, the small whorled pogonia (*Isotria medeoloides*) at 4601 Ironbound Road, in Williamsburg, Virginia. The property consists of approximately 323 ± acres of undeveloped wooded land, parking areas and buildings. Only the wooded portions of the site were surveyed for the small whorled pogonia, with the exception of the area west of Rt. 199, the area at the south western corner of the property, and the area east of Ashbury Lane, south of the tributary, as shown on the Small Whorled Pogonia Survey Area map.

The results of the survey indicated that unlikely to good habitat for the small whorled pogonia was present; and no individuals were found. This survey was conducted by Sandra J.Y. Brinson and Integrity staff on May 25 and 26, and June 1 and 19, between May 25 to July 15, as required by the U.S. Fish and Wildlife Department, for the area of Virginia south of Caroline County. A small Whorled pogonia habitat assessment was completed in August 2024. No individuals or colonies of this plant have been found on this site.

2.0 SPECIES DESCRIPTION

2.1 Species Taxonomy

This tiny orchid is a scapose perennial herb with long slender filamentous roots and 5 verticillate (or whorled) leaves inserted at the top of the slender fistulose (hollow) stem. The greenish or white tinged stem is 9.5 to 25 cm. (3.7 to 9.8 in.) tall, robust and glaucus (covered with a fine waxy powder giving it a whitish color). The leaves are drooping, pale dusty green, glaucus, elliptic to elliptic-obovate, 3.0-9.5 cm. long (1.1 to 3.7 in.) and 2.5-5.2 cm. wide (0.9-2.0 in.) and are borne in a single whorl at the stem summit. The 1-2 flowers are pale yellowish green, subsessile, arise from the center of the whorl, are 1.7 cm. long (0.7 in.) and 3 mm. wide (0.1 in.) and occur from late April to early July. The fruit is an erect ellipsoid-cylindrical capsule 1.7 to 3.0 cm long (0.7-1.2 in.) (Radford et al. 1968). Gleason and Cronquist (1991) identified the size of the plant as much smaller in size, 1.5 to 2.5 cm. tall (0.6-1.0 in.).

2.2 Distribution

The small whorled pogonia is known from southern Ontario, Canada south to northeastern Georgia and is broadly distributed in the Eastern United States. The largest number of colonies and also the largest in size, are centered in New Hampshire and Maine. It is also recorded in several counties in Pennsylvania, Tennessee, Vermont, Michigan, Illinois, and Missouri. The small whorled pogonia was discovered in the spring of 2022 in Vermont, it was believed to be extinct since 1902 (Vermont Fish and Wildlife Department, 2022).

There are currently three main population centers: 1) northernmost population in the Appalachian mountain foothills in New Hampshire, Vermont and Maine, 2) the southernmost population at the southern end of the Blue Ridge Mountains at the

intersection of North Carolina, South Carolina, Tennessee and Georgia and 3) the central population located in the Piedmont and coastal plain provinces of Virginia. Smaller populations have been identified in Pennsylvania, Michigan, Illinois, and Missouri. It has also been located in Connecticut, Massachusetts, Rhode Island, New York, New Jersey, Delaware, Maryland, West Virginia, Ohio.

In Virginia, the small whorled pogonia is currently documented as colonies or single plants in the City of Williamsburg and Petersburg, Appomattox, Bedford, Buckingham, Caroline, Craig, Fairfax, Giles, Gloucester, Hanover, James City, King William, Lancaster, Lee, Madison, New Kent, Pittsylvania, Prince William, Spotsylvania, Stafford, Wise and York counties, according to the U.S. Fish and Wildlife Service. It has also been found or believed to occur in Floyd and Norton counties (ECOS, 2017).

2.3 Species Habitat

The Small Whorled Pogonia generally occurs in mature second or third growth deciduous forests on terrain that is almost level or gently sloping in northerly or easterly directions. In rare instances the species occurs on steep or southerly slopes, though it is also known to occur on fairly steep slopes and other aspects. The canopy of these forests is moderately dense, and the understory is distinctly open allowing light to penetrate in the form of mottles or flecks (Ware, 1991). The forest canopy is commonly dominated by white oak (*Quercus alba*). Herbaceous plants occurring with the small whorled pogonia include: large whorled pogonia (*Isotria verticillata*), cucumber root (*Mediola virginiana*), strawberry bush (*Euonymus americanus*), Partridge berry (*Mitchella repens*), false Solomon's seal (*Smilacina racemosa*), and beggar's ticks (*Desmodium nudiflorum*). Areas whose canopy is predominantly pine (>60%) can generally be excluded as potential habitat (Ware pers. comm. 1996). Preferred soils are acidic sandy loams, having pHs ranging from 4.3 to 5.5 and typically low to very low in nutrient content (Ware, 1991). The sites are also

characterized by proximity to canopy openings, dead standing trunks and wood litter (Ware 1987).

Habitat parameters therefore include:

1.	Direction:	northerly or easterly
2.	Slope:	level or gentle to moderate
3.	Canopy:	dense
4.	Understory:	distinctly open
5.	Herbaceous:	low to moderate cover
6.	Soils:	acidic sandy loams, pH 4.3-5.5

The Smithsonian Environmental Research Center found in a recent study that a Russulaceae fungus must be present for the orchid to survive. The orchids parasitize the fungus, especially during periods of dormancy, when they don't have leaves to capture sunlight and produce carbon. There is a direct positive correlation between the number of these fungi in the soil and the amount of small whorled pogonias aboveground. In areas where the fungus has not been found, neither has the orchid. In areas where there is more fungus there are more small whorled pogonias, and in areas with a lot of fungus the plants are aboveground and are no longer dormant (Smithsonian Insider, 2017).

2.4 Life History

The perennial small whorled pogonia over winters as a dormant bud. Winter dormancy breaks in March or April and flowering typically begins in late April to early May in James City County, depending on length of winter, seasonal temperatures and precipitation. A flowering plant typically stays in bloom more than one week but less than two and the colony is so well synchronized that the complete flowering period

for the colony occurs within two to three weeks.

The plants can remain dormant for up to 13 years, without emerging above ground (USFWS, 2025). During these periods of dormancy it is difficult to tell if the plant is dead or alive, without digging it up.

The small whorled pogonia is self-pollinating and rarely produces more than one stem per plant (Mehroff, 1983). As the flowering period ends, those plants with successful pollination show an immediate enlargement of the ovary. The fruit reaches full size by July, but it does not fully ripen until fall, often not dehiscing (opening to drop seeds) until late autumn. A plant that produces a vigorous flowering stem one year may reappear the following year as a small vegetative plant. Plants appearing after a dormant period may also be small, vegetative and resemble a seedling.

2.5 Species Status

The small whorled pogonia was federally listed as endangered in 1982. Virginia listed the plant as endangered in 1985. The Virginia Natural Heritage program ranks this species as G2/S2, very rare throughout its range and extremely rare in Virginia. The United States Fish and Wildlife Service (USFWS) reclassified the small whorled pogonia from endangered to threatened in 1994 based on the fulfillment of reclassification criteria as stated in the Small Whorled Pogonia Recovery Plan. Reclassification could proceed when a minimum of 25% of the known viable sites are protected.

3.0 METHODOLOGY

Sandra J.Y. Brinson, Senior Environmental Scientist with Integrity Environmental, Inc., and Integrity staff surveyed the site. For this report, the term "good habitat" indicates that most or all of the Small Whorled Pogonia documented habitat parameters are present; "moderate habitat" indicates that some of the habitat parameters were present; "marginal habitat" indicates that some of the parameters were present but have been altered in some way; "unlikely habitat" indicates that few of the habitat parameters were present and "no habitat" indicates that no parameters were present.

Areas characterized as having marginal to good habitat are typically surveyed using contour transects. In this method a visual search of the entire area is performed by walking transects along the slope of the subject area on approximate 25 foot to 50 foot spacing. Transect spacing for each area is determined based on the habitat quality, vegetation density, and slope gradient. In areas with unlikely to marginal habitat meandering spot-search methodology is typically employed, concentrating inspection within microhabitat areas such as canopy gaps, topographic breaks on steep slopes, areas with little competitive ground cover, areas with large detrital accumulations, etc. Unsuitable habitat areas, which typically encompass wetlands, non-forested areas, south and west facing slopes with unfavorable vegetative community structures and/or species composition, and pine-dominated areas are documented and spot searched.

4.0 FIELD SURVEY RESULTS

4.1 Site Location

The 323 ± acres of undeveloped wooded land, maintained lawn and developed area is located in James City County, Virginia. Elevations range from roughly 50 ft. mean sea level (msl) to 100 ft. msl., on the site. Chisel Run drains through the northern perimeter of the site and the southern perimeter of the site. Chisel Run flows into Long Hill Swamp on the western side of Rt. 199 (James City CivQuest, 2025).

4.2 Vegetation Present

The wooded areas of the site consisted of early successional pine stands, disturbed areas, second growth forest and bottomlands. The canopy layer, consisted of loblolly pine (*Pinus taeda*), tulip poplar (*Liriodendron tulipifera*), sweet gum (Liquidambar styraciflua), and red maple (*Acer rubrum*). Non-dominants in the canopy included American beech (*Fagus grandifolia*), mockernut hickory (*Carya tomentosa*), white oak (*Quercus alba*), willow oak (*Quercus phellos*), Southern red oak (*Quercus pagoda*), and American elm (*Ulmus americana*). The subcanopy was dominated by loblolly pine, ironwood (*Carpinus caroliniana*), and American holly (*Ilex opaca*). The shrub layer was dominated by autumn olive (*Elaeagnus angustifolia*), loblolly pine, American holly, and paw paw (*Asimina triloba*). The herbaceous layer was dominated by Japanese stiltgrass (*Microstegium vimineum*), Southern hound's tongue (*Andersonglossum virginianum*), huckleberry (Gaylussacia sp.), greenbrier (*Smilax rotundifolia*). Christmas fern (*Polystichum acrostichoides*).

4.3 Results

No individuals or colonies of small whorled pogonia were observed on the site, unlikely to good habitat for the small whorled pogonia was present. This site is composed of maintained lawns, pine stands, mixed pine and deciduous hardwood forests. Much of the wooded area has a dense shrub layer, and large areas of Japanese stilt grass and other herbaceous plants competing for sunlight. The autumn olive has formed thickets in areas that were formerly disturbed. Very little of the site has a thick duff layer, which the small whorled pogonia prefers.

Unlikely habitats were comprised of areas with greater than 60% pine, wetland areas with a thick herbaceous layer, large open areas in the canopy, and relatively flat areas with little duff layer. Good habitat for the small whorled pogonia existed in areas F and M. The Small Whorled Pogonia Survey Table below provides additional information about each area identified.

SMALL WHORLED POGONIA SURVEY TABLE								
Area	**Direction northerly or easterly**	**Slope Level or gentle to moderate**	**Canopy dense**	**Understory distinctly open**	**Herb Low to moderate**	**Soils pH 4.3 to 5.5**	**Plant comm-unity**	**Comments**
A		X				X	lawn	Maintained lawn
B	X	X	X			X	Herb-aceous grass-es, sedg-es and young wood-ies	Lower elevations near road
C		X	X	X	X	X	Mixed pine decid-	Majority of area upslope to top of hill

							uous hard-wood	
D		X			X	X	Distur-bed area with small pines and Jap-anese stilt grass	Area receives too much sun
E	X	X				X	Mixed pine decid-uous hard-wood	Too much sun, lack of duff layer
F	X	X	X	X	X	X	Mixed pine decid-uous hard-wood	Associate species
G	X	X				X	Mixed pine decid-uous hard-wood	Canopy not dense enough, too much understory
H		X				X	Mixed pine decid-uous hard-wood	Too much sun, too much understory
I	X	X				X	Pine	60% or more pine, very thick understory and herbaceous layer
J		X	X			X	Decid-uous hard-	Thick shrub and herbaceous layer

							wood	
K		X			X	X	Pine	Thick shrub and herbaceous layer
L	X	X					Mixed pine decid-uous hard-wood	Canopy too young, thick shrub and herbaceous layer
M	X	X	X	X	X	X	Decid-uous hard-wood	Associate species
N	X	X				X	Mixed pine decid-uous hard-wood	Thick understory, shrub and herbaceous layer
O		X	X	X	X	X	Mixed pine decid-uous hard-wood	Much of this area was wetland and scouring had occurred leaving little duff layer
P						X	Decid-uous hardw-ood	This area is thick with paw paw and Japanese stilt grass the southern side is disturbed and has been planted in perennial ryegrass
Q						X	Mixed pine decid-uous hard-wood	Disturbed area adjacent to road, with fill, young pines and deciduous hardwoods
R	X	X				X	Mixed pine decid-uous	Most of herbaceous layer covered in Japanese stilt

							hard-wood	grass

4.4 Limitations

The small whorled pogonia's documented life cycle contains periods of dormancy. Because of this growth strategy, the fact the species was not identified and recorded during the survey period, does not completely eliminate the possibility that it may appear in subsequent growing seasons. Consequently, the USFWS may require additional surveys in subsequent growing seasons. The USFWS has required additional surveys two years after the initial survey confirmed the absence of the species if development has not yet occurred.

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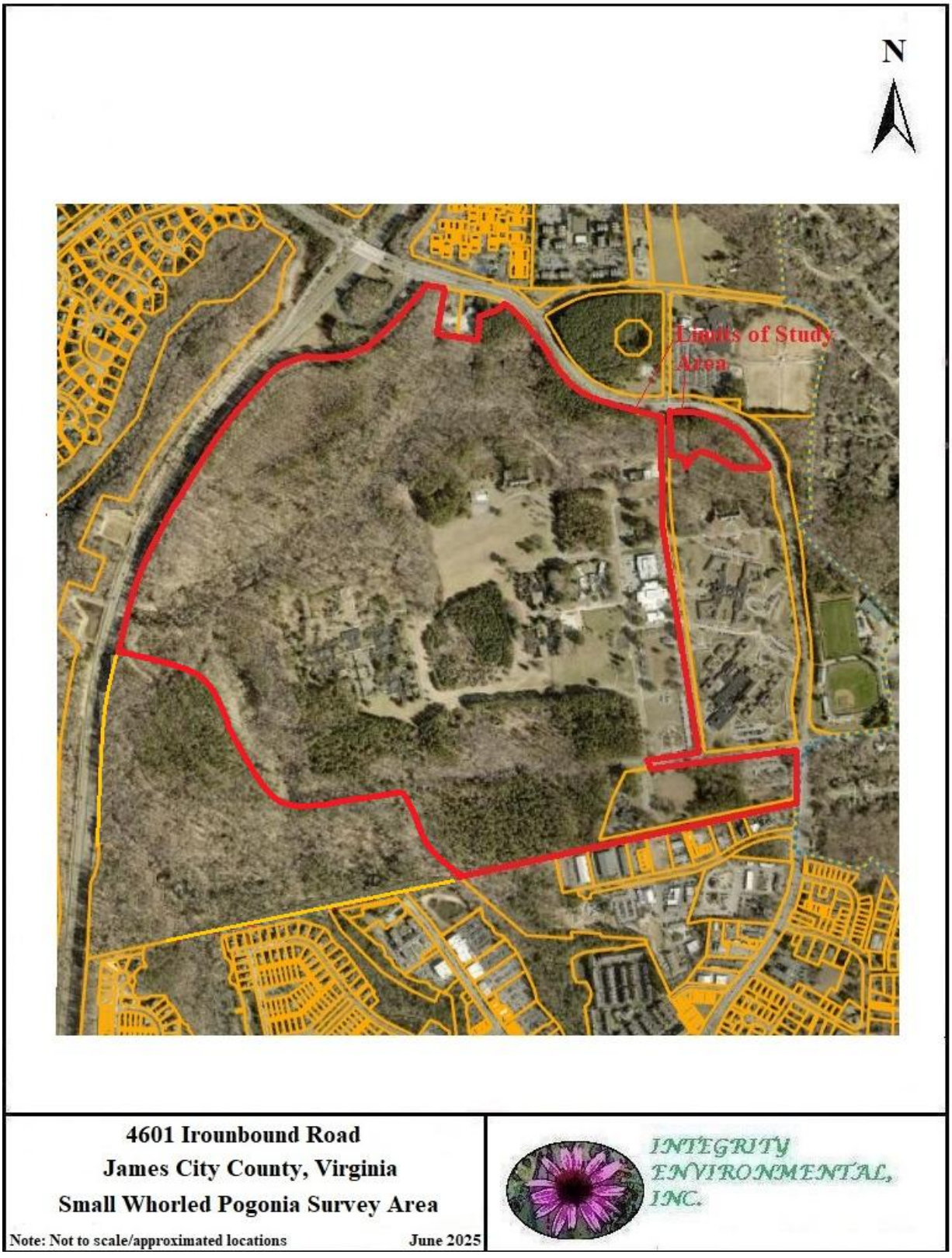
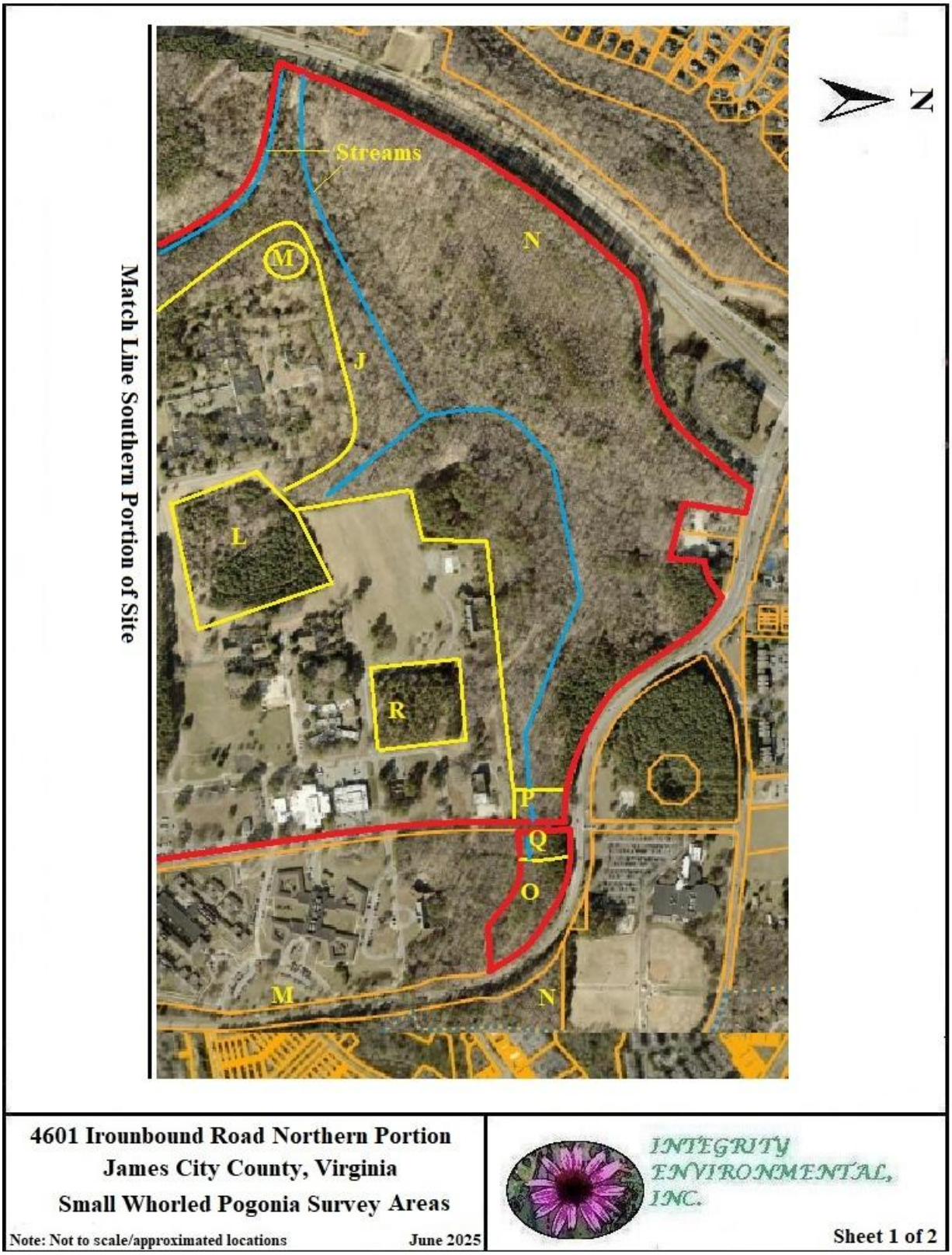
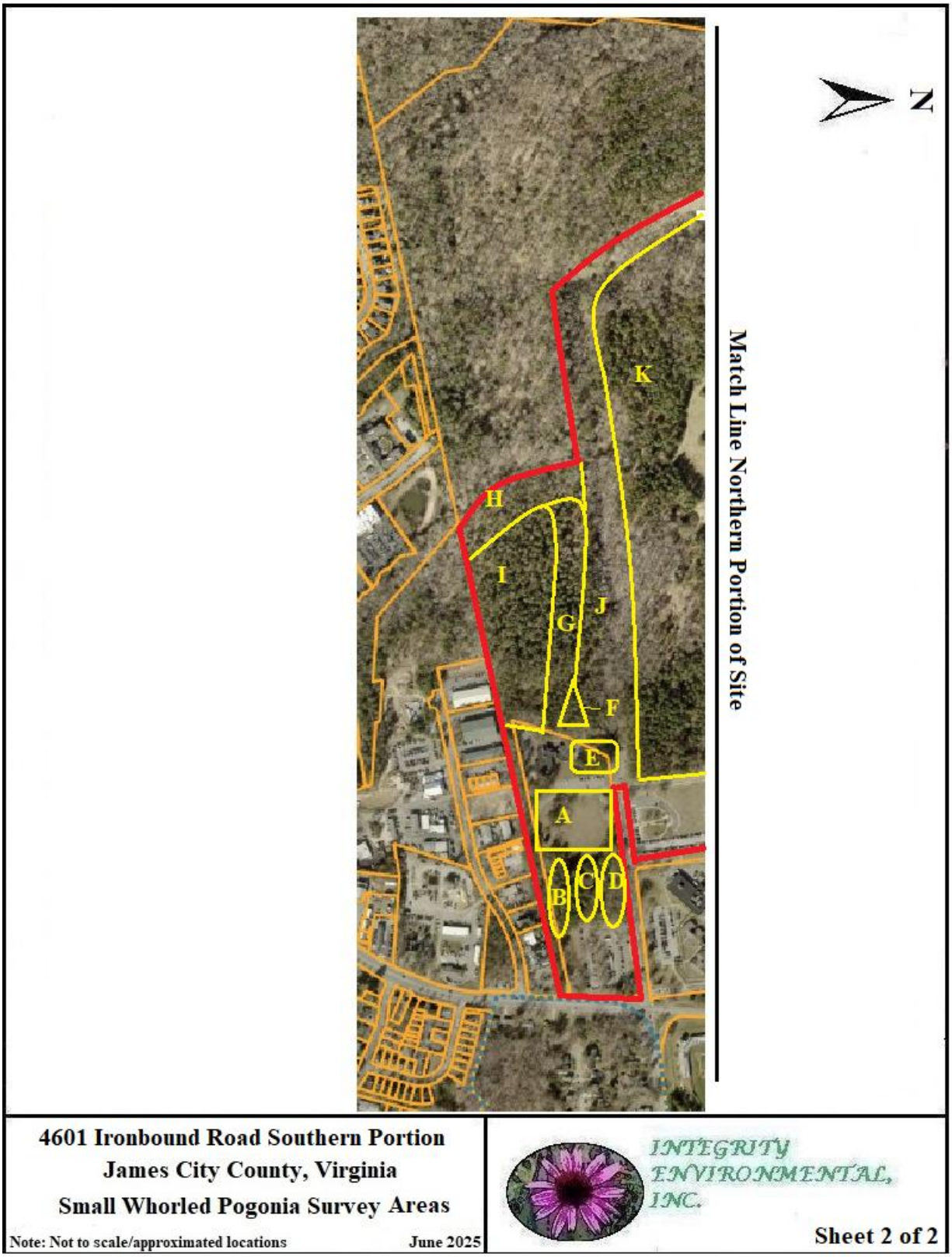
.

APPENDIX A


N
Limits of Study Area
4601 Irounbound Road
James City County, Virginia
Small Whorled Pogonia Survey Area
Note: Not to scale/approximated locations
June 2025
INTEGRITY ENVIRONMENTAL, INC.


Streams
N
M
J
L
R
P
Q
O
M
N
Match Line Southern Portion of Site
N
4601 Irounbound Road Northern Portion
James City County, Virginia
Small Whorled Pogonia Survey Areas
Note: Not to scale/approximated locations
June 2025
INTEGRITY ENVIRONMENTAL, INC.
Sheet 1 of 2


N
Match Line Northern Portion of Site
K
H
I
J
G
F
E
A
B
C
D
4601 Ironbound Road Southern Portion
James City County, Virginia
Small Whorled Pogonia Survey Areas
Note: Not to scale/approximated locations
June 2025
INTEGRITY ENVIRONMENTAL, INC.
Sheet 2 of 2

APPENDIX B



Area A



Area B



Area C



Area D



Area E



Area F



Area G



Area H



Area I



Area J



Area K



Area L



Area M



Area N



Area O



Area P southern limits



Area P northern limits



Area Q northern limits



Area Q southern limits



Area R

TIMMONS GROUP

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June 11, 2025

To: Terry Costello
James City County Planning

RE: Cardinal Ridge – Visual Tree Verification

Dear Terry,

To achieve a bonus density credit under Zoning Ordinance Section 24-519 (b), we are proposing to preserve a single area of healthy, mature, mixed hardwood forestland of approximately (10) ten acres, within the developable portion of the site. The forested area meets the minimum requirements of Item G of the ordinance below. Meeting this requirement shall allow the developer to achieve one (1) point toward the required density bonus points.

> *24-519 (b) G: Preserving a single area of healthy, mature, mixed hardwood forestland at least two (2) acres in size, within the developable portion of the site. The planning director may request that the developer provide confirmation, prepared by a certified horticulturalist, that these qualities are present.*

On June 6, 2025, a site visit was conducted to document the vegetative status of the above mentioned ten (10) +/- acres (See representative sample area attached). The following observations and documentation relative to existing tree species, sizes, and health are as follows:

Of the overall area of ten (10) +/- acres, hardwoods occupy approximately 80% of the site. Hardwood species include multiple Maple species, multiple Oak species, Tulip Poplar, Beech, Hickory, and Sweet Gum. Sizes range from 2” to 72” caliper at breast height (DBH) and are generally in good health.

Of the overall area of ten (10) +/- acres, softwoods occupy approximately 20% of the site. Softwood species include Loblolly and Virginia Pine. Sizes range from 2” to 24” caliper at breast height (DBH) and are generally in good health.

In addition to the above assessment, it was observed that there is an understory layer of mostly hardwood saplings less than 2” in diameter that are in relatively good health but not counted in the existing tree assessment.

Sincerely,



David S. Taylor, PLA
VA Certification 000328

6/6/2025
TREE INVENTORY
CARDINAL RIDGE
50' X 50'SAMPLE AREA
TRUNK DIAMETERS AT CHEST HEIGHT

BEECH:
(4) @ 3 INCH
(3) @ 4 INCH
(3) @ 8 INCH
(2) @ 10 INCH
(3) @ 12 INCH
(1) @ 15 INCH
(2) @ 18 INCH
(1) @ 26 INCH
(2) @ 40 INCH
(1) @ 72 INCH
(3) @ SUB 2 INCH

HOLLY:
(1) @ 10 INCH

IRONWOOD:
(1) @ 8 INCH

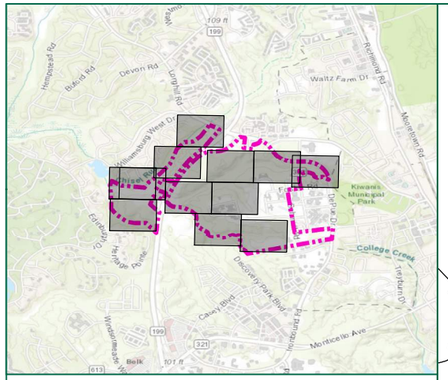
PAW PAW:
(3) @ 5 INCH
(1) @ 8 INCH
(~50) @ SUB 1 INCH

PIGNUT HICKORY:
(3) 60 INCH
(1) 52 INCH

SWEET GUM:
(1) @ 6 INCH
(1) @ 60 INCH

OUTSIDE OF SAMPLE AREA:

- OBSERVED MULTIPLE LARGE MATURE TULIP POPLARS
- MATURE WHITE OAK
- MATURE RED OAK
- MATURE LOBLOLLY PINE



Legend

- Project Study Limits - 386.7 Acres
- PSA Reach
- Resource Protection Area
- Culvert
- Perennial Stream (R3)
- Intermittent Stream (R4)
- Ephemeral Stream (R6)
- Palustrine Emergent (PEM) Wetland
- Palustrine Forested (PFO) Wetland

Topographic Contours

- Major - 10ft
- Minor - 1ft

Sheet 8 Sheet 9 Sheet 10 Sheet 11 Sheet 12 Sheet 2 Sheet 3 Sheet 4 Sheet 5 Sheet 6 Sheet 7 Sheet 13

PSA-52-1 PSA-45-1 PSA-57-2 PSA-56-1 PSA-57-1 PSA-53-1 PSA-47-2 PSA-47-1 PSA-57-5 PSA-57-3 PSA-57-4

Bulwell Fret, Bradley Flats, Pathfinder Dr, Cromwell, Williamsburg Dr, Lane Pl, Pulliam Henry Dr, Cavalier Rd, Country Club Dr, Wilmington West, Great Glen, Courtney, Select Flats, Wilmington West Dr, Gregory, Douglas, Westbury, Clinton Field, Lanthorn Dr, Country Club, Country Club Dr, Glyndale, St Aaron, Shamblin, Henry Park, Bradbury, Ellora, Bellsbrook Dr, Brookwater, Sampford, Harbourside, Hedging Ashe, Cypress Cir, Millbrook, Silkwood, Rathlin Dr, Observation Park Blvd, Tawling Rd, Palmer Ln, Mirrorstone Rd, Rockwell Rd, Rockwell Ln, Overcreek Rd, Overcreek Dr, Gulf Ln, Sabrina Dr, Hartley Dr, Brewer Rd, Anthony Ln, Moore Rd, Moore Dr, Sewell Dr, Sewell Rd, Gerald Rd, Peyton Rd, Lone Oak Dr, Lone Oak Ln, Greenwell Mews, Sandstone Mews, Salisbury Mews, Clarke Mews, Pickett Mews, Pickett Ln, Willey Mews, Beresford Mews, Cambridge Mews, Pickett Henry Dr, Pickett Ln, Greene Dr, John Anthony Ln, O Hanlon Way, Randolph Rd, Sand Stone Dr, Clarke Cross, Kiwanis Municipal Park, College Creek, Waltz Farm Dr, Rosemont Rd, Devon Rd, Bacid Rd, Cromwell Rd, Monticello Ave, Belk, Meadowlake Rd, Hickory Rd, Cleary Blvd, Courtney Puma Blvd, Hickory Ridge Rd, Rosemont West Dr, Rosemont Rd, Meadowlake Rd, Williamsburg Rd, 199, 321, 612, 101

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
TEL 804.200.6500
www.timmons.com

PROJECT NAME & LOCATION

CARDINAL RIDGE (EASTERN STATE HOSPITAL)

JAMES CITY COUNTY - VIRGINIA

DATE 12/13/2022

PROJECT NUMBER 43654.002

PROJECT NAME CARDINAL RIDGE

DESIGNED BY / DRAWN BY C. LEATON

1. Wetlands and waters within the project study limits have been located using submeter, Bluetooth GPS antennas by Timmons Group.
2. Wetlands and waters have not been confirmed by the U.S. Army Corps of Engineers until stamped.
3. Project limits are approximate.
4. Topography based on USGS LiDAR.
5. Cowardin Stream Classifications are based on NC DWQ Stream Identification form version 4.11.

These plans and associated documents are the exclusive property of TIMMONS GROUP and may not be reproduced in whole or in part and shall not be used for any purpose whatsoever, inclusive, but not limited to construction, bidding, and/or construction staking without the express written consent of TIMMONS GROUP.

REVISIONS

#	MM/DD/YY	DESCRIPTION
1	1/05/23	Additional 78.68 Acres
2	1/16/24	Additional area added
3	06/14/2024	Feature and RPA updated

DRAWING DESCRIPTION

FIGURE 5: RESOURCE PROTECTION AREA MAP

SCALE (FEET)

0 300 600

PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE H:1 " = 300 '

SHEET NUMBER 1

Y:\804\43654.002-Cardinal_Ridge\GIS\WTDM\43654.002-JD-RPA.mxd

Appendix E – Traffic Impact Study

TRAFFIC IMPACT STUDY INCLUDED
UNDER SEPARATE COVER

Appendix F – Public Schools Data

FutureThink
PLAN TO EMPOWER

FINAL REPORT

Enrollment Projections Update
November 1, 2024

ACKNOWLEDGEMENTS

FutureThink would like to extend our appreciation to the Williamsburg-James City County Public Schools for selecting us to assist them in developing these enrollment projections. In addition, thank you to Rene Ewing for providing information necessary in the completion of this report.

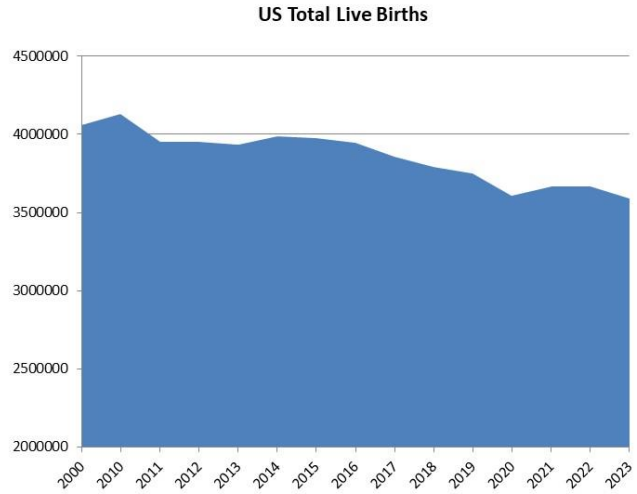
As a consulting team, we appreciate this opportunity to serve your school community as you embark on your vision for the future of education in the Williamsburg-James City County Public Schools.

Tracy Healy

President

NATIONAL & VIRGINIA TRENDS IN ENROLLMENT

The United States as a whole continues to undergo major shifts in public student enrollment. Births are a significant part of this shift. From 2000 to 2010, births increased then declined until 2014 when there was a slight uptick. Since 2014, there has been steady decline reaching an all-time low in 2020. The decrease from 2019 to 2020 was approximately 4 percent. However, in 2021, there was a slight uptick of 1.5 percent. Since, birth counts have dropped in 2022 and 2023.

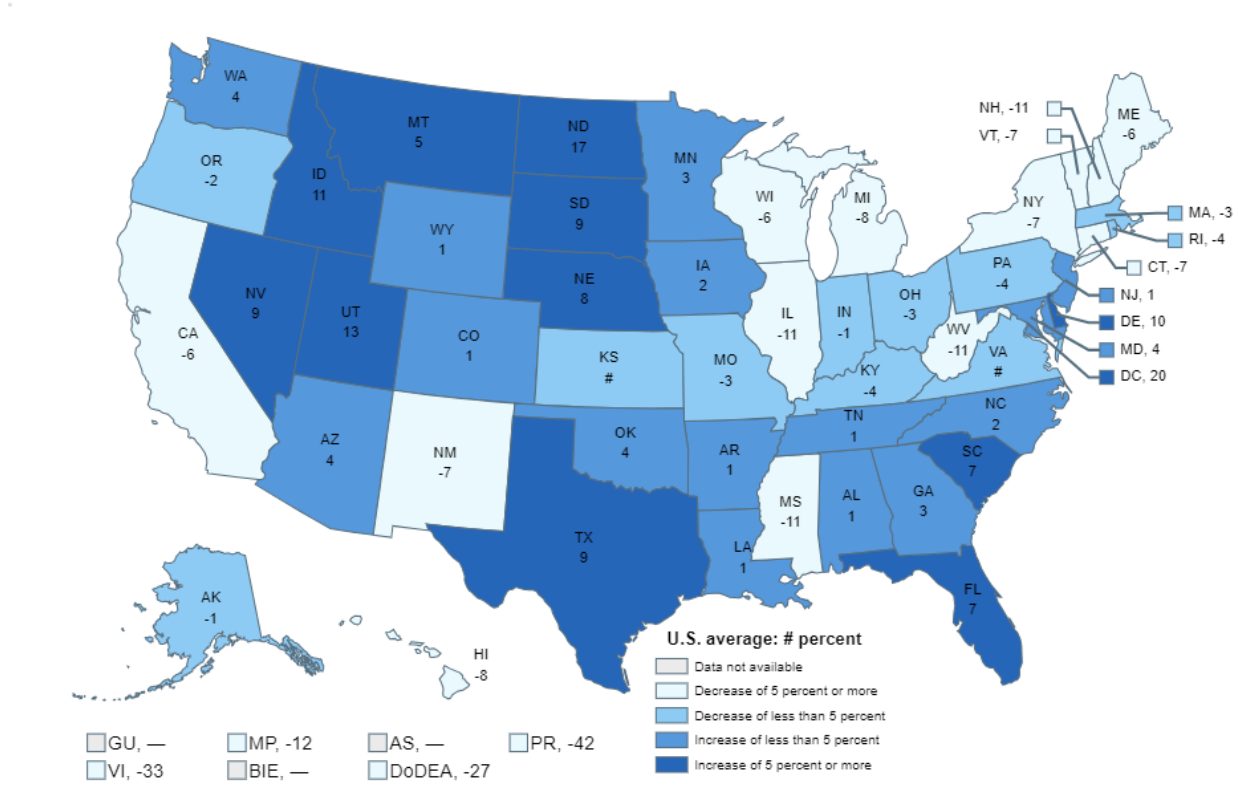


Source: CDC, NVSS, National Vital Statistics Reports, Report No. 35, April 2024

Williamsburg-James City County Public Schools

The figure below illustrates the change in Pre-K - 12 public school enrollment from the 2012-13 to the 2022-23 school year. States with growth in enrollment were primarily in the southeast and west. Virginia experienced no change.

Figure 2. Percentage change in public elementary and secondary school enrollment, by state or jurisdiction: Fall 2012 to fall 2022



— Not available.

Rounds to zero.

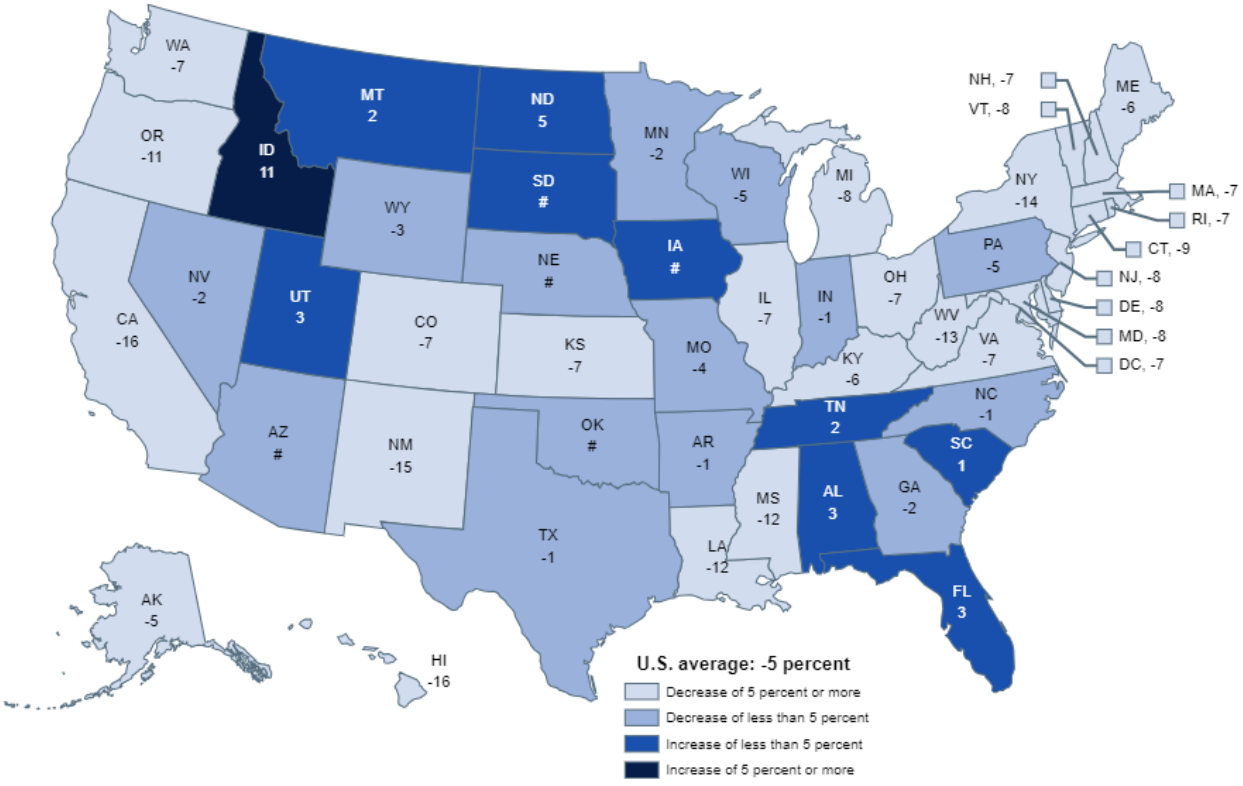
NOTE: U.S. average is for the 50 states and the District of Columbia. Data include both traditional public schools and public charter schools. Includes imputations for nonreported prekindergarten enrollment in California and Oregon for fall 2022. Figures are plotted based on unrounded data.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Nonfiscal Survey of Public Elementary/Secondary Education," 2012–13 and 2022–23. Department of Defense Education Activity (DoDEA) Data Center, Enrollment Data, 2012 and 2022, retrieved December 12, 2022, from https://www.dodea.edu/datacenter/enrollment.cfm. See *Digest of Education Statistics 2023*, table 203.20.

Williamsburg-James City County Public Schools

The figure below illustrates the projected change in Pre-K-12 public school enrollment from the 2022-23 to the 2031-32 school year. Growth is expected in only 10 states over this time period. Virginia is projected to experience a decrease of 7 percent.

Figure 3. Projected percentage change in public elementary and secondary school enrollment, by state: Fall 2022 to fall 2031



Rounds to zero.

NOTE: U.S. average is for the 50 states and the District of Columbia. Projected enrollment data are not available for the other U.S. jurisdictions. Data include both traditional public schools and public charter schools. Includes imputations for nonreported prekindergarten enrollment in California and Oregon for fall 2022. Projections in this figure were calculated after the onset of the coronavirus pandemic and take into account the expected impacts of the pandemic. Projections for fall 2023 through fall 2031 are based on historical data through fall 2021, only. Figures are plotted based on unrounded data.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Nonfiscal Survey of Public Elementary/Secondary Education," 2022–23; and State Public Elementary and Secondary Enrollment Projection Model, through 2031. See *Digest of Education Statistics 2023*, table 203.20.

ENROLLMENT PROJECTION METHODOLOGIES

When projecting future enrollments, it is vital to track the number of births, the patterns of enrollment, the amount of new housing activity, and the change in household composition.

In addition, any of the following factors could cause a significant change in projected student enrollments:

- Boundary adjustments
- New school openings
- Changes/additions in program offerings
- Preschool programs
- Change in grade configuration
- Interest rates/unemployment shifts
- Magnet/charter/private school opening or closure
- Zoning changes
- Unplanned new housing activity
- Planned, but not built, housing

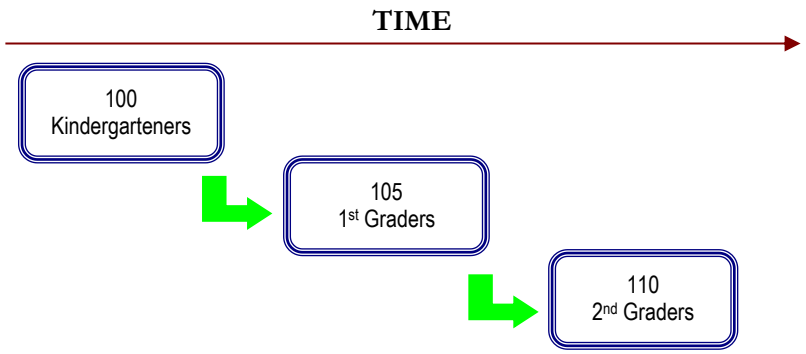
Obviously, certain factors can be gauged and planned for far better than others. For instance, it may be relatively straightforward to gather housing data from local builders regarding the total number of lots in a planned subdivision and calculate the potential student yield. However, planning for changes in the unemployment rate, and how these may either boost or reduce public school enrollment, proves more difficult. In any case, it is essential to gather a wide variety of information in preparation for producing enrollment projections.

When looking ahead at a school Division's enrollment over the next two, five, or ten years, it is helpful to approach the process from a global perspective. For example: How many new homes have been constructed each year? How many births have occurred each year in relation to the resident population? Is housing experiencing a turnover – if so, what is the composition of families moving in/out? Are more or less students attending private school or being home-schooled? What has the unemployment rate trend been over the past ten years? What new educational policies are in place now that could affect student enrollment figures?

The data sets generated from questions such as these have led to the development of general methodologies to project future student enrollments. They are as follows:

Cohort Survival Method

A cohort is a group of persons [in this case, students]. The cohort survival projection methodology uses previous live birth data and historical student enrollments to "age" a known population or cohort throughout the school grades. For instance, a cohort begins when a group of kindergarteners enrolls in grade K and moves to first grade the following year, second grade the next year, and so on.



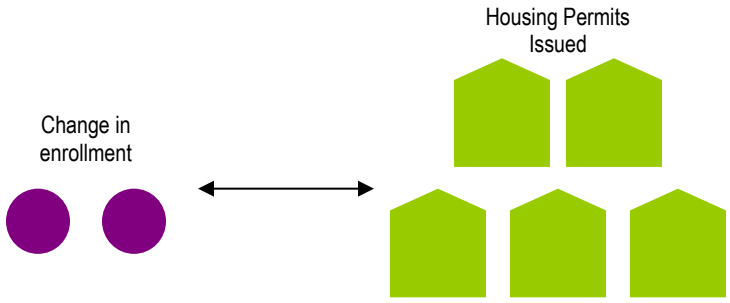
A "survival ratio" is developed to track how this group of students grew or shrunk in number as they moved through the grade levels. By developing survival ratios for each grade transition [i.e., 2nd to 3rd grade] over a ten-year period of time, patterns emerge and can be folded into projections by using the survival ratios as a multiplier.

For example, if student enrollment has consistently increased from the 8th to the 9th grade over the past ten years, the survival ratio would be greater than 100% and could be multiplied by the current 8th grade to develop a projection for next year's 9th grade. This methodology can be carried through to develop ten years of projection figures. Because there is not a grade cohort to follow for students coming into kindergarten, live birth counts are used to develop a survival ratio. Babies born five years previous to the kindergarten class are compared in number, and a ratio can be developed to project future kindergarten enrollments.

The cohort survival method is useful in areas where population is stable [relatively flat, growing steadily, or declining steadily], and where there have been no significant fluctuations in enrollment, births, and housing patterns from year to year.

Housing

Enrollment projections can also be determined by analyzing the housing data for the areas that make up a school Division. Yield factors can be established by comparing the historic change in enrollment from year to year divided by the total number of building or occupancy permits issued. For example, if student enrollment has increased by approximately 100 students each year and approximately 200 building permits have been issued each year for the past ten years, then the yield factor would be approximately .5 students per building permit.

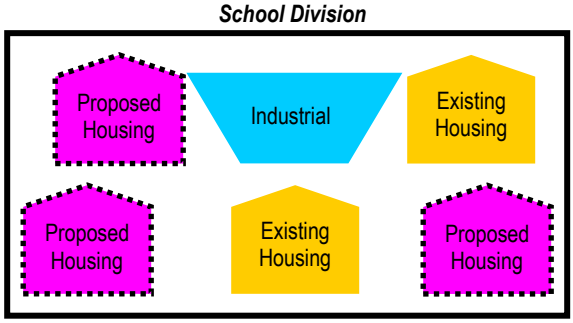


Once yield factors are established, the number of new students per year can be estimated by multiplying the yield factor by the number of projected new housing units. This method is effective when the rate of student enrollment far exceeds the live birth rate.

If housing demolitions are occurring in a Division, these must also be taken into account. For instance, if housing demolitions/withdrawals have increased rapidly over recent years while new housing starts have remained relatively constant over many years, the conclusion may be that some of the new housing starts will simply be replacements for the families displaced by the demolitions. Of course, housing value and household composition would need to be further analyzed to confirm that this is indeed the case. It is possible that enrollment may remain flat or even decline even though there is new housing occurring in the area.

Land-Saturation Analysis

Housing data also drives the land-saturation analysis enrollment methodology. In areas where there is a high rate of development and the future development patterns in the area are clear, a "build-out" scenario can be developed. The scenario takes into consideration the remaining acreage to be developed, planned rate of completion, zoning policies, density per acre, type of housing, and ratios of school-age children per household type. This method is particularly useful in areas experiencing rapid growth.



HISTORICAL ENROLLMENT

Over the past ten years, student enrollment in the Williamsburg-James City County Public Schools has increased by 76 students in grades K–12. Total enrollment for the 2024-25 school year is 11,379, an increase of 55 students from the previous school year.

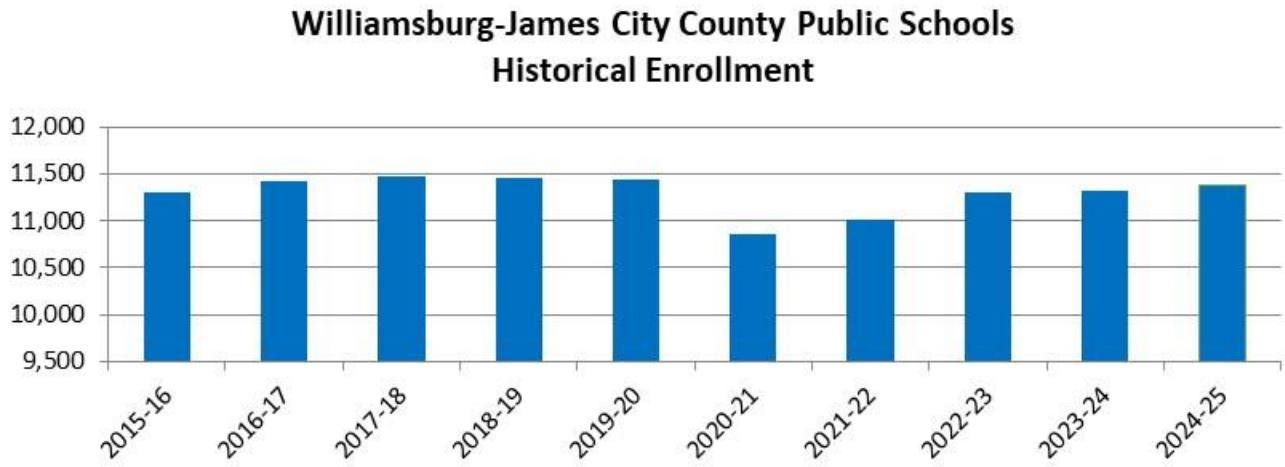
The following table and graphs illustrate the Division's enrollment history from 2015-16 through 2024-25.

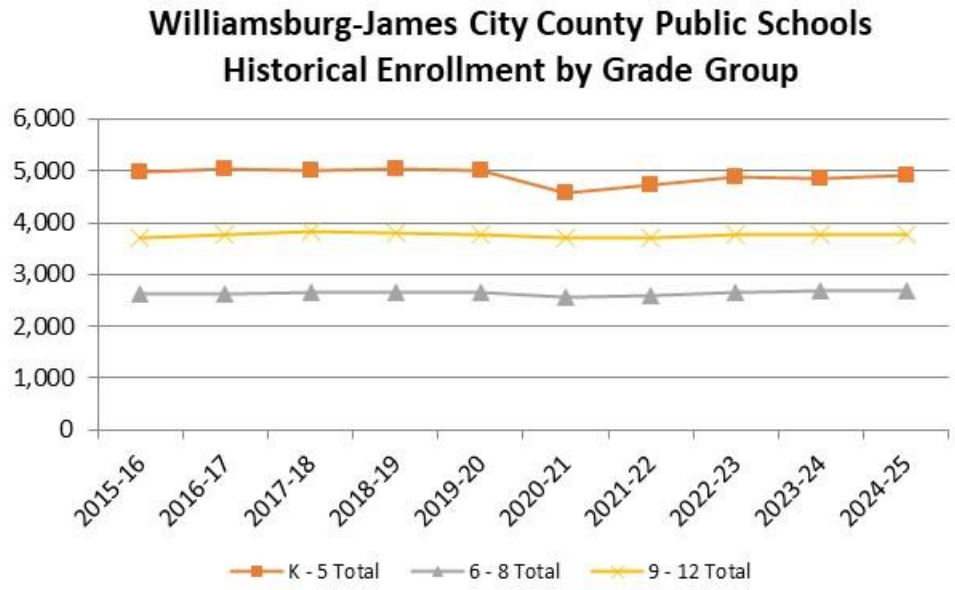
Williamsburg-James City County Public Schools
Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	760	813	770	807	788	670	763	786	733	727
1	810	792	863	791	811	765	724	847	824	803
2	832	808	808	886	832	747	803	779	850	847
3	865	860	828	825	902	762	772	814	780	883
4	871	868	868	840	833	843	784	825	834	808
5	841	887	881	875	853	796	879	822	832	856
K - 5 Total	**4,979**	**5,028**	**5,018**	**5,024**	**5,019**	**4,583**	**4,725**	**4,873**	**4,853**	**4,924**
6	887	879	857	897	884	824	836	922	835	845
7	859	886	876	872	892	864	851	869	961	860
8	873	863	907	872	879	867	898	874	896	976
6 - 8 Total	**2,619**	**2,628**	**2,640**	**2,641**	**2,655**	**2,555**	**2,585**	**2,665**	**2,692**	**2,681**
9	953	1,008	931	989	940	958	1,015	1,036	957	1,043
10	976	965	1,035	948	1,005	912	932	991	992	906
11	939	918	959	958	897	964	833	886	928	925
12	837	884	894	901	932	886	928	857	902	900
9 - 12 Total	**3,705**	**3,775**	**3,819**	**3,796**	**3,774**	**3,720**	**3,708**	**3,770**	**3,779**	**3,774**
K - 12 Total	**11,303**	**11,431**	**11,477**	**11,461**	**11,448**	**10,858**	**11,018**	**11,308**	**11,324**	**11,379**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Williamsburg-James City County Public Schools





Williamsburg-James City County Public Schools

The following table illustrates the Division's enrollment history by school from 2015-16 through 2024-25. During that time, James Blair Middle School opened.

Williamsburg-James City County Public Schools
Historical Enrollment by School

School	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Baker Elementary	536	528	513	515	491	443	469	493	475	457
Laurel Lane Elementary	482	487	486	465	464	430	419	494	485	526
Montague Elementary	438	461	482	503	506	464	507	514	520	515
Norge Elementary	610	591	583	583	593	553	569	603	575	578
Whaley Elementary	512	489	480	541	500	429	452	435	454	485
James River Elementary	492	502	498	448	454	428	420	431	445	449
Stonehouse Elementary	714	727	723	745	764	718	758	802	827	838
Matoaka Elementary	721	730	754	745	760	674	675	643	601	595
Blayton Elementary	474	513	499	479	487	444	456	458	471	481
Berkeley Middle	880	860	881	596	633	599	631	652	665	666
Toano Middle	803	826	816	701	678	628	616	678	700	704
Hornsby Middle	936	942	943	794	809	795	793	790	807	805
James Blair Middle				550	535	533	545	545	520	506
Lafayette High	1,209	1,152	1,130	1,112	1,113	1,123	1,137	1,213	1,249	1,251
Jamestown High	1,308	1,328	1,317	1,296	1,289	1,257	1,237	1,232	1,232	1,244
Warhill High	1,188	1,295	1,372	1,388	1,372	1,340	1,334	1,325	1,298	1,279
Total	**11,303**	**11,431**	**11,477**	**11,461**	**11,448**	**10,858**	**11,018**	**11,308**	**11,324**	**11,379**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

ACTUAL VERSUS PROJECTED ENROLLMENT

Actual enrollment for the 2024-25 school year fell between the moderate and low previously developed projections. The actual enrollment was 123 students more than the low projection and 68 students less than the moderate projection. Both projections were within 1% of the actual enrollment.

Williamsburg-James City County Public Schools
Actual vs. Projected Enrollment - Low

Grade	2024-25 Actual	Low Projection	Difference	Percentage
K	727	822	-95	-13.07%
1	803	758	45	5.60%
2	847	832	15	1.77%
3	883	849	34	3.85%
4	808	783	25	3.09%
5	856	838	18	2.10%
6	845	839	6	0.71%
7	860	848	12	1.40%
8	976	958	18	1.84%
9	1,043	970	73	7.00%
10	906	935	-29	-3.20%
11	925	930	-5	-0.54%
12	900	894	6	0.67%
Total	**11,379**	**11,256**	**123**	**1.08%**

Source: Williamsburg-James City County Public Schools, FutureThink

Williamsburg-James City County Public Schools
Actual vs. Projected Enrollment - Moderate

Grade	2024-25 Actual	Moderate Projection	Difference	Percentage
K	727	838	-111	-15.20%
1	803	768	35	4.36%
2	847	847	0	-0.03%
3	883	862	21	2.34%
4	808	796	12	1.48%
5	856	853	3	0.36%
6	845	865	-20	-2.37%
7	860	857	3	0.35%
8	976	974	2	0.20%
9	1,043	991	52	4.99%
10	906	947	-41	-4.53%
11	925	943	-18	-1.95%
12	900	906	-6	-0.67%
Total	**11,379**	**11,447**	**-68**	**-0.60%**

Source: Williamsburg-James City County Public Schools, FutureThink

Williamsburg-James City County Public Schools

The following compares the moderate projections by school. The schools with the largest differences between actual and projected enrollment include: Warhill High School (-31), Montague Elementary School (-26), and Baker Elementary School (-25). The rest are within 24 students or less.

Williamsburg-James City County Public Schools
Actual vs. Projected Enrollment - Moderate

School	2024-25 Actual	Moderate Projection	Difference	Percentage
Baker Elementary	457	482	-25	-5.47%
Laurel Lane Elementary	526	502	24	4.56%
Montague Elementary	515	541	-26	-5.05%
Norge Elementary	578	580	-2	-0.35%
Whaley Elementary	485	462	23	4.74%
James River Elementary	449	459	-10	-2.23%
Stonehouse Elementary	838	847	-9	-1.07%
Matoaka Elementary	595	601	-6	-1.01%
Blayton Elementary	481	490	-9	-1.87%
Berkeley Middle	666	661	5	0.75%
Toano Middle	704	696	8	1.14%
Hornsby Middle	805	821	-16	-1.99%
James Blair Middle	506	518	-12	-2.37%
Lafayette High	1,251	1,241	10	0.80%
Jamestown High	1,244	1,236	8	0.64%
Warhill High	1,279	1,310	-31	-2.42%
Total	**11,379**	**11,447**	**-68**	**-0.60%**

Source: Williamsburg-James City County Public Schools, FutureThink

LIVE BIRTH DATA

Utilization of live birth data is recommended when projecting future kindergarten enrollments. This data provides a helpful overall trend. Large bubbles in birth counts, both up or down, can also be planned for and anticipated by the Division.

In addition, the live birth counts are used in determining a birth-to-kindergarten survival ratio. This ratio identifies the percentage of children born in a representative area who attend kindergarten in the Division five years later. The survival ratios for birth-to-kindergarten as well as grades 1-12 can be found later in this report.

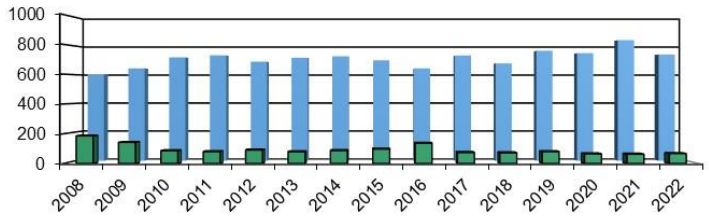
The chart and graph that follow illustrate live birth counts in Williamsburg and James City County.

Williamsburg & James City County
Live Birth Count
2008-2022

Year	Williamsburg	James City County	Total
2008	186	602	788
2009	142	644	786
2010	86	721	807
2011	80	735	815
2012	91	691	782
2013	79	718	797
2014	87	729	816
2015	97	701	798
2016	137	644	781
2017	74	734	808
2018	72	679	751
2019	80	767	847
2020	65	750	815
2021	63	841	904
2022	67	741	808

Source: Virginia Department of Health, Office of Vital Records and Health Statistics

Williamsburg & James City County
Birth Counts



DEMOGRAPHICS

The Williamsburg-James City County Public School Division is comprised of Williamsburg City and James City County, Virginia. General demographic information follows.

General Demographic Information

	James City County	Virginia
Per Capita Income	$57,962	$47,199
Median Household Income	$110,137	$85,873
Persons Below Poverty	7.9%	10.6%

Source: US Census, American Community Survey 2022, 5-year estimates

Total Population

	2010	2020
Williamsburg City	14,068	15,425
James City County	67,009	78,254

Source: US Census 2010; 2020 Decennial Census

Following are block group estimates and projections provided by ESRI Business Information Solutions (ESRI BIS). ESRI BIS uses a time series of estimates from the U.S. Census Bureau that includes the latest estimates and intercensal estimates adjusted for error of closure. The Census Bureau's time series is consistent, but testing has revealed improved accuracy by using a variety of sources to track county population trends.

ESRI BIS also employs a time series of building permits and housing starts plus residential deliveries. Finally, local data sources that tested well against Census data are reviewed. Data sources are integrated and then analyzed by Census Block Groups.

Sources of data include:

- Supplementary Surveys of the Census Bureau
- Bureau of Labor Statistics' (BLS) Local Area Unemployment Statistics
- BLS Occupational Employment Statistics
- *Info*USA
- U.S. Bureau of the Census' Current Population Survey
- National Planning Association Data Service

Below is a list of definitions as they appear on the U.S. Census Bureau website, to aid in interpretation of the following tables and maps.

Household:
A household includes all the people who occupy a housing unit as their usual place of residence.

Average family size:
A measure obtained by dividing the number of members of families by the total number of families (or family householders).

Family household (Family):
A family includes a householder and one or more people living in the same household who are related to the householder by birth, marriage, or adoption. All people who are related to the householder are regarded as members of his or her family. A family household may contain people not related to the householder, but those people are not included as part of the householder's family in census tabulations. Thus, the number of family households is equal to the number of families, but family households may include more members than do families. A household can contain only one family for purposes of census tabulations. Not all households contain families since a household may comprise a group of unrelated people or one person living alone.

Householder:
The person, or one of the people, in whose name the home is owned, being bought, or rented. If there is no such person present, any household member 15 years old and over can serve as the householder for the purposes of the census. Two types of householders are distinguished: a family householder and a nonfamily householder. A family householder is a householder living with one or more people related to him or her by birth, marriage, or adoption. The householder and all people in the household related to him are family members. A nonfamily householder is a householder living alone or with nonrelatives only.

Williamsburg-James City County Public Schools

The following tables illustrate the current estimates and 5-year population projections based on block groups that comprise the Division, indicating areas of current and projected growth. The tables have been developed to determine selected age group projections and projections for household income, family size, and family income.

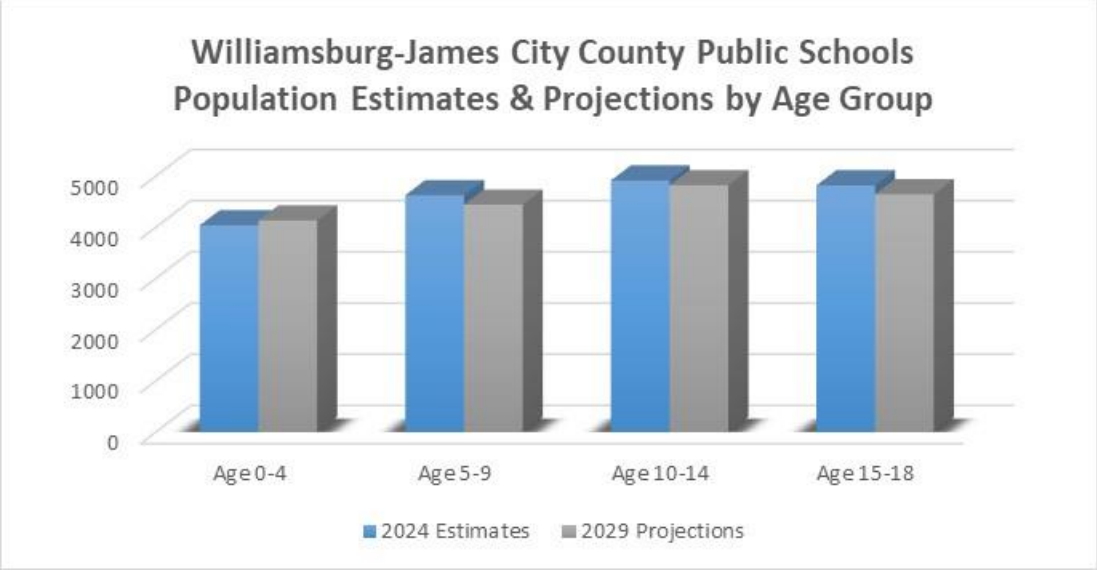
The total population in the Division is 98,754. This population is projected to increase by 4,353 people, or approximately 4% over a 5-year period.

The 0–18-year-old population in the Division currently totals 18,403. This population is projected to decrease by 359 children, or 2 percent.

The median age is projected to increase by approximately 3% from 45.0 to 46.3 years of age.

Williamsburg-James City County Public Schools	2024 Estimates	2029 Projections	Change 2024-29	Change 2024-29 (%)
Total Population	98,754	103,107	4,353	4.4%
Age 0-4	4,041	4,134	93	2.3%
Age 5-9	4,628	4,442	-186	-4.0%
Age 10-14	4,914	4,822	-92	-1.9%
Age 15-18	4,820	4,646	-174	-3.6%
Total Age 0-18	18,403	18,044	-359	-2.0%
Median Age	45.0	46.3	1.3	2.9%

Source: ESRI



Williamsburg-James City County Public Schools

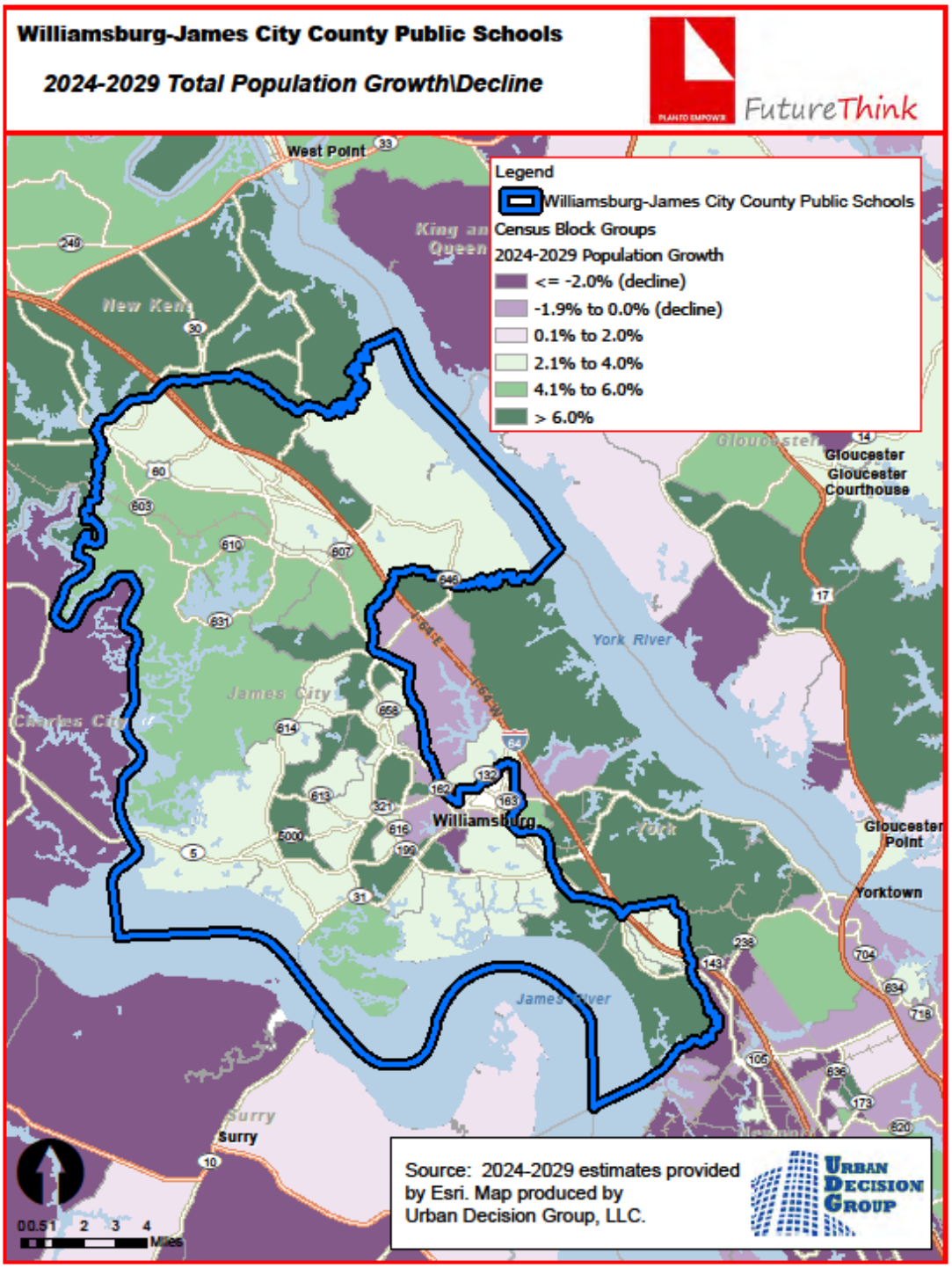
Median and average household incomes in the Division are projected to increase by approximately 11% and 15%, respectively, over a 5-year period. The average family size is projected to decline slightly, and the number of family households is projected to increase by approximately 5 percent.

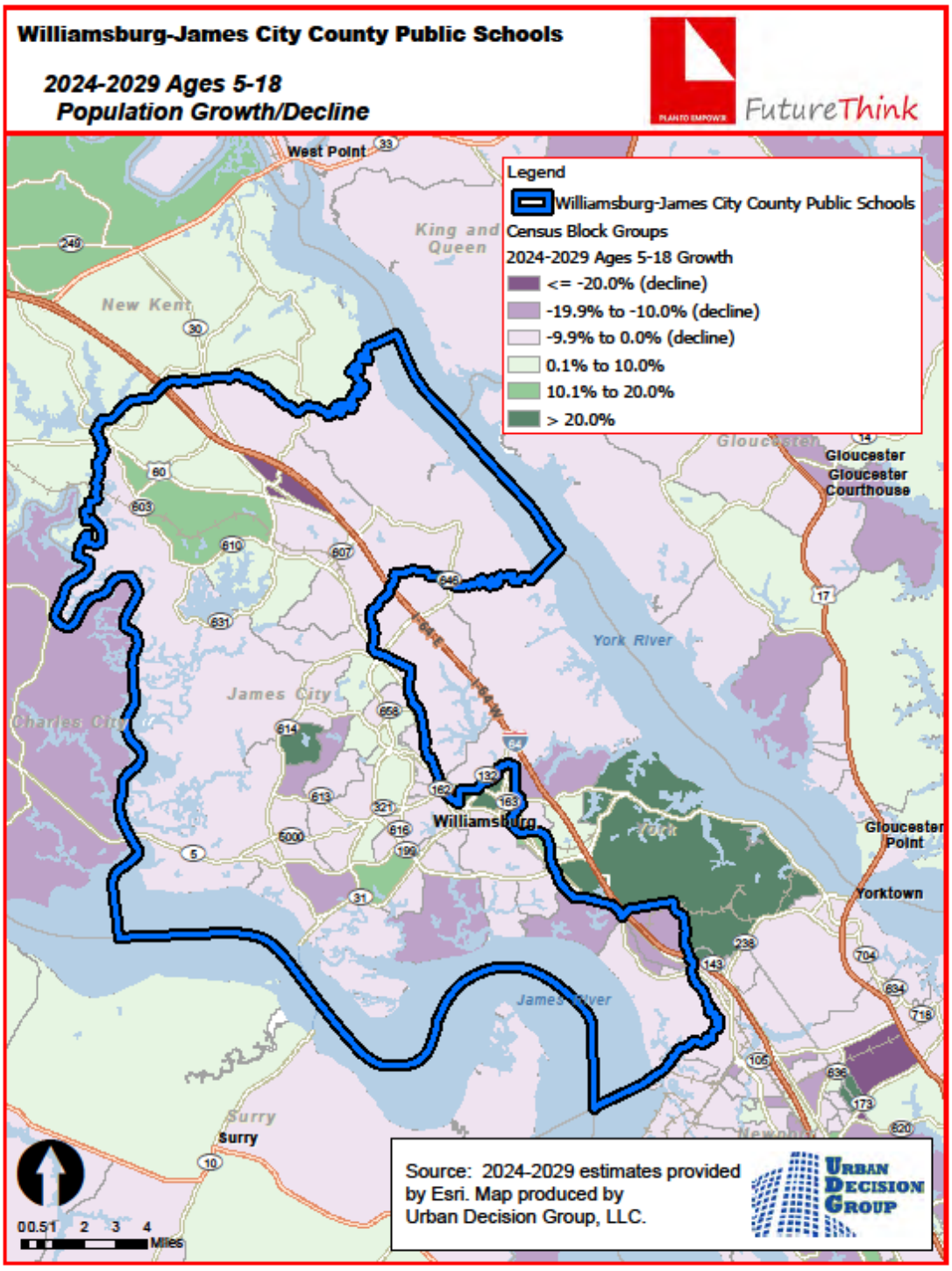
Williamsburg-James City County Public Schools	2024 Estimates	2029 Projections	Change 2024-29	Change 2024-29 (%)
Median Household Income	$100,213	$111,528	$11,315	11.3%
Average Household Income	$135,607	$156,248	$20,641	15.2%
Average Family Size	2.88	2.87	-0.01	-0.3%
Total Family Households	26,149	27,435	1,286	4.9%

Source: ESRI

The maps on the following pages illustrate the data identified in the tables. The color coding identifies areas within the Division that may be increasing or decreasing at different rates than others.

Williamsburg-James City County Public Schools




Williamsburg-James City County Public Schools
2024-2029 Ages 5-18
Population Growth/Decline
FutureThink
Legend
Williamsburg-James City County Public Schools
Census Block Groups
2024-2029 Ages 5-18 Growth
<= -20.0% (decline)
-19.9% to -10.0% (decline)
-9.9% to 0.0% (decline)
0.1% to 10.0%
10.1% to 20.0%
> 20.0%
West Point
King and Queen
New Kent
James City
Charles City
York River
James River
Surry
Williamsburg
Gloucester
Gloucester Courthouse
Gloucester Point
Yorktown
Source: 2024-2029 estimates provided by Esri. Map produced by Urban Decision Group, LLC.
Urban Decision Group
0 0.5 1 2 3 4 Miles

HOUSING INFORMATION

The total number of new single-family dwellings in Williamsburg and James City County has fluctuated between 279 and 484 units over the past several years. Beginning in 2021, there are no age-restricted communities reflected in the number of permits issued.

# of Single-Family Building Permits Issued

Year	Williamsburg	James City County	Total
2011	29	318	347
2013	11	378	389
2014	30	454	484
2015	21	381	402
2016	49	374	423
2017	43	335	378
2018	25	386	411
2019	29	250	279
2020	28	314	342
2021	33	341	374
2022	47	261	308
2023	15	321	336
2024*	3	213	216

Source: City of Williamsburg, SOCDS Building Permits Database

* through September 20, 2024 for Williamsburg & September 30, 2024 for James City County

SURVIVAL RATIOS

The chart below demonstrates the changes in enrollment as students move through the system. Percentages greater than 100 indicate that there are more students than there were in the previous grade the previous year. In other words, there was growth and new students were added to the system. Percentages less than 100 indicate that there was decline or students left the system.

- Birth to Kindergarten: This ratio indicates the number of children born in the area who attend kindergarten in the Division 5 years later. Percentages less than 100% result from movement out of the Division, attendance at a non-public or charter school, or residence in another Division within the same area. Percentages greater than 100% represent people moving into the Division with children of Kindergarten age.

- Grades 8-9: The higher than usual percentage often is a result of Division promotion policies. Often in school Divisions, students are promoted from 8th to 9th grade and after one year in 9th grade do not have sufficient credits to be classified as 10th graders and are counted again as 9th graders the following year. There may also be students who are attending private or charter schools or are home schooled through grade 8 and then attend public schools for high school education.

The following table illustrates the survival ratios for the Williamsburg-James City County Public Schools.

from	to	birth -> K	K->1	1->2	2->3	3->4	4->5	5->6	6->7	7->8	8->9	9->10	10->11	11->12
2015	2016	99.8%	104.2%	99.8%	103.4%	100.3%	101.8%	104.5%	99.9%	100.5%	115.5%	101.3%	94.1%	94.1%
2016	2017	98.5%	106.2%	102.0%	102.5%	100.9%	101.5%	96.6%	99.7%	102.4%	107.9%	102.7%	99.4%	97.4%
2017	2018	101.3%	102.7%	102.7%	102.1%	101.4%	100.8%	101.8%	101.8%	99.5%	109.0%	101.8%	92.6%	94.0%
2018	2019	96.6%	100.5%	105.2%	101.8%	101.0%	101.5%	101.0%	99.4%	100.8%	107.8%	101.6%	94.6%	97.3%
2019	2020	84.0%	97.1%	92.1%	91.6%	93.5%	95.6%	96.6%	97.7%	97.2%	109.0%	97.0%	95.9%	98.8%
2020	2021	97.7%	108.1%	105.0%	103.3%	102.9%	104.3%	105.0%	103.3%	103.9%	117.1%	97.3%	91.3%	96.3%
2021	2022	97.3%	111.0%	107.6%	101.4%	106.9%	104.8%	104.9%	103.9%	102.7%	115.4%	97.6%	95.1%	102.9%
2022	2023	97.6%	104.8%	100.4%	100.1%	102.5%	100.8%	101.6%	104.2%	103.1%	109.5%	95.8%	93.6%	101.8%
2023	2024	85.8%	109.5%	102.8%	103.9%	103.6%	102.6%	101.6%	103.0%	101.6%	116.4%	94.7%	93.2%	97.0%
	average	95.38%	104.902%	101.94%	101.1%	101.44%	101.5%	101.5%	101.4%	101.3%	111.946%	98.861%	94.425%	97.719%
	standard deviation	5.774%	4.166%	4.175%	3.541%	3.376%	2.505%	3.004%	2.192%	1.951%	3.759%	2.815%	2.170%	2.875%

ENROLLMENT PROJECTIONS

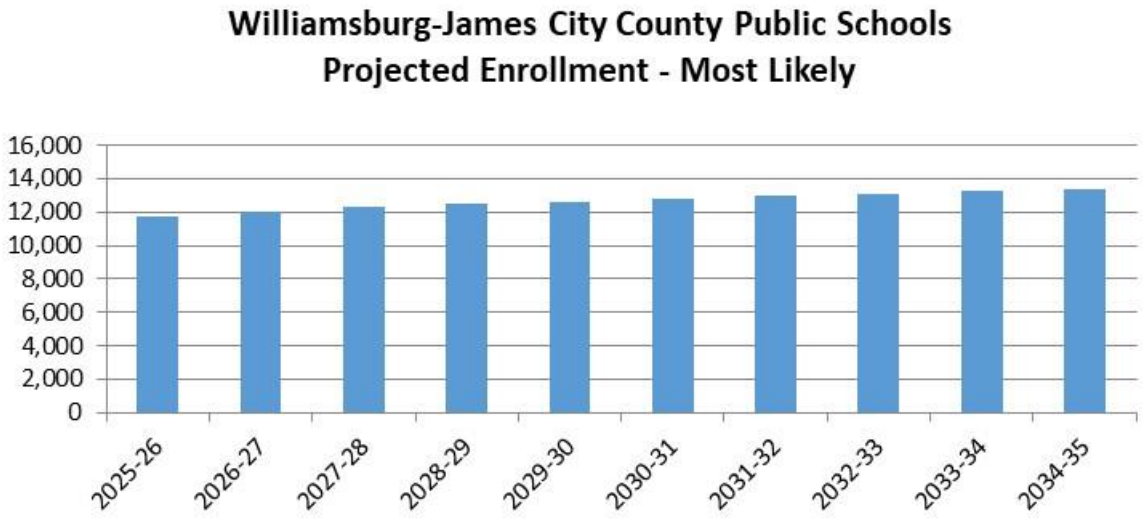
Following is the most likely ten-year projected enrollment. According to this projection, enrollment would increase 2,008 students in grades K–12 from the current 2024-25 enrollment of 11,379 to the 2034-35 projected enrollment of 13,387, an increase of approximately 18 percent.

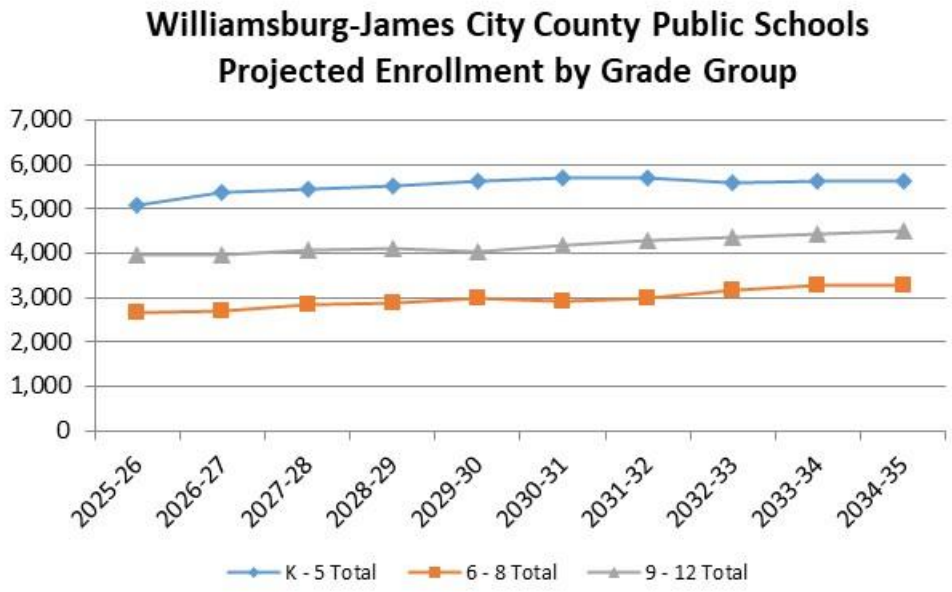
Williamsburg-James City County Public Schools
Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	805	891	789	814	799	802	805	805	807	809
1	797	883	978	865	892	876	877	881	885	885
2	845	836	924	1,025	909	935	919	921	923	926
3	873	872	860	950	1,056	935	964	946	948	950
4	936	925	924	916	1,008	1,118	991	1,019	1,002	1,005
5	838	968	957	959	947	1,044	1,159	1,024	1,056	1,039
K - 5 Total	**5,094**	**5,375**	**5,432**	**5,529**	**5,611**	**5,710**	**5,715**	**5,596**	**5,621**	**5,614**
6	897	866	979	965	946	922	1,019	1,130	1,010	1,031
7	876	927	896	1,014	998	979	955	1,054	1,168	1,044
8	884	899	954	919	1,042	1,026	1,005	980	1,082	1,200
6 - 8 Total	**2,657**	**2,692**	**2,829**	**2,898**	**2,986**	**2,927**	**2,979**	**3,164**	**3,260**	**3,275**
9	1,124	1,019	1,041	1,077	1,039	1,177	1,160	1,148	1,119	1,236
10	1,023	1,101	998	1,019	1,054	1,018	1,152	1,136	1,124	1,095
11	863	974	1,048	949	970	1,002	968	1,097	1,081	1,070
12	940	878	985	1,063	963	984	1,018	982	1,112	1,097
9 - 12 Total	**3,950**	**3,972**	**4,072**	**4,108**	**4,026**	**4,181**	**4,298**	**4,363**	**4,436**	**4,498**
K - 12 Total	**11,701**	**12,039**	**12,333**	**12,535**	**12,623**	**12,818**	**12,992**	**13,123**	**13,317**	**13,387**

Source: FutureThink

Williamsburg-James City County Public Schools





Historical & Projected Enrollment by School

The following charts illustrate the historical and most likely projected enrollment of each school in the Division.

Baker Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	71	83	79	86	72	55	75	93	68	81
1	88	79	94	78	86	70	57	81	92	66
2	97	91	76	96	83	78	76	61	78	88
3	84	95	89	74	91	86	82	84	61	73
4	93	80	96	84	74	85	86	88	88	66
5	103	100	79	97	85	69	93	86	88	83
Total	**536**	**528**	**513**	**515**	**491**	**443**	**469**	**493**	**475**	**457**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Baker Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	85	94	84	86	84	85	85	85	85	86
1	84	88	98	87	89	87	88	88	88	88
2	67	85	90	99	89	91	89	89	90	90
3	90	69	87	91	101	91	93	91	91	91
4	79	97	74	94	99	109	98	100	98	98
5	66	79	97	75	95	99	110	98	101	99
Total	**471**	**512**	**530**	**532**	**557**	**562**	**563**	**551**	**553**	**552**

Source: FutureThink

Williamsburg-James City County Public Schools

Laurel Lane Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	85	79	84	77	81	66	74	86	94	81
1	82	87	88	81	80	77	68	83	82	104
2	78	75	90	72	74	69	75	85	79	95
3	86	80	74	88	83	68	62	78	78	88
4	84	79	71	72	76	71	78	79	73	83
5	67	87	79	75	70	79	62	83	79	75
Total	**482**	**487**	**486**	**465**	**464**	**430**	**419**	**494**	**485**	**526**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Laurel Lane Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	89	99	88	90	89	89	89	89	90	90
1	87	96	106	95	97	95	95	96	96	96
2	117	98	108	119	107	109	107	107	107	108
3	98	120	100	111	123	110	112	110	110	111
4	99	110	135	113	125	138	124	126	124	124
5	86	102	114	140	117	129	143	128	130	128
Total	**576**	**625**	**651**	**668**	**658**	**670**	**670**	**656**	**657**	**657**

Source: FutureThink

Montague Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	75	91	72	80	71	75	71	83	87	70
1	63	73	87	77	84	73	75	83	88	97
2	72	75	81	90	84	82	84	84	87	87
3	76	68	74	91	91	68	91	82	83	96
4	88	79	82	81	92	87	81	93	87	80
5	64	75	86	84	84	79	105	89	88	85
Total	**438**	**461**	**482**	**503**	**506**	**464**	**507**	**514**	**520**	**515**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Montague Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	83	92	82	84	82	82	83	83	83	83
1	79	94	104	93	95	93	93	94	94	94
2	103	85	100	111	99	101	99	100	100	100
3	90	107	87	103	115	102	105	103	103	103
4	99	92	110	90	106	118	105	108	106	106
5	81	100	94	112	91	108	120	107	109	107
Total	**535**	**570**	**577**	**593**	**588**	**604**	**605**	**595**	**595**	**593**

Source: FutureThink

Williamsburg-James City County Public Schools

Norge Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	99	102	105	102	92	88	96	106	71	89
1	96	109	91	96	101	91	84	106	107	87
2	104	91	97	96	108	93	99	89	99	106
3	97	100	95	99	95	94	96	95	93	102
4	100	92	100	98	109	84	98	105	100	91
5	114	97	95	92	88	103	96	102	105	103
Total	**610**	**591**	**583**	**583**	**593**	**553**	**569**	**603**	**575**	**578**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Norge Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	97	107	96	98	96	97	97	97	97	97
1	99	107	119	106	109	107	107	107	108	108
2	88	99	108	120	107	110	108	108	108	108
3	108	89	101	110	122	109	112	109	110	110
4	107	114	94	107	116	129	115	117	115	116
5	94	110	117	97	110	119	132	118	121	119
Total	**593**	**626**	**635**	**638**	**660**	**671**	**671**	**656**	**659**	**658**

Source: FutureThink

Whaley Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	76	69	74	105	73	59	71	72	77	82
1	99	71	85	87	104	59	68	74	74	82
2	102	86	68	91	89	89	65	66	80	83
3	81	108	81	74	81	75	88	65	71	86
4	84	77	95	86	62	81	68	84	70	81
5	70	78	77	98	91	66	92	74	82	71
Total	**512**	**489**	**480**	**541**	**500**	**429**	**452**	**435**	**454**	**485**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Whaley Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	81	89	80	82	80	80	81	81	81	81
1	86	85	94	84	86	84	84	85	85	85
2	89	93	91	101	91	93	91	91	91	92
3	87	92	97	95	106	95	97	95	95	95
4	93	93	99	104	103	114	102	104	102	102
5	84	96	96	103	108	106	118	105	107	105
Total	**520**	**548**	**557**	**569**	**574**	**572**	**573**	**561**	**561**	**560**

Source: FutureThink

Williamsburg-James City County Public Schools

James River Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	75	80	68	70	72	67	69	78	71	57
1	74	77	85	57	69	76	75	75	78	76
2	70	74	75	94	62	63	77	84	76	78
3	99	78	83	75	93	61	62	71	81	79
4	87	103	80	79	74	88	55	65	71	83
5	87	90	107	73	84	73	82	58	68	76
Total	**492**	**502**	**498**	**448**	**454**	**428**	**420**	**431**	**445**	**449**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

James River Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	77	85	76	78	76	77	77	77	77	77
1	60	80	89	80	81	80	80	80	81	81
2	80	63	84	94	84	85	84	84	84	85
3	79	81	63	85	95	85	86	85	85	85
4	82	82	84	66	88	98	88	89	88	88
5	88	87	87	88	69	94	104	93	95	93
Total	**466**	**478**	**483**	**491**	**493**	**519**	**519**	**508**	**510**	**509**

Source: FutureThink

Stonehouse Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	104	119	97	116	133	106	139	116	114	120
1	115	110	129	106	113	127	117	156	129	127
2	115	112	126	140	112	113	131	132	161	135
3	126	117	118	129	141	111	115	142	139	159
4	133	132	119	126	137	134	116	134	143	150
5	121	137	134	128	128	127	140	122	141	147
Total	**714**	**727**	**723**	**745**	**764**	**718**	**758**	**802**	**827**	**838**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Stonehouse Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	120	133	119	121	119	119	120	120	120	121
1	134	134	148	132	135	133	133	133	134	134
2	134	141	141	157	140	143	140	141	141	141
3	141	141	148	148	164	147	150	147	148	148
4	173	154	153	162	161	179	160	163	160	161
5	157	181	161	161	169	169	187	167	171	168
Total	**859**	**884**	**870**	**881**	**888**	**890**	**890**	**871**	**874**	**873**

Source: FutureThink

Williamsburg-James City County Public Schools

Matoaka Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	106	103	115	107	111	84	97	90	80	82
1	116	117	112	132	109	113	105	106	105	95
2	117	123	127	117	135	103	112	102	98	96
3	126	133	127	124	133	125	114	110	94	105
4	118	131	141	125	133	122	121	114	110	95
5	138	123	132	140	139	127	126	121	114	122
Total	**721**	**730**	**754**	**745**	**760**	**674**	**675**	**643**	**601**	**595**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Matoaka Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	103	115	102	105	103	103	103	103	104	104
1	96	121	134	119	122	120	120	120	121	121
2	91	92	116	128	115	117	115	115	116	116
3	98	93	93	117	130	116	119	117	117	117
4	106	98	93	94	118	131	117	120	117	118
5	98	109	101	96	97	122	136	121	124	122
Total	**592**	**628**	**639**	**659**	**685**	**709**	**710**	**696**	**699**	**698**

Source: FutureThink

Blayton Elementary School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
K	69	87	76	64	83	70	71	62	71	65
1	77	69	92	77	65	79	75	83	69	69
2	77	81	68	90	85	57	84	76	92	79
3	90	81	87	71	94	74	62	87	80	95
4	84	95	84	89	76	91	81	63	92	79
5	77	100	92	88	84	73	83	87	67	94
Total	**474**	**513**	**499**	**479**	**487**	**444**	**456**	**458**	**471**	**481**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Blayton Elementary School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	70	77	62	70	70	70	70	70	70	70
1	72	78	86	69	78	77	77	78	78	78
2	76	80	86	96	77	86	86	86	86	86
3	82	80	84	90	100	80	90	89	89	90
4	98	85	82	86	92	102	82	92	92	92
5	84	104	90	87	91	98	109	87	98	98
Total	**482**	**504**	**490**	**498**	**508**	**513**	**514**	**502**	**513**	**514**

Source: FutureThink

Williamsburg-James City County Public Schools

Berkeley Middle School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
6	290	288	313	192	232	202	207	227	204	207
7	293	280	283	216	194	210	195	214	235	219
8	297	292	285	188	207	187	229	211	226	240
Total	**880**	**860**	**881**	**596**	**633**	**599**	**631**	**652**	**665**	**666**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Berkeley Middle School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	220	212	240	237	231	225	249	276	247	252
7	216	229	221	250	246	241	235	259	287	257
8	229	226	240	231	262	258	252	246	271	301
Total	**665**	**667**	**701**	**718**	**739**	**724**	**736**	**781**	**805**	**810**

Source: FutureThink

Toano Middle School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
6	268	275	262	232	207	190	210	235	215	228
7	276	275	276	230	245	195	203	233	250	220
8	259	276	278	239	226	243	203	210	235	256
Total	**803**	**826**	**816**	**701**	**678**	**628**	**616**	**678**	**700**	**704**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Toano Middle School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	231	223	252	249	246	240	265	294	263	268
7	241	243	235	266	262	260	253	280	310	277
8	226	247	250	241	273	269	266	260	287	318
Total	**698**	**713**	**737**	**756**	**781**	**769**	**784**	**834**	**860**	**863**

Source: FutureThink

Williamsburg-James City County Public Schools

Hornsby Middle School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
6	329	316	282	270	279	262	248	278	262	248
7	290	331	317	244	262	279	264	248	287	263
8	317	295	344	280	268	254	281	264	258	294
Total	**936**	**942**	**943**	**794**	**809**	**795**	**793**	**790**	**807**	**805**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Hornsby Middle School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	269	260	294	289	283	276	305	338	302	308
7	252	273	264	299	294	287	280	309	343	306
8	270	259	281	271	307	302	295	287	317	352
Total	**791**	**792**	**839**	**859**	**884**	**865**	**880**	**934**	**962**	**966**

Source: FutureThink

James Blair Middle School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
6				203	166	170	171	182	154	162
7				182	191	180	189	174	189	158
8				165	178	183	185	189	177	186
Total				**550**	**535**	**533**	**545**	**545**	**520**	**506**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

James Blair Middle School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	177	171	193	190	186	181	200	222	198	203
7	167	182	176	199	196	191	187	206	228	204
8	159	167	183	176	200	197	192	187	207	229
Total	**503**	**520**	**552**	**565**	**582**	**569**	**579**	**615**	**633**	**636**

Source: FutureThink

Williamsburg-James City County Public Schools

Lafayette High School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
9	310	290	284	287	273	283	309	362	307	333
10	319	318	287	295	306	258	295	314	353	301
11	297	291	289	263	285	310	247	272	307	324
12	283	253	270	267	249	272	286	265	282	293
Total	**1,209**	**1,152**	**1,130**	**1,112**	**1,113**	**1,123**	**1,137**	**1,213**	**1,249**	**1,251**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Lafayette High School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	372	337	344	356	344	389	384	380	370	409
10	334	373	338	345	357	345	390	385	381	371
11	284	316	352	319	326	337	326	369	364	360
12	327	287	318	355	322	329	340	328	372	367
Total	**1,317**	**1,313**	**1,352**	**1,375**	**1,349**	**1,400**	**1,440**	**1,462**	**1,487**	**1,507**

Source: FutureThink

Jamestown High School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
9	331	346	307	336	324	330	341	346	332	325
10	337	321	362	307	339	320	290	309	311	314
11	344	323	333	330	296	311	287	284	284	305
12	296	338	315	323	330	296	319	293	305	300
Total	**1,308**	**1,328**	**1,317**	**1,296**	**1,289**	**1,257**	**1,237**	**1,232**	**1,232**	**1,244**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Jamestown High School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	370	336	343	355	342	388	382	378	369	407
10	303	345	313	319	330	319	361	356	352	343
11	305	294	335	303	310	320	309	350	345	342
12	323	322	311	354	321	328	339	327	370	365
Total	**1,301**	**1,297**	**1,302**	**1,331**	**1,303**	**1,355**	**1,391**	**1,411**	**1,436**	**1,457**

Source: FutureThink

Warhill High School

Historical Enrollment

Grade	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
9	312	372	340	366	343	345	365	328	318	385
10	320	326	386	346	360	334	347	368	328	291
11	298	304	337	365	316	343	299	330	337	296
12	258	293	309	311	353	318	323	299	315	307
Total	**1,188**	**1,295**	**1,372**	**1,388**	**1,372**	**1,340**	**1,334**	**1,325**	**1,298**	**1,279**

Source: Williamsburg-James City County Public Schools, 9/30/24 Count

Warhill High School

Projected Enrollment - Most Likely

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	382	346	354	366	353	400	394	390	380	420
10	386	383	347	355	367	354	401	395	391	381
11	274	364	361	327	334	345	333	378	372	368
12	290	269	356	354	320	327	339	327	370	365
Total	**1,332**	**1,362**	**1,418**	**1,402**	**1,374**	**1,426**	**1,467**	**1,490**	**1,513**	**1,534**

Source: FutureThink

In addition to the most likely enrollment projection presented in this report, following are low, moderate, and high enrollment projections developed based on the cohort survival method. Historically, the most likely projections have fallen between the moderate and high projections. The following defines, in terms of economy and housing, the differences between the projections.

Low Projection

- Higher inflation/interest rates
- Decline in new housing and births

Moderate Projection

- Moderate inflation/interest rates
- Moderate level of new housing & births remain steady

High Projection

- Low inflation/interest rates
- High level of new housing & increase in births

The most likely projection falls fairly equally between the moderate and high projections. The projections range from a low of 11,369 students to a high of 14,143 students in the 2034-35 school year.

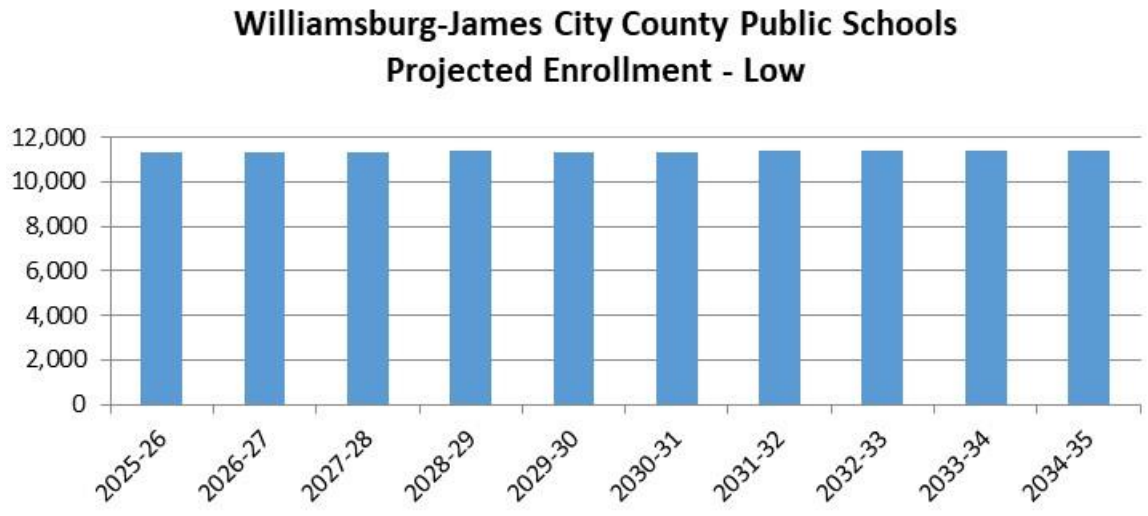
Low Projection

According to this projection, enrollment would decrease 10 students in grades K–12 from the current 2024-25 enrollment of 11,379 to the 2034-35 projected enrollment of 11,369, a decrease of less than 1 percent.

Williamsburg-James City County Public Schools
Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	761	842	753	770	754	757	759	761	762	764
1	777	812	898	803	821	806	808	810	812	813
2	816	789	823	913	816	833	818	821	821	824
3	851	821	791	824	917	819	836	821	823	824
4	910	873	843	816	850	943	842	860	845	847
5	822	926	887	856	830	864	960	855	874	858
K - 5 Total	**4,937**	**5,063**	**4,995**	**4,982**	**4,988**	**5,022**	**5,023**	**4,928**	**4,937**	**4,930**
6	865	829	922	901	868	827	875	969	866	885
7	856	877	840	934	911	878	837	884	982	877
8	870	866	887	849	944	923	887	846	895	993
6 - 8 Total	**2,591**	**2,572**	**2,649**	**2,684**	**2,723**	**2,628**	**2,599**	**2,699**	**2,743**	**2,755**
9	1,068	955	964	991	949	1,055	1,028	989	943	997
10	947	1,020	912	920	947	906	1,008	982	944	900
11	850	879	946	847	853	877	841	936	910	876
12	952	851	877	945	845	854	878	839	935	911
9 - 12 Total	**3,817**	**3,705**	**3,699**	**3,703**	**3,594**	**3,692**	**3,755**	**3,746**	**3,732**	**3,684**
K - 12 Total	**11,345**	**11,340**	**11,343**	**11,369**	**11,305**	**11,342**	**11,377**	**11,373**	**11,412**	**11,369**

Source: FutureThink



Baker Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	82	90	81	83	81	81	81	82	82	82
1	81	82	90	81	83	81	81	81	82	82
2	66	81	81	90	81	82	81	81	81	81
3	88	65	80	81	90	80	82	80	81	81
4	77	92	69	85	85	95	85	86	85	85
5	66	77	92	69	84	85	94	84	86	84
Total	**460**	**487**	**493**	**489**	**504**	**504**	**504**	**494**	**497**	**495**

Source: FutureThink

Laurel Lane Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	87	97	86	88	87	87	87	87	87	88
1	84	91	100	90	92	90	90	90	91	91
2	110	89	95	106	95	97	95	95	95	96
3	96	111	89	96	107	95	97	96	96	96
4	90	97	113	91	98	109	97	99	97	98
5	84	91	99	114	93	100	111	99	101	99
Total	**551**	**576**	**582**	**585**	**572**	**578**	**577**	**566**	**567**	**568**

Source: FutureThink

Montague Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	81	89	80	82	80	80	81	81	81	81
1	77	88	98	87	89	88	88	88	88	89
2	101	80	92	102	91	93	91	92	92	92
3	87	101	79	91	101	91	93	91	91	91
4	98	88	102	81	93	103	92	94	92	93
5	79	96	86	100	79	91	101	90	92	91
Total	**523**	**542**	**537**	**543**	**533**	**546**	**546**	**536**	**536**	**537**

Source: FutureThink

Norge Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	90	99	89	91	89	89	90	90	90	90
1	98	99	110	98	100	98	99	99	99	99
2	85	96	97	108	96	98	96	97	97	97
3	107	86	97	97	108	97	99	97	97	97
4	104	109	88	99	100	110	99	101	99	99
5	92	106	110	89	100	101	112	100	102	100
Total	**576**	**595**	**591**	**582**	**593**	**593**	**595**	**584**	**584**	**582**

Source: FutureThink

Whaley Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	78	87	78	79	78	78	78	78	79	79
1	85	81	90	80	82	81	81	81	81	81
2	84	87	83	92	82	84	83	83	83	83
3	85	86	89	85	94	84	86	84	84	85
4	89	87	88	92	87	97	87	88	87	87
5	81	89	87	88	92	87	97	87	88	87
Total	**502**	**517**	**515**	**516**	**515**	**511**	**512**	**501**	**502**	**502**

Source: FutureThink

James River Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	73	81	72	74	72	73	73	73	73	73
1	58	74	82	73	75	74	74	74	74	74
2	77	59	75	83	75	76	75	75	75	75
3	76	76	58	74	82	73	75	73	74	74
4	81	78	77	59	75	83	74	76	75	75
5	87	85	82	81	62	79	88	78	80	78
Total	**452**	**453**	**446**	**444**	**441**	**458**	**459**	**449**	**451**	**449**

Source: FutureThink

Stonehouse Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	117	130	116	118	116	117	117	117	117	118
1	133	130	144	129	132	129	130	130	130	130
2	131	138	135	149	133	136	134	134	134	135
3	139	135	142	138	154	137	140	138	138	138
4	171	149	145	152	149	165	147	151	148	148
5	156	178	155	151	159	155	172	153	157	154
Total	**847**	**860**	**837**	**837**	**843**	**839**	**840**	**823**	**824**	**823**

Source: FutureThink

Matoaka Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	86	95	85	87	85	85	85	86	86	86
1	93	97	107	96	98	96	96	97	97	97
2	89	87	91	101	90	92	90	90	90	91
3	91	85	83	86	96	86	87	86	86	86
4	105	91	85	83	86	96	85	87	86	86
5	95	105	91	85	83	86	96	85	87	86
Total	**559**	**560**	**542**	**538**	**538**	**541**	**539**	**531**	**532**	**532**

Source: FutureThink

Blayton Elementary School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	67	74	66	68	66	67	67	67	67	67
1	68	70	77	69	70	69	69	70	70	70
2	73	72	74	82	73	75	73	74	74	74
3	82	76	74	76	85	76	77	76	76	76
4	95	82	76	74	77	85	76	78	76	76
5	82	99	85	79	78	80	89	79	81	79
Total	**467**	**473**	**452**	**448**	**449**	**452**	**451**	**444**	**444**	**442**

Source: FutureThink

Berkeley Middle School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	212	203	226	221	213	203	215	238	213	217
7	209	215	206	229	223	215	205	217	241	215
8	224	214	220	210	234	229	220	210	222	246
Total	**645**	**632**	**652**	**660**	**670**	**647**	**640**	**665**	**676**	**678**

Source: FutureThink

Toano Middle School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	226	217	241	235	227	216	228	253	226	231
7	232	230	220	245	239	231	220	232	258	230
8	223	235	233	223	248	242	233	222	235	261
Total	**681**	**682**	**694**	**703**	**714**	**689**	**681**	**707**	**719**	**722**

Source: FutureThink

Hornsby Middle School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	262	251	279	273	263	250	265	293	262	268
7	249	263	252	280	273	263	251	265	294	263
8	266	252	266	255	283	277	266	254	269	298
Total	**777**	**766**	**797**	**808**	**819**	**790**	**782**	**812**	**825**	**829**

Source: FutureThink

James Blair Middle School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	165	158	176	172	165	158	167	185	165	169
7	166	169	162	180	176	169	161	170	189	169
8	157	165	168	161	179	175	168	160	169	188
Total	**488**	**492**	**506**	**513**	**520**	**502**	**496**	**515**	**523**	**526**

Source: FutureThink

Williamsburg-James City County Public Schools

Lafayette High School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	352	315	318	327	313	348	339	326	311	329
10	327	346	309	312	321	307	342	333	320	305
11	276	300	317	284	286	294	282	314	305	294
12	320	273	296	313	280	283	291	278	310	302
Total	**1,275**	**1,234**	**1,240**	**1,236**	**1,200**	**1,232**	**1,254**	**1,251**	**1,246**	**1,230**

Source: FutureThink

Jamestown High School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	364	325	328	337	323	359	350	337	321	339
10	293	328	294	296	305	292	324	316	304	290
11	298	279	312	279	281	289	277	308	300	288
12	312	305	285	319	285	288	296	283	315	307
Total	**1,267**	**1,237**	**1,219**	**1,231**	**1,194**	**1,228**	**1,247**	**1,244**	**1,240**	**1,224**

Source: FutureThink

Warhill High School

Projected Enrollment - Low

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	352	315	318	327	313	348	339	326	311	329
10	327	346	309	312	321	307	342	333	320	305
11	276	300	317	284	286	294	282	314	305	294
12	320	273	296	313	280	283	291	278	310	302
Total	**1,275**	**1,234**	**1,240**	**1,236**	**1,200**	**1,232**	**1,254**	**1,251**	**1,246**	**1,230**

Source: FutureThink

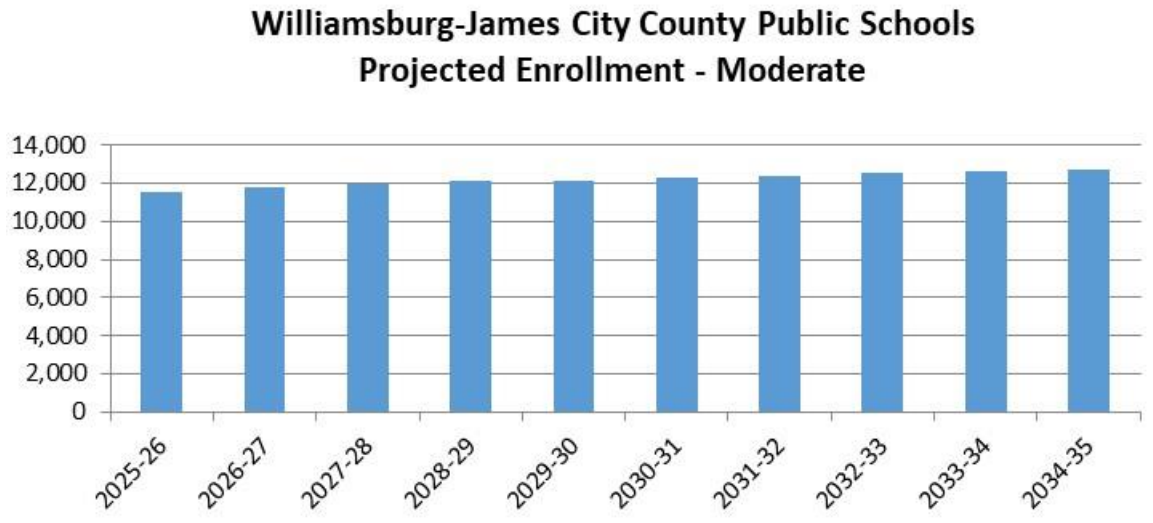
Moderate Projection

According to this projection, enrollment would increase 1,293 students in grades K–12 from the current 2023-24 enrollment of 11,379 to the 2034-35 projected enrollment of 12,672, an increase of approximately 11 percent.

Williamsburg-James City County Public Schools
Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	791	878	784	800	786	790	790	792	794	797
1	790	858	953	851	869	854	856	858	861	862
2	833	815	887	984	880	898	880	886	886	888
3	865	852	834	908	1,006	900	919	902	904	908
4	920	903	888	870	947	1,048	938	958	940	942
5	833	948	930	915	898	973	1,081	967	986	969
K - 5 Total	**5,032**	**5,254**	**5,276**	**5,328**	**5,386**	**5,463**	**5,464**	**5,363**	**5,371**	**5,366**
6	880	844	950	928	910	881	967	1,072	960	979
7	869	906	869	977	955	937	906	995	1,104	987
8	880	888	926	888	999	976	957	926	1,017	1,127
6 - 8 Total	**2,629**	**2,638**	**2,745**	**2,793**	**2,864**	**2,794**	**2,830**	**2,993**	**3,081**	**3,093**
9	1,110	1,003	1,022	1,052	1,011	1,138	1,115	1,094	1,059	1,162
10	1,012	1,076	972	990	1,019	979	1,102	1,081	1,061	1,026
11	854	955	1,015	916	934	963	924	1,041	1,019	1,001
12	930	861	956	1,019	920	938	965	928	1,045	1,024
9 - 12 Total	**3,906**	**3,895**	**3,965**	**3,977**	**3,884**	**4,018**	**4,106**	**4,144**	**4,184**	**4,213**
K - 12 Total	**11,567**	**11,787**	**11,986**	**12,098**	**12,134**	**12,275**	**12,400**	**12,500**	**12,636**	**12,672**

Source: FutureThink



Baker Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	84	94	84	85	84	84	84	85	85	85
1	83	86	95	85	87	85	86	86	86	86
2	66	83	86	95	85	87	85	86	86	86
3	89	67	83	87	96	86	88	86	87	87
4	78	95	71	89	93	103	92	94	93	93
5	66	78	95	72	90	93	104	93	94	93
Total	**466**	**503**	**514**	**513**	**535**	**538**	**539**	**530**	**531**	**530**

Source: FutureThink

Laurel Lane Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	87	97	86	88	87	87	87	87	87	88
1	85	92	102	91	93	91	91	92	92	92
2	113	92	99	110	99	101	99	99	99	100
3	97	115	95	102	113	101	103	101	102	102
4	92	102	121	99	107	118	106	108	106	106
5	85	95	105	124	102	110	122	109	111	109
Total	**559**	**593**	**608**	**614**	**601**	**608**	**608**	**596**	**597**	**597**

Source: FutureThink

Montague Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	82	90	81	83	81	81	81	82	82	82
1	78	91	101	90	92	91	91	91	91	92
2	102	82	96	106	95	97	95	95	95	96
3	89	104	84	98	108	97	99	97	97	98
4	98	90	106	85	99	110	98	101	99	99
5	80	98	91	106	86	100	111	99	101	99
Total	**529**	**555**	**559**	**568**	**561**	**576**	**575**	**565**	**565**	**566**

Source: FutureThink

Norge Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	96	106	95	97	95	96	96	96	96	97
1	99	106	118	105	108	106	106	106	107	107
2	87	98	106	118	105	107	105	106	106	106
3	107	88	99	107	119	106	109	107	107	107
4	106	112	91	104	112	124	111	113	111	111
5	93	109	114	94	106	114	127	113	116	114
Total	**588**	**619**	**623**	**625**	**645**	**653**	**654**	**641**	**643**	**642**

Source: FutureThink

Whaley Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	80	89	79	81	79	80	80	80	80	80
1	86	83	93	83	84	83	83	83	84	84
2	87	91	88	98	88	89	88	88	88	88
3	86	90	94	92	102	91	93	91	91	92
4	91	91	95	99	97	107	96	98	96	96
5	83	92	93	97	101	99	109	98	100	98
Total	**513**	**536**	**542**	**550**	**551**	**549**	**549**	**538**	**539**	**538**

Source: FutureThink

James River Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	76	84	75	77	75	76	76	76	76	76
1	59	79	88	78	80	78	79	79	79	79
2	80	62	83	92	82	84	82	83	83	83
3	77	79	62	82	91	82	83	82	82	82
4	81	80	81	64	85	94	84	86	84	84
5	88	86	84	86	67	89	99	89	90	89
Total	**461**	**470**	**473**	**479**	**480**	**503**	**503**	**495**	**494**	**493**

Source: FutureThink

Stonehouse Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	119	132	118	120	118	119	119	119	119	120
1	134	132	147	131	134	132	132	132	133	133
2	133	140	139	154	138	141	138	139	139	139
3	141	139	146	145	161	144	147	144	144	145
4	172	152	151	158	157	174	156	159	156	157
5	157	180	159	157	165	164	182	163	166	163
Total	**856**	**875**	**860**	**865**	**873**	**874**	**874**	**856**	**857**	**857**

Source: FutureThink

Matoaka Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	98	109	97	99	98	98	98	98	99	99
1	95	114	126	113	115	113	113	114	114	114
2	90	90	108	120	107	109	107	108	108	108
3	97	92	91	110	122	109	111	109	109	110
4	105	97	92	91	110	122	109	111	109	109
5	98	108	101	95	95	113	126	112	115	113
Total	**583**	**610**	**615**	**628**	**647**	**664**	**664**	**652**	**654**	**653**

Source: FutureThink

Williamsburg-James City County Public Schools

Blayton Elementary School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	69	77	69	70	69	69	69	69	70	70
1	71	75	83	75	76	75	75	75	75	75
2	75	77	82	91	81	83	81	82	82	82
3	82	78	80	85	94	84	86	85	85	85
4	97	84	80	81	87	96	86	88	86	87
5	83	102	88	84	86	91	101	91	93	91
Total	**477**	**493**	**482**	**486**	**493**	**498**	**498**	**490**	**491**	**490**

Source: FutureThink

Berkeley Middle School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	216	207	234	228	224	217	238	264	236	241
7	214	224	215	242	236	232	224	246	273	244
8	228	223	233	223	251	245	241	233	256	283
Total	**658**	**654**	**682**	**693**	**711**	**694**	**703**	**743**	**765**	**768**

Source: FutureThink

Toano Middle School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	229	220	247	242	237	229	252	279	250	255
7	238	240	230	258	252	248	240	263	292	261
8	225	243	245	235	264	258	253	245	269	298
Total	**692**	**703**	**722**	**735**	**753**	**735**	**745**	**787**	**811**	**814**

Source: FutureThink

Hornsby Middle School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	267	256	288	281	276	267	293	325	291	297
7	251	270	259	291	285	279	270	297	329	294
8	269	256	276	265	298	291	285	276	303	336
Total	**787**	**782**	**823**	**837**	**859**	**837**	**848**	**898**	**923**	**927**

Source: FutureThink

James Blair Middle School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	168	161	181	177	173	168	184	204	183	186
7	166	172	165	186	182	178	172	189	210	188
8	158	166	172	165	186	182	178	172	189	210
Total	**492**	**499**	**518**	**528**	**541**	**528**	**534**	**565**	**582**	**584**

Source: FutureThink

Williamsburg-James City County Public Schools

Lafayette High School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	366	331	337	347	333	375	368	361	349	383
10	330	363	328	334	344	330	372	364	358	346
11	282	310	340	307	313	323	310	349	342	336
12	323	281	308	339	306	312	321	309	348	341
Total	**1,301**	**1,285**	**1,313**	**1,327**	**1,296**	**1,340**	**1,371**	**1,383**	**1,397**	**1,406**

Source: FutureThink

Jamestown High School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	367	332	338	348	335	377	369	362	351	385
10	298	337	304	310	319	307	345	339	332	321
11	301	286	324	292	298	307	295	332	325	319
12	320	317	300	340	307	313	322	309	348	341
Total	**1,286**	**1,272**	**1,266**	**1,290**	**1,259**	**1,304**	**1,331**	**1,342**	**1,356**	**1,366**

Source: FutureThink

Warhill High School

Projected Enrollment - Moderate

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	377	340	347	357	343	386	378	371	359	394
10	384	376	340	346	356	342	385	378	371	359
11	271	359	351	317	323	333	319	360	352	346
12	287	263	348	340	307	313	322	310	349	342
Total	**1,319**	**1,338**	**1,386**	**1,360**	**1,329**	**1,374**	**1,404**	**1,419**	**1,431**	**1,441**

Source: FutureThink

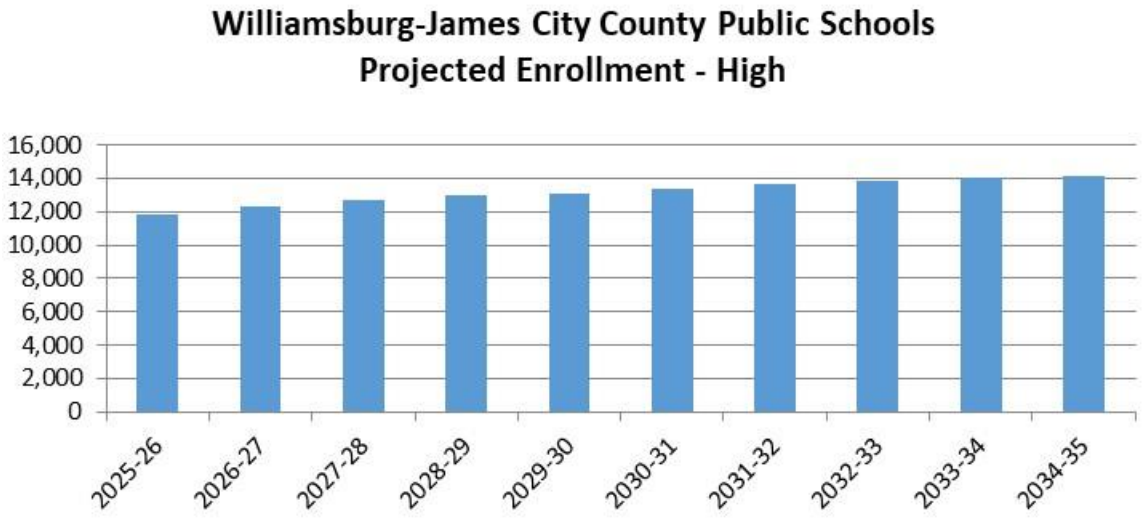
High Projection

According to this projection, enrollment would increase 2,764 students in grades K–12 from the current 2024-25 enrollment of 11,379 to the 2034-35 projected enrollment of 14,143, an increase of approximately 24 percent.

Williamsburg-James City County Public Schools
Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	826	901	824	832	818	821	823	827	828	828
1	805	905	990	905	913	900	903	904	907	909
2	851	850	957	1,046	956	965	951	952	953	959
3	898	889	889	996	1,091	995	1,003	990	994	996
4	927	961	949	950	1,066	1,166	1,064	1,073	1,058	1,060
5	855	966	998	987	988	1,107	1,211	1,107	1,116	1,100
K - 5 Total	**5,162**	**5,473**	**5,606**	**5,716**	**5,831**	**5,954**	**5,955**	**5,853**	**5,856**	**5,853**
6	914	887	1,010	1,001	997	981	1,088	1,207	1,079	1,102
7	879	950	922	1,050	1,042	1,038	1,019	1,133	1,257	1,123
8	887	908	981	951	1,084	1,074	1,071	1,053	1,169	1,296
6 - 8 Total	**2,680**	**2,745**	**2,913**	**3,002**	**3,123**	**3,093**	**3,178**	**3,393**	**3,505**	**3,521**
9	1,138	1,034	1,058	1,101	1,067	1,214	1,201	1,196	1,173	1,302
10	1,033	1,128	1,025	1,049	1,090	1,056	1,204	1,189	1,184	1,161
11	870	991	1,082	982	1,006	1,046	1,012	1,154	1,140	1,137
12	950	894	1,014	1,109	1,007	1,031	1,072	1,037	1,183	1,169
9 - 12 Total	**3,991**	**4,047**	**4,179**	**4,241**	**4,170**	**4,347**	**4,489**	**4,576**	**4,680**	**4,769**
K - 12 Total	**11,833**	**12,265**	**12,698**	**12,959**	**13,124**	**13,394**	**13,622**	**13,822**	**14,041**	**14,143**

Source: FutureThink



Baker Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	86	95	85	87	85	85	85	86	86	86
1	86	91	100	90	92	90	90	90	91	91
2	69	89	94	104	93	95	94	94	94	94
3	92	72	93	98	109	97	99	98	98	98
4	79	100	78	101	107	118	106	108	106	106
5	67	80	101	79	102	108	120	107	109	107
Total	**479**	**527**	**551**	**559**	**588**	**593**	**594**	**583**	**584**	**582**

Source: FutureThink

Laurel Lane Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	90	99	89	91	89	89	90	90	90	90
1	86	95	105	94	96	94	95	95	95	95
2	116	96	106	118	106	108	106	106	106	107
3	98	120	99	110	122	109	111	109	110	110
4	96	107	131	108	120	133	119	121	119	120
5	86	100	111	136	113	125	138	124	126	124
Total	**572**	**617**	**641**	**657**	**646**	**658**	**659**	**645**	**646**	**646**

Source: FutureThink

Montague Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	84	93	83	85	83	84	84	84	84	84
1	80	96	107	96	98	96	96	96	96	97
2	105	87	104	116	104	106	104	104	104	105
3	91	110	91	109	121	108	110	108	109	109
4	100	95	114	95	114	126	113	115	113	113
5	82	103	97	117	97	117	129	116	118	116
Total	**542**	**584**	**596**	**618**	**617**	**637**	**636**	**623**	**624**	**624**

Source: FutureThink

Norge Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	98	108	97	99	97	97	98	98	98	98
1	99	108	120	107	110	108	108	108	109	109
2	89	101	111	123	110	112	110	110	110	111
3	109	91	104	114	126	113	115	113	113	114
4	108	116	97	110	121	134	120	122	120	120
5	94	112	120	100	114	125	139	124	126	124
Total	**597**	**636**	**649**	**653**	**678**	**689**	**690**	**675**	**676**	**676**

Source: FutureThink

Whaley Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	82	90	81	83	81	81	81	82	82	82
1	86	86	95	85	87	85	86	86	86	86
2	90	95	95	105	94	96	94	94	94	95
3	89	97	102	101	112	100	102	101	101	101
4	95	98	106	112	112	124	111	113	111	111
5	85	99	102	111	117	116	129	115	118	116
Total	**527**	**565**	**581**	**597**	**603**	**602**	**603**	**591**	**592**	**591**

Source: FutureThink

James River Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	78	86	77	79	77	78	78	78	78	78
1	61	83	92	83	84	83	83	83	83	84
2	83	66	91	100	90	92	90	90	90	91
3	80	84	68	92	102	92	93	92	92	92
4	82	83	88	70	96	107	95	97	96	96
5	88	88	88	93	75	102	113	101	104	102
Total	**472**	**490**	**504**	**517**	**524**	**554**	**552**	**541**	**543**	**543**

Source: FutureThink

Stonehouse Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	121	134	120	122	120	120	120	121	121	121
1	134	135	149	134	136	134	134	135	135	135
2	135	143	144	159	142	145	143	143	143	144
3	142	143	151	151	168	150	153	150	151	151
4	174	156	156	165	166	184	164	168	165	165
5	157	183	164	164	173	174	193	173	176	173
Total	**863**	**894**	**884**	**895**	**905**	**907**	**907**	**890**	**891**	**889**

Source: FutureThink

Matoaka Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	106	118	105	107	105	106	106	106	107	107
1	97	125	139	124	126	124	125	125	125	125
2	92	94	121	134	120	123	120	121	121	121
3	98	94	95	123	137	122	125	122	123	123
4	108	100	96	98	126	140	125	128	125	126
5	99	112	104	100	101	131	145	130	133	130
Total	**600**	**643**	**660**	**686**	**715**	**746**	**746**	**732**	**734**	**732**

Source: FutureThink

Williamsburg-James City County Public Schools

Blayton Elementary School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
K	81	78	87	79	81	81	81	82	82	82
1	76	86	83	92	84	86	86	86	87	87
2	72	79	91	87	97	88	90	90	91	91
3	99	78	86	98	94	104	95	97	97	98
4	85	106	83	91	104	100	111	101	103	103
5	97	89	111	87	96	109	105	117	106	108
Total	**510**	**517**	**540**	**534**	**555**	**568**	**568**	**573**	**566**	**570**

Source: FutureThink

Berkeley Middle School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	224	217	247	245	244	240	266	295	264	270
7	217	234	227	259	257	256	251	279	310	277
8	231	228	247	239	273	270	269	265	294	326
Total	**672**	**679**	**721**	**743**	**774**	**766**	**786**	**839**	**868**	**873**

Source: FutureThink

Toano Middle School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	232	225	256	254	253	249	276	306	274	280
7	243	247	240	273	271	270	265	295	327	292
8	226	250	254	247	281	279	278	273	303	336
Total	**701**	**722**	**750**	**774**	**805**	**798**	**819**	**874**	**904**	**908**

Source: FutureThink

Hornsby Middle School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	272	264	301	298	297	292	324	360	321	328
7	252	277	269	306	304	302	297	330	366	327
8	271	261	286	277	316	313	312	307	341	378
Total	**795**	**802**	**856**	**881**	**917**	**907**	**933**	**997**	**1,028**	**1,033**

Source: FutureThink

James Blair Middle School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
6	186	181	206	204	203	200	222	246	220	224
7	167	192	186	212	210	210	206	229	254	227
8	159	169	194	188	214	212	212	208	231	256
Total	**512**	**542**	**586**	**604**	**627**	**622**	**640**	**683**	**705**	**707**

Source: FutureThink

Lafayette High School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	378	343	351	365	354	403	398	397	389	432
10	338	384	349	357	371	359	410	405	403	395
11	286	321	365	331	339	352	341	389	384	383
12	331	292	328	372	338	346	360	348	397	392
Total	**1,333**	**1,340**	**1,393**	**1,425**	**1,402**	**1,460**	**1,509**	**1,539**	**1,573**	**1,602**

Source: FutureThink

Jamestown High School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	373	339	347	361	350	398	394	392	385	427
10	307	353	321	329	341	331	377	372	371	364
11	308	301	346	314	322	335	324	369	365	364
12	325	328	321	369	335	343	356	345	393	389
Total	**1,313**	**1,321**	**1,335**	**1,373**	**1,348**	**1,407**	**1,451**	**1,478**	**1,514**	**1,544**

Source: FutureThink

Warhill High School

Projected Enrollment - High

Grade	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
9	387	352	360	375	363	413	409	407	399	443
10	388	391	355	363	378	366	417	412	410	402
11	276	369	371	337	345	359	347	396	391	390
12	294	274	365	368	334	342	356	344	393	388
Total	**1,345**	**1,386**	**1,451**	**1,443**	**1,420**	**1,480**	**1,529**	**1,559**	**1,593**	**1,623**

Source: FutureThink

CONCLUSION

The enrollment projections presented in this report were developed using the cohort-survival methodology while incorporating housing and geographic information system data.

As with any projection, the Division should pay close attention to live birth counts, enrollment in elementary schools, and housing starts. Each of these factors will have an impact on future student enrollment.

FutureThink is pleased to have had the opportunity to provide the Division with enrollment projection services. We hope this document will provide the necessary information to make informed decisions about the future of the Williamsburg-James City County Public Schools.

DESIGN GUIDELINES

CARDINAL RIDGE
DESIGN GUIDELINES

James City County, Virginia
December 9, 2025
Prepared for:

D·R·HORTON
America's Builder

Prepared by:

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PURPOSE & INTENT

The Design Guidelines serve as a comprehensive set of regulations specifically catered to the successful development of Cardinal Ridge. The Guidelines were inspired by the property's unique location and the large areas of forested land cover and streams along three sides of the property. The Guidelines provide detailed criteria for building architecture, lot layouts, street standards, open space, landscape, etc. to compliment the County's Zoning Ordinance. The purpose of this document is to ensure that the property's overall vision is carefully executed. Modifications to the Guidelines are subject to the approval of the James City County Planning Director.

SITE

The +/-365 acre property is bounded by DePue Drive to the north, Ironbound Road to the east, and a large forested area to the south. While the area proposed for development is bounded by Humelsine Parkway to the west, the parcel extends westward past Humelsine Parkway to the Chisel Run Creek located behind Ford's Colony. With the property's easy access to Humelsine Parkway (Route 199), Richmond Road (Route 60), and to historic Williamsburg, it's an excellent location for redevelopment. The property is adjacent to the New Town development and the James City County Recreation Center and the future site of the County Complex. The proximity and surrounding amenities make this an ideal location for a Mixed Use Development.

The parcel is comprised partially of wetlands, creeks, or forested land cover, as well as previously developed areas ready for redevelopment. A new, well-designed mixed-use community will greatly benefit James City County by offering a variety of housing and commercial options for residents. The proposed redevelopment aligns with the James City County 2045 Comprehensive Plan's "Preferred Land Use Scenario B" where this site is designated for Mixed Use development.



PLAN

The Master Plan for Cardinal Ridge is a traditional neighborhood design that responds to the natural environment, historical context, and the surrounding uses. The northern end of the property is well-suited for a mix of neighborhood commercial uses and directly across from the J.C.C. Recreation Center and the new location of for the J.C.C. Complex. Featuring a large central park, several interspersed pocket parks, and a bike and trail system, the community is designed for the pedestrian experience. A large public use site is also proposed adjacent to Humelsine Parkway.

The Master Plan places the higher densities closest to the existing hospital and then decreases in scale as you approach the forested areas to the west. A mix of housing types are provided to encourage a variety of families and a range of household incomes. The overall layout supports interconnectivity and multimodal transport between the various uses, creating a walkable community that will add to the character and charm of James City County.



LEGEND

1 - Public use site
2 - Hope family village
3 - Colonial Behavioral Health
4 - Marketplace District
5 - Affordable Apartments
6 - Apartments
7 - Clubhouse, pool, & amenities
8 - Central park
9 - Townhomes
10 - Single Family Homes
11 - Forested Areas to remain
12 - Open Space

(Note: Additional details are available in the complete Master Plan document.

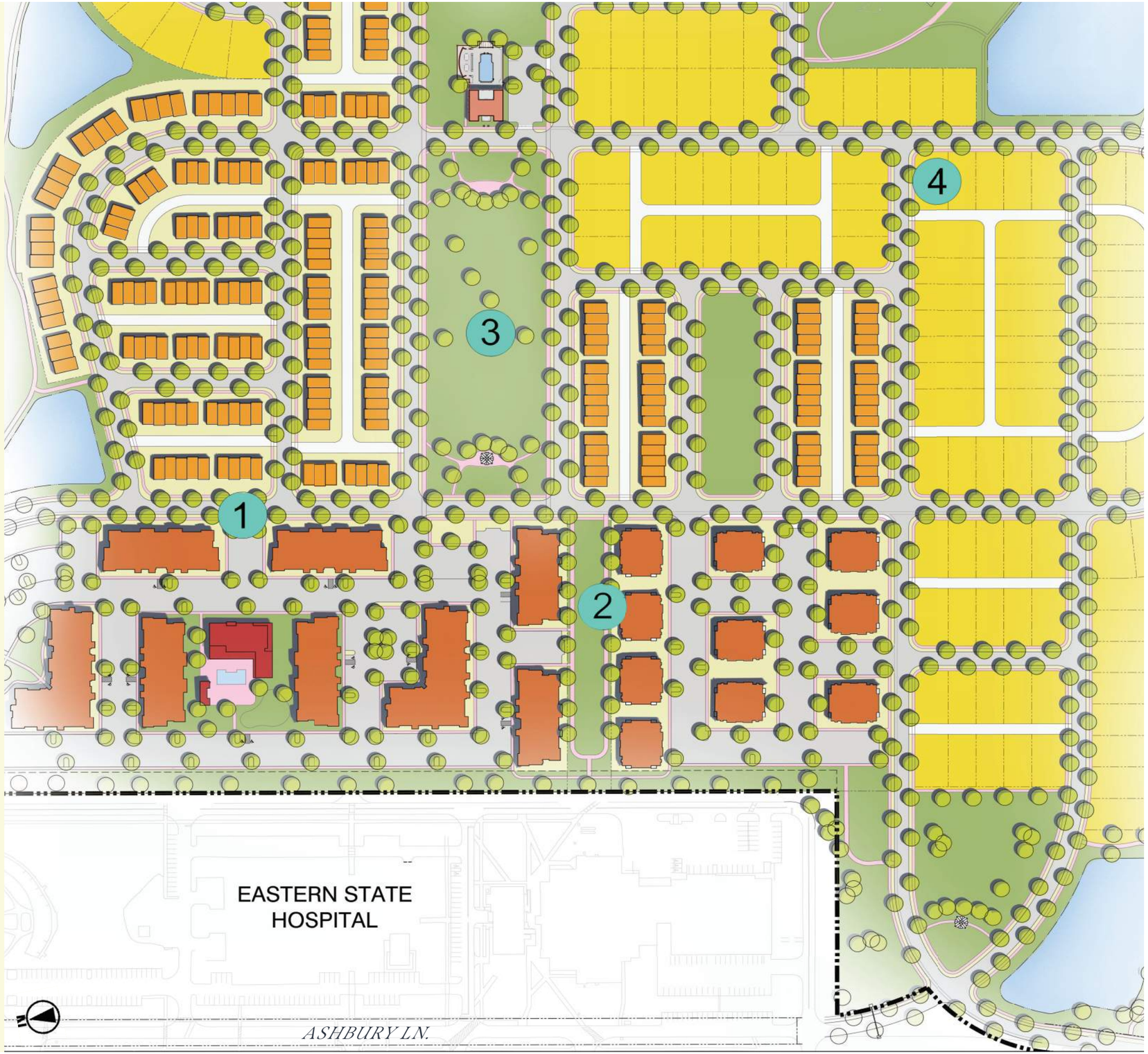
TRANSECT

Cardinal Ridge follows the transect approach to structure the community. The largest massing, the existing hospital buildings and infrastructure, are sited the closest to Depue Road where they are adjacent to other moderate intensity uses and main intersections. The scale and intensity lessen as you move westward into the property. The lowest density areas comprised of single family homes are intentionally located along the periphery of the property next to preserved forested areas.

1. Multimodal Design
2. Pedestrian Circulation
3. Open Space
4. Street Trees

Legend:

- Moderate Density - Apartments
- Lower Density - Multifamily (Townhomes)
- Lowest Density - Single Family
- Parks/Open Space
- Ponds/Stormwater Management



ACCESS

Three different configurations of access streets are proposed at Cardinal Ridge to create comfortable and attractive streetscapes. Approximately half of the streets within Cardinal Ridge will serve as Primary Streets, which are those that are more heavily traveled and place a greater emphasis on pedestrian-scale streetscapes without the interruption of driveways. The residential units served by these streets are alley loaded. Secondary streets are less traveled roadways located more internal to the development. On Secondary Streets "A" driveways may occur on any one side of the street. On Secondary Streets "B" lots will be larger and roadways may have driveways occur on both sides of a street. Corner lots shall be side loaded when possible and when blocks incorporate front loaded homes, 1 lot for every 3 shall have a side loaded garage. The plan also places emphasis on shared ingress/egress points to promote efficient multimodal travel.



LEGEND:

- Primary Street (Streets without driveways)
- Secondary Streets A (Driveways on one side)
- Secondary Street B (Driveways on both sides)
- Corner lots with side entry garages
- Alley loaded lots
- 1 lot every 3 lots to have side loaded garage
- External site ingress/egress points
- Internal commercial or multifamily ingress/egress points

AMENITIES

CENTRAL PARK

A large central park (5 a.c. +/-) has been provided that is shared between all the land uses in Cardinal Ridge. Multi-use trails line the edges of the park and link the surrounding neighborhood to the gathering space. The community clubhouse and pool is sited at the end of the park creating grand vista across the green. With grills and dining areas, trellises, play areas, and lush landscaping, the central park and clubhouse is the premier destination point for the community. Other small open space parks will be found throughout the community, They will be planned with a variety of uses that may include passive seating areas, trail entries, dog parks, play areas, and landscape features.







AMENITIES

Amenities within the central park may include a combination of the following:

- Clubhouse & resort style pool
- Outdoor kitchen with grilling area
- Children's play area
- Lounge area
- Lush landscaping with hardscape details like walls and pavers
- Arbors and seating areas
- Fitness center and meeting spaces

(See master plan for a complete list of active recreation amenities proposed within open spaces)



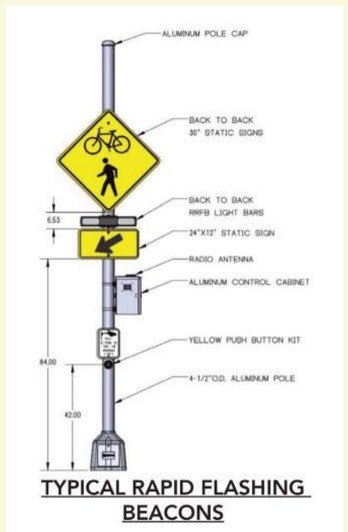


CREATING NETWORKS

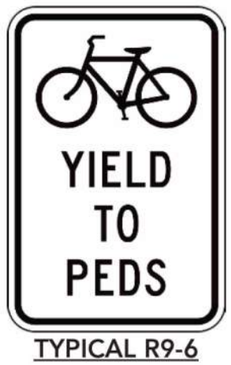
Networks are interconnected pedestrian and/or bicycle transportation facilities that allow people of all ages and abilities to safely and conveniently access the different portions of the community. Cardinal Ridge embraces multimodal transportation by creating a network of multi-use trails and bike lanes throughout the neighborhood.

ON STREET BIKE PATHS

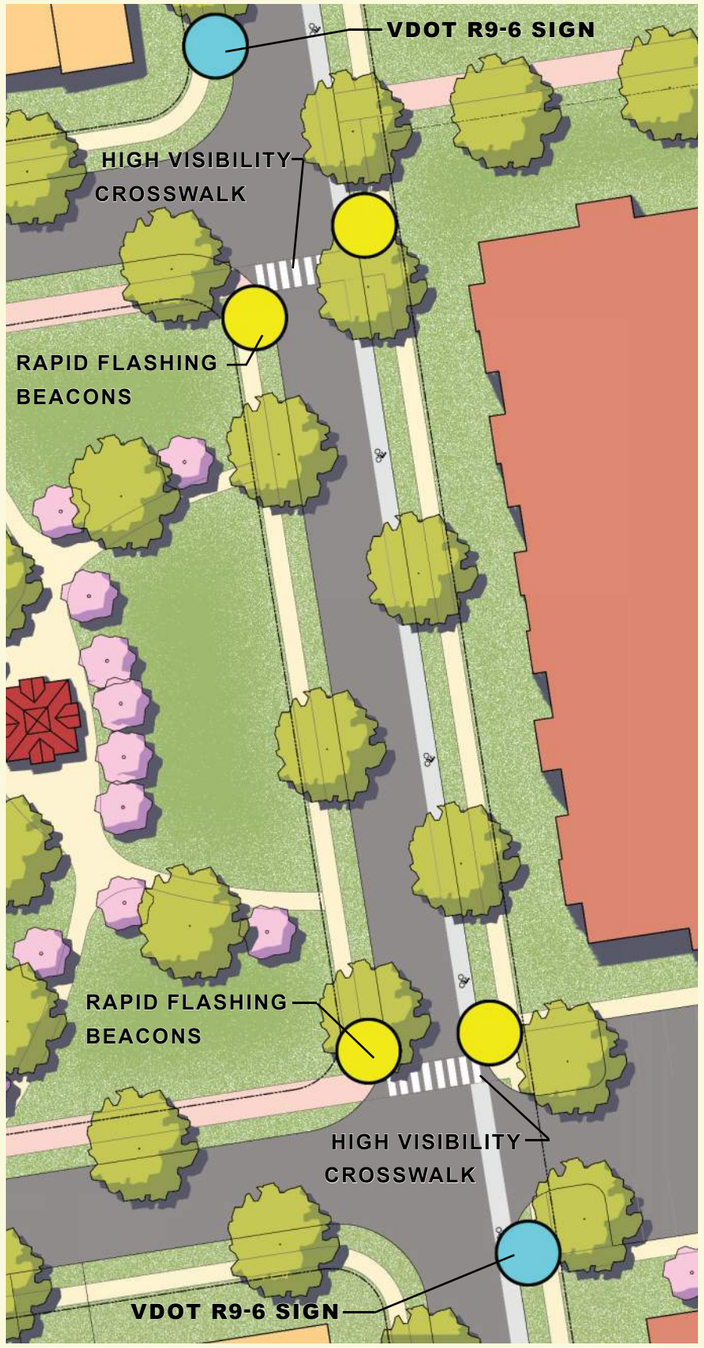
On street bike paths will be 5' in width and provide a striped and stenciled lane to offer a comfortable space for residents to connect to green spaces and commercial areas. Rapid flashing beacons and VDOT R9-6 signage shall be provided at major mid-block crossings along with high visibility crosswalk markings.



TYPICAL RAPID FLASHING BEACONS



TYPICAL R9-6



TRAILS

Multi-use trails shall be 8' in width. Around ponds and in developed areas, the trail surface shall be asphalt whenever possible. Trails through RPAs and other sensitive areas shall be a natural surface.

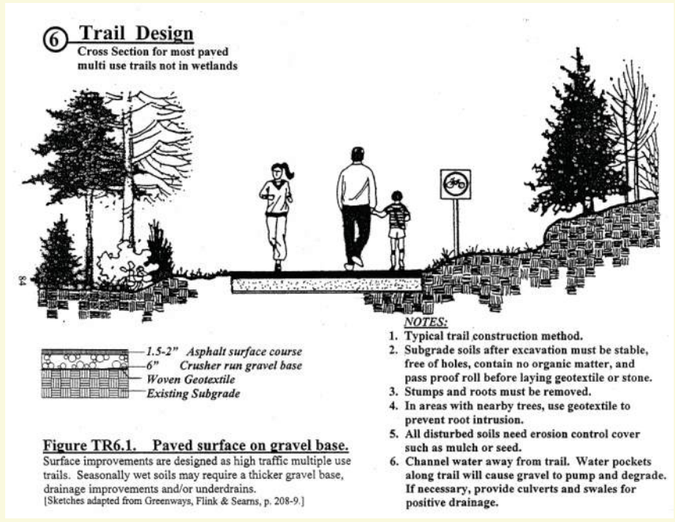


Figure TR6.1. Paved surface on gravel base.
Surface improvements are designed as high traffic multiple use trails. Seasonally wet soils may require a thicker gravel base, drainage improvements and/or underdrains.
[Sketches adapted from Greenways, Flink & Searns, p. 208-9.]

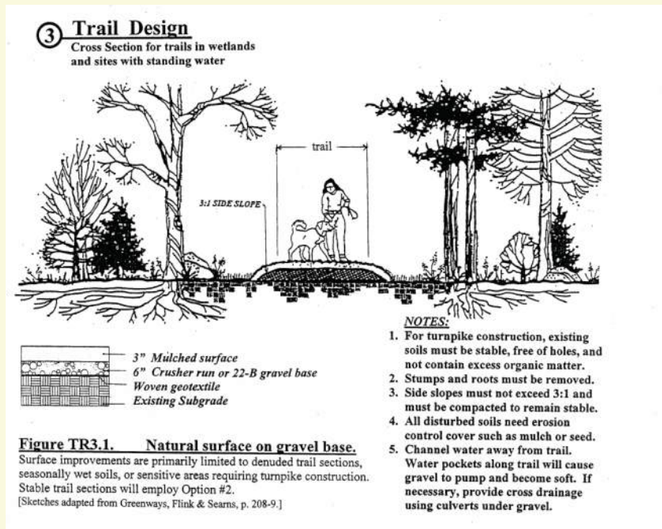


Figure TR3.1. Natural surface on gravel base.
Surface improvements are primarily limited to denuded trail sections, seasonally wet soils, or sensitive areas requiring turnpike construction. Stable trail sections will employ Option #2.
[Sketches adapted from Greenways, Flink & Searns, p. 208-9.]



RESIDENTIAL

As a place where people live, work, shop, and visit, homes should be well crafted and set comfortably within the natural environment. The development will be home to a variety of architectural styles creating unique streetscapes with timeless character. The goal is to create a harmonious streetscape of well designed homes that complement each other and contribute to the sense of place. The plan and design guidelines will establish the minimum front, side, and rear setbacks, and the minimum architectural standards for all homes, whether they are single family detached, townhomes, or multifamily.

PROPERTY ATTRIBUTES

STREETSCAPE

Building massing will be varied along the street through the use of varied heights, sizes and shapes of primary and secondary massing elements throughout the use of full gabled fronts versus bay gables, different porch depths and designs, different roof pitches and different size and/or placement along the main facade of secondary wings.

ORIENTATION

Orientation of the homes shall be responsive to the street hierarchy, characteristics of adjacent buildings, views, and parks. Buildings will be sited towards the street upon which the front entry is located. Each building along primary streets will have walkway connections between the front entry and street.

DIVERSITY & DESIGN MIX

In general, no two adjacent homes should be of the same design. A plan may be ‘flipped’ and be next door as long as the color and two other design items are different. Every third house should vary an element of the exterior material. The same color house should not occur more than every forth house.



CARDINAL RIDGE

JAMES CITY COUNTY

CARDINAL RIDGE

REAR LOADED TOWNHOMES

Rear loaded Townhomes shall be 20'-24' wide. No less than 3 units and no more than 6 units shall be attached in a row of townhomes.

1 FRONT SETBACK

The front setback is 15'.

2 SIDE SETBACK

The minimum side setback is 6' or zero feet from an interior property line. 12' shall be provided from end unit to end unit.

3 REAR SETBACK

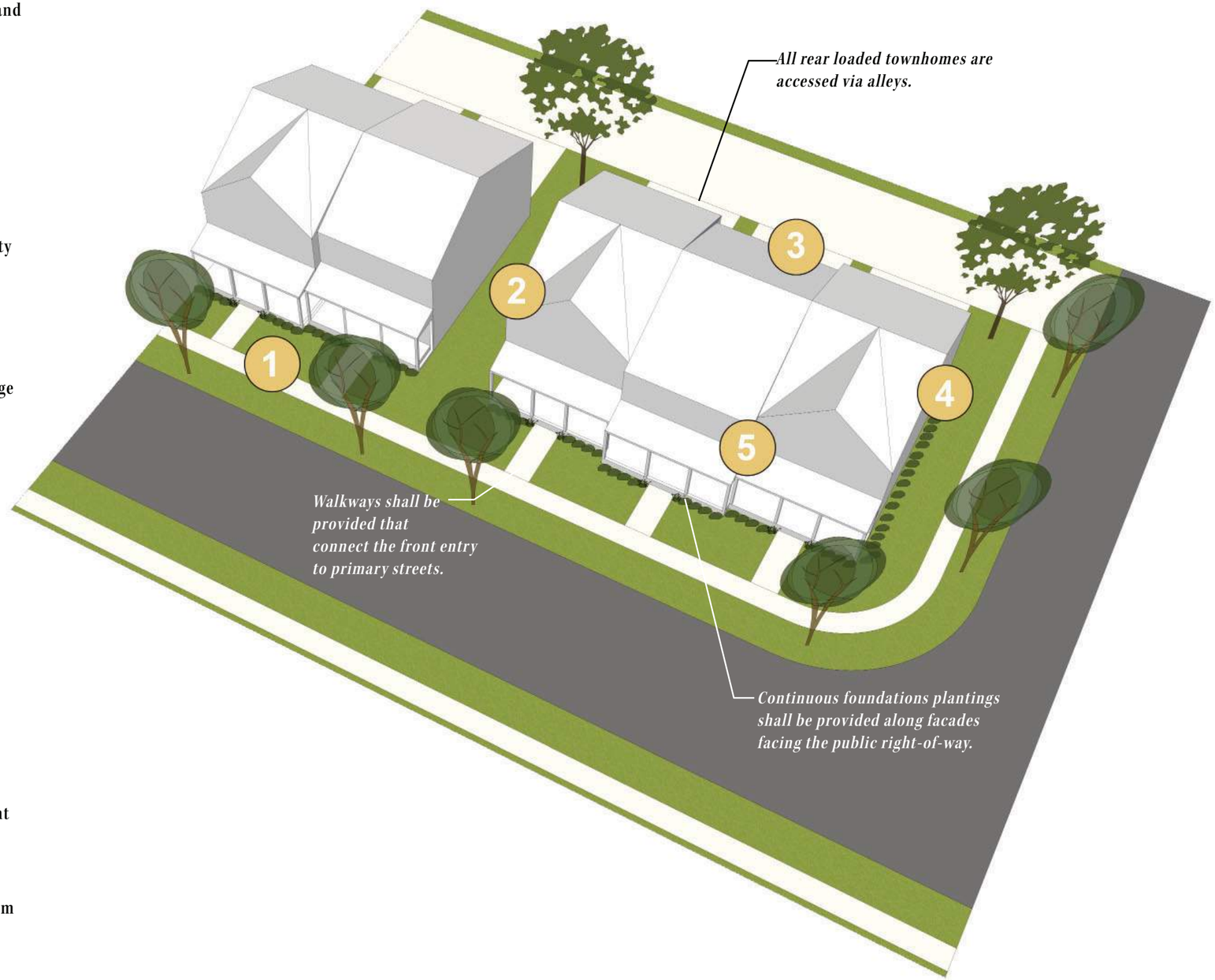
The rear setback is 20' to allow for parking spaces between the garage and alley

4 CORNER SETBACK

The minimum corner setback is 15'.

5 STAGGER

Along the front facade, each dwelling unit shall present a complete and discrete vertical facade composition. Each dwelling unit shall have a clearly different ground story facade composition (both framing materials and fenestration proportions), a clearly different "bay" rhythm (e.g. 'ABA", 'ABBA,' BAAB', ABCBA), and clearly different external wall materials (simple color changes do not suffice). The front setback shall vary with adjacent townhouse units by a minimum of three feet to create a staggered front and roof line within each attached grouping.



FRONT LOADED TOWNHOMES

Front loaded Townhomes shall be a minimum of 20'-24' wide. No less than 3 units and no more than 6 units shall be attached in a row of townhomes. Garages shall not be located side by side.

Roof lines shall show variation in dimension and pitch.

1 FRONT SETBACK

The front setback is 20'.

2 SIDE SETBACK

The minimum side setback is 6' or zero feet from an interior property line. 12' shall be provided from end unit to end unit.

3 REAR SETBACK

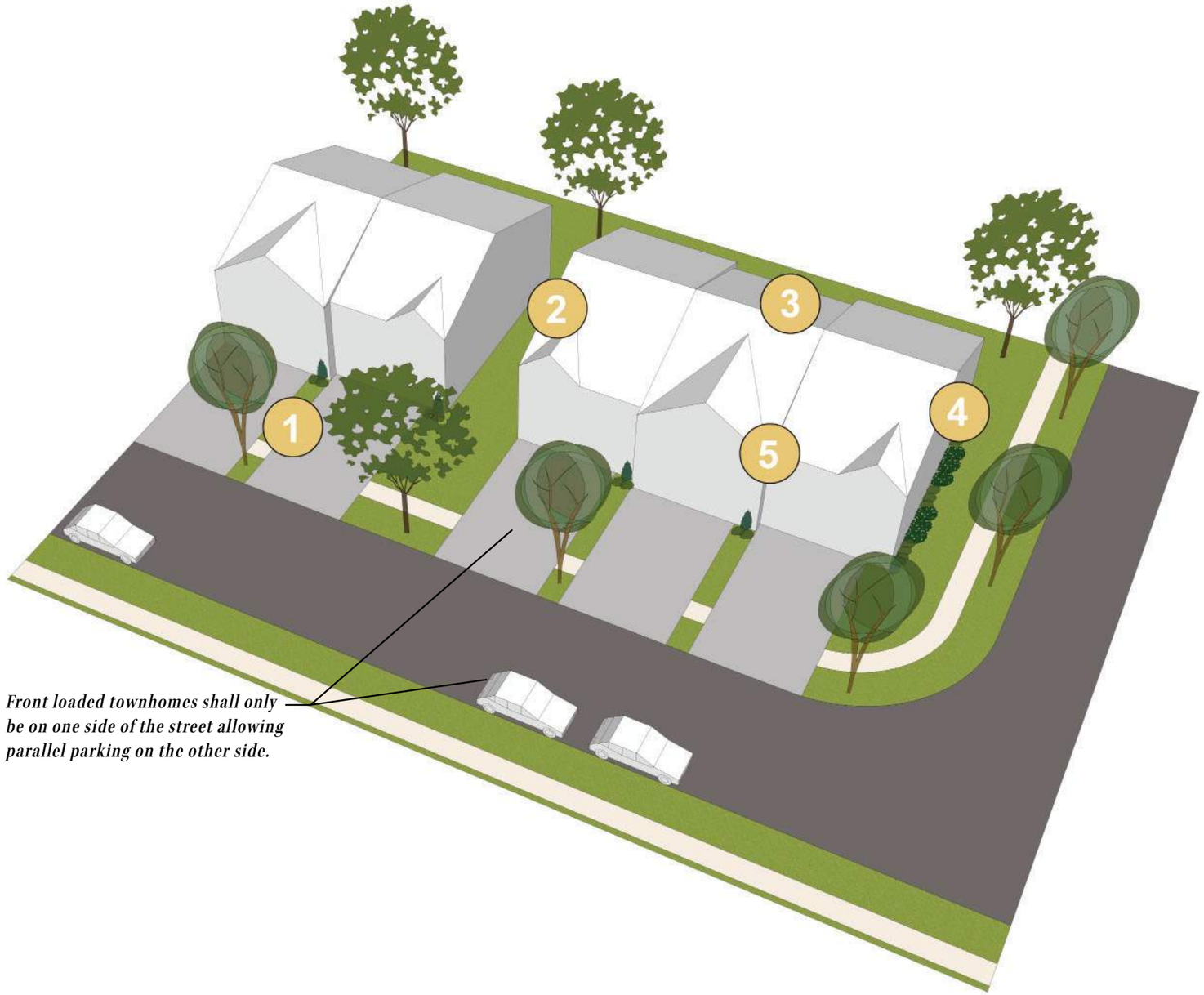
The minimum rear setback is 20'.

4 CORNER SETBACK

The minimum corner setback is 15'.

5 STAGGER

Along the front facade, each dwelling unit shall present a complete and discrete vertical facade composition. Each dwelling unit shall have a clearly different ground story facade composition (both framing materials and fenestration proportions), a clearly different "bay" rhythm (e.g. 'ABA", 'ABBA,' BAAB', ABCBA), and clearly different external wall materials (simple color changes do not suffice). The front setback shall vary with adjacent townhouse units by a minimum of three feet to create a staggered front and roof line within each attached grouping.



Front loaded townhomes shall only be on one side of the street allowing parallel parking on the other side.

CARDINAL RIDGE

SMALL LOT SINGLE FAMILY

Small single family lots are a minimum of 50’ wide and have garages that are accessed via alleys. Garages may be attached or detached.

1 FRONT SETBACK (PRIMARY STRUCTURE)

The front setback is 12’.

2 SIDE SETBACK (PRIMARY STRUCTURE)

The minimum side setback is 6’.

3 REAR SETBACK (PRIMARY STRUCTURE)

The rear setback is 20’ to allow for parking spaces between the garage and alley

4 CORNER SETBACK (PRIMARY STRUCTURE)

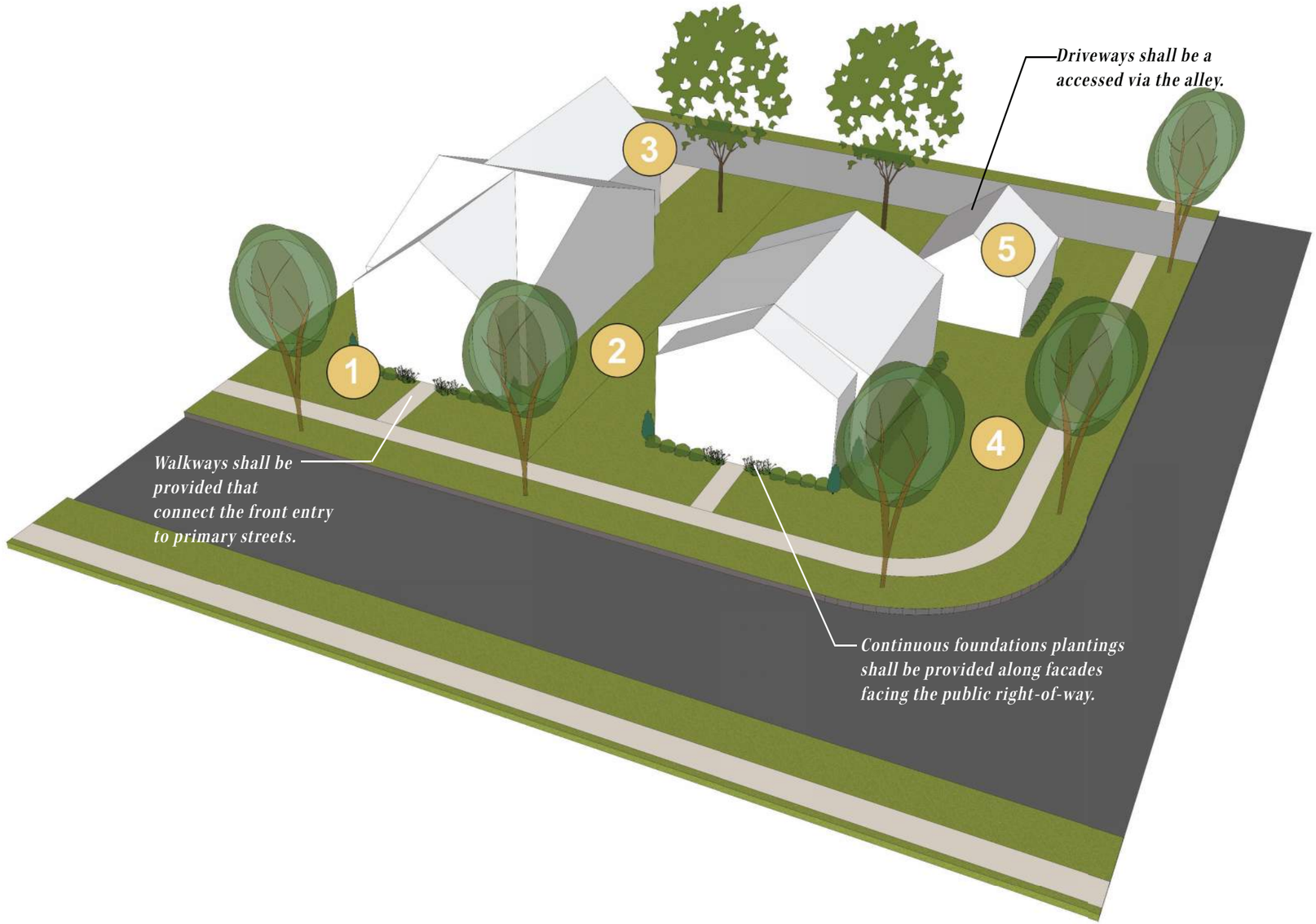
The minimum corner setback is 12’.

5 ACCESSORY STRUCTURES

Accessory structures shall have a 6’ rear and side setback and be behind the main mass of the home. If a detached garage is provided, it shall only load from alleys and be setback 20’ from the alley.

REPEAT PATTERN

3 lots shall separate identical houses on the same side of the street. A minimum of 1 full lot separation is required between identical houses located across the street from each other on the same block.



LARGE LOT SINGLE FAMILY

Large single family lots are a minimum of 60’ wide.

1 FRONT SETBACK (PRIMARY STRUCTURE)

The front setback is 20’.

2 SIDE SETBACK (PRIMARY STRUCTURE)

The minimum side setback is 6’.

3 REAR SETBACK (PRIMARY STRUCTURE)

The rear setback is 20’

4 CORNER SETBACK (PRIMARY STRUCTURE)

The minimum corner setback is 12’. Side load garages shall have a 20’ setback to accommodate parking.

5 ACCESSORY STRUCTURES

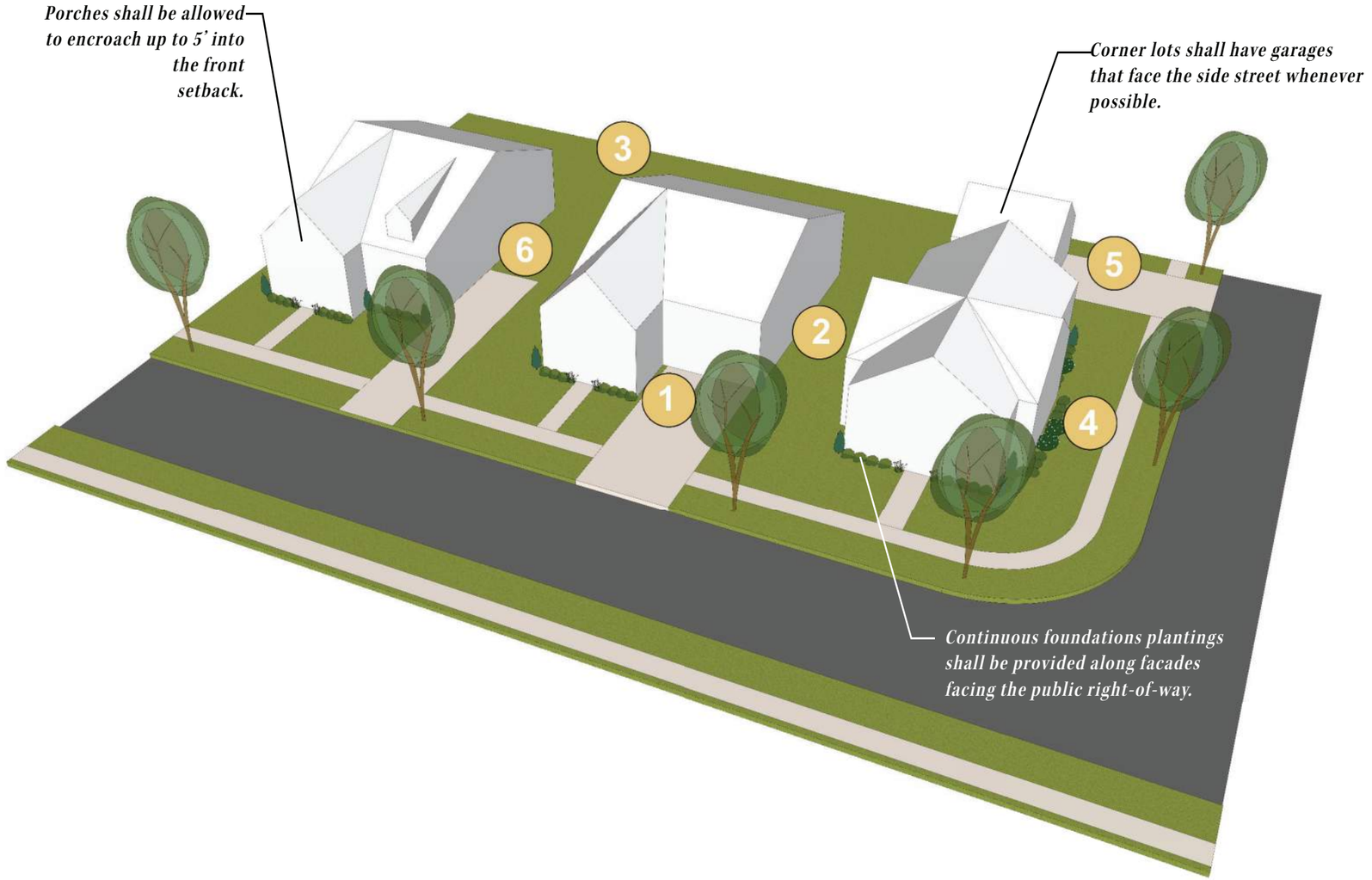
Accessory structures shall have a 6’ rear and side setback and be behind the main mass of the home.

6 SIDE LOAD LOTS

On streets where front loaded homes are provided, 1 lot for every 3 lots shall have a side loaded garage.

REPEAT PATTERN

3 lots shall separate identical houses on the same side of the street. A minimum of 1 full lot separation is required between identical houses located across the street from each other on the same block.



APARTMENTS

Apartments buildings should be situated to face the roadway with parking behind and to the side whenever possible. If parking must be along the ROW, evergreen screening shall be provided. Walkway connections to the street shall be provided to connect the homes to the street network.

1 STREET SETBACK

The minimum setback from the public row is 15’

2 SIDE SETBACK

The minimum side setback from a property line is 15’.

3 REAR SETBACK

The minimum rear setback from a property line is 15’

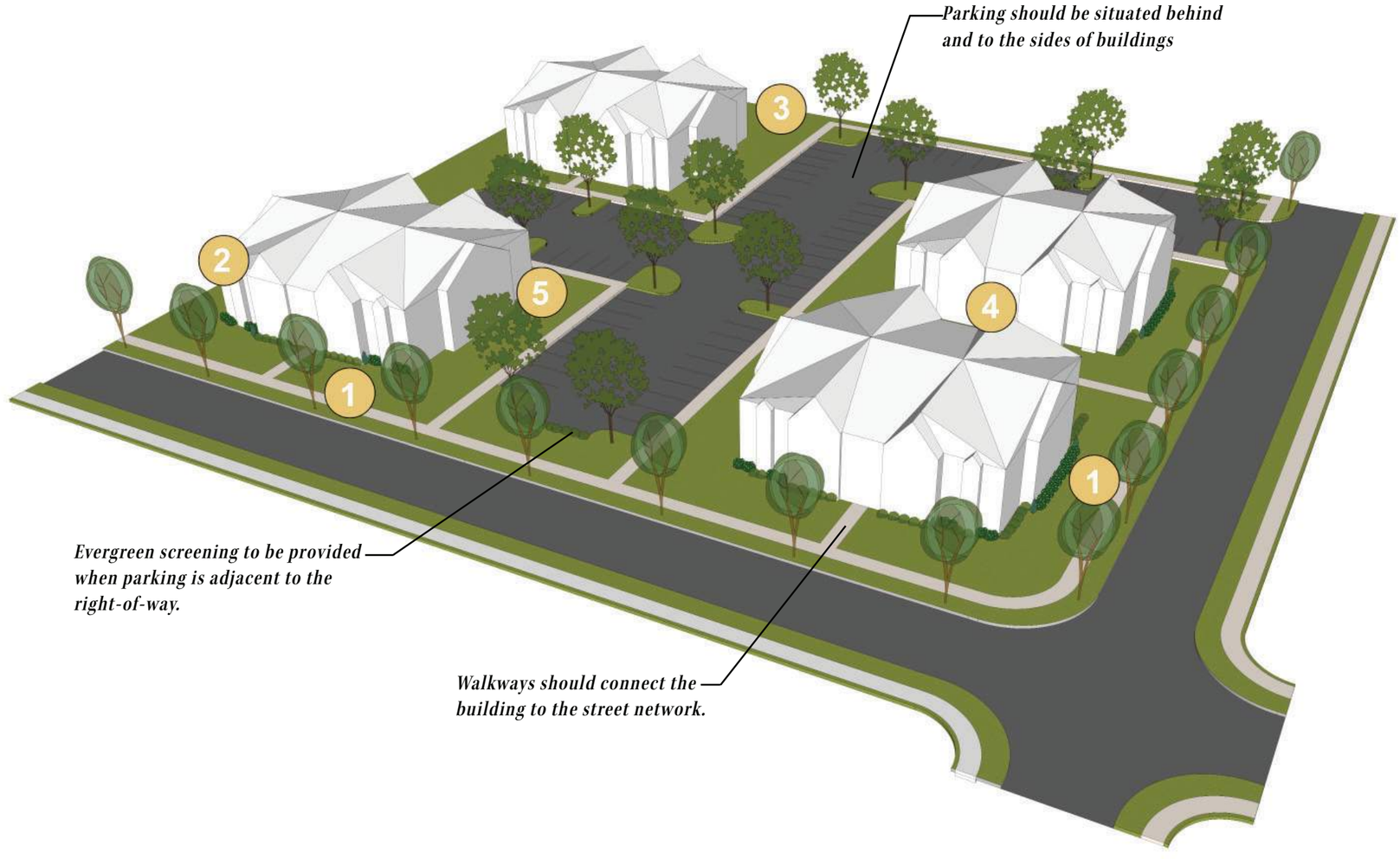
4 BUILDING SEPARATION

The minimum distance between buildings shall be 30’.

5 PARKING SETBACK

Buildings shall be setback from parking lots a minimum of 15’ and parking lots shall be setback a minimum of 15’ from the public right-of-way.

MAXIMUM HEIGHT: 58’





ARCHITECTURAL FEATURES

The overall success of a community is achieved in part by how well structures and groups of structures relate to each other. While structures may have distinct features, they must be considerate of adjacent structures with respect to height, form, exterior finish and colors. High quality, well thought out details, lead to home designs that are pleasing to live in and contribute to the overall community aesthetic.







ROOFS

Any architectural grade product with weight of 250 pounds per “square” (100 square feet) or greater will be acceptable, with a minimum 25 year warranty. Standing seam, pre-finished metal roofs, painted galvanized metal roofs, composite slate and composite cedar roofs are all acceptable alternatives. Roofing materials shall be darker in color than the exterior wall colors. Roof lines shall be varied in nature and overhangs shall be in balance with both the size of the roof and volume of the structure. Metal roofs are encouraged on accents, pigeon walls and porches.

EXTERIOR APPURTENANCES

Exposed roof vent stacks shall be located on the rear of the house for minimum visibility and shall be either painted black or another color matching the roof.

Garages

- The garages on front loaded homes shall not have visual prominence on the front façade and shall not compose more than 40 percent of the total length of the front elevation.
- Front-loaded garages shall not be the prominent feature of the structure and shall be setback no less than 6 feet from the front building façade.
- The maximum width for individual garage doors shall be 9 feet for a single door and 18 feet for a double door.
- The garages on front-loaded homes shall be limited to one-car or two-car garages.
- The garages on front loaded townhomes shall not have visual prominence on the front façade and shall be recessed no less than three feet behind the front wall plane that contains the primary entrance to the dwelling facing the street frontage.
- The maximum width for front loading townhome garage doors shall be nine feet.

ARCHITECTURAL FEATURES



EXTERIOR

Architectural motif and exterior elevations are to be aesthetically pleasing in appearance and generally compatible in terms of the overall structure and its relationship to other structures based on location, size and quality within the development. The selection of materials shall be harmonious with the architectural motif of each dwelling unit and community as a whole. Exterior materials shall reflect harmony with both the environment and other structures in the neighborhood.

1. Unfinished wood and exposed concrete or cinder block are not permitted.

2. Exterior finish materials are limited to fiber-cement siding, engineered wood siding, horizontal lap siding (no vinyl), brick, stone, stucco (EIFS will not be allowed), wood, and machine cut shingles (no vinyl).

3. No more than three exterior materials and four colors (including trim roof and trim colors) shall be allowed on each structure.

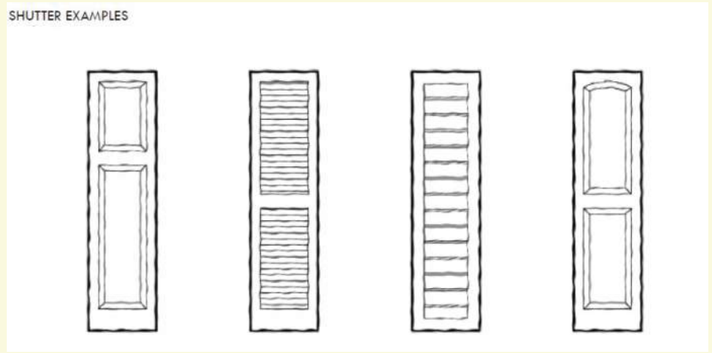
4. All exposed joists or rafters shall be painted or stained and all exposed porch and deck details visible from public right of ways shall be painted or stained (except for treads and floor decking).

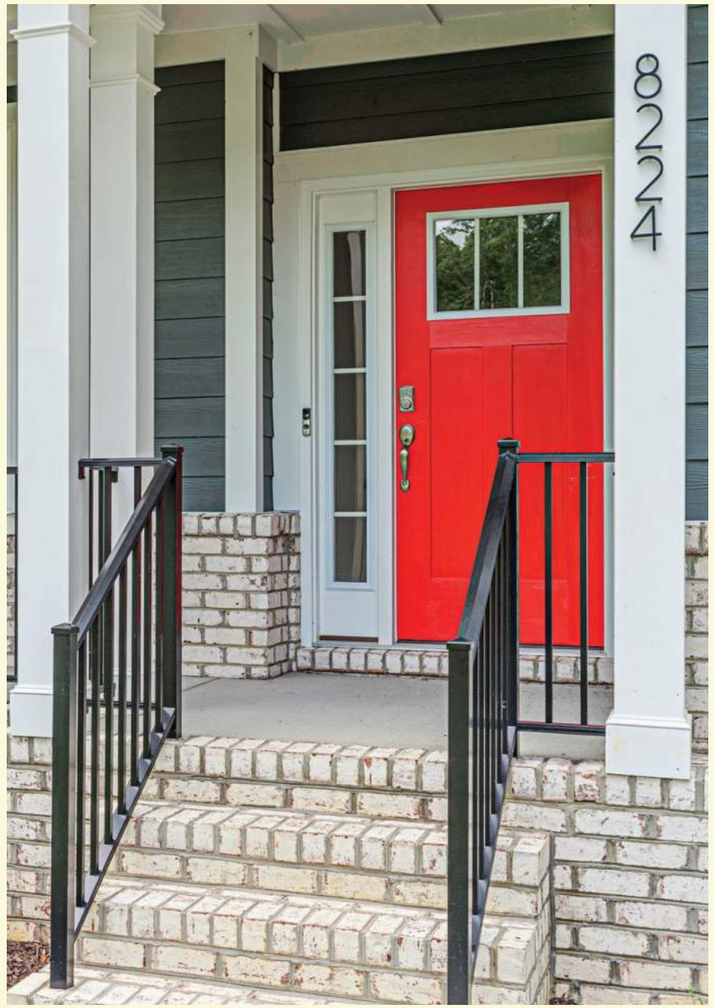
DOORS

Doors, door trim, surrounds (and transom, if used) shall be appropriate to architectural style of home. Storm doors, if used, shall be full glass doors. Doors shall be stained or painted. Front doors may be paneled and may include sidelights or a transom above. All doors, sidelights, and transoms will be cased with appropriate detailing that visually connects all of the entry elements. Garage doors shall be constructed of insulated metal, fiberglass, vinyl, or other approved composite materials.

WINDOWS

Primary windows shall be double hung or single hung windows, with grille patterns appropriate to the style of architecture. Shutters shall be vinyl, solid PVC, wood or metal, and be sized to match the window sash height.





OTHER IMPORTANT FEATURES

DRIVEWAYS: Driveways shall be planned to cover a minimum area of the lot. All driveways must be paved with an impervious surface.

LIGHTING: No exterior lighting shall encroach across property lines to the detriment of the surrounding property owner.

FENCING: All fences shall be designed so that a finished side faces outward from the property on which it is located. No chain-link or opaque fencing is allowed. Materials should be wrought iron, aluminum, vinyl, or painted wood. Front or corner yard fences, if provided, should be open in their design and pickets no higher than 3'. Fences adjacent to sidewalks shall be set a minimum of 18" from the walkway. Shrubs and ground covers are recommended on the public side of fences. Landscaping along the sidewalk in the form of fencing, walls, low hedges, or other plantings is encouraged.

REFUSE/STORAGE: Refuse containers, woodpiles, etc. will be stored within an enclosed storage area or be appropriately fenced, walled or screened by landscaping from public view.

ACCESSORY BUILDINGS AND STRUCTURES: Any accessory building or structure must be compatible with the style, materials, and color of the primary structure.

DORMERS: Dormers shall have gable, hip, or shed roofs, and shall be designed to be appropriate to the architectural style of the home. Dormer windows shall be proportional to the dormer itself with the window filling out the majority of the dormer face.









SINGLE FAMILY PRODUCT EXAMPLES











SINGLE FAMILY PRODUCT EXAMPLES









TOWNHOME PRODUCT EXAMPLES





Note: Front loaded townhomes shall comply with these design guidelines and the garage standards on page 17 or the plan shall be revised so that all townhomes are rear loaded.

APARTMENT PRODUCT EXAMPLES







JAMES CITY COUNTY

MARKET PLACE DISTRICT

The Market Place District, the primary retail area of at Cardinal Ridge, should compliment and not compete with New Town. Located at the intersection of DePue Drive and Longhill Road, the Marketplace District is situated to be a successful retail area with high visibility to the public while still integrated into the fabric of the community.

The Marketplace district focuses on “placemaking” to create a small, yet unique and vibrant destination providing needed services to the local community . Restaurants, neighborhood services, retail & arts and craft boutiques, coffee shops, are all encouraged within the Marketplace District.







BUILDING ORIENTATION

Buildings should line DePue Drive with parking to the side or rear of the buildings.

STREET SETBACKS

Commercial buildings shall have a 20' setback from the right-of-way.

PARKING SETBACK

Buildings shall be setback 10' from parking areas. Architectural elements may encroach up to 5' in this area.

PARKING STANDARDS

All parking within the Marketplace District shall be shared among uses. Parking and off-street loading requirements for specific uses shall be in accordance with the provisions of the Zoning Ordinance for James City Count.

SCREENING

Parking lots on the sides of buildings and abutting public streets shall be screened by evergreen landscaping. Low level screening should mitigate views of parked cars, yet retain a sense of security for parking lot users.



**Building placement may change depending on end user.*



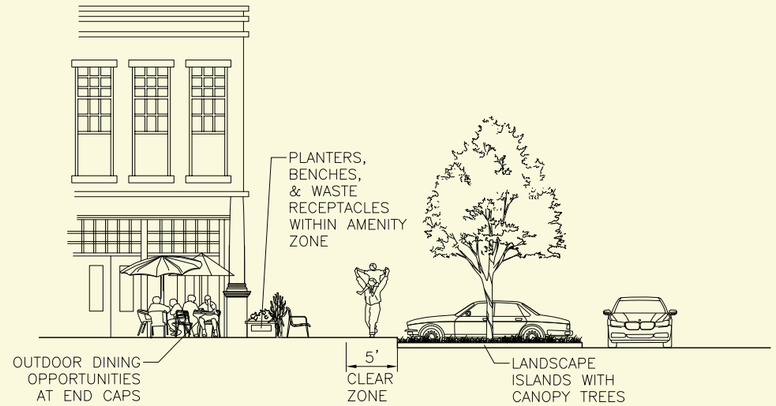
STREETSCAPE & SIDEWALKS

Sidewalks in the Marketplace District serve as a place for pedestrian activity and gathering. Opportunities for gathering spots with seating and plantings shall be provided between the building and parking whenever possible. Amenity elements shall not inhibit the flow of pedestrian traffic within the clear zone.

Prominent building endcaps should be utilized for outdoor dining if appropriate. Outdoor dining areas shall be fenced with 4' black aluminum fencing and provide shaded seating for patrons.

AMENITY ZONES

A 5' clear zone shall be maintained directly adjacent to the parking area. The remaining area shall be dedicated to pedestrian amenities including seating, planters, and waste receptacles. With multi-purpose trails leading from the surrounding area and neighborhood, each building group shall have bike racks provided.





EXTERIORS

- Dominant exterior building materials exposed to view on public ROWs should be brick, natural or artificial stone, or architectural metals. Additional dominant materials may include architectural concrete (pre-cast concrete or cast stone, glass, and cementitious siding. Mortar and caulking colors should be compatible with the predominant materials.
- Mechanical equipment, utility boxes and similar features should be located on the side or rear. If visible from the street, they should be screened from public view. Rooftop equipment shall be screened or concealed from view
- Customer entrances should be clearly identified and highly visible.

LIGHTING

Street lights shall be a post-type fixture that coordinates with the retail frontage and other pedestrian amenities. Lights should be amber in color (3000k max) and full-cutoff to reduce light spill into the night sky. Street lights are just one element of streetscape lighting. Light should flow out from within the retail spaces and their storefronts to maintain a vibrant pedestrian zone. Light trespass regulations shall be in conformance with the Zoning Ordinance.

SITE FURNISHINGS

Site furnishings shall be attractive, simple, and functional in their design and complement the architectural character of the area they serve. The same type of furnishings should be consistent in their design and use and shall be unified in their design by the use of common materials, finishes, and details. Site furnishings shall be coordinated in appearance with other street amenities and be equivalent to those shown here.



FULL-CUTOFF LIGHT



SEATING



BENCHES



LANDSCAPE GUIDELINES

Cardinal Ridge places significant emphasis on preserving the natural forested environment along the RPA and Wetland areas. Linking these spaces to the fabric of the community will provide all residents with an exceptional environmental resource. Plants should be used to establish a hierarchy of spaces and to demonstrate the relationship of architecture and landscape architecture. Trees and plantings will be vital elements in the fabric of the neighborhood. They allow people to continue their connection with nature, can moderate seasonal climate effects, can soften hard urban surfaces, and can provide a physical buffer between the pedestrian or bicyclist and vehicular traffic.

STREETSCAPES

- Trees and other plan material shall be appropriate for the environmental setting they are placed within.
- Street tree types will be varied based on the sun/shade exposure and the scale of the street and verge.
- Trees will be spaced at regular intervals in verges between the curb and sidewalk when not in conflict with utilities and street lighting. Spacing shall be 40' on center unless utilities prohibit such spacing. Tree alignment will be coordinated on both sides of the street whenever possible.
- Entry roads will be planted with a variety of canopy trees, ornamental trees, and shrubs that shall be maintained at a maximum of 3' high.
- All street trees shall be selected and planted to maintain vehicular sight distance

RESIDENTIAL LANDSCAPES

- Each single family lot shall provide a minimum of 20% tree canopy. Canopy trees shall be credited with 400 s.f. of coverage and small ornamental or screening trees shall be credited with 200 s.f. of coverage.
- Each individual yard shall be designed to blend into the neighborhood as a whole. Plant beds should be laid out to flow in curvilinear lines and plantings shall be massed in groupings whenever possible.
- Foundation plantings consisting of evergreens, flowering shrubs, or ground covers are required in front of all residential homes.

PLANT SIZES

- Canopy trees shall be a minimum of 2-3 inch caliper.
- Multi-stem ornamental trees or evergreen screening trees shall be a minimum of 1.25"-1.75" caliper at time of planting.
- Screening shrubs shall be 30"-36" ht minimum at time of planting.
- Foundation shrubs shall be 18"-24" ht minimum at time of planting.

NATIVES

Plant pallets should emphasis native plantings whenever possible. The structure, leaves, flowers, seeds, berries and other fruits of these plants provide food and shelter for a variety of birds and other wildlife. Native plants naturally occur in the region in which they evolved. While non-native plants might provide some of the above benefits, native plants have many additional advantages. Because native plants are adapted to local soils and climate conditions, they generally require less watering and fertilizing than non-natives. Natives are often more resistant to insects and disease as well, and so are less likely to need pesticides. Wildlife evolved with plants; therefore, they use native plant communities for food, cover and rearing young. Using native plants helps preserve the balance and beauty of natural ecosystems.

Note: Landscaping shall be in compliance with the zoning ordinance unless a greater requirement is listed above.



NATIVE RED BUD



NATIVE SERVICE BERRY

RECOMMENDED PLANTS

A list of plants to be utilized in the development can be found below. Primarily native plants are represented however acceptable alternatives have been provided that can be chosen for their unique qualities that may be desirable in certain locations.

CANOPY TREES:

Acer rubrum - Red Maple (including all cultivars)
Betula nigra 'BNMTF'- Dura Heat River Birch
Carpinus caroliniana - American Hornbeam,
Celtis occidentalis – Hackberry
Gleditsia triancanthos va. inermis - Thornless Honeylocust
Liquidambar styraciflua 'Rotundiloba' - Sweetgum
Magnolia grandiflora 'Bracken's Brown Beauty' - Southern Magnolia
Nyssa Sylvatica 'Wildfire' or 'Green Gable' - Black Gum
Oxydendrum arboreum - Sourwood
Platanus x acerifolia- London Planetree
Pinus palustrus - Longleaf Pine
Pinus taeda - Loblolly Pine
Pinus strobus - Eastern White Pine
Quercus alba - White Oak
Quercus coccinea - Scarlet Oak
Quercus palustris - Pin Oak
Quercus phellos - Willow Oak
Quercus virginiana 'Highrise' - Highrise Live Oak
Taxodium distichum - Bald cypress
Tilia cordata - Littleleaf Linden
Zelkova serrata 'Village Green' - Village Green Zelkova

SMALL ORNAMENTAL OR SCREENING TREES:

Amelanchier x grandiflora - Autumn Brilliance Serviceberry
Amelanchier canadensis - Canada Serviceberry
Cercis canadensis - Eastern Redbud
Chionanthus virginicus - White Fringetree
Cornus florida- Flowering Dogwood
Crataegus viridis - Green Hawthorn
Ilex opaca - American Holly
Juniperus virginiana – Eastern Red Cedar
Magnolia virginiana – Sweet Bay Magnolia
Thuja occidentalis - Arborvitae

SHRUBS

Aronia arbutifolia - Red Chokeberry
Callicarpa americana - American beautyberry
Ceanothus americanus - New Jersery Tea
Cephalanthus occidentalis – Buttonbush
Clethra alnifolia – Summersweet
Distylium varieties
Encore Azaleas varieties
Fothergilla 'Mount Airy' - Dwarf Fothergilla
Hamamelis virginiana - Witch Hazel
Hydrangea arborescens - Wild Hydrangea
Ilex cornuta 'Burfordii Nana' - Dwarf Burford Holly
Ilex glabra- Inkberry
Ilex verticillata - Winterberry
Ilex vomitoria- Yaupon Holly
Itea virginica - Virginia Sweetspire
Morella cerifera - Wax Myrtle
Viburnum dentatum – Arrowwood Viburnum
Viburnum nudum - Possumhaw Viburnum

GRASSES AND PERENNIALS

Achillea millefolium - Common Yarrow
Andropogon virginicus - Broomsedge
Aquilegia canadensis- Eastern Red Columbine
Asclepias incarnata - Swamp Milkweed
Asclepias tuberosa- Butterfly Weed
Coreopsis verticillata - Threadleaf Coreopsis
Echinacea purpurea - Purple coneflower
Eragrostis spectabilis - Purple Love Grass,
Eutrochium dubium - Three-nerved Joe Pye-Weed
Helenium autumnale - Autumn Sneezeweed
Helianthus angustifolius - Narrow-leaved Sunflower
Iris virginica - Virginia Blue Flag
Juncus effusus - Common Rush
Lobelia cardinalis - Cardinal Flower
Muhlenbergia capillaris - Pink Muhly Grass
Panicum virgatum - Switch Grass
Phlox paniculata - Garden Phlox
Rudbeckia hirta - Black-eyed susan
Rudbeckia fulgida - Orange coneflower
Schizachyrium scoparium - Little Blue Stem
Sisyrinchium angustifolium - Narrowleaf Blue-eyed Grass
Symphiotrichium grandiflorum - Large-flowered Aster
Solidago

CARDINAL RIDGE

JAMES CITY COUNTY, VIRGINIA

CHAPTER 527
TRAFFIC IMPACT ANALYSIS

MARCH 2023
REVISED APRIL 2026



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

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1 EXECUTIVE SUMMARY

This study presents the findings of a revised Chapter 527 Traffic Impact Analysis (TIA) prepared for the proposed Cardinal Ridge Development in James City County, Virginia. The site is generally located east of Route 199, southwest of Longhill Road/DePue Drive, and north of Schmidt Road as shown on Figure 2-1 (all figures are located at the end of the respective Chapter).

The TIA was initially submitted in March 2023 and resubmitted thru August 2025. A copy of the most recent VDOT/County comments and responses is included in Appendix A.1. This revised TIA has been prepared as a result of those comments/responses and changes in the development program.

The approximately 365-acre site is currently zoned Public Lands (PL) and is the site of the former Eastern State Hospital. The Applicant is seeking to rezone the site to permit the development of a mixed use residential and commercial development on a portion of the site.

For purposes of this analysis, the development was assumed to consist of 100,000 s.f. of retail space, 294 single family dwelling units, 120 units of affordable housing, 235 townhomes and 330 apartments. With the development, the remainder of the site will be provided to the State/County for the development of a 25-acre public use site (assumed 700 student middle school), a 35-acre Hope Family Residential site (27 dwelling units), and an 11-acre Colonial Behavioral Health site (62,000 s.f. of office).

For purposes of this analysis, the development was assumed to occur in the following four phases:

- Phase 1 (2028)
  - Colonial Behavioral Health Site (62,000 s.f. office)
  - Hope Family Village site (27 dwelling units)
  - 150 single family detached units
  - 120 affordable dwelling units
  - 94 townhomes
  - 330 apartments

- Phase 2 (2030)
  - 64 single family detached units
  - 141 townhomes

- Phase 3 (2030)
  - 80 single family detached units

- Phase 4 (2032)
  - 100,000 s.f. of retail space
  - Public Use Site (700 student middle school)

Access to the site will be provided via two (2) external site entrances off of DePue Drive (one opposite Longhill Road and the other opposite Ashbury Lane) and multiple internal site entrances along Galt Drive and Ashbury Lane Extended. The DePue Drive entrance opposite Ashbury Lane will be constructed with Phase 1 of the site. The DePue Drive entrance opposite Longhill Road will be constructed with Phase 4 (commercial) of the site.

A conceptual phasing plan is shown on Figure 1-1.

This traffic impact analysis (TIA) has been prepared in accordance with (1) the procedures outlined in the Virginia Department of Transportation's (VDOT) Traffic Impact Analysis Regulations (henceforth referred

to as Chapter 527), (2) the VDOT Traffic Operations and Safety Analysis Manual (TOSAM), and (3) the Scope of Study agreed upon between James City County, VDOT, and Timmons Group (see Appendix A.2 for the scoping agreement). It should be noted that the development program has changed since the scoping meeting and the current program is utilized in the analysis.

In accordance with the scoping agreement, the study area includes the following ten (10) existing intersections that are proximate to the site (see Figure 2-1):

1. Longhill Road/199 SB Ramps (Signalized);
2. Longhill Road/199 NB Ramps (Signalized);
3. DePue Drive/Longhill Road (Unsignalized);
4. DePue Drive/Ashbury Lane (Unsignalized);
5. Ironbound Road/DePue Drive (Signalized);
6. Ironbound Road/Schmidt Road (Unsignalized);
7. Schmidt Road/Foster Road (Unsignalized);
8. Ashbury Lane/Foster Road (Unsignalized);
9. Schmidt Road/Galt Drive (Unsignalized); and
10. Ashbury Lane/Galt Drive (Unsignalized).

The analysis also includes the Route 199/Longhill Road interchange mainline, diverge, and merge sections.

In accordance with the scoping agreement, analyses were completed for the following scenarios:

1. 2022 Existing Traffic Conditions;
2. 2028 Background Traffic Conditions (without development of the site);
3. 2028 Future Traffic Conditions (with development of Phase 1)
4. 2030 Background Traffic Conditions (without development of the site);
5. 2030 Future Traffic Conditions (with development of Phase 2+3)
6. 2032 Background Traffic Conditions (without development of the site);
7. 2032 Future Traffic Conditions (with full development of the site);
8. 2038 Background Traffic Conditions (without development of the site); and
9. 2038 Future Traffic Conditions (with full development of the site);

Each of the study intersections was analyzed under AM and PM peak hour conditions.

It was assumed that proposed intersection improvements at DePue Drive/Ashbury Lane and DePue Drive/Longhill Road/Proposed Access would be implemented by 2028.

The following steps were taken to determine the potential traffic impacts associated with this project:

1. Data Collection – Traffic counts were conducted at the study intersections on Tuesday, September 13, 2022. Additionally, 24-hour tube counts were completed at three locations in the study area.

2. Traffic Growth – A 1.0% annual growth rate was applied to the study area road network based on growth in the study area. The growth rate was compounded annually for each future scenario.

3. Background Developments – The traffic associated with the completion of two (2) other developments was assumed under all background scenarios.

4. Trip Generation – Traffic generated by the proposed development (and background developments) was estimated using the 11th Edition of the Institute of Transportation Engineers'

Trip Generation Manual. The number of dwelling units and square footage were used as the independent variables to determine the trip generation.

5. Traffic Distributions – The distribution of trips generated by the proposed development was based on the existing traffic volumes, the nature of use, and the surrounding roadway network.

6. Traffic Projections – Future traffic volumes were determined using the existing traffic counts, the 1.0% growth rate, the completion of the five (5) other developments, and the trips generated by the site.

7. Traffic Capacity Analysis – Level of service calculations for existing, background, and future conditions were performed using SYNCHRO Version 11 (signalized/unsignalized intersections) and SIDRA Version 9 for roundabouts.

8. Queuing Analysis – The 95th percentile queue lengths (Synchro) and maximum queues (SimTraffic) were reviewed at the intersections listed above.

9. Interchange Analysis – The Route 199/Longhill Road interchange mainline, diverge, and merge sections were analyzed using HCS7.

1.1 PROPOSED DEVELOPMENT

The proposed development was assumed to consist of 100,000 s.f. of retail space, 294 single family dwelling units, 120 units of affordable housing, 235 townhomes and 330 apartments. With the development, the remainder of the site will be provided to the State/County for the development of a 25-acre public use site (assumed 700 student middle school), a 35-acre Hope Family Residential site (27 dwelling units), and an 11-acre Colonial Behavioral Health site (62,000 s.f. of office).

For purposes of this analysis, it was assumed the site will be completed by 2032.

To evaluate the impacts of the traffic generated by the proposed development, analyses were completed using traffic associated with the weekday AM and PM peak hour of the adjacent street. The AM peak hour was found to be 7:45 AM – 8:45 AM and the PM peak hour was found to be 4:45 PM – 5:45 PM.

As indicated in Table 1-1, on a typical weekday, the development is anticipated to generate approximately 17,010 daily trips, 1,424 AM peak hour trips, and 1,300 PM peak hour trips.

Table 1-1: Trip Generation Summary

Buildout Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Average Daily Trips
Phase 1 Trips[1]										
Commercial										
Colonial Behavioral Health (General Office)	62,000	S.F.	710	98	13	111	19	93	112	766
Residential										
Single Family Detached	150	D.U.	210	28	80	108	91	54	145	1,465
Affordable Housing	120	D.U.	223	17	43	60	33	23	55	577
Townhomes	94	D.U.	215	13	30	43	30	22	52	666
Multifamily Housing (Low-Rise)	330	D.U.	220	30	95	125	102	60	162	2,191
Hope Family Village (Single Family Detached)	27	D.U.	210	6	17	23	18	11	29	303
Residential Subtotal	*721*	*D.U.*		*94*	*265*	*359*	*274*	*170*	*443*	*5,202*
Internal Reduction										
Office				*(5)*	*(1)*	*(6)*	*(1)*	*(5)*	*(6)*	*(38)*
Residential				*(1)*	*(5)*	*(6)*	*(5)*	*(1)*	*(6)*	*(38)*
External Trips										
Office				*93*	*12*	*105*	*18*	*88*	*106*	*727*
Residential				*93*	*259*	*352*	*268*	*168*	*437*	*5,163*
Phase 1 Total External Trips				**186**	**271**	**457**	**286**	**256**	**543**	**5,890**
Phase 2 Trips[1]										
Residential										
Single Family Detached	64	D.U.	210	13	37	50	41	24	65	669
Townhomes	141	D.U.	215	21	47	68	46	35	81	1,024
Residential Subtotal	*205*	*D.U.*		*34*	*84*	*118*	*87*	*59*	*146*	*1,693*
Phase 2 Total Trips				**34**	**84**	**118**	**87**	**59**	**146**	**1,693**
Phase 3 Trips[1]										
Residential										
Single Family Detached	80	D.U.	210	16	45	61	51	30	81	822
Phase 3 Total Trips				**16**	**45**	**61**	**51**	**30**	**81**	**822**
Phase 4 Trips[1]										
Commercial										
Retail Shopping Plaza (40-150k) [2]	100,000	S.F.	821[2]	219	134	353	425	461	886	9,449
Internal Trips				(11)	(7)	(18)	(26)	(41)	(67)	(1,158)
Pass-by Trips				0	0	0	(160)	(168)	(328)	0
New Trips				208	127	335	239	252	491	8,291
Residential										
Internal Trips				(7)	(11)	(18)	(41)	(26)	(67)	(1,158)
Public | Middle School	700	Students	522	253	216	469	50	55	105	1,470
Phase 4 Total "New" Trips				**455**	**332**	**787**	**248**	**281**	**529**	**8,604**
Summary										
				186	**271**	**457**	**286**	**256**	**543**	**5,890**
Phase 1 Trips				**34**	**84**	**118**	**87**	**59**	**146**	**1,693**
Phase 2 Trips				**16**	**45**	**61**	**51**	**30**	**81**	**822**
Phase 3 Trips				**455**	**332**	**787**	**248**	**281**	**529**	**8,604**
Phase 4 "New" Trips										
				691	**733**	**1,424**	**673**	**626**	**1,300**	**17,010**
Total Development "New" Trips										

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 11th Edition. Assumes General Urban/Suburban land use category.
(2) See Table 5-1 for calculations.

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1.2 PRINCIPAL FINDINGS

1. Under 2022 existing conditions:

   - The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) operate at an overall LOS B or better in both peak hours.
     - Each of the movements at the intersections operate at LOS C or better in both peak hours.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - Each of the movements at the Longhill Road/DePue Drive intersection (unsignalized) operate at LOS C or better with the following exception:
     - The southbound left from Longhill Road onto DePue Drive operates at LOS E in the AM and LOS F in the PM peak hours.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - Each of the movements at the DePue Drive/Ashbury Lane intersection (unsignalized) operate at LOS D or better with the following exception:
     - The northbound approach (one lane approach) operates at LOS E in the PM peak hour.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - The DePue Drive/Ironbound Road/Galt Drive intersection (signalized) operates at an overall LOS C in both peak hours.
     - Each of the movements at the intersection operate at LOS D or better except the northbound left from Ironbound Road onto Galt Drive which operates at LOS E in the AM peak hour.
     - The northbound left carries very limited volume (14 vehicles in the AM/2 vehicles in the PM peak hours) and the LOS E is a function of the limited green time provided to the movement. No improvement is necessary for this movement.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - All movements at the Foster Road/Schmidt Road intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

   - All movements at the Foster Road/Ashbury Lane intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

   - All movements at the Galt Drive/Schmidt Road intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

   - All movements at the Galt Drive/Ashbury Lane intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

2. There are two (2) other developments in the vicinity of the site that are planned/approved and will add approximately 8,500 vehicles per day to the surrounding roadway network.

- New Town Park is anticipated to add approximately 4,600 vehicles per day to the roadway network.

- The County Office site between Longhill Road, DePue Drive, and Ashbury Lane is anticipated to add approximately 3,900 vehicles per day to the roadway network.

    - With the development of the County Office site, the County will construct a dual lane roundabout at the intersections of Longhill Road/DePue Drive intersection and a single lane roundabout at the DePue Drive/Ashbury Road intersection. These improvements will be in place by 2028.

3. Under 2028 to 2032 background conditions (without development of Cardinal Ridge but with the development of the two (2) other developments and the improvements noted above), the intersections will all operate at LOS C or better with v/c ratios of less than 1.0.

4. Access to the site is proposed via the following connection points:

    - A series of access points along Galt Drive and Ashbury Lane Extended to serve the residential components of the site (Phases 1-3). With these access points, the existing internal roadway system will be reworked eliminating the Ironbound Road/Schmidt Road and Foster Road/Ashbury Lane intersections.

    - Adding a northbound (fourth leg) approach to the Longhill Road/DePue Drive intersection (Phase 4).

    - Constructing an access roadway between Ashbury Lane and the commercial development component (Phase 4). The intersection between Ashbury Lane and the commercial development is assumed to be right-in/right-out, left-in only. A southbound right turn lane is warranted at the intersection. A northbound left turn lane is not warranted at the intersection.

5. Proffered Improvements

    - With development of the site, the Applicant is proffering to modify the roundabouts the County is constructing at the intersections of Longhill Road/DePue Drive and DePue Drive/Ashbury Lane as follows to accommodate the site traffic:
        i. The DePue Drive/Ashbury Lane roundabout will be modified to a dual lane roundabout. To accommodate the expansion of the roundabout, the section of Longhill Road/DePue Drive between the roundabouts will be widened to a four-lane section.
            - These improvements will be constructed with Phase 1 (2028) of the site.

        ii. The Longhill Road/DePue Drive roundabout will be modified to include the fourth leg (northbound approach) and a second southbound approach lane.
            - These improvements will be constructed with Phase 4 (2032) of the site.

6. Total Future Traffic Conditions

- With the proffered improvements, all intersections will operate at overall LOS C or better and will accommodate traffic into and out of the site.

- No additional improvements are needed to accommodate the site traffic.

- In 2032 at buildout of the site: All intersections will operate at comparable levels to background conditions. Specifically:

    - The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
        - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
        - The 95th percentile and maximum queues will be contained within the available storage.
        - All v/c ratios are less than 1.0 during both peaks.

    - With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A/B in both peak hours. All movements will operate at LOS C or better and all v/c ratios are less than 1.0.

    - With the construction of the dual lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS B or better and all v/c ratios are less than 1.0.

    - At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
        - The eastbound approach operates at LOS D during both peaks.
        - The westbound approach operates at LOS C during both peaks.
        - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
        - The mainline southbound approach operates at LOS C during both peaks.
        - All v/c ratios are less than 1.0 during both peaks.

    - All movements at the other intersections operate at LOS B or better with all v/c ratios less than 1.0.

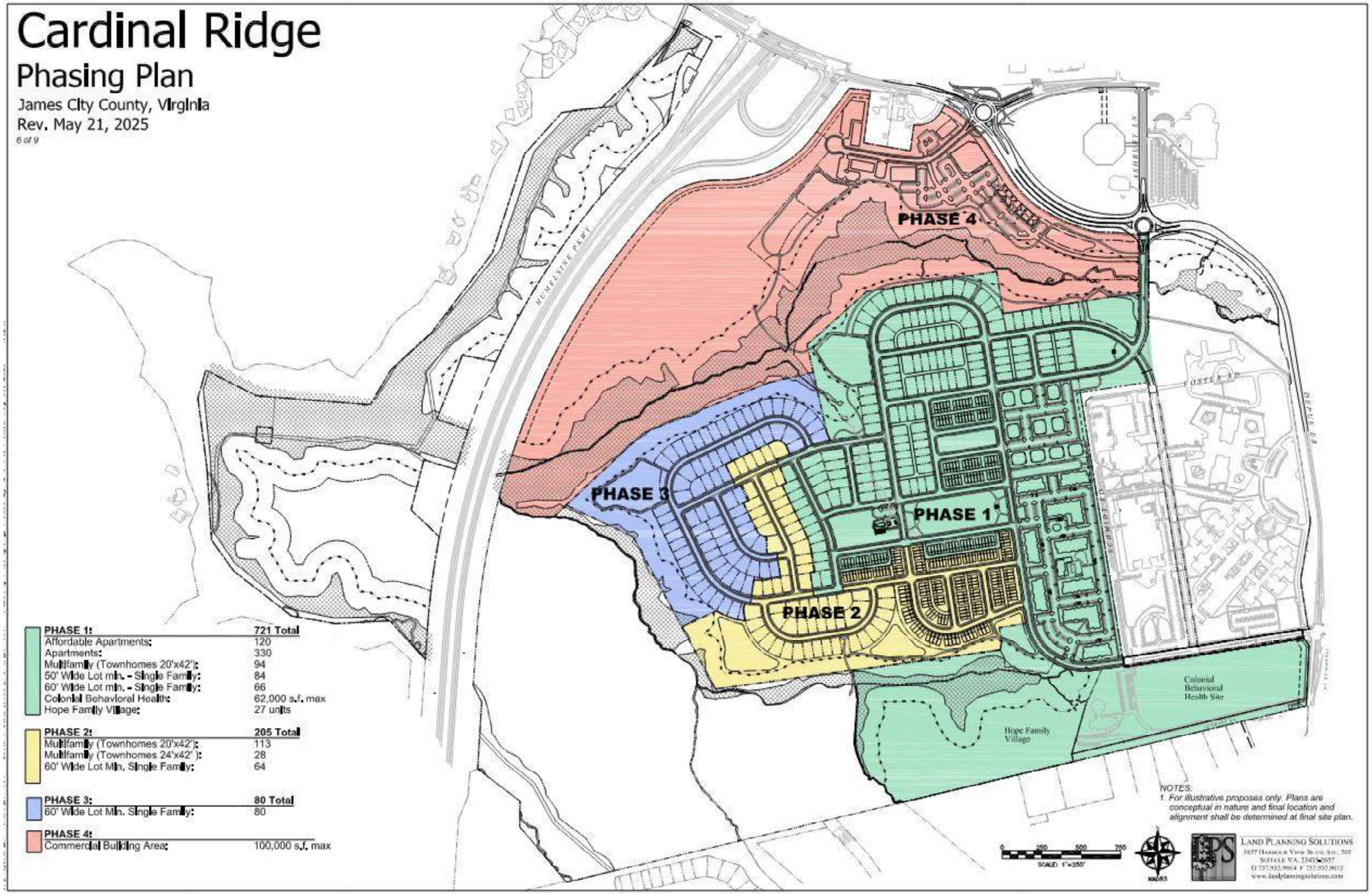
Cardinal Ridge

Phasing Plan

James City County, Virginia

Rev. May 21, 2025

6 of 9



PHASE 1:	721 Total
Affordable Apartments:	120
Apartments:	330
Multifamily (Townhomes 20'x42'):	94
50' Wide Lot min. - Single Family:	84
60' Wide Lot min. - Single Family:	66
Colonial Behavioral Health:	62,000 s.f. max
Hope Family Village:	27 units

PHASE 2:	205 Total
Multifamily (Townhomes 20'x42'):	113
Multifamily (Townhomes 24'x42'):	28
60' Wide Lot Min. Single Family:	64

PHASE 3:	80 Total
60' Wide Lot Min. Single Family:	80

PHASE 4:	
Commercial Building Area:	100,000 s.f. max

NOT TO SCALE

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Conceptual Phasing Plan
Cardinal Ridge
James City County, Virginia

Figure
1-1

2 BACKGROUND INFORMATION

The scope of the traffic study was established in a meeting with the County/VDOT on July 21, 2022, and in subsequent correspondence. A copy of the scoping agreement is included in Appendix A.2.

2.1 STUDY AREA LIMITS

The study area shown in Figure 2-1 includes the following ten (10) intersections:

1. Route 199 Interchange with Longhill Road at Southbound Ramps (Signalized);
2. Route 199 Interchange with Longhill Road at Northbound Ramps (Signalized);
3. DePue Drive at Longhill Road (Unsignalized);
4. DePue Drive at Ashbury Lane (Unsignalized);
5. DePue Drive at Ironbound Road (Signalized);
6. Ironbound Road at Schmidt Road (Unsignalized);
7. Foster Road at Schmidt Road (Unsignalized);
8. Foster Road at Ashbury Lane (Unsignalized);
9. Galt Drive at Schmidt Road (Unsignalized); and
10. Galt Drive at Ashbury Lane (Unsignalized).

The analysis also includes the Route 199/Longhill Road interchange mainline, diverge, and merge sections. The interchange analysis for all scenarios is included in Chapter 9.

Per VDOT comments, intersections 6, 7, and 9 have been removed from the future analyses.

2.2 DESCRIPTION OF DEVELOPMENT

The proposed development was assumed to consist of 100,000 s.f. of retail space, 294 single family dwelling units, 120 units of affordable housing, 235 townhomes and 330 apartments. With the development, the remainder of the site will be provided to the State/County for the development of a 25-acre public use site (assumed 700 student middle school), a 35-acre Hope Family Residential site (27 dwelling units), and an 11-acre Colonial Behavioral Health site (62,000 s.f. of office).

Access to the site will be provided via two (2) external site entrances off of DePue Drive (one opposite Longhill Road and the other opposite Ashbury Lane) and multiple internal site entrances along Galt Drive and Ashbury Lane Extended. The DePue Drive entrance opposite Ashbury Lane will be constructed with Phase 1 of the site. The DePue Drive entrance opposite Longhill Road will be constructed with Phase 4 (commercial) of the site.

With development of the site, the Applicant is proffering to modify the roundabouts the County is constructing at the intersections of Longhill Road/DePue Drive and DePue Drive/Ashbury Lane as follows to accommodate the site traffic:

- The DePue Drive/Ashbury Lane roundabout will be modified to a dual lane roundabout. To accommodate the expansion of the roundabout, the section of Longhill Road/DePue Drive between the roundabouts will be widened to a four-lane section.
    - These improvements will be constructed with Phase 1 (2028) of the site.

- The Longhill Road/DePue Drive roundabout will be modified to include the fourth leg (northbound approach) and a second southbound approach lane.
    - These improvements will be constructed with Phase 4 (2032) of the site.

2.3 EXISTING ROADWAY NETWORK

The existing intersection geometry for each of the ten (10) study intersections is shown on Figure 2-2. This includes the traffic control, lane geometry, and turn lane storage for all approaches.

It is noted that some of the roadways in the study area change names/route numbers as they traverse the study area.

Longhill Road (Route 612) connects to Route 199 at an interchange and travels approximately 1,000 feet east before turning left at the intersection with Route 615 (DePue Drive).

Longhill Road is a two-lane, undivided minor arterial road with a posted speed limit of 45 mph. According to 2023 VDOT AADT data, Longhill Road services 15,000 vehicles per day from Route 830 to Longhill Connector Road and 4,600 vehicles per day from Longhill Connector Road to Ashbury Lane (Route 322).

Route 615 is referred to as DePue Drive from the interchange with Longhill Road south to the signalized intersection with Ironbound Road/Galt Drive. From the intersection with Ironbound Road/Galt Drive south to the signalized intersection with Monticello Avenue, Route 615 is referred to as Ironbound Road.

DePue Drive (Route 615) is a two-lane, undivided minor arterial road with a posted speed limit of 45 mph. According to 2023 VDOT AADT data, DePue Drive services 8,900 vehicles per day from Longhill Road to Ashbury Lane and 9,500 vehicles per day from Ashbury Lane to Ironbound Road. The VDOT traffic count data refers to Route 615 as "Longhill Connector Road" but all street signs in the area refer to the road as DePue Drive.

Ironbound Road (Route 615) is a two-lane, undivided minor arterial road with a posted speed limit of 35 mph. According to 2023 VDOT AADT data, Ironbound Road services 12,000 vehicles per day in the vicinity of the site.

Ironbound Road (Route 7081) is a City of Williamsburg maintained roadway that travels east from the intersection of Route 615 (Ironbound Road/DePue Drive)/Galt Drive and connects with US Route 60 to the east. The roadway is a two-lane, undivided minor arterial road with a posted speed limit of 25 mph. According to 2023 VDOT AADT data, this section of Ironbound Road carries 8,900 vehicles per day in the vicinity of the site.

Ashbury Lane (Route 322) is an internal roadway to the state owned Eastern State Hospital and connects Longhill Road to the north with Galt Drive to the south. The roadway is a two-lane, undivided road with a posted speed limit of 25 mph. There is no available AADT data for Ashbury Lane.

Schmidt Road is an internal roadway to the state owned Eastern State Hospital and connects Ironbound Road to the southeast with Foster Road to the north. The roadway is a two-lane, undivided road with a posted speed limit of 25 mph. There is no available AADT data for Schmidt Road.

Foster Road is an internal roadway to the state owned Eastern State Hospital and connects Galt Drive to the south with Schmidt Road to the northwest. The roadway is a two-lane, undivided road with a posted speed limit of 25 mph. There is no available AADT data for Foster Road.

Galt Drive is an internal roadway to the state owned Eastern State Hospital and connects Ironbound Road to the east with Schmidt Road to the west. The roadway is a two-lane, undivided road with a posted speed limit of 25 mph. There is no available AADT data for Galt Drive.

2.4 CRASH ANALYSIS

A crash analysis was performed over the past five (5) years (2020-2024) within the vicinity of the site and at the major study intersections as detailed below.

At the Longhill Road/Route 199 SB Ramp intersection (and along the ramps), there have been a total of 35 crashes over the past 5 years.

The crash severity type breakdown is:
- 18 property damage only
- 12 non-visible injury crashes
- 5 visible injury crashes

The crash type breakdown is:
- 8 rear-end crashes
- 19 angle crashes
- 1 head on crash
- 1 sideswipe same direction
- 6 off-road or animal

At the Longhill Road/Route 199 NB Ramp intersection (and along the ramps), there have been a total of 9 crashes over the past 5 years.

The crash severity type breakdown is:
- 4 property damage only
- 4 non-visible injury crashes
- 1 visible injury crash

The crash type breakdown is:
- 3 rear-end crashes
- 2 angle crashes
- 1 sideswipe same direction
- 4 off-road

At the Longhill Road/Longhill Road Connector intersection, there have been a total of 6 crashes over the past 5 years.

The crash severity type breakdown is:
- 4 property damage only
- 1 non-visible injury crashes
- 1 visible injury crash

The crash type breakdown is:
- 3 angle crashes
- 1 sideswipe same direction
- 2 off-road or animal

At the Longhill Road/DePue Drive intersection, there have been a total of 8 crashes over the past 5 years.

The crash severity type breakdown is:
- 2 property damage only
- 4 non-visible injury crashes
- 1 visible injury crash
- 1 severe injury crash

The crash type breakdown is:
- 6 angle crashes
- 1 rear end crash
- 1 off-road

At the DePue Drive/Ironbound Road/Galt Drive intersection, there have been a total of 6 crashes over the past 5 years.

The crash severity type breakdown is:
- 3 property damage only
- 3 non-visible injury crashes

The crash type breakdown is:
- 2 angle crashes
- 3 rear end crash
- 1 "other" crash

2.5 EXISTING TRAFFIC VOLUMES

Existing count data was obtained from a peak hour directional turning movement count at each of the ten (10) study intersections noted above.

The counts were collected at times that correspond with the typical AM peak (7:00 AM to 9:00 AM) and PM peak (4:00 PM to 6:00 PM).

The peak hour counts included heavy vehicles by movement and pedestrian counts. The complete count data is provided in Appendix B.

The count data was used to develop the 2022 existing peak hour volumes used in the analyses. The 2022 existing AM (7:45 – 8:45) and PM (4:45 – 5:45) peak hour volumes are summarized on Figure 2-3. The existing peak hour factors and heavy vehicle percentages is shown on Figure 2-4.

See Section 12.1 for a comparison of new traffic counts collected in 2025 vs the 2022 traffic counts. It is noted that the continued use of the 2022 counts has been approved by VDOT and the County.

2.6 FUTURE IMPROVEMENTS

Background Improvements

With the development of the County Office site, the County will construct a dual lane roundabout at the intersection of Longhill Road/DePue Drive intersection and a single lane roundabout at the DePue Drive/Ashbury Road intersection. Schematics of the roundabouts are included in Appendix B.1. Construction of the roundabouts will begin in 2027 and will be complete by 2028. The County constructed roundabouts will be in place for all future scenarios (with and without Cardinal Ridge).

There are two (2) additional planned improvements in the vicinity of the site during the analysis timeframe. Neither improvement will impact the capacity of the study intersections, but both are included for reference.

- James City County is planning a shared used path along DePue Drive from Route 199 to the DePue Drive/Longhill Road intersection.

- The City of Williamsburg is planning to widen Ironbound Road (Route 7081) east of Route 615 (DePue Drive). This widening will not impact study intersection #5.

Site Improvements

With development of the site, the Applicant is proffering to modify the roundabouts the County is constructing at the intersections of Longhill Road/DePue Drive and DePue Drive/Ashbury Lane as follows to accommodate the site traffic:

- The DePue Drive/Ashbury Lane roundabout will be modified to a dual lane roundabout. To accommodate the expansion of the roundabout, the section of Longhill Road/DePue Drive between the roundabouts will be widened to a four-lane section.
    - These improvements will be constructed with Phase 1 (2028) of the site.

- The Longhill Road/DePue Drive roundabout will be modified to include the fourth leg (northbound approach) and a second southbound approach lane.
    - These improvements will be constructed with Phase 4 (2032) of the site.

Schematics of the roundabouts are included in Appendix B.2.

Additionally, the existing internal roadway system will be reworked eliminating the Ironbound Road/Schmidt Road and Foster Road/Ashbury Lane intersections.

The future intersection geometry is shown on Figure 2-5 for 2028 and Figure 2-6 for 2032.

2.7 OTHER MODES OF TRANSPORTATION

In accordance with Chapter 527 regulations, this study also reviews the potential for walking, bicycling, and transit trips to and from the area.

Walking/Bicycling

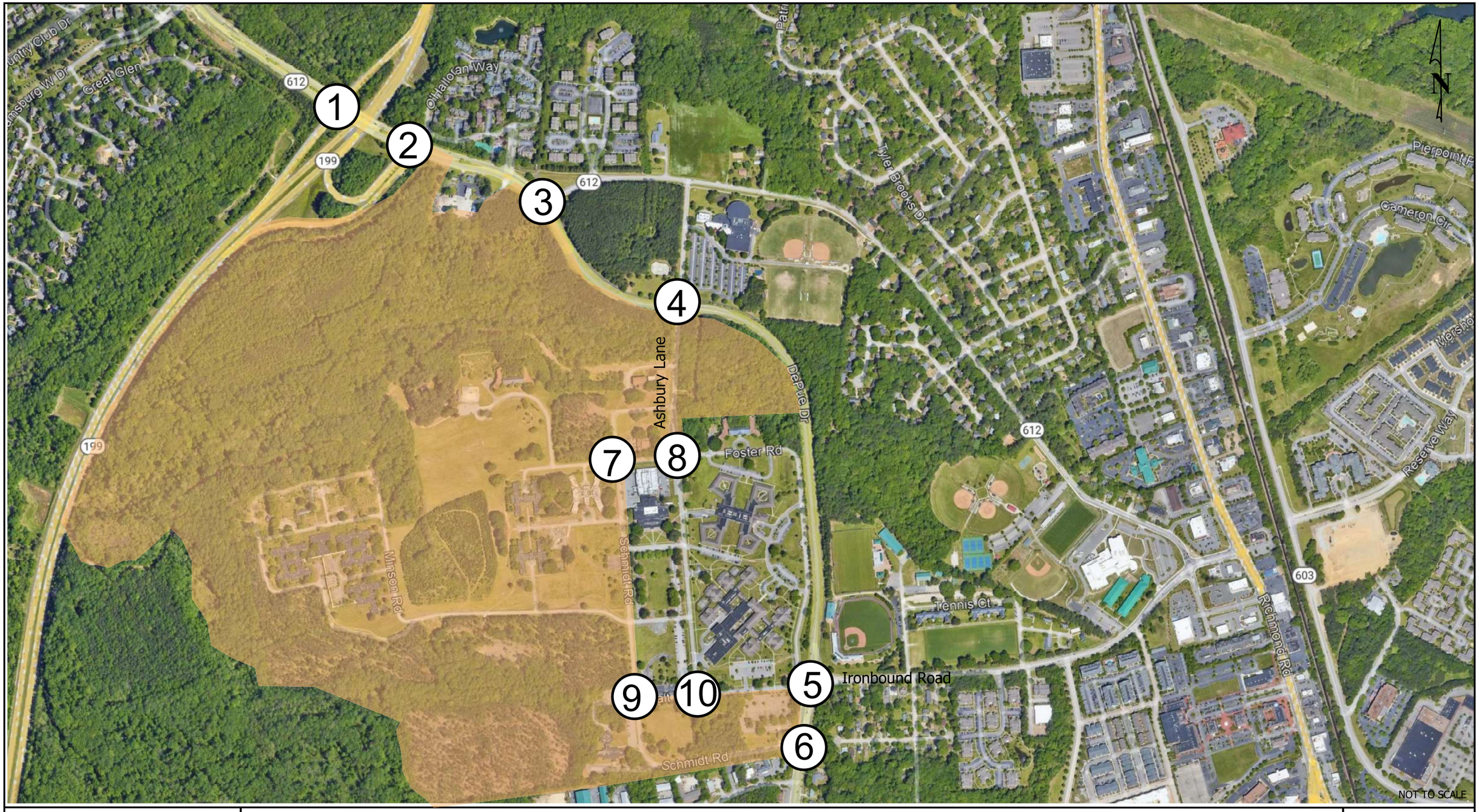
Currently, there is a shared use path along the north side of DePue Drive from Ironbound Road to the intersection with Longhill Road. There are also sidewalks along one or both sides of portions of Galt Drive, Schmidt Road, and Ashbury Lane.

With development of the site, the Applicant will install pedestrian accommodations throughout the site.

Transit/Ride-Sharing

The Williamsburg Area Transit Authority (WATA) system provides local bus service within James City County and the City of Williamsburg. Route 4 (Longhill Road) provides service in the vicinity of the site with stops at Longhill Road/Rolling Meadows and Ashbury Lane at the JCC Recreational Center.

While it is possible that some trips to the site will be made via walking, bicycle, and transit, given the nature of the use and the provided facilities, it is unlikely that a significant portion of trips would be made via these modes. To be conservative, no reduction in trips was taken for other modes of transportation.



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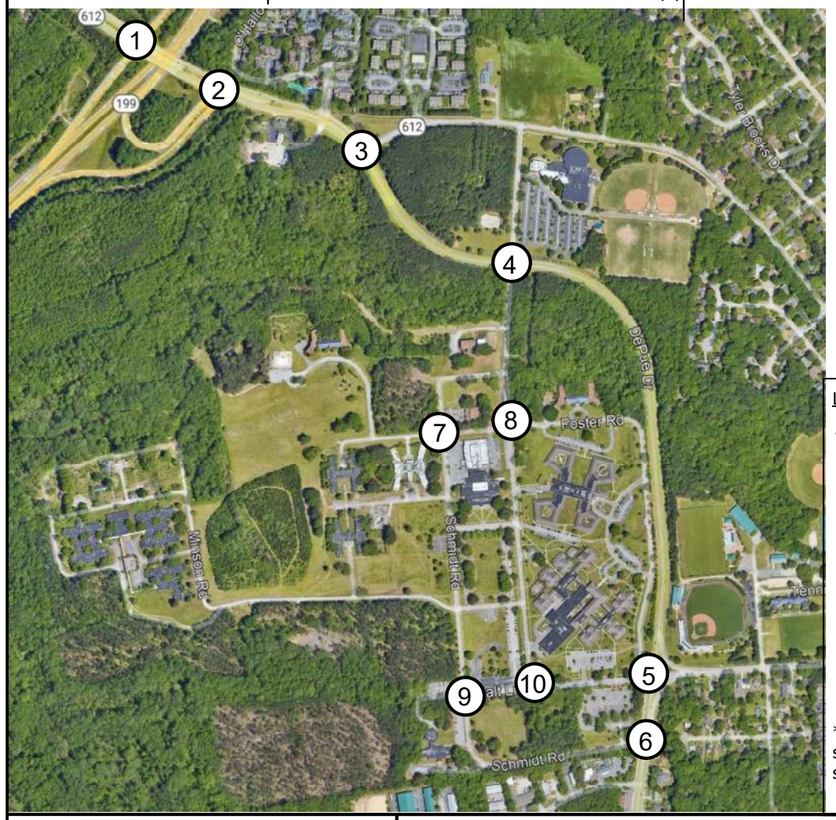
Site Location Map and Study Area Intersections
Cardinal Ridge
James City County, Virginia

Figure
2-1



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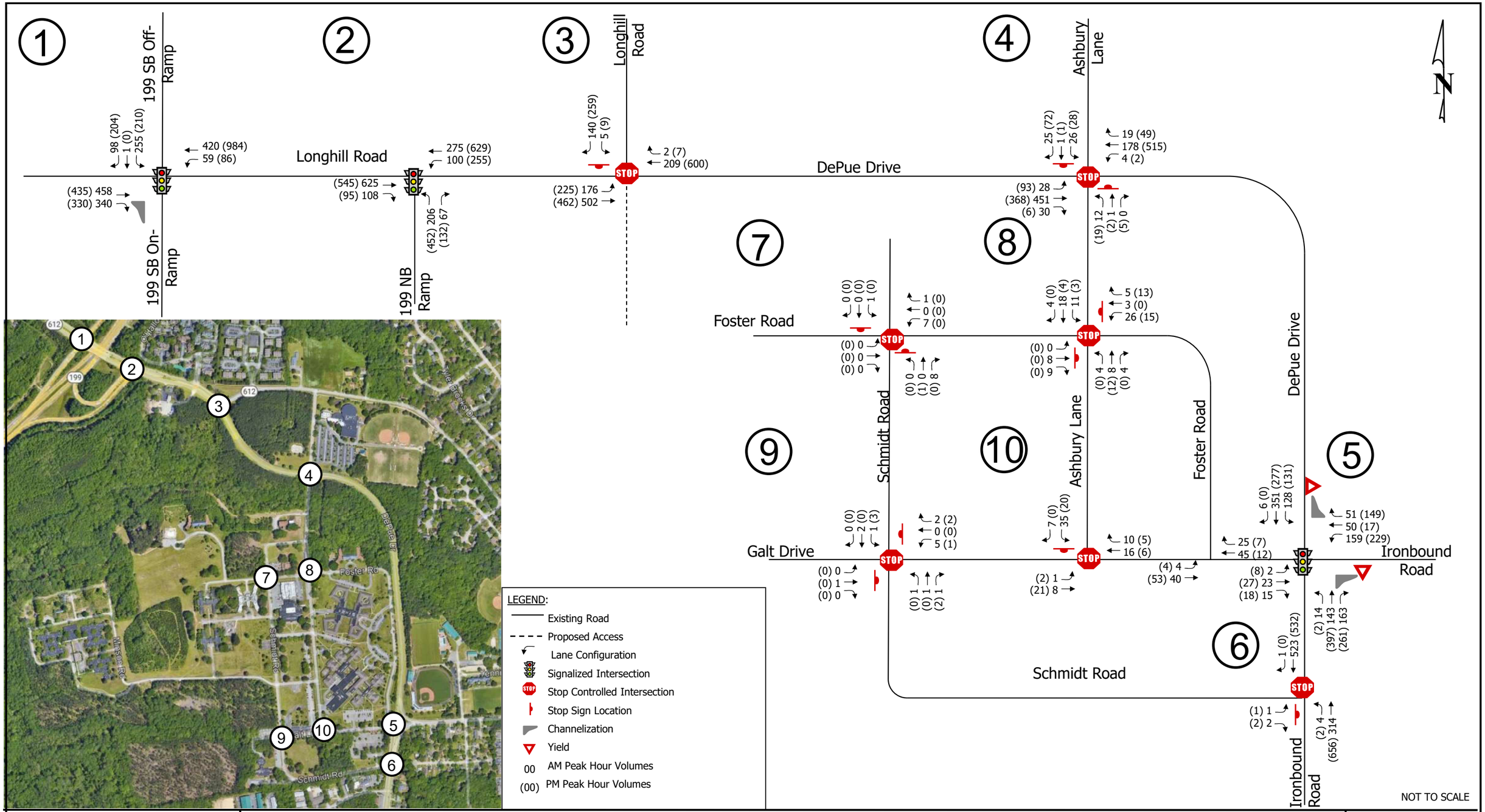
2022 Existing Geometry
Cardinal Ridge
James City County, Virginia

Figure
2-2



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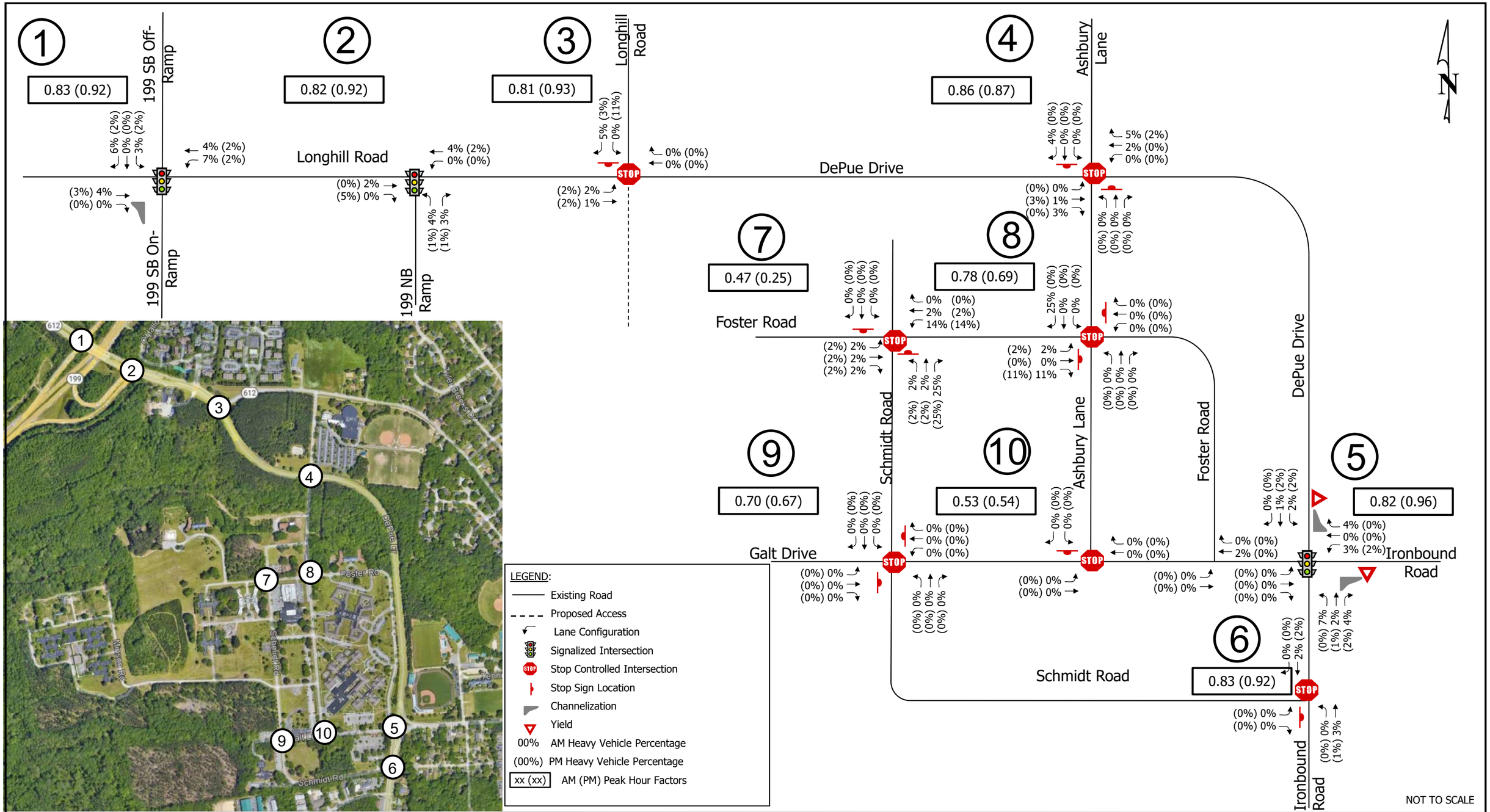
2022 Existing Volumes
Cardinal Ridge
James City County, Virginia

Figure
2-3



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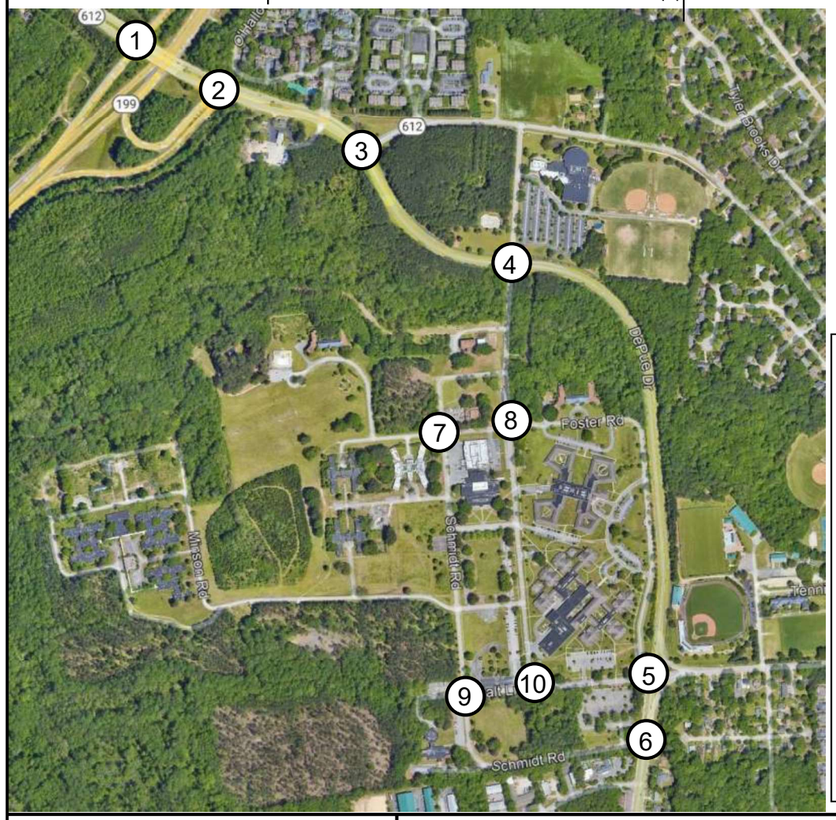
2022 Peak Hour Factors and Heavy Vehicle Percentages
Cardinal Ridge
James City County, Virginia

Figure
2-4



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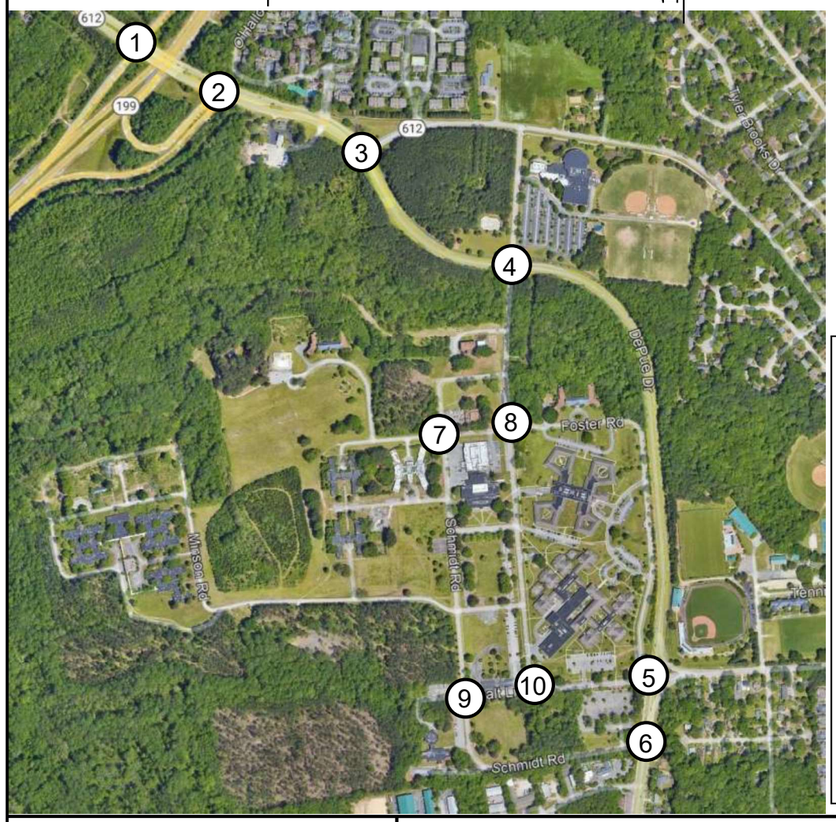
2028 Future Geometry
Cardinal Ridge
James City County, Virginia

Figure
2-5



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- S′ Effective Storage (in feet)*
- Channelization
- Yield
- TWLTL Two Way Left Turn Lane
- Roundabout

*According to TOSAM guidelines, the effective storage equals the length of the full width storage plus ½ the taper length.

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2032 Future Geometry
Cardinal Ridge
James City County, Virginia

Figure
2-6

3 ANALYSIS OF EXISTING CONDITIONS

3.1 EXISTING TRAFFIC VOLUMES

Existing AM and PM peak hour traffic counts were collected at each of the existing study intersections on Tuesday, September 13, 2022. The counts were conducted from 7:00-9:00 AM and 4:00-6:00 PM and included passenger vehicles, heavy vehicles, bicycles, and pedestrians where applicable.

The complete traffic data is included in Appendix B and summarized on Figure 2-3. A common peak hour of 7:45-8:45 AM and 4:45-5:45 PM was chosen for the study intersections based on the peak hours at the highest volume intersections.

3.2 CAPACITY ANALYSES

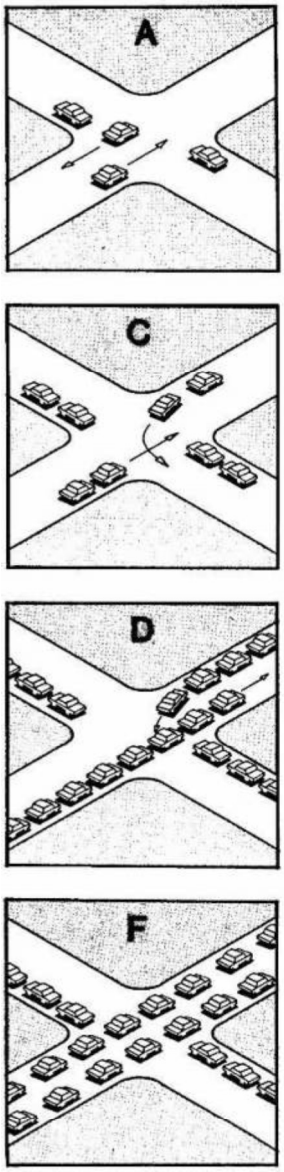
Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. The Transportation Research Board's (TRB) *Highway Capacity Manual* (HCM) methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of Levels of Service (LOS) from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. Table 3-1 shows in detail how each of these levels of service are interpreted.

Per James City County standards, an overall LOS C is considered acceptable and throughout all analysis scenarios, improvements will be identified to maintain an overall LOS C at the study intersections.

Table 3-1: Level of Service Definitions

Level of Service	Roadway Segments or Controlled Access Highways	Intersections
A	Free flow, low traffic density.	No vehicle waits longer than one signal indication.
B	Delay is not unreasonable, stable traffic flow.	On a rare occasion motorists wait through more than one signal indication.
C	Stable condition, movements somewhat restricted due to higher volumes, but not objectionable for motorists.	Intermittently drivers wait through more than one signal indication, and occasionally backups may develop behind left turning vehicles, traffic flow still stable and acceptable.
D	Movements more restricted, queues and delays may occur during short peaks, but lower demands occur often enough to permit clearing, thus preventing excessive backups.	Delays at intersections may become extensive with some, especially left-turning vehicles waiting two or more signal indications, but enough cycles with lower demand occur to permit periodic clearance, thus preventing excessive backups.
E	Actual capacity of the roadway invloves delay to all motorists due to congestion.	Very long queues may create lengthly delays, especially for left-turning vehicles.
F	Forced flow with demand volumes greater than capacity resulting in complete congestion. Volumes drop to zero in extreme cases.	Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a storage ares during part or all of an hour.

SOURCE: *"A Policy on Design of Design of Urban Highways and Arterial Streets"* - AASHTO, 1973 based upon material published in *"Highway Capacity Manual"*, National Academy of Sciences, 1965.



For both unsignalized and signalized intersections, level of service is defined in terms of delay, a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Table 3-2 summarizes the delay associated with each LOS category:

Table 3-2: Unsignalized and Signalized Intersection Level of Service Criteria

Signalized Intersections		Unsignalized Intersections	
Level of Service	Control Delay per Vehicle (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤ 10	A	0 to 10
B	> 10 to ≤ 20	B	> 10 to ≤ 15
C	> 20 to ≤ 35	C	> 15 to ≤ 25
D	> 35 to ≤ 55	D	> 25 to ≤ 35
E	> 55 to ≤ 80	E	> 35 to ≤ 50
F	> 80	F	> 50

Source: Exhibit 16-2 and Exhibit 17-2 from TRB's "Highway Capacity Manual 2000"

Capacity analyses were performed to assess existing, background, and future operational conditions. The signalized and unsignalized intersections were analyzed using SYNCHRO Version 11 based on HCM 2000 methodologies with the following assumptions:

- Level terrain;
- 12-foot lane widths;
- No parking activity or bus stops;
- Existing peak hour factor as determined by the traffic counts (by intersection) for existing scenario;
- For all future scenarios, the higher of the existing peak hour factor as determined by traffic counts (by intersection) or a peak hour factor of 0.92 was utilized;
- Heavy vehicle percentage as determined by the traffic counts (by movement); and
- Traffic signals timing data provided by VDOT. It is noted that the traffic signals are running "free" in both the AM and PM peak hours. Therefore, the cycle lengths and splits were optimized under all scenarios. The existing timing data is included in Appendix C.

Queuing analyses were conducted using both the HCM 2000 Edition methodology (as calculated by SYNCHRO) and SimTraffic simulations. The Synchro 95th percentile queue is the maximum back of queue for a particular lane within a lane group considering 95th percentile traffic volumes. The SimTraffic maximum queues are the average maximum queues after 10 runs of 60 minutes each.

Note that it is possible for the 95th percentile queue to be higher than the SimTraffic maximum queue due to the method in which each software calculates its respective value. The 95th percentile queue is based on an HCM formula while the SimTraffic maximum queue varies based on simulation results.

HCM 2000 methodologies were used in the analysis (instead of HCM 6th) as HCM 6th requires strict NEMA phasing at all intersections. Some of the study intersections utilize non-NEMA phasing for the side streets which requires the use of HCM 2000.

SIDRA was utilized for all roundabouts and HCS was utilized for the interchange ramps.

3.3 2022 EXISTING TRAFFIC VOLUMES ANALYSIS

Table 3-3 summarizes the 2022 existing intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2022 existing peak hour traffic volumes shown on Figure 2-4, the existing lane geometry shown on Figure 2-2, and the existing traffic signal timings. The corresponding analysis worksheets are included in Appendix D.

As shown in Table 3-3, under 2022 existing conditions:

- The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) operate at an overall LOS B or better in both peak hours.
    - Each of the movements at the intersections operate at LOS C or better in both peak hours.
    - The 95th percentile and maximum queues are contained within the available storage.
    - All v/c ratios at the intersection are less than 1.0.

- Each of the movements at the Longhill Road/DePue Drive intersection (unsignalized) operate at LOS C or better with the following exception:
    - The southbound left from Longhill Road onto DePue Drive operates at LOS E in the AM and LOS F in the PM peak hours.
    - The 95th percentile and maximum queues are contained within the available storage.
    - All v/c ratios at the intersection are less than 1.0.

- Each of the movements at the DePue Drive/Ashbury Lane intersection (unsignalized) operate at LOS D or better with the following exception:
    - The northbound approach (one lane approach) operates at LOS E in the PM peak hour.
    - The 95th percentile and maximum queues are contained within the available storage.
    - All v/c ratios at the intersection are less than 1.0.

- The DePue Drive/Ironbound Road/Galt Drive intersection (signalized) operates at an overall LOS C in both peak hours.
    - Each of the movements at the intersection operate at LOS D or better except the northbound left from Ironbound Road onto Galt Drive which operates at LOS E in the AM peak hour.
        - The northbound left carries very limited volume (14 vehicles in the AM/2 vehicles in the PM peak hours) and the LOS E is a function of the limited green time provided to the movement. No improvement is necessary for this movement.
    - The 95th percentile and maximum queues are contained within the available storage.
    - All v/c ratios at the intersection are less than 1.0.

- All movements at the Foster Road/Schmidt Road intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

- All movements at the Foster Road/Ashbury Lane intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

- All movements at the Galt Drive/Schmidt Road intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

- All movements at the Galt Drive/Ashbury Lane intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

Table 3-3: Intersection Level of Service, Delay, and Queue Summary
2022 Existing Traffic and Existing Geometry

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		10.3	B	0.39	94	156	9.4	A	0.32	83	133
199 SB Ramps	EB Right[3]	430	0.4	A	0.25	0	0	0.3	A	0.22	0	0
Signalized	*EB Approach*		*6.0*	*A*	--	--	--	*5.5*	*A*	--	--	--
	WB Left	225	22.7	C	0.36	22	60	23.1	C	0.42	29	75
	WB Thru		4.5	A	0.24	49	91	5.2	A	0.48	115	130
	WB Approach		*6.7*	*A*	--	--	--	*6.6*	*A*	--	--	--
	SB Left	550	22.9	C	0.60	78	149	18.3	B	0.38	67	138
	SB Left/Thru		23.0	C	0.61	80	110	18.3	B	0.38	67	78
	SB Right	290	17.5	B	0.08	4	97	17.9	B	0.31	61	168
	SB Approach		*21.4*	*C*	--	--	--	*18.1*	*B*	--	--	--
	Overall		9.6	A	0.48	--	--	8.4	A	0.55	--	--
2. Longhill Road (E-W) at	EB Thru		14.8	B	0.62	139	304	15.9	B	0.53	124	236
199 NB Ramps	EB Right[3]		0.1	A	0.08	0	0	0.1	A	0.07	0	0
Signalized	*EB Approach*		*12.6*	*B*	--	--	--	*13.6*	*B*	--	--	--
	WB Left	265	23.0	C	0.46	36	77	39.4	D	0.83	#106	106
	WB Thru		5.3	A	0.17	36	84	7.2	A	0.36	92	123
	WB Approach		*10.0*	*A*	--	--	--	*16.5*	*B*	--	--	--
	NB Left	350	17.9	B	0.42	54	156	20.2	C	0.65	113	219
	NB Right	250	0.1	A	0.06	0	35	0.1	A	0.10	0	60
	NB Approach		*13.5*	*B*	--	--	--	*15.7*	*B*	--	--	--
	Overall		12.1	B	0.54	--	--	15.4	B	0.62	--	--
3. Longhill Road (E-W) at	EB Left	240	8.3	A	0.17	15	63	10.2	B	0.26	26	118
DePue Drive (N)	EB Thru		0.0	A	0.36	0	61	0.0	A	0.29	0	50
Unsignalized	*EB Approach*		*2.2*	A	--	--	--	*3.3*	A	--	--	--
	WB Thru-Right		0.0	A	0.15	0	2	0.0	A	0.38	0	12
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left	150	36.8	E	0.05	4	28	72.6	F	0.16	13	36
	SB Right		11.0	B	0.22	21	86	23.3	C	0.59	95	125
	SB Approach		*11.9*	B	--	--	--	*25.0*	C	--	--	--
4. DePue Drive (E-W) at	EB Left	240	7.7	A	0.02	2	28	9.3	A	0.11	10	61
Ashbury Lane (N-S)	EB Thru-Right		0.0	A	0.33	0	0	0.0	A	0.25	0	0
Unsignalized	*EB Approach*		*0.4*	A	--	--	--	*1.8*	A	--	--	--
	WB Left	240	8.5	A	0.00	0	16	8.2	A	0.00	0	12
	WB Thru		0.0	A	0.12	0	0	0.0	A	0.35	0	0
	WB Right	265	0.0	A	0.01	0	1	0.0	A	0.03	0	5
	WB Approach		*0.2*	A	--	--	--	*0.0*	A	--	--	--
	NB L-T-R		19.3	C	0.06	4	40	42.1	E	0.24	22	46
	NB Approach		*19.3*	C	--	--	--	*42.1*	E	--	--	--
	SB L-T-R		14.8	B	0.14	12	50	25.6	D	0.40	46	72
	SB Approach		*14.8*	B	--	--	--	*25.6*	D	--	--	--
5. DePueDrive (N-S) at	EB L-T-R		35.2	D	0.31	42	66	33.2	C	0.21	55	69
Ironbound Road/Galt Drive	*EB Approach*		*35.2*	*D*	--	--	--	*33.2*	*C*	--	--	--
(E-W)	WB Left		34.6	C	0.67	150	157	41.8	D	0.77	#270	229
Signalized	WB Thru		26.8	C	0.19	57	80	27.1	C	0.05	29	48
	WB Right[3]	335	0.0	A	0.01	0	0	0.1	A	0.10	0	0
	WB Approach		*26.3*	*C*	--	--	--	*25.5*	*C*	--	--	--
	NB Left		74.0	E	0.63	25	44	34.0	C	0.02	8	14
	NB Thru		20.3	C	0.31	116	110	33.9	C	0.79	313	272
	NB Right[3]		0.2	A	0.13	0	0	0.2	A	0.17	0	0
	NB Approach		*12.4*	*B*	--	--	--	*20.6*	*C*	--	--	--
	SB Left	335	32.9	C	0.60	123	145	34.3	C	0.55	131	151
	SB Thru-Right		16.4	B	0.53	259	179	20.4	C	0.45	181	195
	SB Approach		*20.8*	*C*	--	--	--	*24.9*	*C*	--	--	--
	Overall		20.2	C	0.59	--	--	23.4	C	0.67	--	--
6. Schmidt Road (E) at	EB Left-Right		11.1	B	0.01	0	18	11.0	B	0.00	0	18
Ironbound Road (N-S)	*EB Approach*		*11.1*	B	--	--	--	*11.0*	B	--	--	--
Unsignalized	NB Left		8.8	A	0.01	0	18	8.6	A	0.00	0	12
	NB Thru		0.0	A	0.11	0	0	0.0	A	0.21	0	13
	NB Approach		*0.1*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Thru		0.0	A	0.25	0	0	0.0	A	0.23	0	0
	SB Thru		0.0	A	0.12	0	0	0.0	A	0.11	0	0
	SB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
7. Foster Road (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		6.5	A	0.01	1	0	0.0	A	0.00	0	0
	WB Approach		*6.5*	A	--	--	--	*0.0*	A	--	--	--
	NB L-T-R		8.6	A	0.02	1	53	9.0	A	0.00	0	12
	NB Approach		*8.6*	A	--	--	--	*9.0*	A	--	--	--
	SB L-T-R		8.9	A	0.00	0	30	0.0	A	0.00	0	0
	SB Approach		*8.9*	A	--	--	--	*0.0*	A	--	--	--
8. Foster Road (E-W) at	EB L-T-R		9.0	A	0.02	2	46	0.0	A	0.00	0	0
Ashbury Lane (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		9.3	A	0.05	4	44	8.7	A	0.04	3	38
	WB Approach		*9.3*	A	--	--	--	*8.7*	A	--	--	--
	NB L-T-R		1.8	A	0.00	0	3	0.0	A	0.00	0	0
	NB Approach		*1.8*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.5	A	0.01	1	6	2.9	A	0.00	0	3
	SB Approach		*2.5*	A	--	--	--	*2.9*	A	--	--	--
9. Galt Drive (E-W) at	EB L-T-R		9.1	A	0.00	0	18	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*9.1*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		8.5	A	0.10	1	35	8.4	A	0.00	0	27
	WB Approach		*8.5*	A	--	--	--	*8.4*	A	--	--	--
	NB L-T-R		2.4	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*2.4*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		1.8	A	0.00	0	0	7.2	A	0.00	0	0
	SB Approach		*1.8*	A	--	--	--	*7.2*	A	--	--	--
10. Galt Drive (E-W) at	EB Left-Thru		0.9	A	0.00	0	0	0.7	A	0.00	0	0
Ashbury Lane (N)	*EB Approach*		*0.9*	A	--	--	--	*0.7*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.03	0	0	0.0	A	0.01	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		9.1	A	0.08	7	49	9.0	A	0.04	3	30
	SB Approach		*9.1*	A	--	--	--	*9.0*	A	--	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

[2] *Dual left turn lanes; average storage is provided.*

[3] *Channelized right turn not controlled by the signal.*

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

4 ANALYSIS OF TOTAL BACKGROUND CONDITIONS WITHOUT DEVELOPMENT

To complete the analysis of the future background conditions (without development), the existing volumes were projected to the future background years (2028, 2030, and 2032) using an annual growth rate and the traffic generated by two (2) other developments in the vicinity of the site.

4.1 BACKGROUND TRAFFIC VOLUMES

In order to account for growth in the area, an annual compounded growth rate of 1.0% was applied to the 2022 existing traffic volumes over the 6, 8, and 10 year periods.

The resulting 2028, 2030, and 2032 background AM and PM peak hour volumes (existing + growth) are shown on Figures 4-1 thru 4-3.

4.2 BACKGROUND DEVELOPMENTS

A map of the background developments in relation to the Cardinal Ridge site are shown in Figure 4-4. The background developments are described below:

1. New Town Development- 185 units of low-rise housing/single family development, 30,000 S.F. of office space and 17,000 square feet of commercial development.
2. James City County Complex – 177,256 S.F. of government office and 25,000 s.f. of library.

The trips generated for both developments were obtained from the scoping documents prepared for that TIA.

As shown in Table 4-1, the two (2) other developments in the vicinity of the site will add approximately 8,500 vehicles per day to the surrounding roadway network.

- New Town Park is anticipated to add approximately 4,600 vehicles per day to the roadway network and be complete by 2032.

- The County Office site is anticipated to add approximately 3,900 vehicles per day to the roadway network and be complete by 2028.

With the development of the County Office site, the County will construct a dual lane roundabout at the intersections of Longhill Road/DePue Drive intersection and a single lane roundabout at the DePue Drive/Ashbury Road intersection. Schematics of the roundabouts are included in Appendix B.1.

These improvements will be in place by 2028 and are assumed in all future scenarios.

Table 4-1: Background Development Site Trips

Buildout Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Average Daily Trips
New Town Park[1]										
Residential Development	185	D.U.	--	26	74	100	82	49	131	1476
Office Development	30,000	S. F.	--	70	9	79	12	61	73	539
Commercial Development	17,000	S.F.	--	93	70	163	136	123	259	2,575
New Town Park Development Subtotal				*189*	*153*	*342*	*230*	*233*	*463*	*4,590*
James City County Complex[2]										
Government Office Building	177,256	S.F.	730	256	29	285	31	254	285	2,871
Library	25,000	S.F.	25,000	21	9	30	41	51	92	1,050
James City County Complex Subtotal				*277*	*38*	*315*	*72*	*305*	*377*	*3,921*
Total Background Development Trips				**466**	**191**	**657**	**302**	**538**	**840**	**8,511**

Notes: (1) Trips obtained from the New Town Park TIA Scoping Documents
(2) Trips obtained from the "James City County Municipal Complex Traffic Impact Analysis" dated March 2025.

4.3 Background Development Trip Distributions

The New Town Development trip distributions can be found in Figure 4-5 and the trips generated by the site can be found in Figure 4-6.

The trip distributions for the County site can be found in Figure 4-7 and the County trips can be found in Figure 4-8.

The sum total of all background development trips is shown on Figure 4-9.

4.4 2028 Total Background Traffic Forecasts

The 2028 existing + growth volumes shown on Figure 4-1 were added to the County trips shown on Figure 4-8 to yield the 2028 total background traffic forecasts which are shown on Figure 4-10.

4.5 2028 Background Traffic Volume Capacity Analysis

Table 4-2 summarizes the 2028 background intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2028 background peak hour traffic volumes shown on Figure 4-10 and the future lane geometry shown on Figure 2-5. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix E.1.

As shown in Table 4-2, under 2028 background conditions:

- The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
  - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
    - The 95th percentile and maximum queues will be contained within the available storage, with the storage being filled for the eastbound right in the AM peak and the southbound right during the AM peak for the southbound ramps.
    - All v/c ratios are less than 1.0 during both peaks.

- With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS D or better.
    - The southbound left (single approach) to the intersection will operate at a LOS D with a queue of 94 feet.

- With the construction of the single lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A/C in both peak hours. All movements will operate at LOS C or better.

    - The westbound 95th percentile queue is 148 feet in the PM peak hour.

- At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
    - The eastbound approach operates at LOS C during both peaks.
    - The westbound approach operates at LOS C during both peaks.
    - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
    - The mainline southbound approach operates at LOS C during both peaks.
    - All v/c ratios are less than 1.0.

- All movements at the Foster Road/Schmidt Road and Foster Road/Ashbury Lane intersections will operate at LOS A or B in both peak hours. All v/c ratios are less than 1.0.

- All movements at the Galt Drive/Schmidt Road and Galt Drive/Ashbury Lane intersections will operate at LOS A or B in both peak hours. All v/c ratios are less than 1.0.

Table 4-2: Intersection Level of Service, Delay, and Queue Summary
2028 Background Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		13.5	B	0.49	136	163	11.6	B	0.43	101	141
199 SB Ramps	EB Right[3]	430	0.4	A	0.24	0	11	0.3	A	0.24	0	8
Signalized	*EB Approach*		*8.3*	*A*	--	--	--	*7.0*	*A*	--	--	--
	WB Left	225	24.7	C	0.44	31	78	23.7	C	0.59	51	115
	WB Thru		6.6	A	0.28	76	115	6.4	A	0.57	147	169
	WB Approach		*9.0*	*A*	--	--	--	*8.6*	*A*	--	--	--
	SB Left	550	17.8	B	0.51	114	125	17.1	B	0.40	75	91
	SB Left/Thru		17.8	B	0.51	115	161	17.1	B	0.40	75	124
	SB Right	290	15.1	B	0.07	13	102	16.7	B	0.33	64	164
	SB Approach		*17.2*	*B*	--	--	--	*17.0*	*B*	--	--	--
	Overall		**10.6**	**B**	**0.52**	**--**	**--**	**9.6**	**A**	**0.64**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		14.6	B	0.65	189	193	22.5	C	0.72	177	221
199 NB Ramps	EB Right[3]		0.1	A	0.08	0	0	0.1	A	0.07	0	0
Signalized	*EB Approach*		*12.8*	*B*	--	--	--	*19.5*	*B*	--	--	--
	WB Left	265	25.8	C	0.53	45	90	24.7	C	0.66	111	155
	WB Thru		5.0	A	0.18	43	87	7.4	A	0.44	123	149
	WB Approach		*10.5*	*B*	--	--	--	*12.9*	*B*	--	--	--
	NB Left	350	19.7	B	0.42	64	155	24.9	C	0.73	136	262
	NB Right	250	0.1	A	0.1	0	82	0.2	A	0.12	0	186
	NB Approach		*12.1*	*B*	--	--	--	*18.8*	*B*	--	--	--
	Overall		**12.1**	**B**	**0.57**	**--**	**--**	**16.3**	**B**	**0.71**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		4.9	A	0.37	59	-	4.8	A	0.32	52	-
DePue Drive (N)	EB Thru		4.8	*A*	0.37	59	-	4.8	A	0.32	53	-
Future Access (S)	*EB Approach*		*4.8*	*A*	--	--	--	*7.6*	A	--	--	--
Roundabout	WB Thru		4.4	A	0.13	14	-	5.3	A	0.24	28	-
	WB Thru-Right		4.3	A	0.13	14	-	5.3	A	0.24	28	-
	WB Approach		*4.4*	A	--	--	--	*5.3*	A	--	--	--
	SB Left-Right		6.3	A	0.19	21	-	13.1	D	0.52	94	-
	SB Approach		*5.6*	A	--	--	--	*11.6*	D	--	--	--
	Overall		**4.8**	**A**	**0.37**	**--**	**--**	**6.5**	**A**	**0.52**	**--**	**--**
4. DePue Drive (E-W) at	EB L-T-R		8.6	A	0.58	147	-	8.7	A	0.53	125	-
Ashbury Lane (N-S)	*EB Approach*		*8.8*	*A*	--	--	--	*8.7*	A	--	--	--
Roundabout	WB L-T-R		5.7	A	0.29	45	-	10.8	B	0.62	148	-
	WB Approach		*5.7*	A	--	--	--	*10.9*	B	--	--	--
	NB L-T-R		5.4	A	0.23	3	-	5.7	A	0.05	7	-
	NB Approach		*5.4*	*A*	--	--	--	*5.7*	A	--	--	--
	SB L-T-R		4.0	A	0.08	11	-	10.9	B	0.44	84	-
	SB Approach		*4.0*	A	--	--	--	*10.9*	B	--	--	--
	Overall		**7.5**	**A**	**0.58**	**--**	**--**	**26.9**	**C**	**0.88**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		33.7	C	0.32	42	75	33.1	C	0.24	54	84
Ironbound Road/Galt Drive	*EB Approach*		*33.7*	*C*	--	--	--	*33.1*	*C*	--	--	--
(E-W)	WB Left		31.5	C	0.64	141	154	45.5	D	0.82	#244	225
Signalized	WB Thru		25.1	C	0.19	54	69	26.4	C	0.06	26	50
	WB Right[3]	335	0.0	A	0.04	0	0	0.1	A	0.10	0	0
	WB Approach		*24.1*	*C*	--	--	--	*27.6*	*C*	--	--	--
	NB Left		86.7	F	0.67	25	43	32.8	C	0.01	8	78
	NB Thru		19.0	B	0.44	179	160	38.3	D	0.87	#387	331
	NB Right[3]		0.2	A	0.12	0	0	0.3	A	0.18	0	34
	NB Approach		*13.8*	*B*	--	--	--	*24.4*	*C*	--	--	--
	SB Left	335	52.2	D	0.8	#138	144	44.7	D	0.72	#159	171
	SB Thru-Right		16.9	B	0.58	#328	208	24.0	C	0.67	271	258
	SB Approach		*25.5*	*C*	--	--	--	*29.2*	*C*	--	--	--
	Overall		**21.6**	**C**	**0.64**	**--**	**--**	**26.9**	**C**	**0.77**	**--**	**--**
6. Schmidt Road (E) at	EB Left-Right		11.2	B	0.01	0	22	11.9	B	0.01	0	23
Ironbound Road (N-S)	*EB Approach*		*11.2*	B	--	--	--	*11.9*	B	--	--	--
Unsignalized	NB Left		8.8	A	0.00	0	21	9.1	A	0.24	0	24
	NB Thru		0.0	A	0.14	0	0	0.0	A	0.24	0	116
	SB Approach		*0.1*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Thru		0.0	A	0.25	0	0	0.0	A	0.29	0	0
	SB Thru		0.0	A	0.13	0	0	0.0	A	0.15	0	0
	SB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
7. Foster Road (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		6.6	A	0.01	0	0	0.0	A	0.00	0	0
	WB Approach		*6.6*	A	--	--	--	*0.0*	A	--	--	--
	NB L-T-R		8.6	A	0.01	1	60	9.0	A	0.00	0	16
	NB Approach		*8.6*	A	--	--	--	*9.0*	A	--	--	--
	SB L-T-R		8.7	A	0.00	0	16	0.0	A	0.00	0	0
	SB Approach		*8.7*	A	--	--	--	*0.0*	A	--	--	--
8. Foster Road (E-W) at	EB L-T-R		9.0	A	0.02	2	52	0.0	A	0.02	0	0
Ashbury Lane (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		9.2	A	0.05	4	47	8.6	A	0.03	2	35
	WB Approach		*9.2*	A	--	--	--	*8.6*	A	--	--	--
	NB L-T-R		1.6	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*1.6*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.5	A	0.01	1	3	3.1	A	0.00	0	0
	SB Approach		*2.5*	A	--	--	--	*3.1*	A	--	--	--
9. Galt Drive (E-W) at	EB L-T-R		9.0	A	0.00	0	15	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		8.5	A	0.01	1	30	8.4	A	0.00	0	27
	WB Approach		*8.5*	A	--	--	--	*8.4*	A	--	--	--
	NB L-T-R		2.4	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*2.4*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.4	A	0.00	0	0	7.2	A	0.00	0	0
	SB Approach		*2.4*	A	--	--	--	*7.2*	A	--	--	--
10. Galt Drive (E-W) at	EB Left-Thru		0.7	A	0.00	0	3	0.5	A	0.00	0	0
Ashbury Lane (N)	*EB Approach*		*0.7*	A	--	--	--	*0.5*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.02	4	0	0.0	A	0.01	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		8.8	A	0.05	0	55	8.8	A	0.03	2	32
	SB Approach		*8.8*	A	--	--	--	*8.8*	A	--	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

[2] *Dual left turn lanes; average storage is provided.*

[3] *Channelized right turn not controlled by the signal.*

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

4.6 2030 TOTAL BACKGROUND TRAFFIC FORECASTS

The 2030 existing + growth volumes shown on Figure 4-2 were added to the County trips shown on Figure 4-8 to yield the 2030 total background traffic forecasts which are shown on Figure 4-11.

4.7 2030 BACKGROUND TRAFFIC VOLUME CAPACITY ANALYSIS

Table 4-3 summarizes the 2030 background intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2030 background peak hour traffic volumes shown on Figure 4-11 and the future lane geometry shown on Figure 2-5. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix E.2.

As shown in Table 4-3, under 2030 background conditions:

- The intersections generally operate at similar levels as under 2028 background conditions. Improvements are required at the Longhill Road/Longhill Connector and DePue Drive/Ashbury Lane intersections.

- The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
  - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
    - The 95th percentile and maximum queues will be contained within the available storage.
    - All v/c ratios are less than 1.0 during both peaks.

- With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS C or better.

- With the construction of the single lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A/B in both peak hours. All movements will operate at LOS B or better.

    - The westbound 95th percentile queue is 154 feet in the PM peak hour.

- At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
    - The eastbound approach operates at LOS C during both peaks.
    - The westbound approach operates at LO S C during both peaks.
    - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
    - The mainline southbound approach operates at LOS C during both peaks.
    - All v/c ratios are less than 1.0 during both peaks.

- All movements at the Foster Road/Schmidt Road and Foster Road/Ashbury Lane intersections will operate at LOS A or B in both peak hours. All v/c ratios are less than 1.0.

- All movements at the Galt Drive/Schmidt Road and Galt Drive/Ashbury Lane intersections will operate at LOS A or B in both peak hours. All v/c ratios are less than 1.0.

Table 4-3: Intersection Level of Service, Delay, and Queue Summary
2030 Background Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		13.5	B	0.5	138	171	11.7	B	0.44	103	142
199 SB Ramps	EB Right[3]	430	0.4	A	0.25	0	3	0.4	A	0.24	0	5
Signalized	*EB Approach*		*8.3*	*A*	--	--	--	*7.1*	*A*	--	--	--
	WB Left	225	24.9	C	0.44	31	72	23.9	C	0.60	51	109
	WB Thru		6.6	A	0.28	78	113	6.6	A	0.59	152	145
	WB Approach		*9.0*	*A*	--	--	--	*8.8*	*A*	--	--	--
	SB Left	550	17.9	B	0.51	115	132	17.1	B	0.40	76	102
	SB Left/Thru		17.9	B	0.52	116	155	17.1	B	0.40	76	122
	SB Right	290	15.1	B	0.08	14	116	16.7	B	0.34	66	169
	SB Approach		*17.3*	*B*	--	--	--	*16.9*	*B*	--	--	--
	Overall		**10.7**	**B**	**0.53**	**--**	**--**	**9.7**	**A**	**0.65**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		14.8	B	0.66	194	209	22.8	C	0.74	181	219
199 NB Ramps	EB Right[3]		0.1	A	0.08	0	0	0.1	A	0.07	0	0
Signalized	*EB Approach*		*13.0*	*B*	--	--	--	*19.8*	*B*	--	--	--
	WB Left	265	26.3	C	0.54	46	82	25.1	C	0.67	113	145
	WB Thru		5.0	A	0.18	44	96	7.6	A	0.45	125	155
	WB Approach		*10.7*	*B*	--	--	--	*13.1*	*B*	--	--	--
	NB Left	350	19.7	B	0.43	65	150	25.1	C	0.74	138	276
	NB Right	250	0.1	A	0.11	0	82	0.2	A	0.12	0	214
	NB Approach		*12.1*	*B*	--	--	--	*18.9*	*B*	--	--	--
	Overall		**12.2**	**B**	**0.58**	**--**	**--**	**16.5**	**B**	**0.72**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		4.9	A	0.37	61	-	4.9	A	0.33	56	-
DePue Drive (N)	EB Thru		4.8	*A*	0.37	61	-	4.8	A	0.33	56	-
Future Access (S)	*EB Approach*		*4.9*	*A*	--	--	--	*4.8*	A	--	--	--
Roundabout	WB Thru		4.4	A	0.13	15	-	7.1	A	0.39	54	-
	WB Thru-Right		4.3	A	0.13	15	-	7.0	A	0.39	54	-
	WB Approach		*4.4*	A	--	--	--	*7.1*	A	--	--	--
	SB Left-Right		6.4	A	0.19	21	-	20.4	C	0.65	131	-
	SB Approach		*5.6*	A	--	--	--	*17.9*	B	--	--	--
	Overall		**4.9**	**A**	**0.37**	**--**	**--**	**8.3**	**A**	**0.65**	**--**	**--**
4. DePue Drive (E-W) at	EB L-T-R		8.7	A	0.59	152	-	8.8	A	0.54	129	-
Ashbury Lane (N-S)	*EB Approach*		*8.7*	*A*	--	--	--	*9.0*	A	--	--	--
Roundabout	WB L-T-R		5.7	A	0.29	46	-	11.2	B	0.64	154	-
	WB Approach		*5.8*	A	--	--	--	*11.2*	B	--	--	--
	NB L-T-R		5.4	A	0.02	3	-	5.8	A	0.05	7	-
	NB Approach		*5.4*	*A*	--	--	--	*5.8*	A	--	--	--
	SB L-T-R		4.1	A	0.08	11	-	11.3	B	0.45	88	-
	SB Approach		*4.1*	A	--	--	--	*11.3*	B	--	--	--
	Overall		**7.6**	**A**	**0.59**	**--**	**--**	**10.3**	**B**	**0.64**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		33.7	C	0.33	43	60	33.3	C	0.25	55	85
Ironbound Road/Galt Drive	*EB Approach*		*33.7*	*C*	--	--	--	*33.3*	*C*	--	--	--
(E-W)	WB Left		31.8	C	0.65	143	150	48.3	D	0.84	#250	257
Signalized	WB Thru		25.1	C	0.19	54	78	26.5	C	0.06	26	62
	WB Right[3]	335	0.0	A	0.04	0	0	0.1	A	0.10	0	0
	WB Approach		*24.3*	*C*	--	--	--	*29.2*	*C*	--	--	--
	NB Left		86.6	F	0.67	25	51	33.0	C	0.02	8	19
	NB Thru		19.1	B	0.44	182	174	39.2	D	0.88	#398	310
	NB Right[3]		0.2	A	0.12	0	0	0.3	A	0.19	0	44
	NB Approach		*13.8*	*B*	--	--	--	*24.9*	*C*	--	--	--
	SB Left	335	54.7	D	0.82	#142	137	46.3	D	0.74	#163	166
	SB Thru-Right		17.1	B	0.59	#337	220	24.1	C	0.67	276	254
	SB Approach		*26.3*	*C*	--	--	--	*29.7*	*C*	--	--	--
	Overall		**22.0**	**C**	**0.65**	**--**	**--**	**27.7**	**C**	**0.78**	**--**	**--**
6. Schmidt Road (E) at	EB Left-Right		11.3	B	0.01	0	23	12.0	B	0.01	0	18
Ironbound Road (N-S)	*EB Approach*		*11.3*	B	--	--	--	*12.0*	B	--	--	--
Unsignalized	NB Left		8.9	A	0.00	0	21	9.2	A	0.25	0	12
	NB Thru		0.0	A	0.14	0	10	0.0	A	0.25	0	42
	SB Approach		*0.1*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Thru		0.0	A	0.26	0	0	0.0	A	0.30	0	0
	SB Thru		0.0	A	0.13	0	0	0.0	A	0.15	0	0
	SB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
7. Foster Road (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		6.6	A	0.01	0	0	0.0	A	0.00	0	0
	WB Approach		*6.6*	A	--	--	--	*0.0*	A	--	--	--
	NB L-T-R		8.6	A	0.01	1	55	9.0	A	0.00	0	16
	NB Approach		*8.6*	A	--	--	--	*9.0*	A	--	--	--
	SB L-T-R		8.7	A	0.00	0	19	0.0	A	0.00	0	0
	SB Approach		*8.7*	A	--	--	--	*0.0*	A	--	--	--
8. Foster Road (E-W) at	EB L-T-R		9.0	A	0.02	2	45	0.0	A	0.02	0	0
Ashbury Lane (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		9.2	A	0.05	4	45	8.6	A	0.03	2	47
	WB Approach		*9.2*	A	--	--	--	*8.6*	A	--	--	--
	NB L-T-R		1.6	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*1.6*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.5	A	0.01	1	9	3.1	A	0.00	0	6
	SB Approach		*2.5*	A	--	--	--	*3.1*	A	--	--	--
9. Galt Drive (E-W) at	EB L-T-R		9.0	A	0.00	0	21	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		8.5	A	0.01	1	33	8.4	A	0.00	0	30
	WB Approach		*8.5*	A	--	--	--	*8.4*	A	--	--	--
	NB L-T-R		2.4	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*2.4*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.4	A	0.00	0	0	7.2	A	0.00	0	0
	SB Approach		*2.4*	A	--	--	--	*7.2*	A	--	--	--
10. Galt Drive (E-W) at	EB Left-Thru		0.7	A	0.00	0	3	0.5	A	0.00	0	3
Ashbury Lane (N)	*EB Approach*		*0.7*	A	--	--	--	*0.5*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.02	4	0	0.0	A	0.01	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		8.8	A	0.05	0	52	8.8	A	0.03	2	42
	SB Approach		*8.8*	A	--	--	--	*8.8*	A	--	--	--

[1] Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

[2] Dual left turn lanes; average storage is provided.

[3] Channelized right turn not controlled by the signal.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

4.8 2032 TOTAL BACKGROUND TRAFFIC FORECASTS

The 2032 existing + growth volumes shown on Figure 4-3 were added to the total background development trips shown on Figure 4-9 to yield the total background traffic forecasts which are shown on Figure 4-12.

4.9 2032 BACKGROUND TRAFFIC VOLUME CAPACITY ANALYSIS

Table 4-4 summarizes the 2032 background intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2032 background peak hour traffic volumes shown on Figure 4-12 and the future lane geometry shown on Figure 2-5. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix E.3.

As shown in Table 4-4, under 2032 background conditions:

- The intersections generally operate at similar levels as under 2028/2030/2032 background conditions. Improvements are required at the Longhill Road/Longhill Connector and DePue Drive/Ashbury Lane intersections.

- The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
  - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
    - The 95th percentile and maximum queues will be contained within the available storage.
    - All v/c ratios are less than 1.0 during both peaks.

- With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS C or better.

- With the construction of the single lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A/B in both peak hours. All movements will operate at LOS B or better.

    - The westbound 95th percentile queue is 134 feet in the PM peak hour.

- At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
    - The eastbound approach operates at LOS B during both peaks.
    - The westbound approach operates at LOS C during both peaks.
    - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
    - The mainline southbound approach operates at LOS C during both peaks.
    - All v/c ratios are less than 1.0 during both peaks.

- All movements at the Foster Road/Schmidt Road and Foster Road/Ashbury Lane intersections will operate at LOS A or B in both peak hours. All v/c ratios are less than 1.0.

- All movements at the Galt Drive/Schmidt Road and Galt Drive/Ashbury Lane intersections will operate at LOS A or B in both peak hours. All v/c ratios are less than 1.0.

Table 4-4: Intersection Level of Service, Delay, and Queue Summary
2032 Background Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		13.7	B	0.51	141	163	11.7	B	0.45	105	146
199 SB Ramps	EB Right[3]	430	0.4	A	0.25	0	20	0.4	A	0.25	0	10
Signalized	*EB Approach*		*8.4*	*A*	--	--	--	*7.1*	*A*	--	--	--
	WB Left	225	25.0	C	0.46	32	62	24.0	C	0.61	51	107
	WB Thru		6.7	A	0.29	80	122	6.7	A	0.60	156	151
	WB Approach		*9.1*	*A*	--	--	--	*8.9*	*A*	--	--	--
	SB Left	550	17.9	B	0.52	117	211	17.1	B	0.41	77	109
	SB Left/Thru		18.0	B	0.52	118	152	17.1	B	0.41	77	129
	SB Right	290	15.1	B	0.08	15	117	16.8	B	0.36	68	170
	SB Approach		*17.3*	*B*	--	--	--	*17.0*	*B*	--	--	--
	Overall		**10.8**	**B**	**0.54**	**--**	**--**	**9.7**	**A**	**0.67**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		15.1	B	0.67	199	209	23.5	C	0.75	#187	225
199 NB Ramps	EB Right[3]		0.1	A	0.08	0	0	0.1	A	0.07	0	0
Signalized	*EB Approach*		*13.2*	*B*	--	--	--	*20.3*	*C*	--	--	--
	WB Left	265	26.6	C	0.55	46	93	25.2	C	0.67	114	151
	WB Thru		5.1	A	0.18	45	85	7.6	A	0.45	128	158
	WB Approach		*10.8*	*B*	--	--	--	*13.2*	*B*	--	--	--
	NB Left	350	19.8	B	0.43	67	158	25.6	C	0.75	#143	279
	NB Right	250	0.1	A	0.11	0	75	0.2	A	0.12	0	189
	NB Approach		*12.2*	*B*	--	--	--	*19.3*	*B*	--	--	--
	Overall		**12.4**	**B**	**0.59**	**--**	**--**	**16.8**	**B**	**0.73**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		6.1	A	0.46	86	-	5.0	A	0.34	59	-
DePue Drive (N)	EB Thru		6.2	*A*	0.46	89	-	4.9	A	0.34	59	-
Future Access (S)	*EB Approach*		*6.2*	*A*	--	--	--	*4.9*	A	--	--	--
Roundabout	WB Thru		5.8	A	0.17	20	-	7.4	A	0.40	57	-
	WB Thru-Right		6.0	A	0.17	19	-	7.3	A	0.40	57	-
	WB Approach		*5.8*	A	--	--	--	*7.4*	A	--	--	--
	SB Left-Right		8.8	A	0.27	31	-	22.7	C	0.68	146	-
	SB Approach		*8.3*	A	--	--	--	*20.1*	C	--	--	--
	Overall		**6.3**	**A**	**0.46**	**--**	**--**	**8.9**	**A**	**0.68**	**--**	**--**
4. DePue Drive (E-W) at	EB L-T-R		8.9	A	0.60	158	-	11.5	B	0.65	161	-
Ashbury Lane (N-S)	*EB Approach*		*9.1*	*A*	--	--	--	*11.6*	B	--	--	--
Roundabout	WB L-T-R		5.8	A	0.30	47	-	9.1	A	0.55	134	-
	WB Approach		*5.8*	A	--	--	--	*9.3*	A	--	--	--
	NB L-T-R		5.5	A	0.02	3	-	5.9	A	0.05	7	-
	NB Approach		*5.5*	*A*	--	--	--	*5.9*	A	--	--	--
	SB L-T-R		4.1	A	0.08	11	-	11.8	B	0.46	93	-
	SB Approach		*4.1*	A	--	--	--	*11.8*	B	--	--	--
	Overall		**7.8**	**A**	**0.6**	**--**	**--**	**10.7**	**B**	**0.65**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		33.7	C	0.33	43	67	33.6	C	0.26	55	103
Ironbound Road/Galt Drive	*EB Approach*		*33.7*	*C*	--	--	--	*33.6*	*C*	--	--	--
(E-W)	WB Left		32.1	C	0.65	146	153	51.3	D	0.86	#258	269
Signalized	WB Thru		25.0	C	0.19	55	75	26.7	C	0.06	27	50
	WB Right[3]	335	0.0	A	0.04	0	0	0.1	A	0.11	0	0
	WB Approach		*24.5*	*C*	--	--	--	*30.9*	*C*	--	--	--
	NB Left		86.6	F	0.67	25	50	33.3	C	0.02	8	23
	NB Thru		19.3	B	0.45	184	164	40.4	D	0.89	#409	317
	NB Right[3]		0.2	A	0.13	0	3	0.3	A	0.19	0	0
	NB Approach		*13.8*	*B*	--	--	--	*25.7*	*C*	--	--	--
	SB Left	240	56.4	E	0.83	#145	149	47.8	D	0.75	#167	190
	SB Thru-Right		17.5	B	0.6	#349	219	24.1	C	0.68	281	240
	SB Approach		*26.9*	*C*	--	--	--	*30.2*	*C*	--	--	--
	Overall		**22.3**	**C**	**0.67**	**--**	**--**	**28.6**	**C**	**0.80**	**--**	**--**
6. Schmidt Road (E) at	EB Left-Right	200	11.4	B	0.01	0	16	12.1	B	0.01	0	20
Ironbound Road (N-S)	*EB Approach*		*11.4*	B	--	--	--	*12.1*	B	--	--	--
Unsignalized	NB Left		8.9	A	0.00	0	20	9.2	A	0.25	0	15
	NB Thru		0.0	A	0.14	0	0	0.0	A	0.25	0	90
	SB Approach		*0.1*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Thru		0.0	A	0.26	0	0	0.0	A	0.30	0	0
	SB Thru		0.0	A	0.13	0	0	0.0	A	0.15	0	0
	SB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
7. Foster Road (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		6.6	A	0.01	0	0	0.0	A	0.00	0	0
	WB Approach		*6.6*	A	--	--	--	*0.0*	A	--	--	--
	NB L-T-R		8.6	A	0.01	1	58	9.0	A	0.00	0	9
	NB Approach		*8.6*	A	--	--	--	*9.0*	A	--	--	--
	SB L-T-R		8.7	A	0.00	0	22	0.0	A	0.00	0	0
	SB Approach		*8.7*	A	--	--	--	*0.0*	A	--	--	--
8. Foster Road (E-W) at	EB L-T-R		9.0	A	0.02	2	48	0.0	A	0.02	0	0
Ashbury Lane (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		9.2	A	0.05	4	40	8.6	A	0.03	2	38
	WB Approach		*9.2*	A	--	--	--	*8.6*	A	--	--	--
	NB L-T-R		1.6	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*1.6*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.5	A	0.01	1	0	3.1	A	0.00	0	3
	SB Approach		*2.5*	A	--	--	--	*3.1*	A	--	--	--
9. Galt Drive (E-W) at	EB L-T-R		9.0	A	0.00	0	12	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		8.5	A	0.01	1	33	8.4	A	0.00	0	30
	WB Approach		*8.5*	A	--	--	--	*8.4*	A	--	--	--
	NB L-T-R		2.4	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*2.4*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.4	A	0.00	0	0	7.2	A	0.00	0	3
	SB Approach		*2.4*	A	--	--	--	*7.2*	A	--	--	--
10. Galt Drive (E-W) at	EB Left-Thru		0.7	A	0.00	0	0	0.5	A	0.00	0	3
Ashbury Lane (N)	*EB Approach*		*0.7*	A	--	--	--	*0.5*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.02	4	0	0.0	A	0.01	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		8.8	A	0.05	0	49	8.8	A	0.03	2	32
	SB Approach		*8.8*	A	--	--	--	*8.8*	A	--	--	--

[1] Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

[2] Dual left turn lanes; average storage is provided.

[3] Channelized right turn not controlled by the signal.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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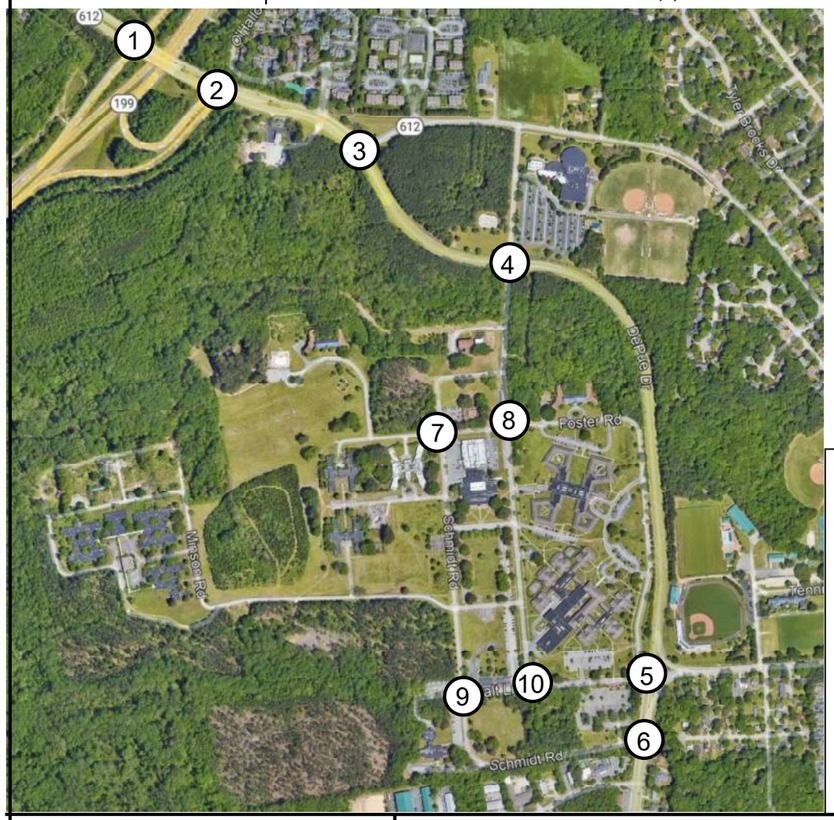

LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 AM Peak Hour Volumes
- (00) PM Peak Hour Volumes

NOT TO SCALE

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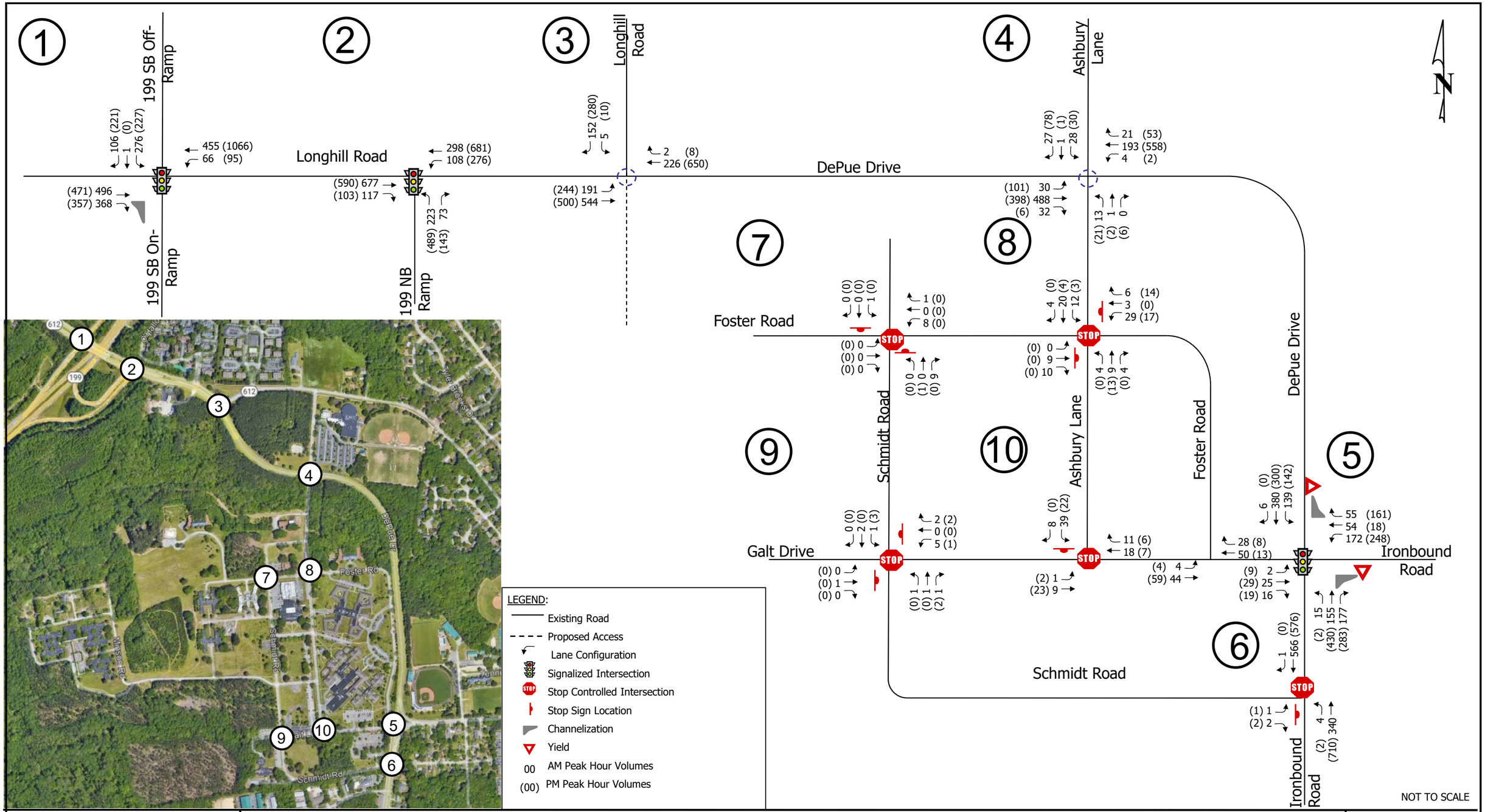
2028 Existing + Growth Volumes
Cardinal Ridge
James City County, Virginia

Figure
4-1



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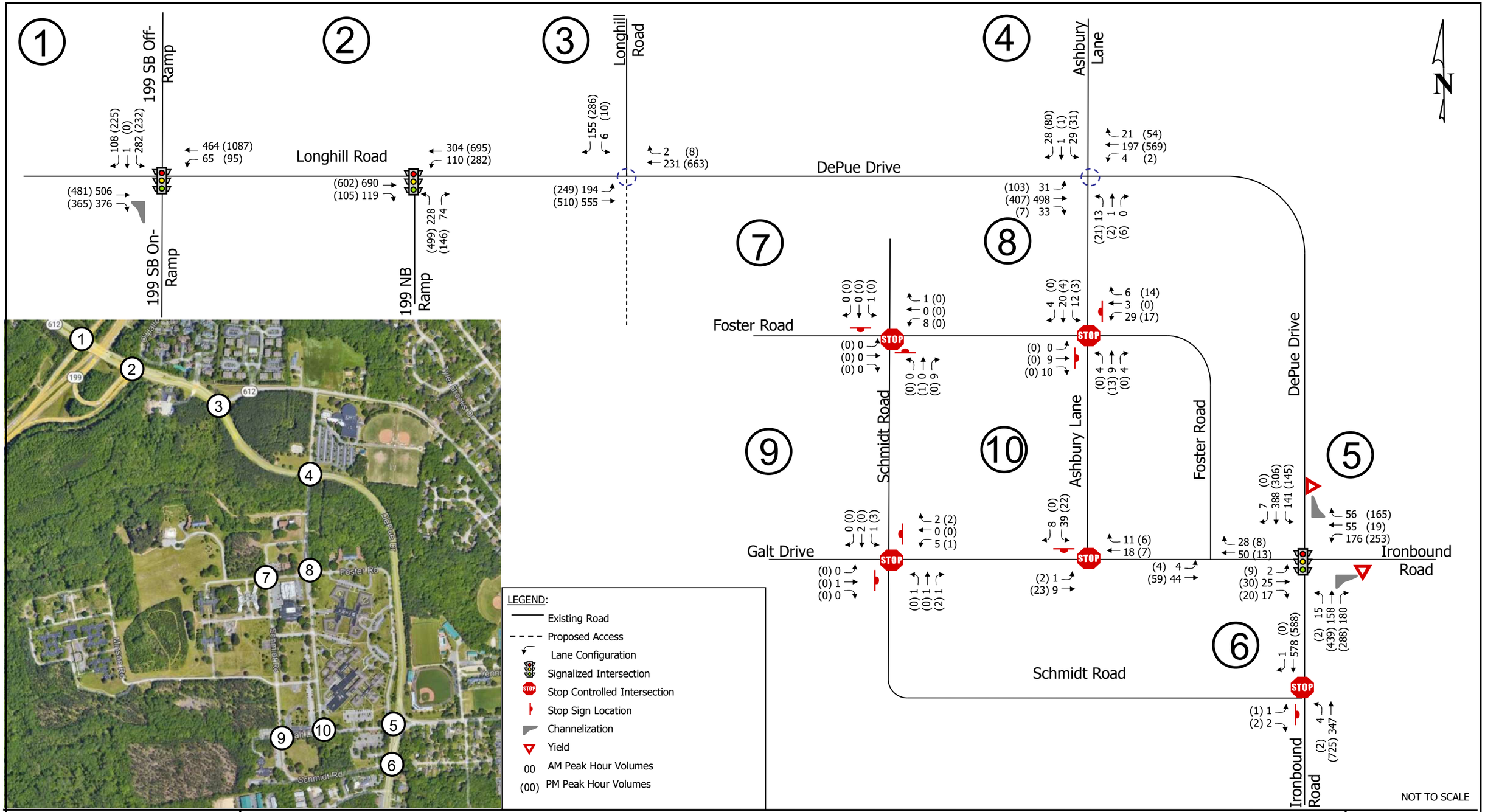
2030 Existing + Growth Volumes
Cardinal Ridge
James City County, Virginia

Figure
4-2



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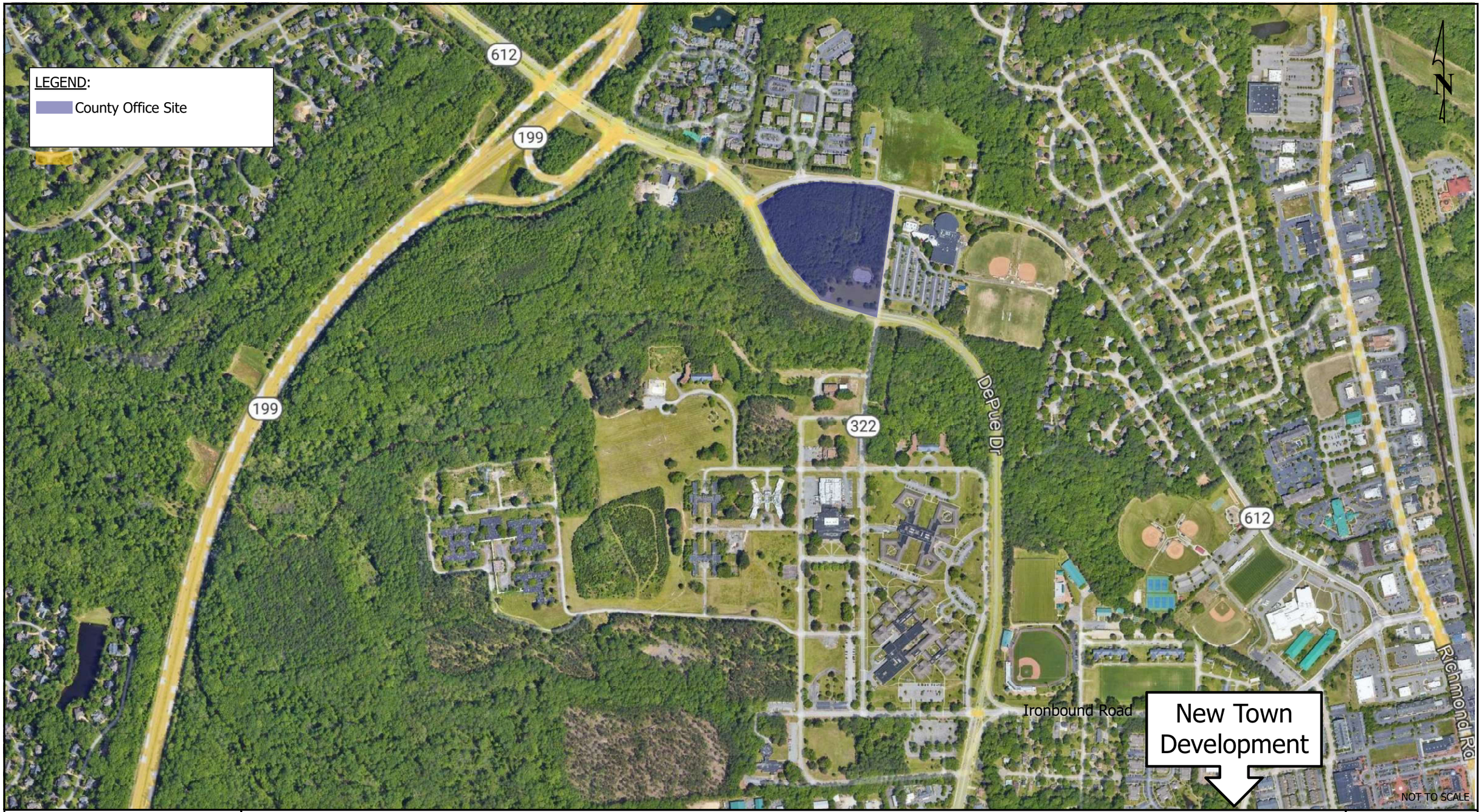
2032 Existing + Growth Volumes
Cardinal Ridge
James City County, Virginia

Figure
4-3



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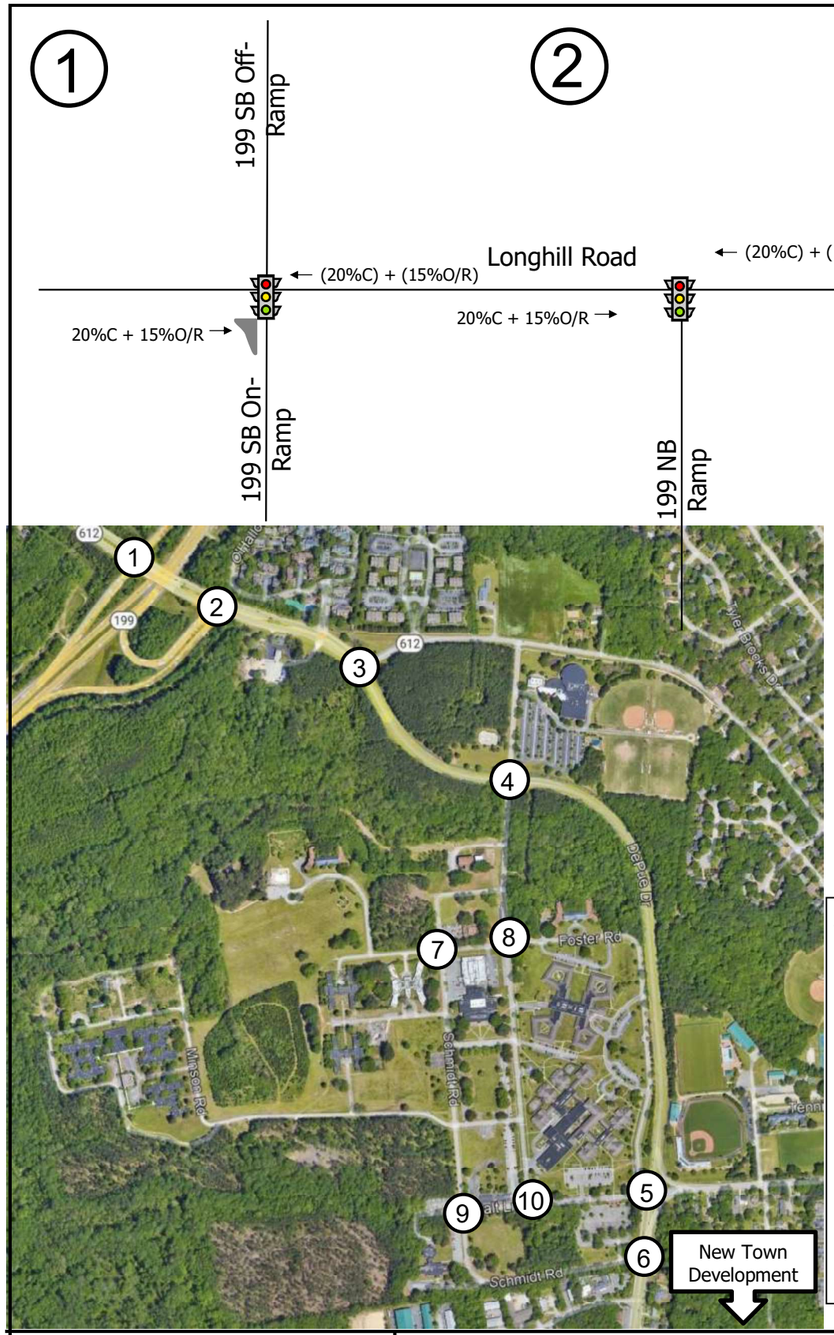
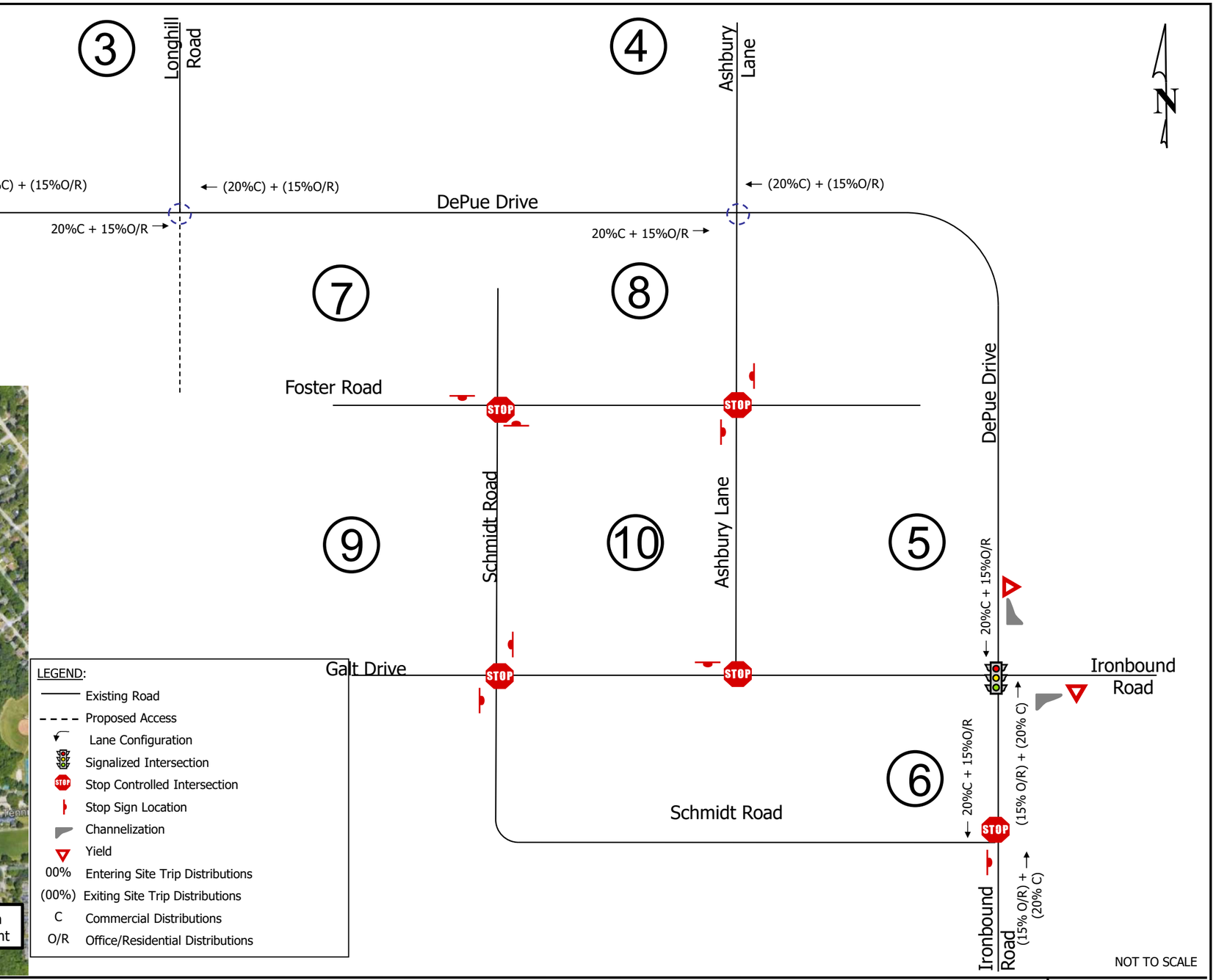
Background Development Locations
Cardinal Ridge
James City County, Virginia

Figure
4-4





LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00% Entering Site Trip Distributions
- (00%) Exiting Site Trip Distributions
- C Commercial Distributions
- O/R Office/Residential Distributions

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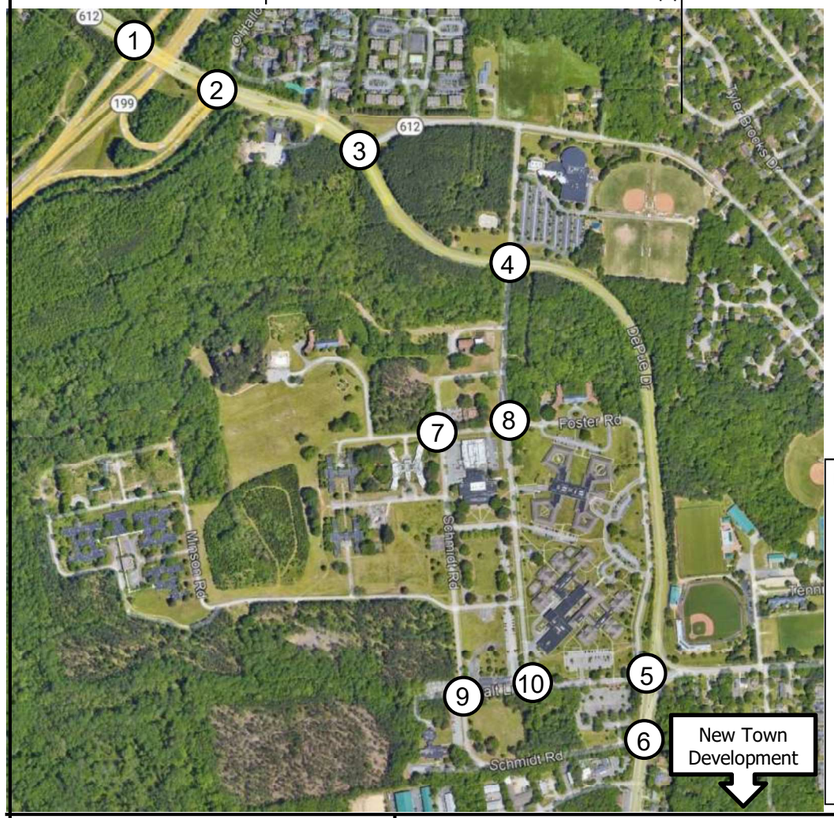
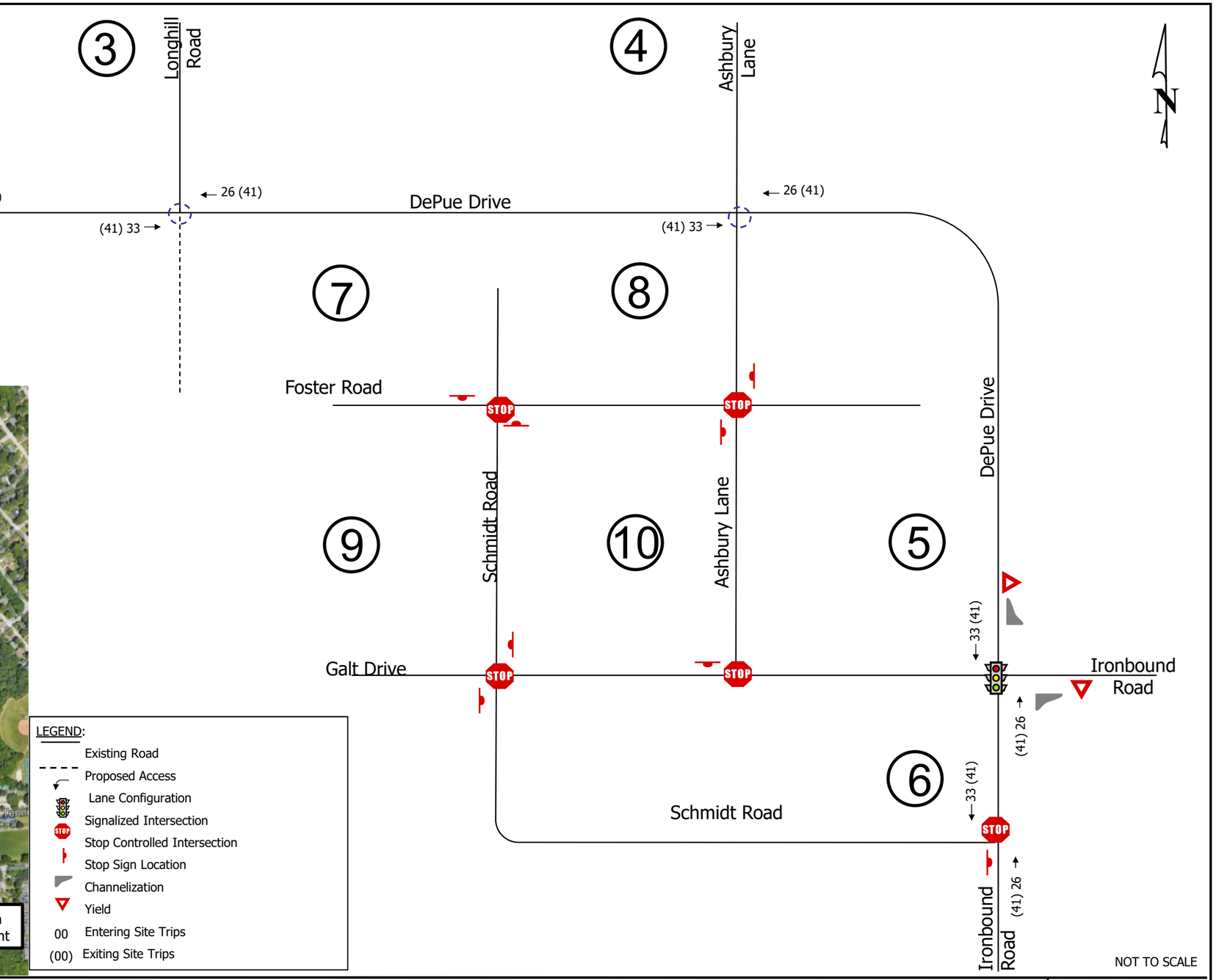
New Town Development Trip Distributions
Cardinal Ridge
James City County, Virginia

Figure 4-5





LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 Entering Site Trips
- (00) Exiting Site Trips

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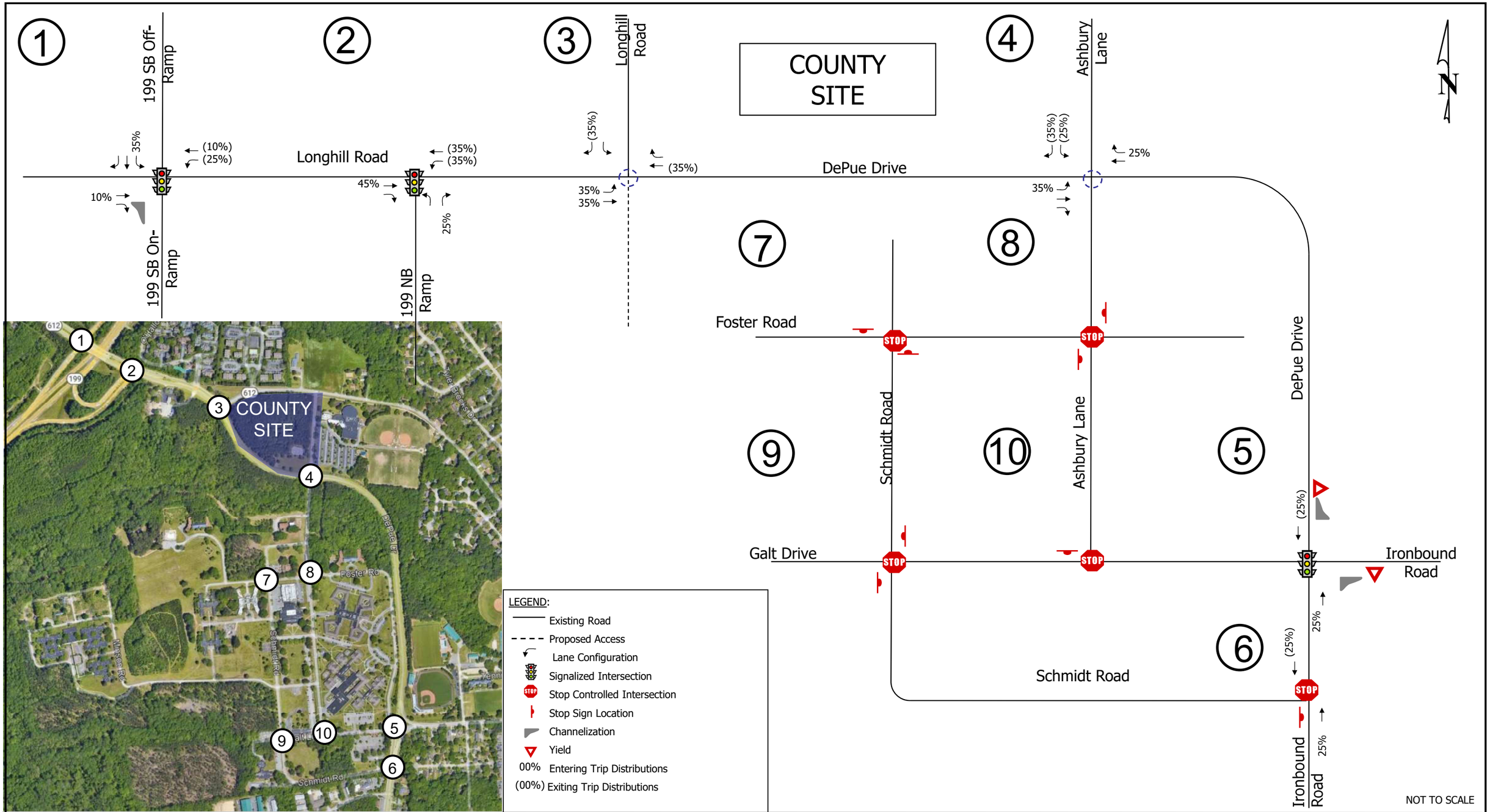
New Town Park Development Trips
Cardinal Ridge
James City County, Virginia

Figure
4-6



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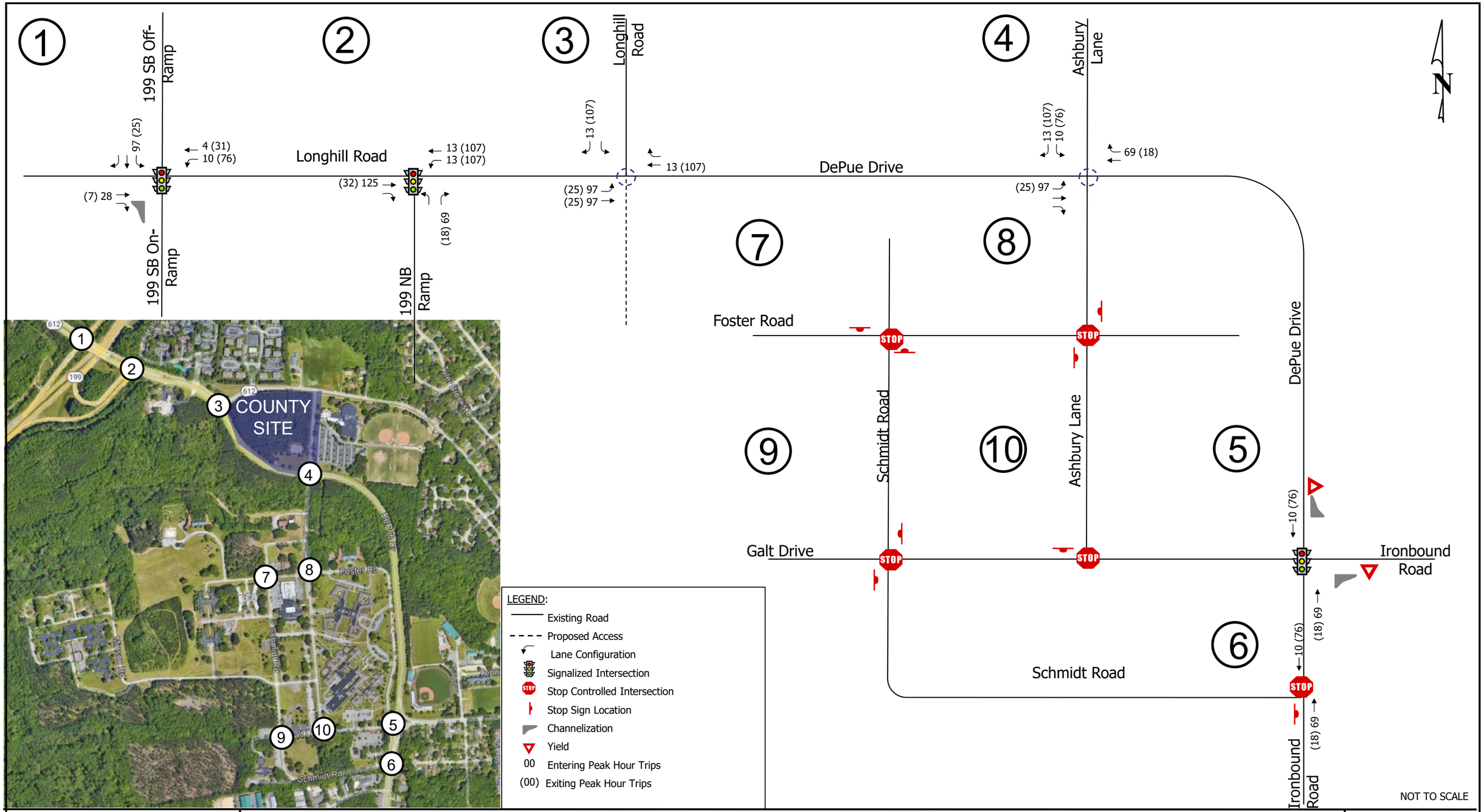
County Site Trip Distributions
Cardinal Ridge
James City County, Virginia

Figure
4-7



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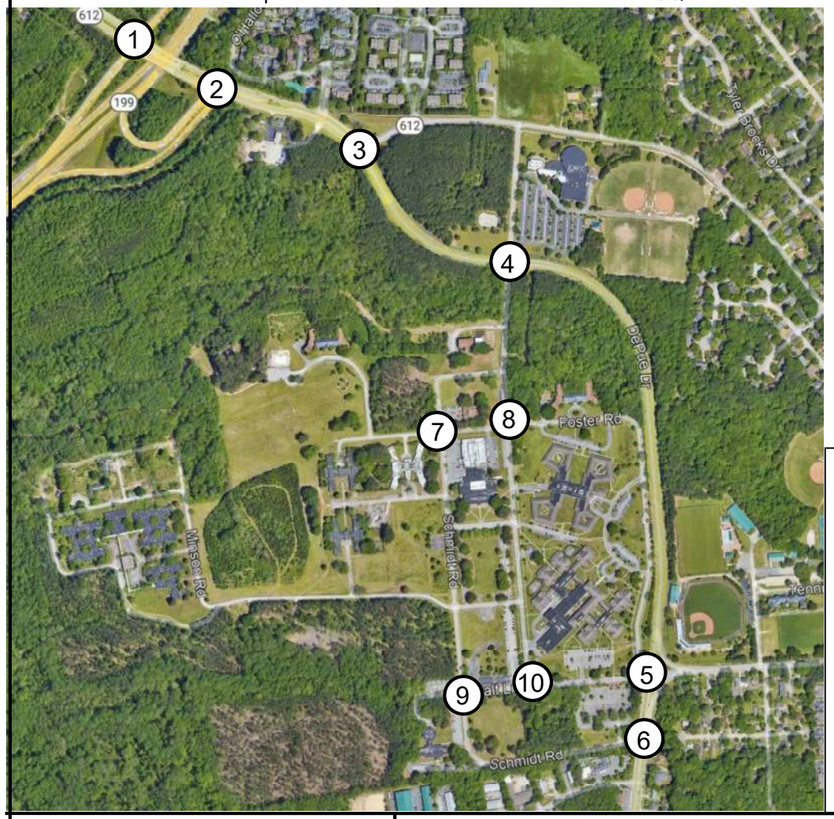
County Site Peak Hour Trips
Cardinal Ridge
James City County, Virginia

Figure
4-8



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 AM Peak Hour Trips
- (00) PM Peak Hour Volumes

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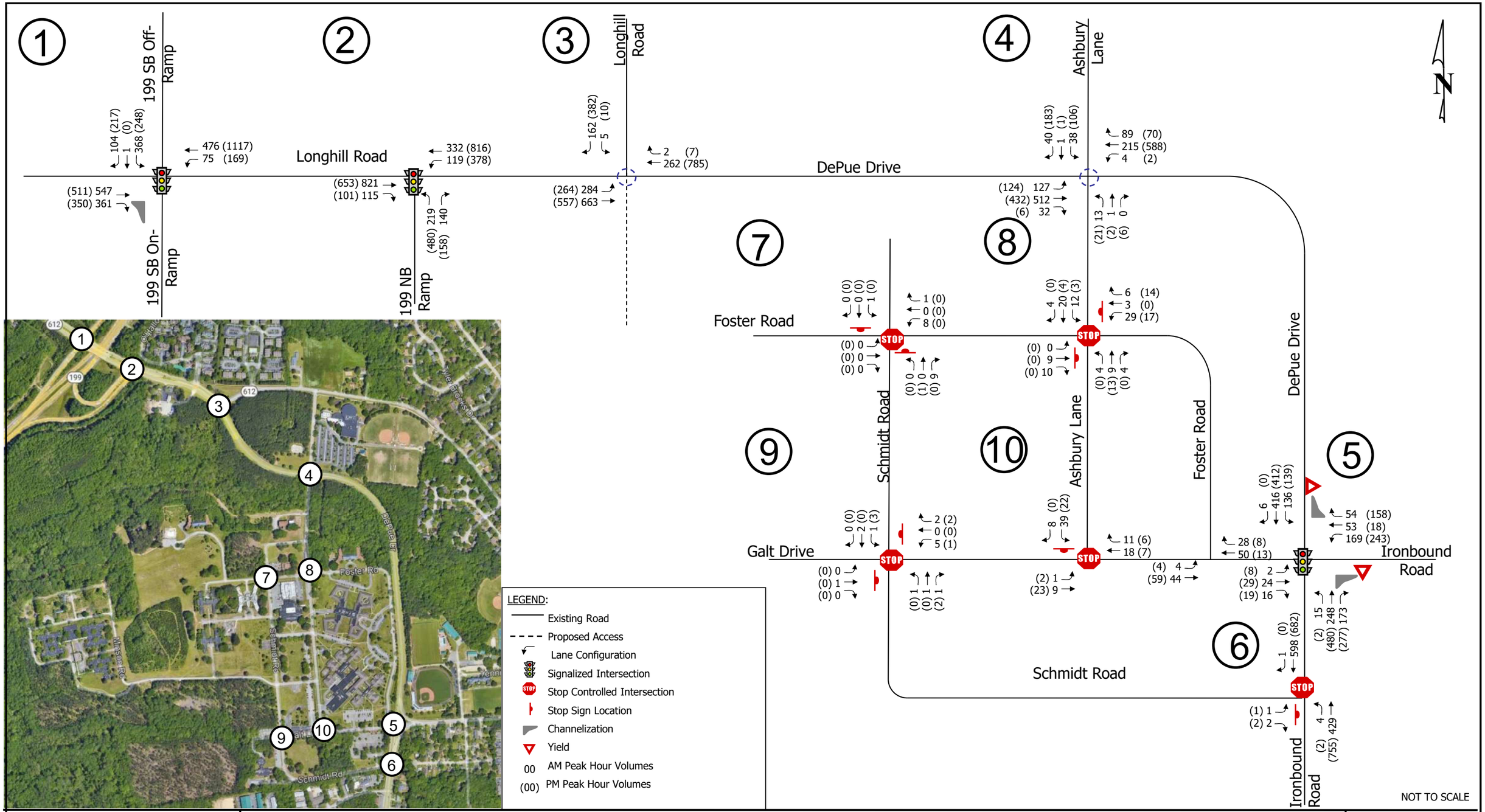
Total Background Development Site Trips
Cardinal Ridge
James City County, Virginia

Figure
4-9



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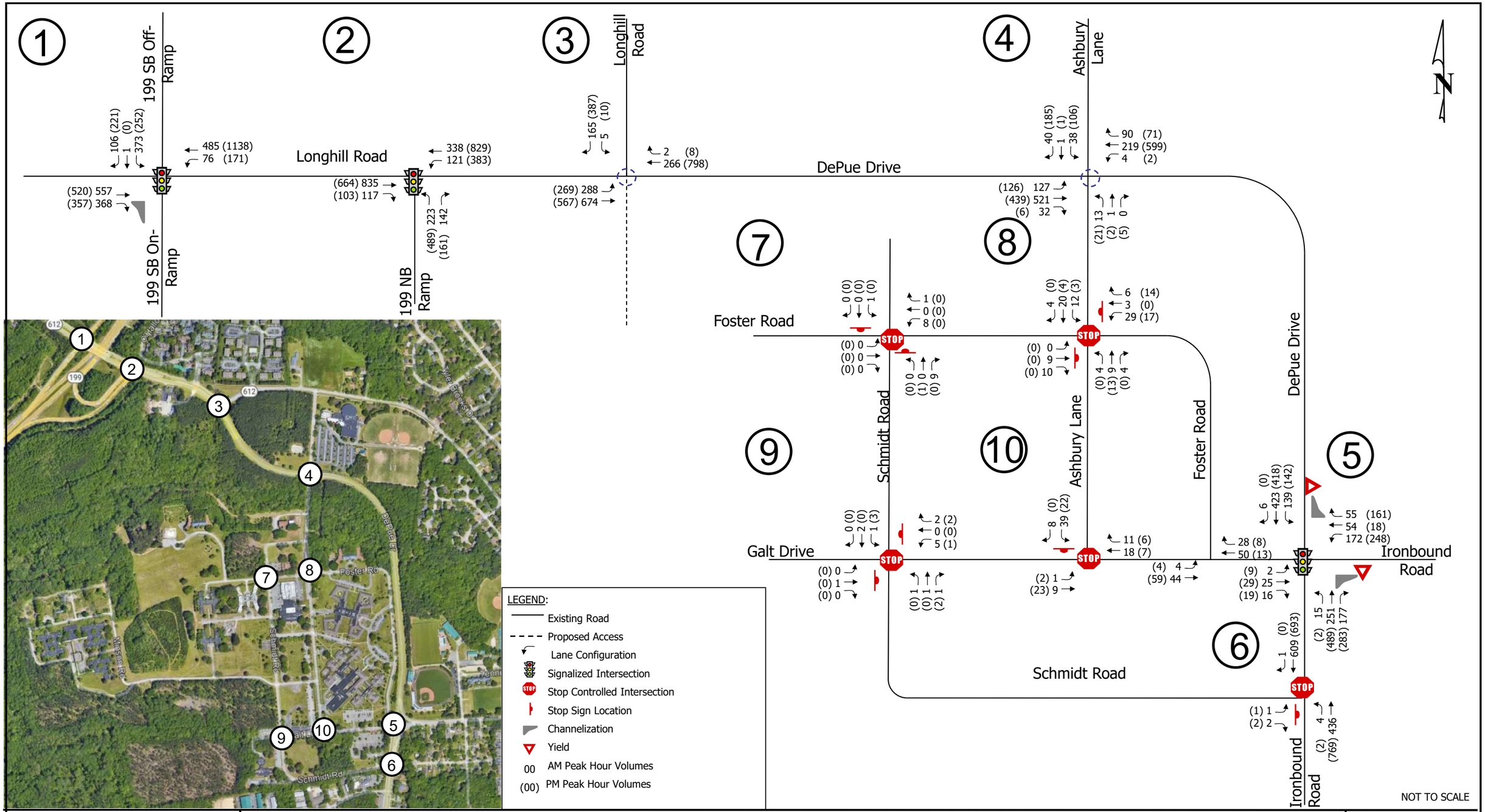
2028 Total Background Traffic Volumes
Cardinal Ridge
James City County, Virginia

Figure
4-10



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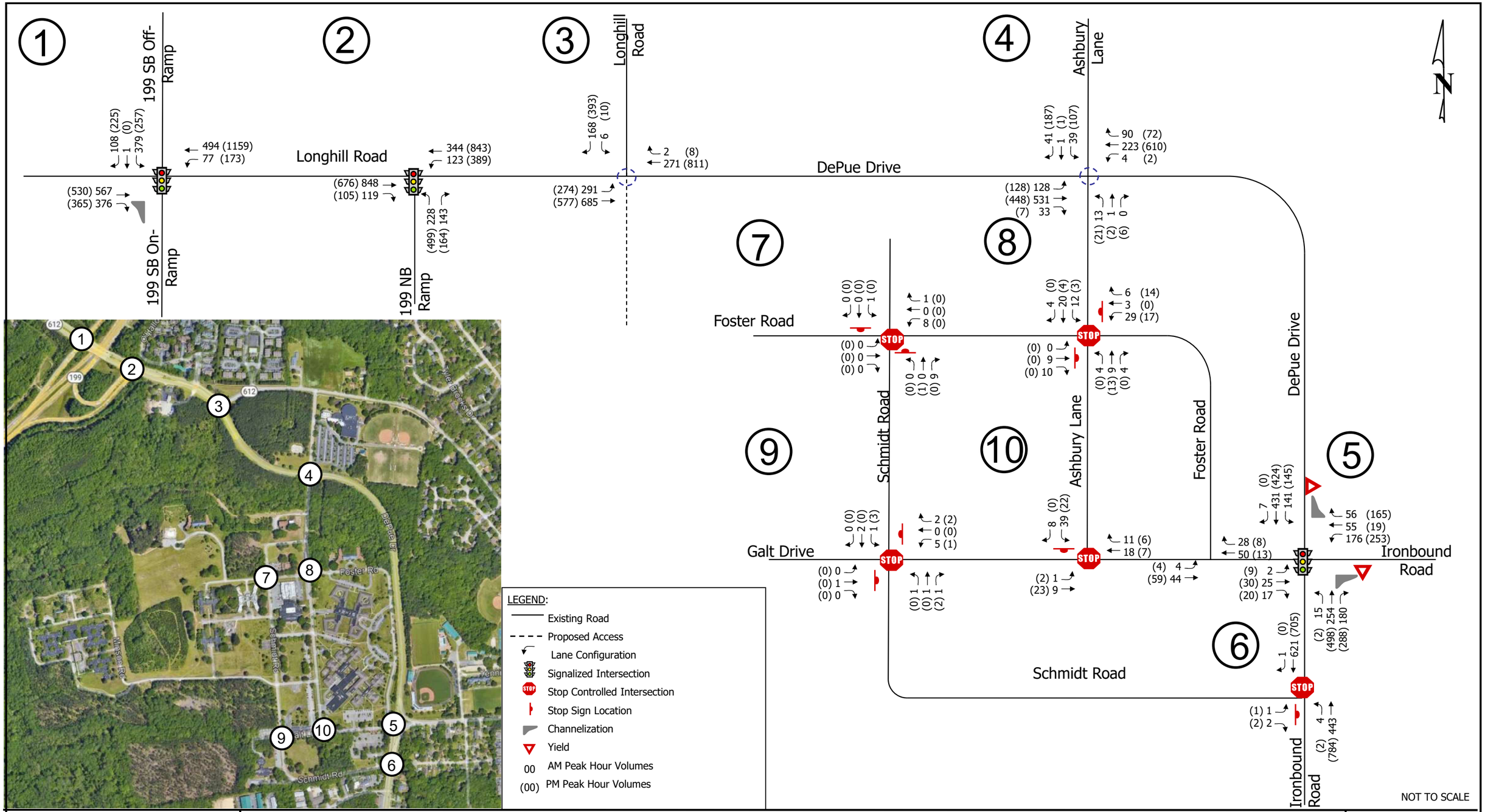
2030 Total Background Traffic Volumes
Cardinal Ridge
James City County, Virginia

Figure
4-11



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2032 Total Background Traffic Volumes
Cardinal Ridge
James City County, Virginia

Figure
4-12

5 TRIP GENERATION

For purposes of this analysis, the development was assumed to consist of 100,000 s.f. of retail space, 294 single family dwelling units, 120 units of affordable housing, 235 townhomes and 330 apartments. With the development, the remainder of the site will be provided to the State/County for the development of a 25-acre public use site (assumed 700 student middle school), a 35-acre Hope Family Residential site (27 dwelling units), and an 11-acre Colonial Behavioral Health site (62,000 s.f. of office).

Access to the site is proposed via the following connection points:

- A series of access points along Galt Drive and Ashbury Lane Extended to serve the residential components of the site (Phases 1-3). With these access points, the existing internal roadway system will be reworked eliminating the Ironbound Road/Schmidt Road and Foster Road/Ashbury Lane intersections.

- Adding a northbound (fourth leg) approach to the Longhill Road/DePue Drive intersection (Phase 4).

- Constructing an access roadway between Ashbury Lane and the commercial development component (Phase 4). The intersection between Ashbury Lane and the commercial development is assumed to be right-in/right-out, left-in only.

For purposes of this analysis, the development was assumed to occur in the following four phases:

- Phase 1 (2028)
  - Colonial Behavioral Health Site (62,000 s.f. office)
  - Hope Family Village site (27 dwelling units)
  - 150 single family detached units
  - 120 affordable dwelling units
  - 94 townhomes
  - 330 apartments

- Phase 2 (2030)
  - 64 single family detached units
  - 141 townhomes

- Phase 3 (2030)
  - 80 single family detached units

- Phase 4 (2032)
  - 100,000 s.f. of retail space
  - Public Use Site (700 student middle school)

A conceptual phasing plan is shown on Figure 1-1.

5.1 OVERALL SITE TRIP GENERATION

The site-generated traffic volumes shown in Table 5-1 were generated using the size of the development and the rates/equations contained in the 11th Edition of ITE's Trip Generation Manual. It is noted that a grocery store was assumed within the retail shopping plaza and therefore the rates/formulas in the Land Use Subcategory "Supermarket- Yes" were utilized.

5.1.1 INTERNAL TRIPS

Internal trips are trips that would make a stop at more than one of the uses within a development. For example, a customer may visit more than one retail store within the development during the same trip. Typically, internal trips are reduced from the overall trip generation of the development and do not appear on any of the external study intersections. In this case, the internal trips only appear at the studied internal intersections.

Per Chapter 527 guidelines (page 62), a 5% reduction in trips was applied to the office/residential trips and a 5%/10%/15% (AM/PM/Daily) reduction was applied to the residential/retail trips. All trips are the smaller of the two uses and are balanced for ins and outs.

For example, the residential to office reduction is 5% in all hours. In the AM peak hour, the residential traffic generates 393 outbound trips (5% x 393 = 20) and the office generates 98 inbound trips (5% x 98 = 5). Therefore the AM residential outbound reduction to office is 5 trips and the AM office inbound reduction from office is 5 trips.

The school trips were excluded from the internal analysis as VDOT Chapter 527 guidelines have no guidance on school reductions.

As noted above, the development will occur in stages and the retail component will not be built until Phase 4. Office/residential internal trips occur in Phase 1 and all other internal trips are not included until the retail is built with Phase 4.

5.1.2 PASS-BY TRIPS

Pass-by trips are trips that would be drawn to the development from the existing traffic stream on the adjacent streets. These trips are intermediate stops on the route from an origin to the primary destination (i.e., stopping for gas on the route from home to work). These trips will not add to the overall traffic volumes on the roadway but will add to the turning traffic at the site access locations.

In accordance with Chapter 527 guidelines and ITE data and the general nature of the retail development, a 40% pass-by trip rate was applied to the retail trips only.

5.1.3 TRIP GENERATION BY PHASE

The trips that will be generated by each phase are shown in Table 5-2. All internal trips and pass-by trips will occur in Phase 4.

Table 5-1: Trip Generation Summary

Buildout Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Average Daily Trips
1. Full Development - ITE Trip Generation[1]										
Commercial										
Retail Shopping Plaza (40-150k)	100,000	S.F.	821[2]	219	134	353	425	461	886	9,449
Colonial Behavioral Health (General Office)	62,000	S.F.	710	98	13	111	19	93	112	766
Commercial Subtotal				**317**	**147**	**464**	**444**	**554**	**998**	**10,215**
Residential										
Single Family Detached	294	D.U.	210	57	162	219	183	108	291	2,956
Affordable Housing	120	D.U.	223	17	43	60	33	23	55	577
Townhomes	235	D.U.	215	34	77	111	76	57	133	1,690
Multifamily Housing (Low-Rise)	330	D.U.	220	30	95	125	102	60	162	2,191
Hope Family Village (Single Family Detached)	27	D.U.	210	6	17	23	18	11	29	303
Residential Subtotal	1,006	D.U.		**144**	**394**	**538**	**412**	**259**	**670**	**7,717**
Public Use Site										
Middle School	700	Students	522	253	216	469	50	55	105	1,470
Total ITE Generated Trips				**714**	**757**	**1,471**	**906**	**867**	**1,773**	**19,402**
2a. Overall Internal Trip Reduction[3,4]										
Residential vs Office	5%	All hours								
Residential				(1)	(5)	(6)	(5)	(1)	(6)	(38)
Office				(5)	(1)	(6)	(1)	(5)	(6)	(38)
Total Residential vs Office										
Residential vs Retail	5%/10%/15%	AM/PM/Daily								
Residential				(7)	(11)	(18)	(41)	(26)	(67)	(1,158)
Retail				(11)	(7)	(18)	(26)	(41)	(67)	(1,158)
Total Residential vs Retail										
Total Internal Reduction				*(24)*	*(24)*	*(47)*	*(73)*	*(73)*	*(145)*	*(2,392)*
4. External Trips (ITE Generated Trips - Internal Trip Reduction)[5]										
Commercial										
Retail Shopping Plaza (40-150k)	100,000	S.F.	821[2]	208	127	335	399	420	819	8,291
Colonial Behavioral Health (General Office)	62,000	S.F.	710	93	12	105	18	88	106	727
Commercial Subtotal										
Residential										
Single Family Detached	294	D.U.	210	54	155	209	163	97	259	2,498
Affordable Housing	120	D.U.	223	16	41	57	29	20	49	488
Townhomes	235	D.U.	215	32	74	106	68	51	119	1,428
Multifamily Housing (Low-Rise)	330	D.U.	220	28	91	120	91	54	144	1,851
Hope Family Village (Single Family Detached)	27	D.U.	210	6	16	22	16	10	26	256
Residential Subtotal	1,006	D.U.		137	378	514	366	232	598	6,521
Public Use Site										
Middle School	700	Students	522	253	216	469	50	55	105	1,470
5. Pass-By Trip Reduction[6]										
		Pass-By Rate								
Retail Pass-By Trips		40%					(160)	(168)	(328)	
Total "New" Retail Trips (External - Pass-by)				**208**	**127**	**335**	**239**	**252**	**491**	**8,291**
6. Total Primary External Trips (Total External Trips - Total Pass-By Trips)				**691**	**733**	**1,424**	**673**	**626**	**1,300**	**17,010**
Summary										
Total ITE Site Trips Generated				**714**	**757**	**1,471**	**906**	**867**	**1,773**	**19,402**
Total Internal Trips				**(24)**	**(24)**	**(47)**	**(73)**	**(73)**	**(145)**	**(2,392)**
Total Pass-By Trips				**0**	**0**	**0**	**(160)**	**(168)**	**(328)**	**0**
Total External Primary Trips				**691**	**733**	**1,424**	**673**	**626**	**1,300**	**17,010**

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 11th Edition. Assumes General Urban/Suburban land use category.
(2) Land Use Subcategory "Supermarket - Yes" utilized.
(3) Per Chapter 527 guidelines (page 62), internal trip reductions are the smaller of the uses below.
The school trips were excluded from the internal analysis as VDOT Chapter 527 guidelines have no guidance on school reductions.
(4) Internal trips are only applied at full buildout when the retail is assumed to be completed (Phase 4).
(5) All internal trips reduced from the retail ITE trip generation.
(6) Pass-by reduction percentage from ITE data (Trip Generation Handbook, 3rd Ed.) per Chapter 527 guidelines and only applied to PM peak hour.

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Table 5-2: Trip Generation By Phase

Buildout Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Average Daily Trips
Phase 1 Trips[1]										
Commercial										
Colonial Behavioral Health (General Office)	62,000	S.F.	710	98	13	111	19	93	112	766
Residential										
Single Family Detached	150	D.U.	210	28	80	108	91	54	145	1,465
Affordable Housing	120	D.U.	223	17	43	60	33	23	55	577
Townhomes	94	D.U.	215	13	30	43	30	22	52	666
Multifamily Housing (Low-Rise)	330	D.U.	220	30	95	125	102	60	162	2,191
Hope Family Village (Single Family Detached)	27	D.U.	210	6	17	23	18	11	29	303
Residential Subtotal	*721*	*D.U.*		*94*	*265*	*359*	*274*	*170*	*443*	*5,202*
Internal Reduction										
Office				*(5)*	*(1)*	*(6)*	*(1)*	*(5)*	*(6)*	*(38)*
Residential				*(1)*	*(5)*	*(6)*	*(5)*	*(1)*	*(6)*	*(38)*
External Trips										
Office				*93*	*12*	*105*	*18*	*88*	*106*	*727*
Residential				*93*	*259*	*352*	*268*	*168*	*437*	*5,163*
Phase 1 Total External Trips				**186**	**271**	**457**	**286**	**256**	**543**	**5,890**
Phase 2 Trips[1]										
Residential										
Single Family Detached	64	D.U.	210	13	37	50	41	24	65	669
Townhomes	141	D.U.	215	21	47	68	46	35	81	1,024
Residential Subtotal	*205*	*D.U.*		*34*	*84*	*118*	*87*	*59*	*146*	*1,693*
Phase 2 Total Trips				**34**	**84**	**118**	**87**	**59**	**146**	**1,693**
Phase 3 Trips[1]										
Residential										
Single Family Detached	80	D.U.	210	16	45	61	51	30	81	822
Phase 3 Total Trips				**16**	**45**	**61**	**51**	**30**	**81**	**822**
Phase 4 Trips[1]										
Commercial										
Retail Shopping Plaza (40-150k) [2]	100,000	S.F.	821[2]	219	134	353	425	461	886	9,449
Internal Trips				(11)	(7)	(18)	(26)	(41)	(67)	(1,158)
Pass-by Trips				0	0	0	(160)	(168)	(328)	0
New Trips				208	127	335	239	252	491	8,291
Residential										
Internal Trips				(7)	(11)	(18)	(41)	(26)	(67)	(1,158)
Public | Middle School	700	Students	522	253	216	469	50	55	105	1,470
Phase 4 Total "New" Trips				**455**	**332**	**787**	**248**	**281**	**529**	**8,604**
Summary										
				186	**271**	**457**	**286**	**256**	**543**	**5,890**
Phase 1 Trips				**34**	**84**	**118**	**87**	**59**	**146**	**1,693**
Phase 2 Trips				**16**	**45**	**61**	**51**	**30**	**81**	**822**
Phase 3 Trips				**455**	**332**	**787**	**248**	**281**	**529**	**8,604**
Phase 4 "New" Trips										
				691	**733**	**1,424**	**673**	**626**	**1,300**	**17,010**
Total Development "New" Trips										

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 11th Edition. Assumes General Urban/Suburban land use category.
(2) See Table 5-1 for calculations.

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5.2 TRIP DISTRIBUTION AND ASSIGNMENT

The distribution of external trips generated by the development was estimated based on the existing travel patterns, the nature of the use, the 2022 traffic volumes, and knowledge of the surrounding area.

The following overall (or global) distributions were assumed:

- 20% to/from the west on Longhill Road;
- 35% to/from the north on 199 SB;
- 15% to/from the south on 199 NB;
- 10% to/from the east on Ironbound Road or the Longhill Road Connector; and
- 20% to/from the south on Ironbound Road.

The overall trip distributions are shown on Figure 5-1. Since access varies depending on the type of development within the site, the trip distributions also vary at the study intersections. The Colonial Behavioral Health trip distributions are shown on Figure 5-2. The Phase 1-3 trip distributions are shown on Figure 5-3 and the Phase 4 trip distributions are shown on Figure 5-4.

The trip distribution percentages for the external trips were applied to the trip generation table (Table 5-1) to distribute the external trips to the surrounding roadway network. The resulting site generated external trips are shown as follows:

The Phase 1 site trips are shown on Figure 5-5 and include the Colonial Behavioral Health trips. The Phase 2 sit trips are shown on Figure 5-6. The Phase 3 site trips are shown on Figure 5-7. The Phase 4 "new" site trips are shown on Figure 5-8.

It is noted that Phase 4 differs in distribution (Figure 5-4) than the other Phases due to the entrances/road network available to this portion of the site.

5.3 INTERNAL CAPTURE TRIPS

The internal trips are trips that stay within the development and do not use the exterior roadway network. The internal capture trip distributions for Phases 1-3 are shown on Figure 5-9 and the internal trips are shown on Figure 5-10. The internal capture trip distributions for Phase 4 are shown on Figure 5-11 and the internal trips are shown on Figure 5-12.

5.4 PASS-BY TRIP DISTRIBUTIONS

Since pass-by trips by nature come from the existing traffic stream, it was assumed that all pass-by trips originated as through traffic on DePue Drive/Longhill Road. The distribution of the pass-by trips was based on the existing directional split on DePue Drive/Longhill Road and the nature of the retail.

In the PM peak hour pass-by traffic will following the existing commuter splits and 40% of pass-by traffic will approach the site from the west on DePue Drive while 60% will approach the site from the east on DePue Drive/Longhill Road.

The trip distribution percentages for the pass-by trips were applied to the pass-by trip generation shown in Table 5-1 to distribute the pass-by trips to the surrounding roadway network. The resulting site generated pass-by trips are shown in Figure 5-13.



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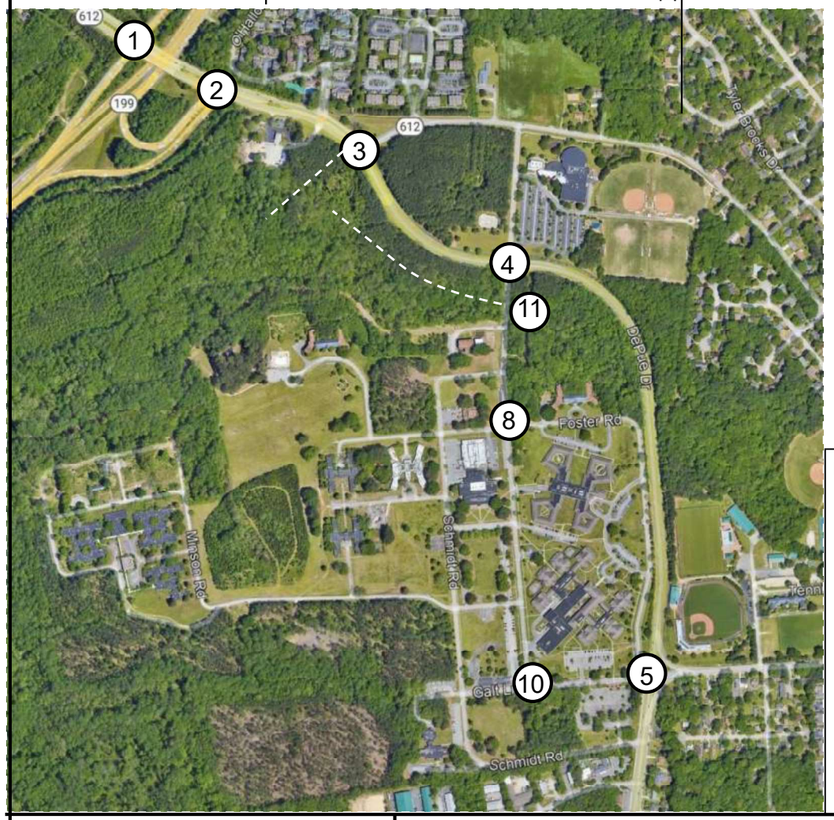
Overall Site Trip Distributions
Cardinal Ridge
James City County, Virginia

Figure
5-1



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00% Entering Peak Hour Distributions
- (00%) Exiting Peak Hour Distributions

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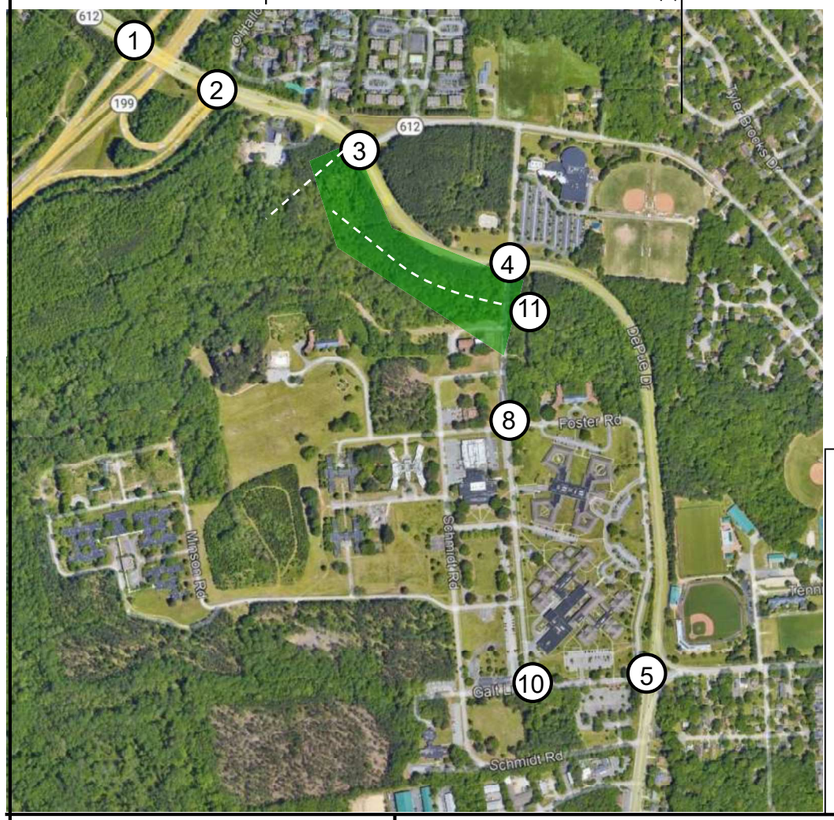
Phase 1,2, and 3 Site Trip Distributions
Cardinal Ridge
James City County, Virginia

Figure
5-2



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00% Entering Peak Hour Distributions
- (00%) Exiting Peak Hour Distributions

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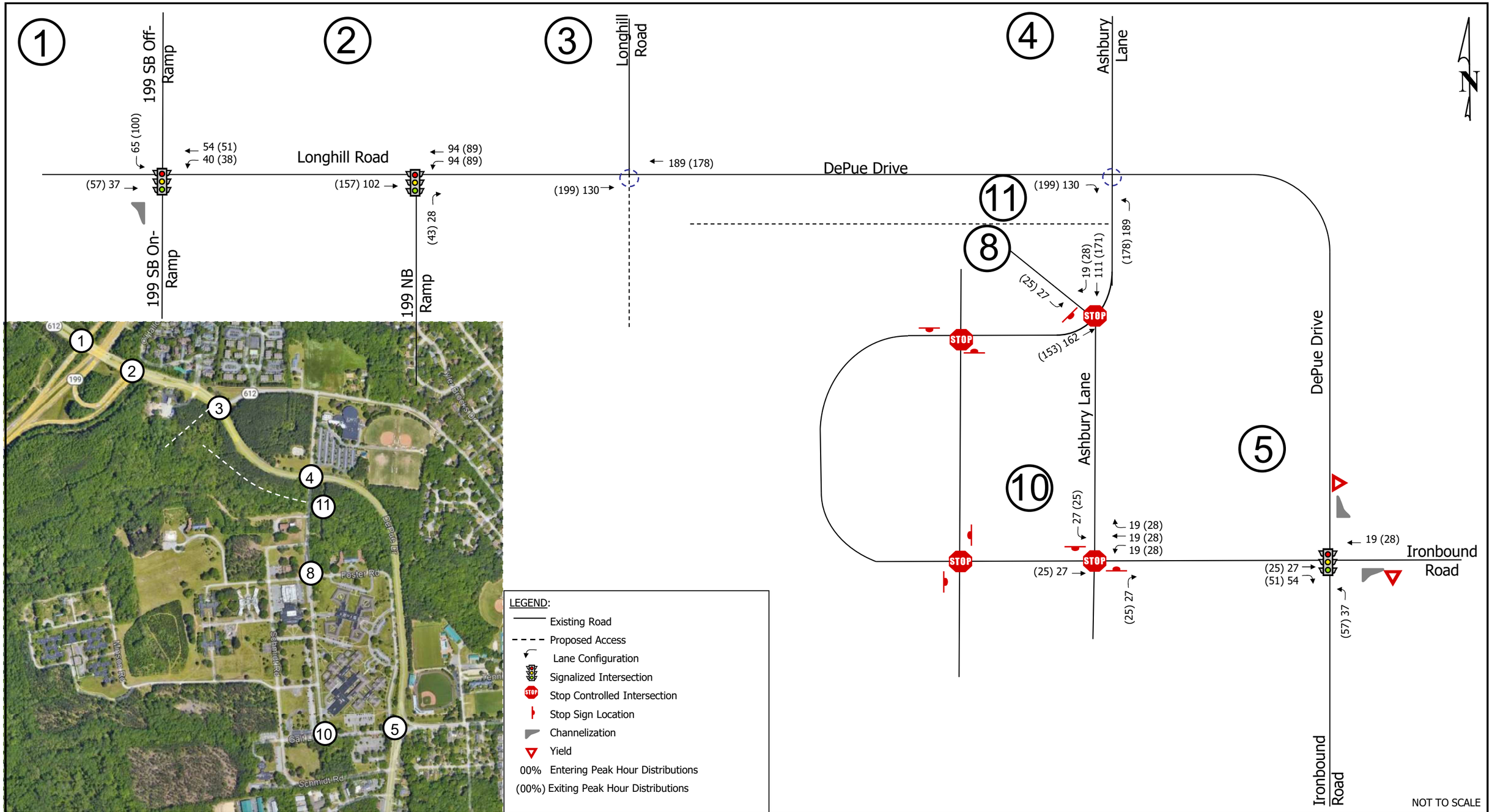
Phase 4 Site Trip Distribution
Cardinal Ridge
James City County, Virginia

Figure 5-3



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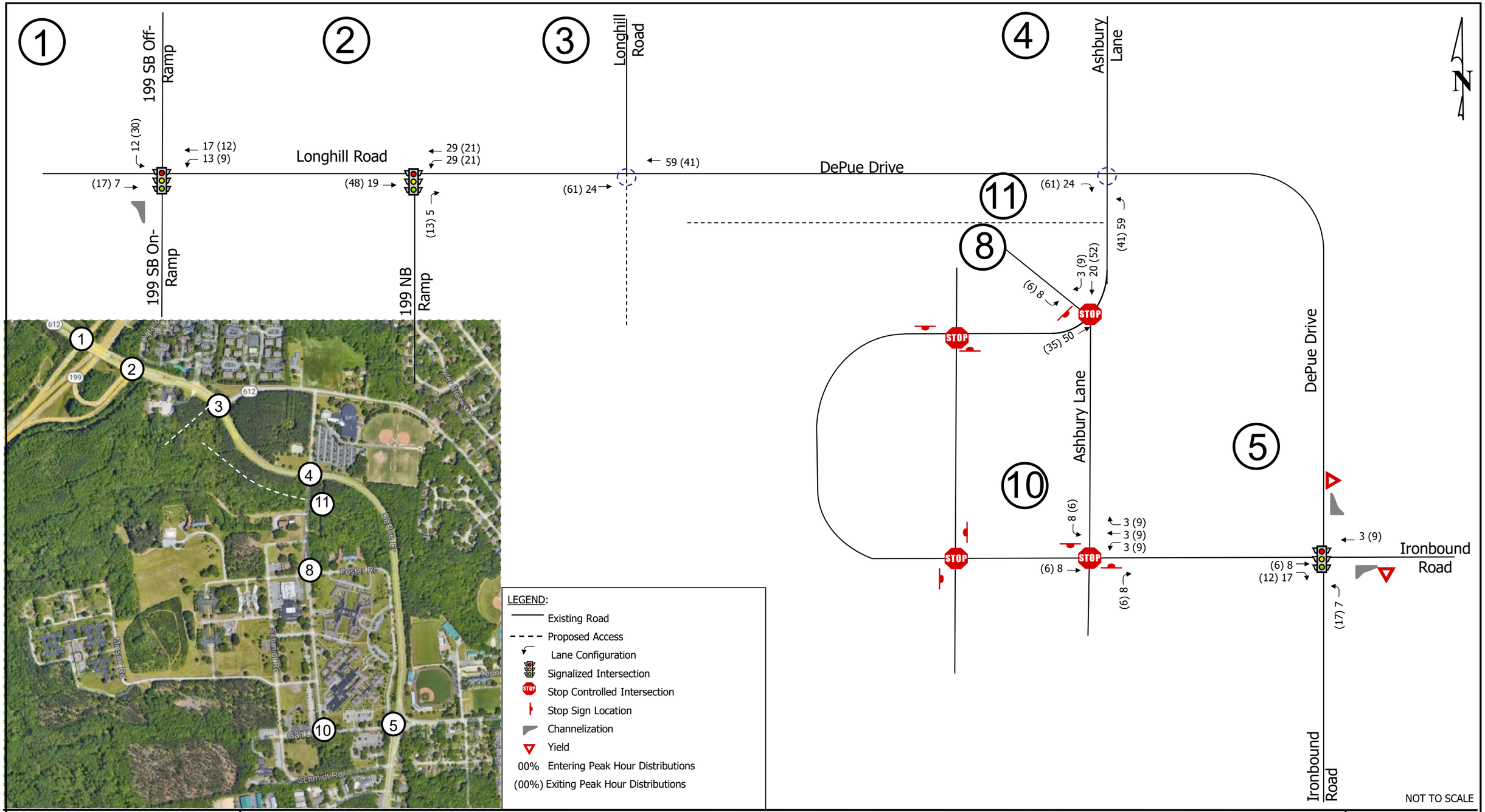
Phase 1 Site Trips
Cardinal Ridge
James City County, Virginia

Figure
5-4



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00% Entering Peak Hour Distributions
- (00%) Exiting Peak Hour Distributions

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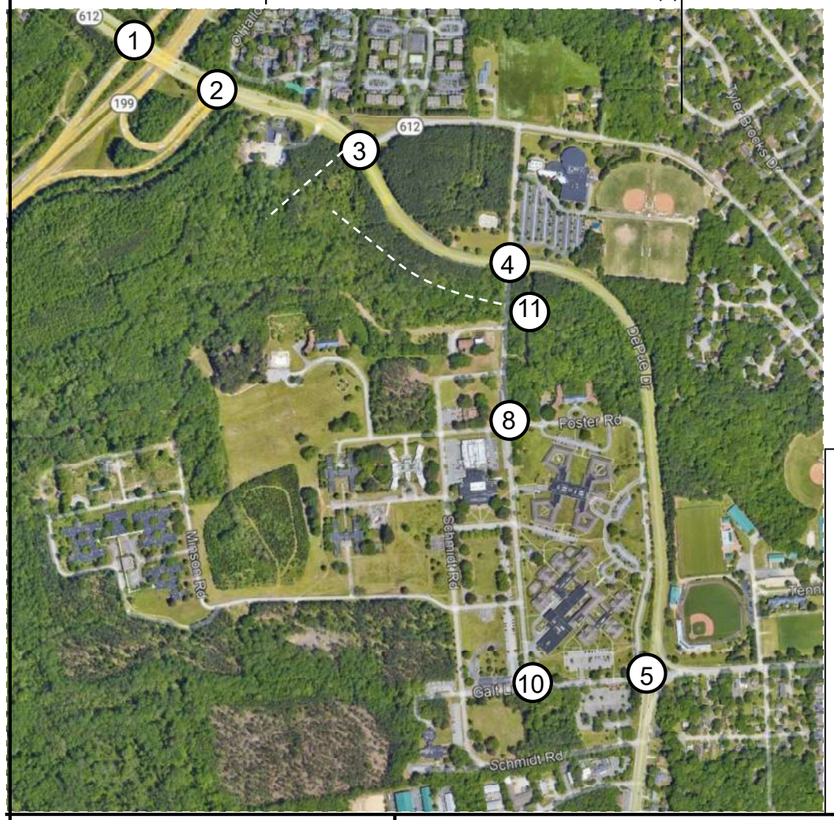
Phase 2 Site Trips
Cardinal Ridge
James City County, Virginia

Figure
5-5



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00% Entering Peak Hour Distributions
- (00%) Exiting Peak Hour Distributions

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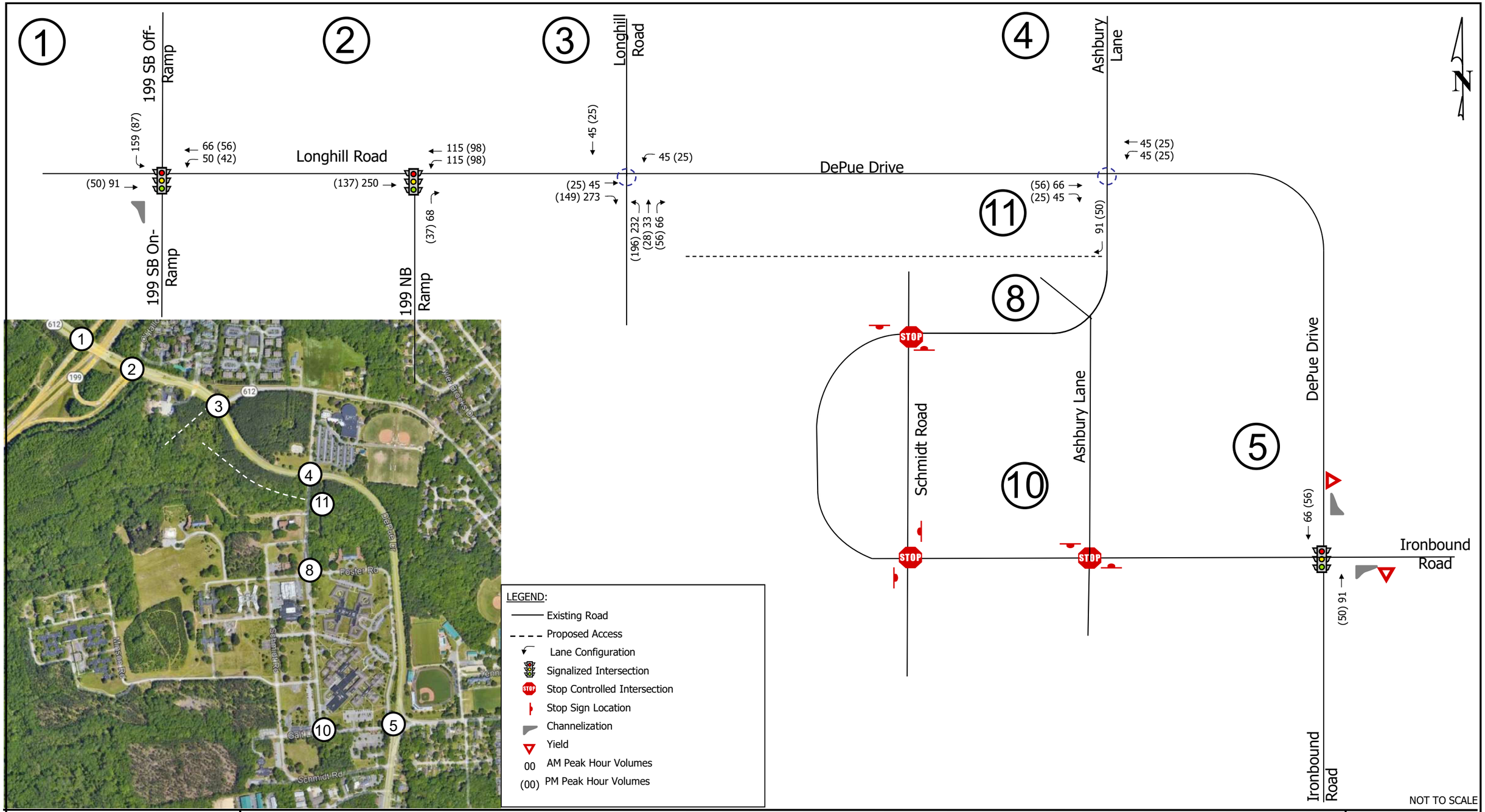
Phase 3 Site Trips
Cardinal Ridge
James City County, Virginia

Figure
5-6



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Phase 4 "New" Trips
Cardinal Ridge
James City County, Virginia

Figure
5-7



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00% Entering Peak Hour Distributions
- (00%) Exiting Peak Hour Distributions

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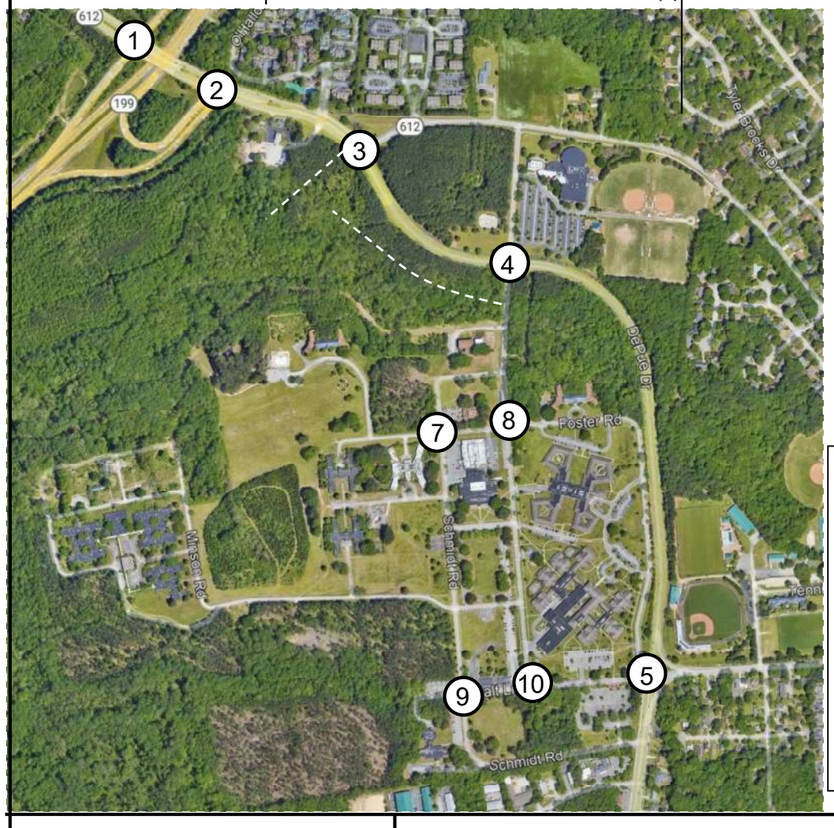
Phase 1,2, and 3 Internal Capture Distributions
Cardinal Ridge
James City County, Virginia

Figure
5-8



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 Entering Peak Hour Trips
- (00) Exiting Peak Hour Trips

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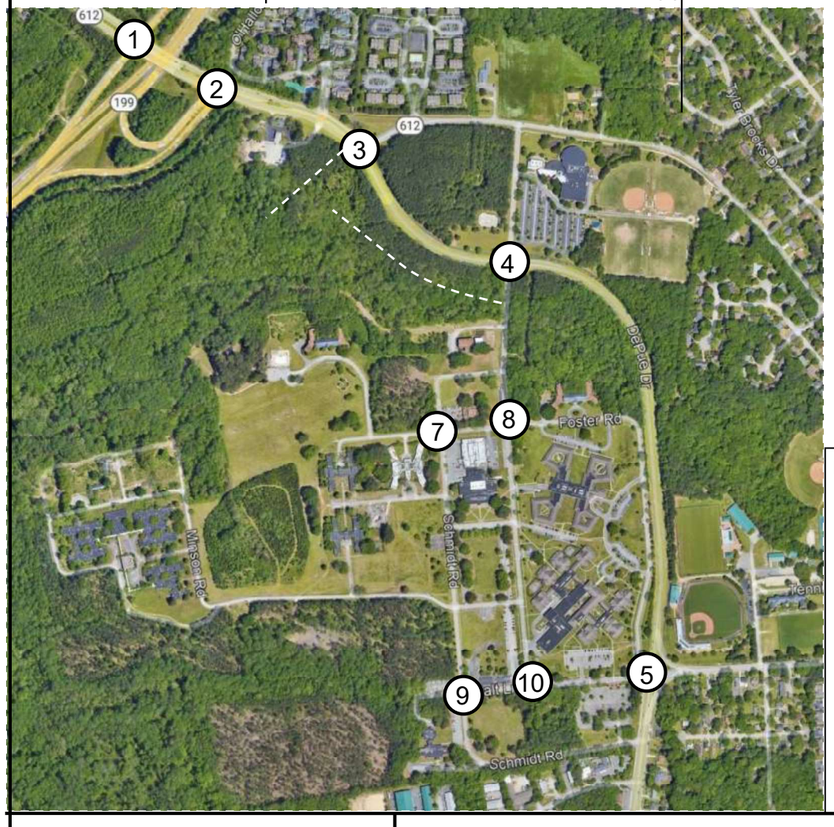
Phase 1,2, and 3 Internal Capture Trips
Cardinal Ridge
James City County, Virginia

Figure
5-9



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00% Entering Peak Hour Distributions
- (00%) Exiting Peak Hour Distributions

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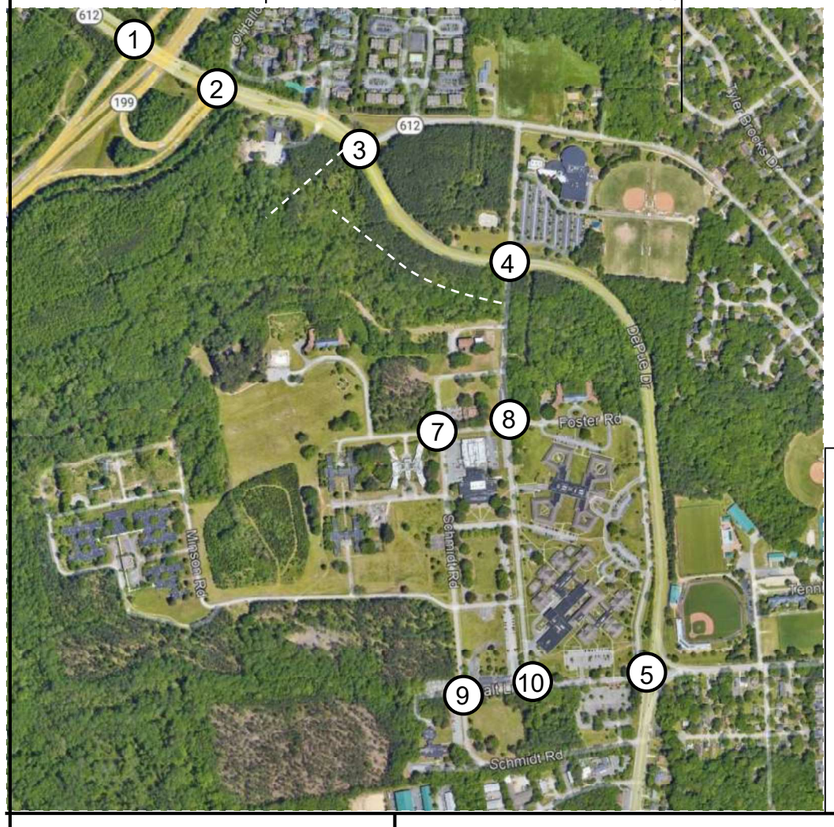
Phase 4 Internal Capture Distributions
Cardinal Ridge
James City County, Virginia

Figure
5-10



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 Entering Peak Hour Trips
- (00) Exiting Peak Hour Trips

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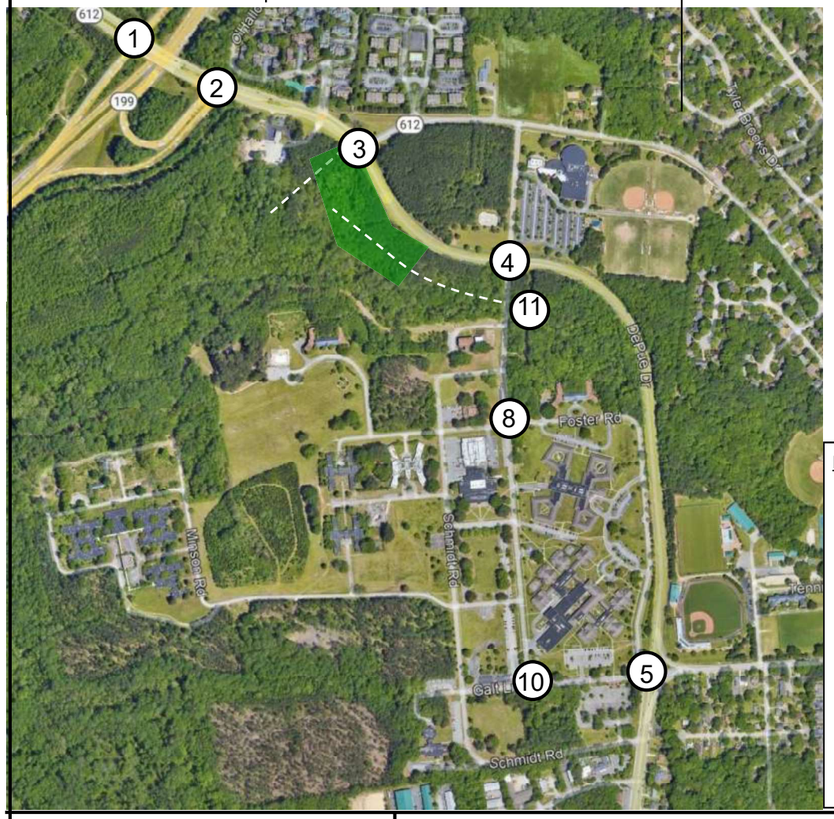
Phase 4 Internal Capture Trips
Cardinal Ridge
James City County, Virginia

Figure
5-11



LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 AM Peak Hour Volumes
- (00) PM Peak Hour Volumes

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Phase 4 Pass-By Trips (Retail Only)
Cardinal Ridge
James City County, Virginia

Figure
5-12

6 ANALYSIS OF 2028 FUTURE CONDITIONS WITH PHASE 1 DEVELOPMENT

To complete the analysis of 2028 future conditions (with Phase 1 of the proposed development), the Phase 1 site trips (Figure 5-5), the Phase 1 internal trips (Figure 5-9) and the background 2028 (Figure 4-10) traffic volumes were summed. The projected 2028 total future volumes are shown in Figure 6-1 and were then used to complete the capacity analysis.

As noted above, with development of the site, the Applicant is proffering to modify the roundabouts the County is constructing at the intersections of Longhill Road/DePue Drive and DePue Drive/Ashbury Lane as follows to accommodate the site traffic:

- The DePue Drive/Ashbury Lane roundabout will be modified to a dual lane roundabout. To accommodate the expansion of the roundabout, the section of Longhill Road/DePue Drive between the roundabouts will be widened to a four-lane section.
    - These improvements will be constructed with Phase 1 (2028) of the site.

- The Longhill Road/DePue Drive roundabout will be modified to include the fourth leg (northbound approach) and a second southbound approach lane.
    - These improvements will be constructed with Phase 4 (2032) of the site.

Schematics of the roundabouts are included in Appendix B.2.

6.1 CAPACITY ANALYSES

Table 6-1 summarizes the 2028 future intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2028 future peak hour traffic volumes shown on Figure 6-1 and the future lane geometry shown on Figure 2-5. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix F.1.

As shown in Table 6-1, under 2028 future conditions:

- All intersections will operate at comparable levels to background conditions. Specifically:

- The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
    - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
        - The 95th percentile and maximum queues will be contained within the available storage.
        - All v/c ratios are less than 1.0 during both peaks.

- With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS C or better and all v/c ratios are less than 1.0.

- With the construction of the dual lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS B or better and all v/c ratios are less than 1.0.

- At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
    - The eastbound approach operates at LOS D during both peaks.
    - The westbound approach operates at LOS C during both peaks.
    - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
    - The mainline southbound approach operates at LOS C during both peaks.
    - All v/c ratios are less than 1.0 during both peaks.

- All movements at the other intersections operate at LOS B or better with all v/c ratios less than 1.0.

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Table 6-1: Intersection Level of Service, Delay, and Queue Summary
2028 Total Future Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		15.0	B	0.54	146	187	15.2	B	0.57	122	151
199 SB Ramps	EB Right[3]	430	0.4	A	0.24	0	20	0.3	A	0.24	0	8
Signalized	*EB Approach*		*9.4*	*A*	--	--	--	*9.5*	*A*	--	--	--
	WB Left	225	25.0	C	0.5	44	108	22.5	C	0.58	#62	125
	WB Thru		6.9	A	0.31	86	133	8.4	A	0.64	179	170
	WB Approach		*10.1*	*B*	--	--	--	*10.5*	*B*	--	--	--
	SB Left		19.9	B	0.58	134	148	19.0	B	0.55	102	124
	SB Left/Thru		19.9	B	0.59	135	186	19.0	B	0.55	102	160
	SB Right	290	15.6	B	0.07	13	116	16.3	B	0.22	51	159
	SB Approach		*19.0*	*B*	--	--	--	*18.0*	*B*	--	--	--
	Overall		**12.1**	**B**	**0.56**	**--**	**--**	**11.7**	**B**	**0.75**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		16.9	B	0.66	254	247	22.9	C	0.69	255	249
199 NB Ramps	EB Right[3]	400	0.1	A	0.08	0	0	0.1	A	0.07	0	0
Signalized	*EB Approach*		*15.1*	*B*	--	--	--	*20.4*	*C*	--	--	--
	WB Left	265	27.8	C	0.49	86	113	31.8	C	0.72	172	188
	WB Thru		4.4	A	0.2	57	93	6.8	A	0.43	138	145
	WB Approach		*12.2*	*B*	--	--	--	*15.3*	*B*	--	--	--
	NB Left	435	26.7	C	0.49	83	182	38.9	D	0.84	#215	291
	NB Right	310	0.2	A	0.13	0	105	0.2	A	0.15	0	235
	NB Approach		*15.2*	*B*	--	--	--	*27.5*	*C*	--	--	--
	Overall		**14.2**	**B**	**0.59**	**--**	**--**	**19.7**	**B**	**0.74**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		5.2	A	0.42	75	-	5.4	A	0.40	77	-
DePue Drive (N)	EB Thru		5.1	*A*	0.42	75	-	5.4	A	0.40	77	-
Future Access (S)	*EB Approach*		*5.2*	*A*	--	--	--	*5.4*	A	--	--	--
Roundabout	WB Thru		5.2	A	0.22	26	-	8.2	A	0.47	71	-
	WB Thru-Right		5.2	A	0.22	26	-	8.2	A	0.47	71	-
	WB Approach		*5.2*	A	--	--	--	*8.2*	A	--	--	--
	SB Left-Right		7.8	A	0.22	23	-	26.2	D	0.72	152	-
	SB Approach		*6.6*	A	--	--	--	*23.1*	C	--	--	--
	Overall		**5.3**	**A**	**0.42**	**--**	**--**	**9.5**	**A**	**0.72**	**--**	**--**
4. DePue Drive (E-W) at	EB Left-Thru		5.3	A	0.32	48	-	5.8	A	0.33	52	-
Ashbury Lane (N-S)	EB Thru-Right		5.4	*A*	0.32	48	-	5.6	A	0.33	52	-
Roundabout	*EB Approach*		*5.3*	*A*	--	--	--	*5.9*	A	--	--	--
	WB Left-Thru		4.8	A	0.16	20	-	6.7	A	0.33	47	-
	WB Thru-Right		5.0	A	0.16	20	-	6.6	A	0.33	48	-
	WB Approach		*4.9*	A	--	--	--	*6.6*	A	--	--	--
	NB L-T-R		7.8	A	0.28	31	-	8.2	A	0.29	33	-
	NB Approach		*7.8*	*A*	--	--	--	*8.2*	A	--	--	--
	SB L-T-R		4.9	A	0.10	11	-	11.5	B	0.45	67	-
	SB Approach		*5.2*	A	--	--	--	*11.5*	B	--	--	--
	Overall		**5.6**	**A**	**0.32**	**--**	**--**	**7.2**	**A**	**0.45**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		40.1	D	0.58	#102	137	37.6	D	0.51	#118	148
Ironbound Road/Galt Drive	*EB Approach*		*40.1*	*D*	--	--	--	*37.6*	*D*	--	--	--
(E-W)	WB Left		34.6	C	0.66	151	189	48.1	D	0.82	#273	287
Signalized	WB Thru		27.6	C	0.26	72	103	28.9	C	0.14	55	94
	WB Right[3]	335	0.0	A	0.04	0	0	0.1	A	0.10	0	0
	WB Approach		*26.5*	*C*	--	--	--	*29.1*	*C*	--	--	--
	NB Left		75.5	E	0.78	64	84	37.9	D	0.42	74	140
	NB Thru		21.4	C	0.46	177	191	36.7	D	0.84	367	341
	NB Right[3]		0.2	A	0.12	0	40	0.3	A	0.18	0	21
	NB Approach		*19.6*	*B*	--	--	--	*24.4*	*C*	--	--	--
	SB Left	240	37.1	D	0.65	#151	157	45.4	D	0.70	#173	204
	SB Thru-Right		19.6	B	0.61	293	265	24.9	C	0.66	287	260
	SB Approach		*23.9*	*C*	--	--	--	*30.1*	*C*	--	--	--
	Overall		**24.4**	**C**	**0.67**	**--**	**--**	**28.0**	**C**	**0.77**	**--**	**--**
8. Foster Road (E-W) at	EB Left-Thru		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.11	0	0	0.0	A	0.13	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		10.9	B	0.05	5	44	11.3	B	0.05	4	52
	SB Approach		*10.9*	B	--	--	--	*11.3*	B	--	--	--
10. Galt Drive (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		1.2	A	0.01	1	42	2.1	A	0.02	1	39
	WB Approach		*1.2*	A	--	--	--	*2.1*	A	--	--	--
	NB L-T-R		8.8	A	0.03	2	46	9.0	A	0.04	3	59
	NB Approach		*8.8*	A	--	--	--	*9.0*	A	--	--	--
	SB L-T-R		10.6	B	0.04	3	51	10.5	B	0.04	3	52
	NB Approach		*10.6*	B	--	--	--	*10.5*	B	--	--	--

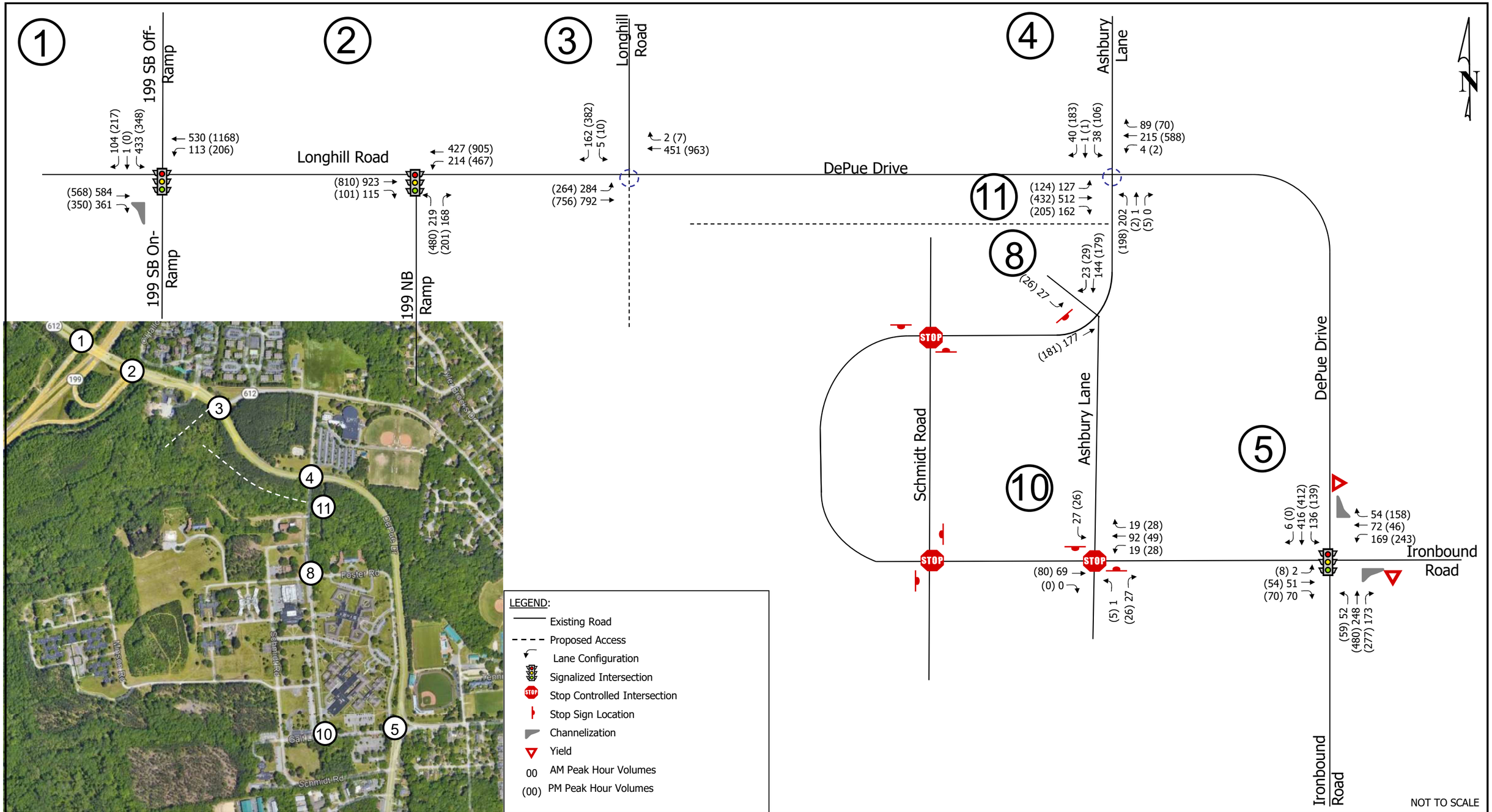
[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

[2] *Dual left turn lanes; average storage is provided.*

[3] *Channelized right turn not controlled by the signal.*

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.



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2028 Total Future Volumes
Cardinal Ridge
James City County, Virginia

Figure
6-1

7 ANALYSIS OF 2030 FUTURE CONDITIONS WITH PHASE 2+3 DEVELOPMENT

To complete the analysis of 2030 future conditions (with Phase 1 through 3 of the proposed development), the Phase 1 site trips (Figure 5-5), the Phase 2 trips (Figure 5-6), the Phase 3 site trips (Figure 5-7), and the Phase 1-3 internal trips (Figure 5-10) were added to the background 2030 (Figure 4-11) traffic volumes. The projected 2030 total future volumes are shown in Figure 7-1 and were then used to complete the capacity analysis.

7.1 CAPACITY ANALYSES

Table 7-1 summarizes the 2030 future intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2030 future peak hour traffic volumes shown on Figure 7-1 and the future lane geometry shown on Figure 2-5. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix F.2.

As shown in Table 7-1, under 2030 future conditions:

- All intersections will operate at comparable levels to background conditions. Specifically:
- The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
    - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
        - The 95th percentile and maximum queues will be contained within the available storage.
        - All v/c ratios are less than 1.0 during both peaks.
- With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A/B in both peak hours. All movements will operate at LOS C or better and all v/c ratios are less than 1.0.
- With the construction of the dual lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS B or better and all v/c ratios are less than 1.0.
- At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
    - The eastbound approach operates at LOS D during both peaks.
    - The westbound approach operates at LOS C during both peaks.
    - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
    - The mainline southbound approach operates at LOS C during both peaks.
    - All v/c ratios are less than 1.0 during both peaks.
- All movements at the other intersections operate at LOS B or better with all v/c ratios less than 1.0.

Table 7-1: Intersection Level of Service, Delay, and Queue Summary
2030 Total Future Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		15.3	B	0.56	152	186	15.9	B	0.61	131	158
199 SB Ramps	EB Right[3]	430	0.4	A	0.25	0	12	0.4	A	0.24	0	11
Signalized	*EB Approach*		*9.7*	*A*	--	--	--	*10.1*	*B*	--	--	--
	WB Left	225	27.1	C	0.58	50	99	23.8	C	0.62	#73	133
	WB Thru		7.1	A	0.33	92	131	8.9	A	0.67	189	183
	WB Approach		*11.0*	*B*	--	--	--	*11.2*	*B*	--	--	--
	SB Left		20.4	C	0.6	142	162	20.6	C	0.62	117	132
	SB Left/Thru		20.4	C	0.61	143	208	20.6	C	0.62	117	178
	SB Right	290	15.6	B	0.08	14	114	16.3	B	0.23	53	184
	SB Approach		*19.5*	*B*	--	--	--	*19.1*	*B*	--	--	--
	Overall		**12.5**	**B**	**0.59**	**--**	**--**	**12.5**	**B**	**0.79**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		17.6	B	0.69	270	242	24.7	C	0.75	291	274
199 NB Ramps	EB Right[3]	400	0.1	A	0.08	0	0	0.1	A	0.07	0	0
Signalized	*EB Approach*		*15.7*	*B*	--	--	--	*22.1*	*C*	--	--	--
	WB Left	265	29.4	C	0.59	103	126	34.1	C	0.77	186	195
	WB Thru		4.5	A	0.22	64	101	6.8	A	0.45	148	162
	WB Approach		*13.3*	*B*	--	--	--	*16.3*	*B*	--	--	--
	NB Left	435	27.2	C	0.5	84	179	42.5	D	0.87	#221	318
	NB Right	310	0.2	A	0.13	0	103	0.2	A	0.17	0	250
	NB Approach		*15.2*	*B*	--	--	--	*29.2*	*C*	--	--	--
	Overall		**14.8**	**B**	**0.63**	**--**	**--**	**21.0**	**C**	**0.80**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		5.3	A	0.44	82	-	5.8	A	0.44	92	-
DePue Drive (N)	EB Thru		5.3	*A*	0.44	82	-	5.7	A	0.44	92	-
Future Access (S)	*EB Approach*		*5.3*	*A*	--	--	--	*5.7*	*A*	--	--	--
Roundabout	WB Thru		5.7	A	0.27	33	-	8.9	A	0.51	81	-
	WB Thru-Right		5.7	A	0.27	33	-	8.7	A	0.51	81	-
	WB Approach		*5.7*	*A*	--	--	--	*8.9*	*A*	--	--	--
	SB Left-Right		8.7	A	0.24	25	-	31.0	D	0.76	173	-
	SB Approach		*7.2*	*A*	--	--	--	*27.6*	*D*	--	--	--
	Overall		**5.6**	**A**	**0.44**	**--**	**--**	**10.4**	**B**	**0.76**	**--**	**--**
4. DePue Drive (E-W) at	EB Left-Thru		5.5	A	0.34	52	-	6.3	A	0.38	63	-
Ashbury Lane (N-S)	EB Thru-Right		5.6	*A*	0.34	53	-	6.2	A	0.38	63	-
Roundabout	*EB Approach*		*5.5*	*A*	--	--	--	*6.4*	A	--	--	--
	WB Left-Thru		5.3	A	0.18	23	-	7.5	A	0.36	53	-
	WB Thru-Right		5.5	A	0.18	24	-	7.3	A	0.36	54	-
	WB Approach		*5.5*	A	--	--	--	*7.2*	A	--	--	--
	NB L-T-R		9.9	A	0.41	56	-	9.8	A	0.39	53	-
	NB Approach		*9.9*	*A*	--	--	--	*9.8*	A	--	--	--
	SB L-T-R		5.4	A	0.11	12	-	12.7	B	0.48	75	-
	SB Approach		*5.7*	A	--	--	--	*12.7*	B	--	--	--
	Overall		**6.4**	**A**	**0.41**	**--**	**--**	**8.0**	**A**	**0.48**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		43.7	D	0.68	#161	226	43.7	D	0.65	#159	174
Ironbound Road/Galt Drive	*EB Approach*		*43.7*	*D*	--	--	--	*43.7*	*D*	--	--	--
(E-W)	WB Left		35.9	D	0.68	153	209	51.6	D	0.84	#281	276
Signalized	WB Thru		28.1	C	0.28	77	109	29.7	C	0.19	67	112
	WB Right[3]	335	0.0	A	0.04	0	0	0.1	A	0.10	0	0
	WB Approach		*27.4*	*C*	--	--	--	*31.1*	*C*	--	--	--
	NB Left		47.0	D	0.64	#82	102	44.2	D	0.61	#121	154
	NB Thru		23.1	C	0.49	179	183	37.0	D	0.85	#377	345
	NB Right[3]		0.2	A	0.12	0	0	0.3	A	0.19	0	42
	NB Approach		*17.8*	*B*	--	--	--	*25.6*	*C*	--	--	--
	SB Left	240	38.6	D	0.67	#156	177	48.0	D	0.73	#179	201
	SB Thru-Right		23.8	C	0.69	300	281	25.3	C	0.66	292	276
	SB Approach		*27.5*	*C*	--	--	--	*31.1*	*C*	--	--	--
	Overall		**26.1**	**C**	**0.73**	**--**	**--**	**29.8**	**C**	**0.80**	**--**	**--**
8. Foster Road (E-W) at	EB Left-Thru		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.13	0	0	0.0	A	0.19	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		12.2	B	0.08	6	48	13.0	B	0.08	6	55
	SB Approach		*12.2*	B	--	--	--	*13.0*	B	--	--	--
10. Galt Drive (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		1.3	A	0.02	1	32	2.3	A	0.03	2	46
	WB Approach		*1.3*	A	--	--	--	*2.3*	A	--	--	--
	NB L-T-R		8.9	A	0.05	4	56	9.2	A	0.05	4	46
	NB Approach		*8.9*	A	--	--	--	*9.2*	A	--	--	--
	SB L-T-R		11.4	B	0.07	6	57	11.4	B	0.06	5	53
	NB Approach		*11.4*	B	--	--	--	*11.4*	B	--	--	--

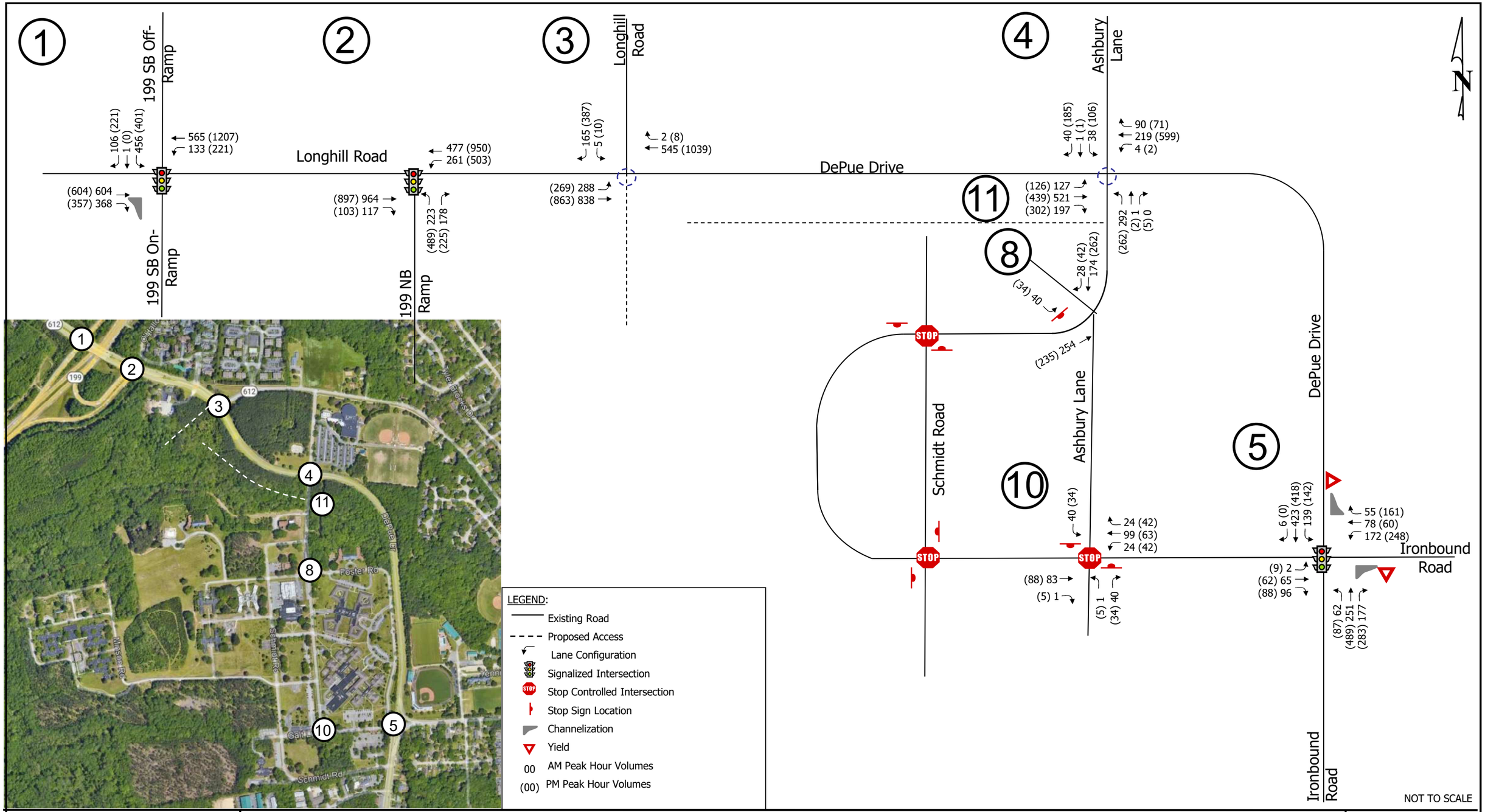
[1] Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

[2] Dual left turn lanes; average storage is provided.

[3] Channelized right turn not controlled by the signal.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.



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2030 Total Future Volumes
Cardinal Ridge
James City County, Virginia

Figure
7-1

8 ANALYSIS OF 2032 FUTURE CONDITIONS WITH FULL DEVELOPMENT

To complete the analysis of 2032 future conditions (with full buildout of the proposed development), the Phase 1 site trips (Figure 5-5), the Phase 2 trips (Figure 5-6), the Phase 3 site trips (Figure 5-7), the Phase 4 "new" site Trips (Figure 5-8), the Phase 1-3 Internal Trips (Figure5-10), the Phase 4 Internal Trips (Figure 5-12) and the Phase 4 "pass-by" trips (Figure 5-13) were added to the background 2032 (Figure 4-12) traffic volumes. The projected 2032 total future volumes are shown in Figure 8-1 and were then used to complete the capacity analysis.

8.1 CAPACITY ANALYSES

Table 8-1 summarizes the 2032 future intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2030 future peak hour traffic volumes shown on Figure 7-1 and the future lane geometry shown on Figure 2-6. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix F.3.

As shown in Table 8-1, under 2032 future conditions:

- All intersections will operate at comparable levels to background conditions. Specifically:
- The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
    - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
        - The 95th percentile and maximum queues will be contained within the available storage.
        - All v/c ratios are less than 1.0 during both peaks.
- With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A/B in both peak hours. All movements will operate at LOS C or better and all v/c ratios are less than 1.0.
- With the construction of the dual lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS B or better and all v/c ratios are less than 1.0.
- At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
    - The eastbound approach operates at LOS D during both peaks.
    - The westbound approach operates at LOS C during both peaks.
    - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
    - The mainline southbound approach operates at LOS C during both peaks.
    - All v/c ratios are less than 1.0 during both peaks.
- All movements at the other intersections operate at LOS B or better with all v/c ratios less than 1.0.

Table 8-1: Intersection Level of Service, Delay, and Queue Summary
2032 Total Future Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		19.3	B	0.69	181	193	17.3	B	0.68	145	189
199 SB Ramps	EB Right[3]	430	0.4	A	0.25	0	30	0.4	A	0.25	0	18
Signalized	*EB Approach*		*12.7*	*B*	--	--	--	*11.3*	*B*	--	--	--
	WB Left	225	29.1	C	0.64	#77	137	29.4	C	0.75	#93	156
	WB Thru		8.2	A	0.38	106	154	10.0	A	0.72	210	197
	WB Approach		*12.8*	*B*	--	--	--	*13.3*	*B*	--	--	--
	SB Left		26.2	C	0.75	#222	197	24.8	C	0.73	#170	160
	SB Left/Thru		26.3	C	0.76	#224	247	24.9	C	0.73	#170	201
	SB Right	290	15.7	B	0.08	15	131	16.2	B	0.24	55	200
	SB Approach		*24.6*	*C*	--	--	--	*22.2*	*C*	--	--	--
	Overall		**16.1**	**B**	**0.71**	**--**	**--**	**14.6**	**B**	**0.87**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		22.6	C	0.85	#426	390	30.5	C	0.87	#391	403
199 NB Ramps	EB Right[3]	400	0.1	A	0.08	0	0	0.1	A	0.07	0	18
Signalized	*EB Approach*		*20.6*	*C*	--	--	--	*27.7*	*C*	--	--	--
	WB Left	265	42.9	D	0.85	#175	170	44.2	D	0.90	#260	206
	WB Thru		4.6	A	0.28	82	128	7.1	A	0.49	172	161
	WB Approach		*19.4*	*B*	--	--	--	*20.6*	*C*	--	--	--
	NB Left	435	29.2	C	0.53	86	187	48.2	D	0.90	#227	382
	NB Right	310	0.3	A	0.18	0	153	0.3	A	0.19	0	260
	NB Approach		*14.2*	*B*	--	--	--	*31.6*	*C*	--	--	--
	Overall		**19.1**	**B**	**0.78**	**--**	**--**	**25.2**	**C**	**0.88**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		9.9	A	0.61	129	-	10.3	B	0.60	125	-
DePue Drive (N)	EB Thru-Right		9.7	*A*	0.61	129	-	10.1	B	0.60	126	-
Future Access (S)	*EB Approach*		*9.8*	*A*	--	--	--	*10.1*	*B*	--	--	--
Roundabout	WB Left-Thru		8.0	A	0.34	42	-	15.7	B	0.66	166	-
	WB Thru-Right		7.3	A	0.34	43	-	14.8	B	0.66	175	-
	WB Approach		*7.4*	A	--	--	--	*14.9*	*B*	--	--	--
	NB Left		9.5	A	0.28	34	-	11.4	B	0.38	53	-
	NB Thru-Right		8.4	A	0.28	34	-	10.0	A	0.38	53	-
	NB Approach		*9.2*	*A*	--	--	--	*10.9*	*B*	--	--	--
	SB Left-Thru		5.9	A	0.15	16	-	20.0	C	0.44	57	-
	SB Right		6.4	A	0.15	16	-	13.9	B	0.44	64	-
	SB Approach		*6.3*	A	--	--	--	*14.1*	*B*	--	--	--
	Overall		**8.9**	**A**	**0.78**	**--**	**--**	**12.3**	**B**	**0.66**	**--**	**--**
4. DePue Drive (E-W) at	EB Left-Thru		6.5	A	0.41	63	-	7.1	A	0.42	72	-
Ashbury Lane (N-S)	EB Thru-Right		6.6	*A*	0.41	64	-	7.1	A	0.42	73	-
Roundabout	*EB Approach*		*6.5*	*A*	--	--	--	*7.1*	A	--	--	--
	WB Left-Thru		5.9	A	0.23	32	-	8.0	A	0.39	60	-
	WB Thru-Right		6.1	A	0.23	33	-	7.7	A	0.39	62	-
	WB Approach		*6.0*	A	--	--	--	*7.8*	A	--	--	--
	NB L-T-R		11.0	B	0.44	64	-	10.7	B	0.41	59	-
	NB Approach		*11.0*	*B*	--	--	--	*10.7*	B	--	--	--
	SB L-T-R		5.7	A	0.12	13	-	13.9	B	0.51	82	-
	SB Approach		*6.1*	A	--	--	--	*13.9*	B	--	--	--
	Overall		**7.1**	**A**	**0.44**	**--**	**--**	**8.6**	**A**	**0.51**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		46.5	D	0.7	#161	191	47.3	D	0.68	#162	183
Ironbound Road/Galt Drive	*EB Approach*		*46.5*	*D*	--	--	--	*47.3*	*D*	--	--	--
(E-W)	WB Left		37.4	D	0.69	#159	181	58.0	E	0.87	#290	288
Signalized	WB Thru		28.9	C	0.29	77	108	30.9	C	0.20	68	95
	WB Right[3]	335	0.0	A	0.04	0	0	0.1	A	0.11	0	0
	WB Approach		*28.5*	*C*	--	--	--	*34.6*	*C*	--	--	--
	NB Left		50.3	D	0.66	#82	101	47.0	D	0.63	#121	179
	NB Thru		26.2	C	0.65	252	219	43.1	D	0.90	#482	384
	NB Right[3]		0.2	A	0.13	0	0	0.3	A	0.19	0	45
	NB Approach		*20.7*	*C*	--	--	--	*30.1*	*C*	--	--	--
	SB Left	240	41.2	D	0.7	#158	136	52.2	D	0.76	#182	168
	SB Thru-Right		27.5	C	0.78	#407	243	27.2	C	0.73	348	274
	SB Approach		*30.5*	*C*	--	--	--	*33.0*	*C*	--	--	--
	Overall		**28.3**	**C**	**0.79**	**--**	**--**	**33.2**	**C**	**0.85**	**--**	**--**
8. Foster Road (E-W) at	EB Left-Thru		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.13	0	0	0.0	A	0.22	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		12.4	B	0.08	7	58	13.9	B	0.08	6	54
	SB Approach		*12.4*	B	--	--	--	*13.9*	B	--	--	--
10. Galt Drive (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		1.3	A	0.02	1	37	2.3	A	0.03	2	43
	WB Approach		*1.3*	A	--	--	--	*2.3*	A	--	--	--
	NB L-T-R		8.9	A	0.04	4	58	9.2	A	0.05	4	51
	NB Approach		*8.9*	A	--	--	--	*9.2*	A	--	--	--
	SB L-T-R		11.4	B	0.06	6	62	11.5	B	0.06	5	59
	NB Approach		*11.4*	B	--	--	--	*11.5*	B	--	--	--
11. Ashbury Lane (N-S) at	EB Left-Right		9.7	A	0.01	1	28	10.6	B	0.07	5	48
Commercial Entrance (W)	*EB Approach*		*9.7*	A	--	--	--	*10.6*	B	--	--	--
Unsignalized	NB Left-Thru		0.4	A	0.01	1	53	0.9	A	0.02	2	79
	NB Approach		*0.4*	A	--	--	--	*0.9*	A	--	--	--
	SB Thru-Right		0.0	A	0.19	0	0	0.0	A	0.23	0	6
	SB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--

[1] Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

[2] Dual left turn lanes; average storage is provided.

[3] Channelized right turn not controlled by the signal.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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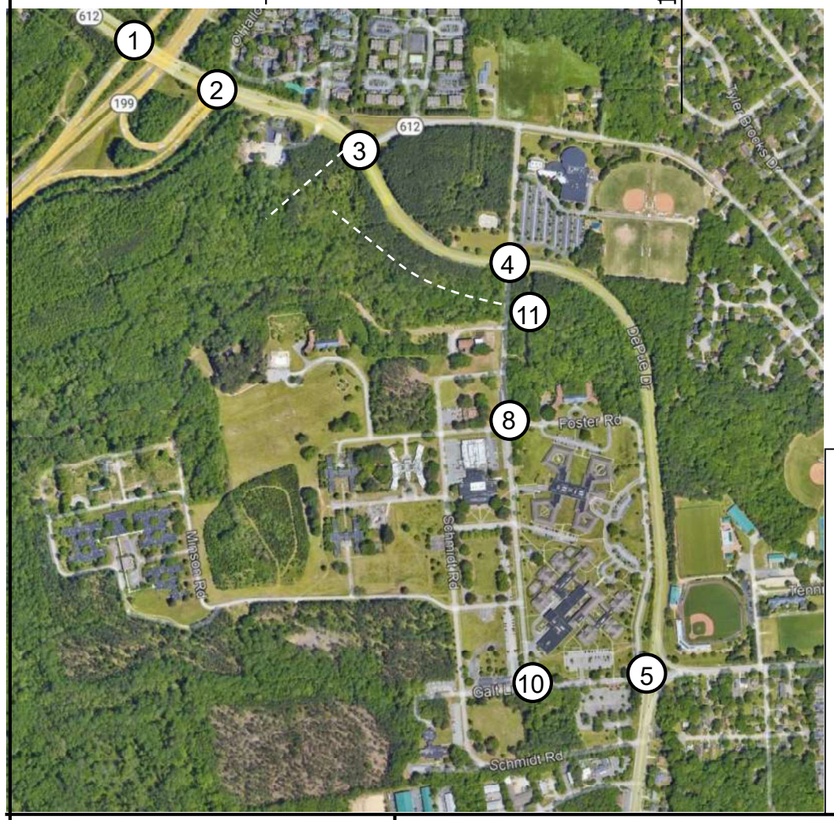

LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 AM Peak Hour Volumes
- (00) PM Peak Hour Volumes

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2032 Total Future Volumes
Cardinal Ridge
James City County, Virginia

Figure
8-1

9 2038 BACKGROUND CONDITIONS AND ANALYSIS

In accordance with Chapter 527 Guidelines, this analysis examines a buildout plus six-year scenario (2038).

The background 2038 volumes were analyzed assuming existing intersection geometry. The background traffic volumes were developed based on a 1% annual growth rate and the completion of the two (2) other developments noted above.

9.1 2038 BACKGROUND TRAFFIC GROWTH

The 1% annual growth rate discussed above was compounded annually for the 16-year period from 2022 to 2038 and applied to all movements. The growth was added to the total background development trips shown in Figure 4-9 to yield the 2038 total background traffic forecasts which are shown on Figure 9-1.

9.2 2038 BACKGROUND TRAFFIC VOLUME CAPACITY ANALYSIS

Table 9-1 summarizes the 2038 background intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2038 background peak hour traffic volumes shown on Figure 9-1 and the future lane geometry shown on Figure 2-5. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix G.

As shown in Table 9-1, under 2038 background conditions, the study intersections will generally experience more delay and queuing as a result of the 1% annual growth rate. No additional improvements are required at the study intersections.

Table 9-1: Intersection Level of Service, Delay, and Queue Summary
2038 Background Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		14.1	B	0.53	150	178	11.8	B	0.46	112	150
199 SB Ramps	EB Right[3]	430	0.4	A	0.27	0	11	0.4	A	0.26	0	22
Signalized	*EB Approach*		*8.6*	*A*	--	--	--	*7.1*	*A*	--	--	--
	WB Left	225	25.8	C	0.49	34	82	25.3	C	0.64	53	119
	WB Thru		6.9	A	0.31	85	122	7.0	A	0.63	171	152
	WB Approach		*9.4*	*A*	--	--	--	*9.3*	*A*	--	--	--
	SB Left	550	18.3	B	0.53	123	134	17.6	B	0.43	37	103
	SB Left/Thru		18.3	B	0.53	124	156	17.6	B	0.44	38	131
	SB Right	290	15.2	B	0.08	18	132	17.4	B	0.41	23	178
	SB Approach		*17.6*	*B*	--	--	--	*17.5*	*B*	--	--	--
	Overall		**11.0**	**B**	**0.56**	**--**	**--**	**10.0**	**A**	**0.70**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		15.8	B	0.7	214	236	25.2	C	0.80	#219	235
199 NB Ramps	EB Right[3]		0.1	A	0.09	0	0	0.1	A	0.08	0	0
Signalized	*EB Approach*		*13.8*	*B*	--	--	--	*21.8*	*C*	--	--	--
	WB Left	265	27.8	C	0.59	48	89	26.1	C	0.70	120	155
	WB Thru		5.2	A	0.19	48	91	7.9	A	0.48	136	148
	WB Approach		*11.2*	*B*	--	--	--	*13.6*	*B*	--	--	--
	NB Left	350	19.9	B	0.45	70	163	27.3	C	0.79	#168	296
	NB Right	250	0.2	A	0.11	0	87	0.2	A	0.13	0	216
	NB Approach		*12.4*	*B*	--	--	--	*20.6*	*C*	--	--	--
	Overall		**12.9**	**B**	**0.62**	**--**	**--**	**17.8**	**B**	**0.77**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		5.1	A	0.34	67	-	5.1	A	0.35	63	-
DePue Drive (N)	EB Thru		5.1	*A*	0.34	67	-	5.0	A	0.35	63	-
Future Access (S)	*EB Approach*		*5.1*	*A*	--	--	--	*5.1*	A	--	--	--
Roundabout	WB Thru		4.5	A	0.14	16	-	7.7	A	0.42	61	-
	WB Thru-Right		4.5	A	0.14	16	-	7.6	A	0.42	61	-
	WB Approach		*4.5*	A	--	--	--	*7.7*	A	--	--	--
	SB Left-Right		6.7	A	0.21	24	-	24.6	C	0.72	162	-
	SB Approach		*5.9*	A	--	--	--	*21.9*	C	--	--	--
	Overall		**5.1**	**A**	**0.4**	**--**	**--**	**9.4**	**A**	**0.72**	**--**	**--**
4. DePue Drive (E-W) at	EB L-T-R		6.2	A	0.46	96	-	9.7	A	0.58	149	-
Ashbury Lane (N-S)	*EB Approach*		*6.1*	*A*	--	--	--	*9.9*	A	--	--	--
Roundabout	WB L-T-R		5.9	A	0.31	48	-	12.8	B	0.69	182	-
	WB Approach		*6.0*	A	--	--	--	*12.8*	B	--	--	--
	NB L-T-R		5.5	A	0.03	4	-	6.2	A	0.05	8	-
	NB Approach		*5.5*	*A*	--	--	--	*6.2*	A	--	--	--
	SB L-T-R		4.2	A	0.09	11	-	13.2	B	0.50	109	-
	SB Approach		*4.2*	A	--	--	--	*13.2*	B	--	--	--
	Overall		**5.9**	**A**	**0.46**	**--**	**--**	**11.7**	**B**	**0.69**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		35.3	D	0.36	45	75	34.4	C	0.27	57	90
Ironbound Road/Galt Drive	*EB Approach*		*35.3*	*D*	--	--	--	*34.4*	*C*	--	--	--
(E-W)	WB Left		36.7	D	0.71	#155	160	58.1	E	0.90	#279	286
Signalized	WB Thru		26.4	C	0.21	58	83	27.1	C	0.06	28	91
	WB Right[3]	335	0.1	A	0.04	0	0	0.1	A	0.11	0	0
	WB Approach		*27.5*	*C*	--	--	--	*34.9*	*C*	--	--	--
	NB Left		112.8	F	0.74	26	45	34.0	C	0.02	8	20
	NB Thru		20.8	C	0.48	192	199	45.2	D	0.92	#443	322
	NB Right[3]		0.2	A	0.13	0	0	0.3	A	0.20	0	17
	NB Approach		*15.5*	*B*	--	--	--	*28.7*	*C*	--	--	--
	SB Left	335	39.0	D	0.7	#158	142	54.1	D	0.80	#180	227
	SB Thru-Right		17.4	B	0.61	#379	231	24.6	C	0.69	296	298
	SB Approach		*22.7*	*C*	--	--	--	*32.2*	*C*	--	--	--
	Overall		**21.7**	**C**	**0.67**	**--**	**--**	**31.4**	**C**	**0.84**	**--**	**--**
6. Schmidt Road (E) at	EB Left-Right		11.6	B	0.01	0	18	12.4	B	0.01	0	21
Ironbound Road (N-S)	*EB Approach*		*11.6*	B	--	--	--	*12.4*	B	--	--	--
Unsignalized	NB Left		9.0	A	0.01	0	27	9.4	A	0.26	0	15
	NB Thru		0.0	A	0.15	0	0	0.0	A	0.26	0	108
	SB Approach		*0.1*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Thru		0.0	A	0.28	0	0	0.0	A	0.32	0	0
	SB Thru		0.0	A	0.14	0	0	0.0	A	0.16	0	0
	SB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
7. Foster Road (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		6.6	A	0.01	0	0	0.0	A	0.00	0	0
	WB Approach		*6.6*	A	--	--	--	*0.0*	A	--	--	--
	NB L-T-R		8.6	A	0.01	1	66	9.0	A	0.00	0	12
	NB Approach		*8.6*	A	--	--	--	*9.0*	A	--	--	--
	SB L-T-R		8.7	A	0.00	0	25	0.0	A	0.00	0	0
	SB Approach		*8.7*	A	--	--	--	*0.0*	A	--	--	--
8. Foster Road (E-W) at	EB L-T-R		9.0	A	0.02	2	47	0.0	A	0.02	0	0
Ashbury Lane (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		9.2	A	0.05	4	47	8.6	A	0.03	2	38
	WB Approach		*9.2*	A	--	--	--	*8.6*	A	--	--	--
	NB L-T-R		1.6	A	0.00	0	3	0.0	A	0.00	0	0
	NB Approach		*1.6*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.5	A	0.01	1	6	3.1	A	0.00	0	0
	SB Approach		*2.5*	A	--	--	--	*3.1*	A	--	--	--
9. Galt Drive (E-W) at	EB L-T-R		9.0	A	0.00	0	18	0.0	A	0.00	0	0
Schmidt Road (N-S)	*EB Approach*		*9.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		8.5	A	0.01	1	30	8.4	A	0.00	0	30
	WB Approach		*8.5*	A	--	--	--	*8.4*	A	--	--	--
	NB L-T-R		2.4	A	0.00	0	0	0.0	A	0.00	0	0
	NB Approach		*2.4*	A	--	--	--	*0.0*	A	--	--	--
	SB L-T-R		2.4	A	0.00	0	0	7.2	A	0.00	0	0
	SB Approach		*2.4*	A	--	--	--	*7.2*	A	--	--	--
10. Galt Drive (E-W) at	EB Left-Thru		0.7	A	0.00	0	0	0.5	A	0.00	0	3
Ashbury Lane (N)	*EB Approach*		*0.7*	A	--	--	--	*0.5*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.02	0	0	0.0	A	0.01	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		8.8	A	0.05	4	52	8.8	A	0.03	2	37
	SB Approach		*8.8*	A	--	--	--	*8.8*	A	--	--	--

[1] Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

[2] Dual left turn lanes; average storage is provided.

[3] Channelized right turn not controlled by the signal.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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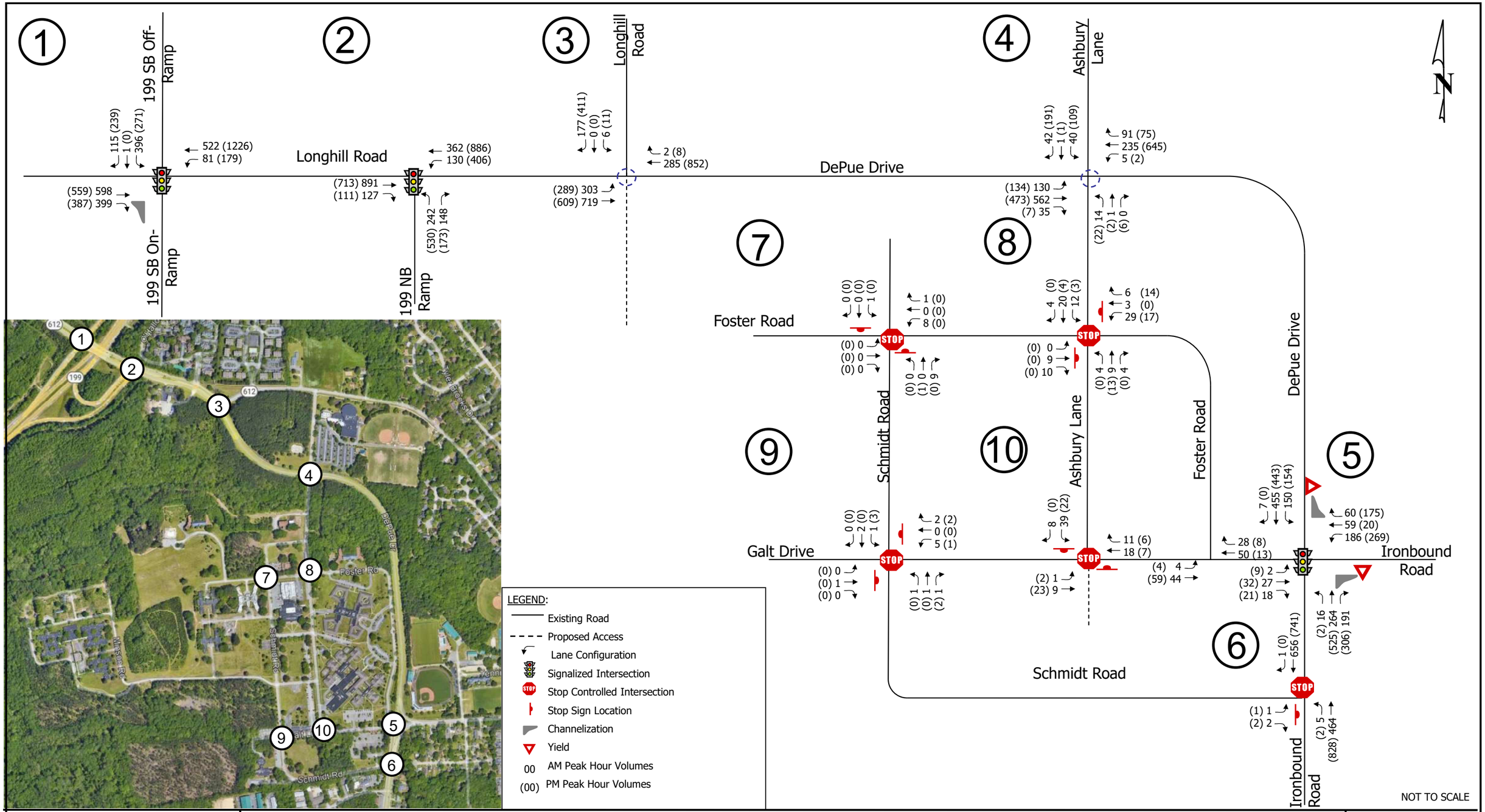

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2038 Total Background Traffic Volumes
Cardinal Ridge
James City County, Virginia

Figure
9-1

10 ANALYSIS OF 2038 CONDITIONS WITH DEVELOPMENT

To complete the analysis of the 2038 total conditions (buildout plus six years), the estimated site trips were added to the background 2038 volumes. The projected volumes were then used to complete the capacity analysis.

10.1 2038 TOTAL TRAFFIC VOLUMES

To generate the 2038 total future traffic volumes, the Phase 1 site trips (Figure 5-4), the Phase 2 trips (Figure 5-5), the Phase 3 site trips (Figure 5-6), the Phase 4 "new" site Trips (Figure 5-7), and the Phase 4 "pass-by" trips (Figure 5-8) were added to the background 2032 traffic volumes shown on Figure 9-1. The resulting 2038 future volumes are shown in Figure 10-1.

10.2 2038 FUTURE TRAFFIC VOLUME CAPACITY ANALYSIS

Table 10-1 summarizes the 2038 future intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2038 future peak hour traffic volumes shown on Figure 10-1 and the future lane geometry shown on Figure 2-6. As noted above, since the traffic signals are running "free", all signal cycle lengths, splits, and offsets were optimized in each scenario. The corresponding analysis worksheets are included in Appendix H.

As shown in Table 10-1, under 2038 future conditions, the study intersections will operate at similar LOS and queueing as under 2038 background conditions. No additional improvements are required at the study intersections.

The Longhill Road/Route 199 Ramps operate at acceptable LOS with v/c ratios less than 1.0. Should growth continue in the area, improvements may be required at the ramps. These improvements should be considered in long-range planning by the County and VDOT.

Table 10-1: Intersection Level of Service, Delay, and Queue Summary
2038 Future Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR					PM PEAK HOUR				
			Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	V/C Ratio	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Longhill Road (E-W) at	EB Thru		20.1	C	0.72	191	208	18.0	B	0.71	153	178
199 SB Ramps	EB Right[3]	430	0.4	A	0.27	0	29	0.4	A	0.26	0	24
Signalized	*EB Approach*		*13.2*	*B*	--	--	--	*11.7*	*B*	--	--	--
	WB Left	225	29.9	C	0.65	#78	165	30.7	C	0.77	#96	168
	WB Thru		8.4	A	0.4	112	174	10.8	B	0.76	228	208
	WB Approach		*13.1*	*B*	--	--	--	*14.1*	*B*	--	--	--
	SB Left		26.9	C	0.77	#231	235	25.8	C	0.74	#175	184
	SB Left/Thru		27.0	C	0.77	#232	296	25.9	C	0.75	#177	217
	SB Right	290	15.7	B	0.08	18	156	16.4	B	0.28	61	158
	SB Approach		*25.3*	*C*	--	--	--	*22.8*	*C*	--	--	--
	Overall		**16.5**	**B**	**0.73**	**--**	**--**	**15.2**	**B**	**0.91**	**--**	**--**
2. Longhill Road (E-W) at	EB Thru		24.9	C	0.88	#452	488	33.3	C	0.90	#414	408
199 NB Ramps	EB Right[3]	400	0.1	A	0.09	0	113	0.1	A	0.08	0	0
Signalized	*EB Approach*		*22.6*	*C*	--	--	--	*30.2*	*C*	--	--	--
	WB Left	265	45.3	D	0.87	#180	171	46.3	D	0.91	#271	215
	WB Thru		4.7	A	0.28	84	212	7.3	A	0.51	183	205
	WB Approach		*20.3*	*C*	--	--	--	*21.4*	*C*	--	--	--
	NB Left	435	29.5	C	0.55	91	197	58.6	E	0.96	#248	407
	NB Right	310	0.3	A	0.19	0	172	0.3	A	0.20	0	261
	NB Approach		*14.6*	*B*	--	--	--	*38.7*	*D*	--	--	--
	Overall		**20.5**	**C**	**0.81**	**--**	**--**	**27.9**	**C**	**0.92**	**--**	**--**
3. Longhill Road (E-W) at	EB Left-Thru		10.4	B	0.63	138	-	10.7	B	0.62	133	-
DePue Drive (N)	EB Thru-Right		10.1	*B*	0.63	138	-	10.4	B	0.62	135	-
Future Access (S)	*EB Approach*		*10.2*	*B*	--	--	--	*10.5*	*B*	--	--	--
Roundabout	WB Left-Thru		8.3	A	0.35	44	-	17.2	B	0.70	187	-
	WB Thru-Right		7.2	A	0.35	45	-	15.4	B	0.70	198	-
	WB Approach		*7.6*	*A*	--	--	--	*16.2*	*B*	--	--	--
	NB Left		10.0	A	0.29	36	-	12.1	B	0.39	56	-
	NB Thru-Right		8.7	A	0.29	36	-	10.6	B	0.39	56	-
	NB Approach		*9.6*	*A*	--	--	--	*11.5*	*B*	--	--	--
	SB Left-Thru		6.1	A	0.16	17	-	21.9	C	0.47	64	-
	SB Right		6.4	A	0.16	17	-	15.2	B	0.47	71	-
	SB Approach		*9.7*	*A*	--	--	--	*15.5*	*B*	--	--	--
	Overall		**9.2**	**A**	**0.63**	**--**	**--**	**13.2**	**B**	**0.70**	**--**	**--**
4. DePue Drive (E-W) at	EB Left-Thru		6.7	A	0.42	66	-	7.3	A	0.44	76	-
Ashbury Lane (N-S)	EB Thru-Right		6.8	*A*	0.42	67	-	7.1	A	0.44	77	-
Roundabout	*EB Approach*		*6.7*	*A*	--	--	--	*7.3*	A	--	--	--
	WB Left-Thru		6.1	B	0.24	33	-	8.4	A	0.42	65	-
	WB Thru-Right		6.2	B	0.24	34	-	8.1	A	0.42	67	-
	WB Approach		*6.1*	B	--	--	--	*19.3*	B	--	--	--
	NB L-T-R		11.3	B	0.45	67	-	11.1	B	0.43	62	-
	NB Approach		*11.3*	*B*	--	--	--	*11.1*	B	--	--	--
	SB L-T-R		5.8	A	0.12	13	-	14.9	B	0.53	89	-
	SB Approach		*6.2*	A	--	--	--	*14.9*	B	--	--	--
	Overall		**7.3**	**A**	**0.45**	**--**	**--**	**9.0**	**A**	**0.53**	**--**	**--**
5. DePueDrive (N-S) at	EB L-T-R		50.9	D	0.74	#167	186	51.7	D	0.72	#167	177
Ironbound Road/Galt Drive	*EB Approach*		*50.9*	*D*	--	--	--	*51.7*	*D*	--		--
(E-W)	WB Left		39.2	D	0.72	#179	192	68.8	E	0.93	#313	359
Signalized	WB Thru		29.1	C	0.3	81	112	31.6	C	0.20	69	103
	WB Right[3]	335	0.1	A	0.04	0	0	0.1	A	0.11	0	0
	WB Approach		*29.6*	*C*	--	--	--	*40.5*	*D*	--	--	--
	NB Left		52.9	D	0.68	#84	100	49.0	D	0.65	#121	263
	NB Thru		26.8	C	0.66	261	242	45.9	D	0.92	#519	497
	NB Right[3]		0.2	A	0.13	0	0	0.3	A	0.20	0	99
	NB Approach		*21.1*	*C*	--	--	--	*31.8*	*C*	--	--	--
	SB Left	240	45.2	D	0.74	#173	221	60.0	E	0.81	#197	198
	SB Thru-Right		29.5	C	0.81	#438	319	27.5	C	0.74	365	303
	SB Approach		*33.0*	*C*	--	--	--	*35.1*	*D*	--	--	--
	Overall		**30.0**	**C**	**0.82**	**--**	**--**	**36.1**	**D**	**0.89**	**--**	**--**
8. Foster Road (E-W) at	EB Left-Thru		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N-S)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB Thru-Right		0.0	A	0.13	0	0	0.0	A	0.22	0	0
	WB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--
	SB Left-Right		12.4	B	0.08	7	53	13.9	B	0.08	7	49
	SB Approach		*12.4*	B	--	--	--	*13.9*	B	--	--	--
10. Galt Drive (E-W) at	EB L-T-R		0.0	A	0.00	0	0	0.0	A	0.00	0	0
Ashbury Lane (N)	*EB Approach*		*0.0*	A	--	--	--	*0.0*	A	--	--	--
Unsignalized	WB L-T-R		1.3	A	0.02	1	36	2.3	A	0.03	2	48
	WB Approach		*1.3*	A	--	--	--	*2.3*	A	--	--	--
	NB L-T-R		9.0	A	0.05	4	58	9.2	A	0.05	4	55
	NB Approach		*9.0*	A	--	--	--	*9.2*	A	--	--	--
	SB L-T-R		11.5	B	0.07	6	53	11.5	B	0.06	5	49
	NB Approach		*11.5*	B	--	--	--	*11.5*	B	--	--	--
11. Ashbury Lane (N-S) at	EB Left-Right		9.8	A	0.01	1	28	10.6	B	0.07	5	53
Commercial Entrance (W)	*EB Approach*		*9.8*	A	--	--	--	*10.6*	B	--	--	--
Unsignalized	NB Left-Thru		0.4	A	0.01	1	44	0.9	A	0.02	2	81
	NB Approach		*0.4*	A	--	--	--	*0.9*	A	--	--	--
	SB Thru-Right		0.0	A	0.19	0	0	0.0	A	0.23	0	0
	SB Approach		*0.0*	A	--	--	--	*0.0*	A	--	--	--

[1] Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

[2] Dual left turn lanes; average storage is provided.

[3] Channelized right turn not controlled by the signal.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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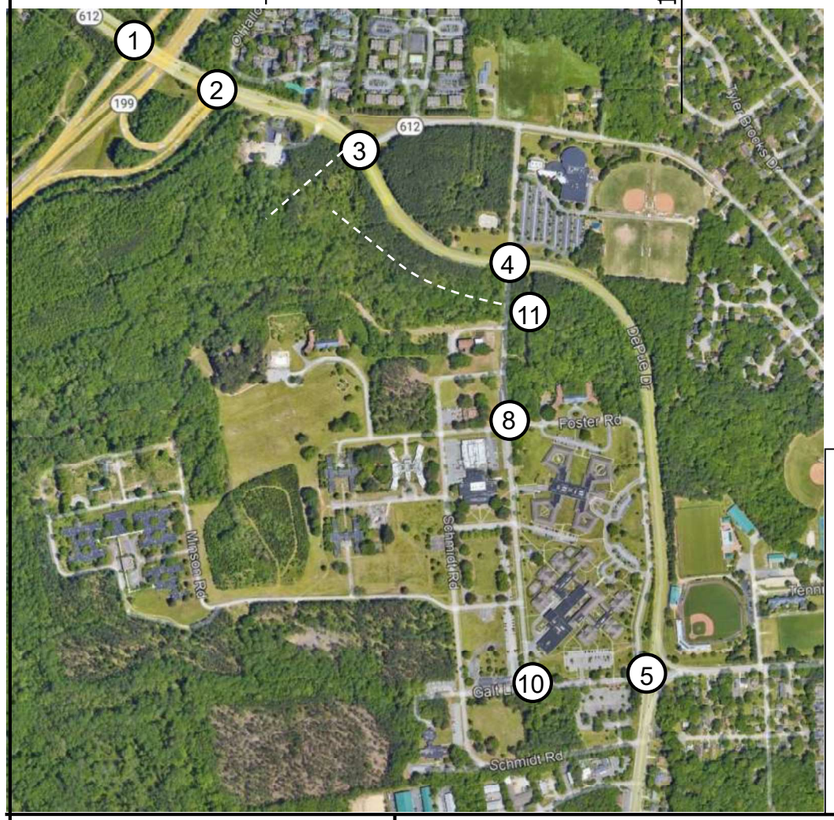

LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 AM Peak Hour Volumes
- (00) PM Peak Hour Volumes

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2038 Total Future Volumes
Cardinal Ridge
James City County, Virginia

Figure
10-1

11 INTERCHANGE ANALYSIS

The Route 199/Longhill Road interchange mainline, diverge, and merge sections were analyzed under all scenarios.

11.1 2022 EXISTING GEOMETRY

In the northbound direction, mainline Route 199 consists of two lanes approaching the interchange with Longhill Road. The one lane off-ramp consists of approximately 450 feet of full width storage prior to the gore of the interchange. The two lane section of mainline Route 199 continues for approximately 650 feet between the gore of the off-ramp and the gore of the on-ramp. The on-ramp transitions from three lanes at the intersection with Longhill Road down to one lane at the merge point with mainline Route 199. The third lane continues for approximately 700 feet before the final merge with mainline Route 199.

In the southbound direction, mainline Route 199 consists of two lanes approaching the interchange with Longhill Road. The one lane off-ramp consists of approximately 400 feet of full width storage prior to the gore of the interchange. The two lane section of mainline Route 199 continues for approximately 1,675 feet between the gore of the off-ramp and the gore of the on-ramp. The on-ramp transitions from three lanes at the intersection with Longhill Road down to one lane at the merge point with mainline Route 199. The third lane continues for approximately 350 feet before the final merge with mainline Route 199.

The existing interchange geometry is shown on Figure 11-1.

11.2 2022 EXISTING TRAFFIC COUNTS

The existing AM and PM peak hour traffic counts along mainline Route 199 were provided by VDOT for both the Route 199 section from US Route 60 to Longhill Road and the section from Longhill Road to Monticello Avenue. The raw counts are included in Appendix B.

The existing ramp volumes were obtained from the existing counts collected for this TIA (and shown on Figure 2-4). The resulting existing AM and PM peak hour interchange volumes are shown on Figure 11-2.

At the request of VDOT, the 2025 mainline through volumes were obtained from VDOT and are included in Appendix B. These volumes were used in conjunction with the 2022 ramp volumes (most recently counted) to develop the future volumes as discussed below.

11.3 BACKGROUND TRAFFIC VOLUMES

2028 Background Volumes

The 2028 background AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate and the background developments.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the three year period from 2025 to 2028 and the 2028 ramp volumes were obtained from Figure 4-10. The resulting 2028 background AM and PM peak hour interchange volumes are shown on Figure 11-3.

2030 Background Volumes

The 2030 background AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate and the background developments.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the eight year period from 2022 to 2030 and the 2030 ramp volumes were obtained from Figure 4-11. The resulting 2030 background AM and PM peak hour interchange volumes are shown on Figure 11-5.

2032 Background Volumes

The 2032 background AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate and the background developments.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the ten year period from 2022 to 2032 and the 2032 ramp volumes were obtained from Figure 4-12. The resulting 2032 background AM and PM peak hour interchange volumes are shown on Figure 11-7.

2038 Background Volumes

The 2038 background AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate and the background developments.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the sixteen year period from 2022 to 2038 and the 2038 ramp volumes were obtained from Figure 9-1. The resulting 2038 background AM and PM peak hour interchange volumes are shown on Figure 11-9.

11.4 Future Traffic Volumes

2028 Total Future Volumes

The 2028 future AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate, the background developments, and the buildout of Phase 1 of Cardinal Ridge.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the three year period from 2025 to 2028 and the 2028 ramp volumes were obtained from Figure 6-1. The resulting 2028 future AM and PM peak hour interchange volumes are shown on Figure 11-4.

2030 Total Future Volumes

The 2030 future AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate, the background developments, and the buildout of Phase 1-3 of Cardinal Ridge.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the five year period from 2025 to 2030 and the 2030 ramp volumes were obtained from Figure 7-1. The resulting 2030 future AM and PM peak hour interchange volumes are shown on Figure 11-6.

2032 Total Future Volumes

The 2032 future AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate, the background developments, and the buildout of Cardinal Ridge.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the seven year period from 2025 to 2032 and the 2032 ramp volumes were obtained from Figure 8-1. The resulting 2032 future AM and PM peak hour interchange volumes are shown on Figure 11-8.

2038 Total Future Volumes

The 2038 future AM and PM peak hour traffic volumes at the interchange were calculated using the 1.0% growth rate, the background developments, and the buildout of Cardinal Ridge.

Specifically, the mainline Route 199 volumes were grown by 1.0% per year for the thirteen year period from 2025 to 2038 and the 2038 ramp volumes were obtained from Figure 10-1. The resulting 2038 future AM and PM peak hour interchange volumes are shown on Figure 11-10.

11.5 INTERCHANGE CAPACITY ANALYSIS

The capacity of the interchange was analyzed under each scenario based on the existing geometry shown on Figure 11-1 and the volumes for each scenario shown on Figure 11-2 through 11-10. The analysis was completed using HCS7 and in accordance with VDOT TOSAM guidelines.

It is specifically noted that TOSAM guidelines for freeway analysis (beginning on page 72 of the TOSAM manual) specifies distances for merge and diverge sections that are different than the actual distances.

The results of the analysis are included in Appendix I and summarized in Table 11-1.

As shown in Table 11-1, the mainline, merge, and diverge sections of the interchange all operate at LOS B or better in both directions under all analysis scenarios. The existing geometry of the interchange can accommodate the background and future traffic.

Table 11-1: Interchange Level of Service

Interchange Segment	Segment	Existing 2022				Background 2028				Background 2030				Background 2032				Total Future 2028				Total Future 2030				Total Future 2032				Background 2038				Total Future 2038			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS	Segment Density[1]	LOS
SB Route 199 at Longhill Road	Basic	4.7	A	7.4	A	7.8	A	11.6	B	7.9	A	11.9	B	8.1	A	12.1	B	7.8	A	11.6	B	7.9	A	11.9	B	8.1	A	12.1	B	8.6	A	12.9	B	8.6	B	12.9	B
	Diverge	4.7	A	7.4	A	5.2	A	7.8	A	5.3	A	7.9	A	5.4	A	8.1	A	5.2	A	7.8	A	5.3	A	7.9	A	5.4	A	8.1	A	5.7	A	8.6	A	5.7	A	8.6	A
	Basic	4.7	A	6.0	A	3.7	A	7.6	A	3.8	A	7.7	A	3.9	A	7.9	A	3.1	A	6.7	A	3.1	A	6.4	A	1.8	A	5.8	A	4.2	A	8.4	A	2.0	A	6.4	A
	Merge	4.4	A	6.0	A	5	A	8.1	A	5.1	A	8.2	A	5.2	A	8.4	A	4.8	A	7.7	A	5	A	7.7	A	4.4	A	7.6	A	5.6	A	8.9	A	4.8	A	8.1	A
	Basic	6.5	A	9.0	A	7.5	A	12.1	B	7.6	A	12.4	B	7.8	A	12.6	B	7.2	A	11.6	B	7.4	A	11.5	B	6.7	B	11.4	B	8.3	B	13.3	B	7.2	B	12.1	B
NB Route 199 at Longhill Road	Basic	6.2	A	6.2	A	11	A	11	B	11.2	B	10.8	A	11.4	B	11	A	11	A	10.6	B	11.2	A	10.8	A	11.4	B	11	A	12.1	B	11.7	B	12.1	B	11.7	B
	Diverge	6.2	A	6.2	A	7.3	A	7.3	A	7.5	A	7.2	A	7.6	A	7.3	A	7.3	A	7	A	7.5	A	7.2	A	7.6	A	7.3	A	8.1	A	7.8	A	8.1	A	7.8	A
	Basic	6.1	A	5.7	A	7.8	A	5.4	A	8	A	5.1	A	8.2	A	5.2	A	7.6	A	4.6	A	7.7	A	4.6	A	7.3	A	4.3	A	8.7	A	5.5	A	7.8	A	4.7	A
	Merge	6.4	A	6.2	A	6.6	A	6.4	A	6.7	A	6.2	A	6.9	A	6.3	A	7	A	6.4	A	7.3	A	6.6	A	7.8	A	7	A	7.3	A	6.7	A	8.2	A	7.4	A
	Basic	9.6	A	9.3	A	9.9	A	9.6	A	10.1	A	9.3	A	10.3	A	9.5	A	10.5	A	9.6	A	11.0	A	9.8	A	11.6	B	10.6	A	11	A	10	B	12.3	B	11.1	B

1. Density units are pc/mi/ln (passenger cars/mile/lane)

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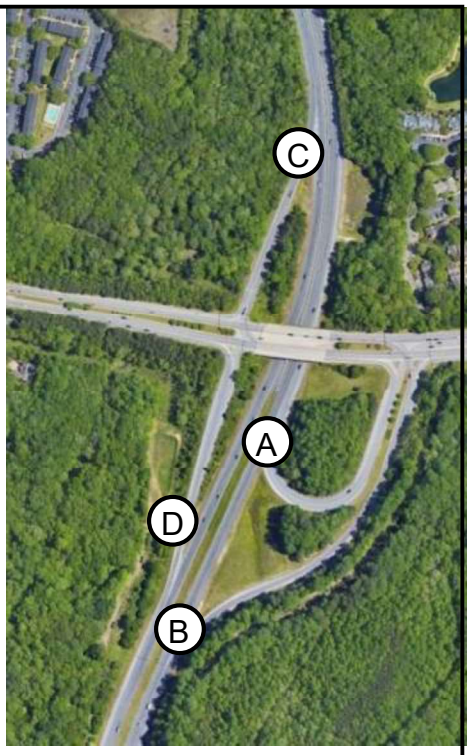

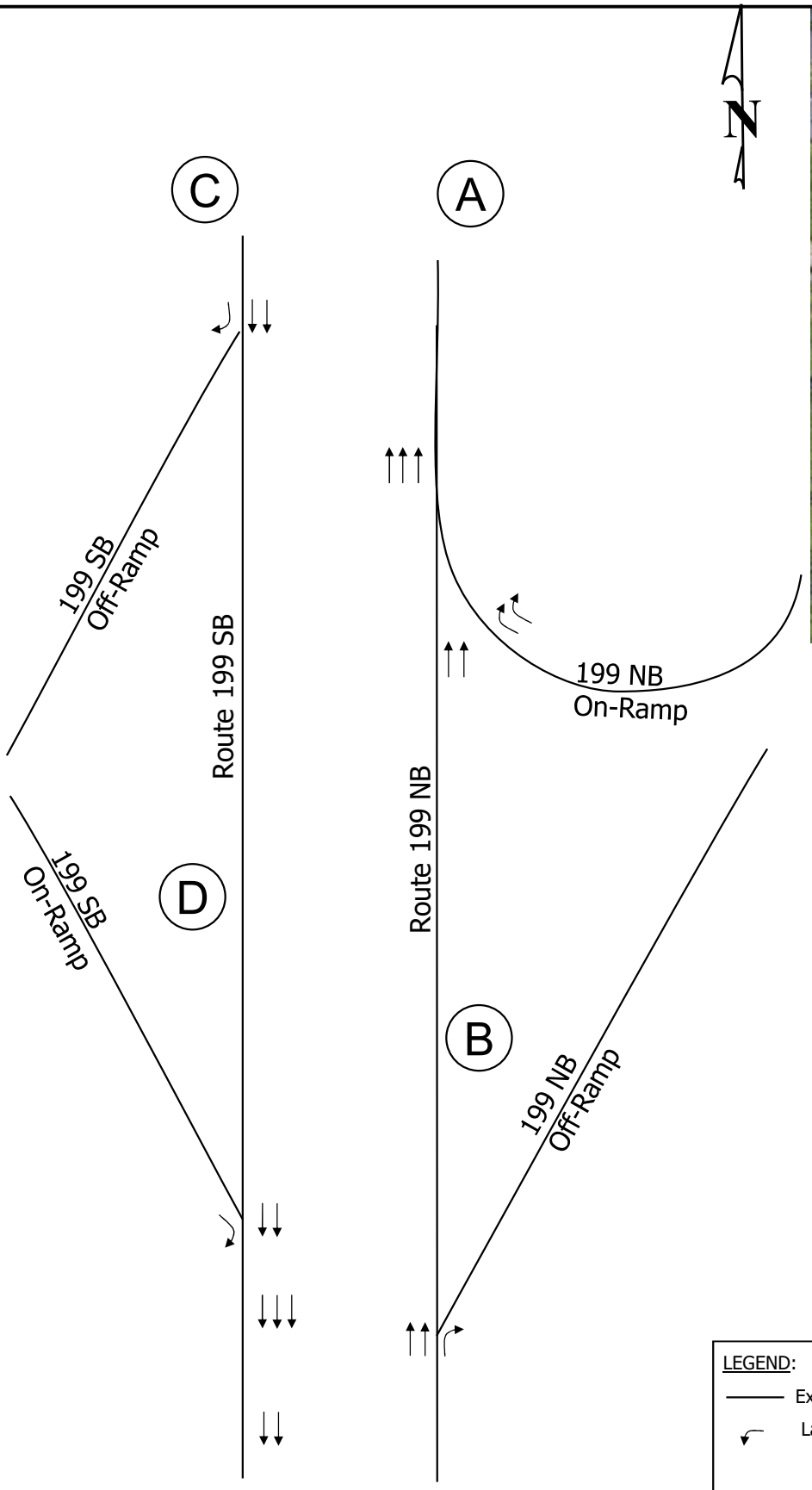

LEGEND:
Existing Road
Lane Configuration

NOT TO SCALE

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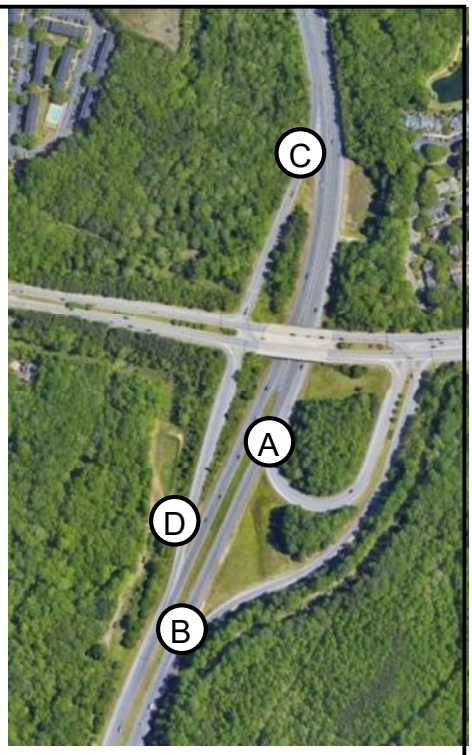
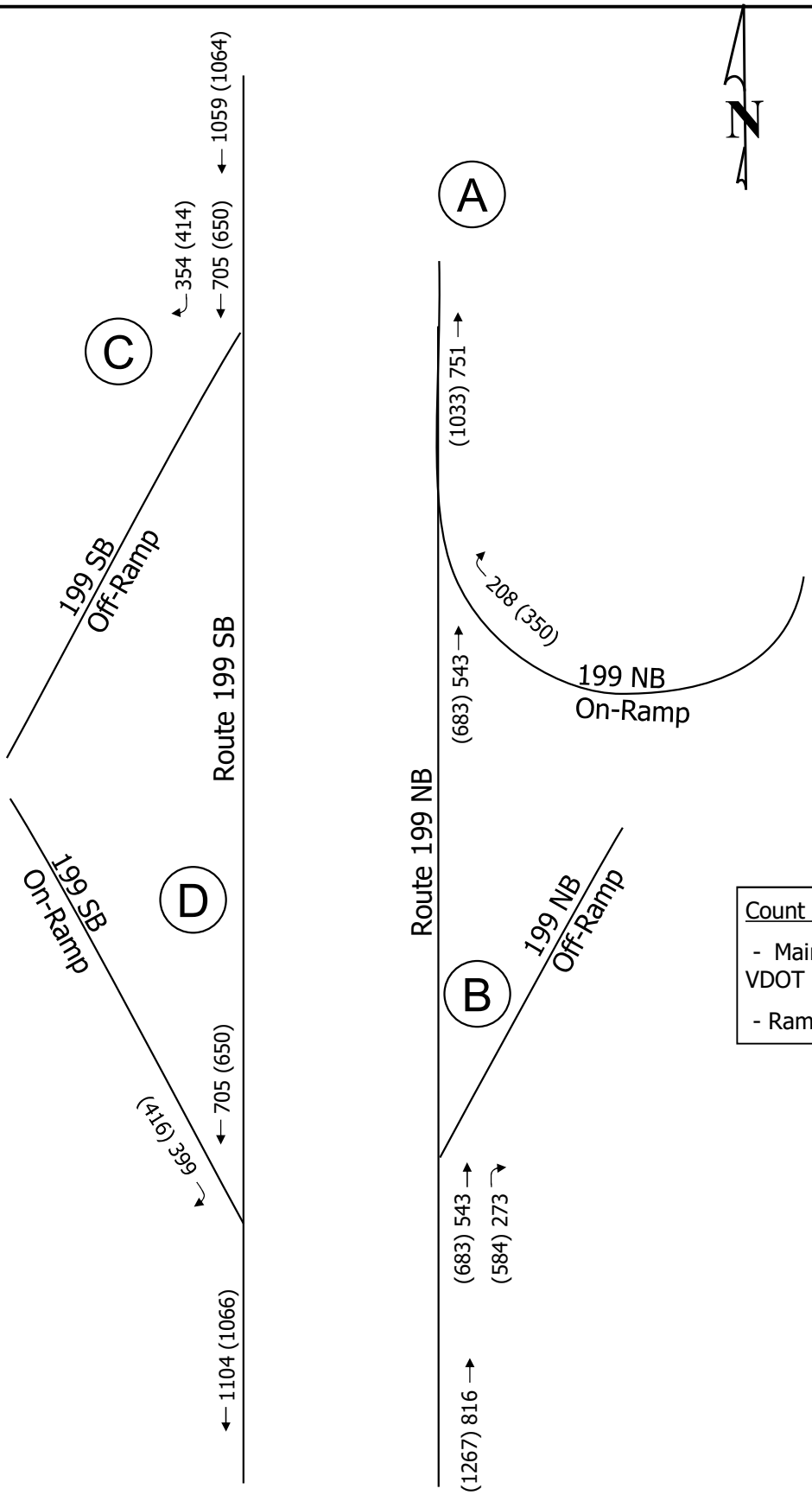
Interchange Analysis - 2022 Existing Geometry
Cardinal Ridge
James City County, Virginia

Figure
11-1





Count Source Data:

- Mainline Route 199 provided via VDOT
- Ramp data from Figure 2-3.

LEGEND:

00 AM Peak Hour
(00) PM Peak Hour
—— Existing Road

NOT TO SCALE

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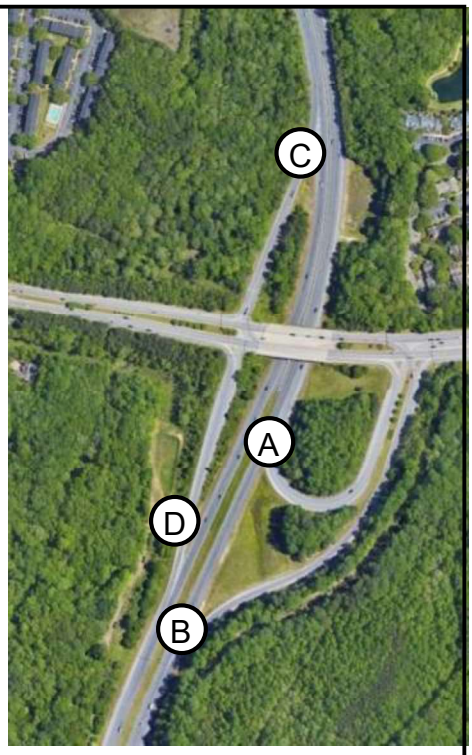
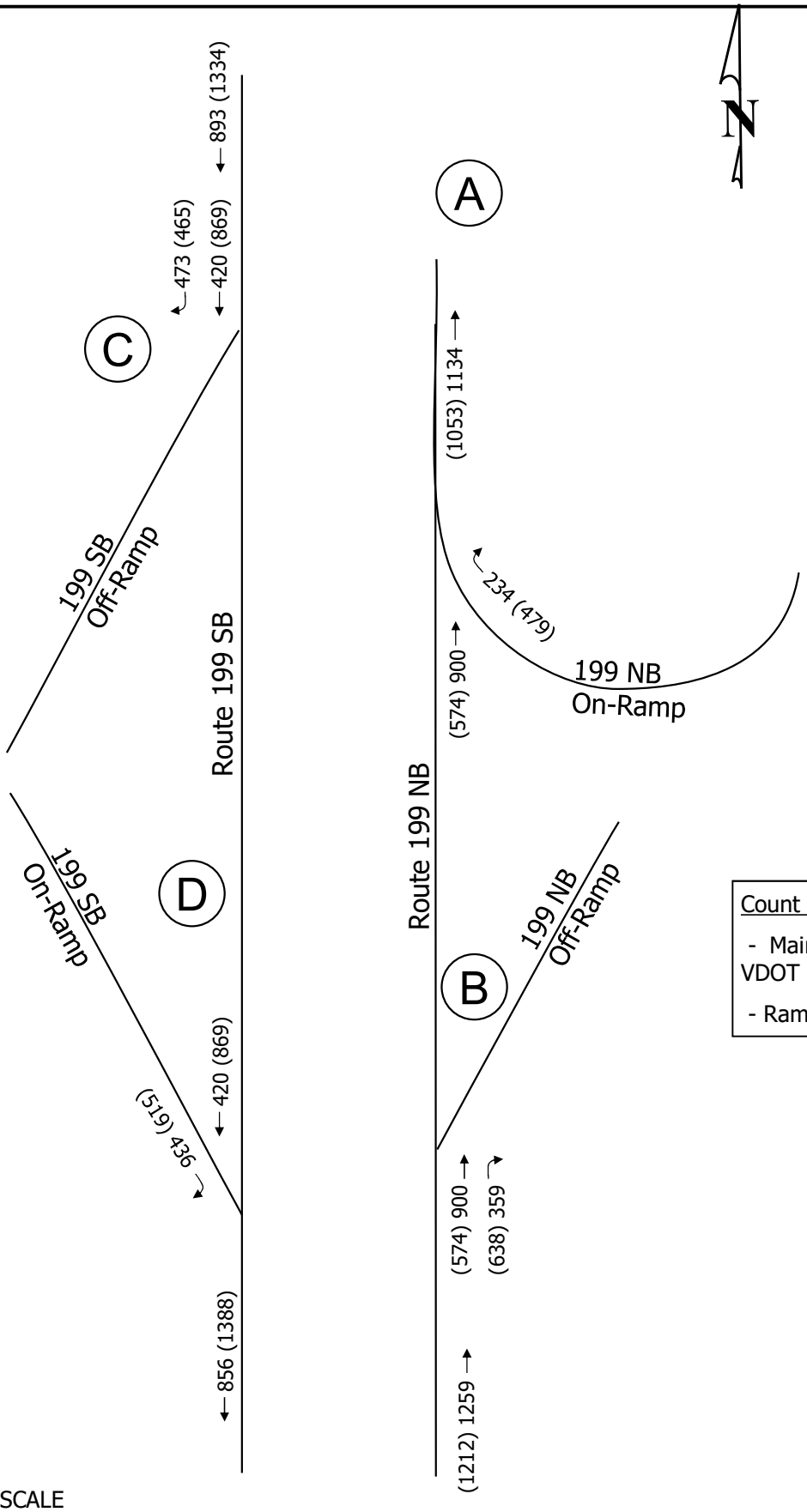
Interchange Analysis - 2022 Existing Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-2





Count Source Data:

- Mainline Route 199 provided via VDOT and grown at 1% / year.
- Ramp data from Figure 4-10.

LEGEND:

00 AM Peak Hour
(00) PM Peak Hour
—— Existing Road

NOT TO SCALE

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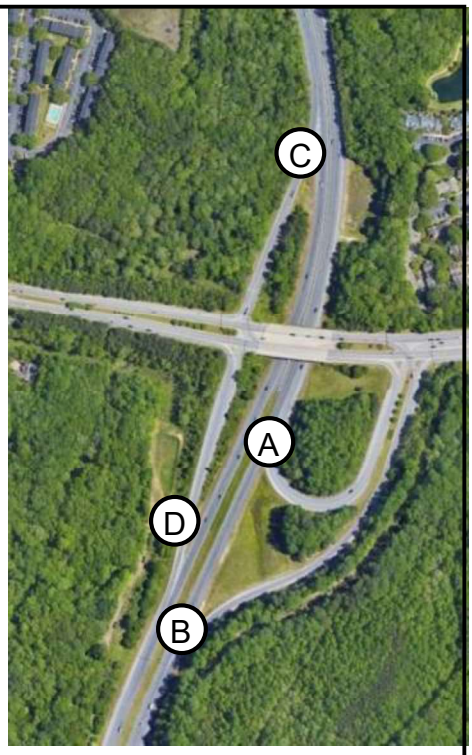
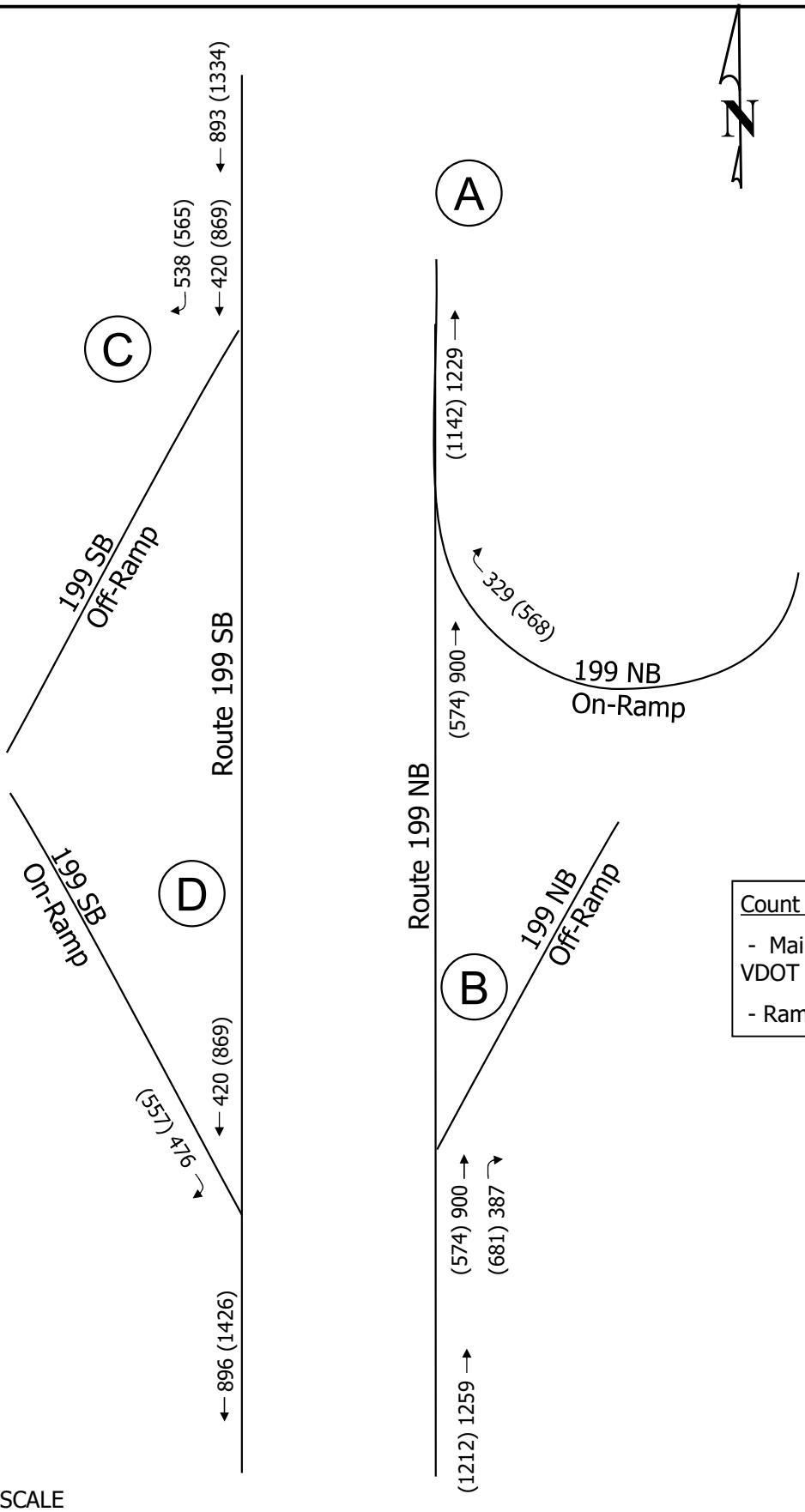
Interchange Analysis – 2028 Background Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-3





Count Source Data:

- Mainline Route 199 provided via VDOT and grown at 1% / year.
- Ramp data from Figure 6-1.

LEGEND:

00 AM Peak Hour
(00) PM Peak Hour
—— Existing Road

NOT TO SCALE

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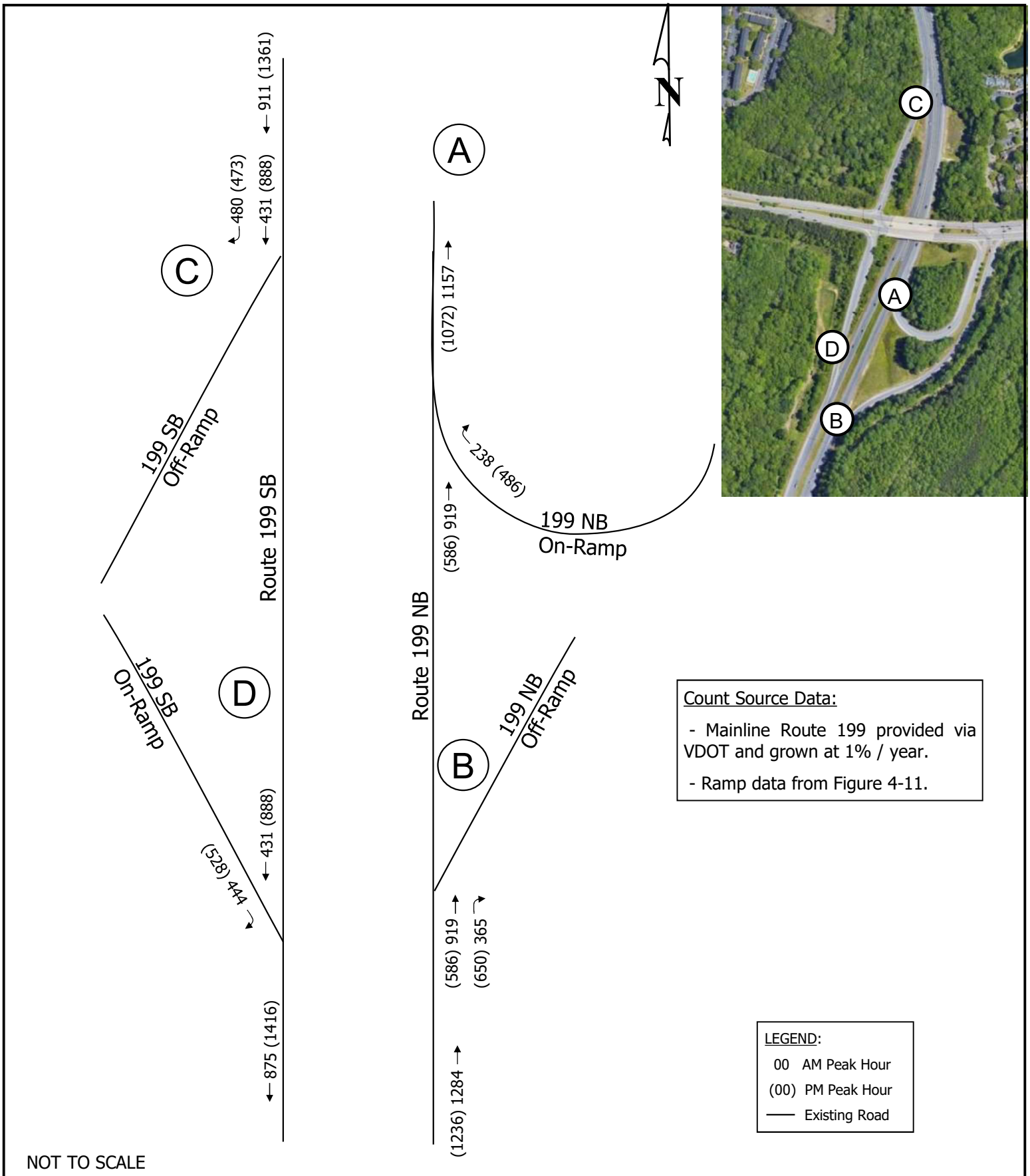
Interchange Analysis – 2028 Future Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-4



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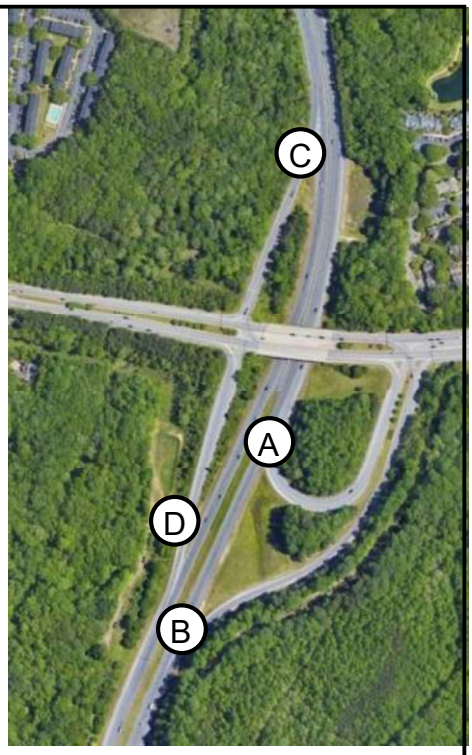
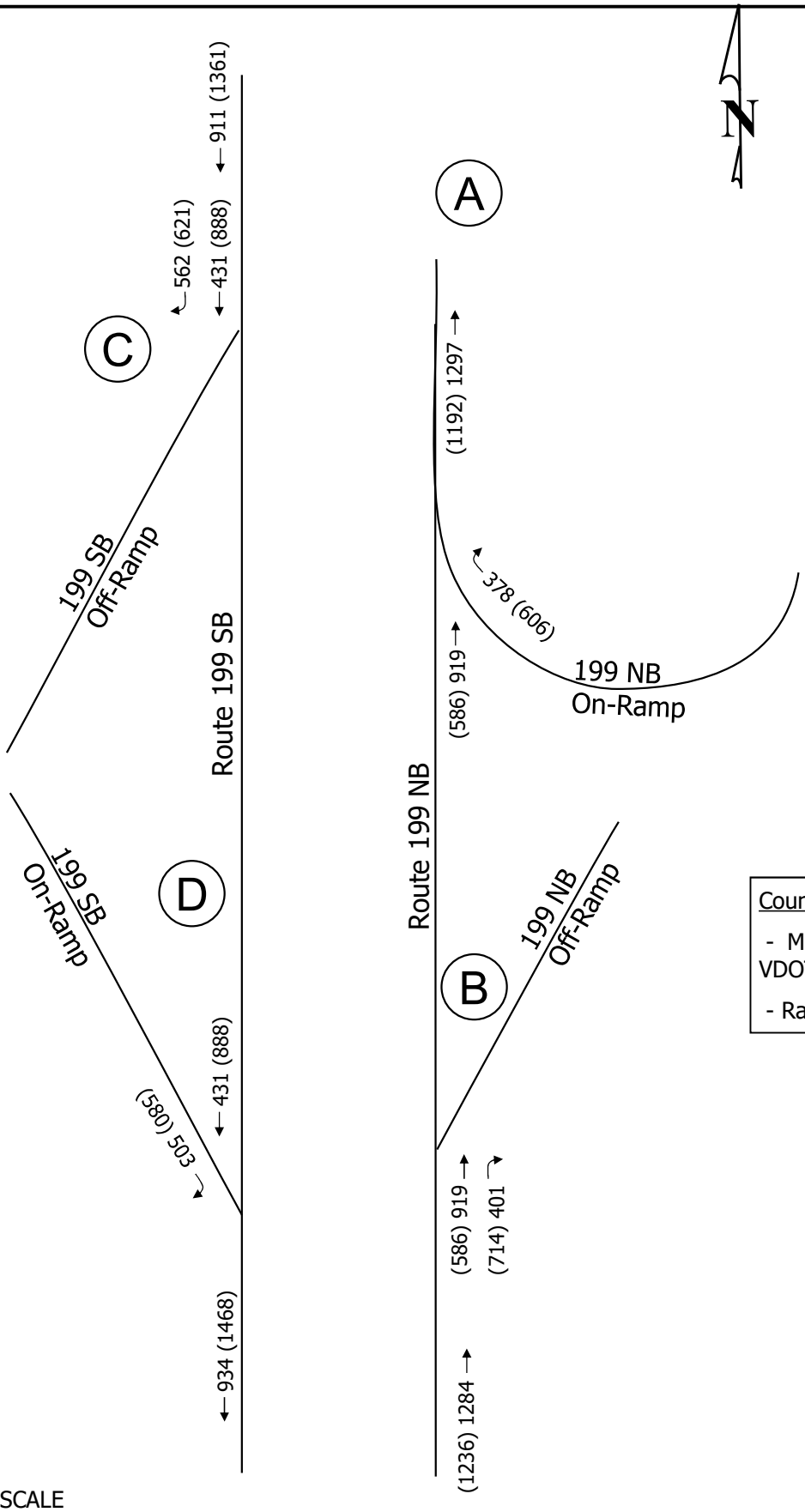
Interchange Analysis - 2030 Background Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-5





Count Source Data:

- Mainline Route 199 provided via VDOT and grown at 1% / year.
- Ramp data from Figure 7-1.

LEGEND:

00 AM Peak Hour
(00) PM Peak Hour
—— Existing Road

NOT TO SCALE

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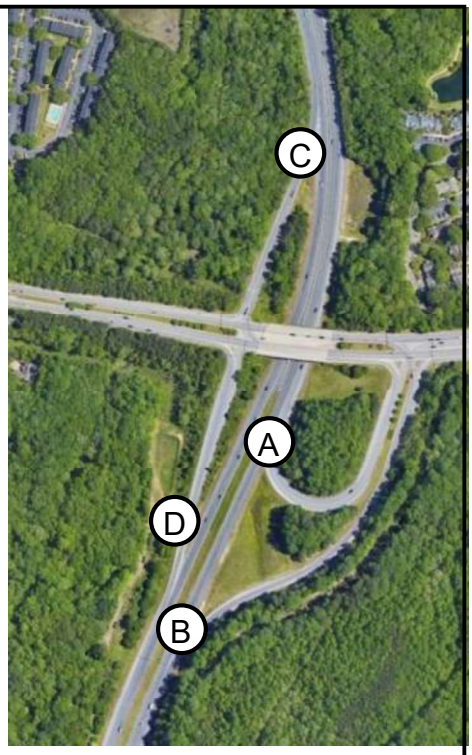
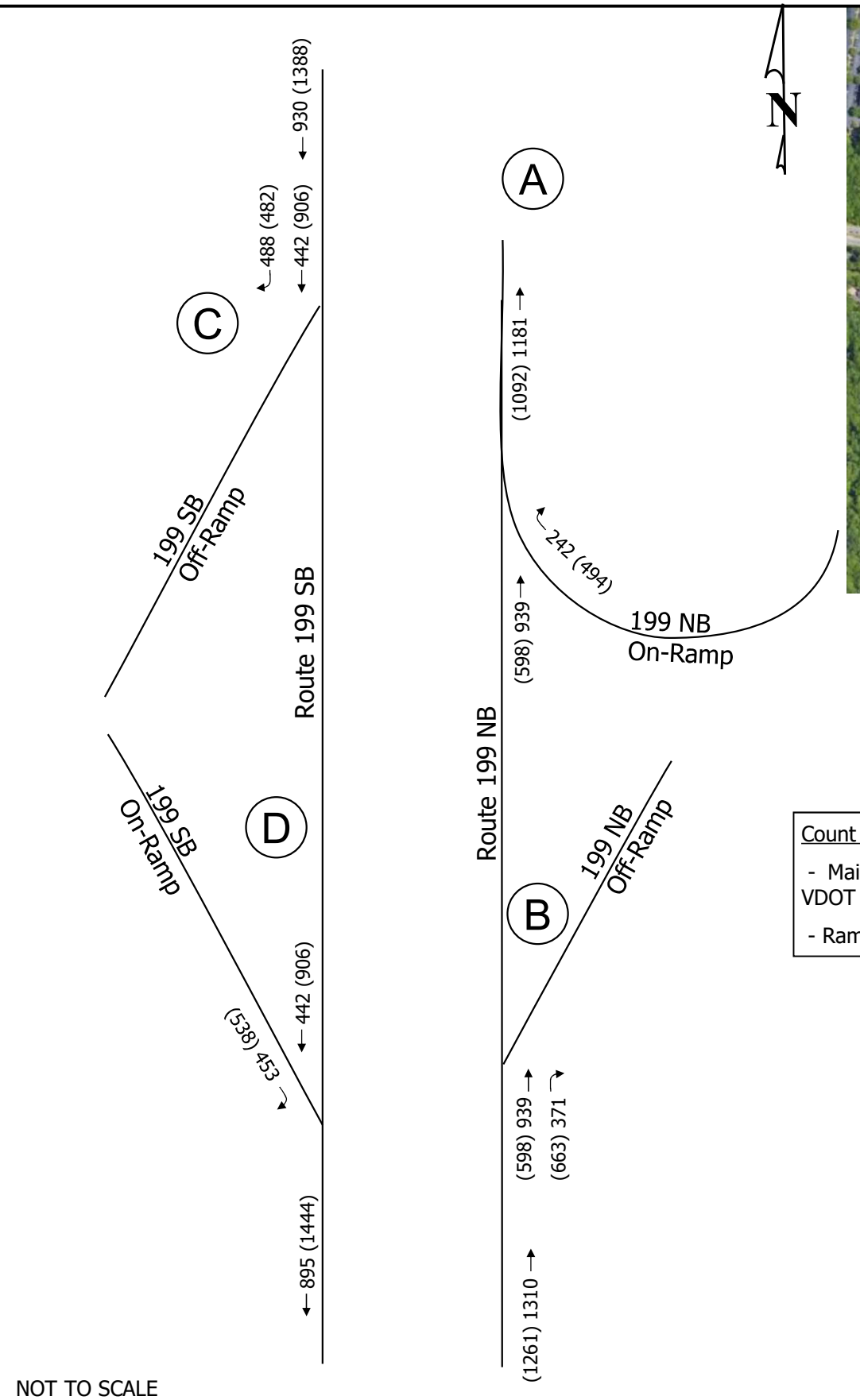
Interchange Analysis - 2030 Future Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-6





Count Source Data:

- Mainline Route 199 provided via VDOT and grown at 1% / year.
- Ramp data from Figure 4-12.

LEGEND:

00 AM Peak Hour

(00) PM Peak Hour

—— Existing Road

NOT TO SCALE

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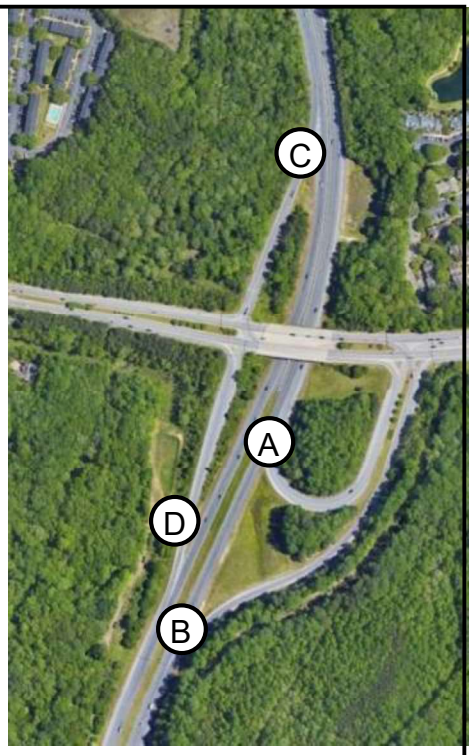
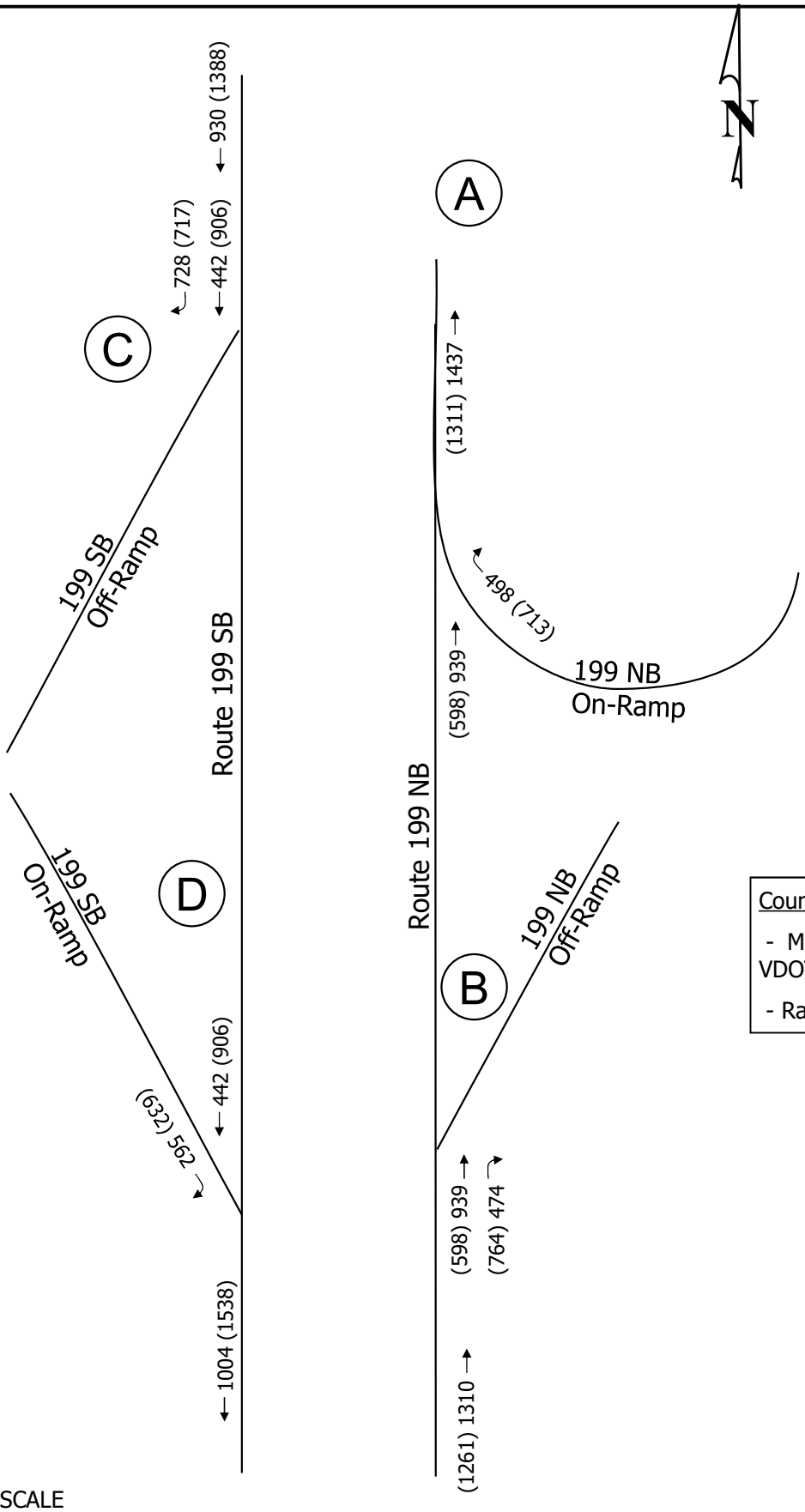
Interchange Analysis - 2032 Background Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-7





Count Source Data:

- Mainline Route 199 provided via VDOT and grown at 1% / year.
- Ramp data from Figure 8-1.

LEGEND:

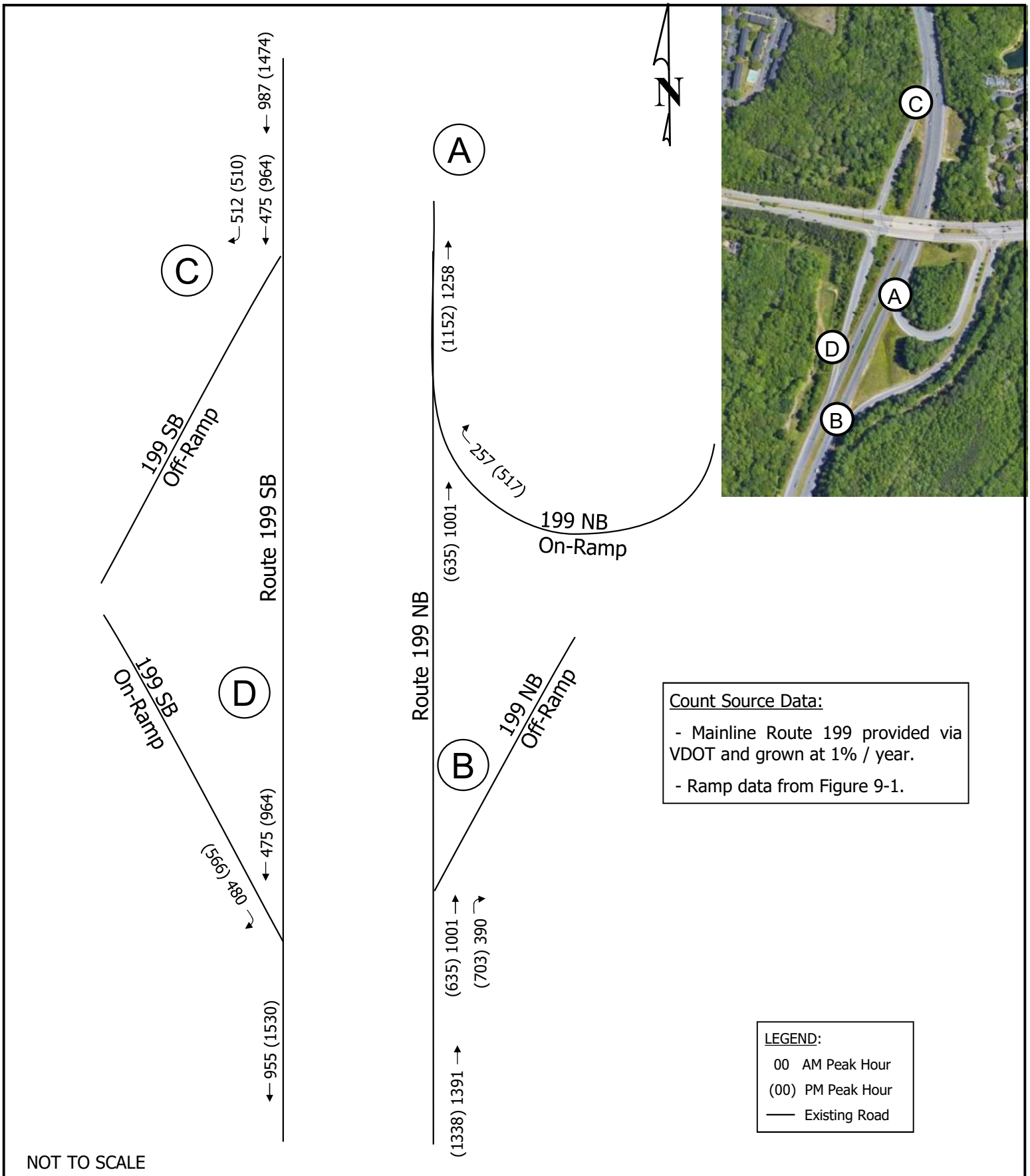
00 AM Peak Hour
(00) PM Peak Hour
—— Existing Road

NOT TO SCALE

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Interchange Analysis - 2032 Future Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-8



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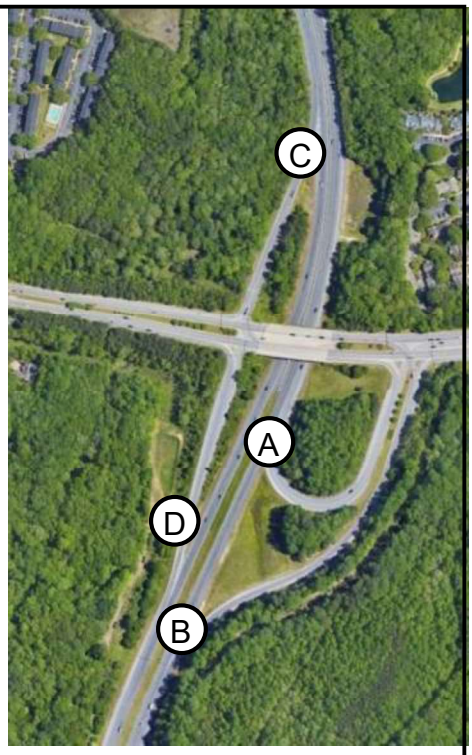
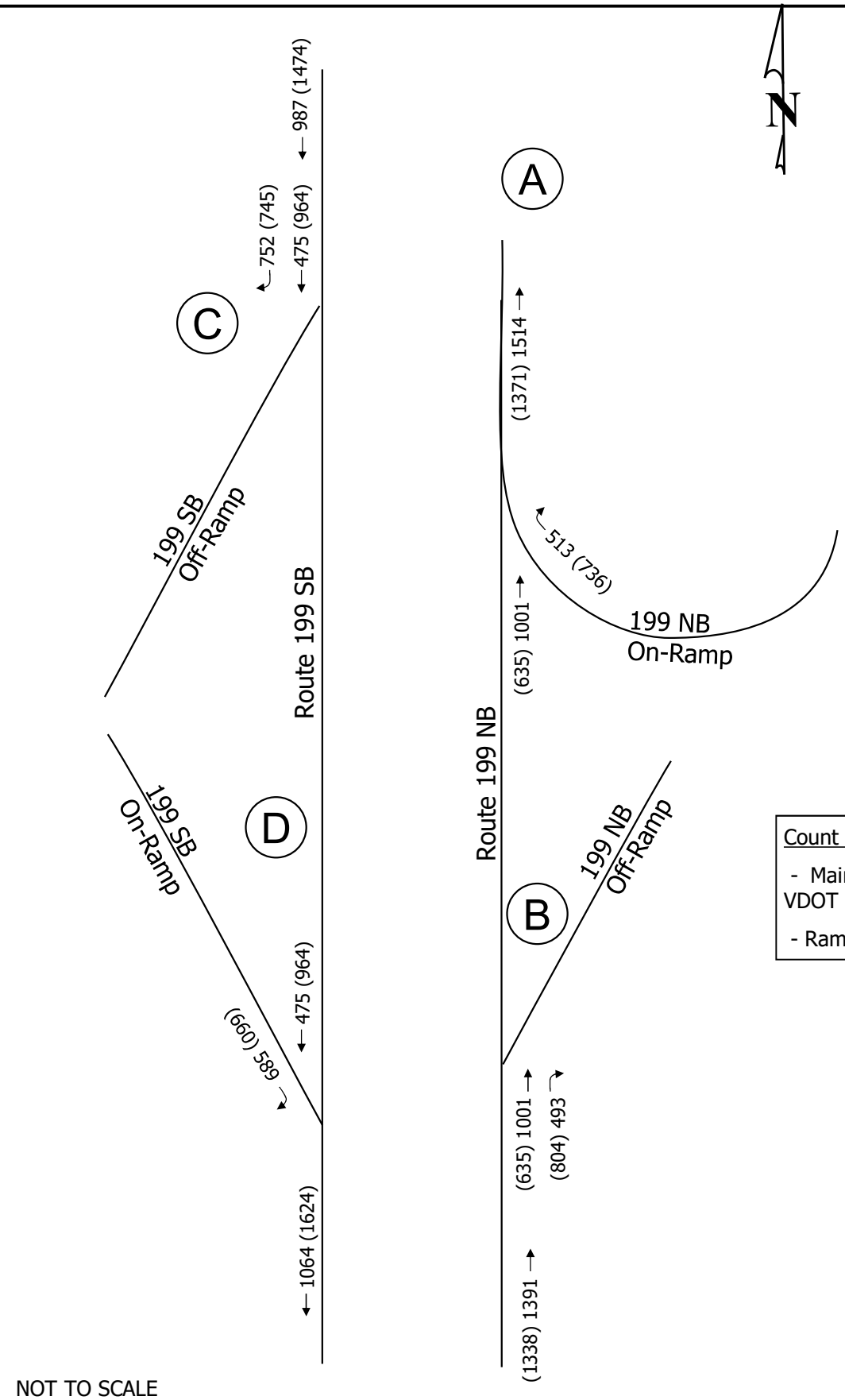
Interchange Analysis - 2038 Background Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-9





Count Source Data:

- Mainline Route 199 provided via VDOT and grown at 1% / year.
- Ramp data from Figure 10-1.

LEGEND:

00 AM Peak Hour
(00) PM Peak Hour
—— Existing Road

NOT TO SCALE

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Interchange Analysis - 2038 Future Volumes
Cardinal Ridge
James City County, Virginia

Figure 11-10

12 SUPPLEMENTAL INTERSECTION #3 ANALYSIS

Due to the date of the existing traffic counts (2022), VDOT requested new traffic counts be conducted in 2025 and compared to the 2022 counts to determine the validity of the previous counts.

2025 traffic counts were conducted at Intersections #2, #3, and #4 and a comparison provided to VDOT. Through email correspondence, it was agreed that a supplemental analysis of Intersection #3 (Longhill Road/DePue Drive roundabout) would be conducted for total future 2038 traffic conditions to ensure the validity of the analysis.

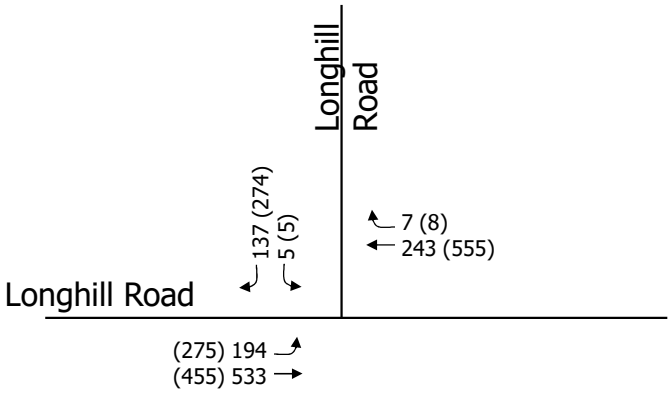
The 2025 raw traffic data and comparison is included in Appendix J.

12.1 INTERSECTION #3 ANALYSIS

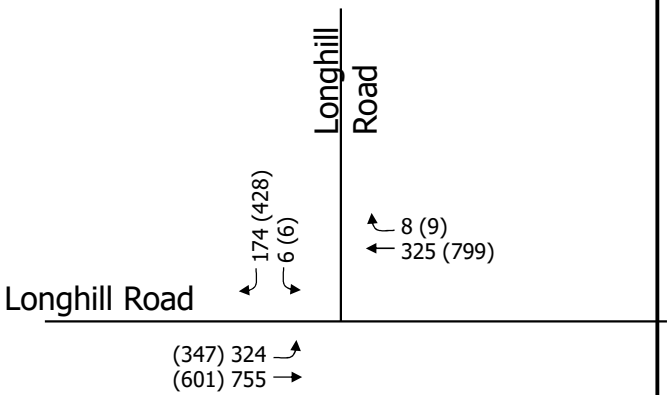
The 2025 existing, 2038 background, and 2038 total future traffic volumes at intersection #3 are shown in Figure 12-1. These volumes were then used to analyze the roundabout and the results are included in Appendix J.

With the updated traffic counts, the Longhill Road/DePue Drive intersection will operate at the same overall LOS A/B in both peak hours. All movements will operate at LOS C or better and all v/c ratios are less than 1.0.

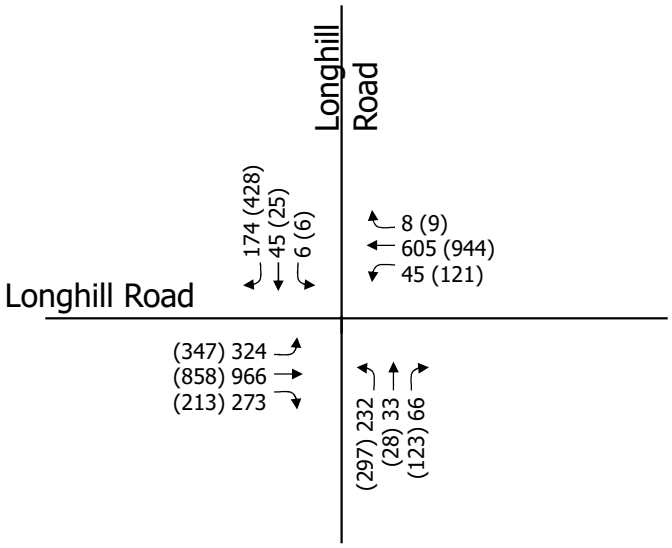
The updated counts do not impact the analysis and the initial 2022 counts remain valid.



Existing 2025



Background 2038



Total Future 2038

LEGEND:
00 AM Peak Hour
(00) PM Peak Hour
—— Existing Road

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Intersection 3 Supplemental Analysis
Cardinal Ridge
James City County, Virginia

Figure
12-1

13 TURN LANE WARRANT ANALYSIS

In response to VDOT comments, turn lane warrant analyses were completed for Intersection #11 which provides access from Ashbury Lane to the commercial portion of the project. This access point will only be constructed when the commercial portion of the site is constructed which will occur with Phase 4 of the project in 2032.

The need for northbound right and southbound left turn lanes at this intersection was evaluated under 2032 future conditions (Figure 8-1) and 2038 future conditions (Figure 10-1). The analysis was completed using the nomographs in VDOT's Road Design Manual Appendix F and the 2032 and 2038 traffic volumes.

The analysis is included in Appendix K and summarized below:

2032
A southbound right turn lane is warranted at the intersection. A northbound left turn lane is not warranted at the intersection.

2038
A southbound right turn lane is warranted at the intersection. A northbound left turn lane is not warranted at the intersection.

14 CONCLUSIONS

Analyses were performed for the 2022 existing, 2028 background, 2030 background, 2032 background and 2038 as well as future analysis for 2028, 2030, 2032 and 2038 conditions with the development of the site. The following represents the findings and recommendations.

14.1 PRINCIPAL FINDINGS

1. Under 2022 existing conditions:

   - The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) operate at an overall LOS B or better in both peak hours.
     - Each of the movements at the intersections operate at LOS C or better in both peak hours.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - Each of the movements at the Longhill Road/DePue Drive intersection (unsignalized) operate at LOS C or better with the following exception:
     - The southbound left from Longhill Road onto DePue Drive operates at LOS E in the AM and LOS F in the PM peak hours.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - Each of the movements at the DePue Drive/Ashbury Lane intersection (unsignalized) operate at LOS D or better with the following exception:
     - The northbound approach (one lane approach) operates at LOS E in the PM peak hour.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - The DePue Drive/Ironbound Road/Galt Drive intersection (signalized) operates at an overall LOS C in both peak hours.
     - Each of the movements at the intersection operate at LOS D or better except the northbound left from Ironbound Road onto Galt Drive which operates at LOS E in the AM peak hour.
     - The northbound left carries very limited volume (14 vehicles in the AM/2 vehicles in the PM peak hours) and the LOS E is a function of the limited green time provided to the movement. No improvement is necessary for this movement.
     - The 95th percentile and maximum queues are contained within the available storage.
     - All v/c ratios at the intersection are less than 1.0.

   - All movements at the Foster Road/Schmidt Road intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

   - All movements at the Foster Road/Ashbury Lane intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

   - All movements at the Galt Drive/Schmidt Road intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

- All movements at the Galt Drive/Ashbury Lane intersection operate at LOS A in both peak hours. All v/c ratios at the intersection are less than 1.0.

2. <u>There are two (2) other developments in the vicinity of the site that are planned/approved and will add approximately 8,500 vehicles per day to the surrounding roadway network.</u>

    - New Town Park is anticipated to add approximately 4,600 vehicles per day to the roadway network.

    - The County Office site between Longhill Road, DePue Drive, and Ashbury Lane is anticipated to add approximately 3,900 vehicles per day to the roadway network.

        - With the development of the County Office site, the County will construct a dual lane roundabout at the intersections of Longhill Road/DePue Drive intersection and a single lane roundabout at the DePue Drive/Ashbury Road intersection. These improvements will be in place by 2028.

3. <u>Under 2028 to 2032 background conditions (without development of Cardinal Ridge but with the development of the two (2) other developments and the improvements noted above), the intersections will all operate at LOS C or better with v/c ratios of less than 1.0.</u>

4. <u>Access to the site is proposed via the following connection points:</u>

    - A series of access points along Galt Drive and Ashbury Lane Extended to serve the residential components of the site (Phases 1-3). With these access points, the existing internal roadway system will be reworked eliminating the Ironbound Road/Schmidt Road and Foster Road/Ashbury Lane intersections.

    - Adding a northbound (fourth leg) approach to the Longhill Road/DePue Drive intersection (Phase 4).

    - Constructing an access roadway between Ashbury Lane and the commercial development component (Phase 4). The intersection between Ashbury Lane and the commercial development is assumed to be right-in/right-out, left-in only. A southbound right turn lane is warranted at the intersection. A northbound left turn lane is not warranted at the intersection.

5. <u>Proffered Improvements</u>

    - With development of the site, the Applicant is proffering to modify the roundabouts the County is constructing at the intersections of Longhill Road/DePue Drive and DePue Drive/Ashbury Lane as follows to accommodate the site traffic:
        iii. The DePue Drive/Ashbury Lane roundabout will be modified to a dual lane roundabout. To accommodate the expansion of the roundabout, the section of Longhill Road/DePue Drive between the roundabouts will be widened to a four-lane section.
            - These improvements will be constructed with Phase 1 (2028) of the site.

iv. The Longhill Road/DePue Drive roundabout will be modified to include the fourth leg (northbound approach) and a second southbound approach lane.
    - These improvements will be constructed with Phase 4 (2032) of the site.

6. Total Future Traffic Conditions

- With the proffered improvements, all intersections will operate at overall LOS C or better and will accommodate traffic into and out of the site.

- No additional improvements are needed to accommodate the site traffic.

- In 2032 at buildout of the site: All intersections will operate at comparable levels to background conditions. Specifically:

    - The Longhill Road/Route 199 northbound and southbound ramp intersections (signalized) will continue to operate at an overall LOS B or better in both peak hours.
        - Each of the movements at the intersections will operate at LOS C or better in both peak hours.
        - The 95th percentile and maximum queues will be contained within the available storage.
        - All v/c ratios are less than 1.0 during both peaks.

    - With the construction of the dual lane roundabout, the Longhill Road/DePue Drive intersection will operate at an overall LOS A/B in both peak hours. All movements will operate at LOS C or better and all v/c ratios are less than 1.0.

    - With the construction of the dual lane roundabout, the DePue Drive/Ashbury Lane intersection will operate at an overall LOS A in both peak hours. All movements will operate at LOS B or better and all v/c ratios are less than 1.0.

    - At the signalized intersection of DePue Drive and Ironbound Road/Galt Drive the overall intersection operates at LOS C during both peaks.
        - The eastbound approach operates at LOS D during both peaks.
        - The westbound approach operates at LOS C during both peaks.
        - The mainline northbound approach operates at LOS B in the AM peak and LOS C in the PM peak.
        - The mainline southbound approach operates at LOS C during both peaks.
        - All v/c ratios are less than 1.0 during both peaks.

    - All movements at the other intersections operate at LOS B or better with all v/c ratios less than 1.0.

Appendix A

Appendix A.1
Response to Comments

TIMMONS GROUP

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Suite 300
Richmond, VA 23225

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E info@timmons.com

To: Robert Butler, PE, VDOT
Patrick Fitzsimmons, P.E., Kimley Horn
From: Steve Schmidt, PE, PTOE, AICP
RE: Cardinal Ridge Chapter 527 Traffic Study
Date: April 13, 2026

Timmons Group (TG) prepared a revised Traffic Impact Analysis (TIA) dated November 2025 for the proposed Cardinal Ridge development location in James City County, Virginia. Virginia Department of Transportation provided comments on the TIA on February 18, 2026. Kimley Horn (on behalf of James City County) also provided comments on January 7,2026.

TG reviewed VDOT and the County's comments (**in bold below**) and prepared the responses below. As a result of the comments and responses, revised figures and analysis tables have been included with these responses. Once VDOT and the County are in agreement with the responses, a full final TIA will be issued.

TG responses to VDOT comments are as follows:

1. The geometry of both of the proposed roundabouts concepts shown in Appendix B.1 do not match the geometry of the roundabouts within the provided Sidra models. Intersection #3 does not have a consistent number of circulating lanes past some approaches, does not have a consistent number of entering lanes on the northbound approach, and the presence of storage/turn lanes is not consistent. Intersection #4 does not have a consistent number of circulating lanes and the presence of storage/turn lanes is not consistent. Either the concepts need to be updated to match the geometry shown within the Sidra models or the Sidra models need to be updated along with all of the output information from those models to reflect the concepts.

TG Response: The SIDRA analysis was completed using the most recent plans for the roundabouts. The corresponding roundabout schematics have been attached and the SIDRA analysis files included for review of specific geometry.

2. Create separate conceptual layouts based on phasing that show all of the recommended improvements together for that phase. Include those graphics within the report rather than the appendix. Currently the conceptual graphics don't align with each other. For example, page 241 of the pdf which primarily shows the DePue Drive / Longhill Road roundabout shows no improvements at the DePue Drive / Ashbury Lane intersection and there is no graphic that shows the new proposed intersection on Ashbury Lane just to the south of the DePue Drive roundabout.

TG Response: The improvements at the DePue Drive / Ashbury Lane intersection are shown on the next page of the pdf. As discussed below, the location/design of the proposed intersection on Ashbury Lane south of the DePue Drive roundabout is conceptual in nature. The full location/design of the intersection will occur at the time of site plan approval for that Phase of development and will be submitted to VDOT for review/comment/approval.

3. The report shows that the new intersection on Ashbury Lane just south of the DePue Drive / Ashbury Lane intersection (Intersection #11) will be constructed without any turn lanes. Due to the proximity to the proposed roundabout at the Depue Drive / Ashbury Lane intersection and the amount of projected traffic using Ashbury Lane after the full buildout of this development, a northbound left-turn lane should be constructed at Intersection #11. This turn lane would allow for safer and more efficient operations at both of these intersections. A raised median between the northbound thru and left-turn lane to enforce the prohibition on eastbound left turns from Intersection #11 would also seem to be a good idea.

   TG Response: Turn lane warrants were run for the DePue Drive/Ashbury Lane intersection under future conditions and are attached for reference. Left turn lanes are not were warranted at the intersection.

4. As stated within previous comment #5, we understand that the exact location of the proposed intersection just south of the Depue Drive / Ashbury Lane intersection (Intersection #11) is still uncertain due to environmental constraints, but previously communicated, VDOT policy specifically prohibits creating intersections within the functional area of another intersection (see definition of "functional area of an intersection" within VDOT's Road Design Manual), so if it is not feasible to build this new roadway without it being within the functional area of the Depue Drive / Ashbury Lane intersection, an Access Management Waiver would be needed. If that waiver is not granted, this analysis would need to be redone to reassign the trips that are currently assigned to that intersection. It does not appear that this is currently the case, but we want you to be aware of this potential risk. Separately but relatedly, there is additional language on page F-31 of Appendix F of the Road Design Manual that you should be aware that states:

   No commercial entrance shall be within 115 feet minimum measured from the outer edge of the inscribed circle of a Roundabout, without prior approval from the Engineer at the Residency or District. If an entrance is approved within the 115 feet of the outer edge of the inscribed circle it shall be "Right-In, Right-Out" Only (115' feet minimum is based on the stopping sight distance for 20 mph).

TG Response: Noted. The Applicant is aware of the risk.

5. The graphic for the DePue Drive / Longhill Road roundabout shows that Charing Crossing is separated by a newly constructed median on Longhill Road. If this is the intent of the design, how will the southbound left out of that intersection be accommodated? The lefts-in would need to be added to the roundabout volume as U- turns to ensure that this roundabout still functions adequately.

   TG Response: The conceptual site plan shown in the TIA does not accurately reflect the most recent roundabout design. Left turns out of Charing Cross will not be impacted by the roundabout and will continue to be permitted. See the attached roundabout design plans.

6. The Proffered Improvements section notes that prior to Phase 1 the DePue Drive / Ashbury Lane roundabout will be modified to a dual-lane roundabout while the widening of DePue Drive itself wouldn't occur until Phase 4. This modification of the roundabout results in 2 lanes entering and exiting it in addition to the 2 lanes entering and exiting the adjacent DePue Drive / Longhill Road roundabout. This proposed configuration would result in DePue Drive transitioning from 2 lanes in each direction, back to 1, then back to 2 in the course of approximately 1200' until Phase 4 was

built. This may cause lane utilization issues at both roundabouts in addition to unnecessary lane transitions and merging. The widening will be required at the same time as the roundabout modification.

TG Response: Noted. The proffered conditions will be modified to include the road widening at the time of the roundabout modification.

7. Within Figure 5-3, it appears that the distribution being shown for Intersection #10 is incorrect. Based on the trip assignment shown in Figures 5-5 – 5-7 it appears that the northbound right movement should have 10% shown while the eastbound thru and westbound thru movements should also be 10%.

TG Response: Figure has been modified appropriately to match the trip distributions utilized in the analysis.

8. Within Figure 5-8, the westbound thru volume shown at Intersection #3 seems like they should not be there based on the trip distribution for Phase 4. Recommend removing these volumes if this is accurate.

TG Response: Figure has been modified appropriately to match the trip distributions utilized in the analysis.

9. Within Figures 6-1, 7-1, 8-1 and 10-1, it appears that the volumes shown for Intersections #8 and 10 are incorrect. We were unable to determine if this is due to how trips were reassigned due to geometry changes, if background volumes are missing, or if something else occurred to these volumes, but they should be corrected.

TG Response: Traffic volumes have been balanced across the intersections and updated in the figures and analysis.

10. Within Figure 7-1, it appears that the northbound and southbound thru movements at the Depue Drive / Ironbound Road intersection are incorrect and should be corrected.

TG Response: Figure has been modified to appropriately match the traffic volumes utilized in the analysis.

11. Within Figures 8-1 and 10-1, the northbound thru values shown at Intersection #11 should be increased to balance with the total northbound approach value at the Depue Drive / Ashbury Lane intersection.

TG Response: Traffic volumes have been balanced across the intersections and updated in the figures and analysis.

12. When the roundabouts are designed, they should have spiral/turbo features that gradually force drivers to exit and reduce lane changes within the roundabout, rather than the older designs that may require lane changes within the roundabout. It is not necessary to reflect these changes within the Sidra models because it doesn't affect the outputs.

TG Response: Noted.

13. Once the fourth leg of the DePue Drive / Longhill Road roundabout is constructed in Phase 4, consider coordinating with the property owners immediately to the west on the south side of Longhill Road to consolidate their entrance and provide access into the commercial component of Cardinal Ridge.

TG Response: Noted. This will be explored at the time the fourth leg is added.

14. In the Int 3 2028 BG model, the westbound thru volume is incorrect and should be changed to be 785 rather than 485.

TG Response: Model has been updated appropriately.

15. In the Int 3 2038 Total PM model – (new counts) model, the eastbound left volume is incorrect and should be about 370 rather than 347.

TG Response: Model has been updated appropriately.

16. Within the 2030 Total Bg AM model, the southbound and northbound thru volumes at the Ironbound Road / Schmidt Road intersection are incorrect.

TG Response: Model has been updated appropriately.

17. Within the 2038 Total Bg AM model, there is a westbound right volume being shown at the Longhill Road / 199 SB Ramps intersection that should be removed as that would mean that vehicles are turning the wrong direction onto the Off-Ramp.

TG Response: Model has been updated appropriately.

TG responses to Kimley Horn comments are as follows:

1. In accordance with the James City County Traffic Impact Analysis Submittal Requirements Policy, the TIA must include improvements necessary to achieve an overall LOS C at study intersections. Table 10-1 shows PM peak hour LOS D at the intersections of Longhill Road at DePue Drive, DePue Drive at Ashbury Lane, and DePue Drive at Ironbound Road/Galt Drive which operated at LOS C under background conditions.

   TG Response: At full buildout of Cardinal Ridge, all intersection will operate at overall LOS C. The overall LOS D mentioned in the comment occurs in the +6 planning level analysis.

   KH Response: Per VDOT's guidance, the build-out of the site (2038) is intended to ensure that conditions are still acceptable after the site is fully developed. LOS D does not meet the County's standards of LOS C or better. Additional improvements are recommended.

TG Response: The LOS D in the 2038 scenario is the result of the ongoing growth in background traffic and not as a result of site traffic. The recommendation for additional improvements is noted.

2. Please confirm volumes in models match what is shown in the figures provided. For example, in the 2028 Total Future Phase 1 AM Peak model at intersection 7, the eastbound through

movement is shown as 42, but in Figure 6-1 2028 Total Future Volumes, the eastbound through movement is shown as 40.

TG Response: All volumes in the models/figures have been verified for consistency and adjusted where needed.

KH Response: While intersection 7 has been removed per VDOT's guidance, this comment has not been fully addressed. For example, in Figure 6-1, at intersection 10, the northbound right-turn PM peak is shown as 25; however, in the 2028 Total Future Volume Synchro model, the northbound right-turn PM volume is shown as 27. Additionally, at intersection 2, in multiple Synchro models, there is an eastbound U-turn movement shown, which is not captured in multiple figures.

TG Response: Models and figures have been updated appropriately.

3. Please ensure that tables present the correct LOS and delay. For example, for Table 6-1, intersection 3, the overall delay is 30.3 (sec/veh), which according to Table 3-2, should be shown as LOS D, but is shown as LOS C. Another example is the 2030 Total Future PM Peak conditions at intersection #3, which shows southbound LOS C in Table 7-1, but is reported as LOS F in the SIDRA outputs.

   TG Response: All results in the tables have been verified for consistency and adjusted where needed.

   KH Response: Comment not addressed for Table 7-1. While the SIDRA output is no longer LOS F, it is now LOS D, but in Table 7-1, it is reported as LOS C.

TG Response: LOS table has been updated appropriately.

4. In Figure 5-3, at intersection 10, the site trip distributions are shown as 10% for the westbound left-turn and right-turn movements and 20% for the westbound through movement. However, in Figure 5-6, all movements are shown with a 10% distribution. Please verify if this is accurate, and update figures accordingly if not.

TG Response: Figure has been modified appropriately to match the trip distributions utilized in the analysis.

Appendix A.2
Scoping Agreement

(Note: All figures in Appendix A.2 were for scoping purposes only and are not to be used as the basis for analysis)

PRE-SCOPE OF WORK MEETING FORM

Information on the Project
Traffic Impact Analysis Base Assumptions

The applicant is responsible for entering the relevant information and submitting the form to VDOT and the locality no less than three (3) business days prior to the meeting. If a form is not received by this deadline, the scope of work meeting may be postponed.

Contact Information				
Consultant Name: Tele: E-mail:	Steve Schmidt 804.200.6502 steve.schmidt@timmons.com			
Developer/Owner Name: Tele: E-mail:				
Project Information				
Project Name:	Cardinal Ridge	Locality/County:	James City County	
Project Location: (Attach regional and site specific location map)	The site is generally located southeast of Route 199, southwest of DePue Drive and north of Schmidt Road in James City County, Virginia as shown in Figure 1.			
Submission Type	Comp Plan ☐	Rezoning ☒	Site Plan ☐	Subd Plat ☐
Project Description: (Including details on the land use, acreage, phasing, access location, etc. Attach additional sheet if necessary)	The approximately 216 acre site is currently zoned Public Lands (PL) and is the site of the former Eastern State Hospital. The applicant is seeking to rezone the site to permit the development of a mixed-use project with approximately 1,046 dwelling units (single family, townhomes, apartments, and age-restricted) and a 74,000 s.f. retail component. Access to the site is proposed via two (2) site entrances off of DePue Drive (one opposite Longhill Road and the other opposite Ashbury Lane (State Route 322)) and multiple site entrances along Galt Drive.			
Proposed Use(s): (Check all that apply; attach additional pages as necessary)	Residential ☐	Commercial ☐	Mixed Use ☒	Other ☐

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

	Residential Uses(s) Number of Units: 1,046 ITE LU Code(s): 210 251 220 215 **Commercial Use(s)** ITE LU Code(s): 821 _____ _____ Square Ft or Other Variable:		74,000 S.F. _____ _____ **Other Use(s)** ITE LU Code(s): _____ _____ _____ Independent Variable(s): _____ _____ _____	
Total Peak Hour Trip Projection:	Less than 100 ☐	100 – 499 ☐	500 – 999 ☒	1,000 or more ☐

Traffic Impact Analysis Assumptions

Study Period	Existing Year: 2022	Build-out Year: 2032	Design Year: 2038
Study Area Boundaries (Attach map)	North: DePue Drive	South: Schmidt Road	
	East: DePue Drive/Ironbound Drive	West: Route 199	
External Factors That Could Affect Project (Planned road improvements, other nearby developments)	Improvements: 1. City widening of Ironbound Road 2. County Longhill Road Shared Use Path (see details below) Other Developments (See Figure 2) to include: 1. New Town (development per scoping docs) 2. County Office Site (Triangle Site) - assumed 270,000 S.F. Office 3. Colonial Behavioral Health Site - assumed 65,000 S.F. Office 4. Hope Family Village - assumed 25 SFD units 5. Public Use Site - assumed as 700 student middle school per conversations with County		
Consistency With Comprehensive Plan (Land use, transportation plan)	Comprehensive Plan calls for Future Land use of Federal, State or County Land Per the County TIA guidelines, improvements required to maintain an overall intersection LOS C will be identified.		
Available Traffic Data (Historical, forecasts)	VDOT AADT Data, new AM/PM traffic counts collected in September 2022; VDOT provided mainline counts for Route 199		
Trip Distribution (Attach sketch)	Road Name: see notes and Figures 3,4	Road Name:	
	Road Name:	Road Name:	
Annual Vehicle Trip	1% consistent	Peak Period for Study (check all that apply)	☒ AM ☒ PM ☐ SAT

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Growth Rate:	with other studies	Peak Hour of the Generator	
Study Intersections and/or Road Segments (Attach additional sheets as necessary)	1.Route 199 Interchange with Longhill Road at SB Ramps	6.Ironbound Road at Schmidt Road	
	2. Route 199 Interchange with Longhill Road at NB Ramps	7.Schmnidt Road at Foster Road	
	3.DePue Drive at Longhill Road	8.Foster Road at Ashbury Lane	
	4.Depue Drive at Ashbury Lane	9.Schmidt Road at Galt Drive	
	5.DePue Drive at Ironbound Road/Galt Drive/Foster Road	10.Galt Drive at Ashbury Lane (see notes for additonal)	
Trip Adjustment Factors	Internal allowance: ☒ Yes ☐ No Reduction: see notes% trips	Pass-by allowance: ☒ Yes ☐ No Reduction: see notes% trips	
Software Methodology	☒ Synchro ☒ HCS (v.2000/+) ☐ aaSIDRA ☐ CORSIM ☐ Other _____		
Traffic Signal Proposed or Affected (Analysis software to be used, progression speed, cycle length)	Existing 1. Route 199 Interchange with Longhill Road at SB Off/On-Ramps 2. Route 199 Interchange with Longhill Road at NB Off/On-Ramps 3. DePue Drive at Ironbound Road/Galt Drive/Foster Road Potential for signal at DePue Drive/Longhill Road/Site Entrance or Depue Drive/Ashbury Lane		
Improvement(s) Assumed or to be Considered	Improvements: 1. City widening of Ironbound Road 2. County Longhill Road Shared Use Path from Lane Place to Depue Drive. According to the conceptual plan included with the Smart Scale Application, the path will run along the north side of Longhill Road and will not include any crossings of Longhill Road. Both improvements will be discussed textually in the report but will have no bearing on the analysis.		
Background Traffic Studies Considered	Other Developments to include: 1. New Town (development per scoping docs) 2. County Office Site (Triangle Site) - assumed 270,000 S.F. Office 3. Colonial Behavioral Health Site - assumed 65,000 S.F. Office 4. Hope Family Village - assumed 25 SFD units 5. Public Use Site - assumed as 700 student middle school per conversations with County		

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Plan Submission	☐ Master Development Plan (MDP) ☒ Generalized Development Plan (GDP) ☐ Preliminary/Sketch Plan ☐ Other Plan type (Final Site, Subd. Plan)
Additional Issues to be Addressed	☒ Queuing analysis ☐ Actuation/Coordination ☒ Weaving analysis ☐ Merge analysis ☒ Bike/Ped Accommodations ☒ Intersection(s) ☐ TDM Measures ☒ Other Signal Warrant Analysis, Turn Lane Warrant Analysis

NOTES on ASSUMPTIONS: 1. Study Intersection Notes
The study will include a HCS analysis of the Route 199/Longhill Road interchange (upstream and downstream freeway segments, merge, and diverge).

2. Trip distribution based on existing traffic counts conducted in 2022 (Figure 3) and assumed as shown on Figure 4 and detailed below:
To/From South on 199 - 15%
To/From North on 199 - 35%
To/From West on Longhill - 20%
To/From South on Ironbound - 20%
To/From East on Ironbound or Longhill - 10%

3. Trip generation based on ITE Trip Generation 11th edition per VDOT Central Office Guidance (ITE removed the web application for v10 at the end of 2022).

4. Pass by and internal trips applied in accordance with Chapter 527 guidelines. See Table 1 for details. Pass-by percentage is from Table E.9 (attached) from the ITE Trip Generation Manual, 3rd Edition and is the average weekday pass-by rate for shopping centers. It is noted the 11th Edition of Trip Generation includes a higher (40%) pass-by rate for shopping centers between 40 and 150,000 s.f..

5. Crash history - 5 years of available data (excluding 2020) will be analyzed at the study intersections. 2021 or 2022 will be verified for availability, quality, and validity.

SIGNED: _____ DATE: 02/16/23
Applicant or Consultant

PRINT NAME: Steve Schmidt
Applicant or Consultant

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

SCOPE OF WORK MEETING CONCLUSIONS

ADDITIONS TO THE VDOT REQUIRED ELEMENTS, CHANGES TO THE METHODOLOGY OR STANDARD ASSUMPTIONS, AND SIGNATURE PAGE

Any additions to the VDOT Required Elements or changes to the Methodology or Standard Assumptions due to special circumstances that are approved by VDOT:

Cardinal Ridge TIA

The applicant will contact VDOT and the locality prior to the preparation of the traffic impact analysis study in the event there are any substantial changes in the existing conditions that will affect the scope of the study.

AGREED: _____ DATE: 02/16/23
Applicant or Consultant

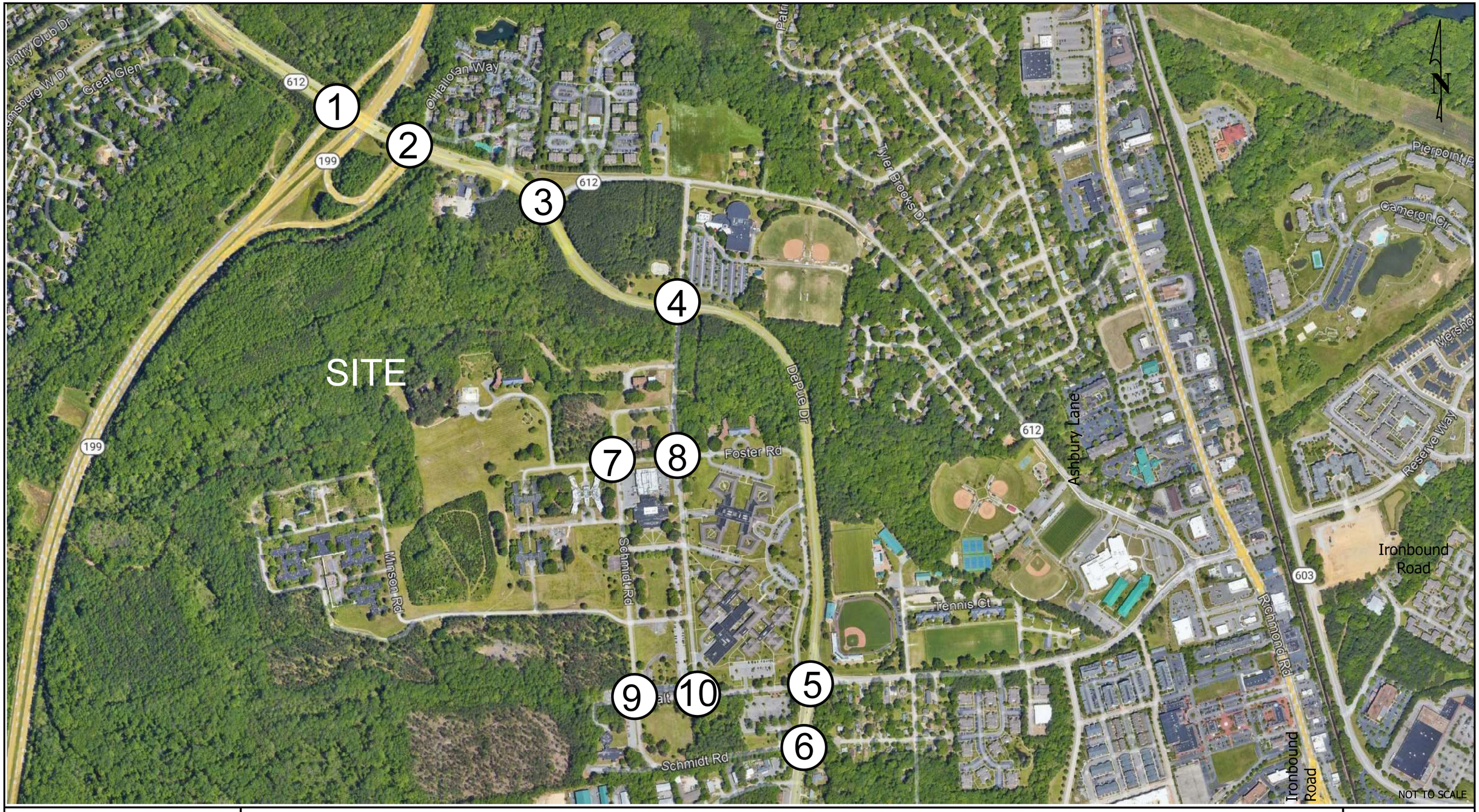
PRINT NAME: Steve Schmidt
Applicant or Consultant

SIGNED: _____ DATE: _____
VDOT Representative

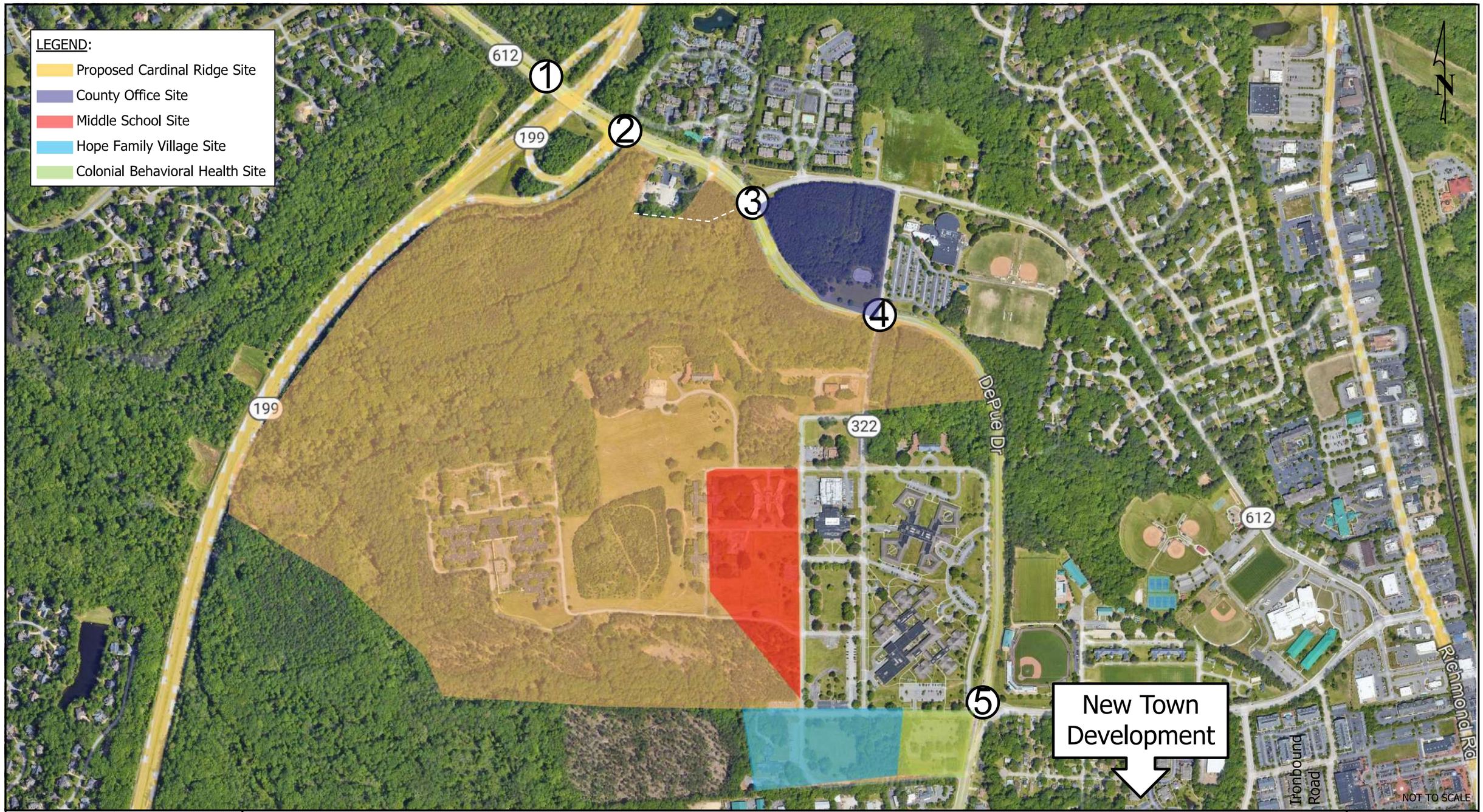
PRINT NAME: _____
VDOT Representative

SIGNED: _____ DATE: 17 FEB 2023
Local Government Representative

PRINT NAME: PAUL HOGI
Local Government Representative



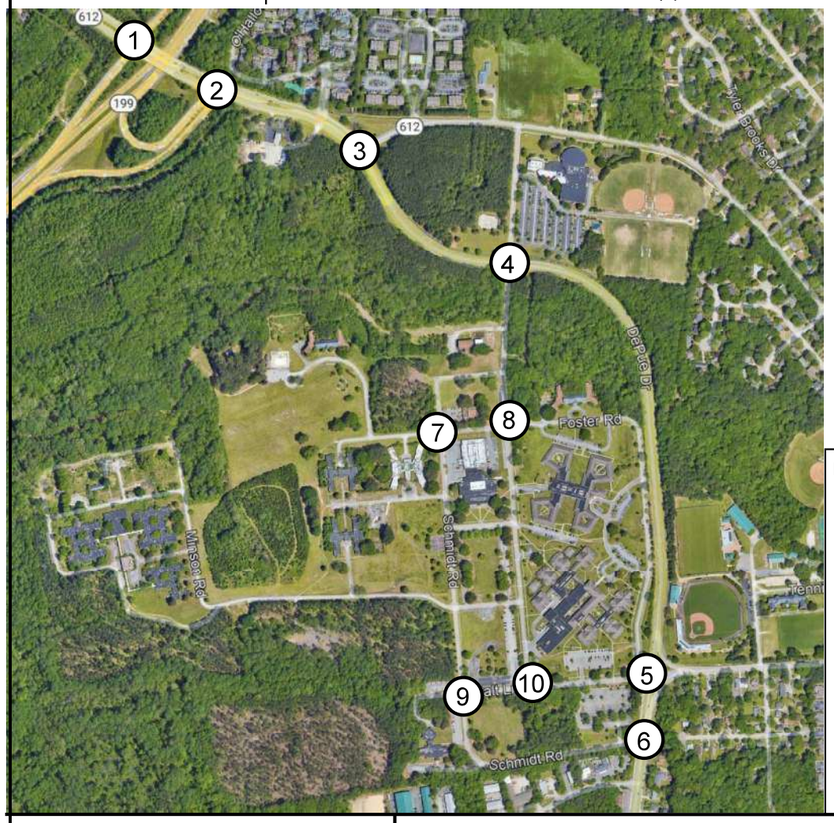
TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Site Location Map and Study Intersections Cardinal Ridge James City County, Virginia	Figure 1



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Background Development Locations
Cardinal Ridge
James City County, Virginia

Figure
2



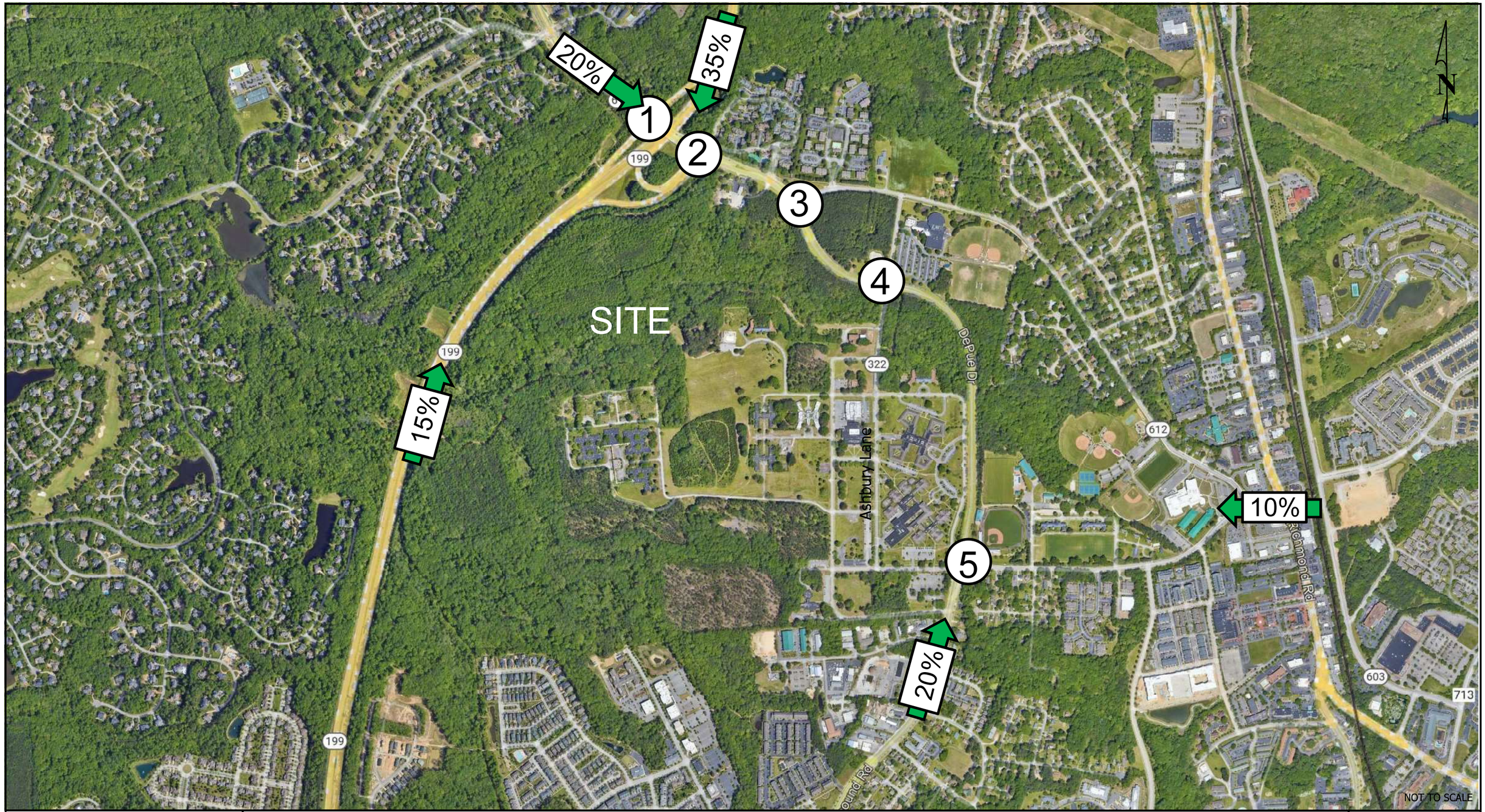
LEGEND:

- Existing Road
- Proposed Access
- Lane Configuration
- Signalized Intersection
- Stop Controlled Intersection
- Stop Sign Location
- Channelization
- Yield
- 00 AM Peak Hour Volumes
- (00) PM Peak Hour Volumes

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

2022 Existing Volumes
Cardinal Ridge
James City County, Virginia

Figure 3



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Overall Site Trip Distributions
Cardinal Ridge
James City County, Virginia

Figure
4

Table 1
Cardinal Ridge
Overall Site-Trip Generation Analysis - Peak Hour of Adjacent Street[1]

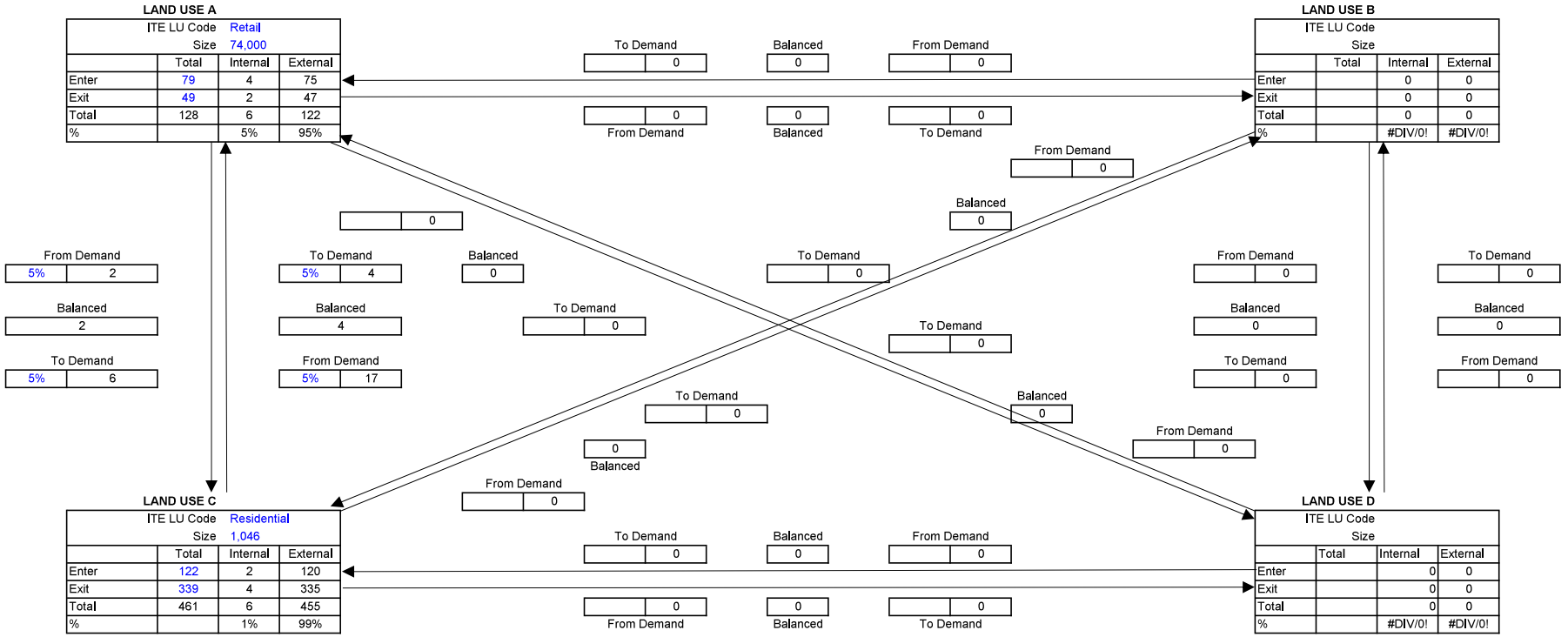
Buildout				Weekday						
			Land Use	AM Peak Hour			PM Peak Hour			Average
Land Use	Size	Units	Code	In	Out	Total	In	Out	Total	Daily Trips
1. ITE Trip Generation[1]										
Commercial										
Retail Shopping Plaza (40-150k)	74,000	S.F.	821[2]	79	49	128	188	196	384	4,996
Commercial Subtotal				**79**	**49**	**128**	**188**	**196**	**384**	**4,996**
Residential										
Single Family Detached	218	D.U.	210	39	112	151	130	77	207	2,067
Senior Adult Housing - Detached	117	D.U.	251	15	29	44	31	19	50	504
Townhomes	135	D.U.	215	20	45	65	44	33	77	978
Multifamily Housing (Low-Rise)	576	D.U.	220	48	153	201	169	99	268	3,767
Residential Subtotal	1,046	D.U.		**122**	**339**	**461**	**374**	**228**	**602**	**7,316**
Total ITE Generated Trips				**201**	**388**	**589**	**562**	**424**	**986**	**12,312**
2. Internal Trip Reduction - ITE Method with VDOT Rates [3,4]										
Retail Shopping Plaza (40-150k)				(4)	(2)	(6)	(19)	(20)	(39)	(750)
Single Family Detached				(1)	(1)	(2)	(7)	(6)	(13)	(211)
Senior Adult Housing - Detached				0	0	0	(3)	(2)	(5)	(53)
Townhomes				0	(1)	(1)	(2)	(3)	(5)	(100)
Multifamily Housing (Low-Rise)				(1)	(2)	(3)	(9)	(8)	(17)	(385)
Total Internal Trips				**(6)**	**(6)**	**(12)**	**(40)**	**(39)**	**(79)**	**(1,499)**
Effective Internal Capture Reduction						-2.1%			-8.0%	-12.2%
4. External Trips (ITE Generated Trips - Internal Trip Reduction)[5]										
Retail Shopping Plaza (40-150k)				75	47	122	169	176	345	4,246
Single Family Detached				38	111	149	123	71	194	1,856
Senior Adult Housing - Detached				15	29	44	28	17	45	451
Townhomes				20	44	64	42	30	72	878
Multifamily Housing (Low-Rise)				47	151	198	160	91	251	3,382
Total External Trips				**195**	**382**	**577**	**522**	**385**	**907**	**10,813**
5. Pass-By Trip Reduction[6]		Pass-By Rate								
Retail Pass-By Trips		34%		(26)	(16)	(42)	(57)	(60)	(117)	(1,444)
Total Pass-By Trips				**(26)**	**(16)**	**(42)**	**(57)**	**(60)**	**(117)**	**(1,444)**
6. Total Primary External Trips (Total External Trips - Total Pass-By Trips)				**169**	**366**	**535**	**465**	**325**	**790**	**9,369**
Summary										
Total ITE Site Trips Generated				**201**	**388**	**589**	**562**	**424**	**986**	**12,312**
Total Internal Trips				**(6)**	**(6)**	**(12)**	**(40)**	**(39)**	**(79)**	**(1,499)**
Total Pass-By Trips				**(26)**	**(16)**	**(42)**	**(57)**	**(60)**	**(117)**	**(1,444)**
Total External Primary Trips				**169**	**366**	**535**	**465**	**325**	**790**	**9,369**

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 11th Edition. Assumes General Urban/Suburban land use category.
(2) Land Use Subcategory "Supermarket - No" utilized.
(3) Per Chapter 527 guidelines (page 62), internal trip reductions are calculated using ITE-based methodologies with VDOT capture rates. See attached calculation worksheets. All reductions are the smaller of trips generated by the two land uses.
(4) Residential internal trips were apportioned off based on the ITE trip generation share of the individual use vs residential total.
(5) External trips are ITE trips minus internal trips.
(6) Pass-by reduction percentage from ITE data (Trip Generation Handbook, 3rd Ed.) per Chapter 527 guidelines and not applied to residential uses.

Analyst SOS
Date 12/2/2022

TABLE 2
MULTI-USE DEVELOPMENT
TRIP GENERATION
AND INTERNAL CAPTURE SUMMARY

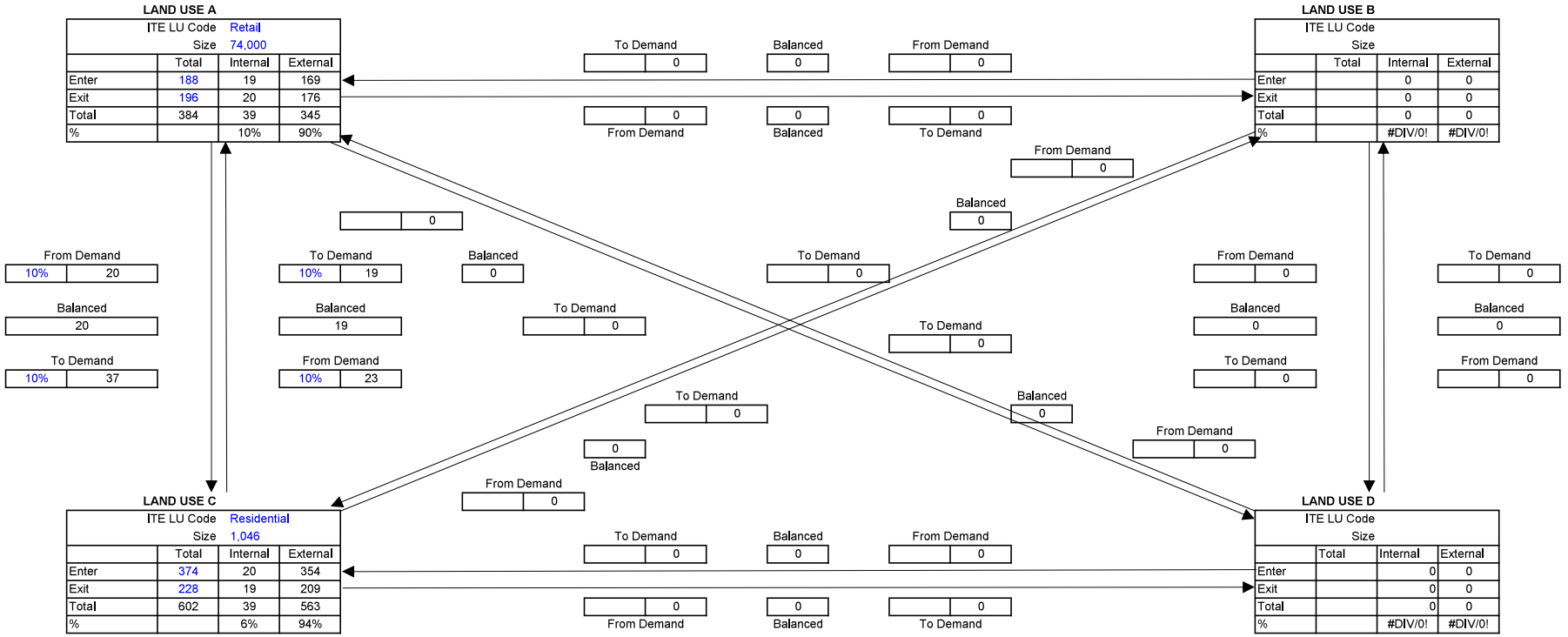
Project: Cardinal Ridge
Time Period AM Peak Hour



Analyst SOS
Date 12/2/2022

TABLE 2
MULTI-USE DEVELOPMENT
TRIP GENERATION
AND INTERNAL CAPTURE SUMMARY

Project: Cardinal Ridge
Time Period PM Peak Hour



Analyst SOS
Date 12/2/2022

TABLE 2
MULTI-USE DEVELOPMENT
TRIP GENERATION
AND INTERNAL CAPTURE SUMMARY

Project: Cardinal Ridge
Time Period ADT

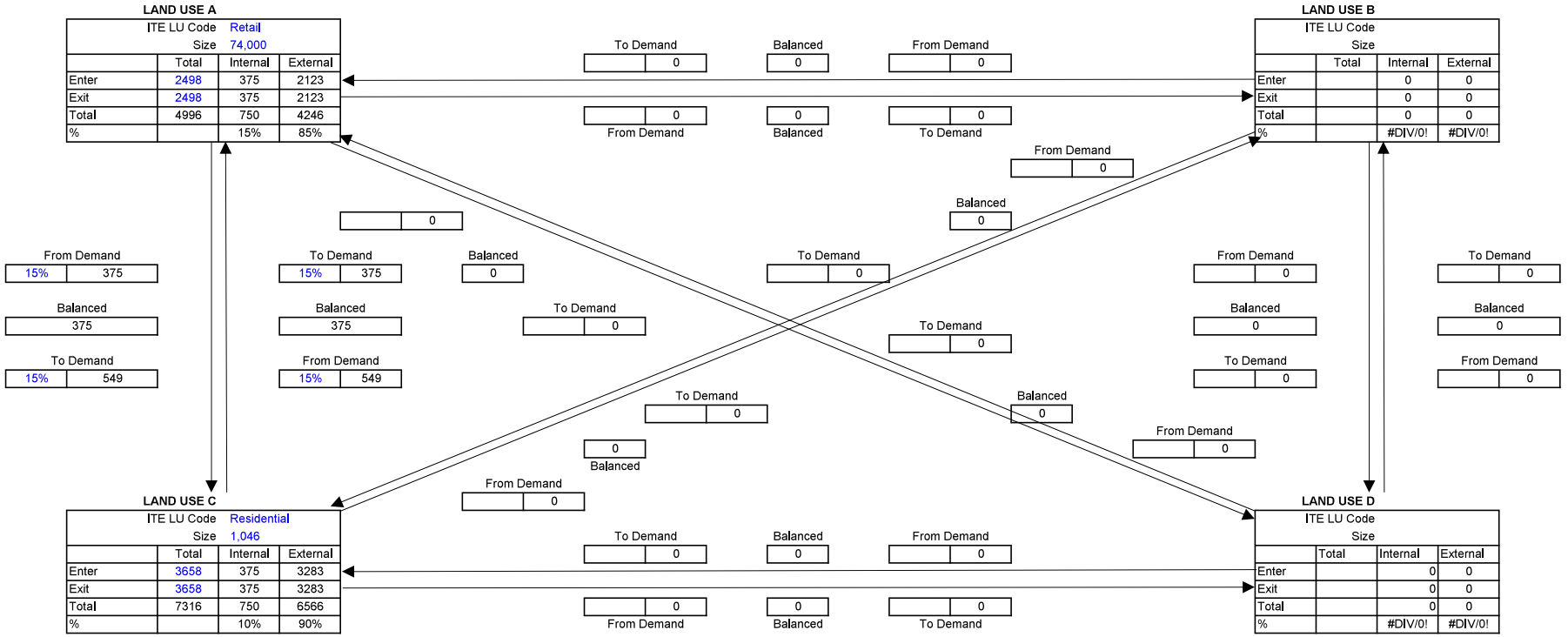


Table E.9 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 820—Shopping Center

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
53	Port Orange, FL	1993	162	2:00–6:00 p.m.	59	—	—	41	—	—	TPD Inc.
9	Kissimmee, FL	1994	107	2:00–6:00 p.m.	66	20	14	34	—	—	TPD Inc.
77	Edgewater, FL	1992	365	2:00–6:00 p.m.	46	—	—	54	—	—	TPD Inc.
82	Deltona, FL	1992	336	2:00–6:00 p.m.	34	—	—	66	—	—	TPD Inc.
78	Orlando, FL	1991	702	2:00–6:00 p.m.	55	23	22	45	—	—	TPD Inc.
45	Orlando, FL	1992	844	2:00–6:00 p.m.	56	24	20	44	—	—	TPD Inc.
50	Orlando, FL	1992	555	2:00–6:00 p.m.	41	41	18	59	—	—	TPD Inc.
52	Orlando, FL	1995	665	2:00–6:00 p.m.	42	33	25	58	—	—	TPD Inc.
17	Orlando, FL	1994	196	2:00–6:00 p.m.	66	—	—	34	—	—	TPD Inc.
60	Orlando, FL	1995	1,583	3:00–7:00 p.m.	40	38	22	60	—	—	TPD Inc.
158	Crestwood, KY	June 1993	129	4:00–6:00 p.m.	36	39	25	64	759	—	Barton-Aschman Assoc.
118	Louisville area, KY	June 1993	133	4:00–6:00 p.m.	22	51	27	78	3,555	—	Barton-Aschman Assoc.
74	Louisville, KY	June 1993	187	4:00–6:00 p.m.	30	43	27	70	922	—	Barton-Aschman Assoc.
59	Louisville area, KY	June 1993	247	4:00–6:00 p.m.	31	52	17	69	2,659	—	Barton-Aschman Assoc.
145	Louisville area, KY	June 1993	210	4:00–6:00 p.m.	53	30	17	47	2,636	—	Barton-Aschman Assoc.
104	Louisville area, KY	June 1993	281	4:00–6:00 p.m.	28	50	22	72	2,111	—	Barton-Aschman Assoc.
235	Louisville, KY	June 1993	211	4:00–6:00 p.m.	35	29	36	65	2,593	—	Barton-Aschman Assoc.
71	Louisville, KY	June 1993	109	4:00–6:00 p.m.	25	42	33	75	1,559	—	Barton-Aschman Assoc.
350	Worcester, MA	Apr. 1994	224	4:00–6:00 p.m.	18	45	37	82	2,112	—	ICSC
738	East Brunswick, NJ	Apr. 1994	283	4:00–6:00 p.m.	14	79	7	86	8,059	—	ICSC
294	Philadelphia, PA	Apr. 1994	213	4:00–6:00 p.m.	25	51	24	75	4,055	—	ICSC
256	Hamden, CT	Apr. 1994	208	4:00–6:00 p.m.	27	51	22	73	3,422	—	ICSC
418	Glen Burnie, MD	Apr. 1994	281	4:00–6:00 p.m.	20	51	29	80	5,610	—	ICSC
560	Harrisonburg, VA	Apr. 1994	437	4:00–6:00 p.m.	19	49	32	81	3,051	—	ICSC

Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 820—Shopping Center

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
361	Glen Allen, VA	Apr. 1994	315	4:00–6:00 p.m.	17	54	29	83	2,034	—	ICSC
375	Shelby, NC	May 1994	214	4:00–6:00 p.m.	30	48	22	70	3,053	—	ICSC
413	Texas City, TX	May 1994	228	4:00–6:00 p.m.	28	52	20	72	589	—	ICSC
488	Texas City, TX	May 1994	257	4:00–6:00 p.m.	12	75	13	88	1,094	—	ICSC
293	Berwyn, IL	May 1994	282	4:00–6:00 p.m.	24	70	6	76	4,606	—	ICSC
667	Bourbonais, IL	May 1994	200	4:00–6:00 p.m.	16	53	31	84	2,770	—	ICSC
225	Bellevue, IL	May 1994	264	4:00–6:00 p.m.	35	32	33	65	1,970	—	ICSC
255	Bettendorf, IA	May 1994	222	4:00–6:00 p.m.	24	37	39	76	3,706	—	ICSC
808	Laguna Hills, CA	June 1994	240	4:00–6:00 p.m.	13	73	14	87	4,035	—	ICSC
450	Hanford, CA	May 1994	321	4:00–6:00 p.m.	23	49	28	77	2,787	—	ICSC
800	San Jose, CA	May 1994	205	4:00–6:00 p.m.	21	51	28	79	7,474	—	ICSC
598	Greeley, CO	May 1994	205	4:00–6:00 p.m.	17	55	28	83	3,840	—	ICSC
581	Pueblo, CO	May 1994	296	4:00–6:00 p.m.	18	53	29	82	2,939	—	ICSC
476	Bellevue, WA	May 1994	234	4:00–6:00 p.m.	26	54	20	74	3,427	—	ICSC
720	Framingham, MA	Dec. 1982	92	3:30–7:00 p.m.	23	39	38	77	—	73,628	Raymond Keyes Assoc.
890	Newark, DE	July 1984	179	3:00–8:00 p.m.	12	49	39	88	—	—	Raymond Keyes Assoc.
402	Manassas, VA	June 1984	87	4:00–6:00 p.m.	48	25	27	52	—	—	Raymond Keyes Assoc.
462	Ross, PA	June 1980	175	5:30–7:00 p.m.	36	—	—	64	—	27,200	Raymond Keyes Assoc.
234	Huntington LI, NY	Nov. 1985	181	4:00–7:00 p.m.	46	21	33	54	—	34,630	Raymond Keyes Assoc.
658	Wayne, NJ	Sept. 1984	243	3:00–6:00 p.m.	27	61	12	73	—	85,600	Raymond Keyes Assoc.
1,200	Washington, DC	1980	364	4:00–6:00 p.m.	25	35	40	75	—	—	Gorove-Slade
800	Southern CA	—	1,000	4:00–6:00 p.m.	12	45	43	88	—	—	Frischer
451	Portland, OR	—	—	5:00–6:00 p.m.	25	—	—	75	—	—	Buttke
113	Portland, OR	—	—	5:00–6:00 p.m.	17	—	—	83	—	—	Buttke

Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 820—Shopping Center

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
622	Ramsey, MN	Nov. 1985	46	4:00–9:00 p.m.	44	26	30	56	—	36,370	Raymond Keyes Assoc.
736	Pensacola, FL	Oct. 1985	383	3:00–7:00 p.m.	26	35	39	74	—	—	Raymond Keyes Assoc.
84	Dover, DE	July 1985	218	3:30–7:00 p.m.	50	6	44	50	—	—	Raymond Keyes Assoc.
500	Meriden, CT	Apr. 1985	—	4:00–6:00 p.m.	8	—	—	92	—	—	Connecticut DOT
660	Enfield, CT	Apr. 1985	—	4:00–6:00 p.m.	22	—	—	78	—	—	Connecticut DOT
845	Waterford, CT	Apr. 1985	—	4:00–6:00 p.m.	14	—	—	86	—	—	Connecticut DOT
1,060	West Hartford, CT	Apr. 1985	—	4:00–6:00 p.m.	17	—	—	83	—	—	Connecticut DOT
131	Pr. Georges Co., MD	1982/83	88	4:00–6:00 p.m.	74	—	—	26	—	—	JHK
181	Pr. Georges Co., MD	1982/83	105	4:00–6:00 p.m.	36	—	—	64	—	—	JHK
100	Pr. Georges Co., MD	1982/83	93	4:00–6:00 p.m.	36	—	—	64	—	—	JHK
475	Pr. Georges Co., MD	1982/83	130	4:00–6:00 p.m.	20	—	—	80	—	—	JHK
60	Pr. Georges Co., MD	1982/83	72	4:00–6:00 p.m.	72	—	—	28	—	—	JHK
90	Pr. Georges Co., MD	1982/83	91	4:00–6:00 p.m.	58	—	—	42	—	—	JHK
78	Pr. Georges Co., MD	1982/83	113	4:00–6:00 p.m.	59	—	—	41	—	—	JHK
44	Pr. Georges Co., MD	1982/83	97	4:00–6:00 p.m.	51	—	—	49	—	—	JHK
467	Pr. Georges Co., MD	1982/83	99	4:00–6:00 p.m.	56	—	—	44	—	—	JHK
352	W. Orange, NJ	Mar. 1986	149	4:00–6:00 p.m.	38	19	43	62	—	21,520	Raymond Keyes Assoc.
176	Tarpon Springs, FL	May 1986	124	3:00–7:00 p.m.	37	28	35	63	—	34,080	Raymond Keyes Assoc.
762	Orlando, FL	Fall 1985	182	4:00–6:00 p.m.	25	52	23	75	—	—	Kimley-Horn and Assoc. Inc.
166	Orlando, FL	Fall 1985	124	4:00–6:00 p.m.	27	48	25	73	—	—	Kimley-Horn and Assoc. Inc.
129	Orlando, FL	Fall 1985	116	4:00–6:00 p.m.	28	50	22	72	—	—	Kimley-Horn and Assoc. Inc.
71	Orlando, FL	Fall 1985	81	4:00–6:00 p.m.	50	44	6	50	—	—	Kimley-Horn and Assoc. Inc.

Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 820—Shopping Center

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
921	Albany, NY	July & Aug. 1985	196	4:00–6:00 p.m.	23	42	35	77	—	60,950	Raymond Keyes Assoc.
108	Overland Park, KS	July 1988	111	4:30–5:30 p.m.	26	61	13	74	—	34,000	—
118	Overland Park, KS	Aug. 1988	123	4:30–5:30 p.m.	25	55	20	75	—	—	—
256	Greece, NY	June 1988	120	4:00–6:00 p.m.	38	62	—	62	—	23,410	Sear Brown
160	Greece, NY	June 1988	78	4:00–6:00 p.m.	29	71	—	71	—	57,306	Sear Brown
550	Greece, NY	June 1988	117	4:00–6:00 p.m.	48	52	—	52	—	40,763	Sear Brown
51	Boca Raton, FL	Dec. 1987	110	4:00–6:00 p.m.	33	34	33	67	—	42,225	Kimley-Horn and Assoc. Inc.
1,090	Ross Twp, PA	July 1988	411	2:00–8:00 p.m.	34	56	10	66	—	51,500	Wilbur Smith and Assoc.
97	Upper Dublin Twp, PA	Winter 1988/89	—	4:00–6:00 p.m.	41	—	—	59	—	34,000	McMahon Associates
118	Tredyffrin Twp, PA	Winter 1988/89	—	4:00–6:00 p.m.	24	—	—	76	—	10,000	Booz Allen & Hamilton
122	Lawnside, NJ	Winter 1988/89	—	4:00–6:00 p.m.	37	—	—	63	—	20,000	Pennoni Associates
126	Boca Raton, FL	Winter 1988/89	—	4:00–6:00 p.m.	43	—	—	57	—	40,000	McMahon Associates
150	Willow Grove, PA	Winter 1988/89	—	4:00–6:00 p.m.	39	—	—	61	—	26,000	Booz Allen & Hamilton
153	Broward Cnty., FL	Winter 1988/89	—	4:00–6:00 p.m.	50	—	—	50	—	85,000	McMahon Associates
153	Arden, DE	Winter 1988/89	—	4:00–6:00 p.m.	30	—	—	70	—	26,000	Orth-Rodgers & Assoc. Inc.
154	Doylestown, PA	Winter 1988/89	—	4:00–6:00 p.m.	32	—	—	68	—	29,000	Orth-Rodgers & Assoc. Inc.
164	Middletown Twp, PA	Winter 1988/89	—	4:00–6:00 p.m.	33	—	—	67	—	25,000	Booz Allen & Hamilton
166	Haddon Twp, NJ	Winter 1988/89	—	4:00–6:00 p.m.	20	—	—	80	—	6,000	Pennoni Associates
205	Broward Cnty., FL	Winter 1988/89	—	4:00–6:00 p.m.	55	—	—	45	—	62,000	McMahon Associates

Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 820—Shopping Center

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
237	W. Windsor Twp, NJ	Winter 1988/89	—	4:00–6:00 p.m.	48	—	—	52	—	46,000	Booz Allen & Hamilton
242	Willow Grove, PA	Winter 1988/89	—	4:00–6:00 p.m.	37	—	—	63	—	26,000	McMahon Associates
297	Whitehall, PA	Winter 1988/89	—	4:00–6:00 p.m.	33	—	—	67	—	26,000	Orth-Rodgers & Assoc. Inc.
360	Broward Cnty., FL	Winter 1988/89	—	4:00–6:00 p.m.	44	—	—	56	—	73,000	McMahon Associates
370	Pittsburgh, PA	Winter 1988/89	—	4:00–6:00 p.m.	19	—	—	81	—	33,000	Wilbur Smith
150	Portland, OR	—	519	4:00–6:00 p.m.	68	6	26	32	—	25,000	Kittelson and Associates
150	Portland, OR	—	655	4:00–6:00 p.m.	65	7	28	35	—	30,000	Kittelson and Associates
760	Calgary, Alberta	Oct.-Dec. 1987	15,436	4:00–6:00 p.m.	20	39	41	80	—	—	City of Calgary DOT
178	Bordentown, NJ	Apr. 1989	154	2:00–6:00 p.m.	35	—	—	65	—	37,980	Raymond Keyes Assoc.
144	Manalapan, NJ	July 1990	176	3:30–6:15 p.m.	32	44	24	68	—	69,347	Raymond Keyes Assoc.
549	Natick, MA	Feb. 1989	—	4:45–5:45 p.m.	33	26	41	67	—	48,782	Raymond Keyes Assoc.

Average Pass-By Trip Percentage: 34
"—" means no data were provided

Figure E.7 Shopping Center (820)

Average Pass-By Trip Percentage vs: 1000 Sq. Feet Gross Leasable Area
On a: Weekday, P.M. Peak Period
Number of Studies: 100
Average 1000 Sq. Feet GLA: 329

Data Plot

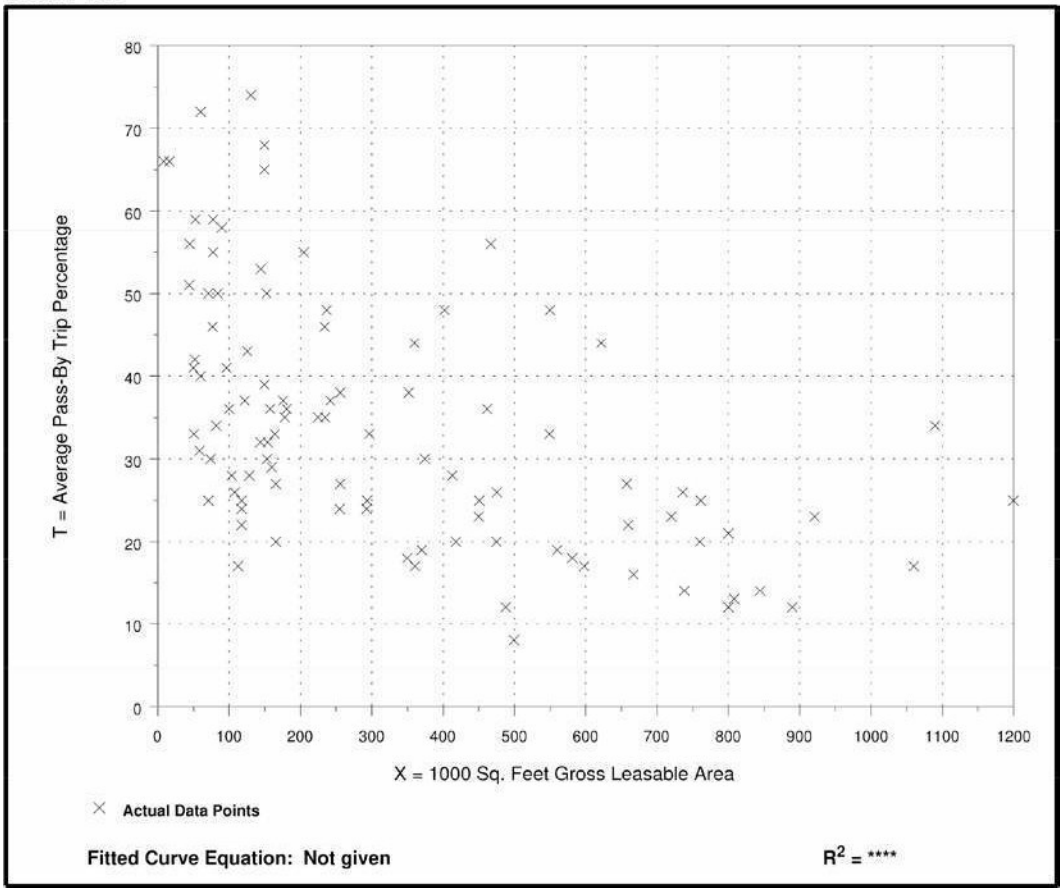
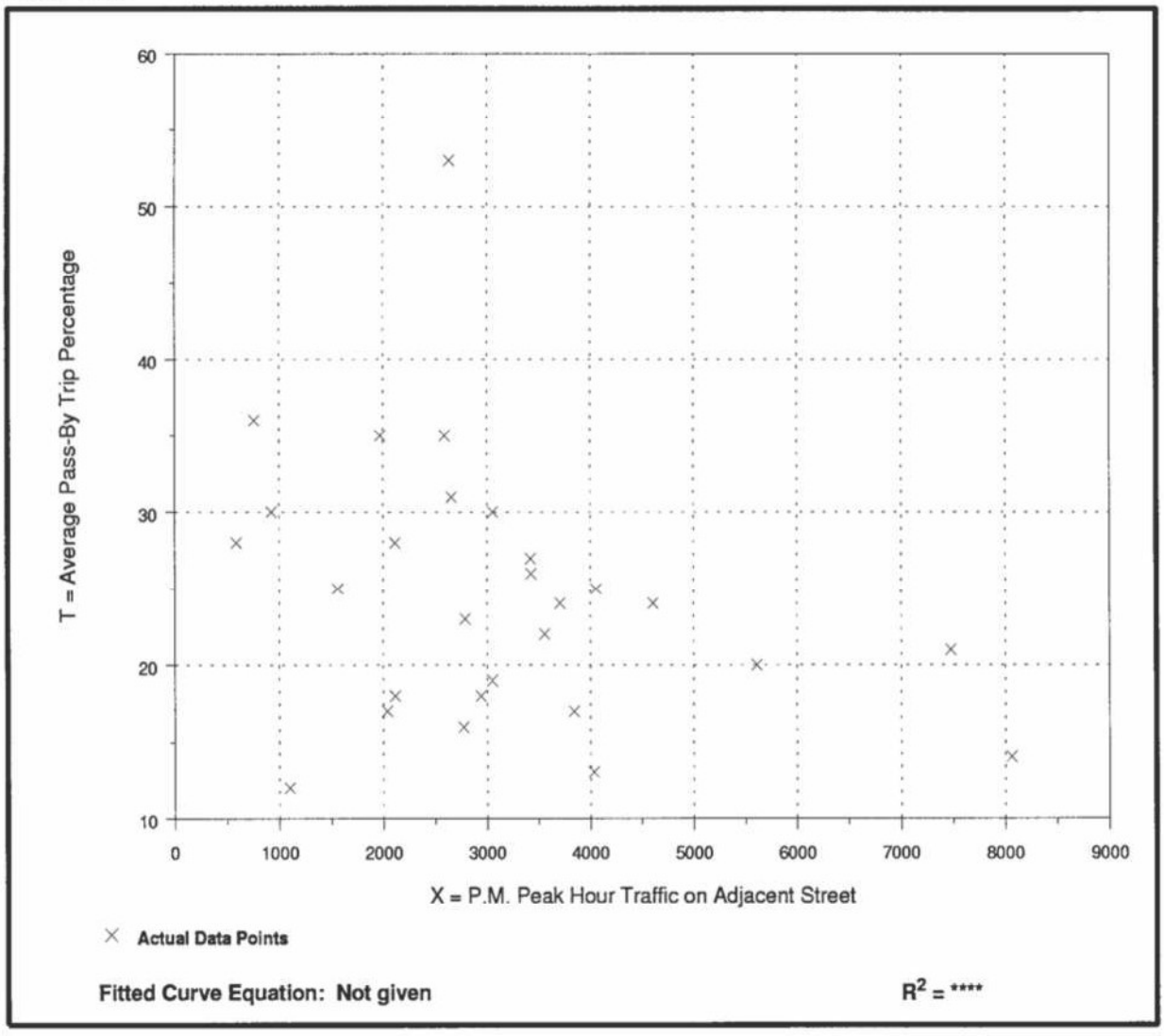


Figure E.8 Shopping Center (820)

Average Pass-By Trip Percentage vs: **PM Peak Hour Traffic on Adjacent Street**
On a: **Weekday, PM Peak Period**
Number of Studies: 28
Average PM Peak Hr. Traf. On Adj. Street: 3,122

Data Plot



Steve Schmidt

From: Tom Leininger <Tom.Leininger@jamescitycountyva.gov>
Sent: Friday, February 17, 2023 7:46 AM
To: Steve Schmidt
Cc: Thomas Wysong; Josh Crump
Subject: RE: [External]RE: [External]RE: Cardinal Ridge Chapter 527 Scoping Meeting
Attachments: Cardinal Ridge Revised Scoping Documents2-17-23_JCC_Signed.pdf

Good morning Steve,

Attached is the signed scoping document from James City County.

Thank you,
Tom

From: Steve Schmidt <Steve.Schmidt@timmons.com>
Sent: Thursday, February 16, 2023 2:09 PM
To: Patil, Yogendra <yogendra.patil@vdot.virginia.gov>
Cc: Tom Leininger <Tom.Leininger@jamescitycountyva.gov>; Smith, Andrew <andrewg.smith@vdot.virginia.gov>; Brooks, Glenn <glenn.brooks@vdot.virginia.gov>; Paul Holt <Paul.Holt@jamescitycountyva.gov>; Scott Dunn <scott.dunn@timmons.com>; Nathan Milaszewski <nathan.milaszewski@vdot.virginia.gov>; Thomas Wysong <Thomas.Wysong@jamescitycountyva.gov>; Josh Crump <Josh.Crump@jamescitycountyva.gov>
Subject: [External]RE: [External]RE: Cardinal Ridge Chapter 527 Scoping Meeting

All,

Attached is a revised version with the existing analysis year changed back to 2022 to reflect VDOT's comment. No other changes have been made.

Thank you,

Steve

Steve Schmidt, PE, PTOE
Senior Project Manager – Traffic Analysis & Planning

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Mobile: 540.818.3356 | steve.schmidt@timmons.com
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From: Patil, Yogendra <yogendra.patil@vdot.virginia.gov>
Sent: Wednesday, February 15, 2023 1:59 PM

To: Steve Schmidt <Steve.Schmidt@timmons.com>
Cc: Tom Leininger <Tom.Leininger@jamescitycountyva.gov>; Smith, Andrew <andrewg.smith@vdot.virginia.gov>; Brooks, Glenn <glenn.brooks@vdot.virginia.gov>; Paul Holt <Paul.Holt@jamescitycountyva.gov>; Scott Dunn <scott.dunn@timmons.com>; Nathan Milaszewski <nathan.milaszewski@vdot.virginia.gov>; Thomas Wysong <Thomas.Wysong@jamescitycountyva.gov>; Josh Crump <Josh.Crump@jamescitycountyva.gov>
Subject: Re: [External]RE: Cardinal Ridge Chapter 527 Scoping Meeting

Please find a comment letter attached from our traffic department.

On Tue, Feb 14, 2023 at 3:53 PM Steve Schmidt <Steve.Schmidt@timmons.com> wrote:

> All,
>
> We have revised the scoping documents per the comments received from both the County and VDOT and have attached them for your review/signature. I have also attached email correspondence on the trip distributions and the original comments from both the County (pdf) and VDOT (word doc) for reference.
>
> A few notes for you as you are reviewing:
>
> 1. We have updated the existing year to 2023 but have not changed the buildout or study years as the applicant is still targeting a 2032 build out.
> 2. We collected traffic counts in the fall of 2022 but those will be treated as existing since they are within the one year timeframe
> 3. Per phone conversations with the County, we **are not** adding in the additional intersections requested by the third party reviewer. Those intersections will either be included in the New Town study, are located within the City, or are across the interchange on Route 199.
> 4. We added in a note on studying the freeway segment, merge, and diverge at the Roue 199/Longhill interchange. This will be an HCS analysis with the understanding if it is over capacity a VISSIM analysis may be needed.
> 5. We added in supporting documentation for the 34% pass-by rate from ITE.
>
> Please review and let me know if you have any questions. If not, please sign and return at your earliest convenience.
>
> Thank you,
>
> Steve

Steve Schmidt, PE, PTOE
Senior Project Manager – Traffic Analysis & Planning

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Mobile: 540.818.3356 | steve.schmidt@timmons.com
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From: Tom Leininger <Tom.Leininger@jamescitycountyva.gov>
Sent: Thursday, February 9, 2023 1:53 PM
To: Steve Schmidt <Steve.Schmidt@timmons.com>; Smith, Andrew <andrewg.smith@vdot.virginia.gov>; Patil, Yogendra <yogendra.patil@vdot.virginia.gov>
Cc: Brooks, Glenn <glenn.brooks@vdot.virginia.gov>; Paul Holt <Paul.Holt@jamescitycountyva.gov>; Scott Dunn <scott.dunn@timmons.com>; Nathan Milaszewski <nathan.milaszewski@vdot.virginia.gov>; Thomas Wysong <Thomas.Wysong@jamescitycountyva.gov>; Josh Crump <Josh.Crump@jamescitycountyva.gov>
Subject: RE: [External]RE: Cardinal Ridge Chapter 527 Scoping Meeting

Good afternoon Steve,

Attached are the comments in coordination with our third-party traffic consultant. Please let me know if there are any questions or issues with viewing the comments.

Thank you,

Tom

From: Steve Schmidt <Steve.Schmidt@timmons.com>
Sent: Wednesday, February 8, 2023 3:44 PM
To: Smith, Andrew <andrewg.smith@vdot.virginia.gov>; Patil, Yogendra <yogendra.patil@vdot.virginia.gov>
Cc: Brooks, Glenn <glenn.brooks@vdot.virginia.gov>; Paul Holt <Paul.Holt@jamescitycountyva.gov>; Tom Leininger <Tom.Leininger@jamescitycountyva.gov>; Scott Dunn <scott.dunn@timmons.com>; Nathan Milaszewski <nathan.milaszewski@vdot.virginia.gov>; Thomas Wysong <Thomas.Wysong@jamescitycountyva.gov>; Josh Crump

<Josh.Crump@jamescitycountyva.gov>
Subject: [External]RE: Cardinal Ridge Chapter 527 Scoping Meeting

All,

I wanted to check in to see if you have any questions on the revised scoping documents. We are working on the study now and want to make sure we finalize the scope so we can complete and submit the study.

Thank you,

Steve

Steve Schmidt, PE, PTOE
Senior Project Manager – Traffic Analysis & Planning

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From: Steve Schmidt
Sent: Monday, January 23, 2023 11:46 AM
To: Smith, Andrew <andrewg.smith@vdot.virginia.gov>; Patil, Yogendra <yogendra.patil@vdot.virginia.gov>
Cc: Brooks, Glenn <glenn.brooks@vdot.virginia.gov>; Paul Holt (Paul.Holt@jamescitycountyva.gov) <paul.holt@jamescitycountyva.gov>; Tom Leininger <Tom.Leininger@jamescitycountyva.gov>; Scott Dunn <scott.dunn@timmons.com>; Nathan Milaszewski <nathan.milaszewski@vdot.virginia.gov>
Subject: RE: Cardinal Ridge Chapter 527 Scoping Meeting

All,

I apologize for any confusion but my email on Friday was not to set up a new meeting.

I was sending around the revised scoping documents that incorporated changes from the meeting we already had. I have reattached those along with my summary of the changes below for your review/approval.

Attached are the revised scoping documents for the Cardinal Ridge Chapter 527 TIA. We have revised the documents per our scoping meeting in on August 22, 2022, subsequent conversations with the County, existing traffic counts collected in the fall, and a slightly revised development program per conversations with our client.

The major changes include:

1. *Adding 5 background developments*
2. *Adding in the proposed trip distributions based on the existing counts*
3. *Adding in some background improvements*
4. *Adding a review of crash history to the requirements*

Please review and let us know if you have any questions or comments. If not, can the County and VDOT please sign the included signature page and return so we can finalize the scope.

Thank you

Steve

Steve Schmidt, PE, PTOE
Senior Project Manager – Traffic Analysis & Planning

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From: Smith, Andrew <andrewg.smith@vdot.virginia.gov>
Sent: Monday, January 23, 2023 10:16 AM
To: Patil, Yogendra <yogendra.patil@vdot.virginia.gov>
Cc: Brooks, Glenn <glenn.brooks@vdot.virginia.gov>; Steve Schmidt <Steve.Schmidt@timmons.com>; Paul Holt (Paul.Holt@jamescitycountyva.gov) <paul.holt@jamescitycountyva.gov>; Tom Leininger <Tom.Leininger@jamescitycountyva.gov>; Scott Dunn <scott.dunn@timmons.com>; Nathan Milaszewski <nathan.milaszewski@vdot.virginia.gov>
Subject: Re: Cardinal Ridge Chapter 527 Scoping Meeting

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Be sure to include Nathan Melazewski.

On Mon, Jan 23, 2023 at 9:56 AM Patil, Yogendra <yogendra.patil@vdot.virginia.gov> wrote:

> yes I am fine with that.
>
> Just send an official meeting invite and we will add to our calendars!
>
> Thanks

On Thu, Jul 21, 2022 at 3:39 PM Brooks, Glenn <glenn.brooks@vdot.virginia.gov> wrote:

> A virtual meeting would be better for Yogi and me. Next week in the afternoon would be OK.
>
> Glenn Brooks, P.E.

VDOT, Williamsburg Residency

On Thu, Jul 21, 2022 at 1:24 PM Steve Schmidt <Steve.Schmidt@timmons.com> wrote:

All,

We would like to set up a Chapter 527 Scoping meeting to discuss the traffic study for the Cardinal Ridge (former Eastern State Hospital site) project located in James City County. The applicant is proposing to redevelop the site to a mixed use residential/commercial project. Attached are the completed pre-scope forms for your review prior to the meeting.

Can you please check your calendars and let us know your earliest availability to meet? Also please let us know if your preference is to meet virtually or in person and if there are others on your teams that should be included in the meeting.

Thank you and we look forward to working with you all on this project.

Steve

Steve Schmidt, PE, PTOE
Senior Project Manager – Traffic Analysis & Planning

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--

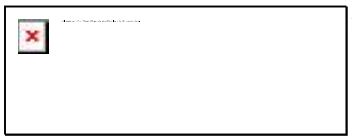
Yogendra Patil

Land Use Engineer

VDOT Williamsburg Residency

Cell - 4193249408

--



Andrew G. Smith, P.E.
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Virginia Department of Transportation
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(757) 469-0690 Mobile
AndrewG.Smith@VDOT.Virginia.gov

--

Yogendra Patil
Land Use Engineer
VDOT Williamsburg Residency
Cell - 4193249408

Appendix B
Traffic Counts

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Ashbury From North					Depue From East					Ashbury From South					Depue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
07:15 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
07:30 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
Total	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
08:00 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:30 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
*** BREAK ***																					
09:15 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
09:30 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
09:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
10:00 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
10:30 AM	0	0	0	4	4	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	5
10:45 AM	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	0	9	9	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	10
11:00 AM	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
11:15 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11:30 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
*** BREAK ***																					
12:15 PM	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
12:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	2	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
*** BREAK ***																					
01:30 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022

Groups Printed- Bikes

	Ashbury From North					Depue From East					Ashbury From South					Depue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
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02:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:30 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
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03:00 PM	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
03:30 PM	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
03:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	3	4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	5
04:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
04:15 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
04:30 PM	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
04:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	8
05:00 PM	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
05:15 PM	0	0	0	2	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3
*** BREAK ***																					
05:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	6	6	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	7
Grand Total	0	1	0	53	54	0	1	0	2	3	0	1	0	0	1	0	1	0	0	1	59
Apprch %	0	1.9	0	98.1		0	33.3	0	66.7		0	100	0	0		0	100	0	0		
Total %	0	1.7	0	89.8	91.5	0	1.7	0	3.4	5.1	0	1.7	0	0	1.7	0	1.7	0	0	1.7	

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Ashbury From North					Depue From East					Ashbury From South					Depue From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	1	1	3	0	5	1	30	6	1	38	5	0	1	0	6	9	83	15	0	107	156
07:15 AM	4	6	3	0	13	0	26	2	0	28	2	3	1	0	6	11	96	21	0	128	175
07:30 AM	5	2	5	0	12	0	35	4	0	39	3	3	2	0	8	3	100	12	0	115	174
07:45 AM	5	0	7	0	12	1	40	6	0	47	5	1	0	0	6	10	139	10	0	159	224
Total	15	9	18	0	42	2	131	18	1	152	15	7	4	0	26	33	418	58	0	509	729
08:00 AM	5	1	7	0	13	1	42	4	0	47	4	0	0	0	4	7	102	9	0	118	182
08:15 AM	8	0	4	0	12	1	42	8	0	51	2	0	0	0	2	3	110	6	0	119	184
08:30 AM	8	0	7	0	15	1	54	1	0	56	1	0	0	0	1	8	100	5	0	113	185
08:45 AM	3	0	8	0	11	0	44	7	0	51	2	0	0	0	2	15	99	1	0	115	179
Total	24	1	26	0	51	3	182	20	0	205	9	0	0	0	9	33	411	21	0	465	730
09:00 AM	4	0	9	0	13	0	48	8	1	57	1	0	0	0	1	7	104	1	0	112	183
09:15 AM	5	0	8	0	13	1	45	5	0	51	2	1	0	0	3	9	97	3	0	109	176
09:30 AM	2	0	4	0	6	0	57	6	0	63	3	1	1	0	5	6	77	3	0	86	160
09:45 AM	10	0	11	0	21	0	45	6	0	51	2	1	0	0	3	12	106	5	0	123	198
Total	21	0	32	0	53	1	195	25	1	222	8	3	1	0	12	34	384	12	0	430	717
10:00 AM	6	0	13	0	19	1	48	8	0	57	2	0	0	0	2	12	88	3	0	103	181
10:15 AM	6	0	6	0	12	0	55	7	0	62	0	3	3	0	6	5	77	1	0	83	163
10:30 AM	8	2	6	0	16	0	58	5	0	63	3	1	1	0	5	7	94	0	0	101	185
10:45 AM	6	1	5	0	12	0	55	6	0	61	4	0	0	0	4	8	80	1	0	89	166
Total	26	3	30	0	59	1	216	26	0	243	9	4	4	0	17	32	339	5	0	376	695
11:00 AM	2	0	14	0	16	0	59	4	0	63	2	1	0	0	3	6	73	1	0	80	162
11:15 AM	8	0	16	0	24	1	58	9	0	68	3	0	0	0	3	3	70	3	0	76	171
11:30 AM	6	0	11	0	17	0	56	5	0	61	7	3	3	0	13	5	75	4	0	84	175
11:45 AM	7	0	9	0	16	0	72	6	0	78	4	4	2	0	10	3	81	0	0	84	188
Total	23	0	50	0	73	1	245	24	0	270	16	8	5	0	29	17	299	8	0	324	696
12:00 PM	11	1	10	0	22	1	77	7	0	85	6	1	2	0	9	7	81	6	0	94	210
12:15 PM	5	0	11	0	16	1	67	7	0	75	3	4	4	0	11	7	77	7	0	91	193
12:30 PM	7	0	4	0	11	2	65	5	0	72	4	3	0	0	7	4	88	5	0	97	187
12:45 PM	3	3	8	0	14	0	54	8	0	62	2	1	2	0	5	8	104	6	0	118	199
Total	26	4	33	0	63	4	263	27	0	294	15	9	8	0	32	26	350	24	0	400	789
01:00 PM	7	0	12	0	19	0	62	5	0	67	4	3	1	0	8	4	94	5	0	103	197
01:15 PM	6	1	3	0	10	1	64	3	0	68	3	0	1	0	4	6	83	2	0	91	173

Data Collection Group
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File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022
Page No : 2

Groups Printed- Passenger Veh - Trucks

	Ashbury From North					Depue From East					Ashbury From South					Depue From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
01:30 PM	6	0	4	0	10	0	73	2	0	75	2	1	1	0	4	10	76	2	0	88	177
01:45 PM	8	3	4	0	15	0	67	5	0	72	3	1	0	0	4	4	87	3	0	94	185
Total	27	4	23	0	54	1	266	15	0	282	12	5	3	0	20	24	340	12	0	376	732
02:00 PM	2	3	4	0	9	0	81	4	0	85	0	0	1	0	1	1	90	1	0	92	187
02:15 PM	5	0	4	0	9	1	59	7	0	67	2	2	0	0	4	3	83	2	0	88	168
02:30 PM	5	3	3	0	11	0	90	5	0	95	0	2	1	0	3	13	92	3	0	108	217
02:45 PM	4	0	7	0	11	0	97	9	1	107	4	2	0	0	6	14	107	1	0	122	246
Total	16	6	18	0	40	1	327	25	1	354	6	6	2	0	14	31	372	7	0	410	818
03:00 PM	8	0	18	0	26	0	99	11	0	110	2	1	2	0	5	9	81	2	0	92	233
03:15 PM	13	1	3	0	17	0	114	3	0	117	1	0	1	0	2	7	82	1	0	90	226
03:30 PM	5	0	11	0	16	0	109	12	0	121	9	6	1	0	16	11	62	3	0	76	229
03:45 PM	3	0	9	0	12	0	113	7	0	120	7	2	1	0	10	7	61	3	0	71	213
Total	29	1	41	0	71	0	435	33	0	468	19	9	5	0	33	34	286	9	0	329	901
04:00 PM	7	0	10	0	17	0	108	16	0	124	28	6	1	0	35	10	76	1	0	87	263
04:15 PM	9	1	9	0	19	0	111	7	0	118	5	1	0	0	6	15	87	2	0	104	247
04:30 PM	6	1	15	0	22	0	122	7	0	129	9	1	1	0	11	16	92	1	0	109	271
04:45 PM	5	0	12	0	17	0	124	7	2	133	9	0	1	0	10	10	102	1	0	113	273
Total	27	2	46	0	75	0	465	37	2	504	51	8	3	0	62	51	357	5	0	413	1054
05:00 PM	5	1	6	0	12	0	136	11	0	147	5	1	2	0	8	16	90	2	0	108	275
05:15 PM	5	0	26	0	31	0	134	18	0	152	4	1	1	0	6	36	107	3	0	146	335
05:30 PM	13	0	28	0	41	0	121	13	0	134	1	0	1	0	2	31	69	0	0	100	277
05:45 PM	9	1	21	0	31	0	65	7	0	72	3	1	1	0	5	16	58	0	0	74	182
Total	32	2	81	0	115	0	456	49	0	505	13	3	5	0	21	99	324	5	0	428	1069
Grand Total	266	32	398	0	696	14	3181	299	5	3499	173	62	40	0	275	414	3880	166	0	4460	8930
Apprch %	38.2	4.6	57.2	0		0.4	90.9	8.5	0.1		62.9	22.5	14.5	0		9.3	87	3.7	0		
Total %	3	0.4	4.5	0	7.8	0.2	35.6	3.3	0.1	39.2	1.9	0.7	0.4	0	3.1	4.6	43.4	1.9	0	49.9	
Passenger Veh	264	32	391	0	687	14	3133	284	5	3436	169	62	40	0	271	412	3809	162	0	4383	8777
% Passenger Veh	99.2	100	98.2	0	98.7	100	98.5	95	100	98.2	97.7	100	100	0	98.5	99.5	98.2	97.6	0	98.3	98.3
Trucks	2	0	7	0	9	0	48	15	0	63	4	0	0	0	4	2	71	4	0	77	153
% Trucks	0.8	0	1.8	0	1.3	0	1.5	5	0	1.8	2.3	0	0	0	1.5	0.5	1.8	2.4	0	1.7	1.7

Data Collection Group
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File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022

	Ashbury From North					Depue From East					Ashbury From South					Depue From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	5	0	**7**	0	12	**1**	40	6	0	47	**5**	**1**	0	0	**6**	**10**	**139**	**10**	0	**159**	**224**
08:00 AM	5	**1**	7	0	13	1	42	4	0	47	4	0	0	0	4	7	102	9	0	118	182
08:15 AM	**8**	0	4	0	12	1	42	**8**	0	51	2	0	0	0	2	3	110	6	0	119	184
08:30 AM	8	0	7	0	**15**	1	**54**	1	0	**56**	1	0	0	0	1	8	100	5	0	113	185
Total Volume	26	1	25	0	52	4	178	19	0	201	12	1	0	0	13	28	451	30	0	509	775
% App. Total	50	1.9	48.1	0		2	88.6	9.5	0		92.3	7.7	0	0		5.5	88.6	5.9	0		
PHF	.813	.250	.893	.000	.867	1.00	.824	.594	.000	.897	.600	.250	.000	.000	.542	.700	.811	.750	.000	.800	.865
Passenger Veh	26	1	24	0	51	4	175	18	0	197	12	1	0	0	13	28	445	29	0	502	763
% Passenger Veh	100	100	96.0	0	98.1	100	98.3	94.7	0	98.0	100	100	0	0	100	100	98.7	96.7	0	98.6	98.5
Trucks	0	0	1	0	1	0	3	1	0	4	0	0	0	0	0	0	6	1	0	7	12
% Trucks	0	0	4.0	0	1.9	0	1.7	5.3	0	2.0	0	0	0	0	0	0	1.3	3.3	0	1.4	1.5

Data Collection Group
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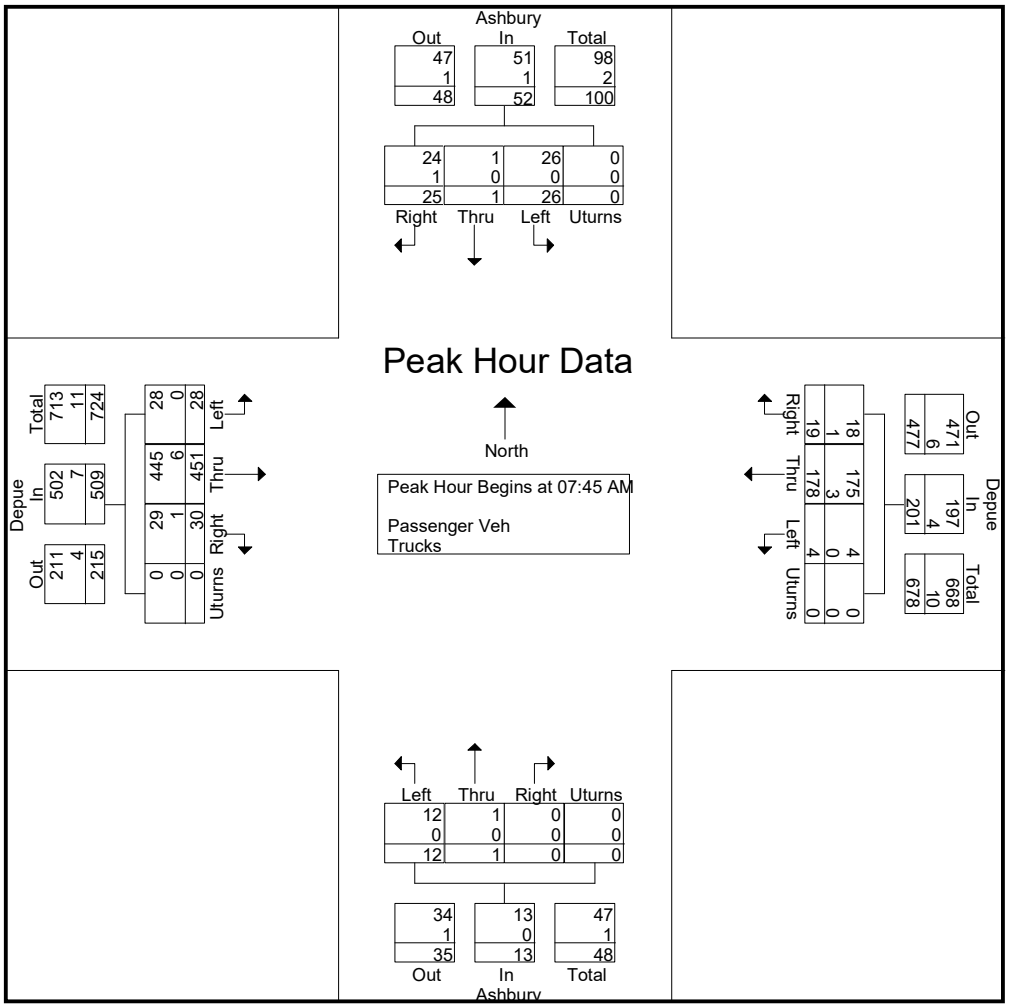
File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022
Page No : 4



Data Collection Group
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File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022
Page No : 5

	Ashbury From North					Depue From East					Ashbury From South					Depue From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	**11**	1	10	0	**22**	1	**77**	7	0	**85**	**6**	1	2	0	9	7	81	6	0	94	**210**
12:15 PM	5	0	**11**	0	16	1	67	7	0	75	3	**4**	**4**	0	**11**	7	77	**7**	0	91	193
12:30 PM	7	0	4	0	11	**2**	65	5	0	72	4	3	0	0	7	4	88	5	0	97	187
12:45 PM	3	**3**	8	0	14	0	54	**8**	0	62	2	1	2	0	5	**8**	**104**	6	0	**118**	199
Total Volume	26	4	33	0	63	4	263	27	0	294	15	9	8	0	32	26	350	24	0	400	789
% App. Total	41.3	6.3	52.4	0		1.4	89.5	9.2	0		46.9	28.1	25	0		6.5	87.5	6	0		
PHF	.591	.333	.750	.000	.716	.500	.854	.844	.000	.865	.625	.563	.500	.000	.727	.813	.841	.857	.000	.847	.939
Passenger Veh	26	4	32	0	62	4	257	26	0	287	14	9	8	0	31	24	345	22	0	391	771
% Passenger Veh	100	100	97.0	0	98.4	100	97.7	96.3	0	97.6	93.3	100	100	0	96.9	92.3	98.6	91.7	0	97.8	97.7
Trucks	0	0	1	0	1	0	6	1	0	7	1	0	0	0	1	2	5	2	0	9	18
% Trucks	0	0	3.0	0	1.6	0	2.3	3.7	0	2.4	6.7	0	0	0	3.1	7.7	1.4	8.3	0	2.3	2.3

Data Collection Group

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File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022
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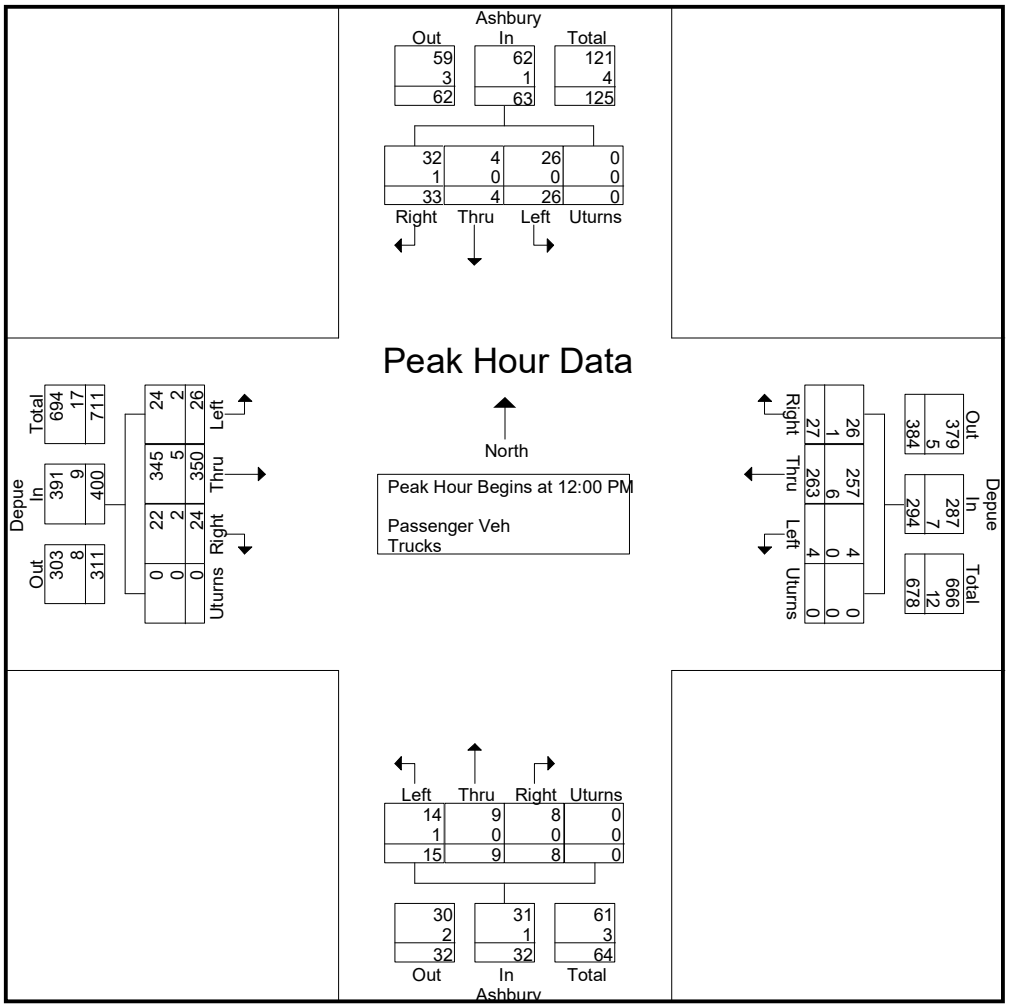

Data Collection Group
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File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022

	Ashbury From North					Depue From East					Ashbury From South					Depue From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	5	0	12	0	17	0	124	7	**2**	133	**9**	0	1	0	**10**	10	102	1	0	113	273
05:00 PM	5	**1**	6	0	12	0	**136**	11	0	147	5	**1**	**2**	0	8	16	90	2	0	108	275
05:15 PM	5	0	26	0	31	0	134	**18**	0	**152**	4	1	1	0	6	**36**	**107**	**3**	0	**146**	**335**
05:30 PM	**13**	0	**28**	0	**41**	0	121	13	0	134	1	0	1	0	2	31	69	0	0	100	277
Total Volume	28	1	72	0	101	0	515	49	2	566	19	2	5	0	26	93	368	6	0	467	1160
% App. Total	27.7	1	71.3	0		0	91	8.7	0.4		73.1	7.7	19.2	0		19.9	78.8	1.3	0		
PHF	.538	.250	.643	.000	.616	.000	.947	.681	.250	.931	.528	.500	.625	.000	.650	.646	.860	.500	.000	.800	.866
Passenger Veh	28	1	72	0	101	0	513	48	2	563	19	2	5	0	26	93	357	6	0	456	1146
% Passenger Veh	100	100	100	0	100	0	99.6	98.0	100	99.5	100	100	100	0	100	100	97.0	100	0	97.6	98.8
Trucks	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	11	0	0	11	14
% Trucks	0	0	0	0	0	0	0.4	2.0	0	0.5	0	0	0	0	0	0	3.0	0	0	2.4	1.2

Data Collection Group
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File Name : Depue and Ashbury
Site Code : 00009324
Start Date : 9/13/2022
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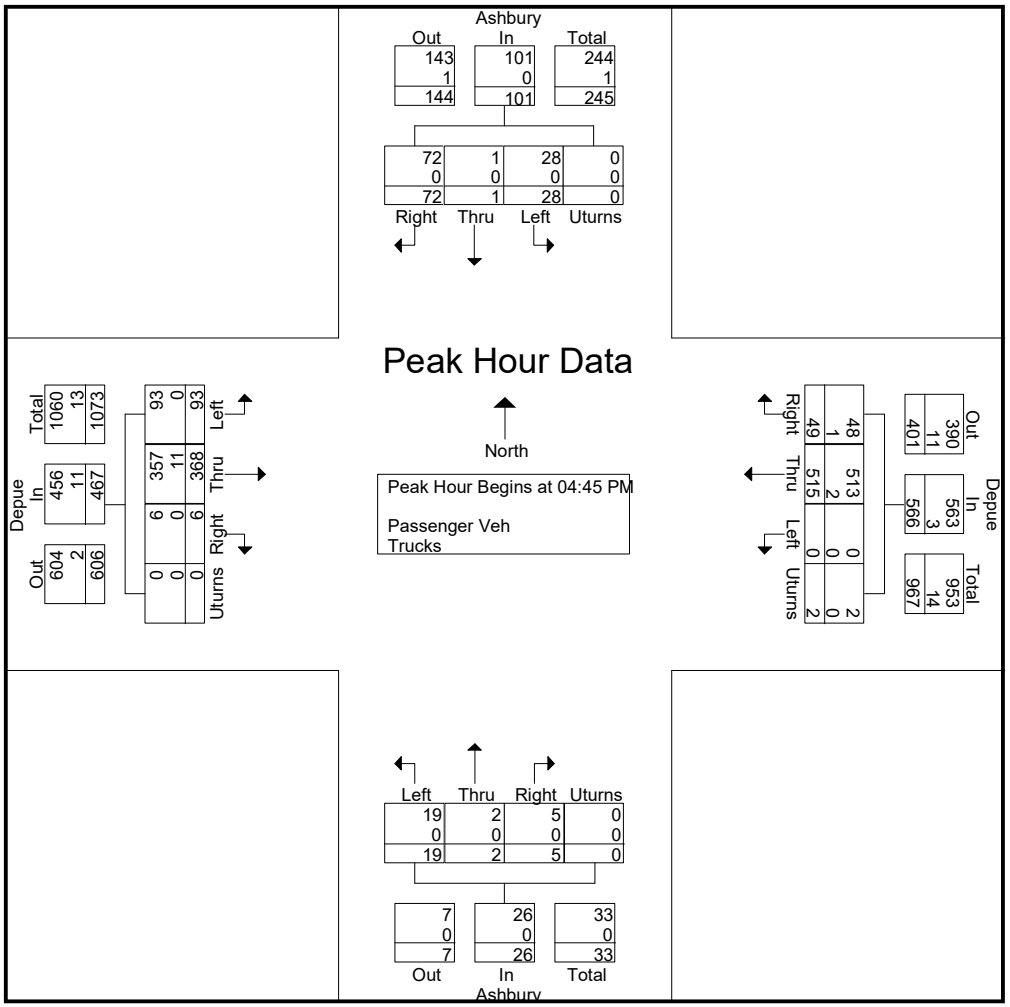

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Depue and Galt
Site Code : 00001885
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Depue Dr From North					Ironbound Rd From East					Ironbound Rd From South					Galt Ln From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
07:30 AM	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
Total	0	0	0	3	3	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	5
08:00 AM	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	2
08:15 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
08:45 AM	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5
Total	0	0	0	2	2	6	0	0	1	7	0	0	0	0	0	0	0	0	0	0	9
*** BREAK ***																					
04:00 PM	0	1	0	1	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	1	2	1	0	0	0	1	0	1	1	0	2	0	0	0	1	1	6
*** BREAK ***																					
05:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	3
05:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	2
Total	0	0	0	1	1	1	0	0	0	1	0	0	2	1	3	0	0	0	0	0	5
Grand Total	0	1	0	7	8	8	0	0	3	11	0	1	3	1	5	0	0	0	1	1	25
Apprch %	0	12.5	0	87.5		72.7	0	0	27.3		0	20	60	20		0	0	0	100		
Total %	0	4	0	28	32	32	0	0	12	44	0	4	12	4	20	0	0	0	4	4	

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Galt
Site Code : 00001885
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Depue Dr From North					Ironbound Rd From East					Ironbound Rd From South					Galt Ln From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	21	53	3	0	77	23	35	8	0	66	6	26	20	0	52	1	2	2	0	5	200
07:15 AM	31	74	3	0	108	31	47	9	0	87	7	20	25	0	52	0	2	2	0	4	251
07:30 AM	29	72	2	0	103	27	20	4	0	51	8	28	37	0	73	3	21	2	0	26	253
07:45 AM	33	100	3	0	136	60	23	14	0	97	6	26	49	0	81	1	16	6	0	23	337
Total	114	299	11	0	424	141	125	35	0	301	27	100	131	0	258	5	41	12	0	58	1041
08:00 AM	24	90	1	0	115	41	13	14	0	68	5	31	41	0	77	0	0	3	0	3	263
08:15 AM	32	90	2	0	124	33	9	8	0	50	2	44	39	0	85	0	3	3	0	6	265
08:30 AM	39	71	0	0	110	25	5	15	0	45	1	42	34	0	77	1	4	3	0	8	240
08:45 AM	28	72	0	0	100	52	4	9	0	65	1	42	41	0	84	0	1	1	0	2	251
Total	123	323	3	0	449	151	31	46	0	228	9	159	155	0	323	1	8	10	0	19	1019
*** BREAK ***																					
04:00 PM	24	61	0	0	85	49	3	26	0	78	0	100	70	0	170	6	61	8	0	75	408
04:15 PM	24	74	0	0	98	71	1	32	0	104	2	74	72	0	148	2	11	6	0	19	369
04:30 PM	27	60	0	0	87	58	2	35	0	95	1	94	77	0	172	1	13	4	0	18	372
04:45 PM	29	84	0	0	113	68	5	33	0	106	1	97	65	0	163	2	5	2	0	9	391
Total	104	279	0	0	383	246	11	126	0	383	4	365	284	0	653	11	90	20	0	121	1540
05:00 PM	28	72	0	0	100	50	1	27	0	78	1	126	68	0	195	4	9	9	0	22	395
05:15 PM	39	62	0	0	101	54	5	53	0	112	0	88	65	0	153	1	9	4	0	14	380
05:30 PM	35	59	0	0	94	57	6	36	0	99	0	86	63	0	149	1	4	3	0	8	350
05:45 PM	21	44	0	0	65	52	4	25	0	81	0	47	67	0	114	1	2	2	0	5	265
Total	123	237	0	0	360	213	16	141	0	370	1	347	263	0	611	7	24	18	0	49	1390
Grand Total	464	1138	14	0	1616	751	183	348	0	1282	41	971	833	0	1845	24	163	60	0	247	4990
Apprch %	28.7	70.4	0.9	0		58.6	14.3	27.1	0		2.2	52.6	45.1	0		9.7	66	24.3	0		
Total %	9.3	22.8	0.3	0	32.4	15.1	3.7	7	0	25.7	0.8	19.5	16.7	0	37	0.5	3.3	1.2	0	4.9	
Passenger Veh	458	1119	14	0	1591	736	183	344	0	1263	40	961	810	0	1811	24	163	60	0	247	4912
% Passenger Veh	98.7	98.3	100	0	98.5	98	100	98.9	0	98.5	97.6	99	97.2	0	98.2	100	100	100	0	100	98.4
Trucks	6	19	0	0	25	15	0	4	0	19	1	10	23	0	34	0	0	0	0	0	78
% Trucks	1.3	1.7	0	0	1.5	2	0	1.1	0	1.5	2.4	1	2.8	0	1.8	0	0	0	0	0	1.6

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Galt
Site Code : 00001885
Start Date : 9/13/2022

	Depue Dr From North					Ironbound Rd From East					Ironbound Rd From South					Galt Ln From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	29	72	2	0	103	27	20	4	0	51	**8**	28	37	0	73	**3**	**21**	2	0	**26**	253
07:45 AM	**33**	**100**	**3**	0	**136**	**60**	**23**	**14**	0	**97**	6	26	**49**	0	81	1	16	**6**	0	23	**337**
08:00 AM	24	90	1	0	115	41	13	14	0	68	5	31	41	0	77	0	0	3	0	3	263
08:15 AM	32	90	2	0	124	33	9	8	0	50	2	**44**	39	0	**85**	0	3	3	0	6	265
Total Volume	118	352	8	0	478	161	65	40	0	266	21	129	166	0	316	4	40	14	0	58	1118
% App. Total	24.7	73.6	1.7	0		60.5	24.4	15	0		6.6	40.8	52.5	0		6.9	69	24.1	0		
PHF	.894	.880	.667	.000	.879	.671	.707	.714	.000	.686	.656	.733	.847	.000	.929	.333	.476	.583	.000	.558	.829
Passenger Veh	116	347	8	0	471	158	65	37	0	260	20	127	155	0	302	4	40	14	0	58	1091
% Passenger Veh	98.3	98.6	100	0	98.5	98.1	100	92.5	0	97.7	95.2	98.4	93.4	0	95.6	100	100	100	0	100	97.6
Trucks	2	5	0	0	7	3	0	3	0	6	1	2	11	0	14	0	0	0	0	0	27
% Trucks	1.7	1.4	0	0	1.5	1.9	0	7.5	0	2.3	4.8	1.6	6.6	0	4.4	0	0	0	0	0	2.4

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Galt
Site Code : 00001885
Start Date : 9/13/2022
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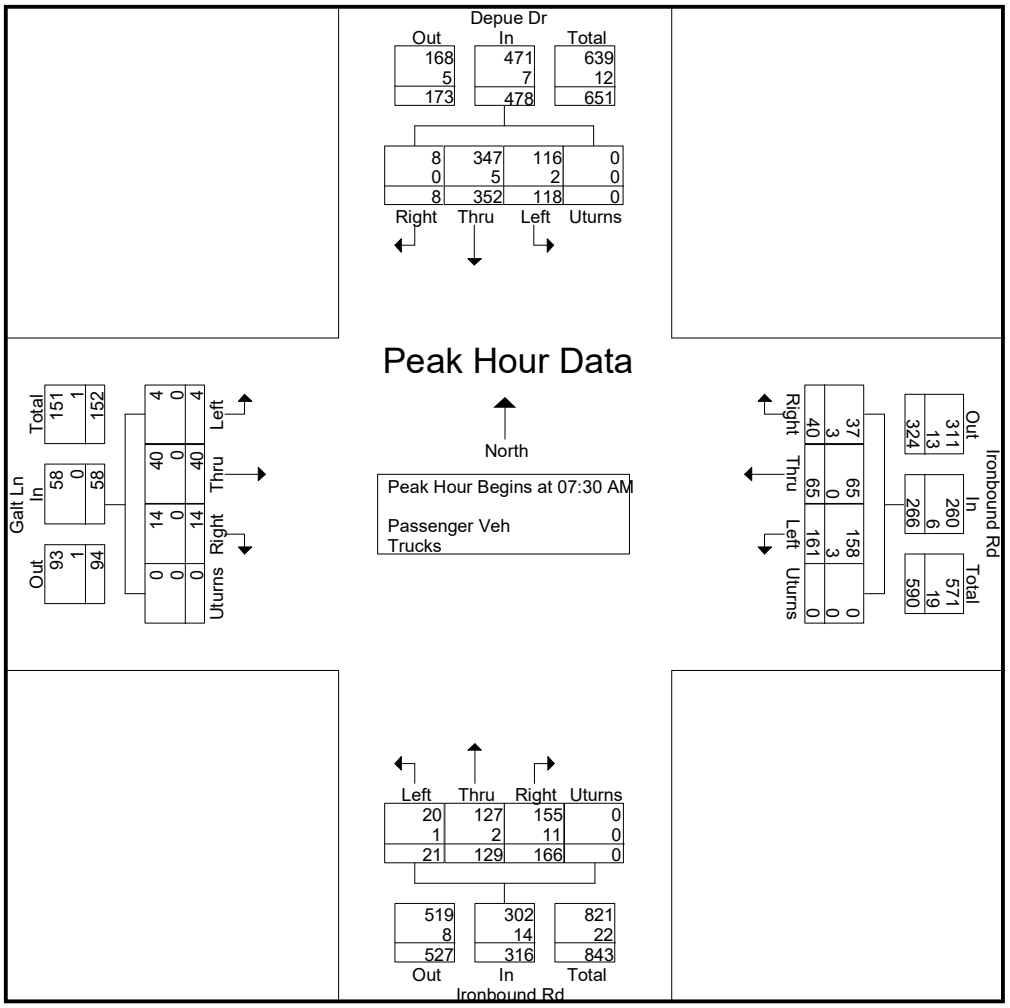

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Galt
Site Code : 00001885
Start Date : 9/13/2022

	Depue Dr From North					Ironbound Rd From East					Ironbound Rd From South					Galt Ln From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	24	61	0	0	85	49	3	26	0	78	0	**100**	70	0	170	**6**	**61**	**8**	0	**75**	**408**
04:15 PM	24	74	0	0	98	**71**	1	32	0	104	**2**	74	72	0	148	2	11	6	0	19	369
04:30 PM	27	60	0	0	87	58	2	**35**	0	95	1	94	**77**	0	**172**	1	13	4	0	18	372
04:45 PM	**29**	**84**	0	0	**113**	68	**5**	33	0	**106**	1	97	65	0	163	2	5	2	0	9	391
Total Volume	104	279	0	0	383	246	11	126	0	383	4	365	284	0	653	11	90	20	0	121	1540
% App. Total	27.2	72.8	0	0		64.2	2.9	32.9	0		0.6	55.9	43.5	0		9.1	74.4	16.5	0		
PHF	.897	.830	.000	.000	.847	.866	.550	.900	.000	.903	.500	.913	.922	.000	.949	.458	.369	.625	.000	.403	.944
Passenger Veh	102	275	0	0	377	242	11	125	0	378	4	364	279	0	647	11	90	20	0	121	1523
% Passenger Veh	98.1	98.6	0	0	98.4	98.4	100	99.2	0	98.7	100	99.7	98.2	0	99.1	100	100	100	0	100	98.9
Trucks	2	4	0	0	6	4	0	1	0	5	0	1	5	0	6	0	0	0	0	0	17
% Trucks	1.9	1.4	0	0	1.6	1.6	0	0.8	0	1.3	0	0.3	1.8	0	0.9	0	0	0	0	0	1.1

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Depue and Galt
Site Code : 00001885
Start Date : 9/13/2022
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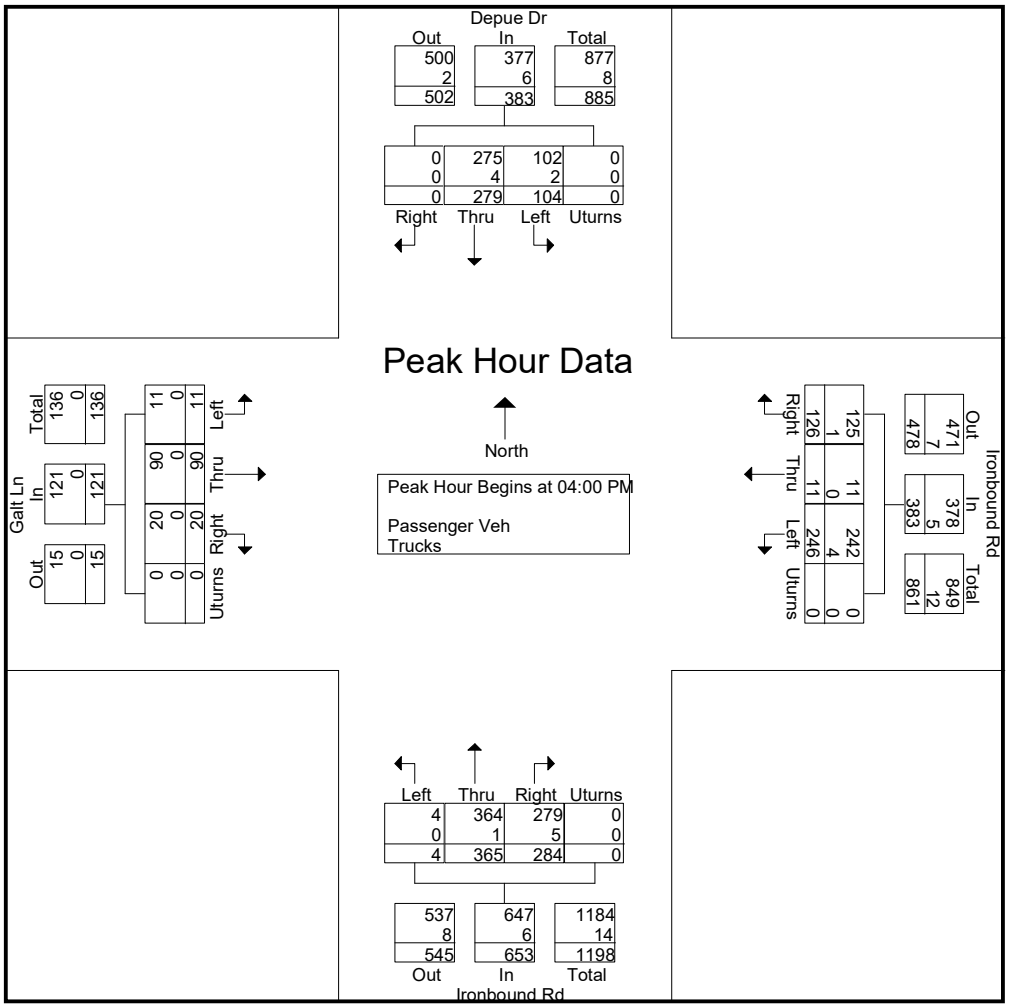

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Longhill From North					Longhill From East					Depue From South					From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	2
*** BREAK ***																					
08:15 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
08:45 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
09:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
10:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
10:30 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
11:30 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
12:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total	1	0	0	0	1	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	3
01:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
01:15 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	3

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022

Groups Printed- Bikes

	Longhill From North					Longhill From East					Depue From South					From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
02:00 PM	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	3
02:15 PM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
02:45 PM	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Total	3	0	0	0	3	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	7
*** BREAK ***																					
03:30 PM	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	2
03:45 PM	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	1	0	0	0	1	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	4
04:00 PM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
*** BREAK ***																					
04:30 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	2	0	0	0	2	2	0	2	0	0	2	0	0	0	0	0	6
*** BREAK ***																					
05:45 PM	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	3
Total	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	3
Grand Total	6	3	0	0	9	0	0	4	14	18	0	6	1	0	7	0	0	0	0	0	34
Apprch %	66.7	33.3	0	0		0	0	22.2	77.8		0	85.7	14.3	0		0	0	0	0		
Total %	17.6	8.8	0	0	26.5	0	0	11.8	41.2	52.9	0	17.6	2.9	0	20.6	0	0	0	0	0	

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Longhill From North					Longhill From East					Depue From South					From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	37	113	0	0	150	1	0	28	0	29	0	36	0	0	36	0	0	0	0	0	215
07:15 AM	43	125	0	0	168	0	0	19	0	19	0	34	1	0	35	0	0	0	0	0	222
07:30 AM	46	106	0	0	152	3	0	30	0	33	0	39	2	0	41	0	0	0	0	0	226
07:45 AM	78	161	0	0	239	1	0	37	0	38	0	53	0	0	53	0	0	0	0	0	330
Total	204	505	0	0	709	5	0	114	0	119	0	162	3	0	165	0	0	0	0	0	993
08:00 AM	32	112	0	0	144	0	0	32	0	32	0	48	0	0	48	0	0	0	0	0	224
08:15 AM	32	127	0	0	159	0	0	36	0	36	0	49	1	0	50	0	0	0	0	0	245
08:30 AM	34	102	0	0	136	4	0	35	0	39	0	59	1	0	60	0	0	0	0	0	235
08:45 AM	43	113	0	0	156	0	0	31	0	31	0	54	4	0	58	0	0	0	0	0	245
Total	141	454	0	0	595	4	0	134	0	138	0	210	6	0	216	0	0	0	0	0	949
09:00 AM	41	111	0	0	152	0	0	30	0	30	0	53	1	0	54	0	0	0	0	0	236
09:15 AM	39	105	0	0	144	1	0	37	0	38	0	58	0	0	58	0	0	0	0	0	240
09:30 AM	38	87	0	0	125	1	0	31	0	32	0	62	2	0	64	0	0	0	0	0	221
09:45 AM	48	120	0	0	168	3	0	37	0	40	0	55	2	0	57	0	0	0	0	0	265
Total	166	423	0	0	589	5	0	135	0	140	0	228	5	0	233	0	0	0	0	0	962
10:00 AM	28	97	0	0	125	2	0	25	0	27	0	66	1	0	67	0	0	0	0	0	219
10:15 AM	37	80	0	0	117	1	0	33	0	34	0	56	3	0	59	0	0	0	0	0	210
10:30 AM	28	89	0	0	117	1	0	30	0	31	0	66	1	0	67	0	0	0	0	0	215
10:45 AM	41	85	0	0	126	2	0	34	0	36	0	65	0	0	65	0	0	0	0	0	227
Total	134	351	0	0	485	6	0	122	0	128	0	253	5	0	258	0	0	0	0	0	871
11:00 AM	35	81	0	0	116	0	0	32	0	32	0	74	2	0	76	0	0	0	0	0	224
11:15 AM	43	77	0	0	120	1	0	50	0	51	0	69	1	0	70	0	0	0	0	0	241
11:30 AM	51	83	0	0	134	2	0	31	0	33	0	71	3	0	74	0	0	0	0	0	241
11:45 AM	41	79	0	0	120	1	0	38	0	39	0	81	1	0	82	0	0	0	0	0	241
Total	170	320	0	0	490	4	0	151	0	155	0	295	7	0	302	0	0	0	0	0	947
12:00 PM	50	92	0	0	142	1	0	49	0	50	0	92	1	0	93	0	0	0	0	0	285
12:15 PM	44	82	0	0	126	3	0	31	0	34	0	81	1	0	82	0	0	0	0	0	242
12:30 PM	43	96	0	0	139	2	0	33	0	35	0	67	3	0	70	0	0	0	0	0	244
12:45 PM	32	115	0	0	147	2	0	43	0	45	0	64	1	0	65	0	0	0	0	0	257
Total	169	385	0	0	554	8	0	156	0	164	0	304	6	0	310	0	0	0	0	0	1028
01:00 PM	39	99	0	0	138	0	0	43	0	43	0	74	3	0	77	0	0	0	0	0	258
01:15 PM	36	88	0	0	124	2	0	38	0	40	0	65	1	0	66	0	0	0	0	0	230

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
Page No : 2

Groups Printed- Passenger Veh - Trucks

	Longhill From North					Longhill From East					Depue From South					From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
01:30 PM	28	81	0	0	109	3	0	36	0	39	0	75	2	0	77	0	0	0	0	0	225
01:45 PM	38	88	0	0	126	2	0	36	0	38	0	72	1	0	73	0	0	0	0	0	237
Total	141	356	0	0	497	7	0	153	0	160	0	286	7	0	293	0	0	0	0	0	950
02:00 PM	38	88	0	0	126	4	0	46	0	50	0	82	1	0	83	0	0	0	0	0	259
02:15 PM	42	81	0	0	123	3	0	42	0	45	0	64	0	0	64	0	0	0	0	0	232
02:30 PM	54	100	0	0	154	5	0	40	0	45	0	93	3	0	96	0	0	0	0	0	295
02:45 PM	43	121	0	0	164	2	0	44	0	46	0	107	1	0	108	0	0	0	0	0	318
Total	177	390	0	0	567	14	0	172	0	186	0	346	5	0	351	0	0	0	0	0	1104
03:00 PM	41	84	0	0	125	2	0	58	0	60	0	116	0	0	116	0	0	0	0	0	301
03:15 PM	35	84	0	0	119	2	0	42	0	44	0	115	1	0	116	0	0	0	0	0	279
03:30 PM	30	75	0	0	105	1	0	48	0	49	0	132	2	0	134	0	0	0	0	0	288
03:45 PM	48	74	0	0	122	0	0	48	0	48	0	124	1	0	125	0	0	0	0	0	295
Total	154	317	0	0	471	5	0	196	0	201	0	487	4	0	491	0	0	0	0	0	1163
04:00 PM	43	93	0	0	136	1	0	54	0	55	0	148	1	0	149	0	0	0	0	0	340
04:15 PM	44	91	0	0	135	4	0	44	0	48	0	117	1	0	118	0	0	0	0	0	301
04:30 PM	50	99	0	0	149	3	0	54	0	57	0	142	2	0	144	0	0	0	0	0	350
04:45 PM	52	118	0	0	170	2	0	63	0	65	0	150	1	0	151	0	0	0	0	0	386
Total	189	401	0	0	590	10	0	215	0	225	0	557	5	0	562	0	0	0	0	0	1377
05:00 PM	61	105	0	0	166	2	0	75	0	77	0	149	2	0	151	0	0	0	0	0	394
05:15 PM	60	141	0	0	201	0	0	64	0	64	0	155	2	0	157	0	0	0	0	0	422
05:30 PM	52	98	0	0	150	5	0	57	0	62	0	146	2	0	148	0	0	0	0	0	360
05:45 PM	51	70	0	0	121	2	0	48	0	50	0	90	0	0	90	0	0	0	0	0	261
Total	224	414	0	0	638	9	0	244	0	253	0	540	6	0	546	0	0	0	0	0	1437
Grand Total	1869	4316	0	0	6185	77	0	1792	0	1869	0	3668	59	0	3727	0	0	0	0	0	11781
Apprch %	30.2	69.8	0	0		4.1	0	95.9	0		0	98.4	1.6	0		0	0	0	0		
Total %	15.9	36.6	0	0	52.5	0.7	0	15.2	0	15.9	0	31.1	0.5	0	31.6	0	0	0	0	0	
Passenger Veh	1802	4247	0	0	6049	74	0	1704	0	1778	0	3615	56	0	3671	0	0	0	0	0	11498
% Passenger Veh	96.4	98.4	0	0	97.8	96.1	0	95.1	0	95.1	0	98.6	94.9	0	98.5	0	0	0	0	0	97.6
Trucks	67	69	0	0	136	3	0	88	0	91	0	53	3	0	56	0	0	0	0	0	283
% Trucks	3.6	1.6	0	0	2.2	3.9	0	4.9	0	4.9	0	1.4	5.1	0	1.5	0	0	0	0	0	2.4

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
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	Longhill From North					Longhill From East					Depue From South					From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**78**	**161**	0	0	**239**	1	0	**37**	0	38	0	53	0	0	53	0	0	0	0	0	**330**
08:00 AM	32	112	0	0	144	0	0	32	0	32	0	48	0	0	48	0	0	0	0	0	224
08:15 AM	32	127	0	0	159	0	0	36	0	36	0	49	**1**	0	50	0	0	0	0	0	245
08:30 AM	34	102	0	0	136	**4**	0	35	0	**39**	0	**59**	1	0	**60**	0	0	0	0	0	235
Total Volume	176	502	0	0	678	5	0	140	0	145	0	209	2	0	211	0	0	0	0	0	1034
% App. Total	26	74	0	0		3.4	0	96.6	0		0	99.1	0.9	0		0	0	0	0		
PHF	.564	.780	.000	.000	.709	.313	.000	.946	.000	.929	.000	.886	.500	.000	.879	.000	.000	.000	.000	.000	.783
Passenger Veh	172	495	0	0	667	5	0	133	0	138	0	205	2	0	207	0	0	0	0	0	1012
% Passenger Veh	97.7	98.6	0	0	98.4	100	0	95.0	0	95.2	0	98.1	100	0	98.1	0	0	0	0	0	97.9
Trucks	4	7	0	0	11	0	0	7	0	7	0	4	0	0	4	0	0	0	0	0	22
% Trucks	2.3	1.4	0	0	1.6	0	0	5.0	0	4.8	0	1.9	0	0	1.9	0	0	0	0	0	2.1

Data Collection Group
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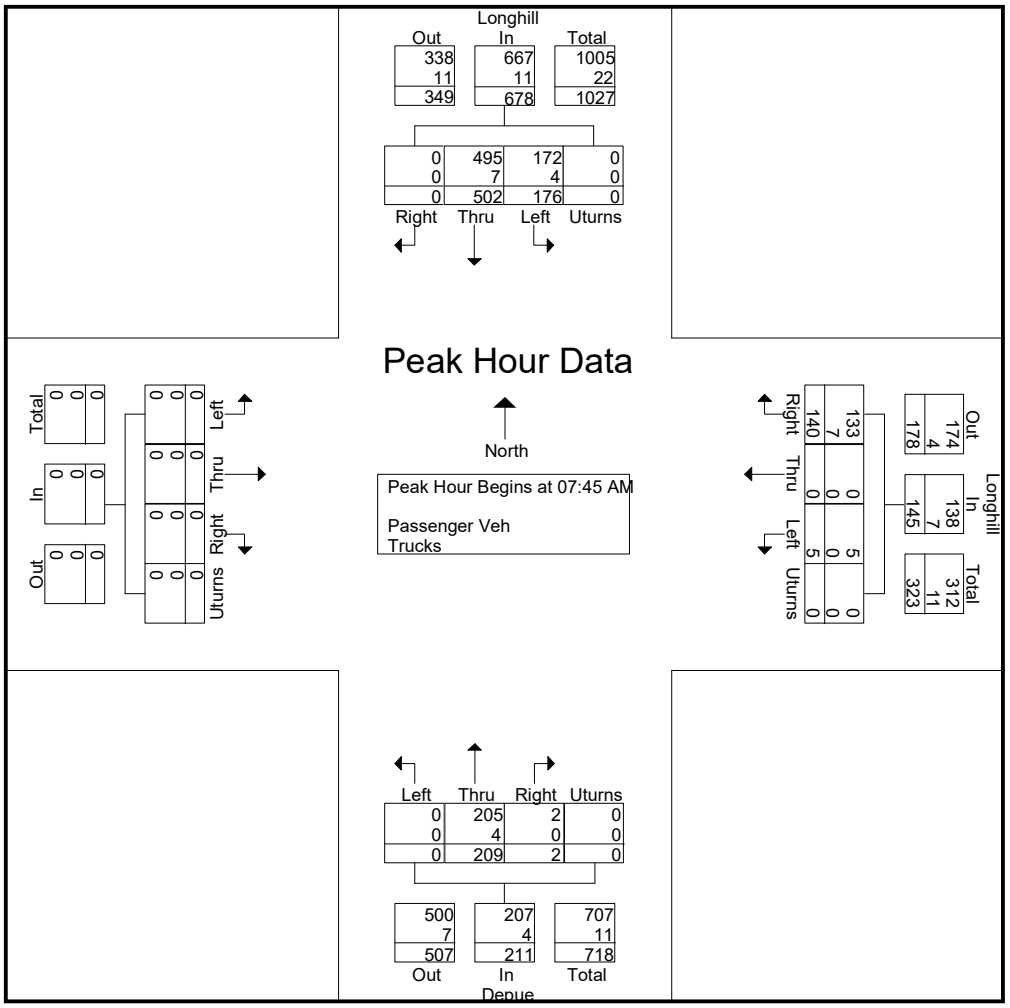
File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
Page No : 4



Data Collection Group
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File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
Page No : 5

	Longhill From North					Longhill From East					Depue From South					From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	**50**	92	0	0	142	1	0	**49**	0	**50**	0	**92**	1	0	**93**	0	0	0	0	0	**285**
12:15 PM	44	82	0	0	126	**3**	0	31	0	34	0	81	1	0	82	0	0	0	0	0	242
12:30 PM	43	96	0	0	139	2	0	33	0	35	0	67	**3**	0	70	0	0	0	0	0	244
12:45 PM	32	**115**	0	0	**147**	2	0	43	0	45	0	64	1	0	65	0	0	0	0	0	257
Total Volume	169	385	0	0	554	8	0	156	0	164	0	304	6	0	310	0	0	0	0	0	1028
% App. Total	30.5	69.5	0	0		4.9	0	95.1	0		0	98.1	1.9	0		0	0	0	0		
PHF	.845	.837	.000	.000	.942	.667	.000	.796	.000	.820	.000	.826	.500	.000	.833	.000	.000	.000	.000	.000	.902
Passenger Veh	164	376	0	0	540	8	0	153	0	161	0	296	6	0	302	0	0	0	0	0	1003
% Passenger Veh	97.0	97.7	0	0	97.5	100	0	98.1	0	98.2	0	97.4	100	0	97.4	0	0	0	0	0	97.6
Trucks	5	9	0	0	14	0	0	3	0	3	0	8	0	0	8	0	0	0	0	0	25
% Trucks	3.0	2.3	0	0	2.5	0	0	1.9	0	1.8	0	2.6	0	0	2.6	0	0	0	0	0	2.4

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File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
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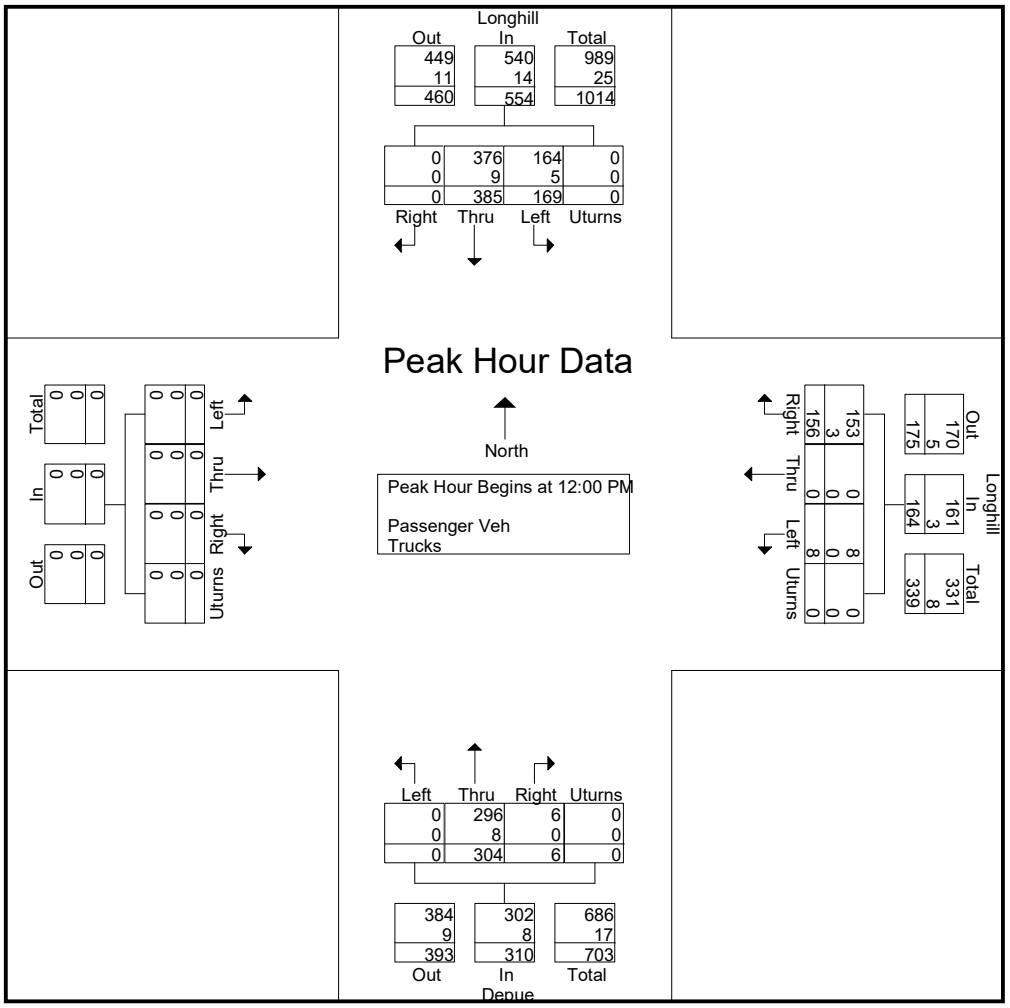

Data Collection Group
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File Name : Depue and Longhill
Site Code : 00009393
Start Date : 9/13/2022
Page No : 7

	Longhill From North					Longhill From East					Depue From South					From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	52	118	0	0	170	2	0	63	0	65	0	150	1	0	151	0	0	0	0	0	386
05:00 PM	**61**	105	0	0	166	2	0	**75**	0	**77**	0	149	**2**	0	151	0	0	0	0	0	394
05:15 PM	60	**141**	0	0	**201**	0	0	64	0	64	0	**155**	2	0	**157**	0	0	0	0	0	**422**
05:30 PM	52	98	0	0	150	**5**	0	57	0	62	0	146	2	0	148	0	0	0	0	0	360
Total Volume	225	462	0	0	687	9	0	259	0	268	0	600	7	0	607	0	0	0	0	0	1562
% App. Total	32.8	67.2	0	0		3.4	0	96.6	0		0	98.8	1.2	0		0	0	0	0		
PHF	.922	.819	.000	.000	.854	.450	.000	.863	.000	.870	.000	.968	.875	.000	.967	.000	.000	.000	.000	.000	.925
Passenger Veh	220	453	0	0	673	8	0	251	0	259	0	599	7	0	606	0	0	0	0	0	1538
% Passenger Veh	97.8	98.1	0	0	98.0	88.9	0	96.9	0	96.6	0	99.8	100	0	99.8	0	0	0	0	0	98.5
Trucks	5	9	0	0	14	1	0	8	0	9	0	1	0	0	1	0	0	0	0	0	24
% Trucks	2.2	1.9	0	0	2.0	11.1	0	3.1	0	3.4	0	0.2	0	0	0.2	0	0	0	0	0	1.5

Data Collection Group
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File Name : Depue and Longhill
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Start Date : 9/13/2022
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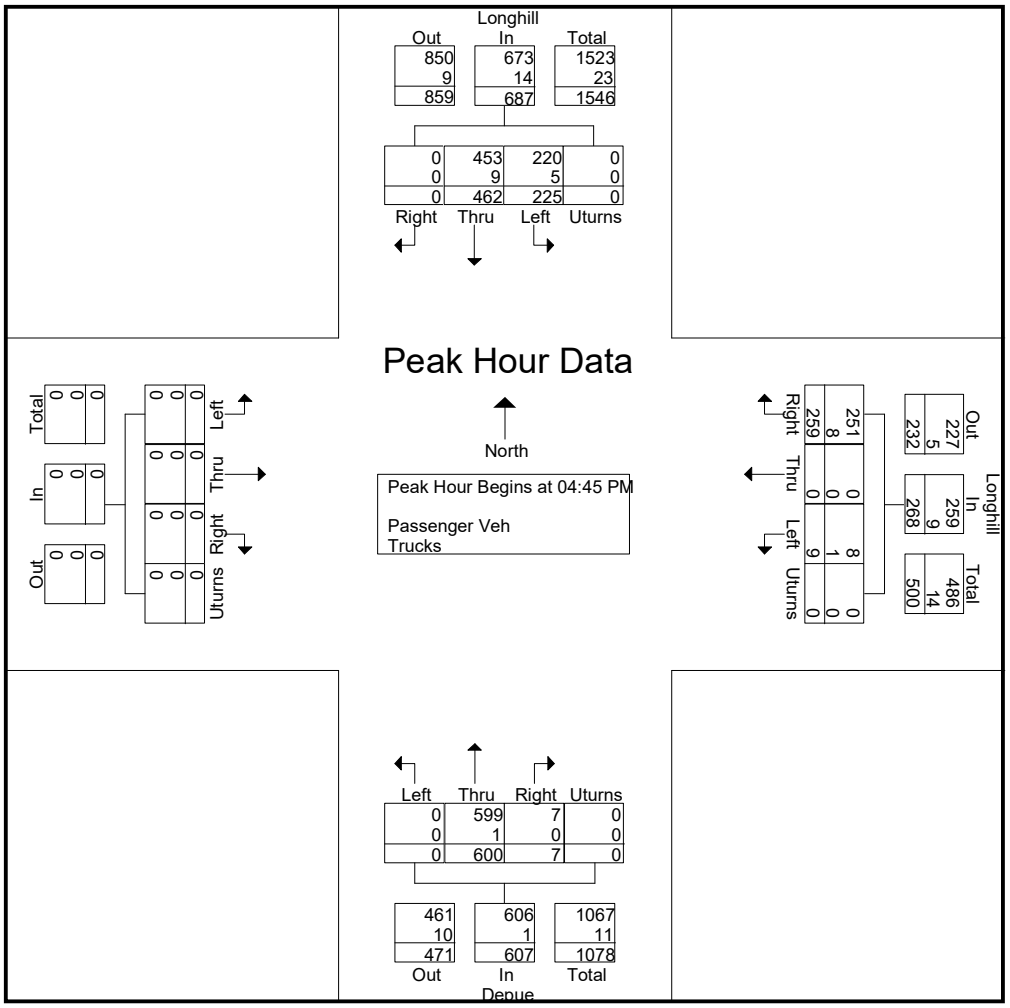

Data Collection Group
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File Name : Foster and Ashbury
Site Code : 00006603
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Ashbury From North					Foster From East					Ashbury From South					Foster From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
*** BREAK ***																					
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	100		
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Foster and Ashbury
Site Code : 00006603
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Ashbury From North					Foster From East					Ashbury From South					Foster From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	12	7	0	0	19	3	1	6	0	10	0	0	0	0	0	0	0	1	0	1	30
07:15 AM	5	18	3	0	26	8	2	1	0	11	0	5	1	0	6	2	0	0	0	2	45
07:30 AM	4	10	2	0	16	12	0	5	0	17	2	2	1	0	5	0	0	0	0	0	38
07:45 AM	3	6	0	0	9	10	0	2	0	12	0	5	2	0	7	0	2	2	0	4	32
Total	24	41	5	0	70	33	3	14	0	50	2	12	4	0	18	2	2	3	0	7	145
08:00 AM	5	6	1	0	12	6	2	1	0	9	0	2	1	0	3	0	2	2	0	4	28
08:15 AM	3	3	1	0	7	6	1	2	0	9	2	0	1	0	3	0	3	2	0	5	24
08:30 AM	0	3	2	0	5	4	0	0	0	4	2	1	0	0	3	0	1	3	0	4	16
08:45 AM	0	1	0	0	1	2	4	0	0	6	0	0	1	0	1	1	1	2	0	4	12
Total	8	13	4	0	25	18	7	3	0	28	4	3	3	0	10	1	7	9	0	17	80
*** BREAK ***																					
04:00 PM	0	0	0	0	0	19	0	11	0	30	0	17	1	0	18	4	0	1	0	5	53
04:15 PM	1	2	0	0	3	5	0	3	0	8	0	4	0	0	4	0	0	0	0	0	15
04:30 PM	1	1	0	0	2	2	0	7	0	9	0	4	0	0	4	0	0	0	0	0	15
04:45 PM	1	0	0	0	1	1	0	5	0	6	0	4	0	0	4	0	0	0	0	0	11
Total	3	3	0	0	6	27	0	26	0	53	0	29	1	0	30	4	0	1	0	5	94
05:00 PM	0	3	0	0	3	5	0	4	0	9	0	5	0	0	5	0	0	0	0	0	17
05:15 PM	1	1	0	0	2	5	0	3	0	8	0	2	0	0	2	0	0	0	0	0	12
05:30 PM	1	0	0	0	1	4	0	1	0	5	0	1	0	0	1	0	0	0	0	0	7
05:45 PM	0	1	0	0	1	2	0	4	0	6	0	1	0	0	1	0	0	0	0	0	8
Total	2	5	0	0	7	16	0	12	0	28	0	9	0	0	9	0	0	0	0	0	44
Grand Total	37	62	9	0	108	94	10	55	0	159	6	53	8	0	67	7	9	13	0	29	363
Apprch %	34.3	57.4	8.3	0		59.1	6.3	34.6	0		9	79.1	11.9	0		24.1	31	44.8	0		
Total %	10.2	17.1	2.5	0	29.8	25.9	2.8	15.2	0	43.8	1.7	14.6	2.2	0	18.5	1.9	2.5	3.6	0	8	
Passenger Veh	37	62	8	0	107	94	10	55	0	159	6	53	8	0	67	6	9	12	0	27	360
% Passenger Veh	100	100	88.9	0	99.1	100	100	100	0	100	100	100	100	0	100	85.7	100	92.3	0	93.1	99.2
Trucks	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	3
% Trucks	0	0	11.1	0	0.9	0	0	0	0	0	0	0	0	0	0	14.3	0	7.7	0	6.9	0.8

Data Collection Group
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File Name : Foster and Ashbury
Site Code : 00006603
Start Date : 9/13/2022
Page No : 2

	Ashbury From North					Foster From East					Ashbury From South					Foster From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**12**	7	0	0	19	3	1	**6**	0	10	0	0	0	0	0	0	0	1	0	1	30
07:15 AM	5	**18**	**3**	0	**26**	8	**2**	1	0	11	0	**5**	1	0	6	**2**	0	0	0	2	**45**
07:30 AM	4	10	2	0	16	**12**	0	5	0	**17**	**2**	2	1	0	5	0	0	0	0	0	38
07:45 AM	3	6	0	0	9	10	0	2	0	12	0	5	**2**	0	**7**	0	**2**	**2**	0	**4**	32
Total Volume	24	41	5	0	70	33	3	14	0	50	2	12	4	0	18	2	2	3	0	7	145
% App. Total	34.3	58.6	7.1	0		66	6	28	0		11.1	66.7	22.2	0		28.6	28.6	42.9	0		
PHF	.500	.569	.417	.000	.673	.688	.375	.583	.000	.735	.250	.600	.500	.000	.643	.250	.250	.375	.000	.438	.806
Passenger Veh	24	41	5	0	70	33	3	14	0	50	2	12	4	0	18	2	2	3	0	7	145
% Passenger Veh	100	100	100	0	100	100	100	100	0	100	100	100	100	0	100	100	100	100	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group
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File Name : Foster and Ashbury
Site Code : 00006603
Start Date : 9/13/2022
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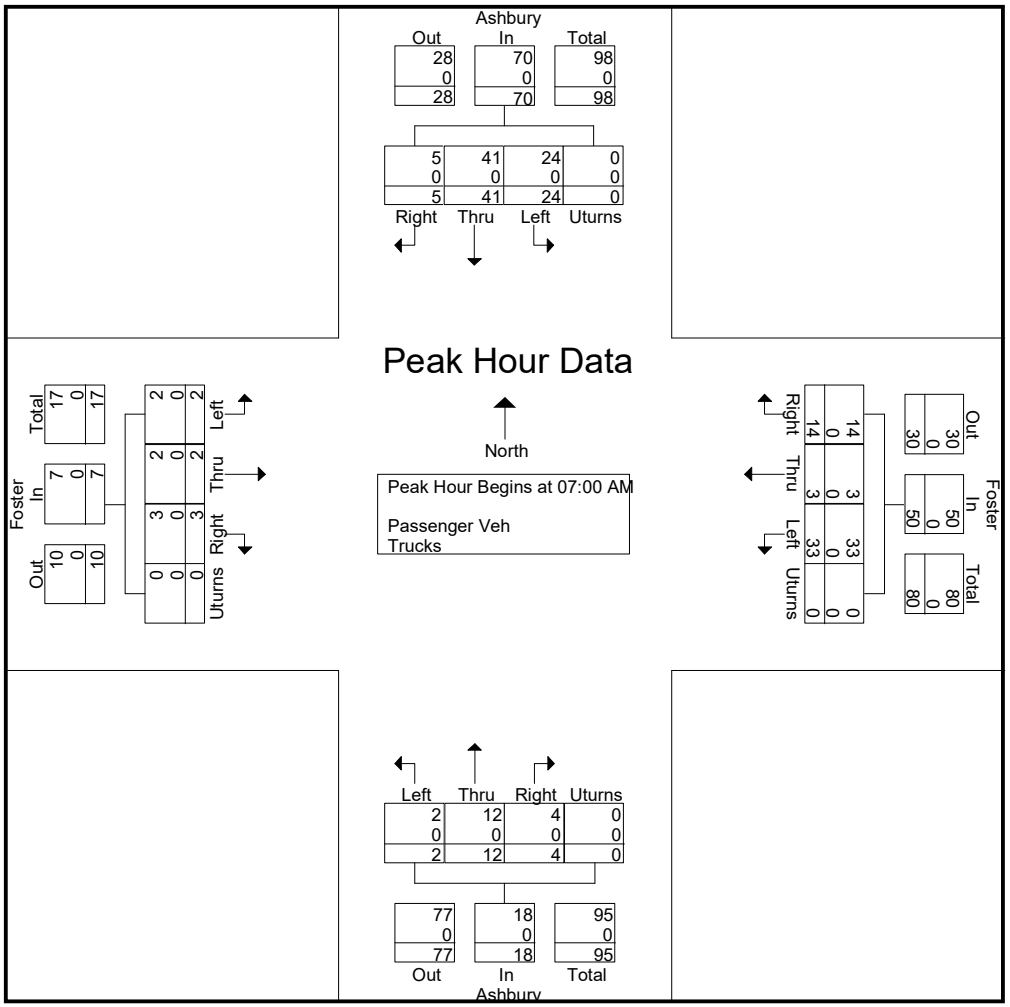

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Foster and Ashbury
Site Code : 00006603
Start Date : 9/13/2022
Page No : 4

	Ashbury From North					Foster From East					Ashbury From South					Foster From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	**19**	0	**11**	0	**30**	0	**17**	**1**	0	**18**	**4**	0	**1**	0	**5**	**53**
04:15 PM	**1**	**2**	0	0	**3**	5	0	3	0	8	0	4	0	0	4	0	0	0	0	0	15
04:30 PM	1	1	0	0	2	2	0	7	0	9	0	4	0	0	4	0	0	0	0	0	15
04:45 PM	1	0	0	0	1	1	0	5	0	6	0	4	0	0	4	0	0	0	0	0	11
Total Volume	3	3	0	0	6	27	0	26	0	53	0	29	1	0	30	4	0	1	0	5	94
% App. Total	50	50	0	0		50.9	0	49.1	0		0	96.7	3.3	0		80	0	20	0		
PHF	.750	.375	.000	.000	.500	.355	.000	.591	.000	.442	.000	.426	.250	.000	.417	.250	.000	.250	.000	.250	.443
Passenger Veh	3	3	0	0	6	27	0	26	0	53	0	29	1	0	30	4	0	1	0	5	94
% Passenger Veh	100	100	0	0	100	100	0	100	0	100	0	100	100	0	100	100	0	100	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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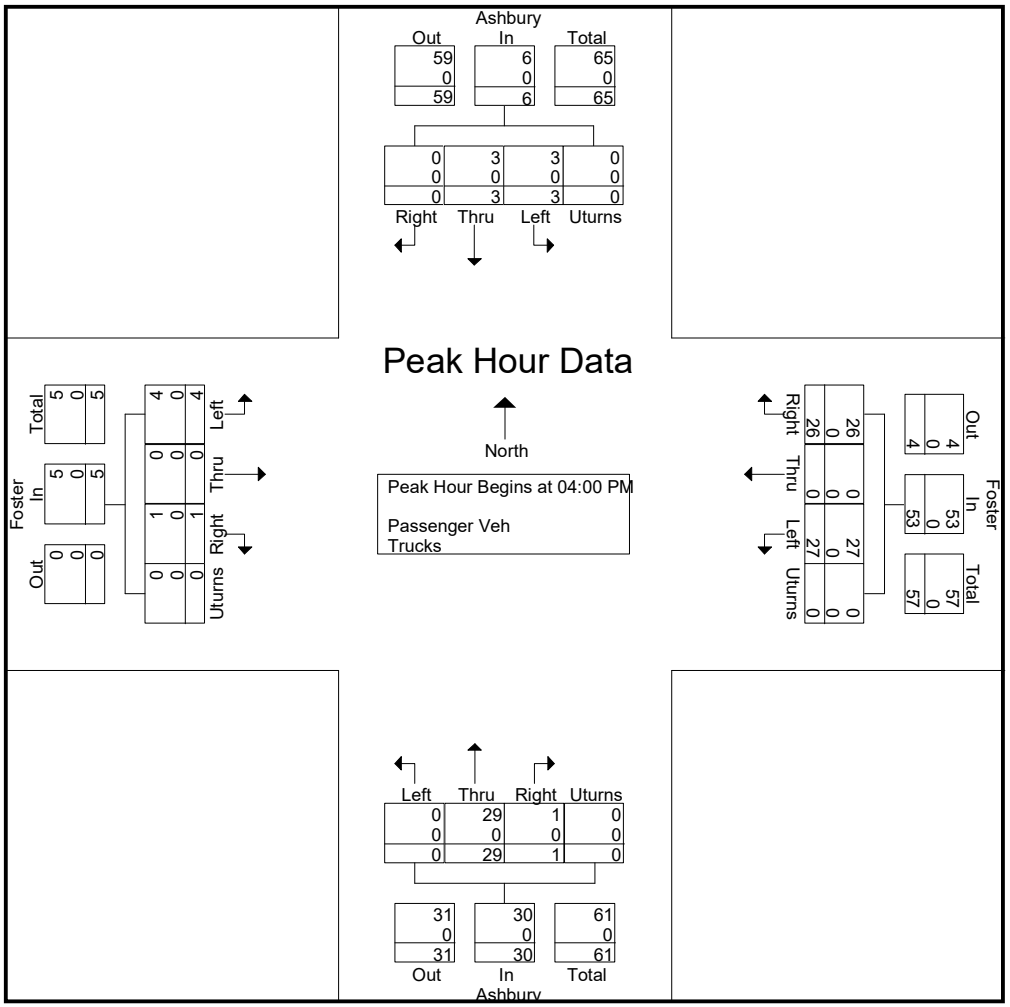
File Name : Foster and Ashbury
Site Code : 00006603
Start Date : 9/13/2022
Page No : 5



Data Collection Group
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File Name : Foster and Galt
Site Code : 00004037
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Foster From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
07:15 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
08:15 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
05:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Apprch %	0	0	0	100		0	0	0	0		0	0	0	0		0	0	0	0		
Total %	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Data Collection Group
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Turns onto Foster

File Name : Foster and Galt
Site Code : 00004037
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Foster From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	17	0	17	0	0	0	0	0	0	0	0	0	0	17
07:15 AM	0	0	0	0	0	0	0	18	0	18	0	0	0	0	0	1	0	0	0	1	19
07:30 AM	0	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	6
07:45 AM	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	2	0	0	0	2	12
Total	0	0	0	0	0	0	0	51	0	51	0	0	0	0	0	3	0	0	0	3	54
08:00 AM	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0	0	0	10
08:15 AM	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	1	0	0	0	1	5
08:30 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	2
08:45 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	2
Total	0	0	0	0	0	0	0	16	0	16	0	0	0	0	0	3	0	0	0	3	19
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	2
04:15 PM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	3
04:30 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	1	0	0	0	1	6
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
05:15 PM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	1	0	0	0	1	4
05:45 PM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	0	0	1	3
Total	0	0	0	0	0	0	0	7	0	7	0	0	0	0	0	4	0	0	0	4	11
Grand Total	0	0	0	0	0	0	0	79	0	79	0	0	0	0	0	11	0	0	0	11	90
Apprch %	0	0	0	0		0	0	100	0		0	0	0	0		100	0	0	0		
Total %	0	0	0	0	0	0	0	87.8	0	87.8	0	0	0	0	0	12.2	0	0	0	12.2	
Passenger Veh	0	0	0	0	0	0	0	79	0	79	0	0	0	0	0	11	0	0	0	11	90
% Passenger Veh	0	0	0	0	0	0	0	100	0	100	0	0	0	0	0	100	0	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group
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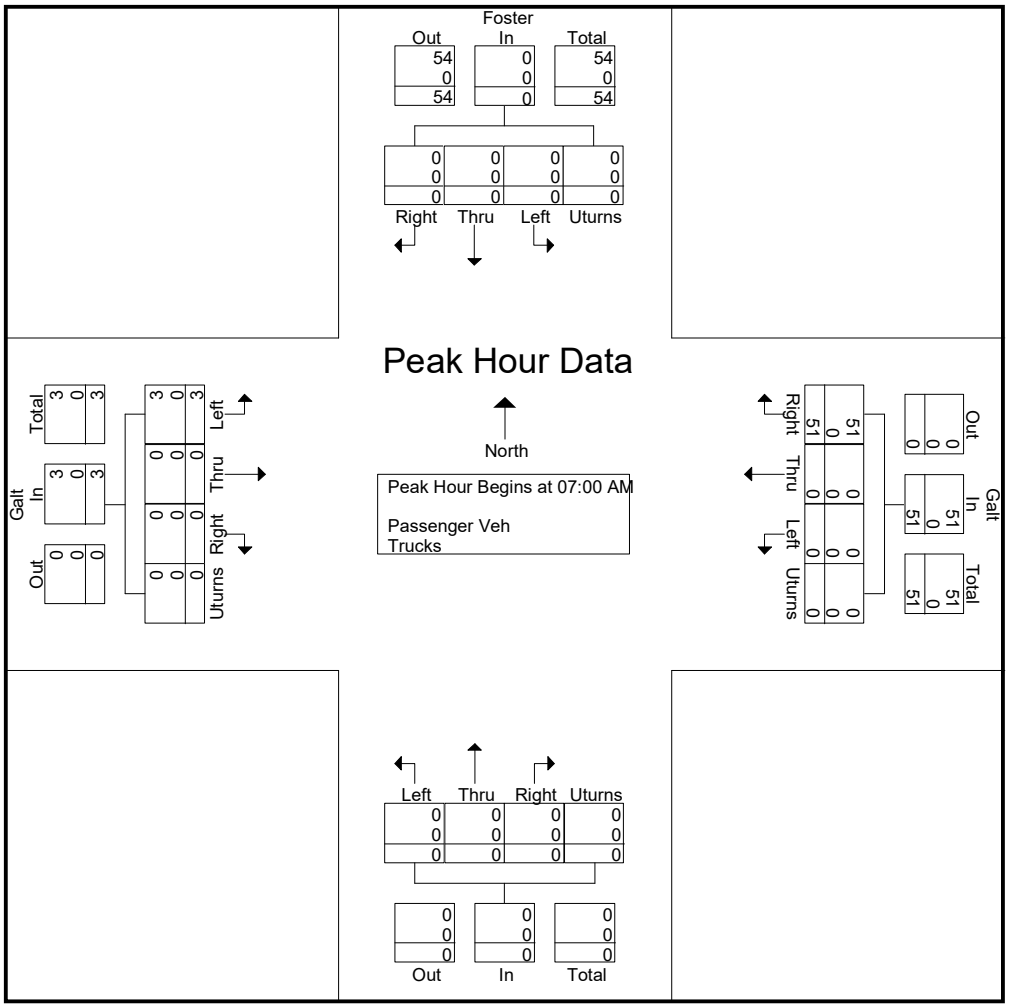
File Name : Foster and Galt
Site Code : 00004037
Start Date : 9/13/2022
Page No : 2

	Foster From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	17	0	17	0	0	0	0	0	0	0	0	0	0	17
07:15 AM	0	0	0	0	0	0	0	**18**	0	**18**	0	0	0	0	0	1	0	0	0	1	**19**
07:30 AM	0	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	6
07:45 AM	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	**2**	0	0	0	**2**	12
Total Volume	0	0	0	0	0	0	0	51	0	51	0	0	0	0	0	3	0	0	0	3	54
% App. Total	0	0	0	0		0	0	100	0		0	0	0	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.708	.000	.708	.000	.000	.000	.000	.000	.375	.000	.000	.000	.375	.711
Passenger Veh	0	0	0	0	0	0	0	51	0	51	0	0	0	0	0	3	0	0	0	3	54
% Passenger Veh	0	0	0	0	0	0	0	100	0	100	0	0	0	0	0	100	0	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Foster and Galt
Site Code : 00004037
Start Date : 9/13/2022
Page No : 3



Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Foster and Galt
Site Code : 00004037
Start Date : 9/13/2022
Page No : 4

	Foster From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0	0	0	**2**	2
05:15 PM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	**3**	0	**3**	0	0	0	0	0	1	0	0	0	1	**4**
05:45 PM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	0	0	1	3
Total Volume	0	0	0	0	0	0	0	7	0	7	0	0	0	0	0	4	0	0	0	4	11
% App. Total	0	0	0	0		0	0	100	0		0	0	0	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.583	.000	.583	.000	.000	.000	.000	.000	.500	.000	.000	.000	.500	.688
Passenger Veh	0	0	0	0	0	0	0	7	0	7	0	0	0	0	0	4	0	0	0	4	11
% Passenger Veh	0	0	0	0	0	0	0	100	0	100	0	0	0	0	0	100	0	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group

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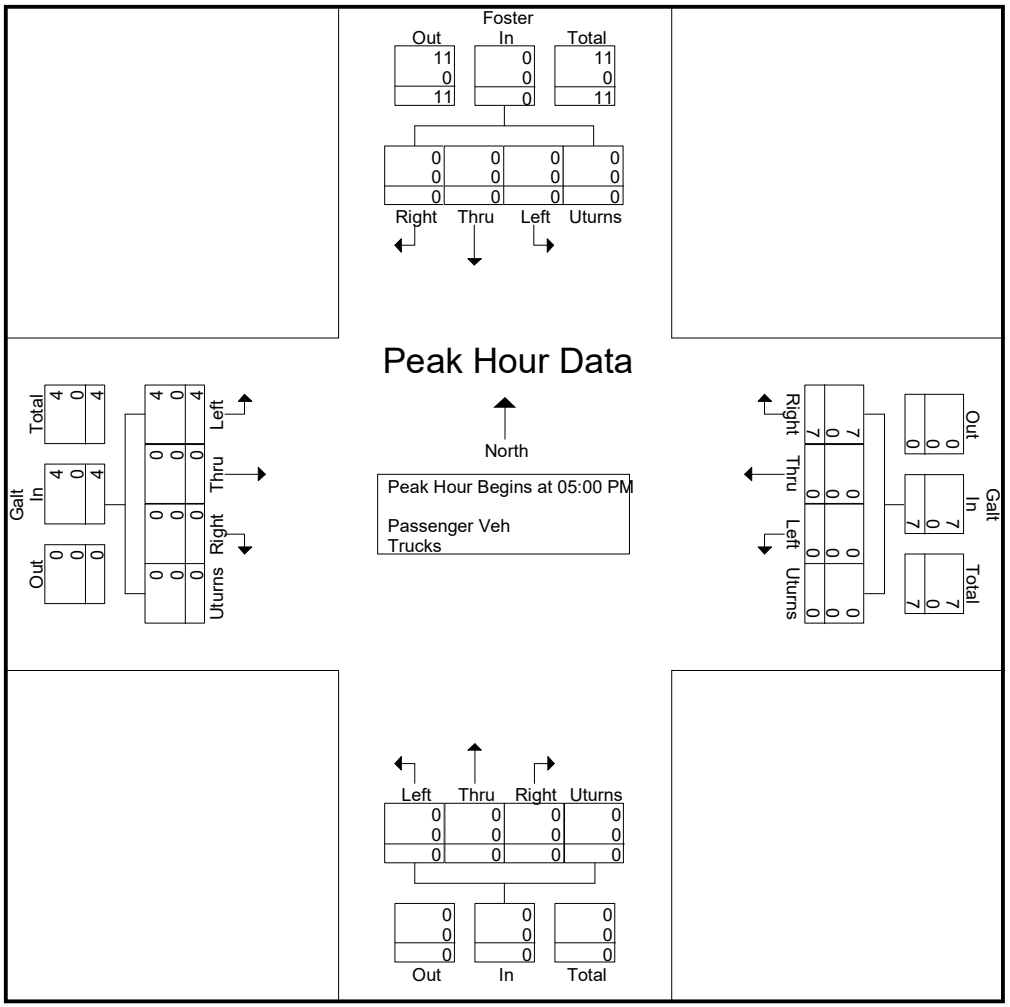
File Name : Foster and Galt
Site Code : 00004037
Start Date : 9/13/2022
Page No : 5



Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Galt and Ashbury
Site Code : 00059088
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Ashbury From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
08:00 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Grand Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Apprch %	0	0	0	100		0	0	0	0		0	0	0	0		0	0	0	0		
Total %	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Galt and Ashbury
Site Code : 00059088
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Ashbury From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	5	0	2	0	7	0	11	5	0	16	0	0	0	0	0	0	1	0	0	1	24
07:15 AM	7	0	10	0	17	0	20	12	0	32	0	0	0	0	0	0	0	0	0	0	49
07:30 AM	20	0	6	0	26	0	4	8	0	12	0	0	0	0	0	0	2	0	0	2	40
07:45 AM	15	0	3	0	18	0	8	5	0	13	0	0	0	0	0	0	5	0	0	5	36
Total	47	0	21	0	68	0	43	30	0	73	0	0	0	0	0	0	8	0	0	8	149
08:00 AM	2	0	3	0	5	0	3	2	0	5	0	0	0	0	0	0	1	0	0	1	11
08:15 AM	10	0	0	0	10	0	1	3	0	4	0	0	0	0	0	1	0	0	0	1	15
08:30 AM	8	0	1	0	9	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	15
08:45 AM	2	0	0	0	2	0	0	2	0	2	0	0	0	0	0	0	1	0	0	1	5
Total	22	0	4	0	26	0	8	7	0	15	0	0	0	0	0	1	4	0	0	5	46
*** BREAK ***																					
04:00 PM	35	0	2	0	37	0	2	2	0	4	0	0	0	0	0	3	21	0	0	24	65
04:15 PM	7	0	0	0	7	0	0	2	0	2	0	0	0	0	0	0	3	0	0	3	12
04:30 PM	3	0	0	0	3	0	1	0	0	1	0	0	0	0	0	1	8	0	0	9	13
04:45 PM	2	0	0	0	2	0	1	3	0	4	0	0	0	0	0	0	2	0	0	2	8
Total	47	0	2	0	49	0	4	7	0	11	0	0	0	0	0	4	34	0	0	38	98
05:00 PM	7	0	0	0	7	0	1	1	0	2	0	0	0	0	0	2	14	0	0	16	25
05:15 PM	7	0	0	0	7	0	3	1	0	4	0	0	0	0	0	0	2	0	0	2	13
05:30 PM	4	0	0	0	4	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	8
05:45 PM	3	0	0	0	3	0	0	2	0	2	0	0	0	0	0	0	1	0	0	1	6
Total	21	0	0	0	21	0	5	4	0	9	0	0	0	0	0	2	20	0	0	22	52
Grand Total	137	0	27	0	164	0	60	48	0	108	0	0	0	0	0	7	66	0	0	73	345
Apprch %	83.5	0	16.5	0		0	55.6	44.4	0		0	0	0	0		9.6	90.4	0	0		
Total %	39.7	0	7.8	0	47.5	0	17.4	13.9	0	31.3	0	0	0	0	0	2	19.1	0	0	21.2	
Passenger Veh	137	0	27	0	164	0	60	48	0	108	0	0	0	0	0	7	66	0	0	73	345
% Passenger Veh	100	0	100	0	100	0	100	100	0	100	0	0	0	0	0	100	100	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group
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File Name : Galt and Ashbury
Site Code : 00059088
Start Date : 9/13/2022
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	Ashbury From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	5	0	2	0	7	0	11	5	0	16	0	0	0	0	0	0	1	0	0	1	24
07:15 AM	7	0	**10**	0	17	0	**20**	**12**	0	**32**	0	0	0	0	0	0	0	0	0	0	**49**
07:30 AM	**20**	0	6	0	**26**	0	4	8	0	12	0	0	0	0	0	0	2	0	0	2	40
07:45 AM	15	0	3	0	18	0	8	5	0	13	0	0	0	0	0	0	**5**	0	0	**5**	36
Total Volume	47	0	21	0	68	0	43	30	0	73	0	0	0	0	0	0	8	0	0	8	149
% App. Total	69.1	0	30.9	0		0	58.9	41.1	0		0	0	0	0		0	100	0	0		
PHF	.588	.000	.525	.000	.654	.000	.538	.625	.000	.570	.000	.000	.000	.000	.000	.000	.400	.000	.000	.400	.760
Passenger Veh	47	0	21	0	68	0	43	30	0	73	0	0	0	0	0	0	8	0	0	8	149
% Passenger Veh	100	0	100	0	100	0	100	100	0	100	0	0	0	0	0	0	100	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Galt and Ashbury
Site Code : 00059088
Start Date : 9/13/2022
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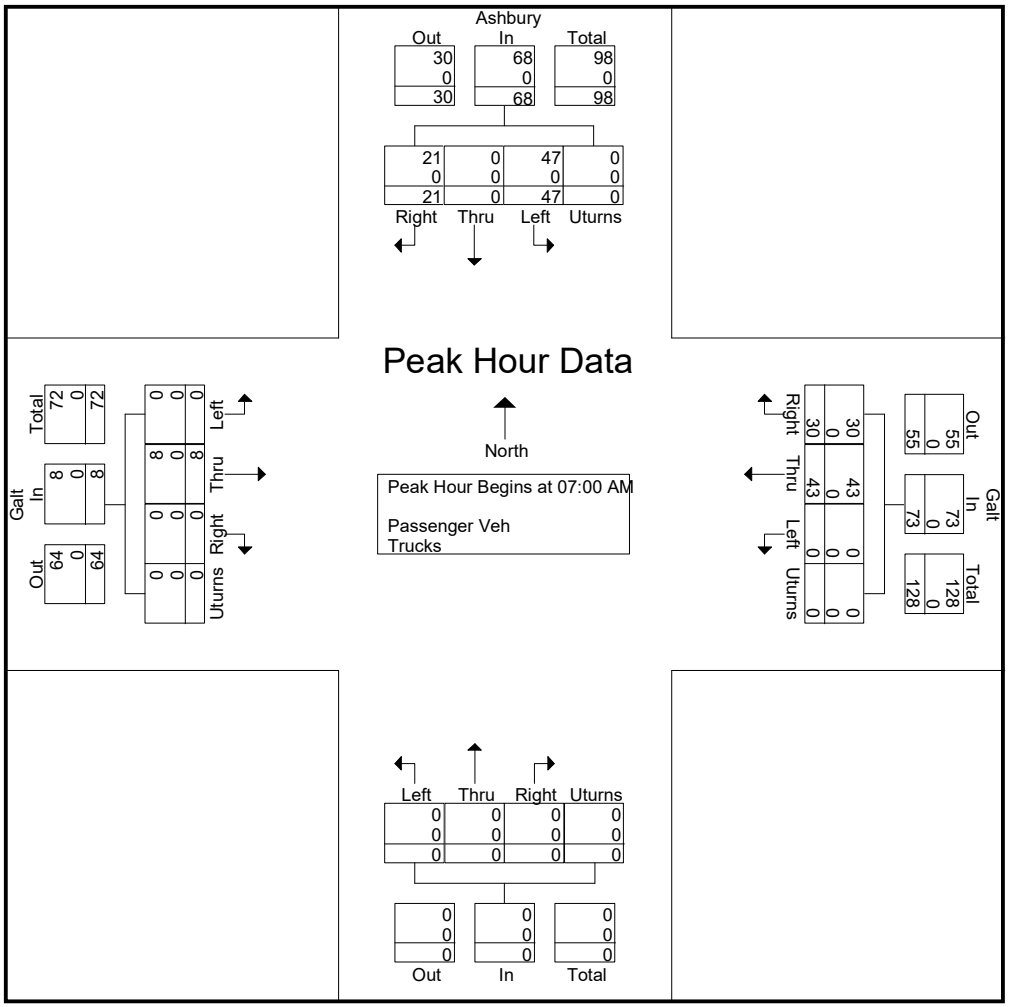

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Galt and Ashbury
Site Code : 00059088
Start Date : 9/13/2022
Page No : 4

	Ashbury From North					Galt From East					From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	**35**	0	**2**	0	**37**	0	**2**	2	0	**4**	0	0	0	0	0	**3**	**21**	0	0	**24**	**65**
04:15 PM	7	0	0	0	7	0	0	2	0	2	0	0	0	0	0	0	3	0	0	3	12
04:30 PM	3	0	0	0	3	0	1	0	0	1	0	0	0	0	0	1	8	0	0	9	13
04:45 PM	2	0	0	0	2	0	1	**3**	0	4	0	0	0	0	0	0	2	0	0	2	8
Total Volume	47	0	2	0	49	0	4	7	0	11	0	0	0	0	0	4	34	0	0	38	98
% App. Total	95.9	0	4.1	0		0	36.4	63.6	0		0	0	0	0		10.5	89.5	0	0		
PHF	.336	.000	.250	.000	.331	.000	.500	.583	.000	.688	.000	.000	.000	.000	.000	.333	.405	.000	.000	.396	.377
Passenger Veh	47	0	2	0	49	0	4	7	0	11	0	0	0	0	0	4	34	0	0	38	98
% Passenger Veh	100	0	100	0	100	0	100	100	0	100	0	0	0	0	0	100	100	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group

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File Name : Galt and Ashbury
Site Code : 00059088
Start Date : 9/13/2022
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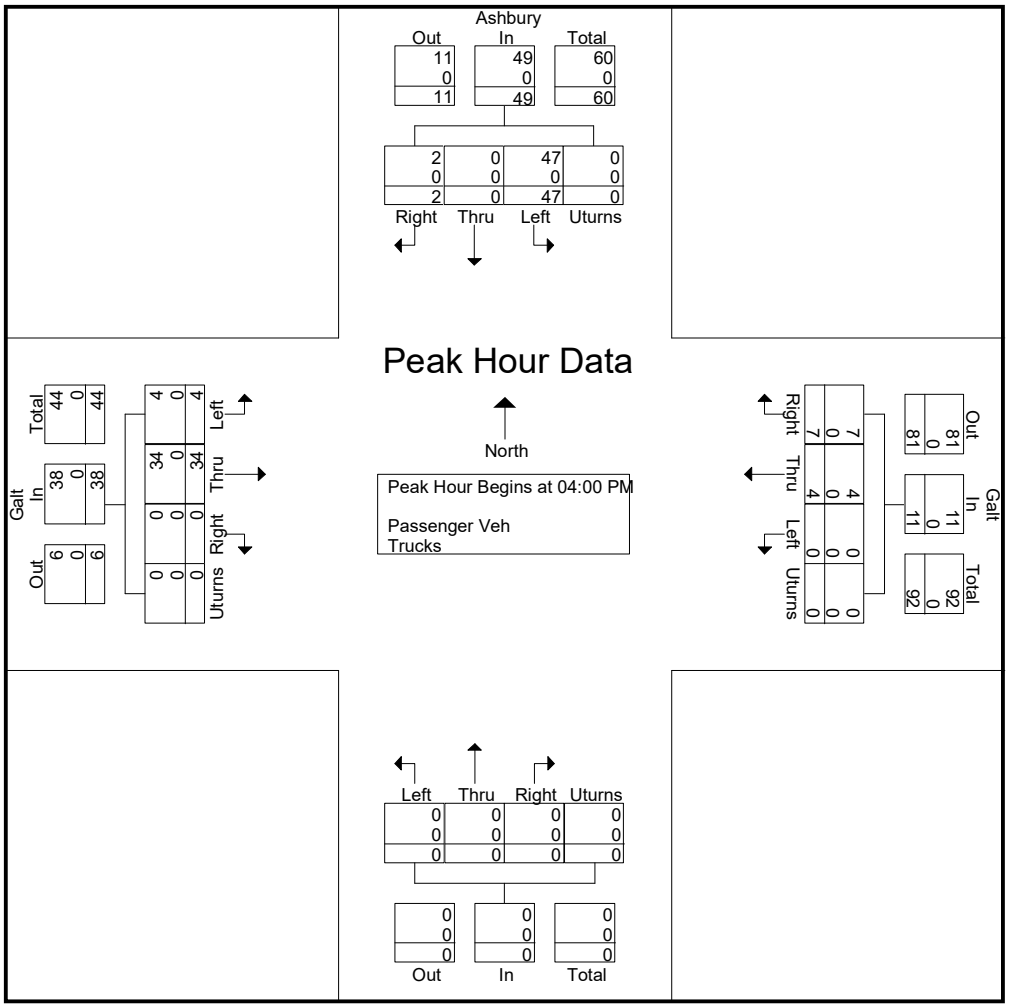


Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Ironbound and Schmidt
Site Code : 00000489
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Ironbound From North					From East					Ironbound From South					Schmidt From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	1	1	7
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	1	1	7
08:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
08:45 AM	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Total	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
*** BREAK ***																					
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	0	0	2
04:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	2	0	0	0	0	0	0	3	0	1	4	0	0	0	1	1	7
*** BREAK ***																					
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Grand Total	0	8	0	0	8	0	0	0	0	0	0	10	0	1	11	0	0	0	2	2	21
Apprch %	0	100	0	0		0	0	0	0		0	90.9	0	9.1		0	0	0	100		
Total %	0	38.1	0	0	38.1	0	0	0	0	0	0	47.6	0	4.8	52.4	0	0	0	9.5	9.5	

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Ironbound and Schmidt
Site Code : 00000489
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Ironbound From North					From East					Ironbound From South					Schmidt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	0	81	0	0	81	0	0	0	0	0	2	55	0	0	57	0	0	0	0	0	138
07:15 AM	0	101	5	0	106	0	0	0	0	0	3	49	0	0	52	1	0	2	0	3	161
07:30 AM	0	98	1	0	99	0	0	0	0	0	0	75	0	0	75	0	0	0	0	0	174
07:45 AM	0	169	0	0	169	0	0	0	0	0	0	84	0	0	84	0	0	1	0	1	254
Total	0	449	6	0	455	0	0	0	0	0	5	263	0	0	268	1	0	3	0	4	727
08:00 AM	0	137	0	0	137	0	0	0	0	0	2	73	0	0	75	1	0	0	0	1	213
08:15 AM	0	119	1	0	120	0	0	0	0	0	1	85	0	0	86	0	0	1	0	1	207
08:30 AM	0	98	0	0	98	0	0	0	0	0	1	72	0	0	73	0	0	0	0	0	171
08:45 AM	0	125	0	0	125	0	0	0	0	0	1	84	0	0	85	0	0	0	0	0	210
Total	0	479	1	0	480	0	0	0	0	0	5	314	0	0	319	1	0	1	0	2	801
*** BREAK ***																					
04:00 PM	0	116	1	0	117	0	0	0	0	0	0	150	0	0	150	16	0	13	0	29	296
04:15 PM	0	151	0	0	151	0	0	0	0	0	1	160	0	0	161	3	0	1	0	4	316
04:30 PM	0	123	0	0	123	1	0	0	0	1	1	167	0	0	168	1	0	0	0	1	293
04:45 PM	0	159	0	0	159	0	0	0	0	0	0	163	0	0	163	1	0	2	0	3	325
Total	0	549	1	0	550	1	0	0	0	1	2	640	0	0	642	21	0	16	0	37	1230
05:00 PM	0	129	0	0	129	0	0	0	0	0	1	191	0	1	193	0	0	0	0	0	322
05:15 PM	0	126	0	0	126	0	0	0	0	0	0	162	0	0	162	0	0	0	0	0	288
05:30 PM	0	118	0	0	118	0	0	0	0	0	1	140	0	0	141	0	0	0	0	0	259
05:45 PM	0	97	0	0	97	0	0	0	0	0	0	121	0	0	121	0	0	0	0	0	218
Total	0	470	0	0	470	0	0	0	0	0	2	614	0	1	617	0	0	0	0	0	1087
Grand Total	0	1947	8	0	1955	1	0	0	0	1	14	1831	0	1	1846	23	0	20	0	43	3845
Apprch %	0	99.6	0.4	0		100	0	0	0		0.8	99.2	0	0.1		53.5	0	46.5	0		
Total %	0	50.6	0.2	0	50.8	0	0	0	0	0	0.4	47.6	0	0	48	0.6	0	0.5	0	1.1	
Passenger Veh	0	1913	8	0	1921	1	0	0	0	1	14	1794	0	1	1809	23	0	20	0	43	3774
% Passenger Veh	0	98.3	100	0	98.3	100	0	0	0	100	100	98	0	100	98	100	0	100	0	100	98.2
Trucks	0	34	0	0	34	0	0	0	0	0	0	37	0	0	37	0	0	0	0	0	71
% Trucks	0	1.7	0	0	1.7	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1.8

Data Collection Group
LSmith@DataCollectionGroup.net

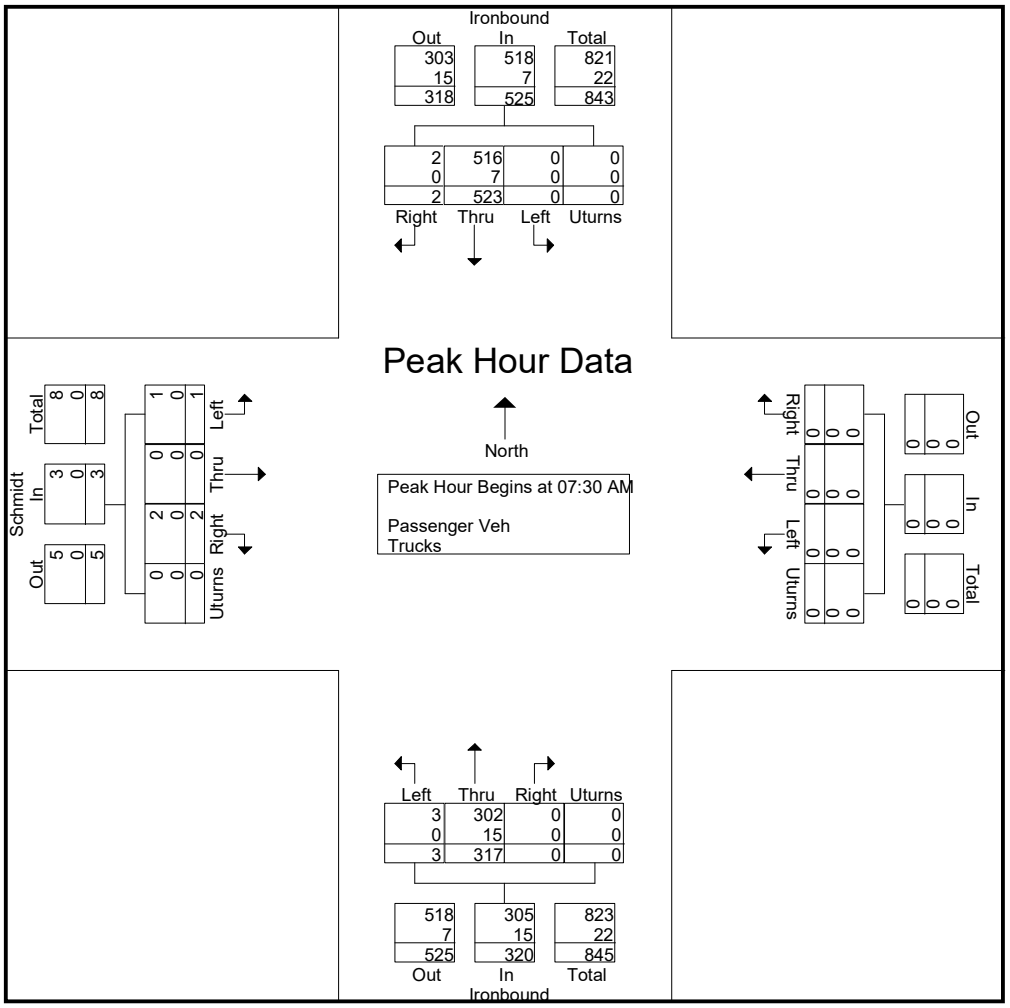
File Name : Ironbound and Schmidt
Site Code : 00000489
Start Date : 9/13/2022

	Ironbound From North					From East					Ironbound From South					Schmidt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	98	**1**	0	99	0	0	0	0	0	0	75	0	0	75	0	0	0	0	0	174
07:45 AM	0	**169**	0	0	**169**	0	0	0	0	0	0	84	0	0	84	0	0	**1**	0	**1**	**254**
08:00 AM	0	137	0	0	137	0	0	0	0	0	**2**	73	0	0	75	**1**	0	0	0	1	213
08:15 AM	0	119	1	0	120	0	0	0	0	0	1	**85**	0	0	**86**	0	0	1	0	1	207
Total Volume	0	523	2	0	525	0	0	0	0	0	3	317	0	0	320	1	0	2	0	3	848
% App. Total	0	99.6	0.4	0		0	0	0	0		0.9	99.1	0	0		33.3	0	66.7	0		
PHF	.000	.774	.500	.000	.777	.000	.000	.000	.000	.000	.375	.932	.000	.000	.930	.250	.000	.500	.000	.750	.835
Passenger Veh	0	516	2	0	518	0	0	0	0	0	3	302	0	0	305	1	0	2	0	3	826
% Passenger Veh	0	98.7	100	0	98.7	0	0	0	0	0	100	95.3	0	0	95.3	100	0	100	0	100	97.4
Trucks	0	7	0	0	7	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	22
% Trucks	0	1.3	0	0	1.3	0	0	0	0	0	0	4.7	0	0	4.7	0	0	0	0	0	2.6

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Ironbound and Schmidt
Site Code : 00000489
Start Date : 9/13/2022
Page No : 3



Data Collection Group
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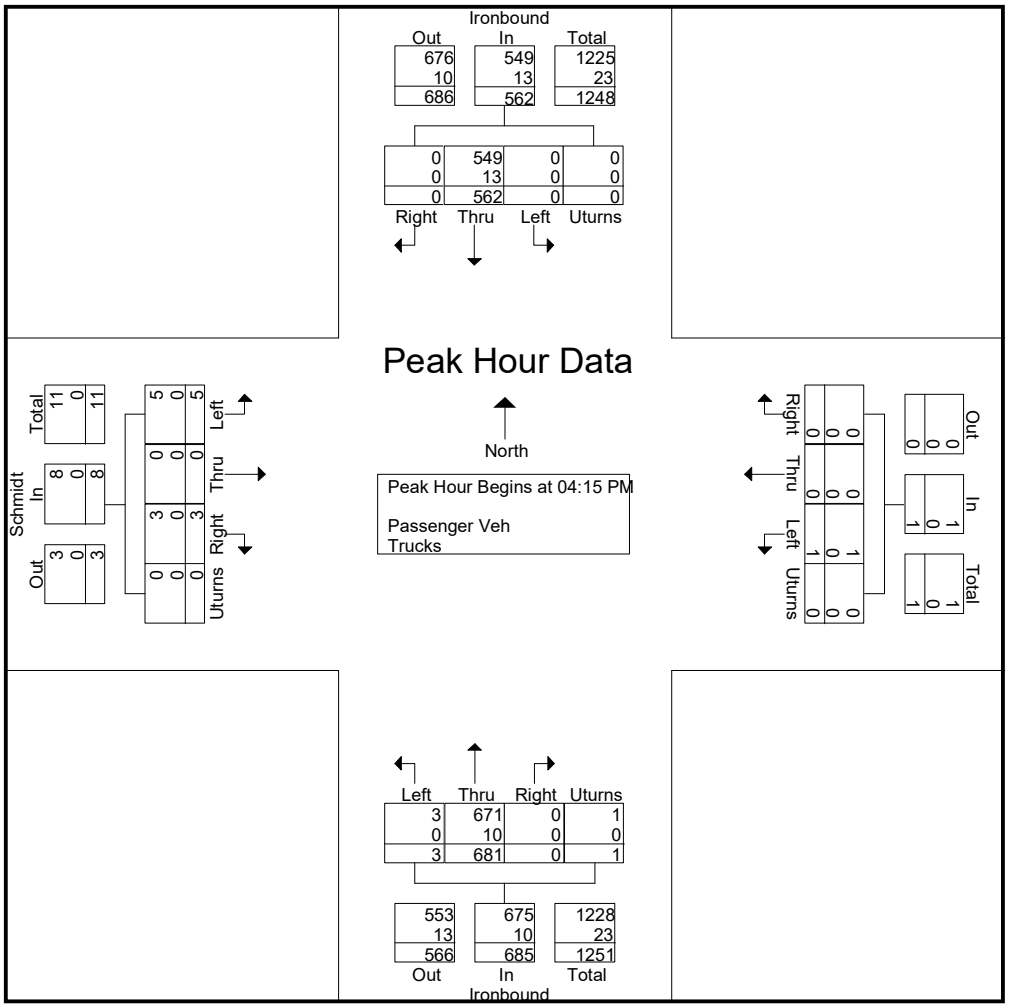
File Name : Ironbound and Schmidt
Site Code : 00000489
Start Date : 9/13/2022
Page No : 4

	Ironbound From North					From East					Ironbound From South					Schmidt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	151	0	0	151	0	0	0	0	0	**1**	160	0	0	161	**3**	0	1	0	**4**	316
04:30 PM	0	123	0	0	123	**1**	0	0	0	**1**	1	167	0	0	168	1	0	0	0	1	293
04:45 PM	0	**159**	0	0	**159**	0	0	0	0	0	0	163	0	0	163	1	0	**2**	0	3	**325**
05:00 PM	0	129	0	0	129	0	0	0	0	0	1	**191**	0	**1**	**193**	0	0	0	0	0	322
Total Volume	0	562	0	0	562	1	0	0	0	1	3	681	0	1	685	5	0	3	0	8	1256
% App. Total	0	100	0	0		100	0	0	0		0.4	99.4	0	0.1		62.5	0	37.5	0		
PHF	.000	.884	.000	.000	.884	.250	.000	.000	.000	.250	.750	.891	.000	.250	.887	.417	.000	.375	.000	.500	.966
Passenger Veh	0	549	0	0	549	1	0	0	0	1	3	671	0	1	675	5	0	3	0	8	1233
% Passenger Veh	0	97.7	0	0	97.7	100	0	0	0	100	100	98.5	0	100	98.5	100	0	100	0	100	98.2
Trucks	0	13	0	0	13	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	23
% Trucks	0	2.3	0	0	2.3	0	0	0	0	0	0	1.5	0	0	1.5	0	0	0	0	0	1.8

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Ironbound and Schmidt
Site Code : 00000489
Start Date : 9/13/2022
Page No : 5



Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 NB
Site Code :
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Longhill Rd From East				Rte 199 NB Ramps From South				Longhill Rd From West				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
07:30 AM	0	1	0	1	0	0	0	0	0	0	0	0	1
Total	0	1	0	1	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	1	0	0	1	0	0	0	0	1
08:45 AM	0	1	0	1	0	0	0	0	0	0	0	0	1
Total	0	1	0	1	1	0	0	1	0	0	0	0	2
04:00 PM	0	1	0	1	0	0	0	0	1	0	0	1	2
Total	0	1	0	1	0	0	0	0	1	0	0	1	2
05:45 PM	0	2	0	2	0	0	0	0	1	0	0	1	3
Total	0	2	0	2	0	0	0	0	1	0	0	1	3
Grand Total	0	5	0	5	1	0	0	1	2	0	0	2	8
Apprch %	0	100	0		100	0	0		100	0	0		
Total %	0	62.5	0	62.5	12.5	0	0	12.5	25	0	0	25	

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 NB
Site Code :
Start Date : 9/13/2022

	Longhill Rd From East				Rte 199 NB Ramps From South				Longhill Rd From West				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	**1**	0	**1**	0	0	0	0	0	0	0	0	**1**
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	**1**			**1**	0	0	0	0	1
Total Volume	0	1	0	1	1	0	0	1	0	0	0	0	2
% App. Total	0	100	0		100	0	0		0	0	0		
PHF	.000	.250	.000	.250	.250	.000	.000	.250	.000	.000	.000	.000	.500

Data Collection Group
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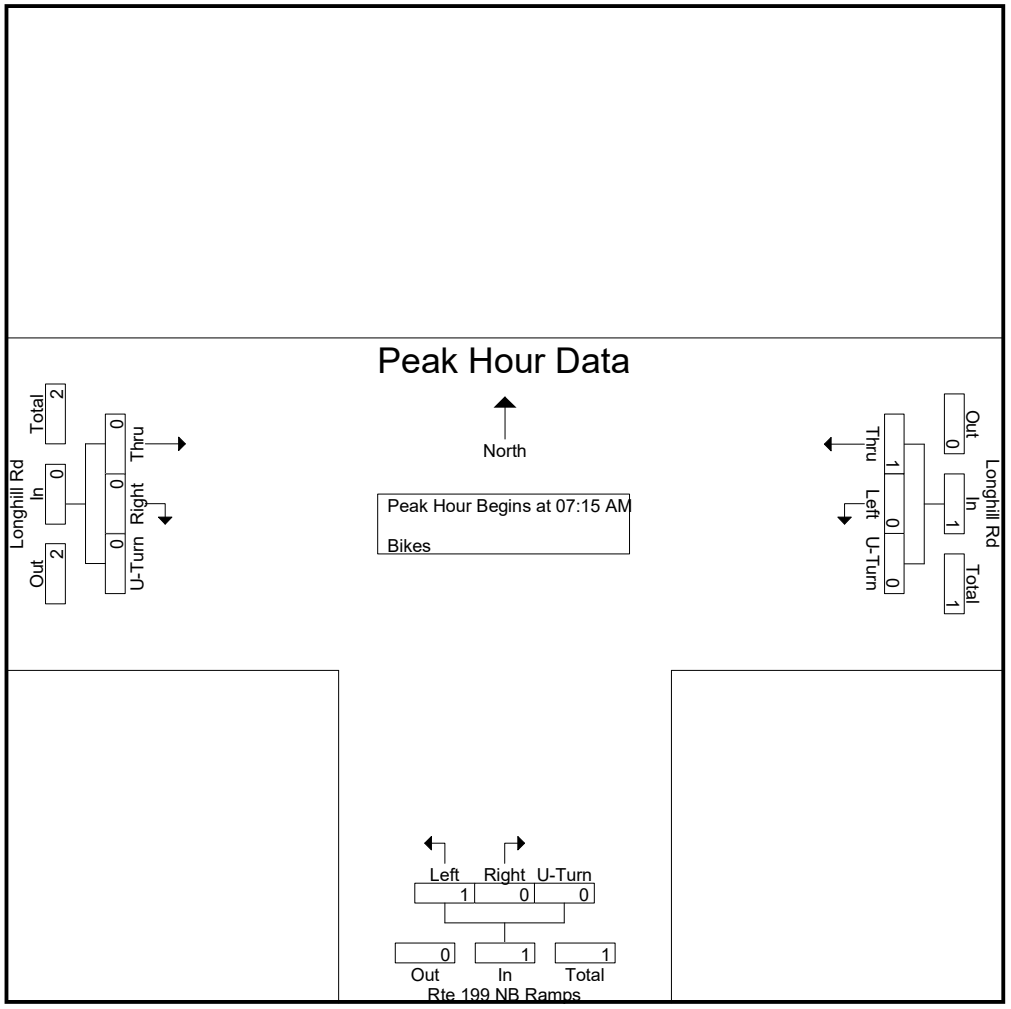
File Name : Longhill and Rte 199 NB
Site Code :
Start Date : 9/13/2022
Page No : 3



Data Collection Group
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File Name : Longhill and Rte 199 NB
Site Code :
Start Date : 9/13/2022

	Longhill Rd From East				Rte 199 NB Ramps From South				Longhill Rd From West				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	**2**	0	**2**	0	0	0	0	**1**	0	0	**1**	**3**
Total Volume	0	2	0	2	0	0	0	0	1	0	0	1	3
% App. Total	0	100	0		0	0	0		100	0	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.250	.000	.000	.250	.250

Data Collection Group
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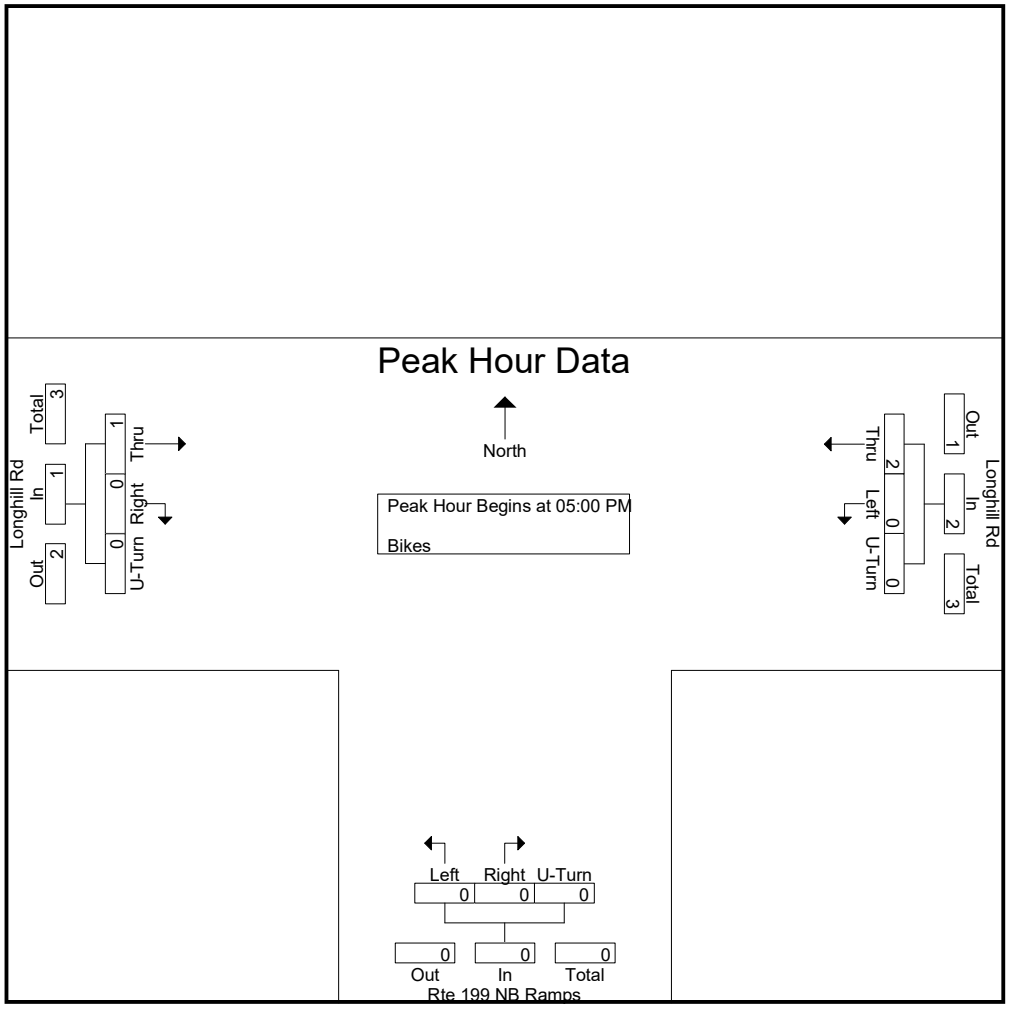
File Name : Longhill and Rte 199 NB
Site Code :
Start Date : 9/13/2022
Page No : 5



Data Collection Group
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File Name : Longhill and Rte 199 NB Ramps
Site Code :
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Longhill Rd From East				Rte 199 NB Ramps From South				Longhill Rd From West				
Start Time	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
07:00 AM	24	46	0	70	55	7	0	62	135	17	0	152	284
07:15 AM	18	33	0	51	25	10	0	35	147	27	0	174	260
07:30 AM	22	47	0	69	28	13	0	41	142	34	0	176	286
07:45 AM	26	71	0	97	46	24	0	70	218	38	0	256	423
Total	90	197	0	287	154	54	0	208	642	116	0	758	1253
08:00 AM	31	58	0	89	47	14	0	61	138	25	0	163	313
08:15 AM	22	59	0	81	56	12	0	68	145	21	0	166	315
08:30 AM	21	87	0	108	57	17	0	74	124	24	0	148	330
08:45 AM	18	59	0	77	74	10	0	84	144	24	1	169	330
Total	92	263	0	355	234	53	0	287	551	94	1	646	1288
04:00 PM	69	126	0	195	74	12	0	86	119	18	0	137	418
04:15 PM	57	107	0	164	94	25	0	119	122	21	0	143	426
04:30 PM	51	144	0	195	76	42	0	118	113	20	0	133	446
04:45 PM	75	142	0	217	120	37	0	157	113	27	0	140	514
Total	252	519	0	771	364	116	0	480	467	86	0	553	1804
05:00 PM	66	157	0	223	109	34	0	143	140	25	1	166	532
05:15 PM	59	161	0	220	116	37	0	153	172	26	0	198	571
05:30 PM	55	169	0	224	107	24	0	131	120	17	0	137	492
05:45 PM	33	100	0	133	74	20	0	94	103	19	0	122	349
Total	213	587	0	800	406	115	0	521	535	87	1	623	1944
Grand Total	647	1566	0	2213	1158	338	0	1496	2195	383	2	2580	6289
Apprch %	29.2	70.8	0		77.4	22.6	0		85.1	14.8	0.1		
Total %	10.3	24.9	0	35.2	18.4	5.4	0	23.8	34.9	6.1	0	41	
Passenger Veh	639	1534	0	2173	1136	333	0	1469	2156	375	2	2533	6175
% Passenger Veh	98.8	98	0	98.2	98.1	98.5	0	98.2	98.2	97.9	100	98.2	98.2
Trucks	8	32	0	40	22	5	0	27	39	8	0	47	114
% Trucks	1.2	2	0	1.8	1.9	1.5	0	1.8	1.8	2.1	0	1.8	1.8

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 NB Ramps
Site Code :
Start Date : 9/13/2022

	Longhill Rd From East				Rte 199 NB Ramps From South				Longhill Rd From West				
Start Time	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	26	71	0	97	46	**24**	0	70	**218**	**38**	0	**256**	**423**
08:00 AM	**31**	58	0	89	47	14	0	61	138	25	0	163	313
08:15 AM	22	59	0	81	56	12	0	68	145	21	0	166	315
08:30 AM	21	**87**	0	**108**	**57**			**74**	124	24	0	148	330
Total Volume	100	275	0	375	206	67	0	273	625	108	0	733	1381
% App. Total	26.7	73.3	0		75.5	24.5	0		85.3	14.7	0		
PHF	.806	.790	.000	.868	.904	.698	.000	.922	.717	.711	.000	.716	.816
Passenger Veh	100	264	0	364	198	65	0	263	614	108	0	722	1349
% Passenger Veh	100	96.0	0	97.1	96.1	97.0	0	96.3	98.2	100	0	98.5	97.7
Trucks	0	11	0	11	8	2	0	10	11	0	0	11	32
% Trucks	0	4.0	0	2.9	3.9	3.0	0	3.7	1.8	0	0	1.5	2.3

Data Collection Group
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File Name : Longhill and Rte 199 NB Ramps
Site Code :
Start Date : 9/13/2022
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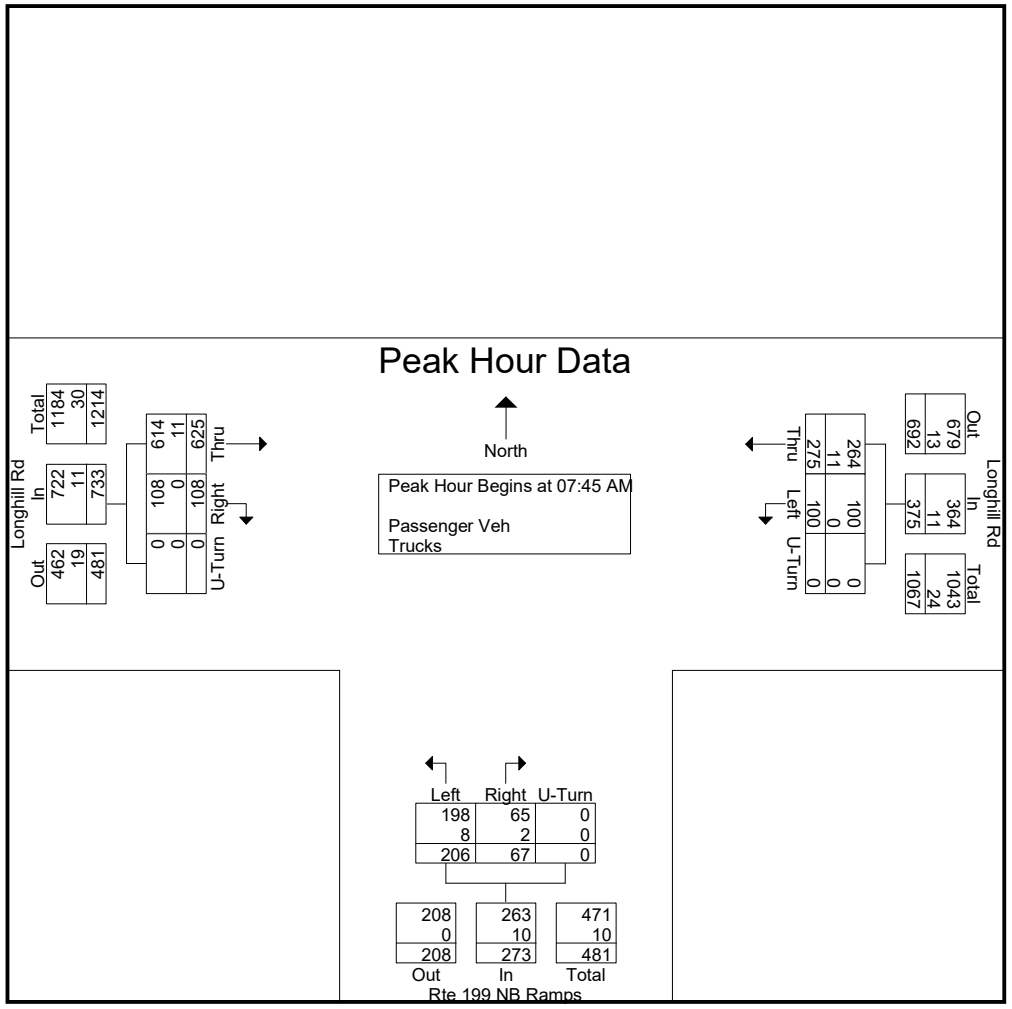

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 NB Ramps
Site Code :
Start Date : 9/13/2022

	Longhill Rd From East				Rte 199 NB Ramps From South				Longhill Rd From West				
Start Time	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	**75**	142	0	217	**120**	**37**	0	**157**	113	**27**	0	140	514
05:00 PM	66	157	0	223	109	34	0	143	140	25	**1**	166	532
05:15 PM	59	161	0	220	116	37	0	153	**172**	26	0	**198**	**571**
05:30 PM	55	**169**	0	**224**	107	24	0	131	120	17	0	137	492
Total Volume	255	629	0	884	452	132	0	584	545	95	1	641	2109
% App. Total	28.8	71.2	0		77.4	22.6	0		85	14.8	0.2		
PHF	.850	.930	.000	.987	.942	.892	.000	.930	.792	.880	.250	.809	.923
Passenger Veh	254	619	0	873	446	131	0	577	533	90	1	624	2074
% Passenger Veh	99.6	98.4	0	98.8	98.7	99.2	0	98.8	97.8	94.7	100	97.3	98.3
Trucks	1	10	0	11	6	1	0	7	12	5	0	17	35
% Trucks	0.4	1.6	0	1.2	1.3	0.8	0	1.2	2.2	5.3	0	2.7	1.7

Data Collection Group
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File Name : Longhill and Rte 199 NB Ramps
Site Code :
Start Date : 9/13/2022
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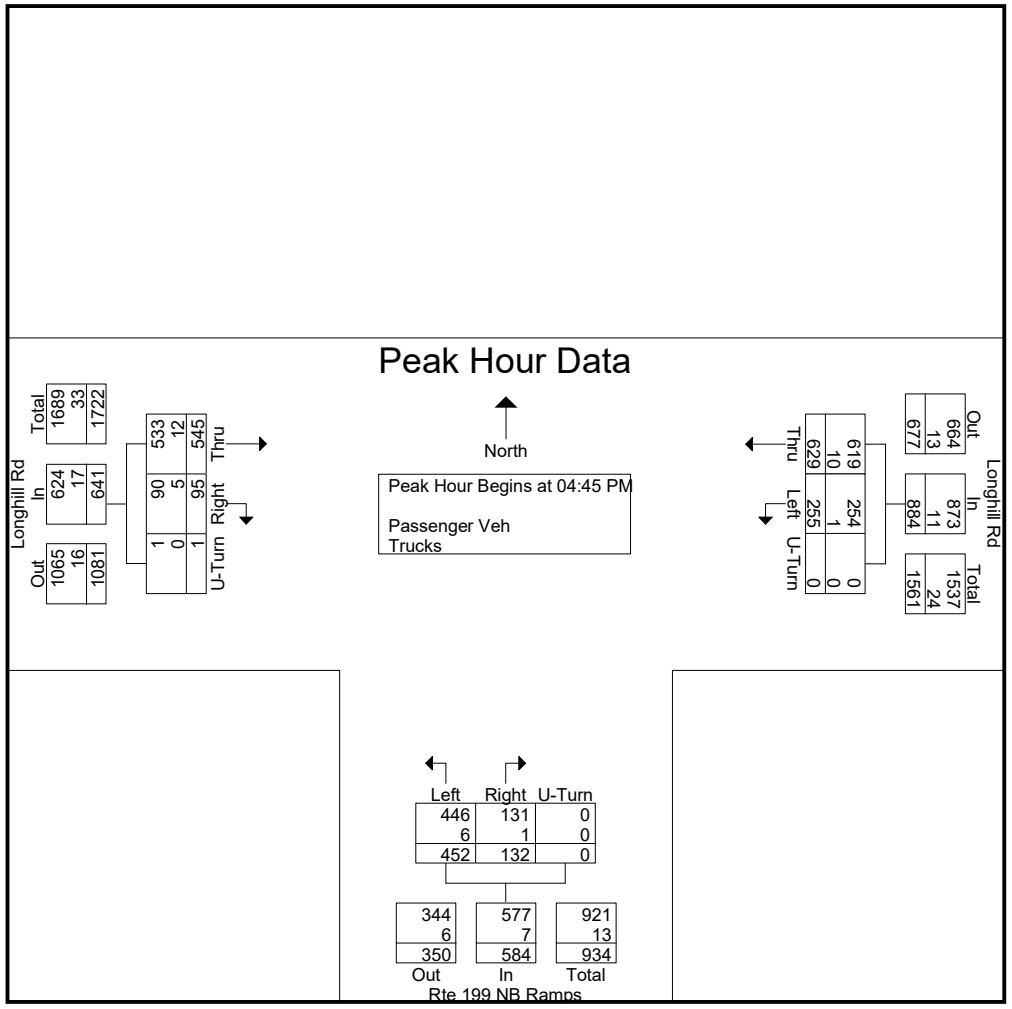

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 SB Ramps
Site Code : 00004037
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Rte 199 SB Off Ramp From North					Longhill Rd From East					From South					Longhill Rd From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
07:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
*** BREAK ***																					
08:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
*** BREAK ***																					
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
04:45 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
Total	0	0	0	3	3	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	8
*** BREAK ***																					
05:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Grand Total	0	0	0	4	4	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	15
Apprch %	0	0	0	100		0	100	0	0		0	0	0	0		0	100	0	0		
Total %	0	0	0	26.7	26.7	0	40	0	0	40	0	0	0	0	0	0	33.3	0	0	33.3	

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 SB Ramps
Site Code : 00004037
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Rte 199 SB Off Ramp From North					Longhill Rd From East					From South					Longhill Rd From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	45	0	20	0	65	9	94	0	0	103	0	0	0	0	0	0	113	90	0	203	371
07:15 AM	72	0	16	0	88	11	47	0	0	58	0	0	0	0	0	0	112	103	0	215	361
07:30 AM	55	0	17	0	72	11	64	0	0	75	0	0	0	0	0	0	120	96	0	216	363
07:45 AM	82	1	29	0	112	20	95	0	1	116	0	0	0	0	0	0	163	101	0	264	492
Total	254	1	82	0	337	51	300	0	1	352	0	0	0	0	0	0	508	390	0	898	1587
08:00 AM	66	0	18	0	84	14	91	0	0	105	0	0	0	0	0	0	92	81	0	173	362
08:15 AM	60	0	31	0	91	11	102	0	0	113	0	0	0	0	0	0	104	72	0	176	380
08:30 AM	47	0	20	0	67	14	132	0	1	147	0	0	0	0	0	0	99	86	0	185	399
08:45 AM	64	0	32	0	96	12	119	0	0	131	0	0	0	0	0	0	109	99	0	208	435
Total	237	0	101	0	338	51	444	0	1	496	0	0	0	0	0	0	404	338	0	742	1576
*** BREAK ***																					
04:00 PM	46	0	39	0	85	24	174	0	3	201	0	0	0	0	0	0	95	84	0	179	465
04:15 PM	45	0	42	0	87	15	186	0	1	202	0	0	0	0	0	0	91	88	0	179	468
04:30 PM	49	0	54	0	103	29	191	0	0	220	0	0	0	0	0	0	87	80	0	167	490
04:45 PM	57	0	48	0	105	20	237	0	1	258	0	0	0	0	0	0	86	71	0	157	520
Total	197	0	183	0	380	88	788	0	5	881	0	0	0	0	0	0	359	323	0	682	1943
05:00 PM	52	0	54	0	106	18	247	0	0	265	0	0	0	0	0	0	120	80	0	200	571
05:15 PM	62	0	51	0	113	23	256	0	0	279	0	0	0	0	0	0	128	94	0	222	614
05:30 PM	39	0	51	0	90	25	244	0	1	270	0	0	0	0	0	0	101	85	0	186	546
05:45 PM	23	1	44	0	68	21	155	0	0	176	0	0	0	0	0	0	97	68	0	165	409
Total	176	1	200	0	377	87	902	0	1	990	0	0	0	0	0	0	446	327	0	773	2140
Grand Total	864	2	566	0	1432	277	2434	0	8	2719	0	0	0	0	0	0	1717	1378	0	3095	7246
Apprch %	60.3	0.1	39.5	0		10.2	89.5	0	0.3		0	0	0	0		0	55.5	44.5	0		
Total %	11.9	0	7.8	0	19.8	3.8	33.6	0	0.1	37.5	0	0	0	0	0	0	23.7	19	0	42.7	
Passenger Veh	850	2	548	0	1400	270	2383	0	8	2661	0	0	0	0	0	0	1684	1350	0	3034	7095
% Passenger Veh	98.4	100	96.8	0	97.8	97.5	97.9	0	100	97.9	0	0	0	0	0	0	98.1	98	0	98	97.9
Trucks	14	0	18	0	32	7	51	0	0	58	0	0	0	0	0	0	33	28	0	61	151
% Trucks	1.6	0	3.2	0	2.2	2.5	2.1	0	0	2.1	0	0	0	0	0	0	1.9	2	0	2	2.1

Data Collection Group
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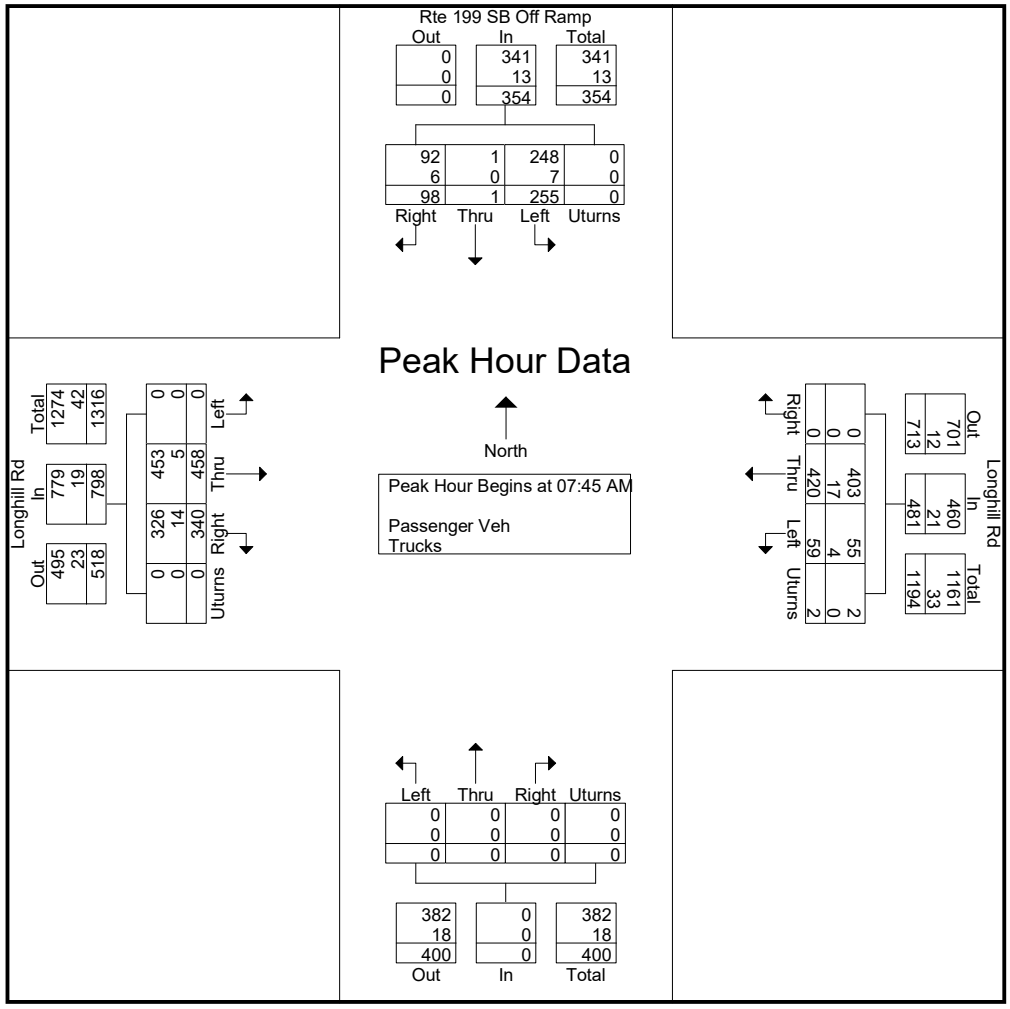
File Name : Longhill and Rte 199 SB Ramps
Site Code : 00004037
Start Date : 9/13/2022

	Rte 199 SB Off Ramp From North					Longhill Rd From East					From South					Longhill Rd From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**82**	**1**			**112**	**20**	95	0	**1**								**163**	**101**		**264**	**492**
08:00 AM	66	0	18	0	84	14	91	0	0	105	0	0	0	0	0	0	92	81	0	173	362
08:15 AM	60	0	**31**																		
08:30 AM	**47**	**0**	**20**	**0**	**67**	**14**	**132**	0	1	**147**	0	0	0	0	0	0	99	86	0	185	399
Total Volume	255	1	98	0	354	59	420	0	2	481	0	0	0	0	0	0	458	340	0	798	1633
% App. Total	72	0.3	27.7	0		12.3	87.3	0	0.4		0	0	0	0		0	57.4	42.6	0		
PHF	.777	.250	.790	.000	.790	.738	.795	.000	.500	.818	.000	.000	.000	.000	.000	.000	.702	.842	.000	.756	.830
Passenger Veh	248	1	92	0	341	55	403	0	2	460	0	0	0	0	0	0	453	326	0	779	1580
% Passenger Veh	97.3	100	93.9	0	96.3	93.2	96.0	0	100	95.6	0	0	0	0	0	0	98.9	95.9	0	97.6	96.8
Trucks	7	0	6	0	13	4	17	0	0	21	0	0	0	0	0	0	5	14	0	19	53
% Trucks	2.7	0	6.1	0	3.7	6.8	4.0	0	0	4.4	0	0	0	0	0	0	1.1	4.1	0	2.4	3.2

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 SB Ramps
Site Code : 00004037
Start Date : 9/13/2022
Page No : 3



Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Longhill and Rte 199 SB Ramps
Site Code : 00004037
Start Date : 9/13/2022

	Rte 199 SB Off Ramp From North					Longhill Rd From East					From South					Longhill Rd From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	57	0	48	0	105	20	237	0	**1**												
05:00 PM	**52**	**0**	**54**	**0**	**106**	**18**	**247**	**0**	**0**	**265**	**0**	**0**	**0**	**0**	**0**	**0**	**120**	**80**	**0**	**200**	**571**
05:15 PM	**62**	0	51	0	**113**	23	**256**	0	0	**279**	0	0	0	0	0	0	**128**	**94**	**0**	**222**	**614**
05:30 PM	39	0	51	0	90	**25**	244	0	1	270	0	0	0	0	0	0	101	85	0	186	546
Total Volume	210	0	204	0	414	86	984	0	2	1072	0	0	0	0	0	0	435	330	0	765	2251
% App. Total	50.7	0	49.3	0		8	91.8	0	0.2		0	0	0	0		0	56.9	43.1	0		
PHF	.847	.000	.944	.000	.916	.860	.961	.000	.500	.961	.000	.000	.000	.000	.000	.000	.850	.878	.000	.861	.917
Passenger Veh	206	0	199	0	405	84	968	0	2	1054	0	0	0	0	0	0	422	330	0	752	2211
% Passenger Veh	98.1	0	97.5	0	97.8	97.7	98.4	0	100	98.3	0	0	0	0	0	0	97.0	100	0	98.3	98.2
Trucks	4	0	5	0	9	2	16	0	0	18	0	0	0	0	0	0	13	0	0	13	40
% Trucks	1.9	0	2.5	0	2.2	2.3	1.6	0	0	1.7	0	0	0	0	0	0	3.0	0	0	1.7	1.8

Data Collection Group
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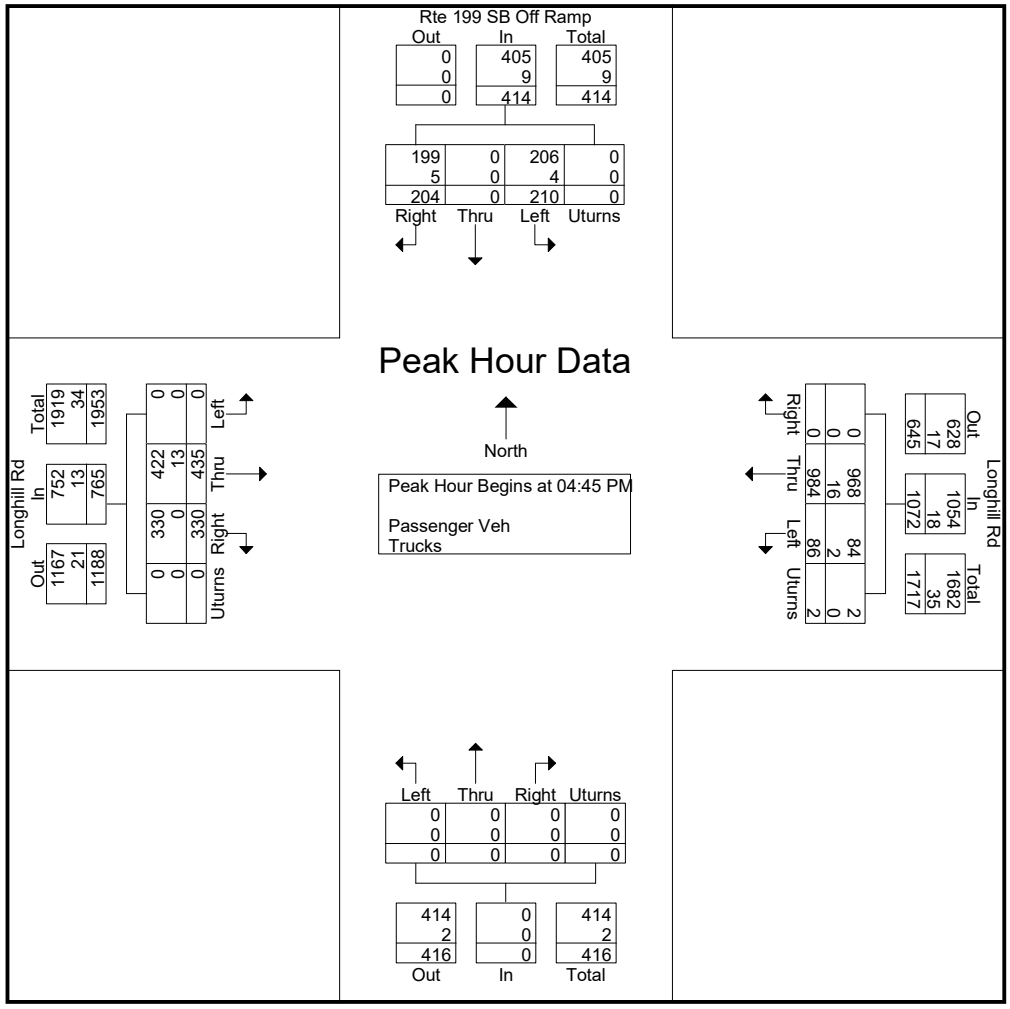
File Name : Longhill and Rte 199 SB Ramps
Site Code : 00004037
Start Date : 9/13/2022
Page No : 5



Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Schmidt and Foster
Site Code : 00002066
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Garrett From North					Foster From East					Schmidt From South					Foster From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					

Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Schmidt and Foster
Site Code : 00002066
Start Date : 9/13/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Garrett From North					Foster From East					Schmidt From South					Foster From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	0	0	0	0	0	2	0	0	0	2	0	2	1	0	3	0	0	0	0	0	5
07:15 AM	0	3	0	0	3	5	0	0	0	5	0	0	2	0	2	0	0	0	0	0	10
07:30 AM	0	0	0	0	0	2	0	0	0	2	0	2	0	0	2	0	0	0	0	0	4
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	0	3	0	0	3	9	0	0	0	9	0	4	4	0	8	0	0	0	0	0	20
08:00 AM	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
08:15 AM	0	0	0	0	0	4	0	0	0	4	0	0	5	0	5	0	0	0	0	0	9
08:30 AM	1	0	0	0	1	0	0	1	0	1	0	0	2	0	2	0	0	0	0	0	4
08:45 AM	1	0	0	0	1	3	0	1	0	4	0	0	2	0	2	0	0	0	0	0	7
Total	2	0	0	0	2	10	0	2	0	12	0	0	9	0	9	0	0	0	0	0	23
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	3	0	4	0	0	0	0	0	4
*** BREAK ***																					
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	2	3	0	5	0	0	0	0	0	5
*** BREAK ***																					
Grand Total	2	3	0	0	5	19	0	2	0	21	0	6	16	0	22	0	0	0	0	0	48
Apprch %	40	60	0	0		90.5	0	9.5	0		0	27.3	72.7	0		0	0	0	0		
Total %	4.2	6.2	0	0	10.4	39.6	0	4.2	0	43.8	0	12.5	33.3	0	45.8	0	0	0	0	0	
Passenger Veh	2	3	0	0	5	18	0	2	0	20	0	6	14	0	20	0	0	0	0	0	45
% Passenger Veh	100	100	0	0	100	94.7	0	100	0	95.2	0	100	87.5	0	90.9	0	0	0	0	0	93.8
Trucks	0	0	0	0	0	1	0	0	0	1	0	0	2	0	2	0	0	0	0	0	3
% Trucks	0	0	0	0	0	5.3	0	0	0	4.8	0	0	12.5	0	9.1	0	0	0	0	0	6.2

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Schmidt and Foster
Site Code : 00002066
Start Date : 9/13/2022
Page No : 2

	Garrett From North					Foster From East					Schmidt From South					Foster From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
08:15 AM	0	0	0	0	0	**4**	0	0	0	**4**	0	0	**5**	0	**5**	0	0	0	0	0	**9**
08:30 AM	**1**	0	0	0	**1**	0	0	**1**	0	1	0	0	2	0	2	0	0	0	0	0	4
08:45 AM	1	0	0	0	1	3	0	1	0	4	0	0	2	0	2	0	0	0	0	0	7
Total Volume	2	0	0	0	2	10	0	2	0	12	0	0	9	0	9	0	0	0	0	0	23
% App. Total	100	0	0	0		83.3	0	16.7	0		0	0	100	0		0	0	0	0		
PHF	.500	.000	.000	.000	.500	.625	.000	.500	.000	.750	.000	.000	.450	.000	.450	.000	.000	.000	.000	.000	.639
Passenger Veh	2	0	0	0	2	9	0	2	0	11	0	0	7	0	7	0	0	0	0	0	20
% Passenger Veh	100	0	0	0	100	90.0	0	100	0	91.7	0	0	77.8	0	77.8	0	0	0	0	0	87.0
Trucks	0	0	0	0	0	1	0	0	0	1	0	0	2	0	2	0	0	0	0	0	3
% Trucks	0	0	0	0	0	10.0	0	0	0	8.3	0	0	22.2	0	22.2	0	0	0	0	0	13.0

Data Collection Group

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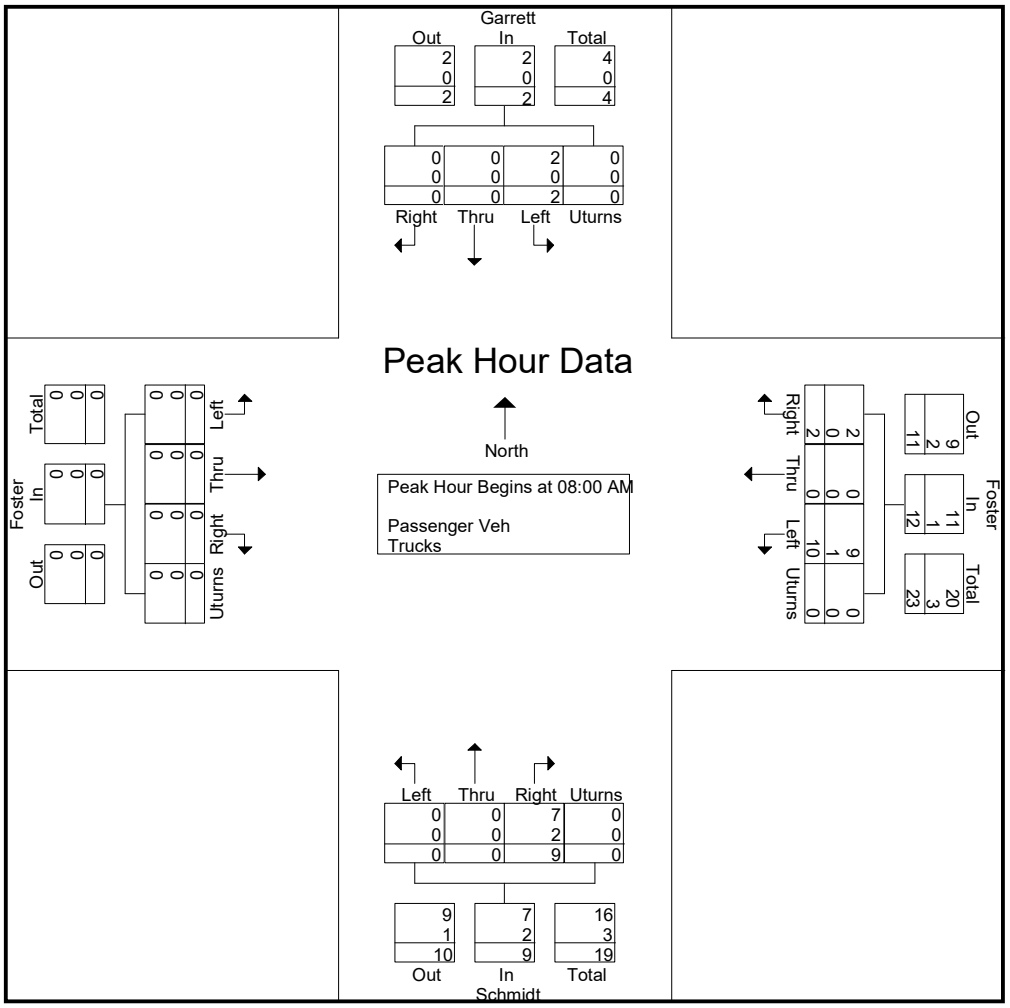
File Name : Schmidt and Foster
Site Code : 00002066
Start Date : 9/13/2022
Page No : 3



Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Schmidt and Foster
Site Code : 00002066
Start Date : 9/13/2022
Page No : 4

	Garrett From North					Foster From East					Schmidt From South					Foster From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	**1**	**3**	0	**4**	0	0	0	0	0	**4**
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	2	3	0	5	0	0	0	0	0	5
% App. Total	0	0	0	0		0	0	0	0		0	40	60	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.250	.000	.313	.000	.000	.000	.000	.000	.313
Passenger Veh	0	0	0	0	0	0	0	0	0	0	0	2	3	0	5	0	0	0	0	0	5
% Passenger Veh	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	0	0	0	0	0	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Collection Group
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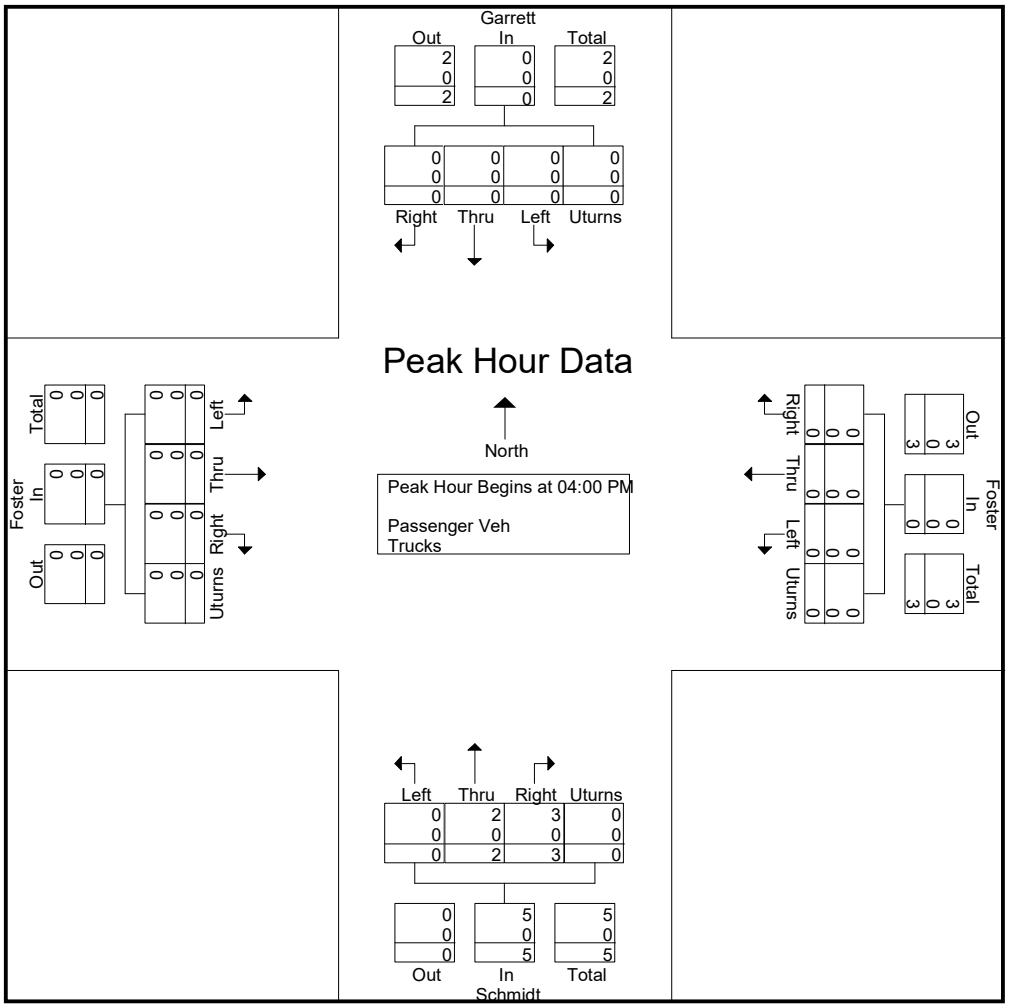
File Name : Schmidt and Foster
Site Code : 00002066
Start Date : 9/13/2022
Page No : 5



Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Schmidt and Galt
Site Code : 00003204
Start Date : 9/13/2022
Page No : 1

Groups Printed- Bikes

	Schmidt From North					Galt From East					Schmidt From South					Galt From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
*** BREAK ***																					
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	3	3	0	0	0	0	0	4
*** BREAK ***																					
Grand Total	0	0	0	0	0	0	0	0	1	1	0	0	0	3	3	0	0	0	0	0	4
Apprch %	0	0	0	0		0	0	0	100		0	0	0	100		0	0	0	0		
Total %	0	0	0	0	0	0	0	0	25	25	0	0	0	75	75	0	0	0	0	0	

Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Schmidt and Galt
Site Code : 00008114
Start Date : 4/19/2022
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Schmidt From North					Galt From East					Schmidt From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
07:00 AM	1	2	0	0	3	8	0	3	0	11	0	1	0	0	1	0	0	0	0	0	15
07:15 AM	1	8	0	0	9	23	1	2	0	26	0	4	1	0	5	0	0	0	0	0	40
07:30 AM	0	2	0	0	2	9	0	0	0	9	0	1	0	0	1	1	0	0	0	1	13
07:45 AM	0	1	0	0	1	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	4
Total	2	13	0	0	15	41	1	7	0	49	0	6	1	0	7	1	0	0	0	1	72
08:00 AM	0	1	0	0	1	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3
08:15 AM	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
08:30 AM	0	0	0	0	0	1	0	0	1	2	1	1	0	0	2	0	1	0	0	1	5
08:45 AM	0	0	1	0	1	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	4
Total	1	1	1	0	3	2	0	0	2	4	1	3	1	0	5	0	2	0	0	2	14
*** BREAK ***																					
04:00 PM	1	0	0	0	1	3	0	1	0	4	0	4	15	0	19	0	0	0	0	0	24
04:15 PM	0	0	0	0	0	1	0	0	0	1	0	0	2	0	2	0	0	0	0	0	3
04:30 PM	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
04:45 PM	1	0	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	3
Total	3	0	0	0	3	4	0	2	1	7	0	4	18	0	22	0	0	0	0	0	32
05:00 PM	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
*** BREAK ***																					
Total	2	0	0	0	2	0	0	1	1	2	0	0	1	0	1	0	0	0	0	0	5
Grand Total	8	14	1	0	23	47	1	10	4	62	1	13	21	0	35	1	2	0	0	3	123
Apprch %	34.8	60.9	4.3	0		75.8	1.6	16.1	6.5		2.9	37.1	60	0		33.3	66.7	0	0		
Total %	6.5	11.4	0.8	0	18.7	38.2	0.8	8.1	3.3	50.4	0.8	10.6	17.1	0	28.5	0.8	1.6	0	0	2.4	
Passenger Veh	8	14	1	0	23	47	1	10	4	62	1	13	21	0	35	1	2	0	0	3	123
% Passenger Veh	100	100	100	0	100	100	100	100	100	100	100	100	100	0	100	100	100	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : Schmidt and Galt
Site Code : 00008114
Start Date : 4/19/2022
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	Schmidt From North					Galt From East					Schmidt From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**1**	2	0	0	3	8	0	**3**	0	11	0	1	0	0	1	0	0	0	0	0	15
07:15 AM	1	**8**	0	0	**9**	**23**	**1**	2	0	**26**	0	**4**	**1**	0	**5**	0	0	0	0	0	**40**
07:30 AM	0	2	0	0	2	9	0	0	0	9	0	1	0	0	1	**1**	0	0	0	**1**	13
07:45 AM	0	1	0	0	1	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	4
Total Volume	2	13	0	0	15	41	1	7	0	49	0	6	1	0	7	1	0	0	0	1	72
% App. Total	13.3	86.7	0	0		83.7	2	14.3	0		0	85.7	14.3	0		100	0	0	0		
PHF	.500	.406	.000	.000	.417	.446	.250	.583	.000	.471	.000	.375	.250	.000	.350	.250	.000	.000	.000	.250	.450
Passenger Veh	2	13	0	0	15	41	1	7	0	49	0	6	1	0	7	1	0	0	0	1	72
% Passenger Veh	100	100	0	0	100	100	100	100	0	100	0	100	100	0	100	100	0	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : Schmidt and Galt
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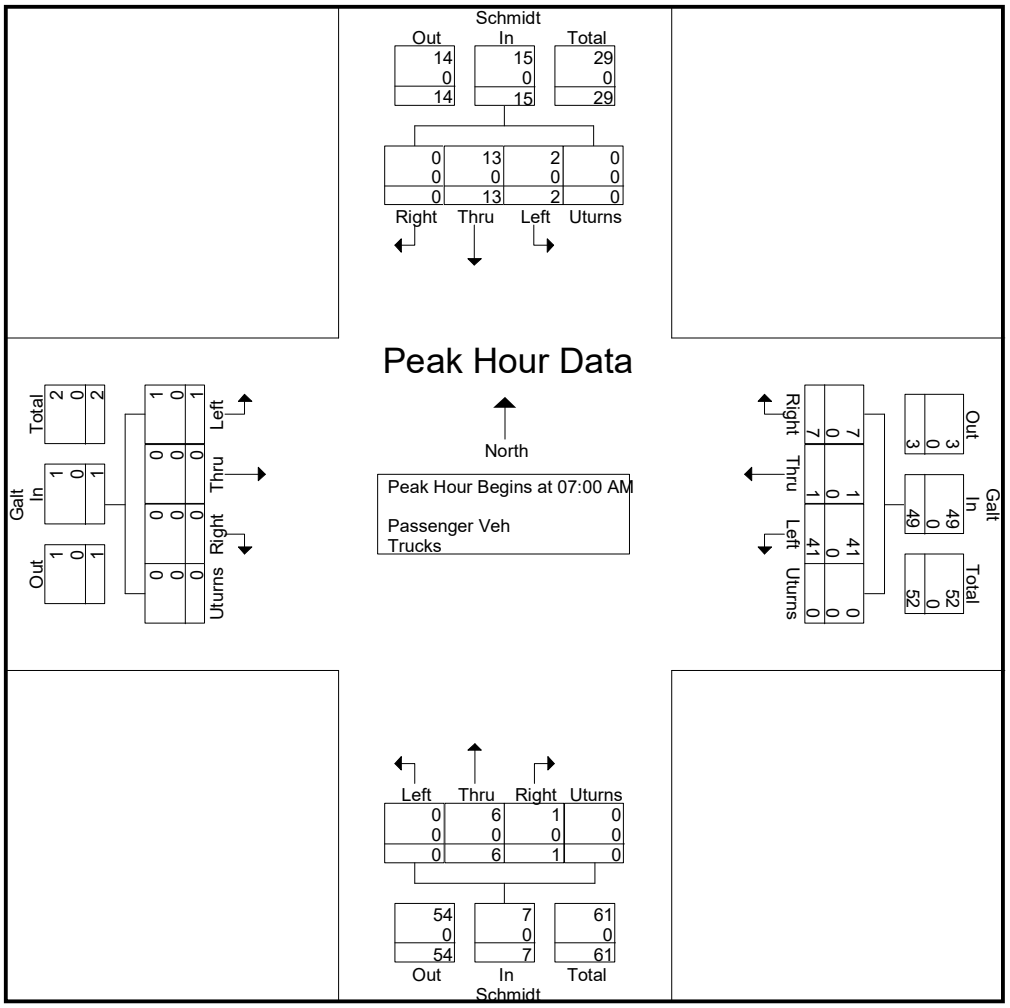

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File Name : Schmidt and Galt
Site Code : 00008114
Start Date : 4/19/2022

	Schmidt From North					Galt From East					Schmidt From South					Galt From West					
Start Time	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Left	Thru	Right	Uturns	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	**1**	0	0	0	**1**	**3**	0	**1**	0	**4**	0	**4**	**15**	0	**19**	0	0	0	0	0	**24**
04:15 PM	0	0	0	0	0	1	0	0	0	1	0	0	2	0	2	0	0	0	0	0	3
04:30 PM	1	0	0	0	1	0	0	0	**1**	1	0	0	0	0	0	0	0	0	0	0	2
04:45 PM	1	0	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	3
Total Volume	3	0	0	0	3	4	0	2	1	7	0	4	18	0	22	0	0	0	0	0	32
% App. Total	100	0	0	0		57.1	0	28.6	14.3		0	18.2	81.8	0		0	0	0	0		
PHF	.750	.000	.000	.000	.750	.333	.000	.500	.250	.438	.000	.250	.300	.000	.289	.000	.000	.000	.000	.000	.333
Passenger Veh	3	0	0	0	3	4	0	2	1	7	0	4	18	0	22	0	0	0	0	0	32
% Passenger Veh	100	0	0	0	100	100	0	100	100	100	0	100	100	0	100	0	0	0	0	0	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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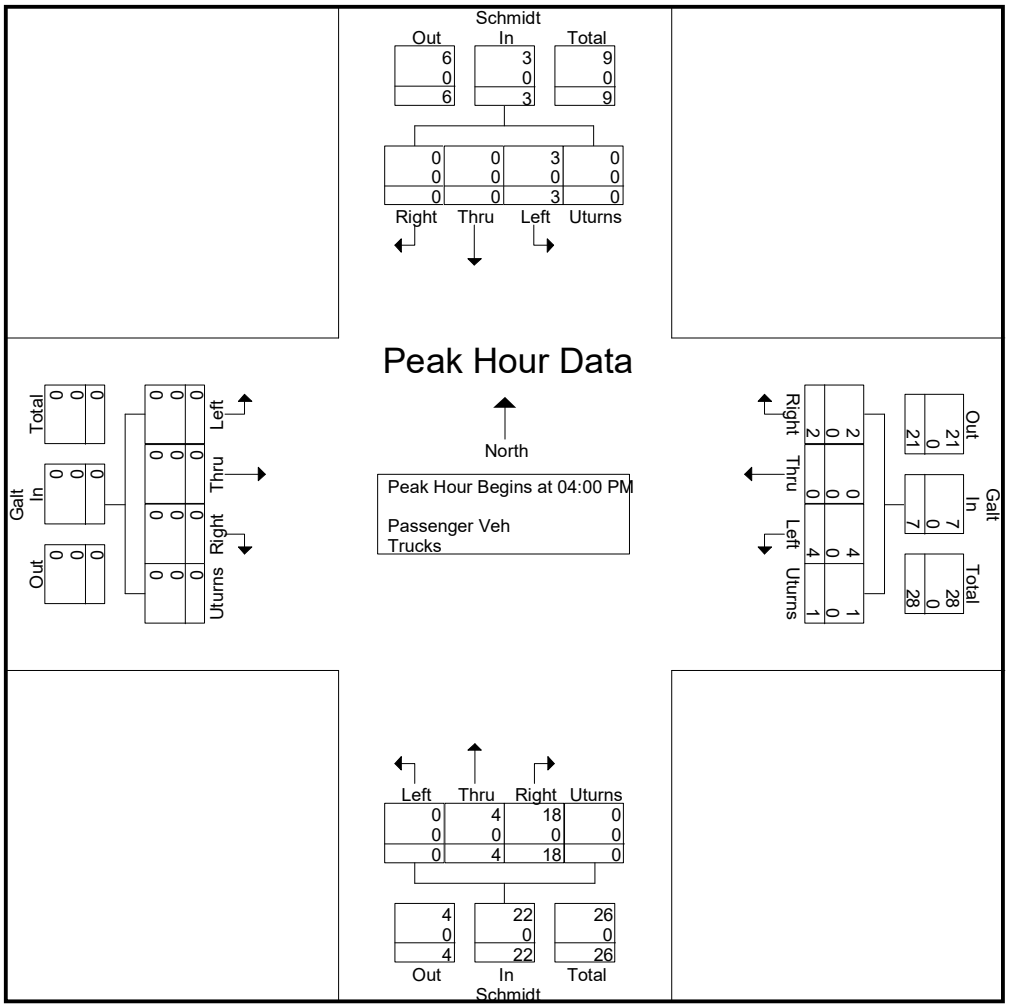

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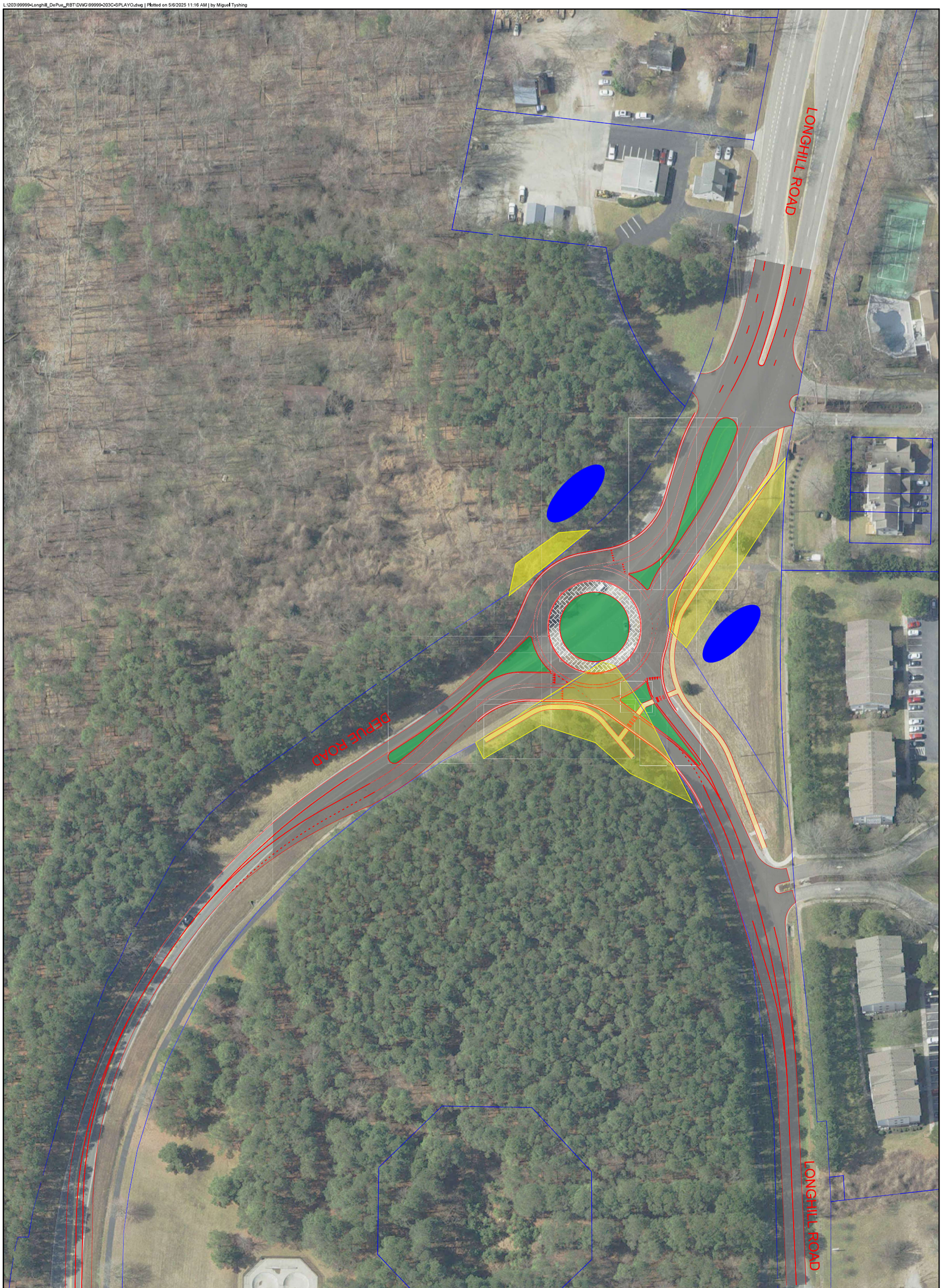
Appendix B.1
Improvement Schematics

L:\203\99999-Longhill_DePue_RBT\DWG\99999-203C-SPLAYO.dwg | Plotted on 5/6/2025 11:16 AM | by Miguel Tyshing



TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

THIS DRAWING PREPARED AT THE
CORPORATE OFFICE
1001 Boulders Parkway, Suite 300 | Richmond, VA 23225
TEL 804.200.6500 FAX 804.560.1016 www.timmons.com

Site Development | Residential | Infrastructure | Technology

SHEET NO.

JOB NO.

JAMES CITY COUNTY ROUNDABOUT CONCEPTS

JAMES CITY COUNTY - VIRGINIA

SCALE

CHECKED BY

DESIGNED BY

DRAWN BY

DATE 3/26/2025

DATE	REVISION DESCRIPTION

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SCALE: 1"=50'
0
50'
100'
NORTH


SCALE: 1"=50'
0
50'
100'
NORTH

Appendix C
Traffic Signal Timings

615 & Eastern State Hospital

Phase Timing

1/3/2023 9:11:16 AM

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Green	5	15	7	7	5	15	0	0	0	0	0	0	0	0	0	0
Veh Ext	3.0	5.0	3.0	3.0	3.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Green 1	20	35	25	25	20	35	0	0	0	0	0	0	0	0	0	0
Max Green 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Green 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Ext	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow	4.0	5.0	3.5	3.5	4.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clr	2.0	1.0	2.5	2.5	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adv Flash	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bike MG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clr	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0
Walk2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sol DW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added	0.0	2.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Initial	0	20	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Min Gap	0.0	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduce After	0	20	0	0	0	20	0	0	0	0	0	0	0	0	0	0
TTReduce	0	15	0	0	0	15	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neg Ped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AP Disc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Return Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

615 & Eastern State Hospital

Phase Options

1/3/2023 9:11:16 AM

Phases	1-8								9-16							
Min Recalls		2				6										
Max Recalls																
Ped Recalls																
Soft Recall																
Dual Entry																
Red Rest																
Walk Rest																
Walk Expand																
Ped Recycle																
Sim Ped Term																
PC Thru Clr																
Guar Passage		2				6										
No Simult Gap																
Yel Lock																
Red Lock																
PhaseNext Lock	1	2	3	4	5	6										
No Term Call	1	2	3	4	5	6										
Cond Serv																
CS Enable																
Cond Reserve																
Reserve																
Veh Omit																
Ped Omit																
Perm Phase																
Protect Calls																
Protect Calls 2																
Flash Entry																
Flash Exit																
Flash Exit Yel																
Flash Exit Red																
Ped Scramble																
No Min Yel																
No Min Red Rev																
Max Scramble Walk																
Flash Yellow																
Flash FYA																
CNA 1																
CNA 2																

615 & Eastern State Hospital

Phase Startup Options

1/3/2023 9:11:16 AM

Startup Flash	0	Mode	Yel->Red
Startup All Red	0	Yellow	0.0

Phases	1-8								9-16							
Startup Phases		2				6										
Startup Yellow		2				6										
Startup Red																
Startup No Walk																
Startup Next																
Startup Yel Fls																
Startup FYA																
No Veh Call	1	2	3	4	5	6	7	8								
No Ped Call		2		4		6		8								

Phase Startup Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Unit

Red Revert	0.0	Ped Protect	No	AdvFls in Flash	No

615 & Eastern State Hospital

Ring Sequence / Conflicting Phases

1/3/2023 9:11:16 AM

Ringgroup 1

Ring 1	1	2	3	4	0	0	0	0	0	0	0	0	0	0	0	0
Ring 2	5	6	7	8	0	0	0	0	0	0	0	0	0	0	0	0

Ringgroup 2

Custom Sequences

Seq 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Conflicting Phases

	1-8							9-16							
Phase 1															
Phase 2															
Phase 3															
Phase 4															
Phase 5															
Phase 6															
Phase 7															
Phase 8															
Phase 9															
Phase 10															
Phase 11															
Phase 12															
Phase 13															
Phase 14															
Phase 15															
Phase 16															

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MCE Options

1/3/2023 9:11:16 AM

Phases	1-8	9-16
MCE Ped Protect		
MCE Veh Call		
MCE Ped Call		
MCE Veh Omit		
MCE Ped Omit		
MCE Veh Sync		
MCE Ped Sync		
MCE Halt Don't Walk		

LRV Phases	1-8
MCE LRV Term Early	

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FYA/FRA

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FYA	1	2	3	4	5	6	7	8
Prot Phs	0	0	0	0	0	0	0	0
Opp Thru	0	0	0	0	0	0	0	0
Start Phs	0	0	0	0	0	0	0	0
Opp Ped	0	0	0	0	0	0	0	0
Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min FYA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skip Prot Red	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Head Mode	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1

Ped Hawk 1

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 2

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 3

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 4

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

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Overlap Startup Options

1/3/2023 9:11:16 AM

Overlaps	1-8							9-16							
Startup Overlap Green															
Startup Overlap Yellow															

Overlap Startup Timing

Overlap	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Min Green	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Overlap Unit Options

Overlaps	1-8							9-16							
Overlap Ped Recalls															
MCE Olap Ped Protect															
MCE Olap Ped Calls															
MCE Olap Ped Expand															
No Min Yellow															
No Min Red Rev															
Flash Yellow															
No Conflict															
Pre Signal															
Perm Red															
Perm FYA															
Perm FRA															

615 & Eastern State Hospital

Coordination Options

1/3/2023 9:11:16 AM

Sync Time	00:00	RTC Set Time	00:00
Transition Mode	Best	Ped Adjust	None
Trans Short %	0	Trans Long %	0
Offset Reference	Lag FO	Short Cycles	0
Dual Entry	Normal	Overlap F/O	Disabled
Master Sync Mode	RTC	Master Sync Length	0
Adapt Thresh	0	Adapt Step	0
External Plan Max	0		
Hardwire No Match	Sched	Hardwire Sync Fail	0
Override Omit/Recall	No		

Phases	1-8	9-16
No Trans Recall		
Trans Ped Recall		
Trans Phases		

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Hardwire Plans

1/3/2023 9:11:16 AM

Hardwire	Plan Select							Pattern	Offset	Mode
Plan 1								0	0	Hardwire
Plan 2								0	0	Hardwire
Plan 3								0	0	Hardwire
Plan 4								0	0	Hardwire
Plan 5								0	0	Hardwire
Plan 6								0	0	Hardwire
Plan 7								0	0	Hardwire
Plan 8								0	0	Hardwire
Plan 9								0	0	Hardwire
Plan 10								0	0	Hardwire
Plan 11								0	0	Hardwire
Plan 12								0	0	Hardwire
Plan 13								0	0	Hardwire
Plan 14								0	0	Hardwire
Plan 15								0	0	Hardwire
Plan 16								0	0	Hardwire
Plan 17								0	0	Hardwire
Plan 18								0	0	Hardwire
Plan 19								0	0	Hardwire
Plan 20								0	0	Hardwire
Plan 21								0	0	Hardwire
Plan 22								0	0	Hardwire
Plan 23								0	0	Hardwire
Plan 24								0	0	Hardwire
Plan 25								0	0	Hardwire
Plan 26								0	0	Hardwire
Plan 27								0	0	Hardwire
Plan 28								0	0	Hardwire
Plan 29								0	0	Hardwire
Plan 30								0	0	Hardwire
Plan 31								0	0	Hardwire
Plan 32								0	0	Hardwire

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Soft Interconnect

1/3/2023 9:11:16 AM

Mode	Slave	Remote Int Number	0
Yield Delay	0		
Yield Duration	0		
Permissive	0		
Local Hold Limit	0		

Phases	1-8	9-16
Local Control Phases		
Local Hold Phases		
Local Perm Phases		
Local Call Phases		
Remote Perm Phases		
Remote Hold Phases		

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Preempt Inputs

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Preempt Input	1	2	3	4	5	6	7	8	9	10
Delay	0	0	0	0	0	0	0	0	0	0
Checkout Limit	0	0	0	0	0	0	0	0	0	0
Locked	No	No	No	No	No	No	No	No	No	No
Interlock	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Input Number	0	0	0	0	0	0	0	0	0	0
Input Priority	All	All	All	All	All	All	All	All	All	All
Delay Mode	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp

Preempt Priority

Preempt	1	2	3	4	5	6	7	8	9	10
Priority	0	0	0	0	0	0	0	0	0	0

Remote Preemption

Remote Preempt	RM 1	RM 2	RM 3	RM 4	RM 5	RM 6	RM 7	RM 8
Int Number	0	0	0	0	0	0	0	0
PE Number	0	0	0	0	0	0	0	0
Mode	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Dis
Slack	0	0	0	0	0	0	0	0
Travel Time	0	0	0	0	0	0	0	0
Alt TT 1	0	0	0	0	0	0	0	0
Alt TT 2	0	0	0	0	0	0	0	0
Alt TT 3	0	0	0	0	0	0	0	0
Alt TT 4	0	0	0	0	0	0	0	0
Alt TT 5	0	0	0	0	0	0	0	0
Alt TT 6	0	0	0	0	0	0	0	0
Alt TT 7	0	0	0	0	0	0	0	0

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Preempt 1 (Configuration)

1/3/2023 9:11:16 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	1	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 1 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	1 6	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk	5	
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6 7 8	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

615 & Eastern State Hospital

Preempt 2 (Configuration)

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Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	2	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 2 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	2 5	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk	6	
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6 7 8	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

615 & Eastern State Hospital

Preempt 3 (Configuration)

1/3/2023 9:11:16 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	3	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 3 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	3	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk	6	
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6 7 8	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

615 & Eastern State Hospital

Preempt 4 (Configuration)

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Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	4	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 4 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	4	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk	6	
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6 7 8	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

615 & Eastern State Hospital

TOD Pattern Events

1/3/2023 9:11:16 AM

	Time	DOW							Holidays								Mode	Pattern	Offset
Event 1	00:00																Sched	0	0
Event 2	00:00																Sched	0	0
Event 3	00:00																Sched	0	0
Event 4	00:00																Sched	0	0
Event 5	00:00																Sched	0	0
Event 6	00:00																Sched	0	0
Event 7	00:00																Sched	0	0
Event 8	00:00																Sched	0	0
Event 9	00:00																Sched	0	0
Event 10	00:00																Sched	0	0
Event 11	00:00																Sched	0	0
Event 12	00:00																Sched	0	0
Event 13	00:00																Sched	0	0
Event 14	00:00																Sched	0	0
Event 15	00:00																Sched	0	0
Event 16	00:00																Sched	0	0
Event 17	00:00																Sched	0	0
Event 18	00:00																Sched	0	0
Event 19	00:00																Sched	0	0
Event 20	00:00																Sched	0	0
Event 21	00:00																Sched	0	0
Event 22	00:00																Sched	0	0
Event 23	00:00																Sched	0	0
Event 24	00:00																Sched	0	0
Event 25	00:00																Sched	0	0
Event 26	00:00																Sched	0	0
Event 27	00:00																Sched	0	0
Event 28	00:00																Sched	0	0
Event 29	00:00																Sched	0	0
Event 30	00:00																Sched	0	0
Event 31	00:00																Sched	0	0
Event 32	00:00																Sched	0	0

615 & Eastern State Hospital

Holidays

1/3/2023 9:11:16 AM

	Active Holidays							Month	Day	DOW						WOM
Date 1								0	0							0
Date 2								0	0							0
Date 3								0	0							0
Date 4								0	0							0
Date 5								0	0							0
Date 6								0	0							0
Date 7								0	0							0
Date 8								0	0							0
Date 9								0	0							0
Date 10								0	0							0
Date 11								0	0							0
Date 12								0	0							0
Date 13								0	0							0
Date 14								0	0							0
Date 15								0	0							0
Date 16								0	0							0
Date 17								0	0							0
Date 18								0	0							0
Date 19								0	0							0
Date 20								0	0							0
Date 21								0	0							0
Date 22								0	0							0
Date 23								0	0							0
Date 24								0	0							0
Date 25								0	0							0
Date 26								0	0							0
Date 27								0	0							0
Date 28								0	0							0
Date 29								0	0							0
Date 30								0	0							0
Date 31								0	0							0
Date 32								0	0							0

615 & Eastern State Hospital

Vehicle Detector 1

1/3/2023 9:11:16 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	1	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	1	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 2

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	2	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	2	
XSwitch Phases		
Bike Call Phases		

615 & Eastern State Hospital

Vehicle Detector 3

1/3/2023 9:11:16 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	3	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	3	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 4

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	4	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	4	
XSwitch Phases		
Bike Call Phases		

615 & Eastern State Hospital

Vehicle Detector 5

1/3/2023 9:11:16 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	5	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	5	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 6

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	6	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	6	
XSwitch Phases		
Bike Call Phases		

615 & Eastern State Hospital

Pedestrian Detector 4

1/3/2023 9:11:16 AM

No Act	0	Max Pres	0	Erratic	0	Fail Mode	None

Phases/Overlaps	1-8								9-16							
Call Ped Phases				4												
Call Ped Olaps																
Call Phases																
Locked Call Phases																
Ped Entry Phases																
Olap Ped Entry Phases																
Ped Cascade Phases																
Call Walk2																

615 & Eastern State Hospital

Transit/LRV Startup/Options

1/3/2023 9:11:16 AM

	LRV 1-8									
No Startup Call										

Warn Flash Rate: 1 Hz

Rsrv Inh Mode: Seconds

615 & Eastern State Hospital

Control / Config

1/3/2023 9:11:16 AM

Pattern Mode	Free						
Manual Pattern	0	Manual Offset	0				
Stop Time Input	Enabled						
Aux Switch	None		0				
DLS Mode	Auto	Time Zone	Est (UTC-5)	GPS Thresh	0		
Password Timeout	5						

	1-8	9-16
Maint Phs Recalls		
Maint Ped Recalls		

Serial 1 Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00
Serial Rebroadcast	Disabled	Response	None

Serial 2 Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00

Ethernet Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00
Serial Rebroadcast	Disabled		

Peer Configuration

Peer 1	0
Peer 2	0
Peer 3	0
Peer 4	0
Peer 5	0
Peer 6	0
Peer 7	0
Peer 8	0

199 WB off ramp at 612

Phase Timing

1/3/2023 8:48:03 AM

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Green	5	15	0	7	0	15	0	0	0	0	0	0	0	0	0	0
Veh Ext	3.0	5.0	0.0	3.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Green 1	20	40	0	28	0	40	0	0	0	0	0	0	0	0	0	0
Max Green 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Green 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Ext	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow	4.0	5.0	0.0	3.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clr	3.0	1.0	0.0	3.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adv Flash	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bike MG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sol DW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Initial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduce After	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TTReduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neg Ped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AP Disc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Return Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

199 WB off ramp at 612

Phase Options

1/3/2023 8:48:03 AM

Phases	1-8							9-16							
Min Recalls		2				6										
Max Recalls																
Ped Recalls																
Soft Recall																
Dual Entry																
Red Rest																
Walk Rest																
Walk Expand																
Ped Recycle																
Sim Ped Term																
PC Thru Clr																
Guar Passage																
No Simult Gap																
Yel Lock																
Red Lock																
PhaseNext Lock	1	2		4		6										
No Term Call	1	2		4		6										
Cond Serv																
CS Enable																
Cond Reserve																
Reserve																
Veh Omit																
Ped Omit																
Perm Phase																
Protect Calls																
Protect Calls 2																
Flash Entry																
Flash Exit																
Flash Exit Yel																
Flash Exit Red																
Ped Scramble																
No Min Yel																
No Min Red Rev																
Max Scramble Walk																
Flash Yellow																
Flash FYA																
CNA 1																
CNA 2																

199 WB off ramp at 612

Phase Startup Options

1/3/2023 8:48:03 AM

Startup Flash	0	Mode	Yel->Red
Startup All Red	0	Yellow	0.0

Phases	1-8							9-16							
Startup Phases		2				6										
Startup Yellow		2				6										
Startup Red																
Startup No Walk																
Startup Next																
Startup Yel Fls																
Startup FYA																
No Veh Call																
No Ped Call																

Phase Startup Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Unit

Red Revert	4.0	Ped Protect	No	AdvFIs in Flash	No

199 WB off ramp at 612

Ring Sequence / Conflicting Phases

1/3/2023 8:48:03 AM

Ringgroup 1

Ring 1	1	2	3	4	0	0	0	0	0	0	0	0	0	0	0	0
Ring 2	5	6	7	8	0	0	0	0	0	0	0	0	0	0	0	0

Ringgroup 2

Custom Sequences

Seq 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Conflicting Phases

	1-8							9-16							
Phase 1															
Phase 2															
Phase 3															
Phase 4															
Phase 5															
Phase 6															
Phase 7															
Phase 8															
Phase 9															
Phase 10															
Phase 11															
Phase 12															
Phase 13															
Phase 14															
Phase 15															
Phase 16															

199 WB off ramp at 612

MCE Options

1/3/2023 8:48:03 AM

Phases	1-8								9-16							
MCE Ped Protect		2		4		6		8								
MCE Veh Call		2		4		6		8								
MCE Ped Call		2		4		6		8								
MCE Veh Omit																
MCE Ped Omit																
MCE Veh Sync		2		4		6		8								
MCE Ped Sync		2		4		6		8								
MCE Halt Don't Walk																

LRV Phases	1-8							
MCE LRV Term Early								

199 WB off ramp at 612

FYA/FRA

1/3/2023 8:48:03 AM

FYA	1	2	3	4	5	6	7	8
Prot Phs	0	0	0	0	0	0	0	0
Opp Thru	0	0	0	0	0	0	0	0
Start Phs	0	0	0	0	0	0	0	0
Opp Ped	0	0	0	0	0	0	0	0
Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min FYA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skip Prot Red	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Head Mode	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1

Ped Hawk 1

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 2

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 3

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 4

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

199 WB off ramp at 612

Overlap Startup Options

1/3/2023 8:48:03 AM

Overlaps	1-8							9-16							
Startup Overlap Green															
Startup Overlap Yellow															

Overlap Startup Timing

Overlap	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Min Green	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Overlap Unit Options

Overlaps	1-8							9-16							
Overlap Ped Recalls															
MCE Olap Ped Protect															
MCE Olap Ped Calls															
MCE Olap Ped Expand															
No Min Yellow															
No Min Red Rev															
Flash Yellow															
No Conflict															
Pre Signal															
Perm Red															
Perm FYA															
Perm FRA															

199 WB off ramp at 612

Coordination Options

1/3/2023 8:48:03 AM

Sync Time	00:00	RTC Set Time	00:00
Transition Mode	Best 2	Ped Adjust	None
Trans Short %	20	Trans Long %	35
Offset Reference	Crd Grp End	Short Cycles	0
Dual Entry	Normal	Overlap F/O	Disabled
Master Sync Mode	RTC	Master Sync Length	0
Adapt Thresh	0	Adapt Step	0
External Plan Max	0		
Hardwire No Match	Sched	Hardwire Sync Fail	0
Override Omit/Recall	No		

Phases	1-8	9-16
No Trans Recall		
Trans Ped Recall		
Trans Phases		

199 WB off ramp at 612

Hardwire Plans

1/3/2023 8:48:03 AM

Hardwire	Plan Select								Pattern	Offset	Mode
Plan 1									0	0	Hardwire
Plan 2									0	0	Hardwire
Plan 3									0	0	Hardwire
Plan 4									0	0	Hardwire
Plan 5									0	0	Hardwire
Plan 6									0	0	Hardwire
Plan 7									0	0	Hardwire
Plan 8									0	0	Hardwire
Plan 9									0	0	Hardwire
Plan 10									0	0	Hardwire
Plan 11									0	0	Hardwire
Plan 12									0	0	Hardwire
Plan 13									0	0	Hardwire
Plan 14									0	0	Hardwire
Plan 15									0	0	Hardwire
Plan 16									0	0	Hardwire
Plan 17									0	0	Hardwire
Plan 18									0	0	Hardwire
Plan 19									0	0	Hardwire
Plan 20									0	0	Hardwire
Plan 21									0	0	Hardwire
Plan 22									0	0	Hardwire
Plan 23									0	0	Hardwire
Plan 24									0	0	Hardwire
Plan 25									0	0	Hardwire
Plan 26									0	0	Hardwire
Plan 27									0	0	Hardwire
Plan 28									0	0	Hardwire
Plan 29									0	0	Hardwire
Plan 30									0	0	Hardwire
Plan 31									0	0	Hardwire
Plan 32									0	0	Hardwire

199 WB off ramp at 612

Soft Interconnect

1/3/2023 8:48:03 AM

Mode	Slave	Remote Int Number	0
Yield Delay	0		
Yield Duration	0		
Permissive	0		
Local Hold Limit	0		

Phases	1-8	9-16
Local Control Phases		
Local Hold Phases		
Local Perm Phases		
Local Call Phases		
Remote Perm Phases		
Remote Hold Phases		

199 WB off ramp at 612

Preempt Inputs

1/3/2023 8:48:03 AM

Preempt Input	1	2	3	4	5	6	7	8	9	10
Delay	0	0	0	0	0	0	0	0	0	0
Checkout Limit	0	0	0	0	0	0	0	0	0	0
Locked	No	No	No	No	No	No	No	No	No	No
Interlock	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Input Number	0	0	0	0	0	0	0	0	0	0
Input Priority	All	All	All	All	All	All	All	All	All	All
Delay Mode	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp

Preempt Priority

Preempt	1	2	3	4	5	6	7	8	9	10
Priority	0	0	0	0	0	0	0	0	0	0

Remote Preemption

Remote Preempt	RM 1	RM 2	RM 3	RM 4	RM 5	RM 6	RM 7	RM 8
Int Number	0	0	0	0	0	0	0	0
PE Number	0	0	0	0	0	0	0	0
Mode	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Dis
Slack	0	0	0	0	0	0	0	0
Travel Time	0	0	0	0	0	0	0	0
Alt TT 1	0	0	0	0	0	0	0	0
Alt TT 2	0	0	0	0	0	0	0	0
Alt TT 3	0	0	0	0	0	0	0	0
Alt TT 4	0	0	0	0	0	0	0	0
Alt TT 5	0	0	0	0	0	0	0	0
Alt TT 6	0	0	0	0	0	0	0	0
Alt TT 7	0	0	0	0	0	0	0	0

199 WB off ramp at 612

Preempt 1 (Configuration)

1/3/2023 8:48:03 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	1	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 1 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	1, 6	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green	1, 2, 3, 4, 5, 6	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	0
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 WB off ramp at 612

Preempt 2 (Configuration)

1/3/2023 8:48:03 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	2	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 2 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	2	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	0
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 WB off ramp at 612

Preempt 4 (Configuration)

1/3/2023 8:48:03 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	4	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 4 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	4	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	0
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 WB off ramp at 612

Preempt 5 (Configuration)

1/3/2023 8:48:03 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs		

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 5 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases		
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green		
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	0
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 WB off ramp at 612

TOD Pattern Events

1/3/2023 8:48:03 AM

	Time	DOW							Holidays								Mode	Pattern	Offset
Event 1	00:00																Sched	0	0
Event 2	00:00																Sched	0	0
Event 3	00:00																Sched	0	0
Event 4	00:00																Sched	0	0
Event 5	00:00																Sched	0	0
Event 6	00:00																Sched	0	0
Event 7	00:00																Sched	0	0
Event 8	00:00																Sched	0	0
Event 9	00:00																Sched	0	0
Event 10	00:00																Sched	0	0
Event 11	00:00																Sched	0	0
Event 12	00:00																Sched	0	0
Event 13	00:00																Sched	0	0
Event 14	00:00																Sched	0	0
Event 15	00:00																Sched	0	0
Event 16	00:00																Sched	0	0
Event 17	00:00																Sched	0	0
Event 18	00:00																Sched	0	0
Event 19	00:00																Sched	0	0
Event 20	00:00																Sched	0	0
Event 21	00:00																Sched	0	0
Event 22	00:00																Sched	0	0
Event 23	00:00																Sched	0	0
Event 24	00:00																Sched	0	0
Event 25	00:00																Sched	0	0
Event 26	00:00																Sched	0	0
Event 27	00:00																Sched	0	0
Event 28	00:00																Sched	0	0
Event 29	00:00																Sched	0	0
Event 30	00:00																Sched	0	0
Event 31	00:00																Sched	0	0
Event 32	00:00																Sched	0	0

199 WB off ramp at 612

Holidays

1/3/2023 8:48:03 AM

	Active Holidays							Month	Day	DOW						WOM
Date 1								0	0							0
Date 2								0	0							0
Date 3								0	0							0
Date 4								0	0							0
Date 5								0	0							0
Date 6								0	0							0
Date 7								0	0							0
Date 8								0	0							0
Date 9								0	0							0
Date 10								0	0							0
Date 11								0	0							0
Date 12								0	0							0
Date 13								0	0							0
Date 14								0	0							0
Date 15								0	0							0
Date 16								0	0							0
Date 17								0	0							0
Date 18								0	0							0
Date 19								0	0							0
Date 20								0	0							0
Date 21								0	0							0
Date 22								0	0							0
Date 23								0	0							0
Date 24								0	0							0
Date 25								0	0							0
Date 26								0	0							0
Date 27								0	0							0
Date 28								0	0							0
Date 29								0	0							0
Date 30								0	0							0
Date 31								0	0							0
Date 32								0	0							0

199 WB off ramp at 612

Vehicle Detector 1

1/3/2023 8:48:03 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Enabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0	Fail Time	0
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	1	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	1	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 2

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Enabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0	Fail Time	0
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	2	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	2	
XSwitch Phases		
Bike Call Phases		

199 WB off ramp at 612

Vehicle Detector 4

1/3/2023 8:48:03 AM

Delay	Extend	Carryover	Queue Limit
0.0	0.0	0.0	0

Mode	Added	System
No Disc	Disabled	Enabled

Fail Mode	Max Pres	No Act	Erratic	Fail Time
None	0	0	0	0

Delay 2: 0.0

Phases	1-8	9-16
Call Phases	4	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	4	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 6

Delay	Extend	Carryover	Queue Limit
0.0	0.0	0.0	0

Mode	Added	System
No Disc	Disabled	Enabled

Fail Mode	Max Pres	No Act	Erratic	Fail Time
None	0	0	0	0

Delay 2: 0.0

Phases	1-8	9-16
Call Phases	6	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	6	
XSwitch Phases		
Bike Call Phases		

199 WB off ramp at 612

Pedestrian Detector 2

1/3/2023 8:48:03 AM

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8	9-16
Call Ped Phases	2	
Call Ped Olaps		
Call Phases		
Locked Call Phases		
Ped Entry Phases		
Olap Ped Entry Phases		
Ped Cascade Phases		
Call Walk2		

Pedestrian Detector 4

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8	9-16
Call Ped Phases	4	
Call Ped Olaps		
Call Phases		
Locked Call Phases		
Ped Entry Phases		
Olap Ped Entry Phases		
Ped Cascade Phases		
Call Walk2		

Pedestrian Detector 6

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8	9-16
Call Ped Phases	6	
Call Ped Olaps		
Call Phases		
Locked Call Phases		
Ped Entry Phases		
Olap Ped Entry Phases		
Ped Cascade Phases		
Call Walk2		

Pedestrian Detector 8

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8	9-16
Call Ped Phases	8	
Call Ped Olaps		
Call Phases		
Locked Call Phases		
Ped Entry Phases		
Olap Ped Entry Phases		
Ped Cascade Phases		
Call Walk2		

199 WB off ramp at 612

Transit/LRV Startup/Options

1/3/2023 8:48:03 AM

	LRV 1-8									
No Startup Call									Warn Flash Rate	1 Hz	Rsrv Inh Mode	Seconds

199 WB off ramp at 612

Control / Config

1/3/2023 8:48:03 AM

Pattern Mode	Free					
Manual Pattern	0	Manual Offset	0			
Stop Time Input	Enabled					
Aux Switch	None		5			
DLS Mode	D4	Time Zone	Est (UTC-5)	GPS Thresh	0	
Password Timeout	5					

	1-8	9-16
Maint Phs Recalls		
Maint Ped Recalls		

Serial 1 Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00
Serial Rebroadcast	Disabled	Response	None

Serial 2 Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00

Ethernet Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00
Serial Rebroadcast	Disabled		

Peer Configuration

Peer 1	0
Peer 2	0
Peer 3	0
Peer 4	0
Peer 5	0
Peer 6	0
Peer 7	0
Peer 8	0

199 EB Ramp & 612

Phase Timing

1/3/2023 8:43:45 AM

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Green	5	15	0	7	0	15	0	0	0	0	0	0	0	0	0	0
Veh Ext	3.0	5.0	0.0	3.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Green 1	20	40	0	20	0	40	0	0	0	0	0	0	0	0	0	0
Max Green 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Green 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max Ext	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow	4.0	5.0	0.0	3.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clr	2.5	1.0	0.0	2.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adv Flash	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bike MG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sol DW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Wlk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Initial	0	20	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Min Gap	0.0	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduce After	0	17	0	0	0	17	0	0	0	0	0	0	0	0	0	0
TTReduce	0	15	0	0	0	15	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neg Ped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AP Disc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pmt Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Return Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

199 EB Ramp & 612

Phase Options

1/3/2023 8:43:45 AM

Phases	1-8								9-16							
Min Recalls		2				6										
Max Recalls																
Ped Recalls																
Soft Recall																
Dual Entry																
Red Rest																
Walk Rest																
Walk Expand																
Ped Recycle																
Sim Ped Term																
PC Thru Clr																
Guar Passage																
No Simult Gap																
Yel Lock																
Red Lock																
PhaseNext Lock	1	2	3	4	5	6										
No Term Call	1	2	3	4	5	6										
Cond Serv																
CS Enable																
Cond Reserve																
Reserve																
Veh Omit																
Ped Omit																
Perm Phase																
Protect Calls																
Protect Calls 2																
Flash Entry																
Flash Exit																
Flash Exit Yel																
Flash Exit Red																
Ped Scramble																
No Min Yel																
No Min Red Rev																
Max Scramble Walk																
Flash Yellow																
Flash FYA																
CNA 1																
CNA 2																

199 EB Ramp & 612

Phase Startup Options

1/3/2023 8:43:45 AM

Startup Flash	0	Mode	Yel->Red
Startup All Red	0	Yellow	0.0

Phases	1-8							9-16							
Startup Phases		2				6										
Startup Yellow		2				6										
Startup Red																
Startup No Walk																
Startup Next																
Startup Yel Fls																
Startup FYA																
No Veh Call																
No Ped Call																

Phase Startup Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Max Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Unit

Red Revert	0.0	Ped Protect	No	AdvFIs in Flash	No

199 EB Ramp & 612

Ring Sequence / Conflicting Phases

1/3/2023 8:43:45 AM

Ringgroup 1

Ring 1	1	2	3	4	0	0	0	0	0	0	0	0	0	0	0	0
Ring 2	5	6	7	8	0	0	0	0	0	0	0	0	0	0	0	0

Ringgroup 2

Custom Sequences

Seq 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seq 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Conflicting Phases

	1-8							9-16							
Phase 1															
Phase 2															
Phase 3															
Phase 4															
Phase 5															
Phase 6															
Phase 7															
Phase 8															
Phase 9															
Phase 10															
Phase 11															
Phase 12															
Phase 13															
Phase 14															
Phase 15															
Phase 16															

199 EB Ramp & 612

MCE Options

1/3/2023 8:43:45 AM

Phases	1-8								9-16							
MCE Ped Protect		2		4		6		8								
MCE Veh Call	1	2	3	4	5	6	7	8								
MCE Ped Call		2		4		6		8								
MCE Veh Omit																
MCE Ped Omit																
MCE Veh Sync																
MCE Ped Sync																
MCE Halt Don't Walk																

LRV Phases	1-8							
MCE LRV Term Early								

199 EB Ramp & 612

FYA/FRA

1/3/2023 8:43:45 AM

FYA	1	2	3	4	5	6	7	8
Prot Phs	0	0	0	0	0	0	0	0
Opp Thru	0	0	0	0	0	0	0	0
Start Phs	0	0	0	0	0	0	0	0
Opp Ped	0	0	0	0	0	0	0	0
Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min FYA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skip Prot Red	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Head Mode	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1	FYA 1

Ped Hawk 1

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 2

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 3

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

Ped Hawk 4

Veh Phase	0		
Ped Phase	0		
Flash Yel	0.0	Dark Signal	Yes
Flash Delay	0.0	Flash Carryover	0.0
Green Mode	Normal		

199 EB Ramp & 612

Overlap Startup Options

1/3/2023 8:43:45 AM

Overlaps	1-8							9-16							
Startup Overlap Green															
Startup Overlap Yellow															

Overlap Startup Timing

Overlap	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Min Green	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Overlap Unit Options

Overlaps	1-8							9-16							
Overlap Ped Recalls															
MCE Olap Ped Protect															
MCE Olap Ped Calls															
MCE Olap Ped Expand															
No Min Yellow															
No Min Red Rev															
Flash Yellow															
No Conflict															
Pre Signal															
Perm Red															
Perm FYA															
Perm FRA															

199 EB Ramp & 612

Coordination Options

1/3/2023 8:43:45 AM

Sync Time	00:00	RTC Set Time	00:00
Transition Mode	Best 2	Ped Adjust	None
Trans Short %	20	Trans Long %	35
Offset Reference	Lag FO	Short Cycles	0
Dual Entry	Normal	Overlap F/O	Disabled
Master Sync Mode	RTC	Master Sync Length	0
Adapt Thresh	0	Adapt Step	0
External Plan Max	0		
Hardwire No Match	Sched	Hardwire Sync Fail	0
Override Omit/Recall	No		

Phases	1-8	9-16
No Trans Recall		
Trans Ped Recall		
Trans Phases		

199 EB Ramp & 612

Hardwire Plans

1/3/2023 8:43:45 AM

Hardwire	Plan Select								Pattern	Offset	Mode
Plan 1									0	0	Hardwire
Plan 2									0	0	Hardwire
Plan 3									0	0	Hardwire
Plan 4									0	0	Hardwire
Plan 5									0	0	Hardwire
Plan 6									0	0	Hardwire
Plan 7									0	0	Hardwire
Plan 8									0	0	Hardwire
Plan 9									0	0	Hardwire
Plan 10									0	0	Hardwire
Plan 11									0	0	Hardwire
Plan 12									0	0	Hardwire
Plan 13									0	0	Hardwire
Plan 14									0	0	Hardwire
Plan 15									0	0	Hardwire
Plan 16									0	0	Hardwire
Plan 17									0	0	Hardwire
Plan 18									0	0	Hardwire
Plan 19									0	0	Hardwire
Plan 20									0	0	Hardwire
Plan 21									0	0	Hardwire
Plan 22									0	0	Hardwire
Plan 23									0	0	Hardwire
Plan 24									0	0	Hardwire
Plan 25									0	0	Hardwire
Plan 26									0	0	Hardwire
Plan 27									0	0	Hardwire
Plan 28									0	0	Hardwire
Plan 29									0	0	Hardwire
Plan 30									0	0	Hardwire
Plan 31									0	0	Hardwire
Plan 32									0	0	Hardwire

199 EB Ramp & 612

Soft Interconnect

1/3/2023 8:43:45 AM

Mode	Slave	Remote Int Number	0
Yield Delay	0		
Yield Duration	0		
Permissive	0		
Local Hold Limit	0		

Phases	1-8	9-16
Local Control Phases		
Local Hold Phases		
Local Perm Phases		
Local Call Phases		
Remote Perm Phases		
Remote Hold Phases		

199 EB Ramp & 612

Preempt Inputs

1/3/2023 8:43:45 AM

Preempt Input	1	2	3	4	5	6	7	8	9	10
Delay	0	0	0	0	0	0	0	0	0	0
Checkout Limit	0	0	0	0	0	0	0	0	0	0
Locked	No	No	No	No	No	No	No	No	No	No
Interlock	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Input Number	0	0	0	0	0	0	0	0	0	0
Input Priority	All	All	All	All	All	All	All	All	All	All
Delay Mode	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp	Inp

Preempt Priority

Preempt	1	2	3	4	5	6	7	8	9	10
Priority	0	0	0	0	0	0	0	0	0	0

Remote Preemption

Remote Preempt	RM 1	RM 2	RM 3	RM 4	RM 5	RM 6	RM 7	RM 8
Int Number	0	0	0	0	0	0	0	0
PE Number	0	0	0	0	0	0	0	0
Mode	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Dis
Slack	0	0	0	0	0	0	0	0
Travel Time	0	0	0	0	0	0	0	0
Alt TT 1	0	0	0	0	0	0	0	0
Alt TT 2	0	0	0	0	0	0	0	0
Alt TT 3	0	0	0	0	0	0	0	0
Alt TT 4	0	0	0	0	0	0	0	0
Alt TT 5	0	0	0	0	0	0	0	0
Alt TT 6	0	0	0	0	0	0	0	0
Alt TT 7	0	0	0	0	0	0	0	0

199 EB Ramp & 612

Preempt 1 (Configuration)

1/3/2023 8:43:45 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	1	

	1-8		
LRV Disable		Max	256
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 1 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	1, 6	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green	1, 2, 3, 4, 5, 6	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 EB Ramp & 612

Preempt 2 (Configuration)

1/3/2023 8:43:45 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	2	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 2 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	2	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 EB Ramp & 612

Preempt 3 (Configuration)

1/3/2023 8:43:45 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	3	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 3 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases		
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 EB Ramp & 612

Preempt 4 (Configuration)

1/3/2023 8:43:45 AM

Enabled	Yes	Dwell Mode	Normal	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	4	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 4 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	4	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green	1 2 3 4 5 6	
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	180
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA		

199 EB Ramp & 612

Preempt 6 (Configuration)

1/3/2023 8:43:45 AM

Enabled	Yes	Dwell Mode	Flash	Output Mode	All
Output2 Mode	All	Fail Action	Preempt Off	Exit Mode	Normal
Override Flash	No	Change Phasenext	Yes		

	1-8	9-16
Enable Phases		
Preempt Inputs	6	

	1-8		
LRV Disable		Max	0
LRV Dwell Flash			
LRV Omit		Delay	0
LRV No Yel			

Preempt 6 (Timing/Phases/Overlaps)

Phases/Overlaps	1-8	9-16
Omit Olap Grn Clr		
Phs EWlk to Grn		
TClr 1 Veh Phases		
TClr 1 Ped Phases		
TClr 1 Olap		
TClr 1 Olap Ped		
TClr 2 Veh Phases		
TClr 2 Ped Phases		
TClr 2 Olap		
TClr 2 Olap Ped		
Init Dwell Phases		
Dwell Veh Phases	1 6	
Dwell Ped Phases		
Dwell Olap		
Dwell Olap Ped		
Exit Veh Phases		
Exit Ped Phases		
Exit Olap		
Exit Olap Ped		
Zero Phase Walk		
Zero Phase Ped Clr		
Zero Phase Green		
Zero Olap Walk		
Zero Olap Ped Clr		
Zero Olap Green		
Dwell-Phase Red		
Dwell-Phase Red Flash		
Dwell-Phase Yel Flash		
Dwell-Olap Red Flash		
Dwell-Olap Yel Flash		
Dwell-Ped Dark		
Dwell-Olap Ped Dark		

Start Green	0	Start Walk	0
		Start Ped Clr	0
Track Clear 1	0	Track Clear 2	0
TC1 Extend	0	TC1 Max	0
Exit Ped Clr	0	Exit Yellow	0.0
Exit Red	0.0		
Min Dwell	0	Min Duration	0
Dwell Extend	0		
Max Dwell	0	Max Call	0
Reserve Inh Same	0		
Reserve Inh All	0		
Delay	0		

Phases/Overlaps	1-8	9-16
TClr 1 FR Olap		
TClr 2 FR Olap		
Dwell FR Olap		
TClr 1 FYA		
TClr 2 FYA		
Dwell FYA	5	

199 EB Ramp & 612

TOD Pattern Events

1/3/2023 8:43:45 AM

	Time	DOW							Holidays								Mode	Pattern	Offset
Event 1	00:00																Free	0	0
Event 2	00:00																Sched	0	0
Event 3	00:00																Free	0	0
Event 4	00:00																Sched	0	0
Event 5	00:00																Free	0	0
Event 6	00:00																Sched	0	0
Event 7	00:00																Sched	0	0
Event 8	00:00																Sched	0	0
Event 9	00:00																Sched	0	0
Event 10	00:00																Sched	0	0
Event 11	00:00																Sched	0	0
Event 12	00:00																Sched	0	0
Event 13	00:00																Sched	0	0
Event 14	00:00																Sched	0	0
Event 15	00:00																Sched	0	0
Event 16	00:00																Sched	0	0
Event 17	00:00																Sched	0	0
Event 18	00:00																Sched	0	0
Event 19	00:00																Sched	0	0
Event 20	00:00																Sched	0	0
Event 21	00:00																Sched	0	0
Event 22	00:00																Sched	0	0
Event 23	00:00																Sched	0	0
Event 24	00:00																Sched	0	0
Event 25	00:00																Sched	0	0
Event 26	00:00																Sched	0	0
Event 27	00:00																Sched	0	0
Event 28	00:00																Sched	0	0
Event 29	00:00																Sched	0	0
Event 30	00:00																Sched	0	0
Event 31	00:00																Sched	0	0
Event 32	00:00																Sched	0	0

199 EB Ramp & 612

Holidays

1/3/2023 8:43:45 AM

	Active Holidays								Month	Day	DOW							WOM
Date 1									0	0								0
Date 2									0	0								0
Date 3									0	0								0
Date 4									0	0								0
Date 5									0	0								0
Date 6									0	0								0
Date 7									0	0								0
Date 8									0	0								0
Date 9									0	0								0
Date 10									0	0								0
Date 11									0	0								0
Date 12									0	0								0
Date 13									0	0								0
Date 14									0	0								0
Date 15									0	0								0
Date 16									0	0								0
Date 17									0	0								0
Date 18									0	0								0
Date 19									0	0								0
Date 20									0	0								0
Date 21									0	0								0
Date 22									0	0								0
Date 23									0	0								0
Date 24									0	0								0
Date 25									0	0								0
Date 26									0	0								0
Date 27									0	0								0
Date 28									0	0								0
Date 29									0	0								0
Date 30									0	0								0
Date 31									0	0								0
Date 32									0	0								0

199 EB Ramp & 612

Vehicle Detector 1

1/3/2023 8:43:45 AM

Delay	3.5	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	FYA	Added	Disabled	System	Enabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	1	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	1	
XSwitch Phases	2	
Bike Call Phases		

Vehicle Detector 2

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	2	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	2	
XSwitch Phases		
Bike Call Phases		

199 EB Ramp & 612

Vehicle Detector 3

1/3/2023 8:43:45 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0	Fail Time	0
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	3	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	3	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 4

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0	Fail Time	0
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	4	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	4	
XSwitch Phases		
Bike Call Phases		

199 EB Ramp & 612

Vehicle Detector 5

1/3/2023 8:43:45 AM

Delay	3.5	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	FYA	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	5	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	5	
XSwitch Phases	6	
Bike Call Phases		

Vehicle Detector 6

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	6	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	6	
XSwitch Phases		
Bike Call Phases		

199 EB Ramp & 612

Vehicle Detector 7

1/3/2023 8:43:45 AM

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	7	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	7	
XSwitch Phases		
Bike Call Phases		

Vehicle Detector 8

Delay	0.0	Extend	0.0	Carryover	0.0	Queue Limit	0
Mode	No Disc	Added	Disabled	System	Disabled		
Fail Mode	None	Max Pres	0	No Act	0	Erratic	0
Fail Time	0						
Delay 2	0.0						

Phases	1-8	9-16
Call Phases	8	
Yellow Lock Phases		
Red Lock Phases		
Extend Phases	8	
XSwitch Phases		
Bike Call Phases		

199 EB Ramp & 612

Pedestrian Detector 2

1/3/2023 8:43:45 AM

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8								9-16							
Call Ped Phases		2														
Call Ped Olaps																
Call Phases																
Locked Call Phases																
Ped Entry Phases																
Olap Ped Entry Phases																
Ped Cascade Phases																
Call Walk2																

Pedestrian Detector 4

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8								9-16							
Call Ped Phases				4												
Call Ped Olaps																
Call Phases																
Locked Call Phases																
Ped Entry Phases																
Olap Ped Entry Phases																
Ped Cascade Phases																
Call Walk2																

Pedestrian Detector 6

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8								9-16							
Call Ped Phases						6										
Call Ped Olaps																
Call Phases																
Locked Call Phases																
Ped Entry Phases																
Olap Ped Entry Phases																
Ped Cascade Phases																
Call Walk2																

Pedestrian Detector 8

No Act	Max Pres	Erratic	Fail Mode
0	0	0	None

Phases/Overlaps	1-8								9-16							
Call Ped Phases								8								
Call Ped Olaps																
Call Phases																
Locked Call Phases																
Ped Entry Phases																
Olap Ped Entry Phases																
Ped Cascade Phases																
Call Walk2																

199 EB Ramp & 612

Transit/LRV Startup/Options

1/3/2023 8:43:45 AM

	LRV 1-8									
No Startup Call									Warn Flash Rate	1 Hz	Rsrv Inh Mode	Seconds

199 EB Ramp & 612

Control / Config

1/3/2023 8:43:45 AM

Pattern Mode	Free					
Manual Pattern	1	Manual Offset	0			
Stop Time Input	Enabled					
Aux Switch	None		0			
DLS Mode	Auto	Time Zone	Est (UTC-5)	GPS Thresh	0	
Password Timeout	5					

	1-8	9-16
Maint Phs Recalls		
Maint Ped Recalls		

Serial 1 Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00
Serial Rebroadcast	Disabled	Response	None

Serial 2 Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00

Ethernet Port Configuration

Broadcast Plan/Sync	Disabled	Broadcast Time	00:00
Serial Rebroadcast	Disabled		

Peer Configuration

Peer 1	0
Peer 2	0
Peer 3	0
Peer 4	0
Peer 5	0
Peer 6	0
Peer 7	0
Peer 8	0

Appendix D
SYNCHRO & SimTraffic Analysis Of 2022 Existing Conditions



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	552	410	71	506	153	155	118
v/c Ratio	0.33	0.25	0.17	0.23	0.45	0.45	0.25
Control Delay	12.1	0.4	20.7	5.6	21.5	21.5	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	0.4	20.7	5.6	21.5	21.5	2.0
Queue Length 50th (ft)	65	0	9	33	41	42	0
Queue Length 95th (ft)	94	0	22	49	78	80	4
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1692	1615	423	2441	411	412	532
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.25	0.17	0.21	0.37	0.38	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	458	340	59	420	0	0	0	0	255	1	98
Future Volume (vph)	0	458	340	59	420	0	0	0	0	255	1	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1670	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1670	1524
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.92	0.92	0.92	0.92	0.83	0.83	0.83
Adj. Flow (vph)	0	552	410	71	506	0	0	0	0	307	1	118
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	100
Lane Group Flow (vph)	0	552	410	71	506	0	0	0	0	153	155	18
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		19.6	47.8	2.9	29.0					7.3	7.3	7.3
Effective Green, g (s)		19.6	47.8	2.9	29.0					7.3	7.3	7.3
Actuated g/C Ratio		0.41	1.00	0.06	0.61					0.15	0.15	0.15
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1423	1615	198	2105					254	255	232
v/s Ratio Prot		c0.16		0.02	0.15					0.09	c0.09	0.01
v/s Ratio Perm			c0.25									
v/c Ratio		0.39	0.25	0.36	0.24					0.60	0.61	0.08
Uniform Delay, d1		9.9	0.0	21.6	4.3					18.9	18.9	17.4
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.4	0.4	1.1	0.1					4.0	4.1	0.1
Delay (s)		10.3	0.4	22.7	4.5					22.9	23.0	17.5
Level of Service		B	A	C	A					C	C	B
Approach Delay (s)		6.0			6.7			0.0			21.4	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	47.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	762	132	122	335	251	82
v/c Ratio	0.61	0.08	0.32	0.18	0.41	0.06
Control Delay	16.4	0.1	24.4	5.7	19.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	0.1	24.4	5.7	19.9	0.1
Queue Length 50th (ft)	96	0	18	20	34	0
Queue Length 95th (ft)	139	0	36	36	54	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		500	265		350	250
Base Capacity (vph)	1298	1615	377	2172	941	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.08	0.32	0.15	0.27	0.06

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	625	108	100	275	206	67
Future Volume (vph)	625	108	100	275	206	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	762	132	122	335	251	82
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	762	132	122	335	251	82
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	16.9	49.0	3.7	27.6	9.4	49.0
Effective Green, g (s)	16.9	49.0	3.7	27.6	9.4	49.0
Actuated g/C Ratio	0.34	1.00	0.08	0.56	0.19	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1220	1615	264	1955	597	1450
v/s Ratio Prot	c0.22		c0.03	0.10	c0.08	
v/s Ratio Perm		0.08				0.06
v/c Ratio	0.62	0.08	0.46	0.17	0.42	0.06
Uniform Delay, d1	13.4	0.0	21.7	5.2	17.4	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.1	1.3	0.1	0.5	0.1
Delay (s)	14.8	0.1	23.0	5.3	17.9	0.1
Level of Service	B	A	C	A	B	A
Approach Delay (s)	12.6			10.0	13.5	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	49.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

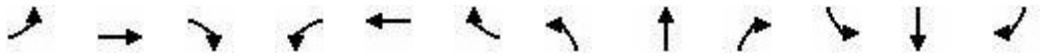
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	176	502	209	2	5	140
Future Volume (Veh/h)	176	502	209	2	5	140
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	217	620	258	2	6	173
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		985				
pX, platoon unblocked					0.74	
vC, conflicting volume	260				1313	259
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	260				1247	259
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				95	78
cM capacity (veh/h)	1304				119	772

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	217	620	260	6	173
Volume Left	217	0	0	6	0
Volume Right	0	0	2	0	173
cSH	1304	1700	1700	119	772
Volume to Capacity	0.17	0.36	0.15	0.05	0.22
Queue Length 95th (ft)	15	0	0	4	21
Control Delay (s)	8.3	0.0	0.0	36.8	11.0
Lane LOS	A			E	B
Approach Delay (s)	2.2		0.0	11.9	
Approach LOS				B	

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	451	30	4	178	19	12	1	0	26	1	25
Future Volume (Veh/h)	28	451	30	4	178	19	12	1	0	26	1	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	33	524	35	5	207	22	14	1	0	30	1	29
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	229			559			854	846	542	808	842	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	229			559			854	846	542	808	842	207
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			95	100	100	90	100	96
cM capacity (veh/h)	1351			1022			264	292	545	294	294	828

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	33	559	5	207	22	15	60
Volume Left	33	0	5	0	0	14	30
Volume Right	0	35	0	0	22	0	29
cSH	1351	1700	1022	1700	1700	266	428
Volume to Capacity	0.02	0.33	0.00	0.12	0.01	0.06	0.14
Queue Length 95th (ft)	2	0	0	0	0	4	12
Control Delay (s)	7.7	0.0	8.5	0.0	0.0	19.3	14.8
Lane LOS	A		A			C	B
Approach Delay (s)	0.4		0.2			19.3	14.8
Approach LOS						C	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	48	194	61	62	17	174	199	156	435
v/c Ratio	0.21	0.60	0.17	0.04	0.10	0.36	0.13	0.54	0.48
Control Delay	25.3	36.9	28.0	0.0	34.6	25.9	0.2	35.7	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	36.9	28.0	0.0	34.6	25.9	0.2	35.7	17.3
Queue Length 50th (ft)	12	78	23	0	7	67	0	64	129
Queue Length 95th (ft)	42	150	57	0	25	116	0	123	259
Internal Link Dist (ft)	717		1034			330			3142
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	412	387	420	1553	373	854	1553	391	917
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.50	0.15	0.04	0.05	0.20	0.13	0.40	0.47

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	23	15	159	50	51	14	143	163	128	351	6
Future Volume (vph)	2	23	15	159	50	51	14	143	163	128	351	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1800		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1800		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	2	28	18	194	61	62	17	174	199	156	428	7
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	31	0	194	61	62	17	174	199	156	434	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		4.1		12.2	12.2	73.6	1.2	22.4	73.6	10.9	32.1	
Effective Green, g (s)		4.1		12.2	12.2	73.6	1.2	22.4	73.6	10.9	32.1	
Actuated g/C Ratio		0.06		0.17	0.17	1.00	0.02	0.30	1.00	0.15	0.44	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		100		290	314	1553	27	567	1553	262	818	
v/s Ratio Prot		0.02		c0.11	0.03		0.01	0.09		c0.09	c0.23	
v/s Ratio Perm						0.04			c0.13			
v/c Ratio		0.31		0.67	0.19	0.04	0.63	0.31	0.13	0.60	0.53	
Uniform Delay, d1		33.4		28.8	26.5	0.0	36.0	19.6	0.0	29.3	15.2	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.8		5.7	0.3	0.0	38.0	0.6	0.2	3.6	1.2	
Delay (s)		35.2		34.6	26.8	0.0	74.0	20.3	0.2	32.9	16.4	
Level of Service		D		C	C	A	E	C	A	C	B	
Approach Delay (s)		35.2			26.3			12.4			20.8	
Approach LOS		D			C			B			C	

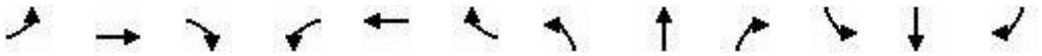
Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	24.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	4	314	523	1
Future Volume (Veh/h)	1	2	4	314	523	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	1	2	5	378	630	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	830	316	631			
vC1, stage 1 conf vol	630					
vC2, stage 2 conf vol	199					
vCu, unblocked vol	830	316	631			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	470	686	961			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	5	189	189	420	211
Volume Left	1	5	0	0	0	0
Volume Right	2	0	0	0	0	1
cSH	595	961	1700	1700	1700	1700
Volume to Capacity	0.01	0.01	0.11	0.11	0.25	0.12
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	11.1	8.8	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.1	0.1			0.0	
Approach LOS	B					

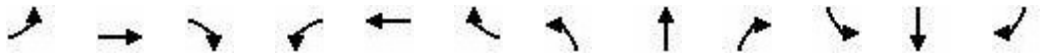
Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	24.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	7	0	1	0	0	8	1	0	0
Future Volume (Veh/h)	0	0	0	7	0	1	0	0	8	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.47	0.92	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Hourly flow rate (vph)	0	0	0	15	0	2	0	0	17	2	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2			0			31	32	0	48	31	1
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2			0			31	32	0	48	31	1
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	100	100	100
cM capacity (veh/h)	1620			1548			970	852	1021	935	857	1090

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	17	17	2
Volume Left	0	15	0	2
Volume Right	0	2	17	0
cSH	1700	1548	1021	935
Volume to Capacity	0.00	0.01	0.02	0.00
Queue Length 95th (ft)	0	1	1	0
Control Delay (s)	0.0	6.5	8.6	8.9
Lane LOS		A	A	A
Approach Delay (s)	0.0	6.5	8.6	8.9
Approach LOS			A	A

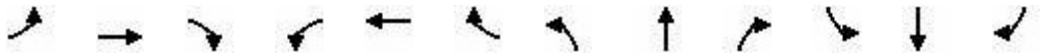
Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	8	9	26	3	5	4	8	4	11	18	4
Future Volume (Veh/h)	0	8	9	26	3	5	4	8	4	11	18	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	10	12	33	4	6	5	10	5	14	23	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	84	78	26	93	78	12	28			15		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	84	78	26	93	78	12	28			15		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	99	96	100	99	100			99		
cM capacity (veh/h)	886	806	1025	869	806	1074	1599			1616		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	43	20	42
Volume Left	0	33	5	14
Volume Right	12	6	5	5
cSH	912	886	1599	1616
Volume to Capacity	0.02	0.05	0.00	0.01
Queue Length 95th (ft)	2	4	0	1
Control Delay (s)	9.0	9.3	1.8	2.5
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	9.3	1.8	2.5
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	18.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Future Volume (Veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	0	1	0	7	0	3	1	1	1	1	3	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	12	9	3	9	8	2	3			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	12	9	3	9	8	2	3			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	100	100			100		
cM capacity (veh/h)	1007	889	1087	1013	889	1089	1632			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	10	3	4
Volume Left	0	7	1	1
Volume Right	0	3	1	0
cSH	889	1035	1632	1634
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	9.1	8.5	2.4	1.8
Lane LOS	A	A	A	A
Approach Delay (s)	9.1	8.5	2.4	1.8
Approach LOS	A	A		

Intersection Summary				
Average Delay	6.0			
Intersection Capacity Utilization	14.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	8	16	10	35	7
Future Volume (Veh/h)	1	8	16	10	35	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.53	0.53	0.53	0.53	0.53	0.53
Hourly flow rate (vph)	2	15	30	19	66	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	49				58	40
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	49				58	40
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				93	99
cM capacity (veh/h)	1571				952	1038

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	17	49	79
Volume Left	2	0	66
Volume Right	0	19	13
cSH	1571	1700	965
Volume to Capacity	0.00	0.03	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.9	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.9	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay		5.0	
Intersection Capacity Utilization		13.3%	ICU Level of Service A
Analysis Period (min)		15	

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	L	L	T	T	L	LT	R
Maximum Queue (ft)	156	127	60	46	82	91	166	133	90
Average Queue (ft)	68	41	23	6	29	36	81	22	39
95th Queue (ft)	123	89	48	27	67	77	137	77	76
Link Distance (ft)	1233	1233			564	564		732	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			225	225			550		290
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	304	248	48	77	84	64	115	156	35
Average Queue (ft)	151	80	11	43	33	21	24	72	3
95th Queue (ft)	258	202	36	71	69	53	76	126	20
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Longhill Road & DePue Drive

Movement	EB	B24	SB	SB
Directions Served	L	T	L	R
Maximum Queue (ft)	63	61	28	86
Average Queue (ft)	23	2	4	38
95th Queue (ft)	53	62	19	66
Link Distance (ft)		572		626
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	240		150	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Ashbury Lane & DePue Drive

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	R	LTR	LTR
Maximum Queue (ft)	28	16	1	40	50
Average Queue (ft)	5	1	0	10	22
95th Queue (ft)	21	8	1	34	42
Link Distance (ft)				957	686
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	240	240	265		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	L	TR
Maximum Queue (ft)	66	157	80	44	110	145	179
Average Queue (ft)	27	74	28	9	45	64	77
95th Queue (ft)	58	128	64	29	92	115	147
Link Distance (ft)	709	1077	1077		320		3143
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		335	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	18	18
Average Queue (ft)	1	1
95th Queue (ft)	9	12
Link Distance (ft)	1399	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Schmidt Road & Foster Road

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	53	30
Average Queue (ft)	7	2
95th Queue (ft)	33	12
Link Distance (ft)	1652	313
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Ashbury Lane & Foster Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	46	44	3	6
Average Queue (ft)	14	20	0	0
95th Queue (ft)	41	46	3	3
Link Distance (ft)	430	174	1640	957
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Schmidt Road & Galt Drive

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	18	35
Average Queue (ft)	1	5
95th Queue (ft)	8	24
Link Distance (ft)	246	402
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Galt Drive & Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	49
Average Queue (ft)	22
95th Queue (ft)	46
Link Distance (ft)	1640
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	473	359	93	1070	114	114	222
v/c Ratio	0.30	0.22	0.22	0.50	0.36	0.36	0.51
Control Delay	10.6	0.3	20.7	6.4	19.9	19.9	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	0.3	20.7	6.4	19.9	19.9	10.8
Queue Length 50th (ft)	47	0	11	66	27	27	13
Queue Length 95th (ft)	83	0	29	115	67	67	61
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1626	1615	418	2360	391	391	494
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.22	0.22	0.45	0.29	0.29	0.45

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	435	330	86	984	0	0	0	0	210	0	204
Future Volume (vph)	0	435	330	86	984	0	0	0	0	210	0	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	6.5	4.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	473	359	93	1070	0	0	0	0	228	0	222
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	135
Lane Group Flow (vph)	0	473	359	93	1070	0	0	0	0	114	114	87
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		20.6	48.3	3.1	30.2					8.6	8.6	8.6
Effective Green, g (s)		20.6	48.3	3.1	30.2					8.6	8.6	8.6
Actuated g/C Ratio		0.43	1.00	0.06	0.63					0.18	0.18	0.18
Clearance Time (s)		4.0		6.5	4.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1494	1615	220	2212					299	299	281
v/s Ratio Prot		0.13		0.03	c0.30					c0.07	0.07	0.06
v/s Ratio Perm			0.22									
v/c Ratio		0.32	0.22	0.42	0.48					0.38	0.38	0.31
Uniform Delay, d1		9.2	0.0	21.7	4.9					17.5	17.5	17.3
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.3	0.3	1.3	0.4					0.8	0.8	0.6
Delay (s)		9.4	0.3	23.1	5.2					18.3	18.3	17.9
Level of Service		A	A	C	A					B	B	B
Approach Delay (s)		5.5			6.6			0.0			18.1	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	48.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	592	103	277	684	491	143
v/c Ratio	0.53	0.07	0.83	0.36	0.66	0.10
Control Delay	17.4	0.1	48.8	7.9	23.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	0.1	48.8	7.9	23.0	0.1
Queue Length 50th (ft)	81	0	46	60	72	0
Queue Length 95th (ft)	124	0	#106	92	113	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		500	265		350	250
Base Capacity (vph)	1171	1538	334	1959	857	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.07	0.83	0.35	0.57	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	545	95	255	629	452	132
Future Volume (vph)	545	95	255	629	452	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	592	103	277	684	491	143
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	592	103	277	684	491	143
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	16.2	52.5	5.0	28.2	12.3	52.5
Effective Green, g (s)	16.2	52.5	5.0	28.2	12.3	52.5
Actuated g/C Ratio	0.31	1.00	0.10	0.54	0.23	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1113	1538	333	1900	751	1479
v/s Ratio Prot	c0.16		c0.08	0.19	c0.15	
v/s Ratio Perm		0.07				0.10
v/c Ratio	0.53	0.07	0.83	0.36	0.65	0.10
Uniform Delay, d1	15.0	0.0	23.3	7.0	18.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	16.1	0.2	2.1	0.1
Delay (s)	15.9	0.1	39.4	7.2	20.2	0.1
Level of Service	B	A	D	A	C	A
Approach Delay (s)	13.6			16.5	15.7	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	52.5	Sum of lost time (s)	19.0
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

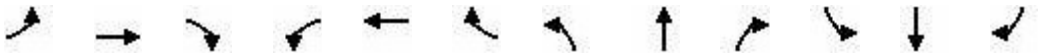
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	225	462	600	7	9	259
Future Volume (Veh/h)	225	462	600	7	9	259
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	242	497	645	8	10	278
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		985				
pX, platoon unblocked					0.83	
vC, conflicting volume	653				1630	649
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	653				1657	649
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	74				84	41
cM capacity (veh/h)	934				63	468

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	242	497	653	10	278
Volume Left	242	0	0	10	0
Volume Right	0	0	8	0	278
cSH	934	1700	1700	63	468
Volume to Capacity	0.26	0.29	0.38	0.16	0.59
Queue Length 95th (ft)	26	0	0	13	95
Control Delay (s)	10.2	0.0	0.0	72.6	23.3
Lane LOS	B			F	C
Approach Delay (s)	3.3		0.0	25.0	
Approach LOS				D	

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	93	368	6	2	515	49	19	2	5	28	1	72
Future Volume (Veh/h)	93	368	6	2	515	49	19	2	5	28	1	72
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	107	423	7	2	592	56	22	2	6	32	1	83
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	648			430			1320	1292	426	1240	1240	592
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	648			430			1320	1292	426	1240	1240	592
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	89			100			79	99	99	77	99	84
cM capacity (veh/h)	947			1140			103	146	632	137	156	510

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	107	430	2	592	56	30	116
Volume Left	107	0	2	0	0	22	32
Volume Right	0	7	0	0	56	6	83
cSH	947	1700	1140	1700	1700	126	288
Volume to Capacity	0.11	0.25	0.00	0.35	0.03	0.24	0.40
Queue Length 95th (ft)	10	0	0	0	0	22	46
Control Delay (s)	9.3	0.0	8.2	0.0	0.0	42.1	25.6
Lane LOS	A		A			E	D
Approach Delay (s)	1.8		0.0			42.1	25.6
Approach LOS						E	D

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	48.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	55	239	18	155	2	414	272	136	289
v/c Ratio	0.28	0.77	0.05	0.10	0.02	0.79	0.17	0.55	0.45
Control Delay	30.0	52.3	31.8	0.1	39.0	38.7	0.2	42.4	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	52.3	31.8	0.1	39.0	38.7	0.2	42.4	22.1
Queue Length 50th (ft)	17	113	8	0	1	186	0	63	106
Queue Length 95th (ft)	55	#270	29	0	8	313	0	131	181
Internal Link Dist (ft)	717		1034			330			3142
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	337	316	340	1615	323	698	1583	316	749
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.76	0.05	0.10	0.01	0.59	0.17	0.43	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	27	18	229	17	149	2	397	261	131	277	0
Future Volume (vph)	8	27	18	229	17	149	2	397	261	131	277	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1798		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1798		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	28	19	239	18	155	2	414	272	136	289	0
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	38	0	239	18	155	2	414	272	136	289	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.9		13.9	13.9	78.9	5.7	22.1	78.9	11.0	27.4	
Effective Green, g (s)		7.9		13.9	13.9	78.9	5.7	22.1	78.9	11.0	27.4	
Actuated g/C Ratio		0.10		0.18	0.18	1.00	0.07	0.28	1.00	0.14	0.35	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		180		311	334	1615	130	526	1583	246	646	
v/s Ratio Prot		0.02		c0.14	0.01		0.00	c0.22		c0.08	c0.16	
v/s Ratio Perm						0.10			c0.17			
v/c Ratio		0.21		0.77	0.05	0.10	0.02	0.79	0.17	0.55	0.45	
Uniform Delay, d1		32.6		31.0	27.0	0.0	34.0	26.2	0.0	31.7	19.9	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.6		10.9	0.1	0.1	0.0	7.6	0.2	2.7	0.5	
Delay (s)		33.2		41.8	27.1	0.1	34.0	33.9	0.2	34.3	20.4	
Level of Service		C		D	C	A	C	C	A	C	C	
Approach Delay (s)		33.2			25.5			20.6			24.9	
Approach LOS		C			C			C			C	

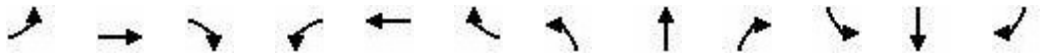
Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	24.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	2	656	532	0
Future Volume (Veh/h)	1	2	2	656	532	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	2	713	578	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	938	289	578			
vC1, stage 1 conf vol	578					
vC2, stage 2 conf vol	360					
vCu, unblocked vol	938	289	578			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	466	714	1006			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	2	356	356	385	193
Volume Left	1	2	0	0	0	0
Volume Right	2	0	0	0	0	0
cSH	606	1006	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.21	0.21	0.23	0.11
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	11.0	8.6	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.0	0.0			0.0	
Approach LOS	B					

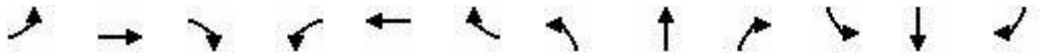
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	0	0	0	0	0	0	0	4	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	2	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	2	0	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1548			1023	896	1021	1022	900	1091

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	4	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	896	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	9.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.0	0.0
Approach LOS			A	A

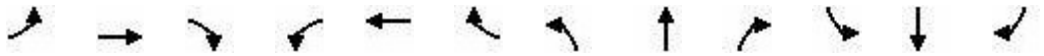
Intersection Summary				
Average Delay	9.0			
Intersection Capacity Utilization	6.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	15	0	13	0	12	0	3	4	0
Future Volume (Veh/h)	0	0	0	15	0	13	0	12	0	3	4	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	0	0	0	22	0	19	0	17	0	4	6	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	50	31	6	31	31	17	6			17		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50	31	6	31	31	17	6			17		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	98	100			100		
cM capacity (veh/h)	931	864	1051	980	864	1068	1628			1613		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	41	17	10
Volume Left	0	22	0	4
Volume Right	0	19	0	0
cSH	1700	1019	1628	1613
Volume to Capacity	0.02	0.04	0.00	0.00
Queue Length 95th (ft)	0	3	0	0
Control Delay (s)	0.0	8.7	0.0	2.9
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.7	0.0	2.9
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Future Volume (Veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.70	0.67	0.70	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	0	0	0	1	0	3	0	0	3	4	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	12	11	0	10	10	2	0			3		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	12	11	0	10	10	2	0			3		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1005	886	1091	1012	887	1089	1636			1632		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	4	3	4
Volume Left	0	1	0	4
Volume Right	0	3	3	0
cSH	1700	1069	1636	1632
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.4	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.4	0.0	7.2
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	21	6	5	20	0
Future Volume (Veh/h)	2	21	6	5	20	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.54	0.54	0.54	0.54	0.54	0.54
Hourly flow rate (vph)	4	39	11	9	37	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	20				62	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	20				62	16
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1609				946	1070

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	43	20	37
Volume Left	4	0	37
Volume Right	0	9	0
cSH	1609	1700	946
Volume to Capacity	0.00	0.01	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.7	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay		3.6	
Intersection Capacity Utilization		13.3%	ICU Level of Service A
Analysis Period (min)		15	

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	L	L	T	T	L	LT	R
Maximum Queue (ft)	133	82	75	50	130	126	138	76	168
Average Queue (ft)	64	34	32	9	60	54	70	15	81
95th Queue (ft)	110	73	62	35	111	103	115	50	139
Link Distance (ft)	1233	1233			564	564		732	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			225	225			550		290
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	236	174	106	125	123	108	190	219	60
Average Queue (ft)	138	71	47	75	61	51	85	129	7
95th Queue (ft)	211	156	88	112	105	94	162	193	39
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)								0	
Queuing Penalty (veh)								0	

Intersection: 3: Longhill Road & DePue Drive

Movement	EB	WB	SB	SB
Directions Served	L	TR	L	R
Maximum Queue (ft)	118	12	36	125
Average Queue (ft)	55	0	8	59
95th Queue (ft)	98	6	30	102
Link Distance (ft)		1198		626
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	240		150	
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 4: Ashbury Lane & DePue Drive

Movement	EB	WB	WB	NB	SB
Directions Served	L	L	R	LTR	LTR
Maximum Queue (ft)	61	12	5	46	72
Average Queue (ft)	24	0	0	18	32
95th Queue (ft)	53	6	4	44	58
Link Distance (ft)				957	686
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	240	240	265		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	L	TR
Maximum Queue (ft)	69	229	48	14	272	151	195
Average Queue (ft)	31	119	13	1	148	71	96
95th Queue (ft)	65	193	39	8	240	124	166
Link Distance (ft)	709	1077	1077		320		3143
Upstream Blk Time (%)					0		
Queuing Penalty (veh)					0		
Storage Bay Dist (ft)				400		335	
Storage Blk Time (%)					0		
Queuing Penalty (veh)					0		

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB	NB
Directions Served	LR	L	T
Maximum Queue (ft)	18	12	13
Average Queue (ft)	1	1	0
95th Queue (ft)	10	8	10
Link Distance (ft)	1399		626
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Schmidt Road & Foster Road

Movement	NB
Directions Served	LTR
Maximum Queue (ft)	12
Average Queue (ft)	0
95th Queue (ft)	7
Link Distance (ft)	1652
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Ashbury Lane & Foster Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	38	3
Average Queue (ft)	18	0
95th Queue (ft)	43	3
Link Distance (ft)	174	957
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Schmidt Road & Galt Drive

Movement	WB
Directions Served	LTR
Maximum Queue (ft)	27
Average Queue (ft)	2
95th Queue (ft)	15
Link Distance (ft)	402
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Galt Drive & Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	13
95th Queue (ft)	37
Link Distance (ft)	1640
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Appendix E

Appendix E.1
SYNCHRO & SimTraffic Analysis Of 2028 Background Conditions

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	595	392	79	517	200	201	113
v/c Ratio	0.46	0.24	0.20	0.30	0.48	0.49	0.22
Control Delay	15.1	0.4	24.8	7.8	21.2	21.2	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	0.4	24.8	7.8	21.2	21.2	2.3
Queue Length 50th (ft)	78	0	12	40	57	57	0
Queue Length 95th (ft)	136	0	31	76	114	115	13
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1467	1615	400	2393	648	650	699
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.24	0.20	0.22	0.31	0.31	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	547	361	73	476	0	0	0	0	368	1	104
Future Volume (vph)	0	547	361	73	476	0	0	0	0	368	1	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1670	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1670	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	595	392	79	517	0	0	0	0	400	1	113
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	86
Lane Group Flow (vph)	0	595	392	79	517	0	0	0	0	200	201	27
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		17.7	50.4	2.8	27.0					11.9	11.9	11.9
Effective Green, g (s)		17.7	50.4	2.8	27.0					11.9	11.9	11.9
Actuated g/C Ratio		0.35	1.00	0.06	0.54					0.24	0.24	0.24
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1218	1615	181	1859					393	394	359
v/s Ratio Prot		c0.17		0.02	0.15					0.12	c0.12	0.02
v/s Ratio Perm			c0.24									
v/c Ratio		0.49	0.24	0.44	0.28					0.51	0.51	0.07
Uniform Delay, d1		12.8	0.0	23.0	6.4					16.7	16.7	15.0
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.6	0.4	1.7	0.2					1.0	1.1	0.1
Delay (s)		13.5	0.4	24.7	6.6					17.8	17.8	15.1
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		8.3			9.0			0.0			17.2	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	50.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	892	125	129	361	238	152
v/c Ratio	0.63	0.08	0.37	0.18	0.41	0.10
Control Delay	15.9	0.1	27.7	5.4	22.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	0.1	27.7	5.4	22.3	0.1
Queue Length 50th (ft)	120	0	21	22	37	0
Queue Length 95th (ft)	189	0	45	43	64	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	1571	1615	353	2382	880	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.08	0.37	0.15	0.27	0.10

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	821	115	119	332	219	140
Future Volume (vph)	821	115	119	332	219	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	892	125	129	361	238	152
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	892	125	129	361	238	152
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	20.6	52.9	3.7	31.3	9.6	52.9
Effective Green, g (s)	20.6	52.9	3.7	31.3	9.6	52.9
Actuated g/C Ratio	0.39	1.00	0.07	0.59	0.18	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1378	1615	244	2053	565	1450
v/s Ratio Prot	c0.25		c0.04	0.10	c0.08	
v/s Ratio Perm		0.08				0.10
v/c Ratio	0.65	0.08	0.53	0.18	0.42	0.10
Uniform Delay, d1	13.2	0.0	23.8	4.9	19.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.1	2.1	0.1	0.5	0.1
Delay (s)	14.6	0.1	25.8	5.0	19.7	0.1
Level of Service	B	A	C	A	B	A
Approach Delay (s)	12.8			10.5	12.1	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	52.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	45	184	58	59	16	270	188	148	459
v/c Ratio	0.19	0.57	0.17	0.04	0.10	0.46	0.12	0.56	0.52
Control Delay	24.6	34.1	26.2	0.0	33.2	24.8	0.2	38.4	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	34.1	26.2	0.0	33.2	24.8	0.2	38.4	18.0
Queue Length 50th (ft)	11	74	22	0	7	104	0	61	133
Queue Length 95th (ft)	42	141	54	0	25	179	0	#138	#328
Internal Link Dist (ft)	717		1034			330			2427
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	232	423	459	1553	174	643	1553	305	927
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.43	0.13	0.04	0.09	0.42	0.12	0.49	0.50

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	24	16	169	53	54	15	248	173	136	416	6
Future Volume (vph)	2	24	16	169	53	54	15	248	173	136	416	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1799		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1799		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	26	17	184	58	59	16	270	188	148	452	7
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	29	0	184	58	59	16	270	188	148	458	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		3.5		11.4	11.4	69.1	1.0	23.0	69.1	7.2	29.2	
Effective Green, g (s)		3.5		11.4	11.4	69.1	1.0	23.0	69.1	7.2	29.2	
Actuated g/C Ratio		0.05		0.16	0.16	1.00	0.01	0.33	1.00	0.10	0.42	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		91		289	313	1553	24	620	1553	184	793	
v/s Ratio Prot		0.02		c0.10	0.03		0.01	0.14		c0.08	c0.24	
v/s Ratio Perm						0.04			c0.12			
v/c Ratio		0.32		0.64	0.19	0.04	0.67	0.44	0.12	0.80	0.58	
Uniform Delay, d1		31.6		26.9	24.9	0.0	33.9	18.0	0.0	30.3	15.2	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.0		4.5	0.3	0.0	52.8	1.0	0.2	21.9	1.6	
Delay (s)		33.7		31.5	25.1	0.0	86.7	19.0	0.2	52.2	16.9	
Level of Service		C		C	C	A	F	B	A	D	B	
Approach Delay (s)		33.7			24.1			13.8			25.5	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	4	429	598	1
Future Volume (Veh/h)	1	2	4	429	598	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	4	466	650	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	892	326	651			
vC1, stage 1 conf vol	650					
vC2, stage 2 conf vol	241					
vCu, unblocked vol	892	326	651			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	454	676	945			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	4	233	233	433	218
Volume Left	1	4	0	0	0	0
Volume Right	2	0	0	0	0	1
cSH	581	945	1700	1700	1700	1700
Volume to Capacity	0.01	0.00	0.14	0.14	0.25	0.13
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	11.2	8.8	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.2	0.1			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Future Volume (Veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	1	0	0	10	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1			0			18	19	0	28	18	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1			0			18	19	0	28	18	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1622			1548			991	870	1021	972	874	1090

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	10	10	1
Volume Left	0	9	0	1
Volume Right	0	1	10	0
cSH	1700	1548	1021	972
Volume to Capacity	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	6.6	8.6	8.7
Lane LOS		A	A	A
Approach Delay (s)	0.0	6.6	8.6	8.7
Approach LOS			A	A

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Future Volume (Veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	10	11	32	3	7	4	10	4	13	22	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	78	72	24	86	72	12	26			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78	72	24	86	72	12	26			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	99	96	100	99	100			99		
cM capacity (veh/h)	894	814	1027	880	814	1074	1601			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	42	18	39
Volume Left	0	32	4	13
Volume Right	11	7	4	4
cSH	913	902	1601	1617
Volume to Capacity	0.02	0.05	0.00	0.01
Queue Length 95th (ft)	2	4	0	1
Control Delay (s)	9.0	9.2	1.6	2.5
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	9.2	1.6	2.5
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	18.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Future Volume (Veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	0	5	0	2	1	1	1	1	2	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10	8	2	8	8	2	2			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10	8	2	8	8	2	2			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1011	890	1088	1015	891	1089	1634			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	7	3	3
Volume Left	0	5	1	1
Volume Right	0	2	1	0
cSH	890	1035	1634	1634
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	9.0	8.5	2.4	2.4
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	8.5	2.4	2.4
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	14.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	9	18	11	39	8
Future Volume (Veh/h)	1	9	18	11	39	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	10	20	12	42	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	32				38	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32				38	26
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	99
cM capacity (veh/h)	1593				979	1056

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	11	32	51
Volume Left	1	0	42
Volume Right	0	12	9
cSH	1593	1700	991
Volume to Capacity	0.00	0.02	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.7	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	163	140	11	78	56	115	115	125	161	102
Average Queue (ft)	83	61	0	31	10	43	52	56	81	44
95th Queue (ft)	137	112	8	62	38	92	99	100	135	84
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	193	184	63	90	87	72	113	155	82
Average Queue (ft)	111	101	18	50	36	25	28	79	21
95th Queue (ft)	172	164	49	81	71	57	81	127	58
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	L	TR
Maximum Queue (ft)	75	154	69	43	160	144	208
Average Queue (ft)	30	74	30	11	75	68	91
95th Queue (ft)	60	129	61	31	137	119	170
Link Distance (ft)	709	1067	1067		320		2443
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		335	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	22	21
Average Queue (ft)	2	1
95th Queue (ft)	12	10
Link Distance (ft)	1399	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Schmidt Road & Foster Road

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	60	16
Average Queue (ft)	11	1
95th Queue (ft)	42	9
Link Distance (ft)	1652	313
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Ashbury Lane & Foster Road

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	52	47	3
Average Queue (ft)	15	23	0
95th Queue (ft)	42	47	0
Link Distance (ft)	430	174	1640
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Schmidt Road & Galt Drive

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	15	30
Average Queue (ft)	1	6
95th Queue (ft)	8	26
Link Distance (ft)	246	402
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Galt Drive & Ashbury Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	3	55
Average Queue (ft)	0	26
95th Queue (ft)	3	49
Link Distance (ft)	402	1640
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 0

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	555	380	182	1214	135	135	236
v/c Ratio	0.42	0.24	0.43	0.59	0.39	0.39	0.52
Control Delay	13.0	0.3	23.8	7.7	20.2	20.2	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	0.3	23.8	7.7	20.2	20.2	10.8
Queue Length 50th (ft)	61	0	25	91	34	34	17
Queue Length 95th (ft)	101	0	51	147	75	75	64
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1369	1615	420	2287	430	430	527
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.24	0.43	0.53	0.31	0.31	0.45

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	511	350	167	1117	0	0	0	0	248	0	217
Future Volume (vph)	0	511	350	167	1117	0	0	0	0	248	0	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	6.5	4.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	555	380	182	1214	0	0	0	0	270	0	236
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	131
Lane Group Flow (vph)	0	555	380	182	1214	0	0	0	0	135	135	105
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		17.4	47.0	4.2	28.1					9.4	9.4	9.4
Effective Green, g (s)		17.4	47.0	4.2	28.1					9.4	9.4	9.4
Actuated g/C Ratio		0.37	1.00	0.09	0.60					0.20	0.20	0.20
Clearance Time (s)		4.0		6.5	4.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1297	1615	306	2115					336	336	316
v/s Ratio Prot		0.16		0.05	c0.34					c0.08	0.08	0.07
v/s Ratio Perm			0.24									
v/c Ratio		0.43	0.24	0.59	0.57					0.40	0.40	0.33
Uniform Delay, d1		11.1	0.0	20.6	5.8					16.4	16.4	16.1
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5	0.3	3.1	0.6					0.8	0.8	0.6
Delay (s)		11.6	0.3	23.7	6.4					17.1	17.1	16.7
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		7.0			8.6			0.0			17.0	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	47.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	710	110	411	887	522	172
v/c Ratio	0.72	0.07	0.66	0.44	0.73	0.12
Control Delay	24.7	0.1	28.1	8.1	28.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	0.1	28.1	8.1	28.0	0.2
Queue Length 50th (ft)	123	0	71	86	89	0
Queue Length 95th (ft)	177	0	111	123	136	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	995	1538	664	2073	773	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.07	0.62	0.43	0.68	0.12

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	653	101	378	816	480	158
Future Volume (vph)	653	101	378	816	480	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	710	110	411	887	522	172
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	710	110	411	887	522	172
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	15.8	58.1	10.4	33.2	12.9	58.1
Effective Green, g (s)	15.8	58.1	10.4	33.2	12.9	58.1
Actuated g/C Ratio	0.27	1.00	0.18	0.57	0.22	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	981	1538	626	2022	712	1479
v/s Ratio Prot	c0.20		c0.12	0.25	c0.16	
v/s Ratio Perm		0.07				0.12
v/c Ratio	0.72	0.07	0.66	0.44	0.73	0.12
Uniform Delay, d1	19.2	0.0	22.2	7.1	21.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	0.1	2.5	0.3	3.9	0.2
Delay (s)	22.5	0.1	24.7	7.4	24.9	0.2
Level of Service	C	A	C	A	C	A
Approach Delay (s)	19.5			12.9	18.8	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	58.1	Sum of lost time (s)	19.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	58	253	19	165	2	500	289	145	429
v/c Ratio	0.32	0.82	0.06	0.10	0.02	0.87	0.18	0.72	0.67
Control Delay	29.8	54.4	28.1	0.1	34.5	42.9	0.3	56.0	27.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	54.4	28.1	0.1	34.5	42.9	0.3	56.0	27.2
Queue Length 50th (ft)	18	123	8	0	1	227	0	71	172
Queue Length 95th (ft)	54	#244	26	0	8	#387	0	#159	271
Internal Link Dist (ft)	717		1034			330			2427
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	183	325	348	1615	142	641	1583	209	712
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.78	0.05	0.10	0.01	0.78	0.18	0.69	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	29	19	243	18	158	2	480	277	139	412	0
Future Volume (vph)	8	29	19	243	18	158	2	480	277	139	412	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1799		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1799		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	30	20	253	19	165	2	500	289	145	429	0
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	40	0	253	19	165	2	500	289	145	429	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.0		13.4	13.4	76.5	5.7	23.4	76.5	8.7	26.4	
Effective Green, g (s)		7.0		13.4	13.4	76.5	5.7	23.4	76.5	8.7	26.4	
Actuated g/C Ratio		0.09		0.18	0.18	1.00	0.07	0.31	1.00	0.11	0.35	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		164		310	332	1615	134	575	1583	201	642	
v/s Ratio Prot		0.02		c0.14	0.01		0.00	c0.27		c0.08	0.23	
v/s Ratio Perm						0.10			c0.18			
v/c Ratio		0.24		0.82	0.06	0.10	0.01	0.87	0.18	0.72	0.67	
Uniform Delay, d1		32.3		30.4	26.3	0.0	32.8	25.1	0.0	32.7	21.3	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.8		15.2	0.1	0.1	0.0	13.2	0.3	12.0	2.6	
Delay (s)		33.1		45.5	26.4	0.1	32.8	38.3	0.3	44.7	24.0	
Level of Service		C		D	C	A	C	D	A	D	C	
Approach Delay (s)		33.1			27.6			24.4			29.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	24.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	2	755	682	0
Future Volume (Veh/h)	1	2	2	755	682	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	2	821	741	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	1156	370	741			
vC1, stage 1 conf vol	741					
vC2, stage 2 conf vol	414					
vCu, unblocked vol	1156	370	741			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	388	632	875			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	2	410	410	494	247
Volume Left	1	2	0	0	0	0
Volume Right	2	0	0	0	0	0
cSH	523	875	1700	1700	1700	1700
Volume to Capacity	0.01	0.00	0.24	0.24	0.29	0.15
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	11.9	9.1	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.9	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1548			1023	896	1021	1027	900	1091

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	1	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	896	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	9.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.0	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	9.0			
Intersection Capacity Utilization	6.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Future Volume (Veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	18	0	15	0	14	0	3	4	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	39	24	4	24	24	14	4			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	39	24	4	24	24	14	4			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	99	100			100		
cM capacity (veh/h)	951	872	1054	991	872	1072	1631			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	33	14	7
Volume Left	0	18	0	3
Volume Right	0	15	0	0
cSH	1700	1026	1631	1617
Volume to Capacity	0.02	0.03	0.00	0.00
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	8.6	0.0	3.1
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.6	0.0	3.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Future Volume (Veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1	0	2	0	0	2	3	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	9	8	0	7	7	1	0			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9	8	0	7	7	1	0			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1012	889	1091	1016	891	1090	1636			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	3	2	3
Volume Left	0	1	0	3
Volume Right	0	2	2	0
cSH	1700	1064	1636	1634
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.4	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.4	0.0	7.2
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	23	7	6	22	1
Future Volume (Veh/h)	2	23	7	6	22	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	25	8	7	24	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	15				40	12
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	15				40	12
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1616				975	1075

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	27	15	25
Volume Left	2	0	24
Volume Right	0	7	1
cSH	1616	1700	979
Volume to Capacity	0.00	0.01	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.5	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.5	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	141	115	8	115	94	169	148	91	124	164
Average Queue (ft)	77	54	0	55	26	82	72	42	60	84
95th Queue (ft)	124	98	6	96	67	140	126	77	104	140
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	221	194	142	155	149	118	221	262	186
Average Queue (ft)	130	106	69	98	82	59	107	153	21
95th Queue (ft)	198	171	117	139	128	99	189	230	87
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)								0	0
Queuing Penalty (veh)								1	0

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	R	L	TR
Maximum Queue (ft)	84	225	50	78	331	34	171	258
Average Queue (ft)	34	127	13	3	201	1	90	143
95th Queue (ft)	73	202	40	35	321	34	150	226
Link Distance (ft)	709	1067	1067		320	320		2443
Upstream Blk Time (%)					1	0		
Queuing Penalty (veh)					6	0		
Storage Bay Dist (ft)				400			335	
Storage Blk Time (%)					1			
Queuing Penalty (veh)					0			

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB	NB	NB
Directions Served	LR	L	T	T
Maximum Queue (ft)	23	24	116	54
Average Queue (ft)	2	2	8	3
95th Queue (ft)	13	13	54	30
Link Distance (ft)	1399		626	626
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100		
Storage Blk Time (%)			1	
Queuing Penalty (veh)			0	

Intersection: 7: Schmidt Road & Foster Road

Movement	NB
Directions Served	LTR
Maximum Queue (ft)	16
Average Queue (ft)	1
95th Queue (ft)	7
Link Distance (ft)	1652
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Ashbury Lane & Foster Road

Movement	WB
Directions Served	LTR
Maximum Queue (ft)	35
Average Queue (ft)	19
95th Queue (ft)	44
Link Distance (ft)	174
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: Schmidt Road & Galt Drive

Movement	WB
Directions Served	LTR
Maximum Queue (ft)	27
Average Queue (ft)	2
95th Queue (ft)	14
Link Distance (ft)	402
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Galt Drive & Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	32
Average Queue (ft)	17
95th Queue (ft)	41
Link Distance (ft)	1640
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 7

MOVEMENT SUMMARY

Site: 101 [Int 3 2028 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	282	2.0	282	2.0	0.128	4.4	LOS A	0.6	14.2	0.39	0.25	0.39	37.2
16	R2	All MCs	2	2.0	2	2.0	0.128	4.3	LOS A	0.6	14.2	0.38	0.24	0.38	36.9
Approach			284	2.0	284	2.0	0.128	4.4	LOS A	0.6	14.3	0.39	0.25	0.39	37.2
North: Longhill Road Connector (SB)															
7	L2	All MCs	5	11.0	5	11.0	0.188	6.3	LOS A	0.8	20.9	0.41	0.28	0.41	23.2
14	R2	All MCs	174	3.0	174	3.0	0.188	5.6	LOS A	0.8	20.9	0.41	0.28	0.41	23.4
Approach			180	3.2	180	3.2	0.188	5.6	LOS A	0.8	20.9	0.41	0.28	0.41	23.3
West: Longhill Road (EB)															
5	L2	All MCs	305	2.0	305	2.0	0.369	4.9	LOS A	2.3	58.9	0.06	0.01	0.06	34.0
2	T1	All MCs	713	2.0	713	2.0	0.369	4.8	LOS A	2.3	59.0	0.06	0.01	0.06	36.3
Approach			1018	2.0	1018	2.0	0.369	4.8	LOS A	2.3	59.0	0.06	0.01	0.06	35.6
All Vehicles			1482	2.2	1482	2.2	0.369	4.8	LOS A	2.3	59.0	0.17	0.09	0.17	33.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Int 3 2028 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	844	2.0	844	2.0	0.380	7.0	LOS A	2.1	52.8	0.47	0.30	0.47	35.7
16	R2	All MCs	8	2.0	8	2.0	0.380	6.9	LOS A	2.1	52.8	0.46	0.29	0.46	35.5
Approach			852	2.0	852	2.0	0.380	7.0	LOS A	2.1	53.0	0.47	0.30	0.47	35.7
North: Longhill Road Connector (SB)															
7	L2	All MCs	11	11.0	11	11.0	0.633	19.7	LOS C	4.9	125.7	0.78	0.98	1.30	20.7
14	R2	All MCs	411	3.0	411	3.0	0.633	17.2	LOS C	4.9	125.7	0.78	0.98	1.30	20.8
Approach			422	3.2	422	3.2	0.633	17.2	LOS C	4.9	125.7	0.78	0.98	1.30	20.8
West: Longhill Road (EB)															
5	L2	All MCs	284	2.0	284	2.0	0.322	4.8	LOS A	2.1	54.5	0.10	0.02	0.10	33.9
2	T1	All MCs	599	2.0	599	2.0	0.322	4.8	LOS A	2.2	54.7	0.10	0.02	0.10	36.3
Approach			883	2.0	883	2.0	0.322	4.8	LOS A	2.2	54.7	0.10	0.02	0.10	35.5
All Vehicles			2156	2.2	2156	2.2	0.633	8.1	LOS A	4.9	125.7	0.38	0.32	0.48	31.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [2028 Int 4 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	14	0.0	14	0.0	0.023	5.4	LOS A	0.1	3.3	0.70	0.50	0.70	22.5
8	T1	All MCs	1	0.0	1	0.0	0.023	5.4	LOS A	0.1	3.3	0.70	0.50	0.70	22.6
18	R2	All MCs	1	0.0	1	0.0	0.023	5.4	LOS A	0.1	3.3	0.70	0.50	0.70	22.6
Approach			16	0.0	16	0.0	0.023	5.4	LOS A	0.1	3.3	0.70	0.50	0.70	22.5
East: DePue Drive (WB)															
1	L2	All MCs	4	0.0	4	0.0	0.288	5.7	LOS A	1.8	44.7	0.39	0.21	0.39	35.7
6	T1	All MCs	234	0.0	234	0.0	0.288	5.7	LOS A	1.8	44.7	0.39	0.21	0.39	36.6
16	R2	All MCs	97	2.0	97	2.0	0.288	5.8	LOS A	1.8	44.7	0.39	0.21	0.39	36.0
Approach			335	0.6	335	0.6	0.288	5.7	LOS A	1.8	44.7	0.39	0.21	0.39	36.4
North: Ashbury Lane (SB)															
7	L2	All MCs	41	0.0	41	0.0	0.080	4.0	LOS A	0.4	10.5	0.43	0.25	0.43	23.1
4	T1	All MCs	1	0.0	1	0.0	0.080	4.0	LOS A	0.4	10.5	0.43	0.25	0.43	23.2
14	R2	All MCs	43	0.0	43	0.0	0.080	4.0	LOS A	0.4	10.5	0.43	0.25	0.43	23.2
Approach			86	0.0	86	0.0	0.080	4.0	LOS A	0.4	10.5	0.43	0.25	0.43	23.2
West: DePue Drive (EB)															
5	L2	All MCs	138	0.0	138	0.0	0.579	8.6	LOS A	5.8	147.3	0.33	0.12	0.33	33.6
2	T1	All MCs	557	3.0	557	3.0	0.579	8.8	LOS A	5.8	147.3	0.33	0.12	0.33	34.0
12	R2	All MCs	35	0.0	35	0.0	0.579	8.6	LOS A	5.8	147.3	0.33	0.12	0.33	34.0
Approach			729	2.3	729	2.3	0.579	8.8	LOS A	5.8	147.3	0.33	0.12	0.33	34.0
All Vehicles			1166	1.6	1166	1.6	0.579	7.5	LOS A	5.8	147.3	0.36	0.16	0.36	33.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2028 Int 4 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	23	0.0	23	0.0	0.045	5.7	LOS A	0.3	6.7	0.72	0.54	0.72	22.5
8	T1	All MCs	2	0.0	2	0.0	0.045	5.7	LOS A	0.3	6.7	0.72	0.54	0.72	22.7
18	R2	All MCs	7	0.0	7	0.0	0.045	5.7	LOS A	0.3	6.7	0.72	0.54	0.72	22.6
Approach			32	0.0	32	0.0	0.045	5.7	LOS A	0.3	6.7	0.72	0.54	0.72	22.6
East: DePue Drive (WB)															
1	L2	All MCs	2	0.0	2	0.0	0.622	10.8	LOS B	5.9	148.3	0.61	0.34	0.61	33.1
6	T1	All MCs	639	0.0	639	0.0	0.622	10.8	LOS B	5.9	148.3	0.61	0.34	0.61	33.9
16	R2	All MCs	76	2.0	76	2.0	0.622	11.0	LOS B	5.9	148.3	0.61	0.34	0.61	33.3
Approach			717	0.2	717	0.2	0.622	10.9	LOS B	5.9	148.3	0.61	0.34	0.61	33.8
North: Ashbury Lane (SB)															
7	L2	All MCs	115	0.0	115	0.0	0.437	10.9	LOS B	3.3	83.6	0.84	0.69	0.90	21.7
4	T1	All MCs	1	0.0	1	0.0	0.437	10.9	LOS B	3.3	83.6	0.84	0.69	0.90	21.8
14	R2	All MCs	199	0.0	199	0.0	0.437	10.9	LOS B	3.3	83.6	0.84	0.69	0.90	21.8
Approach			315	0.0	315	0.0	0.437	10.9	LOS B	3.3	83.6	0.84	0.69	0.90	21.7
West: DePue Drive (EB)															
5	L2	All MCs	135	0.0	135	0.0	0.528	8.7	LOS A	4.9	124.5	0.52	0.26	0.52	33.5
2	T1	All MCs	470	3.0	470	3.0	0.528	8.9	LOS A	4.9	124.5	0.52	0.26	0.52	33.9
12	R2	All MCs	7	0.0	7	0.0	0.528	8.7	LOS A	4.9	124.5	0.52	0.26	0.52	33.9
Approach			611	2.3	611	2.3	0.528	8.9	LOS A	4.9	124.5	0.52	0.26	0.52	33.8
All Vehicles			1675	0.9	1675	0.9	0.622	10.1	LOS B	5.9	148.3	0.62	0.38	0.63	30.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix E.2
SYNCHRO & SimTraffic Analysis Of 2030 Background Conditions

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	171	128	3	72	58	98	113	132	155	116
Average Queue (ft)	91	61	0	30	10	39	50	56	79	45
95th Queue (ft)	152	112	3	59	37	84	95	100	130	88
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	209	192	50	82	96	63	111	150	82
Average Queue (ft)	114	99	16	47	34	28	30	82	20
95th Queue (ft)	181	163	44	75	74	58	87	133	54
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB	B20
Directions Served	LTR	L	T	L	T	L	TR	T
Maximum Queue (ft)	60	150	78	51	174	137	210	10
Average Queue (ft)	28	72	29	12	76	71	97	0
95th Queue (ft)	57	128	64	36	144	123	178	10
Link Distance (ft)	709	1067	1067		320		2381	672
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				400		335		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB	NB
Directions Served	LR	L	T
Maximum Queue (ft)	23	21	10
Average Queue (ft)	2	1	0
95th Queue (ft)	11	11	11
Link Distance (ft)	1399		626
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Schmidt Road & Foster Road

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	55	19
Average Queue (ft)	9	1
95th Queue (ft)	36	12
Link Distance (ft)	1652	313
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Ashbury Lane & Foster Road

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	45	45	9
Average Queue (ft)	16	24	0
95th Queue (ft)	43	46	6
Link Distance (ft)	430	174	930
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Schmidt Road & Galt Drive

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	21	33
Average Queue (ft)	2	6
95th Queue (ft)	13	26
Link Distance (ft)	246	402
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Galt Drive & Ashbury Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	3	52
Average Queue (ft)	0	25
95th Queue (ft)	3	49
Link Distance (ft)	402	1640
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 0

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	605	400	80	527	202	204	115
v/c Ratio	0.47	0.25	0.20	0.31	0.49	0.49	0.23
Control Delay	15.2	0.4	24.9	7.9	21.3	21.3	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	0.4	24.9	7.9	21.3	21.3	2.4
Queue Length 50th (ft)	81	0	12	41	58	60	0
Queue Length 95th (ft)	138	0	31	78	115	116	14
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1464	1615	399	2388	646	648	697
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.25	0.20	0.22	0.31	0.31	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	557	368	74	485	0	0	0	0	373	1	106
Future Volume (vph)	0	557	368	74	485	0	0	0	0	373	1	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1670	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1670	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	605	400	80	527	0	0	0	0	405	1	115
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	88
Lane Group Flow (vph)	0	605	400	80	527	0	0	0	0	202	204	27
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		17.8	50.6	2.8	27.1					12.0	12.0	12.0
Effective Green, g (s)		17.8	50.6	2.8	27.1					12.0	12.0	12.0
Actuated g/C Ratio		0.35	1.00	0.06	0.54					0.24	0.24	0.24
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1221	1615	181	1858					394	396	361
v/s Ratio Prot		c0.17		0.02	0.15					0.12	c0.12	0.02
v/s Ratio Perm			c0.25									
v/c Ratio		0.50	0.25	0.44	0.28					0.51	0.52	0.08
Uniform Delay, d1		12.9	0.0	23.1	6.4					16.8	16.8	15.0
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.7	0.4	1.7	0.2					1.1	1.1	0.1
Delay (s)		13.5	0.4	24.9	6.6					17.9	17.9	15.1
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		8.3			9.0			0.0			17.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	50.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	908	127	132	367	242	154
v/c Ratio	0.64	0.08	0.38	0.19	0.42	0.11
Control Delay	16.1	0.1	27.9	5.4	22.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	0.1	27.9	5.4	22.4	0.1
Queue Length 50th (ft)	123	0	21	23	37	0
Queue Length 95th (ft)	194	0	46	44	65	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	1568	1615	352	2378	878	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.08	0.38	0.15	0.28	0.11

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	835	117	121	338	223	142
Future Volume (vph)	835	117	121	338	223	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	908	127	132	367	242	154
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	908	127	132	367	242	154
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	20.7	53.1	3.7	31.4	9.7	53.1
Effective Green, g (s)	20.7	53.1	3.7	31.4	9.7	53.1
Actuated g/C Ratio	0.39	1.00	0.07	0.59	0.18	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1379	1615	244	2052	568	1450
v/s Ratio Prot	c0.26		c0.04	0.11	c0.08	
v/s Ratio Perm		0.08				0.11
v/c Ratio	0.66	0.08	0.54	0.18	0.43	0.11
Uniform Delay, d1	13.3	0.0	23.9	5.0	19.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.1	2.4	0.1	0.5	0.1
Delay (s)	14.8	0.1	26.3	5.0	19.7	0.1
Level of Service	B	A	C	A	B	A
Approach Delay (s)	13.0			10.7	12.1	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	19.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	46	187	59	60	16	273	192	151	467
v/c Ratio	0.20	0.58	0.17	0.04	0.10	0.47	0.12	0.56	0.53
Control Delay	24.7	34.3	26.3	0.1	33.3	24.9	0.2	38.7	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	34.3	26.3	0.1	33.3	24.9	0.2	38.7	18.2
Queue Length 50th (ft)	12	76	22	0	7	106	0	63	136
Queue Length 95th (ft)	43	143	54	0	25	182	0	#142	#337
Internal Link Dist (ft)	717		1034			330			2368
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	233	425	461	1553	175	645	1553	307	932
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.44	0.13	0.04	0.09	0.42	0.12	0.49	0.50

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	25	16	172	54	55	15	251	177	139	423	6
Future Volume (vph)	2	25	16	172	54	55	15	251	177	139	423	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1801		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1801		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	27	17	187	59	60	16	273	192	151	460	7
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	30	0	187	59	60	16	273	192	151	466	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		3.5		11.4	11.4	69.0	1.0	22.9	69.0	7.2	29.1	
Effective Green, g (s)		3.5		11.4	11.4	69.0	1.0	22.9	69.0	7.2	29.1	
Actuated g/C Ratio		0.05		0.17	0.17	1.00	0.01	0.33	1.00	0.10	0.42	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		91		289	313	1553	24	618	1553	184	791	
v/s Ratio Prot		0.02		c0.11	0.03		0.01	0.15		c0.09	c0.25	
v/s Ratio Perm						0.04			c0.12			
v/c Ratio		0.33		0.65	0.19	0.04	0.67	0.44	0.12	0.82	0.59	
Uniform Delay, d1		31.6		26.9	24.8	0.0	33.8	18.0	0.0	30.3	15.4	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.1		4.9	0.3	0.0	52.8	1.1	0.2	24.5	1.7	
Delay (s)		33.7		31.8	25.1	0.0	86.6	19.1	0.2	54.7	17.1	
Level of Service		C		C	C	A	F	B	A	D	B	
Approach Delay (s)		33.7			24.3			13.8			26.3	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	4	436	609	1
Future Volume (Veh/h)	1	2	4	436	609	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	4	474	662	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	908	332	663			
vC1, stage 1 conf vol	662					
vC2, stage 2 conf vol	245					
vCu, unblocked vol	908	332	663			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	448	670	935			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	4	237	237	441	222
Volume Left	1	4	0	0	0	0
Volume Right	2	0	0	0	0	1
cSH	575	935	1700	1700	1700	1700
Volume to Capacity	0.01	0.00	0.14	0.14	0.26	0.13
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	11.3	8.9	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.3	0.1			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	26.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Future Volume (Veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	1	0	0	10	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1			0			18	19	0	28	18	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1			0			18	19	0	28	18	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1622			1548			991	870	1021	972	874	1090

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	10	10	1
Volume Left	0	9	0	1
Volume Right	0	1	10	0
cSH	1700	1548	1021	972
Volume to Capacity	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	6.6	8.6	8.7
Lane LOS		A	A	A
Approach Delay (s)	0.0	6.6	8.6	8.7
Approach LOS			A	A

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Future Volume (Veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	10	11	32	3	7	4	10	4	13	22	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	78	72	24	86	72	12	26			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78	72	24	86	72	12	26			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	99	96	100	99	100			99		
cM capacity (veh/h)	894	814	1027	880	814	1074	1601			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	42	18	39
Volume Left	0	32	4	13
Volume Right	11	7	4	4
cSH	913	902	1601	1617
Volume to Capacity	0.02	0.05	0.00	0.01
Queue Length 95th (ft)	2	4	0	1
Control Delay (s)	9.0	9.2	1.6	2.5
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	9.2	1.6	2.5
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	18.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Future Volume (Veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	0	5	0	2	1	1	1	1	2	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10	8	2	8	8	2	2			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10	8	2	8	8	2	2			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1011	890	1088	1015	891	1089	1634			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	7	3	3
Volume Left	0	5	1	1
Volume Right	0	2	1	0
cSH	890	1035	1634	1634
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	9.0	8.5	2.4	2.4
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	8.5	2.4	2.4
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	14.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	9	18	11	39	8
Future Volume (Veh/h)	1	9	18	11	39	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	10	20	12	42	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	32				38	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32				38	26
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	99
cM capacity (veh/h)	1593				979	1056

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	11	32	51
Volume Left	1	0	42
Volume Right	0	12	9
cSH	1593	1700	991
Volume to Capacity	0.00	0.02	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.7	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	142	121	5	109	85	138	145	102	122	169
Average Queue (ft)	76	55	0	54	26	76	69	45	58	80
95th Queue (ft)	125	101	5	94	67	130	124	84	98	138
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	B24	B24	NB	NB	NB
Directions Served	T	T	L	L	T	T	T	T	L	L	R
Maximum Queue (ft)	219	192	127	145	147	123	8	14	228	276	214
Average Queue (ft)	132	108	64	94	83	64	0	1	115	162	28
95th Queue (ft)	193	168	109	130	129	103	8	15	202	242	111
Link Distance (ft)	564	564			572	572	260	260		423	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)			265	265					350		250
Storage Blk Time (%)										0	0
Queuing Penalty (veh)										2	0

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	R	L	TR
Maximum Queue (ft)	85	257	62	19	310	44	166	254
Average Queue (ft)	35	134	15	1	194	2	83	146
95th Queue (ft)	73	228	48	10	299	34	139	228
Link Distance (ft)	709	1067	1067		320	320		2381
Upstream Blk Time (%)					0			
Queuing Penalty (veh)					2			
Storage Bay Dist (ft)				400			335	
Storage Blk Time (%)					0			
Queuing Penalty (veh)					0			

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB	NB	NB
Directions Served	LR	L	T	T
Maximum Queue (ft)	18	12	42	15
Average Queue (ft)	1	1	3	1
95th Queue (ft)	10	8	26	13
Link Distance (ft)	1399		626	626
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100		
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 7: Schmidt Road & Foster Road

Movement	NB
Directions Served	LTR
Maximum Queue (ft)	16
Average Queue (ft)	1
95th Queue (ft)	7
Link Distance (ft)	1652
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Ashbury Lane & Foster Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	47	6
Average Queue (ft)	21	0
95th Queue (ft)	46	4
Link Distance (ft)	174	930
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Schmidt Road & Galt Drive

Movement	WB
Directions Served	LTR
Maximum Queue (ft)	30
Average Queue (ft)	2
95th Queue (ft)	16
Link Distance (ft)	402
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Galt Drive & Ashbury Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	3	42
Average Queue (ft)	0	18
95th Queue (ft)	3	43
Link Distance (ft)	402	1640
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 4

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	565	388	184	1237	137	137	240
v/c Ratio	0.42	0.24	0.44	0.60	0.39	0.39	0.52
Control Delay	13.1	0.4	23.8	7.8	20.2	20.2	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	0.4	23.8	7.8	20.2	20.2	11.1
Queue Length 50th (ft)	63	0	25	94	35	35	18
Queue Length 95th (ft)	103	0	51	152	76	76	66
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1363	1615	422	2296	432	432	529
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.24	0.44	0.54	0.32	0.32	0.45

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	520	357	169	1138	0	0	0	0	252	0	221
Future Volume (vph)	0	520	357	169	1138	0	0	0	0	252	0	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	6.5	4.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	565	388	184	1237	0	0	0	0	274	0	240
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	131
Lane Group Flow (vph)	0	565	388	184	1237	0	0	0	0	137	137	109
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		17.3	47.0	4.2	28.0					9.5	9.5	9.5
Effective Green, g (s)		17.3	47.0	4.2	28.0					9.5	9.5	9.5
Actuated g/C Ratio		0.37	1.00	0.09	0.60					0.20	0.20	0.20
Clearance Time (s)		4.0		6.5	4.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1290	1615	306	2108					339	339	319
v/s Ratio Prot		0.16		0.05	c0.35					c0.08	0.08	0.07
v/s Ratio Perm			0.24									
v/c Ratio		0.44	0.24	0.60	0.59					0.40	0.40	0.34
Uniform Delay, d1		11.2	0.0	20.6	5.9					16.3	16.3	16.1
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5	0.4	3.3	0.7					0.8	0.8	0.6
Delay (s)		11.7	0.4	23.9	6.6					17.1	17.1	16.7
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		7.1			8.8			0.0			16.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	47.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	722	112	416	901	532	175
v/c Ratio	0.74	0.07	0.66	0.45	0.74	0.12
Control Delay	25.3	0.1	28.4	8.2	28.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	0.1	28.4	8.2	28.5	0.2
Queue Length 50th (ft)	125	0	72	88	91	0
Queue Length 95th (ft)	181	0	113	125	138	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	991	1538	661	2066	771	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.07	0.63	0.44	0.69	0.12

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	664	103	383	829	489	161
Future Volume (vph)	664	103	383	829	489	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	722	112	416	901	532	175
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	722	112	416	901	532	175
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	15.9	58.4	10.4	33.3	13.1	58.4
Effective Green, g (s)	15.9	58.4	10.4	33.3	13.1	58.4
Actuated g/C Ratio	0.27	1.00	0.18	0.57	0.22	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	982	1538	623	2017	719	1479
v/s Ratio Prot	c0.20		c0.12	0.25	c0.17	
v/s Ratio Perm		0.07				0.12
v/c Ratio	0.74	0.07	0.67	0.45	0.74	0.12
Uniform Delay, d1	19.3	0.0	22.4	7.2	21.1	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.1	2.7	0.3	4.0	0.2
Delay (s)	22.8	0.1	25.1	7.6	25.1	0.2
Level of Service	C	A	C	A	C	A
Approach Delay (s)	19.8			13.1	18.9	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	19.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	59	258	19	168	2	509	295	148	435
v/c Ratio	0.32	0.84	0.06	0.10	0.02	0.88	0.19	0.74	0.67
Control Delay	30.2	56.2	28.1	0.1	34.5	44.1	0.3	57.4	27.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	56.2	28.1	0.1	34.5	44.1	0.3	57.4	27.4
Queue Length 50th (ft)	19	126	8	0	1	233	0	73	175
Queue Length 95th (ft)	55	#250	26	0	8	#398	0	#163	276
Internal Link Dist (ft)	717		1034			330			2368
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	182	323	347	1615	141	638	1583	208	708
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.80	0.05	0.10	0.01	0.80	0.19	0.71	0.61

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	29	19	248	18	161	2	489	283	142	418	0
Future Volume (vph)	9	29	19	248	18	161	2	489	283	142	418	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1799		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1799		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	30	20	258	19	168	2	509	295	148	435	0
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	41	0	258	19	168	2	509	295	148	435	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.0		13.4	13.4	76.8	5.7	23.7	76.8	8.7	26.7	
Effective Green, g (s)		7.0		13.4	13.4	76.8	5.7	23.7	76.8	8.7	26.7	
Actuated g/C Ratio		0.09		0.17	0.17	1.00	0.07	0.31	1.00	0.11	0.35	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		163		308	331	1615	133	580	1583	200	647	
v/s Ratio Prot		0.02		c0.15	0.01		0.00	c0.27		c0.08	0.23	
v/s Ratio Perm						0.10			c0.19			
v/c Ratio		0.25		0.84	0.06	0.10	0.02	0.88	0.19	0.74	0.67	
Uniform Delay, d1		32.5		30.6	26.4	0.0	32.9	25.2	0.0	33.0	21.3	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.8		17.7	0.1	0.1	0.0	14.0	0.3	13.4	2.8	
Delay (s)		33.3		48.3	26.5	0.1	33.0	39.2	0.3	46.3	24.1	
Level of Service		C		D	C	A	C	D	A	D	C	
Approach Delay (s)		33.3			29.2			24.9			29.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	24.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	2	769	693	0
Future Volume (Veh/h)	1	2	2	769	693	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	2	836	753	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	1175	376	753			
vC1, stage 1 conf vol	753					
vC2, stage 2 conf vol	422					
vCu, unblocked vol	1175	376	753			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	382	627	866			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	2	418	418	502	251
Volume Left	1	2	0	0	0	0
Volume Right	2	0	0	0	0	0
cSH	517	866	1700	1700	1700	1700
Volume to Capacity	0.01	0.00	0.25	0.25	0.30	0.15
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	12.0	9.2	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.0	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1548			1023	896	1021	1027	900	1091

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	1	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	896	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	9.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.0	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	9.0			
Intersection Capacity Utilization	6.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Future Volume (Veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	18	0	15	0	14	0	3	4	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	39	24	4	24	24	14	4			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	39	24	4	24	24	14	4			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	99	100			100		
cM capacity (veh/h)	951	872	1054	991	872	1072	1631			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	33	14	7
Volume Left	0	18	0	3
Volume Right	0	15	0	0
cSH	1700	1026	1631	1617
Volume to Capacity	0.02	0.03	0.00	0.00
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	8.6	0.0	3.1
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.6	0.0	3.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Future Volume (Veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1	0	2	0	0	2	3	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	9	8	0	7	7	1	0			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9	8	0	7	7	1	0			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1012	889	1091	1016	891	1090	1636			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	3	2	3
Volume Left	0	1	0	3
Volume Right	0	2	2	0
cSH	1700	1064	1636	1634
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.4	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.4	0.0	7.2
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	23	7	6	22	1
Future Volume (Veh/h)	2	23	7	6	22	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	25	8	7	24	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	15				40	12
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	15				40	12
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1616				975	1075

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	27	15	25
Volume Left	2	0	24
Volume Right	0	7	1
cSH	1616	1700	979
Volume to Capacity	0.00	0.01	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.5	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.5	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization		13.3%	ICU Level of Service A
Analysis Period (min)		15	

MOVEMENT SUMMARY

Site: 101 [Int 3 2030 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	286	2.0	286	2.0	0.130	4.4	LOS A	0.6	14.5	0.39	0.25	0.39	37.2
16	R2	All MCs	2	2.0	2	2.0	0.130	4.3	LOS A	0.6	14.5	0.39	0.24	0.39	36.9
Approach			288	2.0	288	2.0	0.130	4.4	LOS A	0.6	14.6	0.39	0.25	0.39	37.2
North: Longhill Road Connector (SB)															
7	L2	All MCs	5	11.0	5	11.0	0.192	6.4	LOS A	0.8	21.4	0.42	0.28	0.42	23.2
14	R2	All MCs	177	3.0	177	3.0	0.192	5.6	LOS A	0.8	21.4	0.42	0.28	0.42	23.3
Approach			183	3.2	183	3.2	0.192	5.6	LOS A	0.8	21.4	0.42	0.28	0.42	23.3
West: Longhill Road (EB)															
5	L2	All MCs	310	2.0	310	2.0	0.374	4.9	LOS A	2.4	60.5	0.06	0.01	0.06	34.0
2	T1	All MCs	725	2.0	725	2.0	0.374	4.8	LOS A	2.4	60.5	0.06	0.01	0.06	36.3
Approach			1034	2.0	1034	2.0	0.374	4.9	LOS A	2.4	60.5	0.06	0.01	0.06	35.6
All Vehicles			1505	2.2	1505	2.2	0.374	4.9	LOS A	2.4	60.5	0.17	0.09	0.17	33.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Int 3 2030 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	858	2.0	858	2.0	0.388	7.1	LOS A	2.2	54.4	0.48	0.31	0.48	35.6
16	R2	All MCs	9	2.0	9	2.0	0.388	7.0	LOS A	2.2	54.4	0.47	0.30	0.47	35.4
Approach			867	2.0	867	2.0	0.388	7.1	LOS A	2.2	54.6	0.48	0.31	0.48	35.6
North: Longhill Road Connector (SB)															
7	L2	All MCs	11	11.0	11	11.0	0.647	20.4	LOS C	5.1	131.2	0.79	1.01	1.34	20.6
14	R2	All MCs	416	3.0	416	3.0	0.647	17.9	LOS C	5.1	131.2	0.79	1.01	1.34	20.7
Approach			427	3.2	427	3.2	0.647	17.9	LOS C	5.1	131.2	0.79	1.01	1.34	20.7
West: Longhill Road (EB)															
5	L2	All MCs	289	2.0	289	2.0	0.328	4.9	LOS A	2.2	56.1	0.10	0.02	0.10	33.9
2	T1	All MCs	610	2.0	610	2.0	0.328	4.8	LOS A	2.2	56.3	0.10	0.02	0.10	36.3
Approach			899	2.0	899	2.0	0.328	4.8	LOS A	2.2	56.3	0.10	0.02	0.10	35.5
All Vehicles			2192	2.2	2192	2.2	0.647	8.3	LOS A	5.1	131.2	0.38	0.33	0.49	31.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [2030 Int 4 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	14	0.0	14	0.0	0.023	5.4	LOS A	0.1	3.4	0.71	0.51	0.71	22.5
8	T1	All MCs	1	0.0	1	0.0	0.023	5.4	LOS A	0.1	3.4	0.71	0.51	0.71	22.6
18	R2	All MCs	1	0.0	1	0.0	0.023	5.4	LOS A	0.1	3.4	0.71	0.51	0.71	22.6
Approach			16	0.0	16	0.0	0.023	5.4	LOS A	0.1	3.4	0.71	0.51	0.71	22.5
East: DePue Drive (WB)															
1	L2	All MCs	4	0.0	4	0.0	0.293	5.7	LOS A	1.8	45.7	0.40	0.21	0.40	35.7
6	T1	All MCs	238	0.0	238	0.0	0.293	5.7	LOS A	1.8	45.7	0.40	0.21	0.40	36.6
16	R2	All MCs	98	2.0	98	2.0	0.293	5.9	LOS A	1.8	45.7	0.40	0.21	0.40	35.9
Approach			340	0.6	340	0.6	0.293	5.8	LOS A	1.8	45.7	0.40	0.21	0.40	36.4
North: Ashbury Lane (SB)															
7	L2	All MCs	41	0.0	41	0.0	0.081	4.1	LOS A	0.4	10.6	0.43	0.26	0.43	23.1
4	T1	All MCs	1	0.0	1	0.0	0.081	4.1	LOS A	0.4	10.6	0.43	0.26	0.43	23.2
14	R2	All MCs	43	0.0	43	0.0	0.081	4.1	LOS A	0.4	10.6	0.43	0.26	0.43	23.2
Approach			86	0.0	86	0.0	0.081	4.1	LOS A	0.4	10.6	0.43	0.26	0.43	23.2
West: DePue Drive (EB)															
5	L2	All MCs	138	0.0	138	0.0	0.587	8.7	LOS A	6.0	151.6	0.34	0.12	0.34	33.5
2	T1	All MCs	566	3.0	566	3.0	0.587	9.0	LOS A	6.0	151.6	0.34	0.12	0.34	34.0
12	R2	All MCs	35	0.0	35	0.0	0.587	8.7	LOS A	6.0	151.6	0.34	0.12	0.34	34.0
Approach			739	2.3	739	2.3	0.587	8.9	LOS A	6.0	151.6	0.34	0.12	0.34	33.9
All Vehicles			1182	1.6	1182	1.6	0.587	7.6	LOS A	6.0	151.6	0.37	0.16	0.37	33.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2030 Int 4 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	23	0.0	23	0.0	0.046	5.8	LOS A	0.3	6.8	0.72	0.55	0.72	22.5
8	T1	All MCs	2	0.0	2	0.0	0.046	5.8	LOS A	0.3	6.8	0.72	0.55	0.72	22.6
18	R2	All MCs	7	0.0	7	0.0	0.046	5.8	LOS A	0.3	6.8	0.72	0.55	0.72	22.6
Approach			32	0.0	32	0.0	0.046	5.8	LOS A	0.3	6.8	0.72	0.55	0.72	22.5
East: DePue Drive (WB)															
1	L2	All MCs	2	0.0	2	0.0	0.636	11.2	LOS B	6.2	154.4	0.62	0.36	0.62	33.0
6	T1	All MCs	651	0.0	651	0.0	0.636	11.2	LOS B	6.2	154.4	0.62	0.36	0.62	33.7
16	R2	All MCs	77	2.0	77	2.0	0.636	11.4	LOS B	6.2	154.4	0.62	0.36	0.62	33.1
Approach			730	0.2	730	0.2	0.636	11.2	LOS B	6.2	154.4	0.62	0.36	0.62	33.7
North: Ashbury Lane (SB)															
7	L2	All MCs	115	0.0	115	0.0	0.450	11.3	LOS B	3.5	88.2	0.85	0.72	0.94	21.6
4	T1	All MCs	1	0.0	1	0.0	0.450	11.3	LOS B	3.5	88.2	0.85	0.72	0.94	21.7
14	R2	All MCs	201	0.0	201	0.0	0.450	11.3	LOS B	3.5	88.2	0.85	0.72	0.94	21.7
Approach			317	0.0	317	0.0	0.450	11.3	LOS B	3.5	88.2	0.85	0.72	0.94	21.7
West: DePue Drive (EB)															
5	L2	All MCs	137	0.0	137	0.0	0.537	8.8	LOS A	5.1	128.6	0.52	0.26	0.52	33.4
2	T1	All MCs	477	3.0	477	3.0	0.537	9.1	LOS A	5.1	128.6	0.52	0.26	0.52	33.8
12	R2	All MCs	7	0.0	7	0.0	0.537	8.8	LOS A	5.1	128.6	0.52	0.26	0.52	33.8
Approach			621	2.3	621	2.3	0.537	9.0	LOS A	5.1	128.6	0.52	0.26	0.52	33.7
All Vehicles			1700	0.9	1700	0.9	0.636	10.3	LOS B	6.2	154.4	0.63	0.39	0.65	30.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix E.3
SYNCHRO & SimTraffic Analysis Of 2032 Background Conditions

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	616	409	82	537	206	207	117
v/c Ratio	0.48	0.25	0.21	0.31	0.49	0.50	0.23
Control Delay	15.4	0.4	24.9	7.9	21.4	21.4	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	0.4	24.9	7.9	21.4	21.4	2.5
Queue Length 50th (ft)	83	0	12	42	61	61	0
Queue Length 95th (ft)	141	0	32	80	117	118	15
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1459	1615	398	2381	644	647	696
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.25	0.21	0.23	0.32	0.32	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	567	376	75	494	0	0	0	0	379	1	108
Future Volume (vph)	0	567	376	75	494	0	0	0	0	379	1	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1670	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1670	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	616	409	82	537	0	0	0	0	412	1	117
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	89
Lane Group Flow (vph)	0	616	409	82	537	0	0	0	0	206	207	28
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		17.8	50.7	2.8	27.1					12.1	12.1	12.1
Effective Green, g (s)		17.8	50.7	2.8	27.1					12.1	12.1	12.1
Actuated g/C Ratio		0.35	1.00	0.06	0.53					0.24	0.24	0.24
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1218	1615	180	1855					397	398	363
v/s Ratio Prot		c0.18		0.03	0.15					0.12	c0.12	0.02
v/s Ratio Perm			c0.25									
v/c Ratio		0.51	0.25	0.46	0.29					0.52	0.52	0.08
Uniform Delay, d1		13.0	0.0	23.2	6.5					16.8	16.8	15.0
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.7	0.4	1.8	0.2					1.1	1.2	0.1
Delay (s)		13.7	0.4	25.0	6.7					17.9	18.0	15.1
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		8.4			9.1			0.0			17.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	50.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	922	129	134	374	248	155
v/c Ratio	0.65	0.08	0.38	0.19	0.42	0.11
Control Delay	16.3	0.1	28.2	5.5	22.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.3	0.1	28.2	5.5	22.4	0.1
Queue Length 50th (ft)	125	0	22	24	38	0
Queue Length 95th (ft)	199	0	46	45	67	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	1564	1615	351	2371	876	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.08	0.38	0.16	0.28	0.11

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	848	119	123	344	228	143
Future Volume (vph)	848	119	123	344	228	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	922	129	134	374	248	155
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	922	129	134	374	248	155
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	20.7	53.2	3.7	31.4	9.8	53.2
Effective Green, g (s)	20.7	53.2	3.7	31.4	9.8	53.2
Actuated g/C Ratio	0.39	1.00	0.07	0.59	0.18	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1377	1615	243	2048	573	1450
v/s Ratio Prot	c0.26		c0.04	0.11	c0.08	
v/s Ratio Perm		0.08				0.11
v/c Ratio	0.67	0.08	0.55	0.18	0.43	0.11
Uniform Delay, d1	13.4	0.0	23.9	5.0	19.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.1	2.7	0.1	0.5	0.1
Delay (s)	15.1	0.1	26.6	5.1	19.8	0.1
Level of Service	B	A	C	A	B	A
Approach Delay (s)	13.2			10.8	12.2	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	53.2	Sum of lost time (s)	19.0
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	47	191	60	61	16	276	196	153	476
v/c Ratio	0.20	0.59	0.17	0.04	0.10	0.48	0.13	0.57	0.54
Control Delay	24.4	34.5	26.3	0.1	33.3	25.1	0.2	39.0	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	34.5	26.3	0.1	33.3	25.1	0.2	39.0	18.6
Queue Length 50th (ft)	12	78	23	0	7	108	0	64	141
Queue Length 95th (ft)	43	146	55	0	25	184	0	#145	#349
Internal Link Dist (ft)	717		1034			330			2412
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	235	426	462	1553	175	648	1553	308	935
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.45	0.13	0.04	0.09	0.43	0.13	0.50	0.51

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	25	17	176	55	56	15	254	180	141	431	7
Future Volume (vph)	2	25	17	176	55	56	15	254	180	141	431	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1798		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1798		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	27	18	191	60	61	16	276	196	153	468	8
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	30	0	191	60	61	16	276	196	153	475	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		3.5		11.5	11.5	69.0	1.0	22.8	69.0	7.2	29.0	
Effective Green, g (s)		3.5		11.5	11.5	69.0	1.0	22.8	69.0	7.2	29.0	
Actuated g/C Ratio		0.05		0.17	0.17	1.00	0.01	0.33	1.00	0.10	0.42	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		91		292	316	1553	24	615	1553	184	788	
v/s Ratio Prot		0.02		c0.11	0.03		0.01	0.15		c0.09	c0.25	
v/s Ratio Perm						0.04			c0.13			
v/c Ratio		0.33		0.65	0.19	0.04	0.67	0.45	0.13	0.83	0.60	
Uniform Delay, d1		31.6		26.9	24.7	0.0	33.8	18.2	0.0	30.3	15.5	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.1		5.2	0.3	0.0	52.8	1.1	0.2	26.1	1.9	
Delay (s)		33.7		32.1	25.0	0.0	86.6	19.3	0.2	56.4	17.5	
Level of Service		C		C	C	A	F	B	A	E	B	
Approach Delay (s)		33.7			24.5			13.8			26.9	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	4	443	621	1
Future Volume (Veh/h)	1	2	4	443	621	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	4	482	675	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	924	338	676			
vC1, stage 1 conf vol	676					
vC2, stage 2 conf vol	249					
vCu, unblocked vol	924	338	676			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	441	664	925			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	4	241	241	450	226
Volume Left	1	4	0	0	0	0
Volume Right	2	0	0	0	0	1
cSH	568	925	1700	1700	1700	1700
Volume to Capacity	0.01	0.00	0.14	0.14	0.26	0.13
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	11.4	8.9	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.4	0.1			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Future Volume (Veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	1	0	0	10	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1			0			18	19	0	28	18	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1			0			18	19	0	28	18	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1622			1548			991	870	1021	972	874	1090

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	10	10	1
Volume Left	0	9	0	1
Volume Right	0	1	10	0
cSH	1700	1548	1021	972
Volume to Capacity	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	6.6	8.6	8.7
Lane LOS		A	A	A
Approach Delay (s)	0.0	6.6	8.6	8.7
Approach LOS			A	A

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Future Volume (Veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	10	11	32	3	7	4	10	4	13	22	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	78	72	24	86	72	12	26			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78	72	24	86	72	12	26			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	99	96	100	99	100			99		
cM capacity (veh/h)	894	814	1027	880	814	1074	1601			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	42	18	39
Volume Left	0	32	4	13
Volume Right	11	7	4	4
cSH	913	902	1601	1617
Volume to Capacity	0.02	0.05	0.00	0.01
Queue Length 95th (ft)	2	4	0	1
Control Delay (s)	9.0	9.2	1.6	2.5
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	9.2	1.6	2.5
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	18.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Future Volume (Veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	0	5	0	2	1	1	1	1	2	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10	8	2	8	8	2	2			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10	8	2	8	8	2	2			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1011	890	1088	1015	891	1089	1634			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	7	3	3
Volume Left	0	5	1	1
Volume Right	0	2	1	0
cSH	890	1035	1634	1634
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	9.0	8.5	2.4	2.4
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	8.5	2.4	2.4
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	14.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	9	18	11	39	8
Future Volume (Veh/h)	1	9	18	11	39	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	10	20	12	42	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	32				38	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32				38	26
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	99
cM capacity (veh/h)	1593				979	1056

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	11	32	51
Volume Left	1	0	42
Volume Right	0	12	9
cSH	1593	1700	991
Volume to Capacity	0.00	0.02	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.7	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	163	136	20	73	54	102	109	124	157	106
Average Queue (ft)	88	63	1	31	10	38	50	57	86	46
95th Queue (ft)	144	118	12	62	37	82	94	104	138	89
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	209	185	61	93	85	80	115	158	75
Average Queue (ft)	122	108	16	49	37	25	30	81	21
95th Queue (ft)	185	171	48	81	75	60	88	136	56
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	B22
Directions Served	LTR	L	T	L	T	R	L	TR	T
Maximum Queue (ft)	67	153	75	50	164	3	149	215	4
Average Queue (ft)	29	76	32	11	74	0	70	100	0
95th Queue (ft)	59	130	65	35	135	3	120	185	4
Link Distance (ft)	709	1067	1067		320	320		2427	593
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				400			335		
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	16	20
Average Queue (ft)	1	1
95th Queue (ft)	10	10
Link Distance (ft)	1399	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Schmidt Road & Foster Road

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	58	22
Average Queue (ft)	10	1
95th Queue (ft)	40	10
Link Distance (ft)	1652	313
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Ashbury Lane & Foster Road

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	48	40	3
Average Queue (ft)	14	22	0
95th Queue (ft)	42	46	0
Link Distance (ft)	430	174	930
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Schmidt Road & Galt Drive

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	12	33
Average Queue (ft)	0	5
95th Queue (ft)	5	24
Link Distance (ft)	246	402
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Galt Drive & Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	49
Average Queue (ft)	26
95th Queue (ft)	48
Link Distance (ft)	1640
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 0

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	576	397	186	1260	139	140	245
v/c Ratio	0.43	0.25	0.44	0.61	0.40	0.40	0.53
Control Delay	13.2	0.4	23.9	8.0	20.3	20.3	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	0.4	23.9	8.0	20.3	20.3	11.4
Queue Length 50th (ft)	64	0	26	97	35	35	19
Queue Length 95th (ft)	105	0	51	156	77	77	68
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1364	1615	421	2291	431	431	528
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.25	0.44	0.55	0.32	0.32	0.46

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	530	365	171	1159	0	0	0	0	257	0	225
Future Volume (vph)	0	530	365	171	1159	0	0	0	0	257	0	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	6.5	4.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	576	397	186	1260	0	0	0	0	279	0	245
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	131
Lane Group Flow (vph)	0	576	397	186	1260	0	0	0	0	139	140	114
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		17.3	47.0	4.2	28.0					9.5	9.5	9.5
Effective Green, g (s)		17.3	47.0	4.2	28.0					9.5	9.5	9.5
Actuated g/C Ratio		0.37	1.00	0.09	0.60					0.20	0.20	0.20
Clearance Time (s)		4.0		6.5	4.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1290	1615	306	2108					339	339	319
v/s Ratio Prot		0.16		0.05	c0.36					0.08	c0.08	0.07
v/s Ratio Perm			0.25									
v/c Ratio		0.45	0.25	0.61	0.60					0.41	0.41	0.36
Uniform Delay, d1		11.2	0.0	20.6	6.0					16.3	16.3	16.1
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5	0.4	3.4	0.7					0.8	0.8	0.7
Delay (s)		11.7	0.4	24.0	6.7					17.1	17.1	16.8
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		7.1			8.9			0.0			17.0	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	47.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	735	114	423	916	542	178
v/c Ratio	0.75	0.07	0.67	0.45	0.75	0.12
Control Delay	25.9	0.1	28.7	8.3	29.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	0.1	28.7	8.3	29.0	0.2
Queue Length 50th (ft)	128	0	74	90	93	0
Queue Length 95th (ft)	#187	0	114	128	#143	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	989	1538	660	2062	769	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.07	0.64	0.44	0.70	0.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	676	105	389	843	499	164
Future Volume (vph)	676	105	389	843	499	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	735	114	423	916	542	178
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	735	114	423	916	542	178
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	15.8	58.4	10.5	33.3	13.1	58.4
Effective Green, g (s)	15.8	58.4	10.5	33.3	13.1	58.4
Actuated g/C Ratio	0.27	1.00	0.18	0.57	0.22	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	976	1538	629	2017	719	1479
v/s Ratio Prot	c0.20		c0.12	0.26	c0.17	
v/s Ratio Perm		0.07				0.12
v/c Ratio	0.75	0.07	0.67	0.45	0.75	0.12
Uniform Delay, d1	19.5	0.0	22.3	7.3	21.1	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.1	2.8	0.3	4.5	0.2
Delay (s)	23.5	0.1	25.2	7.6	25.6	0.2
Level of Service	C	A	C	A	C	A
Approach Delay (s)	20.3			13.2	19.3	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	19.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	61	264	20	172	2	519	300	151	442
v/c Ratio	0.34	0.85	0.06	0.11	0.02	0.89	0.19	0.75	0.68
Control Delay	30.3	58.8	28.2	0.1	34.5	45.2	0.3	58.9	27.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.3	58.8	28.2	0.1	34.5	45.2	0.3	58.9	27.5
Queue Length 50th (ft)	19	129	8	0	1	239	0	75	179
Queue Length 95th (ft)	55	#258	27	0	8	#409	0	#167	281
Internal Link Dist (ft)	717		1034			330			2412
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	182	320	344	1615	140	633	1583	206	703
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.82	0.06	0.11	0.01	0.82	0.19	0.73	0.63

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	30	20	253	19	165	2	498	288	145	424	0
Future Volume (vph)	9	30	20	253	19	165	2	498	288	145	424	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1798		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1798		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	31	21	264	20	172	2	519	300	151	442	0
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	42	0	264	20	172	2	519	300	151	442	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.0		13.5	13.5	77.4	5.7	24.1	77.4	8.8	27.2	
Effective Green, g (s)		7.0		13.5	13.5	77.4	5.7	24.1	77.4	8.8	27.2	
Actuated g/C Ratio		0.09		0.17	0.17	1.00	0.07	0.31	1.00	0.11	0.35	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		162		308	331	1615	132	585	1583	201	654	
v/s Ratio Prot		0.02		c0.15	0.01		0.00	c0.28		c0.09	0.24	
v/s Ratio Perm						0.11			c0.19			
v/c Ratio		0.26		0.86	0.06	0.11	0.02	0.89	0.19	0.75	0.68	
Uniform Delay, d1		32.8		31.0	26.7	0.0	33.2	25.4	0.0	33.2	21.4	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.9		20.3	0.1	0.1	0.0	15.1	0.3	14.6	2.8	
Delay (s)		33.6		51.3	26.7	0.1	33.3	40.4	0.3	47.8	24.1	
Level of Service		C		D	C	A	C	D	A	D	C	
Approach Delay (s)		33.6			30.9			25.7			30.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	77.4	Sum of lost time (s)	24.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	2	784	705	0
Future Volume (Veh/h)	1	2	2	784	705	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	2	852	766	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	1196	383	766			
vC1, stage 1 conf vol	766					
vC2, stage 2 conf vol	430					
vCu, unblocked vol	1196	383	766			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	376	621	856			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	2	426	426	511	255
Volume Left	1	2	0	0	0	0
Volume Right	2	0	0	0	0	0
cSH	510	856	1700	1700	1700	1700
Volume to Capacity	0.01	0.00	0.25	0.25	0.30	0.15
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	12.1	9.2	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.1	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1548			1023	896	1021	1027	900	1091

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	1	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	896	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	9.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.0	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	9.0			
Intersection Capacity Utilization	6.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Future Volume (Veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	18	0	15	0	14	0	3	4	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	39	24	4	24	24	14	4			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	39	24	4	24	24	14	4			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	99	100			100		
cM capacity (veh/h)	951	872	1054	991	872	1072	1631			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	33	14	7
Volume Left	0	18	0	3
Volume Right	0	15	0	0
cSH	1700	1026	1631	1617
Volume to Capacity	0.02	0.03	0.00	0.00
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	8.6	0.0	3.1
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.6	0.0	3.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Future Volume (Veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1	0	2	0	0	2	3	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	9	8	0	7	7	1	0			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9	8	0	7	7	1	0			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1012	889	1091	1016	891	1090	1636			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	3	2	3
Volume Left	0	1	0	3
Volume Right	0	2	2	0
cSH	1700	1064	1636	1634
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.4	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.4	0.0	7.2
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	23	7	6	22	1
Future Volume (Veh/h)	2	23	7	6	22	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	25	8	7	24	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	15				40	12
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	15				40	12
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1616				975	1075

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	27	15	25
Volume Left	2	0	24
Volume Right	0	7	1
cSH	1616	1700	979
Volume to Capacity	0.00	0.01	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.5	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.5	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization		13.3%	ICU Level of Service A
Analysis Period (min)		15	

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	146	127	10	107	82	151	146	109	129	170
Average Queue (ft)	78	57	0	56	27	81	69	46	61	87
95th Queue (ft)	126	105	7	96	66	137	121	87	105	146
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	B24	B24	NB	NB	NB
Directions Served	T	T	L	L	T	T	T	T	L	L	R
Maximum Queue (ft)	228	215	126	151	141	117	17	5	225	279	189
Average Queue (ft)	136	112	68	96	84	61	1	0	115	163	28
95th Queue (ft)	203	183	111	134	131	99	12	5	202	240	118
Link Distance (ft)	564	564			572	572	260	260		423	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)			265	265					350		250
Storage Blk Time (%)										0	0
Queuing Penalty (veh)										1	0

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	L	TR
Maximum Queue (ft)	103	269	50	23	317	190	240
Average Queue (ft)	40	140	14	1	204	96	137
95th Queue (ft)	82	227	41	9	314	164	214
Link Distance (ft)	709	1067	1067		320		2427
Upstream Blk Time (%)					1		
Queuing Penalty (veh)					6		
Storage Bay Dist (ft)				400		335	
Storage Blk Time (%)					1		
Queuing Penalty (veh)					0		

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB	NB	NB
Directions Served	LR	L	T	T
Maximum Queue (ft)	20	15	90	43
Average Queue (ft)	1	0	8	2
95th Queue (ft)	10	6	63	24
Link Distance (ft)	1399		626	626
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100		
Storage Blk Time (%)			1	
Queuing Penalty (veh)			0	

Intersection: 7: Schmidt Road & Foster Road

Movement	NB
Directions Served	LTR
Maximum Queue (ft)	9
Average Queue (ft)	0
95th Queue (ft)	6
Link Distance (ft)	1652
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Ashbury Lane & Foster Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	38	3
Average Queue (ft)	21	0
95th Queue (ft)	45	3
Link Distance (ft)	174	930
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Schmidt Road & Galt Drive

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	30	3
Average Queue (ft)	3	0
95th Queue (ft)	17	3
Link Distance (ft)	402	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Galt Drive & Ashbury Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	3	32
Average Queue (ft)	0	16
95th Queue (ft)	3	40
Link Distance (ft)	402	1640
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 8

MOVEMENT SUMMARY

Site: 101 [Int 3 2032 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	291	2.0	291	2.0	0.167	5.8	LOS A	0.8	19.9	0.44	0.30	0.44	36.9
16	R2	All MCs	2	2.0	2	2.0	0.167	6.0	LOS A	0.7	18.7	0.44	0.30	0.44	36.2
Approach			294	2.0	294	2.0	0.167	5.8	LOS A	0.8	19.9	0.44	0.30	0.44	36.8
North: Longhill Road Connector (SB)															
7	L2	All MCs	6	11.0	6	11.0	0.268	8.8	LOS A	1.2	31.2	0.49	0.37	0.49	22.7
14	R2	All MCs	181	3.0	181	3.0	0.268	8.3	LOS A	1.2	31.2	0.49	0.37	0.49	22.8
Approach			187	3.3	187	3.3	0.268	8.3	LOS A	1.2	31.2	0.49	0.37	0.49	22.8
West: Longhill Road (EB)															
5	L2	All MCs	313	2.0	313	2.0	0.456	6.1	LOS A	3.4	85.8	0.09	0.02	0.09	33.5
2	T1	All MCs	737	2.0	737	2.0	0.456	6.2	LOS A	3.5	89.2	0.09	0.02	0.09	36.0
Approach			1049	2.0	1049	2.0	0.456	6.2	LOS A	3.5	89.2	0.09	0.02	0.09	35.2
All Vehicles			1530	2.2	1530	2.2	0.456	6.3	LOS A	3.5	89.2	0.21	0.11	0.21	33.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Int 3 2032 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	872	2.0	872	2.0	0.402	7.4	LOS A	2.3	57.0	0.49	0.32	0.49	35.4
16	R2	All MCs	9	2.0	9	2.0	0.402	7.3	LOS A	2.3	57.0	0.48	0.31	0.48	35.2
Approach			881	2.0	881	2.0	0.402	7.4	LOS A	2.3	57.3	0.49	0.32	0.49	35.4
North: Longhill Road Connector (SB)															
7	L2	All MCs	11	11.0	11	11.0	0.682	22.7	LOS C	5.7	145.9	0.81	1.07	1.44	20.2
14	R2	All MCs	423	3.0	423	3.0	0.682	20.0	LOS C	5.7	145.9	0.81	1.07	1.44	20.3
Approach			433	3.2	433	3.2	0.682	20.1	LOS C	5.7	145.9	0.81	1.07	1.44	20.3
West: Longhill Road (EB)															
5	L2	All MCs	295	2.0	295	2.0	0.338	5.0	LOS A	2.3	58.8	0.10	0.02	0.10	33.9
2	T1	All MCs	620	2.0	620	2.0	0.338	4.9	LOS A	2.3	58.9	0.10	0.02	0.10	36.3
Approach			915	2.0	915	2.0	0.338	4.9	LOS A	2.3	58.9	0.10	0.02	0.10	35.4
All Vehicles			2229	2.2	2229	2.2	0.682	8.9	LOS A	5.7	145.9	0.39	0.34	0.51	31.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [2032 Int 4 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	14	0.0	14	0.0	0.024	5.5	LOS A	0.1	3.4	0.71	0.51	0.71	22.4
8	T1	All MCs	1	0.0	1	0.0	0.024	5.5	LOS A	0.1	3.4	0.71	0.51	0.71	22.6
18	R2	All MCs	1	0.0	1	0.0	0.024	5.5	LOS A	0.1	3.4	0.71	0.51	0.71	22.6
Approach			16	0.0	16	0.0	0.024	5.5	LOS A	0.1	3.4	0.71	0.51	0.71	22.5
East: DePue Drive (WB)															
1	L2	All MCs	4	0.0	4	0.0	0.297	5.8	LOS A	1.9	46.7	0.40	0.21	0.40	35.7
6	T1	All MCs	242	0.0	242	0.0	0.297	5.8	LOS A	1.9	46.7	0.40	0.21	0.40	36.6
16	R2	All MCs	98	2.0	98	2.0	0.297	5.9	LOS A	1.9	46.7	0.40	0.21	0.40	35.9
Approach			345	0.6	345	0.6	0.297	5.8	LOS A	1.9	46.7	0.40	0.21	0.40	36.4
North: Ashbury Lane (SB)															
7	L2	All MCs	42	0.0	42	0.0	0.083	4.1	LOS A	0.4	10.9	0.43	0.26	0.43	23.1
4	T1	All MCs	1	0.0	1	0.0	0.083	4.1	LOS A	0.4	10.9	0.43	0.26	0.43	23.2
14	R2	All MCs	45	0.0	45	0.0	0.083	4.1	LOS A	0.4	10.9	0.43	0.26	0.43	23.2
Approach			88	0.0	88	0.0	0.083	4.1	LOS A	0.4	10.9	0.43	0.26	0.43	23.2
West: DePue Drive (EB)															
5	L2	All MCs	139	0.0	139	0.0	0.598	8.9	LOS A	6.2	157.7	0.35	0.13	0.35	33.4
2	T1	All MCs	577	3.0	577	3.0	0.598	9.2	LOS A	6.2	157.7	0.35	0.13	0.35	33.9
12	R2	All MCs	36	0.0	36	0.0	0.598	8.9	LOS A	6.2	157.7	0.35	0.13	0.35	33.9
Approach			752	2.3	752	2.3	0.598	9.1	LOS A	6.2	157.7	0.35	0.13	0.35	33.8
All Vehicles			1201	1.6	1201	1.6	0.598	7.8	LOS A	6.2	157.7	0.37	0.17	0.37	33.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2032 Int 4 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	23	0.0	23	0.0	0.047	5.9	LOS A	0.3	7.0	0.73	0.56	0.73	22.5
8	T1	All MCs	2	0.0	2	0.0	0.047	5.9	LOS A	0.3	7.0	0.73	0.56	0.73	22.6
18	R2	All MCs	7	0.0	7	0.0	0.047	5.9	LOS A	0.3	7.0	0.73	0.56	0.73	22.6
Approach			32	0.0	32	0.0	0.047	5.9	LOS A	0.3	7.0	0.73	0.56	0.73	22.5
East: DePue Drive (WB)															
1	L2	All MCs	2	0.0	2	0.0	0.649	11.5	LOS B	6.4	160.7	0.64	0.37	0.64	32.8
6	T1	All MCs	663	0.0	663	0.0	0.649	11.5	LOS B	6.4	160.7	0.64	0.37	0.64	33.6
16	R2	All MCs	78	2.0	78	2.0	0.649	11.7	LOS B	6.4	160.7	0.64	0.37	0.64	33.0
Approach			743	0.2	743	0.2	0.649	11.6	LOS B	6.4	160.7	0.64	0.37	0.64	33.5
North: Ashbury Lane (SB)															
7	L2	All MCs	116	0.0	116	0.0	0.462	11.8	LOS B	3.7	93.2	0.87	0.75	0.97	21.5
4	T1	All MCs	1	0.0	1	0.0	0.462	11.8	LOS B	3.7	93.2	0.87	0.75	0.97	21.6
14	R2	All MCs	203	0.0	203	0.0	0.462	11.8	LOS B	3.7	93.2	0.87	0.75	0.97	21.6
Approach			321	0.0	321	0.0	0.462	11.8	LOS B	3.7	93.2	0.87	0.75	0.97	21.6
West: DePue Drive (EB)															
5	L2	All MCs	139	0.0	139	0.0	0.549	9.1	LOS A	5.3	133.9	0.54	0.27	0.54	33.3
2	T1	All MCs	487	3.0	487	3.0	0.549	9.3	LOS A	5.3	133.9	0.54	0.27	0.54	33.7
12	R2	All MCs	8	0.0	8	0.0	0.549	9.1	LOS A	5.3	133.9	0.54	0.27	0.54	33.7
Approach			634	2.3	634	2.3	0.549	9.3	LOS A	5.3	133.9	0.54	0.27	0.54	33.6
All Vehicles			1729	0.9	1729	0.9	0.649	10.7	LOS B	6.4	160.7	0.65	0.41	0.67	30.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix F

Appendix F.1
SYNCHRO & SimTraffic Analysis Of 2028 Future Conditions

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	635	392	123	576	235	237	113
v/c Ratio	0.53	0.24	0.34	0.32	0.57	0.57	0.22
Control Delay	17.2	0.4	27.6	8.1	23.9	24.0	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	0.4	27.6	8.1	23.9	24.0	2.3
Queue Length 50th (ft)	89	0	20	48	72	73	0
Queue Length 95th (ft)	146	0	44	86	134	135	13
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1331	1615	363	2171	588	590	650
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.24	0.34	0.27	0.40	0.40	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	584	361	113	530	0	0	0	0	433	1	104
Future Volume (vph)	0	584	361	113	530	0	0	0	0	433	1	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1670	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1670	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	635	392	123	576	0	0	0	0	471	1	113
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	86
Lane Group Flow (vph)	0	635	392	123	576	0	0	0	0	235	237	27
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		18.1	53.1	4.1	28.7					12.9	12.9	12.9
Effective Green, g (s)		18.1	53.1	4.1	28.7					12.9	12.9	12.9
Actuated g/C Ratio		0.34	1.00	0.08	0.54					0.24	0.24	0.24
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1183	1615	252	1876					404	405	370
v/s Ratio Prot		c0.18		0.04	0.17					0.14	c0.14	0.02
v/s Ratio Perm			c0.24									
v/c Ratio		0.54	0.24	0.49	0.31					0.58	0.59	0.07
Uniform Delay, d1		14.1	0.0	23.5	6.7					17.7	17.7	15.5
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.9	0.4	1.5	0.2					2.1	2.2	0.1
Delay (s)		15.0	0.4	25.0	6.9					19.9	19.9	15.6
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		9.4			10.1			0.0			19.0	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1003	125	233	464	238	183
v/c Ratio	0.67	0.08	0.49	0.20	0.49	0.13
Control Delay	18.5	0.1	32.4	4.8	30.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.5	0.1	32.4	4.8	30.6	0.2
Queue Length 50th (ft)	172	0	50	32	50	0
Queue Length 95th (ft)	254	0	86	57	83	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1704	1615	527	2560	656	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.08	0.44	0.18	0.36	0.13

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	923	115	214	427	219	168
Future Volume (vph)	923	115	214	427	219	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1003	125	233	464	238	183
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1003	125	233	464	238	183
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	28.7	67.3	9.1	44.8	10.5	67.3
Effective Green, g (s)	28.7	67.3	9.1	44.8	10.5	67.3
Actuated g/C Ratio	0.43	1.00	0.14	0.67	0.16	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1509	1615	473	2310	485	1450
v/s Ratio Prot	c0.28		c0.07	0.13	c0.08	
v/s Ratio Perm		0.08				0.13
v/c Ratio	0.66	0.08	0.49	0.20	0.49	0.13
Uniform Delay, d1	15.4	0.0	27.0	4.3	26.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.1	0.8	0.1	0.8	0.2
Delay (s)	16.9	0.1	27.8	4.4	26.7	0.2
Level of Service	B	A	C	A	C	A
Approach Delay (s)	15.1			12.2	15.2	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	67.3	Sum of lost time (s)	19.0
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	133	184	78	59	57	270	188	148	459
v/c Ratio	0.55	0.63	0.24	0.04	0.39	0.50	0.12	0.62	0.58
Control Delay	29.6	39.6	30.0	0.0	42.7	25.7	0.2	44.8	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	39.6	30.0	0.0	42.7	25.7	0.2	44.8	22.5
Queue Length 50th (ft)	30	81	32	0	26	106	0	67	186
Queue Length 95th (ft)	#102	151	72	0	64	177	0	#151	293
Internal Link Dist (ft)	717		1034			776			2501
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	241	364	395	1553	150	691	1553	262	818
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.51	0.20	0.04	0.38	0.39	0.12	0.56	0.56

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	51	70	169	72	54	52	248	173	136	416	6
Future Volume (vph)	2	51	70	169	72	54	52	248	173	136	416	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1752		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1752		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	55	76	184	78	59	57	270	188	148	452	7
RTOR Reduction (vph)	0	61	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	72	0	184	78	59	57	270	188	148	458	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		5.2		11.8	11.8	73.8	3.2	23.3	73.8	9.5	29.6	
Effective Green, g (s)		5.2		11.8	11.8	73.8	3.2	23.3	73.8	9.5	29.6	
Actuated g/C Ratio		0.07		0.16	0.16	1.00	0.04	0.32	1.00	0.13	0.40	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		123		280	303	1553	73	588	1553	227	752	
v/s Ratio Prot		c0.04		c0.10	0.04		0.03	0.14		c0.08	c0.24	
v/s Ratio Perm						0.04			0.12			
v/c Ratio		0.58		0.66	0.26	0.04	0.78	0.46	0.12	0.65	0.61	
Uniform Delay, d1		33.2		29.1	27.2	0.0	35.0	20.2	0.0	30.6	17.5	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		6.9		5.5	0.5	0.0	40.6	1.2	0.2	6.6	2.1	
Delay (s)		40.1		34.6	27.6	0.0	75.5	21.4	0.2	37.1	19.6	
Level of Service		D		C	C	A	E	C	A	D	B	
Approach Delay (s)		40.1			26.5			19.6			23.9	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	73.8	Sum of lost time (s)	24.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	177	144	23	27	0
Future Volume (Veh/h)	0	177	144	23	27	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	192	157	25	29	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	182				362	170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	182				362	170
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	100
cM capacity (veh/h)	1393				638	874

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	192	182	29
Volume Left	0	0	29
Volume Right	0	25	0
cSH	1393	1700	638
Volume to Capacity	0.00	0.11	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	10.9
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.9
Approach LOS			B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	69	1	19	92	19	1	0	27	27	0	0
Future Volume (Veh/h)	0	69	1	19	92	19	1	0	27	27	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	75	1	21	100	21	1	0	29	29	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	121			76			228	238	76	257	228	110
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	121			76			228	238	76	257	228	110
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	97	96	100	100
cM capacity (veh/h)	1467			1523			720	653	986	668	662	943

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	76	142	30	29
Volume Left	0	21	1	29
Volume Right	1	21	29	0
cSH	1467	1523	974	668
Volume to Capacity	0.00	0.01	0.03	0.04
Queue Length 95th (ft)	0	1	2	3
Control Delay (s)	0.0	1.2	8.8	10.6
Lane LOS		A	A	B
Approach Delay (s)	0.0	1.2	8.8	10.6
Approach LOS			A	B

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	28.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	187	158	20	108	76	124	133	148	186	116
Average Queue (ft)	96	76	1	47	23	51	61	65	101	45
95th Queue (ft)	156	132	14	89	62	98	109	118	160	92
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	247	230	88	113	93	73	152	182	105
Average Queue (ft)	138	128	40	73	41	29	49	98	32
95th Queue (ft)	215	204	81	107	77	64	121	157	76
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)								0	
Queuing Penalty (veh)								0	

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	B23
Directions Served	LTR	L	T	L	T	R	L	TR	T
Maximum Queue (ft)	137	189	103	84	191	40	157	245	20
Average Queue (ft)	61	82	40	34	78	1	78	122	1
95th Queue (ft)	109	150	80	72	147	41	133	207	12
Link Distance (ft)	712	1068	1068		810	810		2516	508
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				400			335		
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	44
Average Queue (ft)	15
95th Queue (ft)	36
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	42	46	51
Average Queue (ft)	2	19	18
95th Queue (ft)	22	46	47
Link Distance (ft)	712	336	704
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	617	380	224	1270	189	189	236
v/c Ratio	0.57	0.24	0.58	0.64	0.55	0.55	0.48
Control Delay	16.9	0.3	27.7	9.7	23.7	23.7	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	0.3	27.7	9.7	23.7	23.7	7.9
Queue Length 50th (ft)	79	0	32	123	50	50	7
Queue Length 95th (ft)	122	0	#62	179	102	102	51
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1084	1615	389	1971	398	398	533
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.24	0.58	0.64	0.47	0.47	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	568	350	206	1168	0	0	0	0	348	0	217
Future Volume (vph)	0	568	350	206	1168	0	0	0	0	348	0	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	617	380	224	1270	0	0	0	0	378	0	236
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	164
Lane Group Flow (vph)	0	617	380	224	1270	0	0	0	0	189	189	72
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		15.0	48.5	5.5	27.0					10.0	10.0	10.0
Effective Green, g (s)		15.0	48.5	5.5	27.0					10.0	10.0	10.0
Actuated g/C Ratio		0.31	1.00	0.11	0.56					0.21	0.21	0.21
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1084	1615	389	1970					346	346	326
v/s Ratio Prot		0.18		0.07	c0.36					c0.11	0.11	0.05
v/s Ratio Perm			0.24									
v/c Ratio		0.57	0.24	0.58	0.64					0.55	0.55	0.22
Uniform Delay, d1		14.0	0.0	20.4	7.4					17.2	17.2	16.0
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.1	0.3	2.1	1.0					1.8	1.8	0.3
Delay (s)		15.2	0.3	22.5	8.4					19.0	19.0	16.3
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		9.5			10.5			0.0			18.0	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	48.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	880	110	508	984	522	218
v/c Ratio	0.69	0.07	0.72	0.43	0.84	0.15
Control Delay	24.5	0.1	35.2	7.2	44.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	0.1	35.2	7.2	44.3	0.2
Queue Length 50th (ft)	190	0	121	104	130	0
Queue Length 95th (ft)	255	0	172	138	#215	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1401	1538	797	2511	644	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.07	0.64	0.39	0.81	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	810	101	467	905	480	201
Future Volume (vph)	810	101	467	905	480	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	880	110	508	984	522	218
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	880	110	508	984	522	218
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	26.5	75.2	15.1	48.6	14.6	75.2
Effective Green, g (s)	26.5	75.2	15.1	48.6	14.6	75.2
Actuated g/C Ratio	0.35	1.00	0.20	0.65	0.19	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1272	1538	703	2287	622	1479
v/s Ratio Prot	c0.24		c0.15	0.28	c0.16	
v/s Ratio Perm		0.07				0.15
v/c Ratio	0.69	0.07	0.72	0.43	0.84	0.15
Uniform Delay, d1	20.9	0.0	28.1	6.5	29.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	0.1	3.7	0.3	9.7	0.2
Delay (s)	22.9	0.1	31.8	6.8	38.9	0.2
Level of Service	C	A	C	A	D	A
Approach Delay (s)	20.4			15.3	27.5	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	19.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	137	253	48	165	61	500	289	145	429
v/c Ratio	0.61	0.82	0.15	0.10	0.42	0.85	0.18	0.71	0.66
Control Delay	37.6	57.5	32.6	0.1	47.8	40.8	0.3	57.4	28.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	57.5	32.6	0.1	47.8	40.8	0.3	57.4	28.2
Queue Length 50th (ft)	44	132	22	0	32	246	0	76	190
Queue Length 95th (ft)	#118	#273	55	0	74	367	0	#173	287
Internal Link Dist (ft)	717		1034			776			2501
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	239	325	349	1615	154	737	1583	216	799
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.78	0.14	0.10	0.40	0.68	0.18	0.67	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	54	70	243	46	158	59	480	277	139	412	0
Future Volume (vph)	8	54	70	243	46	158	59	480	277	139	412	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1758		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1758		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	56	73	253	48	165	61	500	289	145	429	0
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	91	0	253	48	165	61	500	289	145	429	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		8.3		14.4	14.4	82.3	6.7	26.0	82.3	9.6	28.9	
Effective Green, g (s)		8.3		14.4	14.4	82.3	6.7	26.0	82.3	9.6	28.9	
Actuated g/C Ratio		0.10		0.17	0.17	1.00	0.08	0.32	1.00	0.12	0.35	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		177		309	332	1615	146	594	1583	206	654	
v/s Ratio Prot		c0.05		c0.14	0.03		0.03	c0.27		c0.08	0.23	
v/s Ratio Perm						0.10			c0.18			
v/c Ratio		0.51		0.82	0.14	0.10	0.42	0.84	0.18	0.70	0.66	
Uniform Delay, d1		35.1		32.7	28.7	0.0	35.9	26.2	0.0	35.0	22.5	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.5		15.4	0.2	0.1	1.9	10.5	0.3	10.4	2.4	
Delay (s)		37.6		48.1	28.9	0.1	37.9	36.7	0.3	45.4	24.9	
Level of Service		D		D	C	A	D	D	A	D	C	
Approach Delay (s)		37.6			29.1			24.4			30.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	82.3	Sum of lost time (s)	24.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	181	179	29	26	0
Future Volume (Veh/h)	0	181	179	29	26	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	197	195	32	28	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	227				408	211
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227				408	211
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	100
cM capacity (veh/h)	1341				599	829

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	197	227	28
Volume Left	0	0	28
Volume Right	0	32	0
cSH	1341	1700	599
Volume to Capacity	0.00	0.13	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	11.3
Lane LOS			B
Approach Delay (s)	0.0	0.0	11.3
Approach LOS			B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	80	5	28	49	28	5	0	26	26	0	0
Future Volume (Veh/h)	0	80	5	28	49	28	5	0	26	26	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	87	5	30	53	30	5	0	28	28	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	83			92			218	232	90	246	220	68
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	83			92			218	232	90	246	220	68
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			99	100	97	96	100	100
cM capacity (veh/h)	1514			1503			728	654	968	677	665	995

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	92	113	33	28
Volume Left	0	30	5	28
Volume Right	5	30	28	0
cSH	1514	1503	922	677
Volume to Capacity	0.00	0.02	0.04	0.04
Queue Length 95th (ft)	0	2	3	3
Control Delay (s)	0.0	2.1	9.0	10.5
Lane LOS		A	A	B
Approach Delay (s)	0.0	2.1	9.0	10.5
Approach LOS			A	B

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	25.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	151	136	8	125	120	170	162	124	160	159
Average Queue (ft)	86	70	0	67	42	97	93	57	82	81
95th Queue (ft)	137	119	6	110	93	151	149	98	135	139
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)					0					
Queuing Penalty (veh)					0					

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	249	233	177	188	145	124	227	291	235
Average Queue (ft)	155	137	101	126	84	62	133	177	47
95th Queue (ft)	225	205	156	172	134	106	208	258	149
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)								1	0
Queuing Penalty (veh)								4	0

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	R	L	TR
Maximum Queue (ft)	148	287	94	140	341	21	204	260
Average Queue (ft)	66	144	31	33	187	0	93	149
95th Queue (ft)	120	250	71	85	291	5	163	239
Link Distance (ft)	712	1068	1068		810	810		2516
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				400			335	
Storage Blk Time (%)				0	0			
Queuing Penalty (veh)				0	0			

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	52
Average Queue (ft)	16
95th Queue (ft)	40
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	39	59	52
Average Queue (ft)	2	20	20
95th Queue (ft)	15	48	48
Link Distance (ft)	712	336	704
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 4

MOVEMENT SUMMARY

Site: 101 [Int 3 2028 TF AM (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	485	2.0	485	2.0	0.220	5.2	LOS A	1.1	26.4	0.42	0.27	0.42	36.7
16	R2	All MCs	2	2.0	2	2.0	0.220	5.2	LOS A	1.1	26.4	0.41	0.26	0.41	36.4
Approach			487	2.0	487	2.0	0.220	5.2	LOS A	1.1	26.5	0.42	0.27	0.42	36.7
North: Longhill Road Connector (SB)															
7	L2	All MCs	5	11.0	5	11.0	0.217	7.8	LOS A	0.9	23.4	0.52	0.41	0.52	23.0
14	R2	All MCs	174	3.0	174	3.0	0.217	6.6	LOS A	0.9	23.4	0.52	0.41	0.52	23.1
Approach			180	3.2	180	3.2	0.217	6.6	LOS A	0.9	23.4	0.52	0.41	0.52	23.1
West: Longhill Road (EB)															
5	L2	All MCs	305	2.0	305	2.0	0.419	5.2	LOS A	2.9	74.7	0.07	0.01	0.07	34.1
2	T1	All MCs	852	2.0	852	2.0	0.419	5.1	LOS A	2.9	74.9	0.07	0.01	0.07	36.1
Approach			1157	2.0	1157	2.0	0.419	5.2	LOS A	2.9	74.9	0.07	0.01	0.07	35.6
All Vehicles			1824	2.1	1824	2.1	0.419	5.3	LOS A	2.9	74.9	0.21	0.12	0.21	34.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Int 3 2028 TF PM (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	1035	2.0	1035	2.0	0.466	8.2	LOS A	2.8	71.1	0.51	0.34	0.51	35.0
16	R2	All MCs	8	2.0	8	2.0	0.466	8.1	LOS A	2.8	71.1	0.50	0.33	0.50	34.8
Approach			1043	2.0	1043	2.0	0.466	8.2	LOS A	2.8	71.3	0.51	0.33	0.51	35.0
North: Longhill Road Connector (SB)															
7	L2	All MCs	11	11.0	11	11.0	0.715	26.2	LOS D	5.9	151.8	0.84	1.15	1.55	19.7
14	R2	All MCs	411	3.0	411	3.0	0.715	23.0	LOS C	5.9	151.8	0.84	1.15	1.55	19.7
Approach			422	3.2	422	3.2	0.715	23.1	LOS C	5.9	151.8	0.84	1.15	1.55	19.7
West: Longhill Road (EB)															
5	L2	All MCs	284	2.0	284	2.0	0.400	5.4	LOS A	3.0	76.8	0.11	0.02	0.11	34.0
2	T1	All MCs	813	2.0	813	2.0	0.400	5.4	LOS A	3.0	77.1	0.11	0.02	0.11	36.0
Approach			1097	2.0	1097	2.0	0.400	5.4	LOS A	3.0	77.1	0.11	0.02	0.11	35.5
All Vehicles			2561	2.2	2561	2.2	0.715	9.5	LOS A	5.9	151.8	0.40	0.34	0.51	31.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [2028 Total AM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	220	0.0	220	0.0	0.284	7.8	LOS A	1.2	30.5	0.59	0.51	0.59	21.9
8	T1	All MCs	1	0.0	1	0.0	0.284	7.8	LOS A	1.2	30.5	0.59	0.51	0.59	22.0
18	R2	All MCs	1	0.0	1	0.0	0.284	7.8	LOS A	1.2	30.5	0.59	0.51	0.59	22.0
Approach			222	0.0	222	0.0	0.284	7.8	LOS A	1.2	30.5	0.59	0.51	0.59	21.9
East: DePue Drive (WB)															
1	L2	All MCs	4	0.0	4	0.0	0.160	4.8	LOS A	0.8	19.9	0.46	0.31	0.46	36.1
6	T1	All MCs	234	2.0	234	2.0	0.160	4.9	LOS A	0.8	20.3	0.46	0.31	0.46	36.8
16	R2	All MCs	97	5.0	97	5.0	0.160	5.0	LOS A	0.8	20.3	0.46	0.30	0.46	36.0
Approach			335	2.8	335	2.8	0.160	4.9	LOS A	0.8	20.3	0.46	0.31	0.46	36.5
North: Ashbury Lane (SB)															
7	L2	All MCs	41	0.0	41	0.0	0.100	4.9	LOS A	0.4	10.5	0.47	0.36	0.47	22.9
4	T1	All MCs	1	0.0	1	0.0	0.100	4.9	LOS A	0.4	10.5	0.47	0.36	0.47	23.0
14	R2	All MCs	43	4.0	43	4.0	0.100	5.4	LOS A	0.4	10.5	0.47	0.36	0.47	23.0
Approach			86	2.0	86	2.0	0.100	5.2	LOS A	0.4	10.5	0.47	0.36	0.47	23.0
West: DePue Drive (EB)															
5	L2	All MCs	138	0.0	138	0.0	0.324	5.3	LOS A	1.9	47.6	0.19	0.07	0.19	34.9
2	T1	All MCs	557	1.0	557	1.0	0.324	5.3	LOS A	1.9	48.1	0.19	0.06	0.19	36.1
12	R2	All MCs	176	3.0	176	3.0	0.324	5.4	LOS A	1.9	48.1	0.19	0.06	0.19	36.0
Approach			871	1.2	871	1.2	0.324	5.3	LOS A	1.9	48.1	0.19	0.06	0.19	35.9
All Vehicles			1513	1.5	1513	1.5	0.324	5.6	LOS A	1.9	48.1	0.33	0.20	0.33	31.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2028 Total PM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	215	0.0	215	0.0	0.294	8.2	LOS A	1.3	33.3	0.62	0.53	0.62	21.9
8	T1	All MCs	2	0.0	2	0.0	0.294	8.2	LOS A	1.3	33.3	0.62	0.53	0.62	22.0
18	R2	All MCs	5	0.0	5	0.0	0.294	8.2	LOS A	1.3	33.3	0.62	0.53	0.62	22.0
Approach			223	0.0	223	0.0	0.294	8.2	LOS A	1.3	33.3	0.62	0.53	0.62	21.9
East: DePue Drive (WB)															
1	L2	All MCs	2	0.0	2	0.0	0.331	6.7	LOS A	1.9	46.8	0.52	0.35	0.52	35.2
6	T1	All MCs	639	0.0	639	0.0	0.331	6.6	LOS A	1.9	47.7	0.52	0.35	0.52	36.1
16	R2	All MCs	76	2.0	76	2.0	0.331	6.6	LOS A	1.9	47.7	0.52	0.34	0.52	35.6
Approach			717	0.2	717	0.2	0.331	6.6	LOS A	1.9	47.7	0.52	0.35	0.52	36.1
North: Ashbury Lane (SB)															
7	L2	All MCs	115	0.0	115	0.0	0.450	11.5	LOS B	2.7	66.8	0.71	0.74	0.91	21.7
4	T1	All MCs	1	0.0	1	0.0	0.450	11.5	LOS B	2.7	66.8	0.71	0.74	0.91	21.8
14	R2	All MCs	199	0.0	199	0.0	0.450	11.5	LOS B	2.7	66.8	0.71	0.74	0.91	21.7
Approach			315	0.0	315	0.0	0.450	11.5	LOS B	2.7	66.8	0.71	0.74	0.91	21.7
West: DePue Drive (EB)															
5	L2	All MCs	135	0.0	135	0.0	0.331	5.8	LOS A	2.0	51.9	0.34	0.16	0.34	34.6
2	T1	All MCs	470	3.0	470	3.0	0.331	6.0	LOS A	2.1	52.2	0.34	0.16	0.34	35.4
12	R2	All MCs	223	0.0	223	0.0	0.331	5.6	LOS A	2.1	52.2	0.34	0.16	0.34	36.1
Approach			827	1.7	827	1.7	0.331	5.9	LOS A	2.1	52.2	0.34	0.16	0.34	35.5
All Vehicles			2083	0.7	2083	0.7	0.450	7.2	LOS A	2.7	66.8	0.49	0.35	0.52	30.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix F.2
SYNCHRO & SimTraffic Analysis Of 2030 Future Conditions

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	657	400	145	614	248	249	115
v/c Ratio	0.54	0.25	0.40	0.34	0.59	0.59	0.22
Control Delay	17.5	0.4	28.7	8.3	24.5	24.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	0.4	28.7	8.3	24.5	24.5	2.3
Queue Length 50th (ft)	94	0	24	54	77	77	0
Queue Length 95th (ft)	152	0	50	92	142	143	14
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1323	1615	361	2159	584	586	647
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.25	0.40	0.28	0.42	0.42	0.18

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	604	368	133	565	0	0	0	0	456	1	106
Future Volume (vph)	0	604	368	133	565	0	0	0	0	456	1	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1669	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1669	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	657	400	145	614	0	0	0	0	496	1	115
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	87
Lane Group Flow (vph)	0	657	400	145	614	0	0	0	0	248	249	28
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		18.2	53.5	4.1	28.8					13.2	13.2	13.2
Effective Green, g (s)		18.2	53.5	4.1	28.8					13.2	13.2	13.2
Actuated g/C Ratio		0.34	1.00	0.08	0.54					0.25	0.25	0.25
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1180	1615	250	1868					410	411	376
v/s Ratio Prot		c0.19		0.04	c0.18					0.15	c0.15	0.02
v/s Ratio Perm			0.25									
v/c Ratio		0.56	0.25	0.58	0.33					0.60	0.61	0.08
Uniform Delay, d1		14.4	0.0	23.9	6.9					17.8	17.8	15.5
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.0	0.4	3.2	0.2					2.5	2.5	0.1
Delay (s)		15.3	0.4	27.1	7.1					20.4	20.4	15.6
Level of Service		B	A	C	A					C	C	B
Approach Delay (s)		9.7			11.0			0.0			19.5	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1048	127	284	520	242	193
v/c Ratio	0.70	0.08	0.59	0.22	0.50	0.13
Control Delay	19.2	0.1	34.3	4.9	31.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	0.1	34.3	4.9	31.0	0.2
Queue Length 50th (ft)	184	0	61	37	51	0
Queue Length 95th (ft)	270	0	103	64	84	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1678	1615	518	2520	646	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.08	0.55	0.21	0.37	0.13

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	964	117	261	478	223	178
Future Volume (vph)	964	117	261	478	223	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1048	127	284	520	242	193
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1048	127	284	520	242	193
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	29.2	68.2	9.4	45.6	10.6	68.2
Effective Green, g (s)	29.2	68.2	9.4	45.6	10.6	68.2
Actuated g/C Ratio	0.43	1.00	0.14	0.67	0.16	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1515	1615	482	2320	483	1450
v/s Ratio Prot	c0.30		c0.08	0.15	c0.08	
v/s Ratio Perm		0.08				0.13
v/c Ratio	0.69	0.08	0.59	0.22	0.50	0.13
Uniform Delay, d1	15.8	0.0	27.6	4.4	26.4	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	0.1	1.8	0.1	0.8	0.2
Delay (s)	17.6	0.1	29.4	4.5	27.2	0.2
Level of Service	B	A	C	A	C	A
Approach Delay (s)	15.7			13.3	15.2	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	68.2	Sum of lost time (s)	19.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	177	187	85	60	67	273	192	151	467
v/c Ratio	0.77	0.66	0.28	0.04	0.49	0.52	0.12	0.66	0.67
Control Delay	45.4	42.0	30.8	0.1	48.1	26.4	0.2	48.0	26.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.4	42.0	30.8	0.1	48.1	26.4	0.2	48.0	26.7
Queue Length 50th (ft)	50	83	35	0	31	107	0	69	191
Queue Length 95th (ft)	#161	153	77	0	#82	179	0	#156	300
Internal Link Dist (ft)	717		1034			776			2521
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	231	337	366	1553	139	641	1553	243	750
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.55	0.23	0.04	0.48	0.43	0.12	0.62	0.62

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	65	96	172	78	55	62	251	177	139	423	6
Future Volume (vph)	2	65	96	172	78	55	62	251	177	139	423	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1748		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1748		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	71	104	187	85	60	67	273	192	151	460	7
RTOR Reduction (vph)	0	63	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	114	0	187	85	60	67	273	192	151	466	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.1		11.8	11.8	74.5	4.6	22.1	74.5	9.5	27.0	
Effective Green, g (s)		7.1		11.8	11.8	74.5	4.6	22.1	74.5	9.5	27.0	
Actuated g/C Ratio		0.10		0.16	0.16	1.00	0.06	0.30	1.00	0.13	0.36	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		166		277	300	1553	104	552	1553	225	680	
v/s Ratio Prot		c0.07		c0.11	0.04		0.04	0.15		c0.09	c0.25	
v/s Ratio Perm						0.04			0.12			
v/c Ratio		0.68		0.68	0.28	0.04	0.64	0.49	0.12	0.67	0.69	
Uniform Delay, d1		32.6		29.5	27.6	0.0	34.2	21.6	0.0	31.0	20.2	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		11.1		6.4	0.5	0.0	12.9	1.5	0.2	7.6	3.7	
Delay (s)		43.7		35.9	28.1	0.0	47.0	23.1	0.2	38.6	23.8	
Level of Service		D		D	C	A	D	C	A	D	C	
Approach Delay (s)		43.7			27.4			17.8			27.5	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	24.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	254	174	28	40	0
Future Volume (Veh/h)	0	254	174	28	40	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	276	189	30	43	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	219				480	204
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	219				480	204
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				92	100
cM capacity (veh/h)	1350				545	837

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	276	219	43
Volume Left	0	0	43
Volume Right	0	30	0
cSH	1350	1700	545
Volume to Capacity	0.00	0.13	0.08
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.0	0.0	12.2
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.2
Approach LOS			B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	23.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	83	1	24	99	24	1	0	40	40	0	0
Future Volume (Veh/h)	0	83	1	24	99	24	1	0	40	40	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	90	1	26	108	26	1	0	43	43	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	134			91			264	276	90	306	264	121
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	134			91			264	276	90	306	264	121
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	96	93	100	100
cM capacity (veh/h)	1451			1504			680	620	967	609	630	930

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	91	160	44	43
Volume Left	0	26	1	43
Volume Right	1	26	43	0
cSH	1451	1504	958	609
Volume to Capacity	0.00	0.02	0.05	0.07
Queue Length 95th (ft)	0	1	4	6
Control Delay (s)	0.0	1.3	8.9	11.4
Lane LOS		A	A	B
Approach Delay (s)	0.0	1.3	8.9	11.4
Approach LOS			A	B

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	30.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	186	166	12	99	77	131	130	162	208	114
Average Queue (ft)	98	80	0	50	29	52	63	73	109	47
95th Queue (ft)	161	143	12	86	70	103	113	131	176	92
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	241	242	106	126	101	88	140	179	103
Average Queue (ft)	143	137	50	80	45	31	45	95	36
95th Queue (ft)	216	209	90	115	87	68	116	152	83
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB	B25	B25
Directions Served	LTR	L	T	L	T	L	TR	T	
Maximum Queue (ft)	226	209	109	102	183	177	262	19	7
Average Queue (ft)	89	90	42	39	79	79	126	1	0
95th Queue (ft)	177	164	84	82	147	141	216	14	7
Link Distance (ft)	712	1068	1068		810		2535	490	490
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				400		335			
Storage Blk Time (%)						0	0		
Queuing Penalty (veh)						0	0		

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	48
Average Queue (ft)	18
95th Queue (ft)	42
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	32	56	57
Average Queue (ft)	2	25	25
95th Queue (ft)	16	51	51
Link Distance (ft)	712	336	704
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	657	388	240	1312	218	218	240
v/c Ratio	0.61	0.24	0.62	0.67	0.61	0.61	0.48
Control Delay	17.7	0.4	29.8	10.2	25.6	25.6	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	0.4	29.8	10.2	25.6	25.6	8.1
Queue Length 50th (ft)	85	0	35	130	60	60	8
Queue Length 95th (ft)	131	0	#73	189	117	117	53
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1076	1615	386	1957	395	395	530
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.24	0.62	0.67	0.55	0.55	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	604	357	221	1207	0	0	0	0	401	0	221
Future Volume (vph)	0	604	357	221	1207	0	0	0	0	401	0	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	657	388	240	1312	0	0	0	0	436	0	240
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	163
Lane Group Flow (vph)	0	657	388	240	1312	0	0	0	0	218	218	77
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		15.0	48.8	5.5	27.0					10.3	10.3	10.3
Effective Green, g (s)		15.0	48.8	5.5	27.0					10.3	10.3	10.3
Actuated g/C Ratio		0.31	1.00	0.11	0.55					0.21	0.21	0.21
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1077	1615	386	1958					354	354	334
v/s Ratio Prot		0.19		0.07	c0.37					c0.13	0.13	0.05
v/s Ratio Perm			0.24									
v/c Ratio		0.61	0.24	0.62	0.67					0.62	0.62	0.23
Uniform Delay, d1		14.4	0.0	20.7	7.7					17.5	17.5	16.0
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.5	0.4	3.1	1.2					3.2	3.2	0.4
Delay (s)		15.9	0.4	23.8	8.9					20.6	20.6	16.3
Level of Service		B	A	C	A					C	C	B
Approach Delay (s)		10.1			11.2			0.0			19.1	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	48.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	975	112	547	1033	532	245
v/c Ratio	0.76	0.07	0.77	0.45	0.87	0.17
Control Delay	26.4	0.1	37.4	7.3	47.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.4	0.1	37.4	7.3	47.6	0.2
Queue Length 50th (ft)	219	0	132	112	134	0
Queue Length 95th (ft)	291	0	186	148	#221	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1366	1538	777	2447	627	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.07	0.70	0.42	0.85	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	897	103	503	950	489	225
Future Volume (vph)	897	103	503	950	489	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	975	112	547	1033	532	245
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	975	112	547	1033	532	245
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	27.6	76.9	15.6	50.2	14.7	76.9
Effective Green, g (s)	27.6	76.9	15.6	50.2	14.7	76.9
Actuated g/C Ratio	0.36	1.00	0.20	0.65	0.19	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1295	1538	710	2310	613	1479
v/s Ratio Prot	c0.27		c0.16	0.29	c0.17	
v/s Ratio Perm		0.07				0.17
v/c Ratio	0.75	0.07	0.77	0.45	0.87	0.17
Uniform Delay, d1	21.7	0.0	29.0	6.5	30.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	0.1	5.2	0.3	12.4	0.2
Delay (s)	24.7	0.1	34.1	6.8	42.5	0.2
Level of Service	C	A	C	A	D	A
Approach Delay (s)	22.1			16.3	29.2	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	166	258	63	168	91	509	295	148	435
v/c Ratio	0.72	0.84	0.19	0.10	0.61	0.85	0.19	0.73	0.67
Control Delay	45.4	60.4	33.4	0.1	58.5	41.3	0.3	59.5	28.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.4	60.4	33.4	0.1	58.5	41.3	0.3	59.5	28.4
Queue Length 50th (ft)	59	139	30	0	50	252	0	80	193
Queue Length 95th (ft)	#159	#281	67	0	#121	#377	0	#179	292
Internal Link Dist (ft)	717		1034			776			2521
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	239	321	344	1615	152	727	1583	213	788
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.80	0.18	0.10	0.60	0.70	0.19	0.69	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	62	88	248	60	161	87	489	283	142	418	0
Future Volume (vph)	9	62	88	248	60	161	87	489	283	142	418	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1753		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1753		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	65	92	258	62	168	91	509	295	148	435	0
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	117	0	258	63	168	91	509	295	148	435	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		8.6		14.5	14.5	83.4	6.9	26.7	83.4	9.6	29.4	
Effective Green, g (s)		8.6		14.5	14.5	83.4	6.9	26.7	83.4	9.6	29.4	
Actuated g/C Ratio		0.10		0.17	0.17	1.00	0.08	0.32	1.00	0.12	0.35	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		180		307	330	1615	149	602	1583	203	656	
v/s Ratio Prot		c0.07		c0.15	0.03		0.05	c0.27		c0.08	0.23	
v/s Ratio Perm						0.10			c0.19			
v/c Ratio		0.65		0.84	0.19	0.10	0.61	0.85	0.19	0.73	0.66	
Uniform Delay, d1		35.9		33.3	29.4	0.0	37.0	26.4	0.0	35.6	22.8	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		7.8		18.3	0.3	0.1	7.2	10.6	0.3	12.3	2.5	
Delay (s)		43.7		51.6	29.7	0.1	44.2	37.0	0.3	48.0	25.3	
Level of Service		D		D	C	A	D	D	A	D	C	
Approach Delay (s)		43.7			31.1			25.6			31.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	24.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	235	262	42	34	0
Future Volume (Veh/h)	0	235	262	42	34	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	255	285	46	37	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	331				563	308
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	331				563	308
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				92	100
cM capacity (veh/h)	1228				487	732

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	255	331	37
Volume Left	0	0	37
Volume Right	0	46	0
cSH	1228	1700	487
Volume to Capacity	0.00	0.19	0.08
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.0	0.0	13.0
Lane LOS			B
Approach Delay (s)	0.0	0.0	13.0
Approach LOS			B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	88	5	42	63	42	5	0	34	34	0	0
Future Volume (Veh/h)	0	88	5	42	63	42	5	0	34	34	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	96	5	46	68	46	5	0	37	37	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	114			101			282	304	98	318	284	91
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	114			101			282	304	98	318	284	91
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			99	100	96	94	100	100
cM capacity (veh/h)	1475			1491			655	590	957	595	606	967

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	101	160	42	37
Volume Left	0	46	5	37
Volume Right	5	46	37	0
cSH	1475	1491	907	595
Volume to Capacity	0.00	0.03	0.05	0.06
Queue Length 95th (ft)	0	2	4	5
Control Delay (s)	0.0	2.3	9.2	11.4
Lane LOS		A	A	B
Approach Delay (s)	0.0	2.3	9.2	11.4
Approach LOS			A	B

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	30.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	158	142	11	133	131	181	183	132	178	184
Average Queue (ft)	89	74	0	73	48	105	99	63	95	87
95th Queue (ft)	137	121	12	120	103	165	161	112	152	153
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)						0				
Queuing Penalty (veh)						0				

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	B24	NB	NB	NB
Directions Served	T	T	L	L	T	T	T	L	L	R
Maximum Queue (ft)	274	267	188	195	145	132	17	273	318	250
Average Queue (ft)	173	159	106	132	87	70	1	139	184	63
95th Queue (ft)	246	237	161	176	138	115	13	224	269	186
Link Distance (ft)	564	564			572	572	260		423	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			265	265				350		250
Storage Blk Time (%)									1	0
Queuing Penalty (veh)									6	1

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	B25
Directions Served	LTR	L	T	L	T	R	L	TR	T
Maximum Queue (ft)	174	276	112	154	345	42	201	265	11
Average Queue (ft)	79	146	41	57	190	2	92	151	0
95th Queue (ft)	146	243	88	119	303	33	165	241	11
Link Distance (ft)	712	1068	1068		810	810		2535	490
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				400			335		
Storage Blk Time (%)					0				
Queuing Penalty (veh)					0				

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	55
Average Queue (ft)	20
95th Queue (ft)	44
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	46	46	53
Average Queue (ft)	6	23	21
95th Queue (ft)	29	48	49
Link Distance (ft)	712	336	704
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 7

MOVEMENT SUMMARY

Site: 101 [Int 3 2030 TF AM (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	586	2.0	586	2.0	0.267	5.7	LOS A	1.3	33.3	0.44	0.28	0.44	36.4
16	R2	All MCs	2	2.0	2	2.0	0.267	5.7	LOS A	1.3	33.3	0.43	0.27	0.43	36.1
Approach			588	2.0	588	2.0	0.267	5.7	LOS A	1.3	33.4	0.44	0.28	0.44	36.4
North: Longhill Road Connector (SB)															
7	L2	All MCs	5	11.0	5	11.0	0.235	8.7	LOS A	1.0	25.4	0.56	0.46	0.56	22.8
14	R2	All MCs	177	3.0	177	3.0	0.235	7.2	LOS A	1.0	25.4	0.56	0.46	0.56	23.0
Approach			183	3.2	183	3.2	0.235	7.2	LOS A	1.0	25.4	0.56	0.46	0.56	23.0
West: Longhill Road (EB)															
5	L2	All MCs	310	2.0	310	2.0	0.438	5.3	LOS A	3.2	81.7	0.07	0.01	0.07	34.1
2	T1	All MCs	901	2.0	901	2.0	0.438	5.3	LOS A	3.2	81.9	0.07	0.01	0.07	36.1
Approach			1211	2.0	1211	2.0	0.438	5.3	LOS A	3.2	81.9	0.07	0.01	0.07	35.5
All Vehicles			1982	2.1	1982	2.1	0.438	5.6	LOS A	3.2	81.9	0.23	0.13	0.23	34.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Int 3 2030 TF PM (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	1116	2.0	1116	2.0	0.505	8.9	LOS A	3.2	80.5	0.54	0.36	0.54	34.7
16	R2	All MCs	9	2.0	9	2.0	0.505	8.7	LOS A	3.2	80.5	0.53	0.35	0.53	34.5
Approach			1125	2.0	1125	2.0	0.505	8.9	LOS A	3.2	80.7	0.54	0.36	0.54	34.7
North: Longhill Road Connector (SB)															
7	L2	All MCs	11	11.0	11	11.0	0.764	31.0	LOS D	6.7	173.0	0.87	1.25	1.71	18.9
14	R2	All MCs	416	3.0	416	3.0	0.764	27.5	LOS D	6.7	173.0	0.87	1.25	1.71	19.0
Approach			427	3.2	427	3.2	0.764	27.6	LOS D	6.7	173.0	0.87	1.25	1.71	19.0
West: Longhill Road (EB)															
5	L2	All MCs	289	2.0	289	2.0	0.444	5.8	LOS A	3.6	91.8	0.12	0.03	0.12	33.9
2	T1	All MCs	928	2.0	928	2.0	0.444	5.7	LOS A	3.6	92.2	0.12	0.02	0.12	35.8
Approach			1217	2.0	1217	2.0	0.444	5.7	LOS A	3.6	92.2	0.12	0.02	0.12	35.3
All Vehicles			2769	2.2	2769	2.2	0.764	10.4	LOS B	6.7	173.0	0.41	0.35	0.54	31.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2030 Total AM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	317	0.0	317	0.0	0.414	9.9	LOS A	2.2	55.8	0.65	0.63	0.78	21.5
8	T1	All MCs	1	0.0	1	0.0	0.414	9.9	LOS A	2.2	55.8	0.65	0.63	0.78	21.6
18	R2	All MCs	1	0.0	1	0.0	0.414	9.9	LOS A	2.2	55.8	0.65	0.63	0.78	21.6
Approach			320	0.0	320	0.0	0.414	9.9	LOS A	2.2	55.8	0.65	0.63	0.78	21.5
East: DePue Drive (WB)															
1	L2	All MCs	4	0.0	4	0.0	0.178	5.3	LOS A	0.9	23.3	0.54	0.39	0.54	35.8
6	T1	All MCs	238	2.0	238	2.0	0.178	5.4	LOS A	0.9	24.0	0.54	0.38	0.54	36.4
16	R2	All MCs	98	5.0	98	5.0	0.178	5.5	LOS A	0.9	24.0	0.54	0.38	0.54	35.7
Approach			340	2.8	340	2.8	0.178	5.5	LOS A	0.9	24.0	0.54	0.38	0.54	36.2
North: Ashbury Lane (SB)															
7	L2	All MCs	41	0.0	41	0.0	0.109	5.4	LOS A	0.5	11.9	0.53	0.42	0.53	22.8
4	T1	All MCs	1	0.0	1	0.0	0.109	5.4	LOS A	0.5	11.9	0.53	0.42	0.53	22.9
14	R2	All MCs	43	4.0	43	4.0	0.109	6.0	LOS A	0.5	11.9	0.53	0.42	0.53	22.9
Approach			86	2.0	86	2.0	0.109	5.7	LOS A	0.5	11.9	0.53	0.42	0.53	22.9
West: DePue Drive (EB)															
5	L2	All MCs	138	0.0	138	0.0	0.342	5.5	LOS A	2.1	52.3	0.20	0.07	0.20	34.9
2	T1	All MCs	566	1.0	566	1.0	0.342	5.5	LOS A	2.1	52.9	0.20	0.07	0.20	36.0
12	R2	All MCs	214	3.0	214	3.0	0.342	5.6	LOS A	2.1	52.9	0.20	0.07	0.20	35.9
Approach			918	1.3	918	1.3	0.342	5.5	LOS A	2.1	52.9	0.20	0.07	0.20	35.8
All Vehicles			1664	1.4	1664	1.4	0.414	6.4	LOS A	2.2	55.8	0.37	0.26	0.40	30.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2030 Total PM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	285	0.0	285	0.0	0.392	9.8	LOS A	2.1	52.8	0.67	0.62	0.75	21.6
8	T1	All MCs	2	0.0	2	0.0	0.392	9.8	LOS A	2.1	52.8	0.67	0.62	0.75	21.6
18	R2	All MCs	5	0.0	5	0.0	0.392	9.8	LOS A	2.1	52.8	0.67	0.62	0.75	21.6
Approach			292	0.0	292	0.0	0.392	9.8	LOS A	2.1	52.8	0.67	0.62	0.75	21.6
East: DePue Drive (WB)															
1	L2	All MCs	2	0.0	2	0.0	0.359	7.5	LOS A	2.1	53.0	0.59	0.42	0.59	34.9
6	T1	All MCs	651	0.0	651	0.0	0.359	7.2	LOS A	2.2	54.4	0.59	0.42	0.59	35.8
16	R2	All MCs	77	2.0	77	2.0	0.359	7.3	LOS A	2.2	54.4	0.59	0.41	0.59	35.2
Approach			730	0.2	730	0.2	0.359	7.2	LOS A	2.2	54.4	0.59	0.42	0.59	35.7
North: Ashbury Lane (SB)															
7	L2	All MCs	115	0.0	115	0.0	0.479	12.7	LOS B	3.0	75.0	0.75	0.81	1.00	21.4
4	T1	All MCs	1	0.0	1	0.0	0.479	12.7	LOS B	3.0	75.0	0.75	0.81	1.00	21.5
14	R2	All MCs	201	0.0	201	0.0	0.479	12.7	LOS B	3.0	75.0	0.75	0.81	1.00	21.5
Approach			317	0.0	317	0.0	0.479	12.7	LOS B	3.0	75.0	0.75	0.81	1.00	21.5
West: DePue Drive (EB)															
5	L2	All MCs	137	0.0	137	0.0	0.377	6.3	LOS A	2.5	62.9	0.36	0.18	0.36	34.4
2	T1	All MCs	477	3.0	477	3.0	0.377	6.5	LOS A	2.5	63.0	0.36	0.17	0.36	35.1
12	R2	All MCs	328	0.0	328	0.0	0.377	6.2	LOS A	2.5	63.0	0.36	0.17	0.36	35.8
Approach			942	1.5	942	1.5	0.377	6.4	LOS A	2.5	63.0	0.36	0.17	0.36	35.3
All Vehicles			2283	0.7	2283	0.7	0.479	8.0	LOS A	3.0	75.0	0.53	0.40	0.57	30.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix F.3
SYNCHRO & SimTraffic Analysis Of 2032 Future Conditions

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	766	409	200	697	337	339	117
v/c Ratio	0.70	0.25	0.63	0.38	0.75	0.75	0.22
Control Delay	21.4	0.4	36.8	9.1	31.5	31.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.4	0.4	36.8	9.1	31.5	31.6	2.3
Queue Length 50th (ft)	125	0	37	73	112	113	0
Queue Length 95th (ft)	181	0	#77	106	#222	#224	15
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1159	1615	316	1891	512	513	588
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.25	0.63	0.37	0.66	0.66	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	705	376	184	641	0	0	0	0	621	1	108
Future Volume (vph)	0	705	376	184	641	0	0	0	0	621	1	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1669	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1669	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	766	409	200	697	0	0	0	0	675	1	117
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	86
Lane Group Flow (vph)	0	766	409	200	697	0	0	0	0	337	339	32
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		18.3	57.2	5.5	30.3					15.4	15.4	15.4
Effective Green, g (s)		18.3	57.2	5.5	30.3					15.4	15.4	15.4
Actuated g/C Ratio		0.32	1.00	0.10	0.53					0.27	0.27	0.27
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1110	1615	314	1838					448	449	410
v/s Ratio Prot		c0.22		0.06	c0.20					0.20	c0.20	0.02
v/s Ratio Perm			0.25									
v/c Ratio		0.69	0.25	0.64	0.38					0.75	0.76	0.08
Uniform Delay, d1		17.0	0.0	24.9	7.9					19.2	19.2	15.6
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		2.4	0.4	4.2	0.3					7.0	7.1	0.1
Delay (s)		19.3	0.4	29.1	8.2					26.2	26.3	15.7
Level of Service		B	A	C	A					C	C	B
Approach Delay (s)		12.7			12.8			0.0			24.6	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1335	129	412	652	248	268
v/c Ratio	0.85	0.08	0.85	0.28	0.53	0.18
Control Delay	24.9	0.1	48.8	5.1	32.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.9	0.1	48.8	5.1	32.4	0.3
Queue Length 50th (ft)	265	0	93	49	53	0
Queue Length 95th (ft)	#426	0	#175	82	86	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1576	1615	487	2367	606	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.08	0.85	0.28	0.41	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1228	119	379	600	228	247
Future Volume (vph)	1228	119	379	600	228	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1335	129	412	652	248	268
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1335	129	412	652	248	268
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	32.0	71.8	10.0	49.0	10.8	71.8
Effective Green, g (s)	32.0	71.8	10.0	49.0	10.8	71.8
Actuated g/C Ratio	0.45	1.00	0.14	0.68	0.15	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1577	1615	487	2368	468	1450
v/s Ratio Prot	c0.38		c0.12	0.19	c0.08	
v/s Ratio Perm		0.08				0.18
v/c Ratio	0.85	0.08	0.85	0.28	0.53	0.18
Uniform Delay, d1	17.7	0.0	30.1	4.5	28.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.9	0.1	12.8	0.1	1.1	0.3
Delay (s)	22.6	0.1	42.9	4.6	29.2	0.3
Level of Service	C	A	D	A	C	A
Approach Delay (s)	20.6			19.4	14.2	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	71.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	178	191	86	61	67	375	196	153	548
v/c Ratio	0.78	0.68	0.28	0.04	0.50	0.68	0.13	0.69	0.77
Control Delay	47.2	43.5	31.3	0.1	49.6	30.7	0.2	50.5	30.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	43.5	31.3	0.1	49.6	30.7	0.2	50.5	30.7
Queue Length 50th (ft)	53	89	38	0	33	160	0	74	241
Queue Length 95th (ft)	#161	#159	77	0	#82	252	0	#158	#407
Internal Link Dist (ft)	717		1034			776			2527
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	228	329	357	1553	136	626	1553	238	732
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.58	0.24	0.04	0.49	0.60	0.13	0.64	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	65	97	176	79	56	62	345	180	141	497	7
Future Volume (vph)	2	65	97	176	79	56	62	345	180	141	497	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1748		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1748		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	71	105	191	86	61	67	375	196	153	540	8
RTOR Reduction (vph)	0	64	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	114	0	191	86	61	67	375	196	153	547	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.1		12.1	12.1	76.4	4.6	23.7	76.4	9.5	28.6	
Effective Green, g (s)		7.1		12.1	12.1	76.4	4.6	23.7	76.4	9.5	28.6	
Actuated g/C Ratio		0.09		0.16	0.16	1.00	0.06	0.31	1.00	0.12	0.37	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		162		277	300	1553	101	577	1553	220	702	
v/s Ratio Prot		c0.06		c0.11	0.05		0.04	0.20		c0.09	c0.29	
v/s Ratio Perm						0.04			0.13			
v/c Ratio		0.70		0.69	0.29	0.04	0.66	0.65	0.13	0.70	0.78	
Uniform Delay, d1		33.6		30.4	28.3	0.0	35.1	22.8	0.0	32.1	21.1	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		12.9		7.0	0.5	0.0	15.2	3.4	0.2	9.2	6.4	
Delay (s)		46.5		37.4	28.9	0.0	50.3	26.2	0.2	41.2	27.5	
Level of Service		D		D	C	A	D	C	A	D	C	
Approach Delay (s)		46.5			28.5			20.7			30.5	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	24.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	265	181	28	40	0
Future Volume (Veh/h)	0	265	181	28	40	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	288	197	30	43	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	227				500	212
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227				500	212
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				92	100
cM capacity (veh/h)	1341				530	828

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	288	227	43
Volume Left	0	0	43
Volume Right	0	30	0
cSH	1341	1700	530
Volume to Capacity	0.00	0.13	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.0	0.0	12.4
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.4
Approach LOS			B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	84	1	24	100	24	1	0	40	40	0	0
Future Volume (Veh/h)	0	84	1	24	100	24	1	0	40	40	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	91	1	26	109	26	1	0	43	43	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	135			92			266	278	92	308	266	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	135			92			266	278	92	308	266	122
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	96	93	100	100
cM capacity (veh/h)	1449			1503			678	619	966	607	629	929

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	92	161	44	43
Volume Left	0	26	1	43
Volume Right	1	26	43	0
cSH	1449	1503	957	607
Volume to Capacity	0.00	0.02	0.05	0.07
Queue Length 95th (ft)	0	1	4	6
Control Delay (s)	0.0	1.3	8.9	11.4
Lane LOS		A	A	B
Approach Delay (s)	0.0	1.3	8.9	11.4
Approach LOS			A	B

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	30.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	7	11	294	202	95
Future Volume (Veh/h)	0	7	11	294	202	95
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	8	12	320	220	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	616	272	323			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	616	272	323			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	450	767	1237			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	8	332	323
Volume Left	0	12	0
Volume Right	8	0	103
cSH	767	1237	1700
Volume to Capacity	0.01	0.01	0.19
Queue Length 95th (ft)	1	1	0
Control Delay (s)	9.7	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.7	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	193	186	30	135	137	154	152	197	247	131
Average Queue (ft)	113	105	1	69	52	62	76	108	133	42
95th Queue (ft)	174	171	17	117	111	121	129	174	206	87
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)					0	0			0	0
Queuing Penalty (veh)					0	0			0	0

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	B24	NB	NB	NB
Directions Served	T	T	L	L	T	T	T	L	L	R
Maximum Queue (ft)	390	386	164	170	117	88	11	145	187	153
Average Queue (ft)	227	216	86	114	54	40	0	51	100	60
95th Queue (ft)	351	340	142	161	101	77	10	124	161	121
Link Distance (ft)	564	564			572	572	260		423	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			265	265				350		250
Storage Blk Time (%)										0
Queuing Penalty (veh)										0

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	L	TR
Maximum Queue (ft)	191	181	108	101	219	136	243
Average Queue (ft)	87	88	44	38	110	75	145
95th Queue (ft)	166	154	89	79	189	123	226
Link Distance (ft)	712	1068	1068		810		2539
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		335	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	58
Average Queue (ft)	20
95th Queue (ft)	45
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	37	58	62
Average Queue (ft)	2	24	24
95th Queue (ft)	19	50	50
Link Distance (ft)	712	336	396
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Ashbury Lane & Commercial Entrance

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	28	53
Average Queue (ft)	6	5
95th Queue (ft)	25	29
Link Distance (ft)	730	845
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 0

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	722	397	288	1396	267	268	245
v/c Ratio	0.68	0.25	0.75	0.72	0.73	0.73	0.48
Control Delay	19.1	0.4	37.1	11.2	31.8	32.0	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	0.4	37.1	11.2	31.8	32.0	8.1
Queue Length 50th (ft)	96	0	43	143	75	75	9
Queue Length 95th (ft)	145	0	#93	210	#170	#170	55
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1066	1615	382	1938	391	391	527
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.25	0.75	0.72	0.68	0.69	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	664	365	265	1284	0	0	0	0	492	0	225
Future Volume (vph)	0	664	365	265	1284	0	0	0	0	492	0	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	722	397	288	1396	0	0	0	0	535	0	245
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	162
Lane Group Flow (vph)	0	722	397	288	1396	0	0	0	0	267	268	83
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		15.0	49.3	5.5	27.0					10.8	10.8	10.8
Effective Green, g (s)		15.0	49.3	5.5	27.0					10.8	10.8	10.8
Actuated g/C Ratio		0.30	1.00	0.11	0.55					0.22	0.22	0.22
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1066	1615	382	1938					368	368	346
v/s Ratio Prot		0.21		0.08	c0.39					0.16	c0.16	0.05
v/s Ratio Perm			0.25									
v/c Ratio		0.68	0.25	0.75	0.72					0.73	0.73	0.24
Uniform Delay, d1		15.0	0.0	21.2	8.3					17.9	17.9	15.9
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		2.2	0.4	8.2	1.7					7.0	7.0	0.4
Delay (s)		17.3	0.4	29.4	10.0					24.8	24.9	16.2
Level of Service		B	A	C	A					C	C	B
Approach Delay (s)		11.3			13.3			0.0			22.2	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	49.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1137	114	661	1154	542	288
v/c Ratio	0.87	0.07	0.90	0.49	0.90	0.19
Control Delay	32.4	0.1	47.6	7.6	52.3	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.4	0.1	47.6	7.6	52.3	0.3
Queue Length 50th (ft)	273	0	166	131	137	0
Queue Length 95th (ft)	#391	0	#260	172	#227	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1311	1538	746	2350	602	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.07	0.89	0.49	0.90	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1046	105	608	1062	499	265
Future Volume (vph)	1046	105	608	1062	499	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1137	114	661	1154	542	288
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1137	114	661	1154	542	288
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	29.0	79.8	16.8	52.8	15.0	79.8
Effective Green, g (s)	29.0	79.8	16.8	52.8	15.0	79.8
Actuated g/C Ratio	0.36	1.00	0.21	0.66	0.19	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1311	1538	737	2341	602	1479
v/s Ratio Prot	c0.31		c0.19	0.33	c0.17	
v/s Ratio Perm		0.07				0.19
v/c Ratio	0.87	0.07	0.90	0.49	0.90	0.19
Uniform Delay, d1	23.6	0.0	30.7	6.8	31.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	0.1	13.5	0.3	16.6	0.3
Delay (s)	30.5	0.1	44.2	7.1	48.2	0.3
Level of Service	C	A	D	A	D	A
Approach Delay (s)	27.7			20.6	31.6	
Approach LOS	C			C	C	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	79.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	168	264	64	172	91	571	300	151	500
v/c Ratio	0.75	0.88	0.20	0.11	0.63	0.90	0.19	0.76	0.73
Control Delay	48.3	65.9	34.0	0.1	60.8	46.8	0.3	63.6	30.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	65.9	34.0	0.1	60.8	46.8	0.3	63.6	30.5
Queue Length 50th (ft)	63	149	32	0	51	296	0	85	232
Queue Length 95th (ft)	#162	#290	68	0	#121	#482	0	#182	348
Internal Link Dist (ft)	717		1034			776			2527
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	233	310	333	1615	147	703	1583	206	761
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.85	0.19	0.11	0.62	0.81	0.19	0.73	0.66

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	63	89	253	61	165	87	548	288	145	480	0
Future Volume (vph)	9	63	89	253	61	165	87	548	288	145	480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1753		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1753		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	66	93	264	64	172	91	571	300	151	500	0
RTOR Reduction (vph)	0	50	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	119	0	264	64	172	91	571	300	151	500	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		8.6		14.7	14.7	86.0	6.9	29.0	86.0	9.7	31.8	
Effective Green, g (s)		8.6		14.7	14.7	86.0	6.9	29.0	86.0	9.7	31.8	
Actuated g/C Ratio		0.10		0.17	0.17	1.00	0.08	0.34	1.00	0.11	0.37	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		175		302	324	1615	144	634	1583	199	688	
v/s Ratio Prot		c0.07		c0.15	0.03		0.05	c0.30		c0.09	0.27	
v/s Ratio Perm						0.11			c0.19			
v/c Ratio		0.68		0.87	0.20	0.11	0.63	0.90	0.19	0.76	0.73	
Uniform Delay, d1		37.4		34.7	30.6	0.0	38.3	27.1	0.0	37.0	23.4	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		9.9		23.2	0.3	0.1	8.7	15.9	0.3	15.2	3.8	
Delay (s)		47.3		58.0	30.9	0.1	47.0	43.1	0.3	52.2	27.2	
Level of Service		D		E	C	A	D	D	A	D	C	
Approach Delay (s)		47.3			34.6			30.1			33.0	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	86.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	262	303	42	34	0
Future Volume (Veh/h)	0	262	303	42	34	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	285	329	46	37	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	375				637	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	375				637	352
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				92	100
cM capacity (veh/h)	1183				441	692

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	285	375	37
Volume Left	0	0	37
Volume Right	0	46	0
cSH	1183	1700	441
Volume to Capacity	0.00	0.22	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.0	0.0	13.9
Lane LOS			B
Approach Delay (s)	0.0	0.0	13.9
Approach LOS			B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	90	5	42	63	42	5	0	34	34	0	0
Future Volume (Veh/h)	0	90	5	42	63	42	5	0	34	34	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	98	5	46	68	46	5	0	37	37	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	114			103			284	306	100	320	286	91
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	114			103			284	306	100	320	286	91
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			99	100	96	94	100	100
cM capacity (veh/h)	1475			1489			653	589	955	594	604	967

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	103	160	42	37
Volume Left	0	46	5	37
Volume Right	5	46	37	0
cSH	1475	1489	905	594
Volume to Capacity	0.00	0.03	0.05	0.06
Queue Length 95th (ft)	0	2	4	5
Control Delay (s)	0.0	2.3	9.2	11.5
Lane LOS		A	A	B
Approach Delay (s)	0.0	2.3	9.2	11.5
Approach LOS			A	B

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	30.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	41	26	270	304	54
Future Volume (Veh/h)	0	41	26	270	304	54
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	45	28	293	330	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	708	360	389			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	708	360	389			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	93	98			
cM capacity (veh/h)	391	685	1170			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	321	389
Volume Left	0	28	0
Volume Right	45	0	59
cSH	685	1170	1700
Volume to Capacity	0.07	0.02	0.23
Queue Length 95th (ft)	5	2	0
Control Delay (s)	10.6	0.9	0.0
Lane LOS	B	A	
Approach Delay (s)	10.6	0.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	189	178	18	150	156	197	176	160	201	200
Average Queue (ft)	99	91	1	83	60	111	104	80	107	89
95th Queue (ft)	162	153	11	132	123	170	162	136	169	158
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)					0	0			0	0
Queuing Penalty (veh)					0	0			0	0

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	B24	B24	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	T	T	L	L	R
Maximum Queue (ft)	395	403	18	196	206	155	144	6	6	292	382	250
Average Queue (ft)	233	227	1	123	150	87	74	0	0	153	202	89
95th Queue (ft)	383	380	18	180	195	143	120	4	4	253	317	227
Link Distance (ft)	564	564	564			572	572	260	260		423	
Upstream Blk Time (%)	0	0									0	
Queuing Penalty (veh)	2	1									0	
Storage Bay Dist (ft)				265	265					350		250
Storage Blk Time (%)										0	2	0
Queuing Penalty (veh)										0	12	2

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	B14
Directions Served	T
Maximum Queue (ft)	10
Average Queue (ft)	0
95th Queue (ft)	8
Link Distance (ft)	230
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	R	L	TR
Maximum Queue (ft)	183	288	95	179	384	45	168	274
Average Queue (ft)	87	154	37	58	222	2	89	176
95th Queue (ft)	153	259	77	119	343	41	151	257
Link Distance (ft)	712	1068	1068		810	810		2539
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				400			335	
Storage Blk Time (%)				0	0			
Queuing Penalty (veh)				0	0			

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	54
Average Queue (ft)	19
95th Queue (ft)	44
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	43	51	59
Average Queue (ft)	3	23	23
95th Queue (ft)	23	47	51
Link Distance (ft)	712	336	396
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Ashbury Lane & Commercial Entrance

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	48	79	6
Average Queue (ft)	22	14	0
95th Queue (ft)	46	51	4
Link Distance (ft)	730	845	154
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 18

MOVEMENT SUMMARY

Site: 101 [Int 3 2032 Total AM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Future Access (NB)															
3	L2	All MCs	249	2.0	249	2.0	0.279	9.5	LOS A	1.4	34.3	0.73	0.68	0.73	21.7
8	T1	All MCs	35	2.0	35	2.0	0.279	8.4	LOS A	1.4	34.3	0.73	0.66	0.73	22.3
18	R2	All MCs	71	2.0	71	2.0	0.279	8.4	LOS A	1.4	34.3	0.73	0.66	0.73	22.3
Approach			356	2.0	356	2.0	0.279	9.2	LOS A	1.4	34.3	0.73	0.68	0.73	21.9
East: Longhill Road (WB)															
1	L2	All MCs	48	2.0	48	2.0	0.339	8.0	LOS A	1.7	41.7	0.60	0.48	0.60	34.0
6	T1	All MCs	592	0.0	592	0.0	0.339	7.3	LOS A	1.7	42.9	0.60	0.47	0.60	35.5
16	R2	All MCs	2	0.0	2	0.0	0.339	7.1	LOS A	1.7	42.9	0.59	0.46	0.59	35.5
Approach			643	0.2	643	0.2	0.339	7.4	LOS A	1.7	42.9	0.60	0.47	0.60	35.4
North: Longhill Road Connector (SB)															
7	L2	All MCs	6	0.0	6	0.0	0.153	5.9	LOS A	0.6	15.6	0.60	0.53	0.60	23.0
4	T1	All MCs	48	2.0	48	2.0	0.153	6.4	LOS A	0.6	15.6	0.60	0.53	0.60	23.1
14	R2	All MCs	181	5.0	181	5.0	0.153	6.3	LOS A	0.6	16.2	0.59	0.51	0.59	23.2
Approach			235	4.2	235	4.2	0.153	6.3	LOS A	0.6	16.2	0.59	0.52	0.59	23.2
West: Longhill Road (EB)															
5	L2	All MCs	313	2.0	313	2.0	0.612	9.9	LOS A	5.1	128.8	0.43	0.21	0.43	32.2
2	T1	All MCs	962	1.0	962	1.0	0.612	9.7	LOS A	5.1	129.1	0.42	0.21	0.42	33.7
12	R2	All MCs	294	2.0	294	2.0	0.612	9.7	LOS A	5.1	129.1	0.42	0.20	0.42	33.8
Approach			1569	1.4	1569	1.4	0.612	9.8	LOS A	5.1	129.1	0.42	0.21	0.42	33.4
All Vehicles			2803	1.4	2803	1.4	0.612	8.9	LOS A	5.1	129.1	0.52	0.35	0.52	30.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Int 3 2032 Total PM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Future Access (NB)															
3	L2	All MCs	319	2.0	319	2.0	0.379	11.4	LOS B	2.1	52.9	0.76	0.77	0.88	21.4
8	T1	All MCs	30	2.0	30	2.0	0.379	10.0	LOS B	2.1	52.9	0.76	0.74	0.86	22.0
18	R2	All MCs	132	2.0	132	2.0	0.379	10.0	LOS B	2.1	52.9	0.76	0.74	0.86	22.0
Approach			482	2.0	482	2.0	0.379	10.9	LOS B	2.1	52.9	0.76	0.76	0.88	21.6
East: Longhill Road (WB)															
1	L2	All MCs	130	2.0	130	2.0	0.663	15.7	LOS C	6.4	166.1	0.79	0.86	1.32	30.0
6	T1	All MCs	1028	2.0	1028	2.0	0.663	14.8	LOS B	7.0	175.0	0.78	0.84	1.27	31.6
16	R2	All MCs	9	2.0	9	2.0	0.663	14.2	LOS B	7.0	175.0	0.77	0.82	1.25	32.0
Approach			1167	2.0	1167	2.0	0.663	14.9	LOS B	7.0	175.0	0.78	0.84	1.28	31.4
North: Longhill Road Connector (SB)															
7	L2	All MCs	11	11.0	11	11.0	0.437	20.0	LOS C	2.2	57.3	0.80	0.89	1.02	20.9
4	T1	All MCs	29	2.0	29	2.0	0.437	15.5	LOS C	2.2	57.3	0.80	0.89	1.02	21.0
14	R2	All MCs	423	3.0	423	3.0	0.437	13.9	LOS B	2.5	63.5	0.81	0.87	1.01	21.5
Approach			462	3.1	462	3.1	0.437	14.1	LOS B	2.5	63.5	0.81	0.88	1.01	21.4
West: Longhill Road (EB)															
5	L2	All MCs	295	2.0	295	2.0	0.599	10.3	LOS B	4.9	124.9	0.55	0.32	0.55	32.0
2	T1	All MCs	896	2.0	896	2.0	0.599	10.1	LOS B	5.0	126.1	0.55	0.32	0.55	33.4
12	R2	All MCs	235	2.0	235	2.0	0.599	10.0	LOS A	5.0	126.1	0.54	0.31	0.54	33.7
Approach			1426	2.0	1426	2.0	0.599	10.1	LOS B	5.0	126.1	0.55	0.32	0.55	33.1
All Vehicles			3537	2.1	3537	2.1	0.663	12.3	LOS B	7.0	175.0	0.69	0.62	0.89	28.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2032 Total AM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	318	0.0	318	0.0	0.441	11.0	LOS B	2.6	64.0	0.69	0.71	0.88	21.3
8	T1	All MCs	1	0.0	1	0.0	0.441	11.0	LOS B	2.6	64.0	0.69	0.71	0.88	21.4
18	R2	All MCs	1	0.0	1	0.0	0.441	11.0	LOS B	2.6	64.0	0.69	0.71	0.88	21.4
Approach			321	0.0	321	0.0	0.441	11.0	LOS B	2.6	64.0	0.69	0.71	0.88	21.3
East: DePue Drive (WB)															
1	L2	All MCs	53	0.0	53	0.0	0.231	5.9	LOS A	1.3	31.7	0.57	0.41	0.57	34.8
6	T1	All MCs	292	2.0	292	2.0	0.231	6.0	LOS A	1.3	32.6	0.57	0.40	0.57	35.7
16	R2	All MCs	98	5.0	98	5.0	0.231	6.1	LOS A	1.3	32.6	0.56	0.40	0.56	35.4
Approach			443	2.4	443	2.4	0.231	6.0	LOS A	1.3	32.6	0.57	0.40	0.57	35.5
North: Ashbury Lane (SB)															
7	L2	All MCs	42	0.0	42	0.0	0.118	5.7	LOS A	0.5	12.7	0.56	0.46	0.56	22.7
4	T1	All MCs	1	0.0	1	0.0	0.118	5.7	LOS A	0.5	12.7	0.56	0.46	0.56	22.8
14	R2	All MCs	45	4.0	45	4.0	0.118	6.5	LOS A	0.5	12.7	0.56	0.46	0.56	22.8
Approach			88	2.0	88	2.0	0.118	6.1	LOS A	0.5	12.7	0.56	0.46	0.56	22.8
West: DePue Drive (EB)															
5	L2	All MCs	139	0.0	139	0.0	0.407	6.5	LOS A	2.5	62.9	0.30	0.14	0.30	34.5
2	T1	All MCs	649	1.0	649	1.0	0.407	6.5	LOS A	2.5	63.6	0.30	0.14	0.30	35.5
12	R2	All MCs	265	3.0	265	3.0	0.407	6.6	LOS A	2.5	63.6	0.30	0.13	0.30	35.3
Approach			1053	1.4	1053	1.4	0.407	6.5	LOS A	2.5	63.6	0.30	0.14	0.30	35.3
All Vehicles			1905	1.4	1905	1.4	0.441	7.1	LOS A	2.6	64.0	0.44	0.31	0.47	31.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2032 Total PM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	285	0.0	285	0.0	0.416	10.7	LOS B	2.4	59.2	0.70	0.69	0.84	21.4
8	T1	All MCs	2	0.0	2	0.0	0.416	10.7	LOS B	2.4	59.2	0.70	0.69	0.84	21.5
18	R2	All MCs	7	0.0	7	0.0	0.416	10.7	LOS B	2.4	59.2	0.70	0.69	0.84	21.5
Approach			293	0.0	293	0.0	0.416	10.7	LOS B	2.4	59.2	0.70	0.69	0.84	21.4
East: DePue Drive (WB)															
1	L2	All MCs	29	0.0	29	0.0	0.394	8.0	LOS A	2.4	60.1	0.61	0.44	0.61	34.4
6	T1	All MCs	690	0.0	690	0.0	0.394	7.7	LOS A	2.5	61.6	0.61	0.43	0.61	35.4
16	R2	All MCs	78	2.0	78	2.0	0.394	7.8	LOS A	2.5	61.6	0.61	0.43	0.61	35.0
Approach			798	0.2	798	0.2	0.394	7.8	LOS A	2.5	61.6	0.61	0.43	0.61	35.3
North: Ashbury Lane (SB)															
7	L2	All MCs	116	0.0	116	0.0	0.508	13.9	LOS B	3.3	81.9	0.77	0.86	1.07	21.2
4	T1	All MCs	1	0.0	1	0.0	0.508	13.9	LOS B	3.3	81.9	0.77	0.86	1.07	21.3
14	R2	All MCs	203	0.0	203	0.0	0.508	13.9	LOS B	3.3	81.9	0.77	0.86	1.07	21.3
Approach			321	0.0	321	0.0	0.508	13.9	LOS B	3.3	81.9	0.77	0.86	1.07	21.2
West: DePue Drive (EB)															
5	L2	All MCs	139	0.0	139	0.0	0.427	7.1	LOS A	2.8	72.3	0.41	0.22	0.41	34.1
2	T1	All MCs	548	3.0	548	3.0	0.427	7.3	LOS A	2.9	72.5	0.41	0.22	0.41	34.8
12	R2	All MCs	357	0.0	357	0.0	0.427	6.9	LOS A	2.9	72.5	0.40	0.21	0.40	35.4
Approach			1043	1.6	1043	1.6	0.427	7.1	LOS A	2.9	72.5	0.41	0.21	0.41	34.9
All Vehicles			2455	0.7	2455	0.7	0.508	8.6	LOS A	3.3	81.9	0.56	0.43	0.61	30.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix G
SYNCHRO & SimTraffic Analysis Of 2038 Background Conditions

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	650	434	86	567	215	216	125
v/c Ratio	0.50	0.27	0.22	0.33	0.51	0.51	0.24
Control Delay	15.7	0.4	25.4	8.2	21.7	21.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.7	0.4	25.4	8.2	21.7	21.7	2.8
Queue Length 50th (ft)	89	0	13	46	66	66	0
Queue Length 95th (ft)	150	0	34	85	123	124	18
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1425	1615	389	2325	629	631	684
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.27	0.22	0.24	0.34	0.34	0.18

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	598	399	79	522	0	0	0	0	396	1	115
Future Volume (vph)	0	598	399	79	522	0	0	0	0	396	1	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1670	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1670	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	650	434	86	567	0	0	0	0	430	1	125
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	95
Lane Group Flow (vph)	0	650	434	86	567	0	0	0	0	215	216	30
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		18.3	51.7	2.8	27.6					12.6	12.6	12.6
Effective Green, g (s)		18.3	51.7	2.8	27.6					12.6	12.6	12.6
Actuated g/C Ratio		0.35	1.00	0.05	0.53					0.24	0.24	0.24
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1228	1615	177	1852					405	407	371
v/s Ratio Prot		c0.19		0.03	0.16					0.13	c0.13	0.02
v/s Ratio Perm			c0.27									
v/c Ratio		0.53	0.27	0.49	0.31					0.53	0.53	0.08
Uniform Delay, d1		13.3	0.0	23.8	6.7					17.0	17.0	15.1
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.8	0.4	2.1	0.2					1.3	1.3	0.1
Delay (s)		14.1	0.4	25.8	6.9					18.3	18.3	15.2
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		8.6			9.4			0.0			17.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	51.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	968	138	141	393	263	161
v/c Ratio	0.68	0.09	0.40	0.20	0.44	0.11
Control Delay	17.1	0.1	28.7	5.7	22.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.1	0.1	28.7	5.7	22.5	0.2
Queue Length 50th (ft)	136	0	23	25	41	0
Queue Length 95th (ft)	214	0	48	48	70	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	1551	1615	349	2351	868	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.09	0.40	0.17	0.30	0.11

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	891	127	130	362	242	148
Future Volume (vph)	891	127	130	362	242	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	968	138	141	393	263	161
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	968	138	141	393	263	161
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	20.9	53.6	3.7	31.6	10.0	53.6
Effective Green, g (s)	20.9	53.6	3.7	31.6	10.0	53.6
Actuated g/C Ratio	0.39	1.00	0.07	0.59	0.19	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1379	1615	241	2046	580	1450
v/s Ratio Prot	c0.27		c0.04	0.11	c0.08	
v/s Ratio Perm		0.09				0.11
v/c Ratio	0.70	0.09	0.59	0.19	0.45	0.11
Uniform Delay, d1	13.7	0.0	24.2	5.1	19.4	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	0.1	3.6	0.1	0.6	0.2
Delay (s)	15.8	0.1	27.8	5.2	19.9	0.2
Level of Service	B	A	C	A	B	A
Approach Delay (s)	13.8			11.2	12.4	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	53.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	51	202	64	65	17	287	208	163	503
v/c Ratio	0.23	0.64	0.19	0.04	0.11	0.56	0.13	0.63	0.55
Control Delay	24.6	36.6	26.5	0.1	33.7	27.0	0.2	41.9	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	36.6	26.5	0.1	33.7	27.0	0.2	41.9	18.9
Queue Length 50th (ft)	13	84	24	0	7	114	0	70	155
Queue Length 95th (ft)	45	#155	58	0	26	192	0	#158	#379
Internal Link Dist (ft)	717		1034			330			2359
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	220	396	429	1553	163	601	1553	285	917
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.51	0.15	0.04	0.10	0.48	0.13	0.57	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	27	18	186	59	60	16	264	191	150	455	7
Future Volume (vph)	2	27	18	186	59	60	16	264	191	150	455	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1796		1752	1900	1553	1687	1863	1553	1770	1877	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1796		1752	1900	1553	1687	1863	1553	1770	1877	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	29	20	202	64	65	17	287	208	163	495	8
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	32	0	202	64	65	17	287	208	163	502	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		3.6		11.6	11.6	71.6	1.0	23.0	71.6	9.4	31.4	
Effective Green, g (s)		3.6		11.6	11.6	71.6	1.0	23.0	71.6	9.4	31.4	
Actuated g/C Ratio		0.05		0.16	0.16	1.00	0.01	0.32	1.00	0.13	0.44	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		90		283	307	1553	23	598	1553	232	823	
v/s Ratio Prot		0.02		c0.12	0.03		0.01	0.15		c0.09	c0.27	
v/s Ratio Perm						0.04			c0.13			
v/c Ratio		0.36		0.71	0.21	0.04	0.74	0.48	0.13	0.70	0.61	
Uniform Delay, d1		32.9		28.4	26.0	0.0	35.2	19.5	0.0	29.8	15.4	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.4		8.3	0.3	0.1	77.7	1.3	0.2	9.3	1.9	
Delay (s)		35.3		36.7	26.4	0.1	112.8	20.8	0.2	39.0	17.4	
Level of Service		D		D	C	A	F	C	A	D	B	
Approach Delay (s)		35.3			27.5			15.5			22.7	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	24.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	5	464	656	1
Future Volume (Veh/h)	1	2	5	464	656	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	5	504	713	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	976	357	714			
vC1, stage 1 conf vol	714					
vC2, stage 2 conf vol	262					
vCu, unblocked vol	976	357	714			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	421	645	895			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	5	252	252	475	239
Volume Left	1	5	0	0	0	0
Volume Right	2	0	0	0	0	1
cSH	548	895	1700	1700	1700	1700
Volume to Capacity	0.01	0.01	0.15	0.15	0.28	0.14
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	11.6	9.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.6	0.1			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Future Volume (Veh/h)	0	0	0	8	0	1	0	0	9	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	9	0	1	0	0	10	1	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1			0			18	19	0	28	18	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1			0			18	19	0	28	18	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1622			1548			991	870	1021	972	874	1090

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	10	10	1
Volume Left	0	9	0	1
Volume Right	0	1	10	0
cSH	1700	1548	1021	972
Volume to Capacity	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	6.6	8.6	8.7
Lane LOS		A	A	A
Approach Delay (s)	0.0	6.6	8.6	8.7
Approach LOS			A	A

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Future Volume (Veh/h)	0	9	10	29	3	6	4	9	4	12	20	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	10	11	32	3	7	4	10	4	13	22	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	78	72	24	86	72	12	26			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78	72	24	86	72	12	26			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	99	96	100	99	100			99		
cM capacity (veh/h)	894	814	1027	880	814	1074	1601			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	42	18	39
Volume Left	0	32	4	13
Volume Right	11	7	4	4
cSH	913	902	1601	1617
Volume to Capacity	0.02	0.05	0.00	0.01
Queue Length 95th (ft)	2	4	0	1
Control Delay (s)	9.0	9.2	1.6	2.5
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	9.2	1.6	2.5
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	18.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Future Volume (Veh/h)	0	1	0	5	0	2	1	1	1	1	2	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	0	5	0	2	1	1	1	1	2	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10	8	2	8	8	2	2			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10	8	2	8	8	2	2			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1011	890	1088	1015	891	1089	1634			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	7	3	3
Volume Left	0	5	1	1
Volume Right	0	2	1	0
cSH	890	1035	1634	1634
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	9.0	8.5	2.4	2.4
Lane LOS	A	A	A	A
Approach Delay (s)	9.0	8.5	2.4	2.4
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	14.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	9	18	11	39	8
Future Volume (Veh/h)	1	9	18	11	39	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	10	20	12	42	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	32				38	26
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32				38	26
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	99
cM capacity (veh/h)	1593				979	1056

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	11	32	51
Volume Left	1	0	42
Volume Right	0	12	9
cSH	1593	1700	991
Volume to Capacity	0.00	0.02	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.7	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	178	160	11	82	56	103	122	134	156	132
Average Queue (ft)	94	71	1	31	11	42	52	62	85	50
95th Queue (ft)	151	128	8	65	39	89	100	113	138	99
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	236	218	58	89	91	76	118	163	87
Average Queue (ft)	135	113	17	51	38	29	32	86	25
95th Queue (ft)	207	182	47	81	77	61	93	139	66
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	L	TR
Maximum Queue (ft)	75	160	83	45	199	142	231
Average Queue (ft)	34	81	31	9	80	77	102
95th Queue (ft)	70	138	68	32	151	128	189
Link Distance (ft)	709	1067	1067		320		2372
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		335	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	18	27
Average Queue (ft)	1	2
95th Queue (ft)	10	14
Link Distance (ft)	1399	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Schmidt Road & Foster Road

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	66	25
Average Queue (ft)	12	1
95th Queue (ft)	45	11
Link Distance (ft)	1652	313
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Ashbury Lane & Foster Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	47	47	3	6
Average Queue (ft)	15	23	0	0
95th Queue (ft)	43	47	5	4
Link Distance (ft)	430	174	1640	930
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Schmidt Road & Galt Drive

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	18	30
Average Queue (ft)	1	6
95th Queue (ft)	10	25
Link Distance (ft)	246	402
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Galt Drive & Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	52
Average Queue (ft)	26
95th Queue (ft)	49
Link Distance (ft)	1640
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 28: Bend

Movement	SB
Directions Served	T
Maximum Queue (ft)	34
Average Queue (ft)	1
95th Queue (ft)	17
Link Distance (ft)	388
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	608	421	192	1333	147	148	260
v/c Ratio	0.45	0.26	0.46	0.64	0.42	0.43	0.57
Control Delay	13.3	0.4	24.5	8.4	20.8	20.9	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	0.4	24.5	8.4	20.8	20.9	12.6
Queue Length 50th (ft)	69	0	27	108	37	38	23
Queue Length 95th (ft)	112	0	53	171	81	82	76
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1367	1615	413	2247	423	423	521
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.26	0.46	0.59	0.35	0.35	0.50

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	559	387	177	1226	0	0	0	0	271	0	239
Future Volume (vph)	0	559	387	177	1226	0	0	0	0	271	0	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	6.5	4.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	608	421	192	1333	0	0	0	0	295	0	260
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	131
Lane Group Flow (vph)	0	608	421	192	1333	0	0	0	0	147	148	129
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		17.9	47.7	4.2	28.6					9.6	9.6	9.6
Effective Green, g (s)		17.9	47.7	4.2	28.6					9.6	9.6	9.6
Actuated g/C Ratio		0.38	1.00	0.09	0.60					0.20	0.20	0.20
Clearance Time (s)		4.0		6.5	4.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1315	1615	302	2121					338	338	318
v/s Ratio Prot		0.17		0.06	c0.38					0.09	c0.09	0.08
v/s Ratio Perm			0.26									
v/c Ratio		0.46	0.26	0.64	0.63					0.43	0.44	0.41
Uniform Delay, d1		11.3	0.0	21.0	6.1					16.7	16.7	16.6
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5	0.4	4.3	0.8					0.9	0.9	0.8
Delay (s)		11.8	0.4	25.3	7.0					17.6	17.6	17.4
Level of Service		B	A	C	A					B	B	B
Approach Delay (s)		7.1			9.3			0.0			17.5	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	775	121	441	963	576	188
v/c Ratio	0.79	0.08	0.70	0.48	0.79	0.13
Control Delay	28.0	0.1	29.7	8.6	31.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	0.1	29.7	8.6	31.0	0.2
Queue Length 50th (ft)	137	0	77	96	100	0
Queue Length 95th (ft)	#219	0	120	136	#168	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)		400	265		350	250
Base Capacity (vph)	980	1538	654	2042	762	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.08	0.67	0.47	0.76	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	713	111	406	886	530	173
Future Volume (vph)	713	111	406	886	530	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	775	121	441	963	576	188
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	775	121	441	963	576	188
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	15.9	58.9	10.6	33.5	13.4	58.9
Effective Green, g (s)	15.9	58.9	10.6	33.5	13.4	58.9
Actuated g/C Ratio	0.27	1.00	0.18	0.57	0.23	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	974	1538	630	2012	729	1479
v/s Ratio Prot	c0.21		c0.13	0.27	c0.18	
v/s Ratio Perm		0.08				0.13
v/c Ratio	0.80	0.08	0.70	0.48	0.79	0.13
Uniform Delay, d1	20.0	0.0	22.7	7.5	21.4	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.2	0.1	3.4	0.4	5.8	0.2
Delay (s)	25.2	0.1	26.1	7.9	27.3	0.2
Level of Service	C	A	C	A	C	A
Approach Delay (s)	21.8			13.6	20.6	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	64	280	21	182	2	547	319	160	461
v/c Ratio	0.36	0.90	0.06	0.11	0.02	0.92	0.20	0.80	0.69
Control Delay	30.9	65.4	28.2	0.1	34.5	49.4	0.3	64.1	28.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	65.4	28.2	0.1	34.5	49.4	0.3	64.1	28.0
Queue Length 50th (ft)	20	139	9	0	1	257	0	79	189
Queue Length 95th (ft)	57	#279	28	0	8	#443	0	#180	296
Internal Link Dist (ft)	717		1034			330			2359
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	180	314	337	1615	137	621	1583	202	692
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.89	0.06	0.11	0.01	0.88	0.20	0.79	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	32	21	269	20	175	2	525	306	154	443	0
Future Volume (vph)	9	32	21	269	20	175	2	525	306	154	443	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1799		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1799		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	33	22	280	21	182	2	547	319	160	461	0
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	44	0	280	21	182	2	547	319	160	461	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.0		13.9	13.9	78.7	5.6	24.9	78.7	8.9	28.2	
Effective Green, g (s)		7.0		13.9	13.9	78.7	5.6	24.9	78.7	8.9	28.2	
Actuated g/C Ratio		0.09		0.18	0.18	1.00	0.07	0.32	1.00	0.11	0.36	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		160		312	335	1615	128	595	1583	200	667	
v/s Ratio Prot		0.02		c0.16	0.01		0.00	c0.29		c0.09	0.25	
v/s Ratio Perm						0.11			c0.20			
v/c Ratio		0.27		0.90	0.06	0.11	0.02	0.92	0.20	0.80	0.69	
Uniform Delay, d1		33.5		31.7	27.0	0.0	34.0	25.9	0.0	34.0	21.5	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.9		26.4	0.1	0.1	0.0	19.3	0.3	20.0	3.1	
Delay (s)		34.4		58.1	27.1	0.1	34.0	45.2	0.3	54.1	24.6	
Level of Service		C		E	C	A	C	D	A	D	C	
Approach Delay (s)		34.4			34.9			28.7			32.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	78.7	Sum of lost time (s)	24.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	2	828	741	0
Future Volume (Veh/h)	1	2	2	828	741	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	2	900	805	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (ft)					410	
pX, platoon unblocked						
vC, conflicting volume	1259	402	805			
vC1, stage 1 conf vol	805					
vC2, stage 2 conf vol	454					
vCu, unblocked vol	1259	402	805			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	358	603	828			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	3	2	450	450	537	268
Volume Left	1	2	0	0	0	0
Volume Right	2	0	0	0	0	0
cSH	491	828	1700	1700	1700	1700
Volume to Capacity	0.01	0.00	0.26	0.26	0.32	0.16
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	12.4	9.4	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.4	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	32.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	1	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			0	0	0	0	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			0	0	0	0	0	0
tC, single (s)	4.1			4.2			7.1	6.5	6.5	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1548			1023	896	1021	1027	900	1091

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	0	1	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	896	1700
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	9.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.0	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	9.0			
Intersection Capacity Utilization	6.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Future Volume (Veh/h)	0	0	0	17	0	14	0	13	0	3	4	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	18	0	15	0	14	0	3	4	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	39	24	4	24	24	14	4			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	39	24	4	24	24	14	4			14		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	99	100			100		
cM capacity (veh/h)	951	872	1054	991	872	1072	1631			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	33	14	7
Volume Left	0	18	0	3
Volume Right	0	15	0	0
cSH	1700	1026	1631	1617
Volume to Capacity	0.02	0.03	0.00	0.00
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	0.0	8.6	0.0	3.1
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.6	0.0	3.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Future Volume (Veh/h)	0	0	0	1	0	2	0	0	2	3	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1	0	2	0	0	2	3	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	9	8	0	7	7	1	0			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9	8	0	7	7	1	0			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1012	889	1091	1016	891	1090	1636			1634		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	3	2	3
Volume Left	0	1	0	3
Volume Right	0	2	2	0
cSH	1700	1064	1636	1634
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.4	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	8.4	0.0	7.2
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	23	7	6	22	1
Future Volume (Veh/h)	2	23	7	6	22	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	25	8	7	24	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			797			
pX, platoon unblocked						
vC, conflicting volume	15				40	12
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	15				40	12
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1616				975	1075

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	27	15	25
Volume Left	2	0	24
Volume Right	0	7	1
cSH	1616	1700	979
Volume to Capacity	0.00	0.01	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.5	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	0.5	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization		13.3%	ICU Level of Service A
Analysis Period (min)		15	

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	150	138	22	119	91	148	152	103	131	178
Average Queue (ft)	80	60	1	55	29	81	75	46	64	89
95th Queue (ft)	129	109	12	94	71	134	131	83	109	153
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	L	L	T	T	L	L	R
Maximum Queue (ft)	235	218	134	155	148	127	235	296	216
Average Queue (ft)	136	122	72	101	85	68	122	170	38
95th Queue (ft)	205	189	117	142	132	109	208	258	140
Link Distance (ft)	564	564			572	572		423	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			265	265			350		250
Storage Blk Time (%)								1	0
Queuing Penalty (veh)								4	1

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	B20
Directions Served	LTR	L	T	L	T	R	L	TR	T
Maximum Queue (ft)	90	286	91	20	322	17	227	296	2
Average Queue (ft)	37	160	15	2	217	1	106	156	0
95th Queue (ft)	76	262	58	12	325	17	196	256	2
Link Distance (ft)	709	1067	1067		320	320		2372	681
Upstream Blk Time (%)					2				
Queuing Penalty (veh)					8				
Storage Bay Dist (ft)				400			335		
Storage Blk Time (%)					2		0	0	
Queuing Penalty (veh)					0		1	0	

Intersection: 6: Ironbound Road & Schmidt Road

Movement	EB	NB	NB	NB
Directions Served	LR	L	T	T
Maximum Queue (ft)	21	15	108	28
Average Queue (ft)	2	1	10	1
95th Queue (ft)	14	8	61	20
Link Distance (ft)	1399		626	626
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100		
Storage Blk Time (%)			1	
Queuing Penalty (veh)			0	

Intersection: 7: Schmidt Road & Foster Road

Movement	NB
Directions Served	LTR
Maximum Queue (ft)	12
Average Queue (ft)	1
95th Queue (ft)	9
Link Distance (ft)	1652
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Ashbury Lane & Foster Road

Movement	WB
Directions Served	LTR
Maximum Queue (ft)	38
Average Queue (ft)	20
95th Queue (ft)	45
Link Distance (ft)	174
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: Schmidt Road & Galt Drive

Movement	WB
Directions Served	LTR
Maximum Queue (ft)	30
Average Queue (ft)	3
95th Queue (ft)	16
Link Distance (ft)	402
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Galt Drive & Ashbury Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	3	37
Average Queue (ft)	0	17
95th Queue (ft)	3	41
Link Distance (ft)	402	1640
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 13

MOVEMENT SUMMARY

Site: 101 [Int 3 2038 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	306	2.0	306	2.0	0.141	4.5	LOS A	0.6	16.0	0.41	0.26	0.41	37.0
16	R2	All MCs	2	2.0	2	2.0	0.141	4.5	LOS A	0.6	16.0	0.40	0.25	0.40	36.7
Approach			309	2.0	309	2.0	0.141	4.5	LOS A	0.6	16.0	0.41	0.26	0.41	37.0
North: Longhill Road Connector (SB)															
7	L2	All MCs	6	11.0	6	11.0	0.210	6.7	LOS A	0.9	23.7	0.44	0.30	0.44	23.1
14	R2	All MCs	190	3.0	190	3.0	0.210	5.9	LOS A	0.9	23.7	0.44	0.30	0.44	23.3
Approach			197	3.3	197	3.3	0.210	5.9	LOS A	0.9	23.7	0.44	0.30	0.44	23.3
West: Longhill Road (EB)															
5	L2	All MCs	326	2.0	326	2.0	0.398	5.1	LOS A	2.6	66.9	0.07	0.01	0.07	33.9
2	T1	All MCs	773	2.0	773	2.0	0.398	5.1	LOS A	2.6	67.0	0.07	0.01	0.07	36.1
Approach			1099	2.0	1099	2.0	0.398	5.1	LOS A	2.6	67.0	0.07	0.01	0.07	35.4
All Vehicles			1604	2.2	1604	2.2	0.398	5.1	LOS A	2.6	67.0	0.18	0.10	0.18	33.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Int 3 2038 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Longhill Road (WB)															
6	T1	All MCs	916	2.0	916	2.0	0.421	7.7	LOS A	2.4	61.3	0.51	0.34	0.51	35.3
16	R2	All MCs	9	2.0	9	2.0	0.421	7.6	LOS A	2.4	61.3	0.50	0.33	0.50	35.1
Approach			925	2.0	925	2.0	0.421	7.7	LOS A	2.4	61.3	0.51	0.34	0.51	35.3
North: Longhill Road Connector (SB)															
7	L2	All MCs	12	11.0	12	11.0	0.716	24.6	LOS C	6.3	162.3	0.84	1.14	1.54	19.9
14	R2	All MCs	442	3.0	442	3.0	0.716	21.8	LOS C	6.3	162.3	0.84	1.14	1.54	19.9
Approach			454	3.2	454	3.2	0.716	21.9	LOS C	6.3	162.3	0.84	1.14	1.54	19.9
West: Longhill Road (EB)															
5	L2	All MCs	311	2.0	311	2.0	0.353	5.1	LOS A	2.5	63.1	0.11	0.02	0.11	33.8
2	T1	All MCs	655	2.0	655	2.0	0.353	5.0	LOS A	2.5	63.4	0.11	0.02	0.11	36.2
Approach			966	2.0	966	2.0	0.353	5.1	LOS A	2.5	63.4	0.11	0.02	0.11	35.4
All Vehicles			2344	2.2	2344	2.2	0.716	9.4	LOS A	6.3	162.3	0.41	0.36	0.54	30.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [2038 Int 4 BG AM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	15	0.0	15	0.0	0.025	5.5	LOS A	0.1	3.6	0.71	0.52	0.71	22.5
8	T1	All MCs	1	0.0	1	0.0	0.025	5.5	LOS A	0.1	3.6	0.71	0.52	0.71	22.6
18	R2	All MCs	1	0.0	1	0.0	0.025	5.5	LOS A	0.1	3.6	0.71	0.52	0.71	22.6
Approach			17	0.0	17	0.0	0.025	5.5	LOS A	0.1	3.6	0.71	0.52	0.71	22.5
East: DePue Drive (WB)															
1	L2	All MCs	5	0.0	5	0.0	0.310	5.9	LOS A	1.9	48.4	0.40	0.21	0.40	35.6
6	T1	All MCs	255	0.0	255	0.0	0.310	5.9	LOS A	1.9	48.4	0.40	0.21	0.40	36.5
16	R2	All MCs	99	2.0	99	2.0	0.310	6.1	LOS A	1.9	48.4	0.40	0.21	0.40	35.8
Approach			360	0.5	360	0.5	0.310	6.0	LOS A	1.9	48.4	0.40	0.21	0.40	36.3
North: Ashbury Lane (SB)															
7	L2	All MCs	43	0.0	43	0.0	0.086	4.2	LOS A	0.5	11.4	0.45	0.27	0.45	23.1
4	T1	All MCs	1	0.0	1	0.0	0.086	4.2	LOS A	0.5	11.4	0.45	0.27	0.45	23.2
14	R2	All MCs	46	0.0	46	0.0	0.086	4.2	LOS A	0.5	11.4	0.45	0.27	0.45	23.2
Approach			90	0.0	90	0.0	0.086	4.2	LOS A	0.5	11.4	0.45	0.27	0.45	23.1
West: DePue Drive (EB)															
5	L2	All MCs	141	0.0	141	0.0	0.456	6.2	LOS A	3.8	95.9	0.26	0.09	0.26	34.8
2	T1	All MCs	611	3.0	611	3.0	0.456	6.2	LOS A	3.8	95.9	0.25	0.09	0.25	35.5
12	R2	All MCs	38	0.0	38	0.0	0.109	4.3	LOS A	0.6	14.9	0.21	0.08	0.21	36.9
Approach			790	2.3	790	2.3	0.456	6.1	LOS A	3.8	95.9	0.25	0.09	0.25	35.4
All Vehicles			1258	1.6	1258	1.6	0.456	5.9	LOS A	3.8	95.9	0.32	0.14	0.32	34.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2038 Int 4 BG PM (Site Folder: BG)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	24	0.0	24	0.0	0.051	6.2	LOS A	0.3	7.7	0.76	0.59	0.76	22.4
8	T1	All MCs	2	0.0	2	0.0	0.051	6.2	LOS A	0.3	7.7	0.76	0.59	0.76	22.5
18	R2	All MCs	7	0.0	7	0.0	0.051	6.2	LOS A	0.3	7.7	0.76	0.59	0.76	22.5
Approach			33	0.0	33	0.0	0.051	6.2	LOS A	0.3	7.7	0.76	0.59	0.76	22.4
East: DePue Drive (WB)															
1	L2	All MCs	2	0.0	2	0.0	0.690	12.8	LOS B	7.3	182.3	0.70	0.41	0.70	32.2
6	T1	All MCs	701	0.0	701	0.0	0.690	12.8	LOS B	7.3	182.3	0.70	0.41	0.70	33.0
16	R2	All MCs	82	2.0	82	2.0	0.690	13.0	LOS B	7.3	182.3	0.70	0.41	0.70	32.4
Approach			785	0.2	785	0.2	0.690	12.8	LOS B	7.3	182.3	0.70	0.41	0.70	32.9
North: Ashbury Lane (SB)															
7	L2	All MCs	118	0.0	118	0.0	0.500	13.2	LOS B	4.3	108.6	0.91	0.82	1.07	21.2
4	T1	All MCs	1	0.0	1	0.0	0.500	13.2	LOS B	4.3	108.6	0.91	0.82	1.07	21.3
14	R2	All MCs	208	0.0	208	0.0	0.500	13.2	LOS B	4.3	108.6	0.91	0.82	1.07	21.3
Approach			327	0.0	327	0.0	0.500	13.2	LOS B	4.3	108.6	0.91	0.82	1.07	21.3
West: DePue Drive (EB)															
5	L2	All MCs	146	0.0	146	0.0	0.581	9.7	LOS A	5.8	148.9	0.57	0.29	0.57	33.0
2	T1	All MCs	514	3.0	514	3.0	0.581	10.0	LOS A	5.8	148.9	0.57	0.29	0.57	33.4
12	R2	All MCs	8	0.0	8	0.0	0.581	9.7	LOS A	5.8	148.9	0.57	0.29	0.57	33.4
Approach			667	2.3	667	2.3	0.581	9.9	LOS A	5.8	148.9	0.57	0.29	0.57	33.3
All Vehicles			1812	0.9	1812	0.9	0.690	11.7	LOS B	7.3	182.3	0.69	0.44	0.72	29.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix H
SYNCHRO & SimTraffic Analysis Of 2038 Future Conditions

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	800	434	204	727	346	348	125
v/c Ratio	0.72	0.27	0.65	0.40	0.77	0.77	0.23
Control Delay	22.2	0.4	37.8	9.3	32.6	32.6	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	0.4	37.8	9.3	32.6	32.6	2.6
Queue Length 50th (ft)	133	0	37	77	116	117	0
Queue Length 95th (ft)	191	0	#78	112	#231	#232	18
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1150	1615	314	1876	507	509	585
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.27	0.65	0.39	0.68	0.68	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	736	399	188	669	0	0	0	0	638	1	115
Future Volume (vph)	0	736	399	188	669	0	0	0	0	638	1	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3471	1615	3273	3471					1665	1669	1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3471	1615	3273	3471					1665	1669	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	800	434	204	727	0	0	0	0	693	1	125
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	91
Lane Group Flow (vph)	0	800	434	204	727	0	0	0	0	346	348	34
Heavy Vehicles (%)	1%	4%	0%	7%	4%	2%	2%	2%	2%	3%	0%	6%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		18.4	57.5	5.5	30.4					15.6	15.6	15.6
Effective Green, g (s)		18.4	57.5	5.5	30.4					15.6	15.6	15.6
Actuated g/C Ratio		0.32	1.00	0.10	0.53					0.27	0.27	0.27
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1110	1615	313	1835					451	452	413
v/s Ratio Prot		c0.23		0.06	c0.21					0.21	c0.21	0.02
v/s Ratio Perm			0.27									
v/c Ratio		0.72	0.27	0.65	0.40					0.77	0.77	0.08
Uniform Delay, d1		17.3	0.0	25.1	8.1					19.3	19.3	15.6
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		2.9	0.4	4.8	0.3					7.6	7.7	0.1
Delay (s)		20.1	0.4	29.9	8.4					26.9	27.0	15.7
Level of Service		C	A	C	A					C	C	B
Approach Delay (s)		13.2			13.1			0.0			25.3	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1382	138	420	672	263	274
v/c Ratio	0.88	0.09	0.87	0.29	0.55	0.19
Control Delay	27.2	0.1	51.2	5.2	32.6	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	0.1	51.2	5.2	32.6	0.3
Queue Length 50th (ft)	284	0	96	52	56	0
Queue Length 95th (ft)	#452	0	#180	84	91	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1569	1615	485	2357	604	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.09	0.87	0.29	0.44	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1271	127	386	618	242	252
Future Volume (vph)	1271	127	386	618	242	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	3502	3471	3114	1450
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	3502	3471	3114	1450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1382	138	420	672	263	274
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1382	138	420	672	263	274
Heavy Vehicles (%)	2%	0%	0%	4%	4%	3%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	32.0	72.1	10.0	49.0	11.1	72.1
Effective Green, g (s)	32.0	72.1	10.0	49.0	11.1	72.1
Actuated g/C Ratio	0.44	1.00	0.14	0.68	0.15	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1570	1615	485	2358	479	1450
v/s Ratio Prot	c0.39		c0.12	0.19	c0.08	
v/s Ratio Perm		0.09				0.19
v/c Ratio	0.88	0.09	0.87	0.28	0.55	0.19
Uniform Delay, d1	18.3	0.0	30.4	4.6	28.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	0.1	14.9	0.1	1.3	0.3
Delay (s)	24.9	0.1	45.3	4.7	29.5	0.3
Level of Service	C	A	D	A	C	A
Approach Delay (s)	22.6			20.3	14.6	
Approach LOS	C			C	B	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	19.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	182	202	90	65	68	386	208	163	574
v/c Ratio	0.81	0.71	0.29	0.04	0.52	0.70	0.13	0.73	0.80
Control Delay	51.0	45.4	31.5	0.1	50.7	31.4	0.2	54.4	32.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	45.4	31.5	0.1	50.7	31.4	0.2	54.4	32.6
Queue Length 50th (ft)	56	95	39	0	34	166	0	80	258
Queue Length 95th (ft)	#167	#179	81	0	#84	261	0	#173	#438
Internal Link Dist (ft)	717		1034			776			2468
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	225	326	353	1553	134	619	1553	235	725
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.62	0.25	0.04	0.51	0.62	0.13	0.69	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	67	98	186	83	60	63	355	191	150	521	7
Future Volume (vph)	2	67	98	186	83	60	63	355	191	150	521	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1748		1752	1900	1553	1687	1863	1553	1770	1878	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1748		1752	1900	1553	1687	1863	1553	1770	1878	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	73	107	202	90	65	68	386	208	163	566	8
RTOR Reduction (vph)	0	64	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	118	0	202	90	65	68	386	208	163	573	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	7%	2%	4%	2%	1%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		7.1		12.4	12.4	77.2	4.6	24.1	77.2	9.6	29.1	
Effective Green, g (s)		7.1		12.4	12.4	77.2	4.6	24.1	77.2	9.6	29.1	
Actuated g/C Ratio		0.09		0.16	0.16	1.00	0.06	0.31	1.00	0.12	0.38	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		160		281	305	1553	100	581	1553	220	707	
v/s Ratio Prot		c0.07		c0.12	0.05		0.04	0.21		c0.09	c0.31	
v/s Ratio Perm						0.04			0.13			
v/c Ratio		0.74		0.72	0.30	0.04	0.68	0.66	0.13	0.74	0.81	
Uniform Delay, d1		34.2		30.7	28.5	0.0	35.6	23.0	0.0	32.6	21.6	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		16.7		8.5	0.5	0.1	17.3	3.8	0.2	12.6	7.9	
Delay (s)		50.9		39.2	29.1	0.1	52.9	26.8	0.2	45.2	29.5	
Level of Service		D		D	C	A	D	C	A	D	C	
Approach Delay (s)		50.9			29.6			21.1			33.0	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	77.2	Sum of lost time (s)	24.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	265	183	28	40	0
Future Volume (Veh/h)	0	265	183	28	40	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	288	199	30	43	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	229				502	214
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	229				502	214
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				92	100
cM capacity (veh/h)	1339				529	826

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	288	229	43
Volume Left	0	0	43
Volume Right	0	30	0
cSH	1339	1700	529
Volume to Capacity	0.00	0.13	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.0	0.0	12.4
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.4
Approach LOS			B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	87	1	24	105	24	1	0	40	40	0	0
Future Volume (Veh/h)	0	87	1	24	105	24	1	0	40	40	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	95	1	26	114	26	1	0	43	43	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	140			96			274	288	96	318	275	127
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	140			96			274	288	96	318	275	127
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	96	93	100	100
cM capacity (veh/h)	1443			1498			669	611	961	599	621	923

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	96	166	44	43
Volume Left	0	26	1	43
Volume Right	1	26	43	0
cSH	1443	1498	952	599
Volume to Capacity	0.00	0.02	0.05	0.07
Queue Length 95th (ft)	0	1	4	6
Control Delay (s)	0.0	1.3	9.0	11.5
Lane LOS		A	A	B
Approach Delay (s)	0.0	1.3	9.0	11.5
Approach LOS			A	B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	30.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	7	11	294	205	95
Future Volume (Veh/h)	0	7	11	294	205	95
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	8	12	320	223	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	618	274	326			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	618	274	326			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	448	764	1234			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	8	332	326
Volume Left	0	12	0
Volume Right	8	0	103
cSH	764	1234	1700
Volume to Capacity	0.01	0.01	0.19
Queue Length 95th (ft)	1	1	0
Control Delay (s)	9.8	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.8	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	208	204	29	163	163	165	174	235	296	156
Average Queue (ft)	119	117	1	75	54	65	77	120	161	51
95th Queue (ft)	189	183	19	131	122	127	136	198	246	108
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)				0	0	0			0	0
Queuing Penalty (veh)				0	0	0			1	0

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	B24	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	T	L	L	R
Maximum Queue (ft)	488	482	113	157	171	118	94	26	162	197	172
Average Queue (ft)	258	257	6	86	115	53	40	1	55	103	64
95th Queue (ft)	445	446	74	139	160	99	79	19	130	163	134
Link Distance (ft)	564	564	564			572	572	260		423	
Upstream Blk Time (%)	0	1									
Queuing Penalty (veh)	2	2									
Storage Bay Dist (ft)				265	265				350		250
Storage Blk Time (%)										0	0
Queuing Penalty (veh)										0	0

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	L	TR
Maximum Queue (ft)	186	192	112	100	242	221	319
Average Queue (ft)	88	90	49	39	116	89	169
95th Queue (ft)	158	155	91	82	202	163	270
Link Distance (ft)	712	1067	1067		810		2481
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		335	
Storage Blk Time (%)						0	0
Queuing Penalty (veh)						0	0

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	53
Average Queue (ft)	19
95th Queue (ft)	41
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	36	58	53
Average Queue (ft)	2	25	24
95th Queue (ft)	17	49	50
Link Distance (ft)	712	336	396
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Ashbury Lane & Commercial Entrance

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	28	44
Average Queue (ft)	7	4
95th Queue (ft)	26	25
Link Distance (ft)	730	845
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 6

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	753	421	295	1468	275	276	260
v/c Ratio	0.71	0.26	0.77	0.76	0.74	0.75	0.51
Control Delay	19.8	0.4	38.5	12.1	33.1	33.3	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	0.4	38.5	12.1	33.1	33.3	9.0
Queue Length 50th (ft)	101	0	44	156	77	77	12
Queue Length 95th (ft)	153	0	#96	228	#175	#177	61
Internal Link Dist (ft)	1199			581		708	
Turn Bay Length (ft)		430	225		550		290
Base Capacity (vph)	1064	1615	382	1935	391	391	527
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.26	0.77	0.76	0.70	0.71	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	693	387	271	1351	0	0	0	0	507	0	239
Future Volume (vph)	0	693	387	271	1351	0	0	0	0	507	0	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.5	6.0					5.5	5.5	5.5
Lane Util. Factor		0.95	1.00	0.97	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3505	1615	3433	3539					1681	1681	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3505	1615	3433	3539					1681	1681	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	753	421	295	1468	0	0	0	0	551	0	260
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	161
Lane Group Flow (vph)	0	753	421	295	1468	0	0	0	0	275	276	99
Heavy Vehicles (%)	0%	3%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Turn Type		NA	Free	Prot	NA					Split	NA	Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			Free									
Actuated Green, G (s)		15.0	49.4	5.5	27.0					10.9	10.9	10.9
Effective Green, g (s)		15.0	49.4	5.5	27.0					10.9	10.9	10.9
Actuated g/C Ratio		0.30	1.00	0.11	0.55					0.22	0.22	0.22
Clearance Time (s)		6.0		6.5	6.0					5.5	5.5	5.5
Vehicle Extension (s)		5.0		3.0	5.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1064	1615	382	1934					370	370	349
v/s Ratio Prot		0.21		0.09	c0.41					0.16	c0.16	0.06
v/s Ratio Perm			0.26									
v/c Ratio		0.71	0.26	0.77	0.76					0.74	0.75	0.28
Uniform Delay, d1		15.3	0.0	21.3	8.7					17.9	18.0	16.0
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		2.7	0.4	9.3	2.1					7.9	8.0	0.4
Delay (s)		18.0	0.4	30.7	10.8					25.8	25.9	16.4
Level of Service		B	A	C	B					C	C	B
Approach Delay (s)		11.7			14.1			0.0			22.8	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	49.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1177	121	679	1201	576	298
v/c Ratio	0.90	0.08	0.91	0.51	0.96	0.20
Control Delay	35.2	0.1	49.8	7.9	61.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	0.1	49.8	7.9	61.9	0.3
Queue Length 50th (ft)	287	0	172	140	148	0
Queue Length 95th (ft)	#414	0	#271	183	#248	0
Internal Link Dist (ft)	581			550	444	
Turn Bay Length (ft)			265		350	250
Base Capacity (vph)	1308	1538	744	2345	601	1479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.08	0.91	0.51	0.96	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1083	111	625	1105	530	274
Future Volume (vph)	1083	111	625	1105	530	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	15%	
Total Lost time (s)	6.0	4.0	7.0	6.0	6.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1538	3502	3539	3207	1479
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1538	3502	3539	3207	1479
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1177	121	679	1201	576	298
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1177	121	679	1201	576	298
Heavy Vehicles (%)	0%	5%	0%	2%	1%	1%
Turn Type	NA	Free	Prot	NA	Prot	Free
Protected Phases	2		1	6	4	
Permitted Phases		Free				Free
Actuated Green, G (s)	29.0	80.0	17.0	53.0	15.0	80.0
Effective Green, g (s)	29.0	80.0	17.0	53.0	15.0	80.0
Actuated g/C Ratio	0.36	1.00	0.21	0.66	0.19	1.00
Clearance Time (s)	6.0		7.0	6.0	6.0	
Vehicle Extension (s)	5.0		3.0	5.0	3.0	
Lane Grp Cap (vph)	1308	1538	744	2344	601	1479
v/s Ratio Prot	c0.33		c0.19	0.34	c0.18	
v/s Ratio Perm		0.08				0.20
v/c Ratio	0.90	0.08	0.91	0.51	0.96	0.20
Uniform Delay, d1	24.1	0.0	30.8	6.9	32.2	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	0.1	15.5	0.4	26.4	0.3
Delay (s)	33.3	0.1	46.3	7.3	58.6	0.3
Level of Service	C	A	D	A	E	A
Approach Delay (s)	30.2			21.4	38.7	
Approach LOS	C			C	D	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	171	280	65	182	91	599	319	160	520
v/c Ratio	0.78	0.92	0.20	0.11	0.65	0.92	0.20	0.81	0.74
Control Delay	51.5	74.3	34.3	0.1	62.4	49.9	0.3	69.7	30.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.5	74.3	34.3	0.1	62.4	49.9	0.3	69.7	30.9
Queue Length 50th (ft)	65	159	32	0	51	317	0	90	245
Queue Length 95th (ft)	#167	#313	69	0	#121	#519	0	#197	365
Internal Link Dist (ft)	717		1034			776			2468
Turn Bay Length (ft)				335	400			335	
Base Capacity (vph)	229	303	325	1615	144	686	1583	201	744
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.92	0.20	0.11	0.63	0.87	0.20	0.80	0.70

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	65	90	269	62	175	87	575	306	154	499	0
Future Volume (vph)	9	65	90	269	62	175	87	575	306	154	499	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1754		1770	1900	1615	1805	1881	1583	1770	1863	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1754		1770	1900	1615	1805	1881	1583	1770	1863	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	68	94	280	65	182	91	599	319	160	520	0
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	122	0	280	65	182	91	599	319	160	520	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	2%	2%	2%	0%
Turn Type	Split	NA		Split	NA	Free	Prot	NA	Free	Prot	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						Free			Free			
Actuated Green, G (s)		8.6		15.0	15.0	87.8	6.9	30.4	87.8	9.8	33.3	
Effective Green, g (s)		8.6		15.0	15.0	87.8	6.9	30.4	87.8	9.8	33.3	
Actuated g/C Ratio		0.10		0.17	0.17	1.00	0.08	0.35	1.00	0.11	0.38	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		171		302	324	1615	141	651	1583	197	706	
v/s Ratio Prot		c0.07		c0.16	0.03		0.05	c0.32		c0.09	0.28	
v/s Ratio Perm						0.11			c0.20			
v/c Ratio		0.72		0.93	0.20	0.11	0.65	0.92	0.20	0.81	0.74	
Uniform Delay, d1		38.4		35.9	31.3	0.0	39.3	27.5	0.0	38.1	23.5	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		13.3		33.0	0.3	0.1	9.7	18.4	0.3	21.9	4.0	
Delay (s)		51.7		68.8	31.6	0.1	49.0	45.9	0.3	60.0	27.5	
Level of Service		D		E	C	A	D	D	A	E	C	
Approach Delay (s)		51.7			40.5			31.8			35.1	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	87.8	Sum of lost time (s)	24.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	263	303	42	34	0
Future Volume (Veh/h)	0	263	303	42	34	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	286	329	46	37	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	375				638	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	375				638	352
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				92	100
cM capacity (veh/h)	1183				441	692

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	286	375	37
Volume Left	0	0	37
Volume Right	0	46	0
cSH	1183	1700	441
Volume to Capacity	0.00	0.22	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.0	0.0	13.9
Lane LOS			B
Approach Delay (s)	0.0	0.0	13.9
Approach LOS			B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	94	5	42	64	42	5	0	34	34	0	0
Future Volume (Veh/h)	0	94	5	42	64	42	5	0	34	34	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	102	5	46	70	46	5	0	37	37	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					797							
pX, platoon unblocked												
vC, conflicting volume	116			107			290	312	104	326	292	93
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116			107			290	312	104	326	292	93
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			99	100	96	94	100	100
cM capacity (veh/h)	1473			1484			647	584	950	588	600	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	107	162	42	37
Volume Left	0	46	5	37
Volume Right	5	46	37	0
cSH	1473	1484	900	588
Volume to Capacity	0.00	0.03	0.05	0.06
Queue Length 95th (ft)	0	2	4	5
Control Delay (s)	0.0	2.3	9.2	11.5
Lane LOS		A	A	B
Approach Delay (s)	0.0	2.3	9.2	11.5
Approach LOS			A	B

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	30.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	41	26	271	304	54
Future Volume (Veh/h)	0	41	26	271	304	54
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	45	28	295	330	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	710	360	389			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	710	360	389			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	93	98			
cM capacity (veh/h)	390	685	1170			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	323	389
Volume Left	0	28	0
Volume Right	45	0	59
cSH	685	1170	1700
Volume to Capacity	0.07	0.02	0.23
Queue Length 95th (ft)	5	2	0
Control Delay (s)	10.6	0.9	0.0
Lane LOS	B	A	
Approach Delay (s)	10.6	0.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: 199 SB On Ramp/199 SB Off Ramp & Longhill Road

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	LT	R
Maximum Queue (ft)	178	177	24	153	168	208	200	184	217	158
Average Queue (ft)	99	97	1	83	61	117	107	83	126	88
95th Queue (ft)	158	151	16	131	128	180	172	154	190	143
Link Distance (ft)	1233	1233				564	564		732	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			430	225	225			550		290
Storage Blk Time (%)						0				
Queuing Penalty (veh)						0				

Intersection: 2: 199 NB Off Ramp & Longhill Road

Movement	EB	EB	WB	WB	WB	WB	B24	B24	NB	NB	NB	B14
Directions Served	T	T	L	L	T	T	T	T	L	L	R	T
Maximum Queue (ft)	405	408	211	215	154	147	51	43	308	407	250	11
Average Queue (ft)	237	241	129	153	88	74	3	2	170	218	110	0
95th Queue (ft)	365	364	194	203	144	123	38	31	272	341	260	7
Link Distance (ft)	564	564			572	572	260	260		423		230
Upstream Blk Time (%)								0		0		
Queuing Penalty (veh)								0		0		
Storage Bay Dist (ft)			265	265					350		250	
Storage Blk Time (%)									0	3	0	
Queuing Penalty (veh)									0	19	3	

Intersection: 5: Ironbound Road & Galt Drive & DePue Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LTR	L	T	L	T	R	L	TR
Maximum Queue (ft)	177	359	103	263	497	99	198	303
Average Queue (ft)	83	191	38	67	253	6	98	180
95th Queue (ft)	151	349	82	188	422	105	175	283
Link Distance (ft)	712	1067	1067		810	810		2481
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				400			335	
Storage Blk Time (%)				0	2		0	0
Queuing Penalty (veh)				0	2		0	0

Intersection: 8: Foster Road/Ashbury Lane

Movement	SB
Directions Served	LR
Maximum Queue (ft)	49
Average Queue (ft)	19
95th Queue (ft)	41
Link Distance (ft)	421
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Colonial Health Access & Galt Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	48	55	49
Average Queue (ft)	5	23	21
95th Queue (ft)	26	49	48
Link Distance (ft)	712	336	396
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Ashbury Lane & Commercial Entrance

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	53	81
Average Queue (ft)	22	13
95th Queue (ft)	45	52
Link Distance (ft)	730	845
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 24

MOVEMENT SUMMARY

Site: 101 [Int 3 2038 Total AM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Future Access (NB)															
3	L2	All MCs	249	2.0	249	2.0	0.288	10.0	LOS A	1.4	35.9	0.74	0.70	0.75	21.7
8	T1	All MCs	35	2.0	35	2.0	0.288	8.7	LOS A	1.4	35.9	0.75	0.68	0.75	22.3
18	R2	All MCs	71	2.0	71	2.0	0.288	8.7	LOS A	1.4	35.9	0.75	0.68	0.75	22.3
Approach			356	2.0	356	2.0	0.288	9.6	LOS A	1.4	35.9	0.75	0.69	0.75	21.8
East: Longhill Road (WB)															
1	L2	All MCs	48	2.0	48	2.0	0.349	8.3	LOS A	1.7	43.5	0.61	0.49	0.61	33.9
6	T1	All MCs	608	0.0	608	0.0	0.349	7.5	LOS A	1.8	44.8	0.60	0.48	0.60	35.4
16	R2	All MCs	2	0.0	2	0.0	0.349	7.2	LOS A	1.8	44.8	0.60	0.47	0.60	35.4
Approach			658	0.1	658	0.1	0.349	7.6	LOS A	1.8	44.8	0.61	0.48	0.61	35.3
North: Longhill Road Connector (SB)															
7	L2	All MCs	6	0.0	6	0.0	0.161	6.1	LOS A	0.6	16.5	0.61	0.54	0.61	23.0
4	T1	All MCs	48	2.0	48	2.0	0.161	6.5	LOS A	0.6	16.5	0.61	0.54	0.61	23.1
14	R2	All MCs	190	5.0	190	5.0	0.161	6.4	LOS A	0.7	17.2	0.60	0.52	0.60	23.2
Approach			245	4.3	245	4.3	0.161	6.4	LOS A	0.7	17.2	0.60	0.53	0.60	23.1
West: Longhill Road8 (EB)															
5	L2	All MCs	326	2.0	326	2.0	0.632	10.4	LOS B	5.5	137.8	0.44	0.22	0.44	32.1
2	T1	All MCs	999	1.0	999	1.0	0.632	10.1	LOS B	5.5	138.1	0.44	0.22	0.44	33.5
12	R2	All MCs	294	2.0	294	2.0	0.632	10.1	LOS B	5.5	138.1	0.43	0.21	0.43	33.6
Approach			1618	1.4	1618	1.4	0.632	10.2	LOS B	5.5	138.1	0.44	0.22	0.44	33.2
All Vehicles			2877	1.4	2877	1.4	0.632	9.2	LOS A	5.5	138.1	0.53	0.36	0.53	30.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Int 3 2038 Total PM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Future Access (NB)															
3	L2	All MCs	319	2.0	319	2.0	0.393	12.1	LOS B	2.2	56.0	0.78	0.80	0.92	21.2
8	T1	All MCs	30	2.0	30	2.0	0.393	10.6	LOS B	2.2	56.0	0.78	0.77	0.90	21.9
18	R2	All MCs	132	2.0	132	2.0	0.393	10.6	LOS B	2.2	56.0	0.78	0.77	0.90	21.9
Approach			482	2.0	482	2.0	0.393	11.5	LOS B	2.2	56.0	0.78	0.79	0.91	21.5
East: Longhill Road (WB)															
1	L2	All MCs	130	2.0	130	2.0	0.696	17.2	LOS C	7.2	186.7	0.81	0.92	1.42	29.4
6	T1	All MCs	1072	2.0	1072	2.0	0.696	16.1	LOS C	7.9	198.3	0.80	0.89	1.38	31.0
16	R2	All MCs	9	2.0	9	2.0	0.696	15.4	LOS C	7.9	198.3	0.80	0.88	1.35	31.4
Approach			1211	2.0	1211	2.0	0.696	16.2	LOS C	7.9	198.3	0.80	0.89	1.38	30.9
North: Longhill Road Connector (SB)															
7	L2	All MCs	12	11.0	12	11.0	0.472	21.9	LOS C	2.5	63.6	0.82	0.93	1.07	20.6
4	T1	All MCs	27	2.0	27	2.0	0.472	17.1	LOS C	2.5	63.6	0.82	0.93	1.07	20.7
14	R2	All MCs	442	3.0	442	3.0	0.472	15.2	LOS C	2.8	71.1	0.83	0.91	1.06	21.2
Approach			481	3.1	481	3.1	0.472	15.5	LOS C	2.8	71.1	0.83	0.91	1.07	21.1
West: Longhill Road (EB)															
5	L2	All MCs	311	2.0	311	2.0	0.617	10.7	LOS B	5.2	133.3	0.57	0.33	0.57	31.8
2	T1	All MCs	930	2.0	930	2.0	0.617	10.5	LOS B	5.3	134.5	0.56	0.33	0.56	33.2
12	R2	All MCs	229	2.0	229	2.0	0.617	10.4	LOS B	5.3	134.5	0.56	0.32	0.56	33.5
Approach			1470	2.0	1470	2.0	0.617	10.5	LOS B	5.3	134.5	0.56	0.33	0.56	32.9
All Vehicles			3643	2.2	3643	2.2	0.696	13.2	LOS B	7.9	198.3	0.71	0.65	0.95	28.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Int 3 2038 Total AM Peak - New Counts (Site Folder: TF)]

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Future Access (NB)														
3	L2	232	2.0	249	2.0	0.295	10.4	LOS B	1.5	37.8	0.76	0.77	0.77	23.2
8	T1	33	2.0	35	2.0	0.295	9.0	LOS A	1.5	37.8	0.76	0.76	0.76	22.2
18	R2	66	2.0	71	2.0	0.295	9.0	LOS A	1.5	37.8	0.76	0.76	0.76	22.6
Approach		331	2.0	356	2.0	0.295	10.0	LOS A	1.5	37.8	0.76	0.77	0.77	23.0
East: Longhill Road (WB)														
1	L2	45	2.0	48	2.0	0.380	8.6	LOS A	2.0	49.2	0.63	0.61	0.64	35.9
6	T1	605	0.0	651	0.0	0.380	8.1	LOS A	2.0	50.0	0.63	0.59	0.63	36.6
16	R2	8	0.0	9	0.0	0.380	7.8	LOS A	2.0	50.0	0.62	0.58	0.62	35.7
Approach		658	0.1	708	0.1	0.380	8.1	LOS A	2.0	50.0	0.63	0.59	0.63	36.5
North: Longhill Road Connector (SB)														
7	L2	6	0.0	6	0.0	0.159	6.6	LOS A	0.7	16.9	0.62	0.61	0.62	24.9
4	T1	45	2.0	48	2.0	0.159	6.8	LOS A	0.7	16.9	0.62	0.61	0.62	23.1
14	R2	174	5.0	187	5.0	0.159	6.3	LOS A	0.7	17.7	0.61	0.59	0.61	23.6
Approach		225	4.3	242	4.3	0.159	6.4	LOS A	0.7	17.7	0.61	0.60	0.61	23.5
West: Longhill Road8 (EB)														
5	L2	324	2.0	348	2.0	0.656	11.4	LOS B	5.9	150.4	0.46	0.26	0.46	33.5
2	T1	966	1.0	1039	1.0	0.656	11.2	LOS B	6.0	150.7	0.46	0.26	0.46	34.2
12	R2	273	2.0	294	2.0	0.656	11.1	LOS B	6.0	150.7	0.45	0.25	0.45	33.6
Approach		1563	1.4	1681	1.4	0.656	11.3	LOS B	6.0	150.7	0.46	0.26	0.46	34.0
All Vehicles		2777	1.4	2986	1.4	0.656	10.0	LOS A	6.0	150.7	0.55	0.42	0.55	31.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Int 3 2038 Total PM Peak - New Counts (Site Folder: TF)]

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Future Access (NB)														
3	L2	297	2.0	319	2.0	0.400	12.5	LOS B	2.4	59.7	0.79	0.88	0.98	22.8
8	T1	28	2.0	30	2.0	0.400	10.9	LOS B	2.4	59.7	0.79	0.87	0.96	21.8
18	R2	123	2.0	132	2.0	0.400	10.9	LOS B	2.4	59.7	0.79	0.87	0.96	22.2
Approach		448	2.0	482	2.0	0.400	11.9	LOS B	2.4	59.7	0.79	0.88	0.97	22.6
East: Longhill Road (WB)														
1	L2	121	2.0	130	2.0	0.678	17.3	LOS C	7.0	181.1	0.81	1.02	1.45	31.2
6	T1	944	2.0	1015	2.0	0.678	15.9	LOS C	7.6	189.1	0.81	1.01	1.42	32.5
16	R2	9	2.0	10	2.0	0.678	15.0	LOS C	7.6	189.1	0.80	1.01	1.39	31.9
Approach		1074	2.0	1155	2.0	0.678	16.0	LOS C	7.6	189.1	0.81	1.01	1.42	32.3
North: Longhill Road Connector (SB)														
7	L2	6	11.0	6	11.0	0.455	17.3	LOS C	2.6	65.9	0.81	0.95	1.13	22.6
4	T1	25	2.0	27	2.0	0.455	16.1	LOS C	2.6	65.9	0.81	0.95	1.13	21.0
14	R2	428	3.0	460	3.0	0.455	14.3	LOS B	2.8	72.2	0.82	0.95	1.11	21.8
Approach		459	3.1	494	3.1	0.455	14.4	LOS B	2.8	72.2	0.82	0.95	1.11	21.7
West: Longhill Road (EB)														
5	L2	347	2.0	373	2.0	0.637	11.5	LOS B	5.6	143.5	0.58	0.38	0.58	33.2
2	T1	858	2.0	923	2.0	0.637	11.3	LOS B	5.7	144.8	0.58	0.38	0.58	34.1
12	R2	213	2.0	229	2.0	0.637	11.1	LOS B	5.7	144.8	0.57	0.37	0.57	33.6
Approach		1418	2.0	1525	2.0	0.637	11.3	LOS B	5.7	144.8	0.58	0.38	0.58	33.8
All Vehicles		3399	2.1	3655	2.1	0.678	13.3	LOS B	7.6	189.1	0.71	0.72	0.97	29.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2038 Total AM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	320	0.0	320	0.0	0.451	11.3	LOS B	2.7	66.6	0.70	0.74	0.91	21.2
8	T1	All MCs	1	0.0	1	0.0	0.451	11.3	LOS B	2.7	66.6	0.70	0.74	0.91	21.3
18	R2	All MCs	1	0.0	1	0.0	0.451	11.3	LOS B	2.7	66.6	0.70	0.74	0.91	21.3
Approach			322	0.0	322	0.0	0.451	11.3	LOS B	2.7	66.6	0.70	0.74	0.91	21.2
East: DePue Drive (WB)															
1	L2	All MCs	54	0.0	54	0.0	0.240	6.1	LOS A	1.3	33.2	0.57	0.41	0.57	34.7
6	T1	All MCs	305	2.0	305	2.0	0.240	6.1	LOS A	1.3	34.1	0.57	0.41	0.57	35.6
16	R2	All MCs	99	5.0	99	5.0	0.240	6.2	LOS A	1.3	34.1	0.57	0.40	0.57	35.3
Approach			459	2.4	459	2.4	0.240	6.1	LOS A	1.3	34.1	0.57	0.41	0.57	35.5
North: Ashbury Lane (SB)															
7	L2	All MCs	43	0.0	43	0.0	0.122	5.8	LOS A	0.5	13.1	0.57	0.47	0.57	22.7
4	T1	All MCs	1	0.0	1	0.0	0.122	5.8	LOS A	0.5	13.1	0.57	0.47	0.57	22.8
14	R2	All MCs	46	4.0	46	4.0	0.122	6.6	LOS A	0.5	13.1	0.57	0.47	0.57	22.8
Approach			90	2.0	90	2.0	0.122	6.2	LOS A	0.5	13.1	0.57	0.47	0.57	22.7
West: DePue Drive (EB)															
5	L2	All MCs	141	0.0	141	0.0	0.422	6.7	LOS A	2.6	66.4	0.31	0.14	0.31	34.4
2	T1	All MCs	683	1.0	683	1.0	0.422	6.7	LOS A	2.6	67.2	0.31	0.14	0.31	35.4
12	R2	All MCs	266	3.0	266	3.0	0.422	6.8	LOS A	2.6	67.2	0.31	0.14	0.31	35.2
Approach			1090	1.4	1090	1.4	0.422	6.7	LOS A	2.6	67.2	0.31	0.14	0.31	35.2
All Vehicles			1961	1.4	1961	1.4	0.451	7.3	LOS A	2.7	67.2	0.45	0.32	0.48	31.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2038 Total PM Peak (Site Folder: TF)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Ashbury Lane (NB)															
3	L2	All MCs	286	0.0	286	0.0	0.427	11.1	LOS B	2.5	61.9	0.71	0.71	0.87	21.3
8	T1	All MCs	2	0.0	2	0.0	0.427	11.1	LOS B	2.5	61.9	0.71	0.71	0.87	21.4
18	R2	All MCs	7	0.0	7	0.0	0.427	11.1	LOS B	2.5	61.9	0.71	0.71	0.87	21.4
Approach			295	0.0	295	0.0	0.427	11.1	LOS B	2.5	61.9	0.71	0.71	0.87	21.3
East: DePue Drive (WB)															
1	L2	All MCs	29	0.0	29	0.0	0.417	8.4	LOS A	2.6	64.8	0.63	0.45	0.63	34.2
6	T1	All MCs	728	0.0	728	0.0	0.417	8.1	LOS A	2.7	66.6	0.63	0.45	0.63	35.2
16	R2	All MCs	82	2.0	82	2.0	0.417	8.1	LOS A	2.7	66.6	0.62	0.44	0.62	34.8
Approach			839	0.2	839	0.2	0.417	8.1	LOS A	2.7	66.6	0.63	0.45	0.63	35.1
North: Ashbury Lane (SB)															
7	L2	All MCs	118	0.0	118	0.0	0.532	14.9	LOS B	3.5	88.5	0.79	0.90	1.12	21.0
4	T1	All MCs	1	0.0	1	0.0	0.532	14.9	LOS B	3.5	88.5	0.79	0.90	1.12	21.1
14	R2	All MCs	208	0.0	208	0.0	0.532	14.9	LOS B	3.5	88.5	0.79	0.90	1.12	21.1
Approach			327	0.0	327	0.0	0.532	14.9	LOS B	3.5	88.5	0.79	0.90	1.12	21.0
West: DePue Drive (EB)															
5	L2	All MCs	146	0.0	146	0.0	0.442	7.3	LOS A	3.0	76.4	0.42	0.23	0.42	34.0
2	T1	All MCs	575	3.0	575	3.0	0.442	7.5	LOS A	3.0	76.7	0.42	0.22	0.42	34.7
12	R2	All MCs	357	0.0	357	0.0	0.442	7.1	LOS A	3.0	76.7	0.42	0.22	0.42	35.3
Approach			1077	1.6	1077	1.6	0.442	7.3	LOS A	3.0	76.7	0.42	0.22	0.42	34.8
All Vehicles			2538	0.7	2538	0.7	0.532	9.0	LOS A	3.5	88.5	0.57	0.44	0.63	30.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix I
Interchange Analysis

HCS7 Freeway Facilities Report

Project Information

Analyst	SOS	Date	2/28/23
Agency	Timmons Group	Analysis Year	2022
Jurisdiction	James City County	Time Period Analyzed	Existing AM Peak Hour
Project Description	Cardinal Ridge	Unit	United States Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	3
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	905	6581	0.14	63.6	4.7	A

Segment 2: Diverge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	905	303	6581	1784	0.14	0.17	63.6	63.6	4.7	4.7	A

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	602	4387	0.14	63.6	4.7	A

Segment 4: Merge

Time Period	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	833	231	6581	1784	0.13	0.13	63.6	63.6	4.4	4.4	A

Segment 5: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	833	4387	0.19	63.6	6.5	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	5.5	5.4	4.00	A

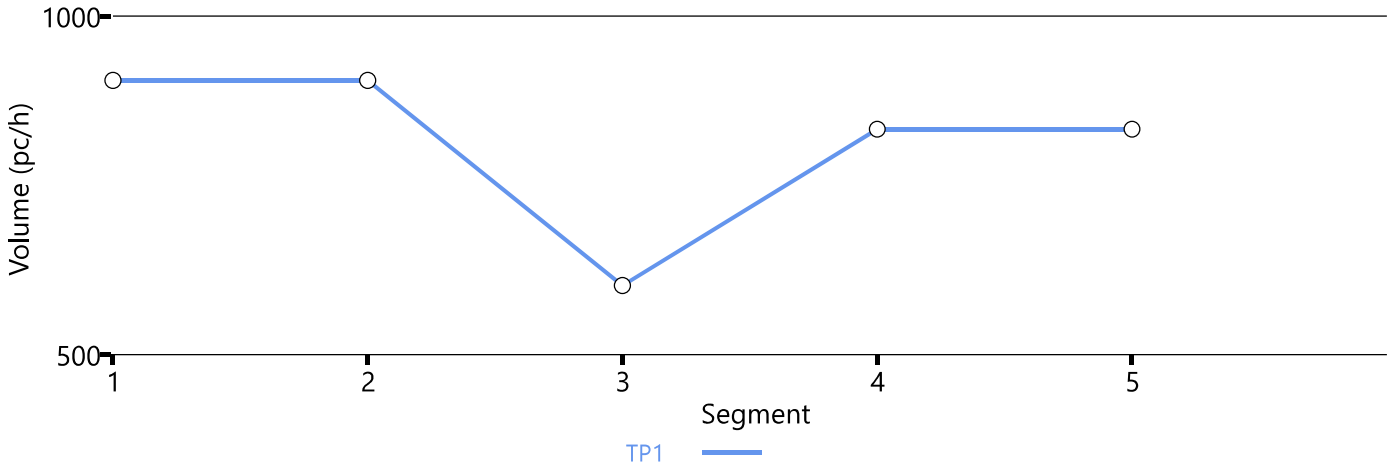
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	5.4
Average Travel Time, min	4.00	Density, pc/mi/ln	5.5

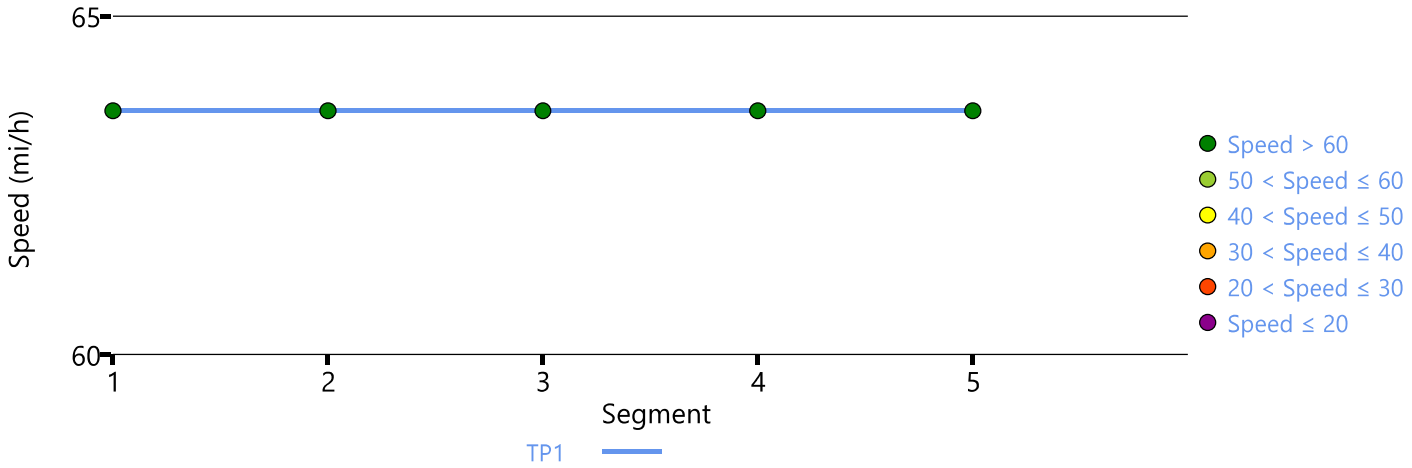
Messages

Comments

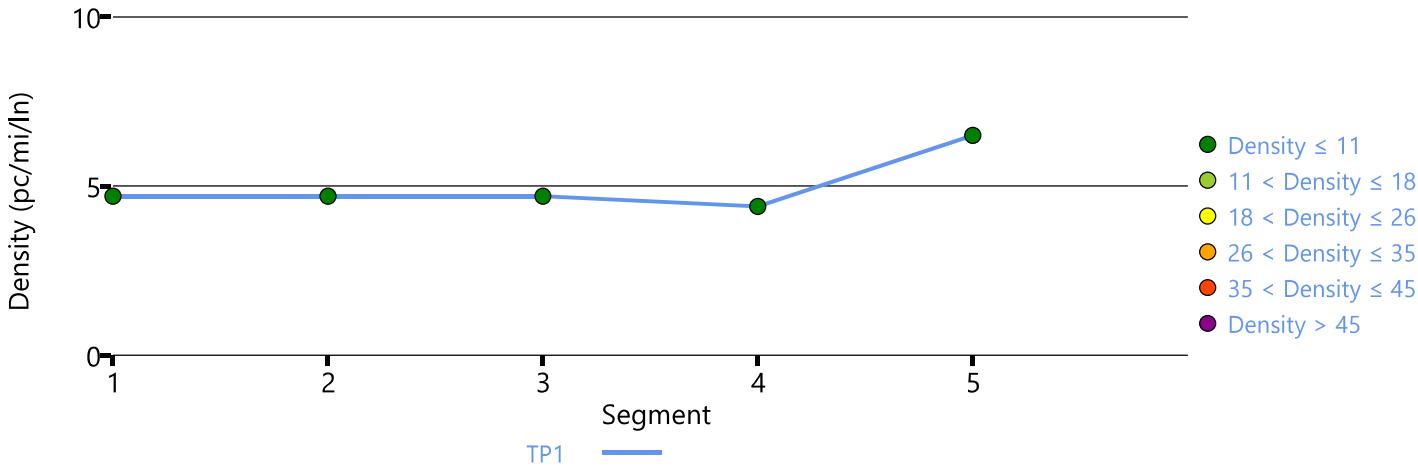
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	SOS	Date	2/28/23
Agency	Timmons Group	Analysis Year	2022
Jurisdiction	James City County	Time Analyzed	Existing PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1405	4387	0.32	63.6	11.0	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1405	648	6581	1784	0.21	0.36	63.6	63.6	7.4	7.4	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	758	4387	0.17	63.6	6.0	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1146	388	6581	1784	0.17	0.22	63.6	63.6	6.0	6.0	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1146	4387	0.26	63.6	9.0	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.1	8.9	4.00	A

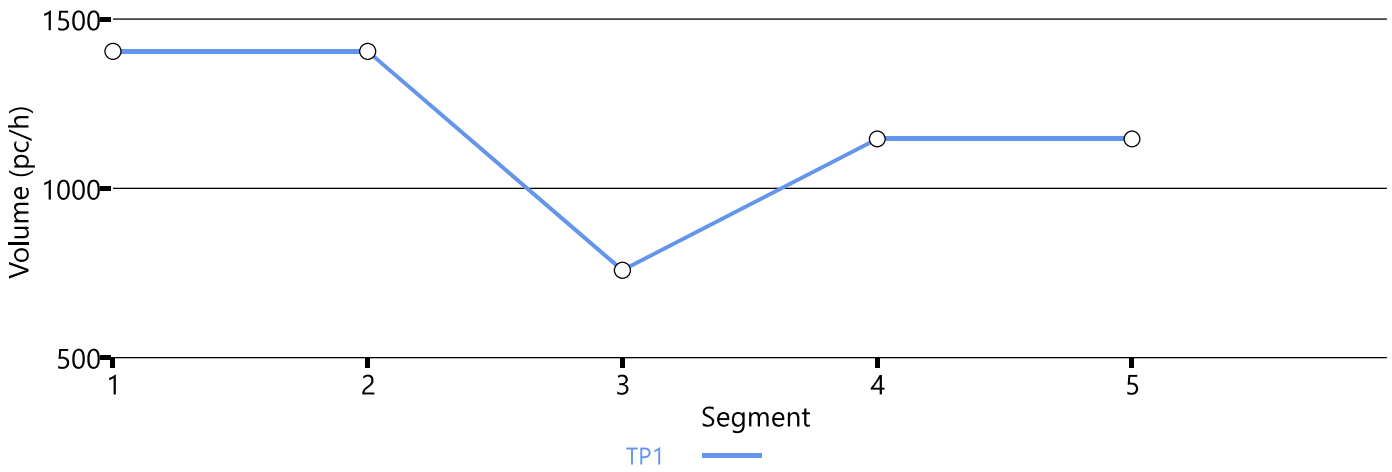
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	8.9
Average Travel Time, min	4.00	Density, pc/mi/ln	9.1

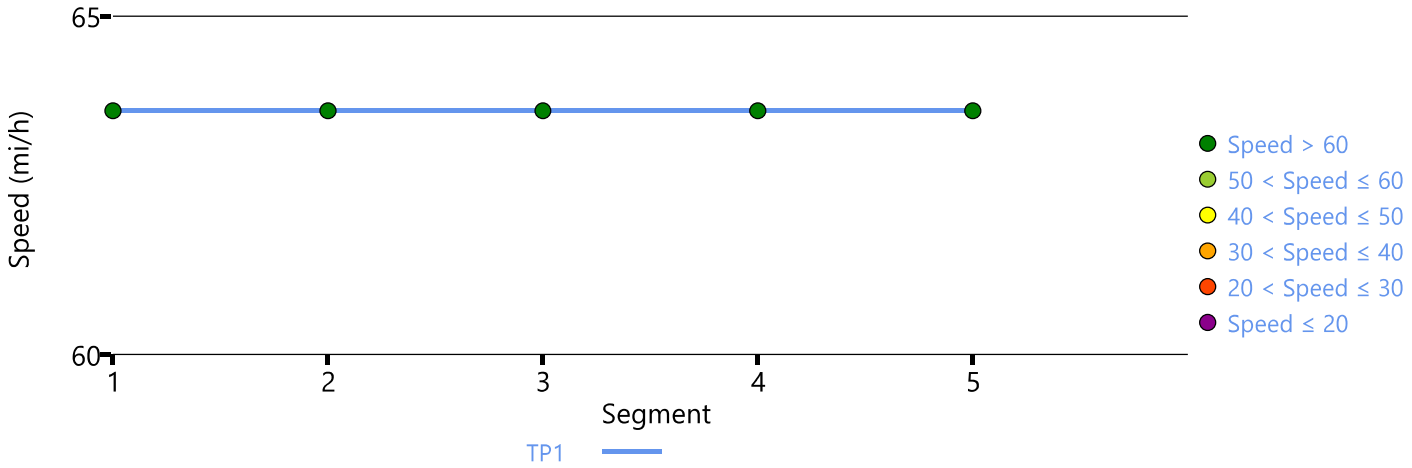
Messages

Comments

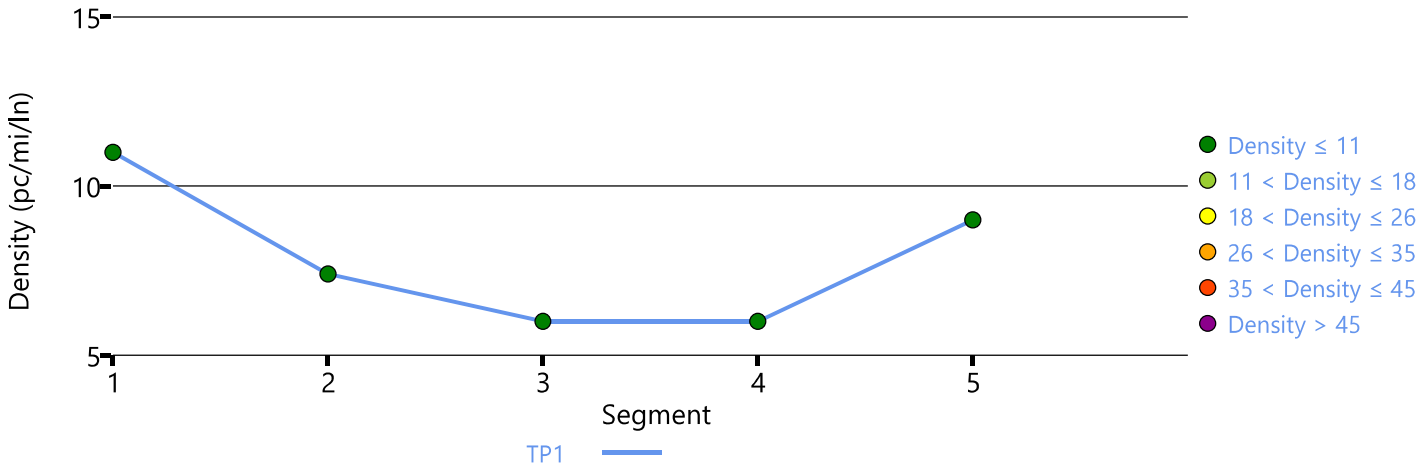
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	SOS	Date	2/28/23
Agency	Timmons Group	Analysis Year	2022
Jurisdiction	James City County	Time Analyzed	Exisitng AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1175	4387	0.27	63.6	9.2	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1175	393	6581	1784	0.18	0.22	63.6	63.6	6.2	6.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	782	4387	0.18	63.6	6.1	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1225	443	6581	1784	0.19	0.25	63.6	63.6	6.4	6.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1224	4387	0.28	63.6	9.6	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	8.6	8.4	4.20	A

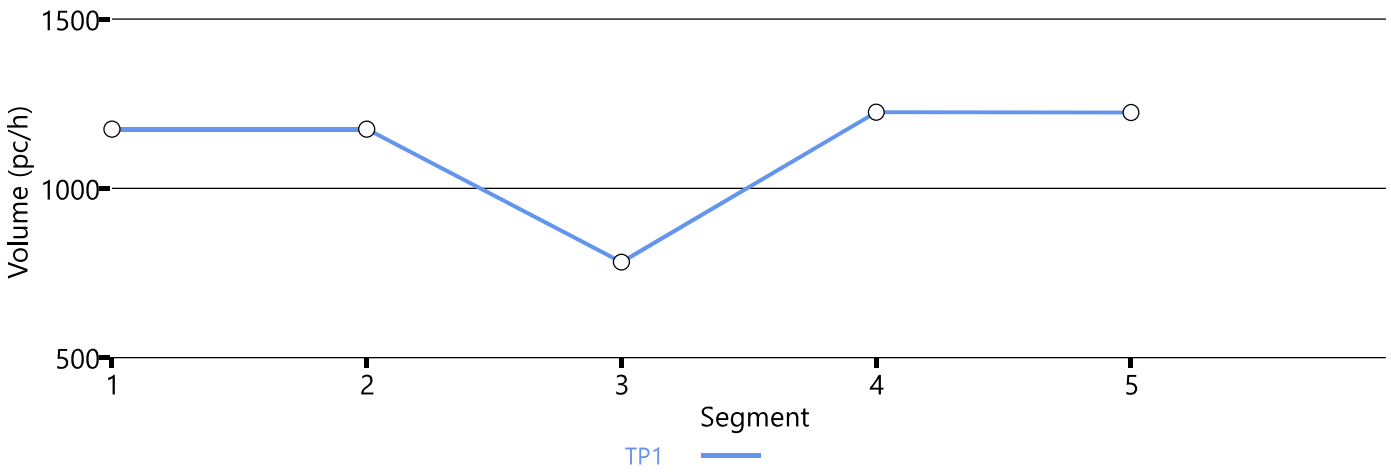
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	8.4
Average Travel Time, min	4.20	Density, pc/mi/ln	8.6

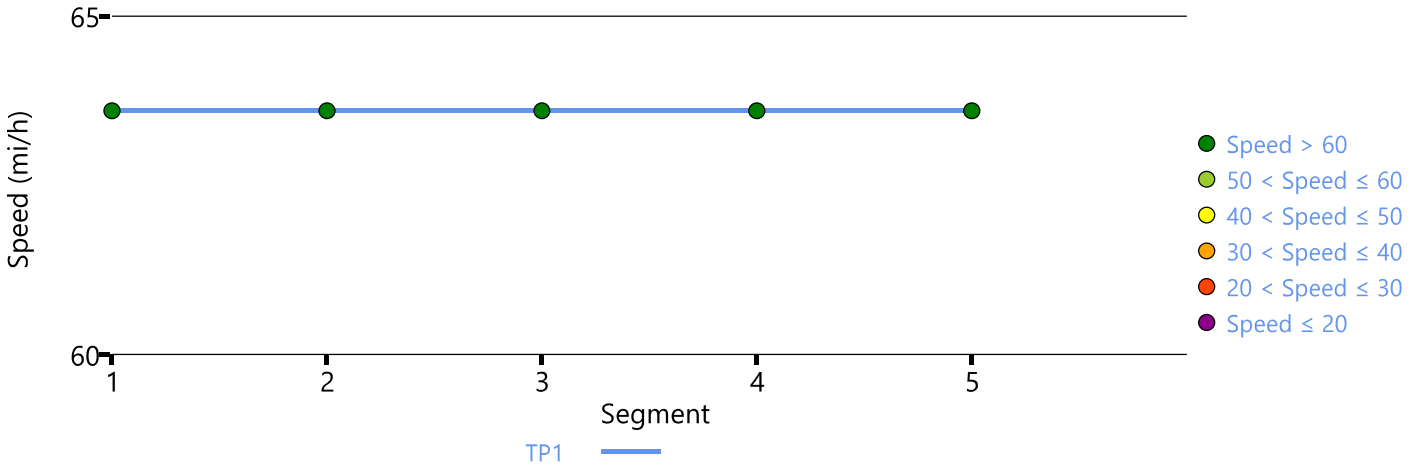
Messages

Comments

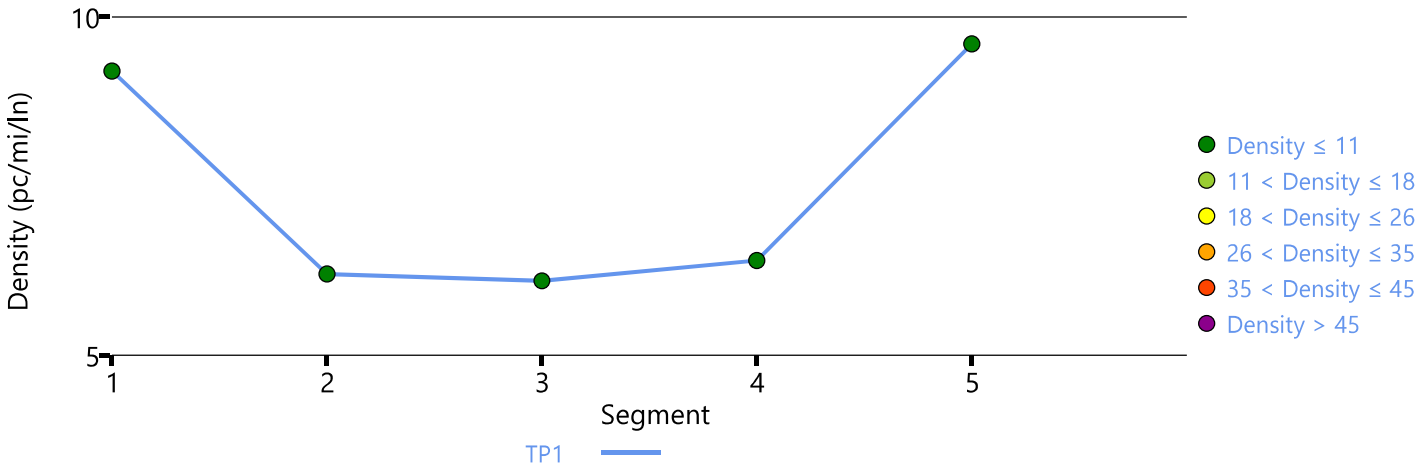
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	SOS	Date	2/28/23
Agency	Timmons Group	Analysis Year	2022
Jurisdiction	James City County	Time Analyzed	Exisitng PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1180	4387	0.27	63.6	9.3	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1180	459	6581	1784	0.18	0.26	63.6	63.6	6.2	6.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	721	4387	0.16	63.6	5.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1182	461	6581	1784	0.18	0.26	63.6	63.6	6.2	6.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1182	4387	0.27	63.6	9.3	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	8.5	8.3	4.20	A

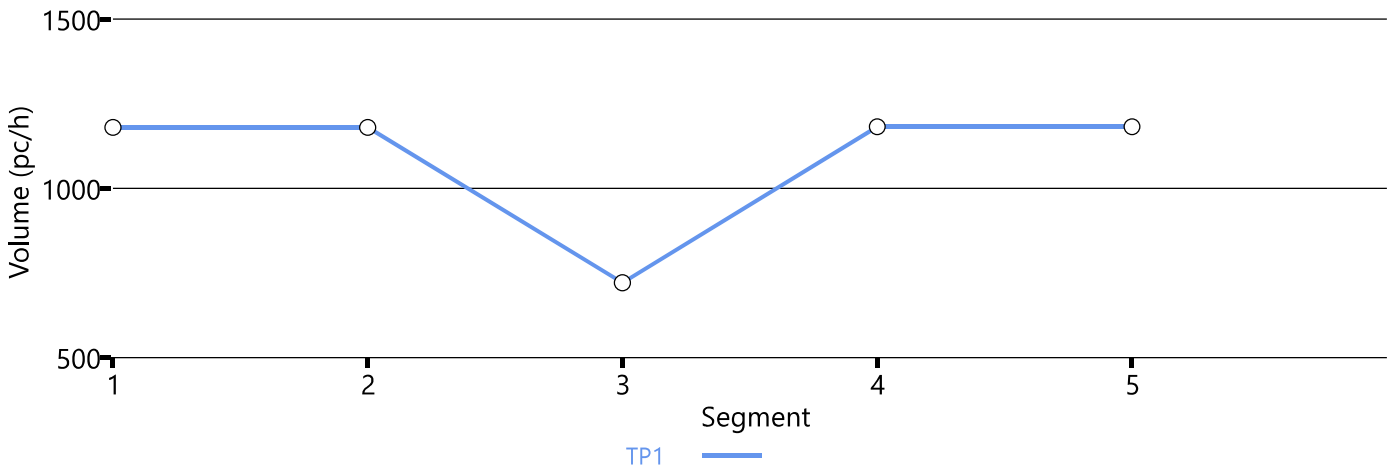
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	8.3
Average Travel Time, min	4.20	Density, pc/mi/ln	8.5

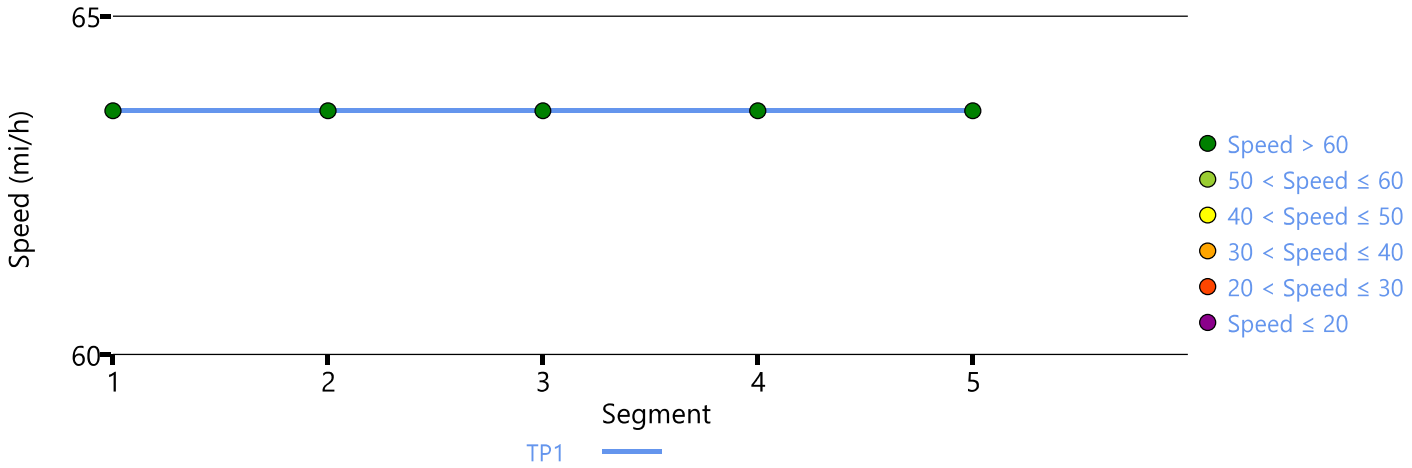
Messages

Comments

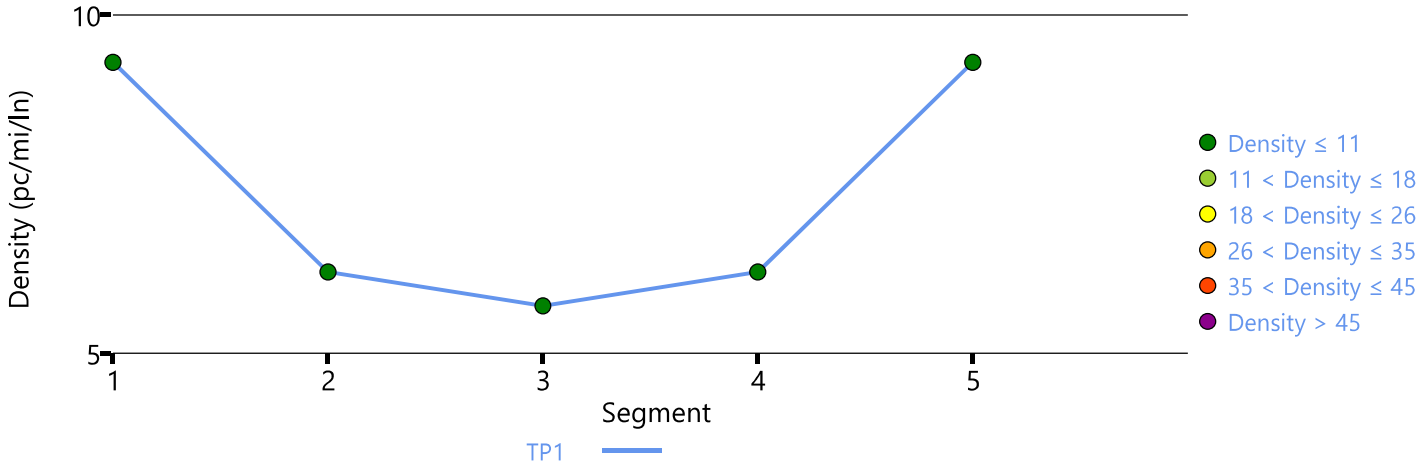
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1396	4387	0.32	63.6	11.0	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1396	398	6581	1784	0.21	0.22	63.6	63.6	7.3	7.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	998	4387	0.23	63.6	7.8	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1258	260	6581	1784	0.19	0.15	63.6	63.6	6.6	6.6	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1396	4387	0.32	63.6	11.0	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1396	708	6581	1784	0.21	0.40	63.6	63.6	7.3	7.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	689	4387	0.16	63.6	5.4	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1220	531	6581	1784	0.19	0.30	63.6	63.6	6.4	6.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	990	4387	0.23	63.6	7.8	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	990	525	6581	1784	0.15	0.29	63.6	63.6	5.2	5.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	466	4387	0.11	63.6	3.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	950	484	6581	1784	0.14	0.27	63.6	63.6	5.0	5.0	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	949	4387	0.22	63.6	7.5	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.0	6.8	4.20	A

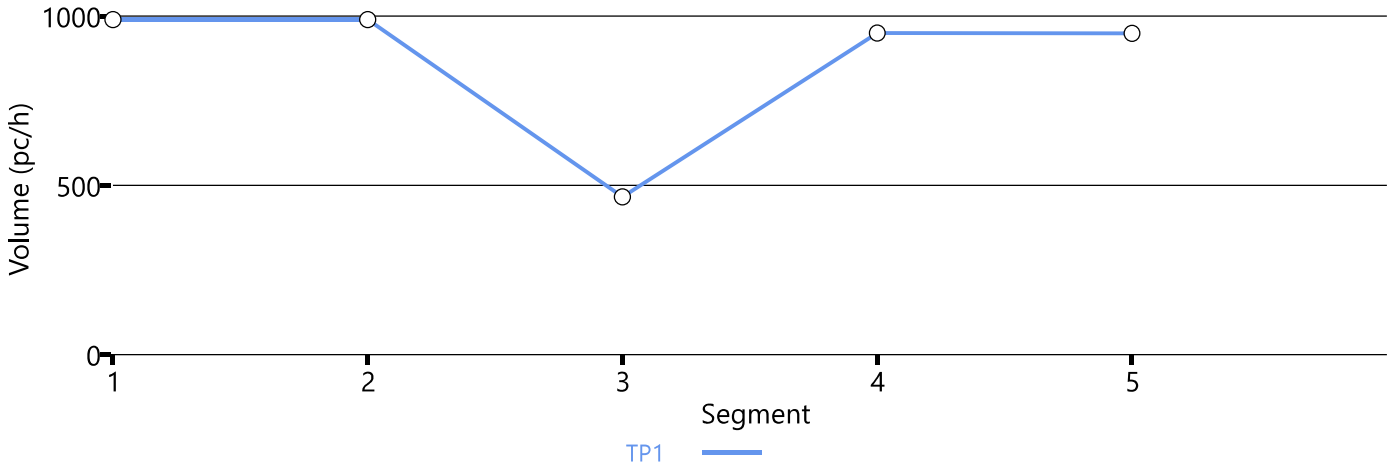
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.8
Average Travel Time, min	4.20	Density, pc/mi/ln	7.0

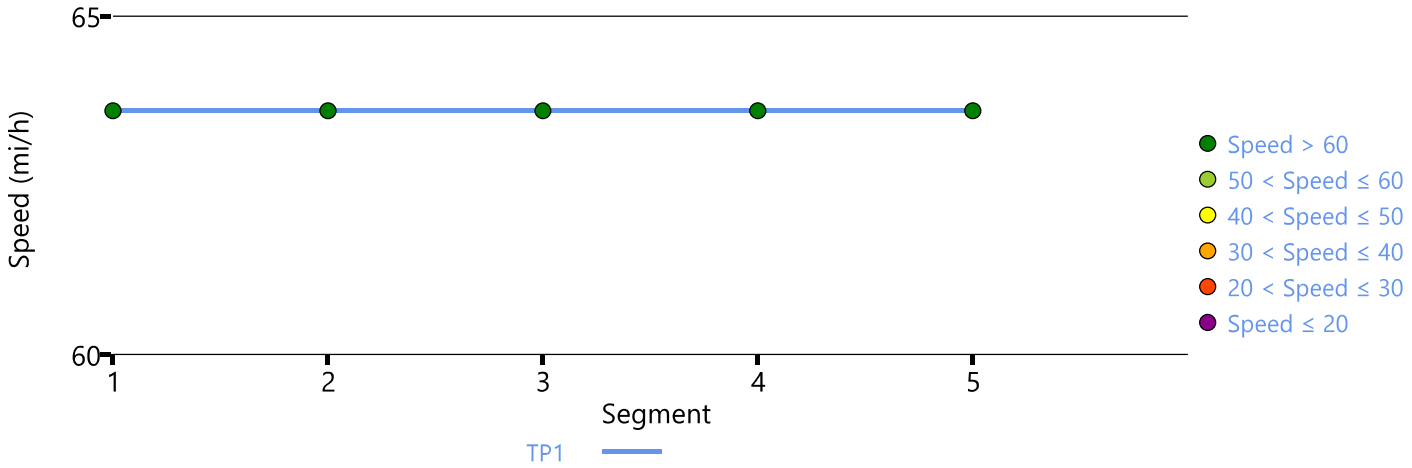
Messages

Comments

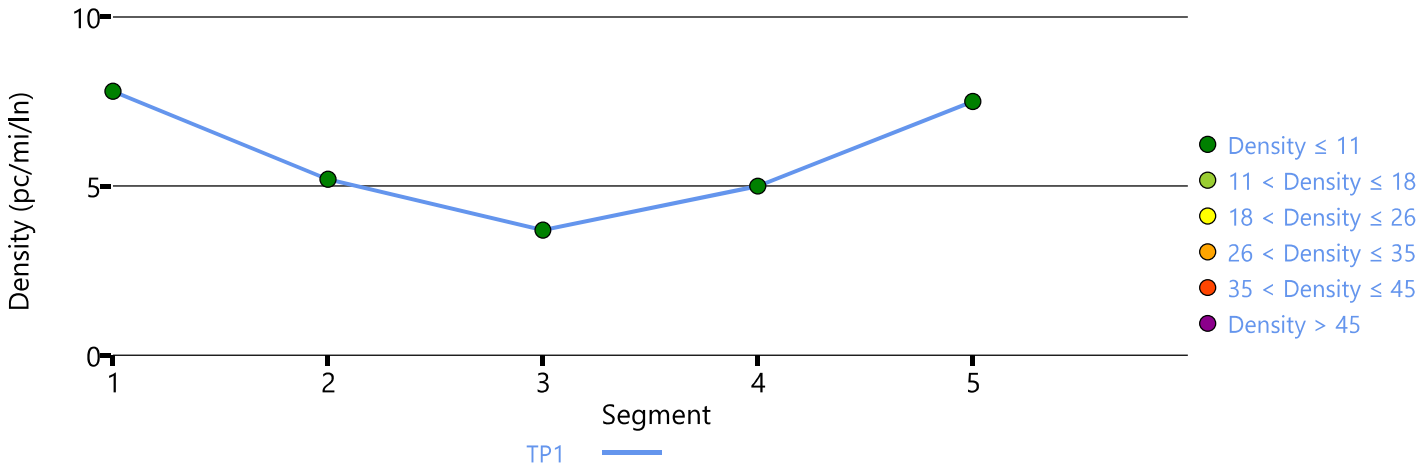
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1480	4387	0.34	63.6	11.6	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1480	516	6581	1784	0.22	0.29	63.6	63.6	7.8	7.8	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	964	4387	0.22	63.6	7.6	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1540	576	6581	1784	0.23	0.32	63.6	63.6	8.1	8.1	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1539	4387	0.35	63.6	12.1	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.8	10.6	4.20	A

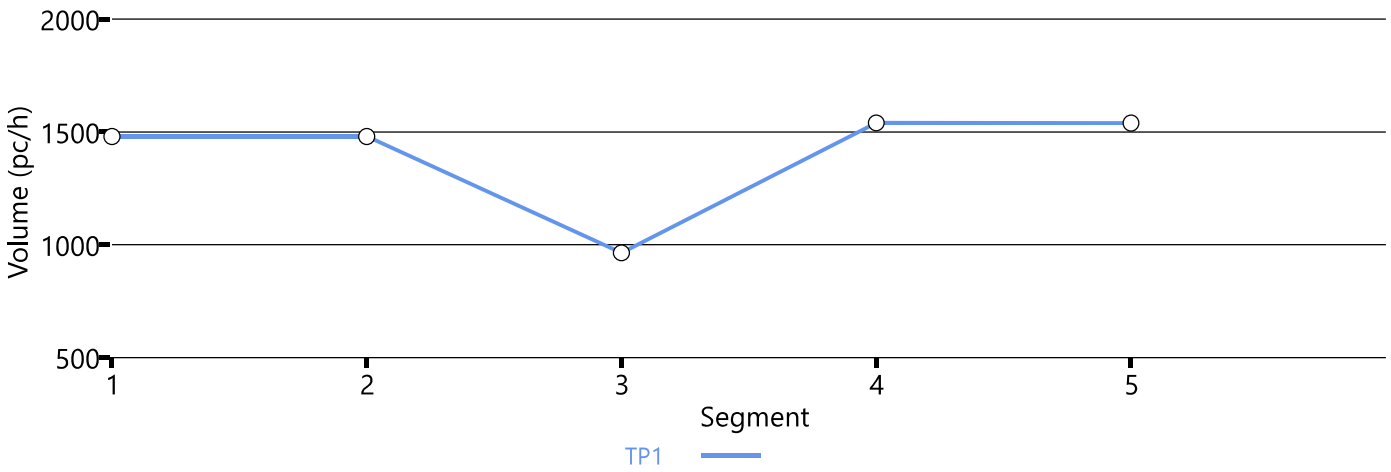
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.6
Average Travel Time, min	4.20	Density, pc/mi/ln	10.8

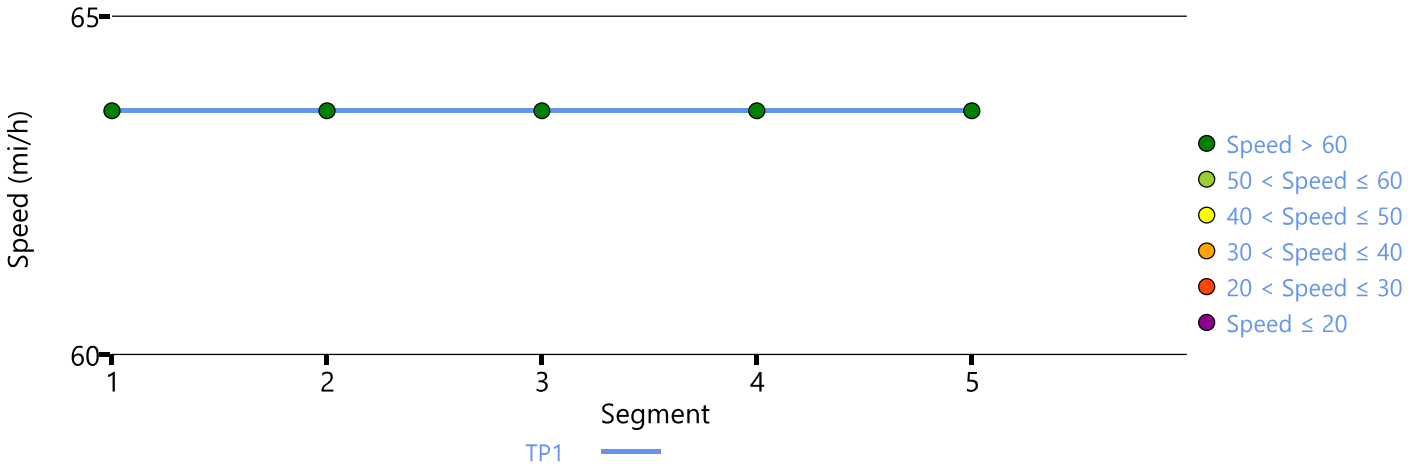
Messages

Comments

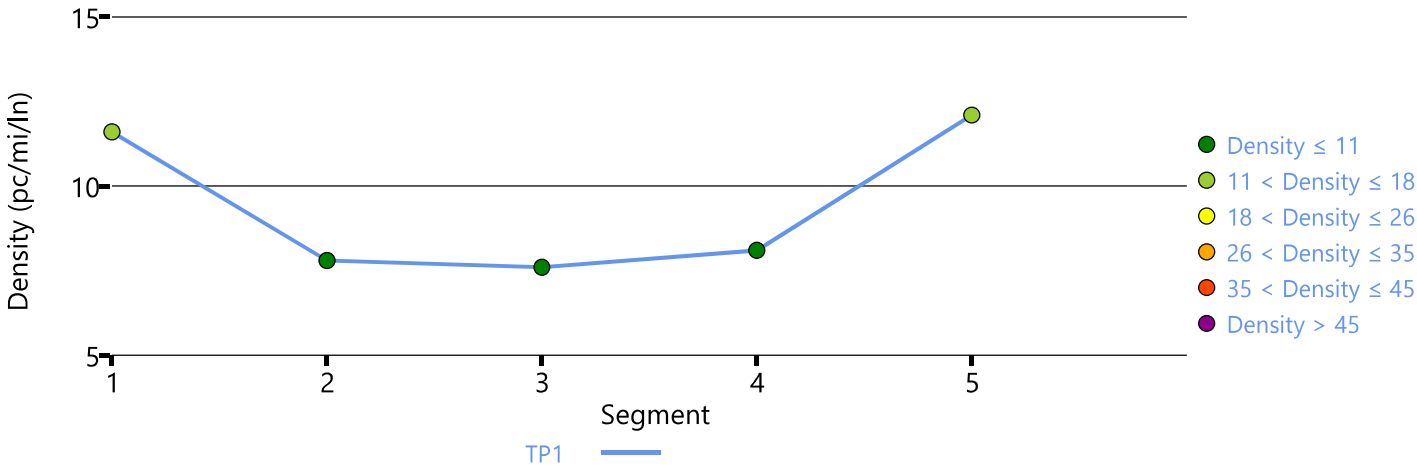
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1010	4387	0.23	63.6	7.9	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1010	532	6581	1784	0.15	0.30	63.6	63.6	5.3	5.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	478	4387	0.11	63.6	3.8	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	970	492	6581	1784	0.15	0.28	63.6	63.6	5.1	5.1	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	970	4387	0.22	63.6	7.6	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.1	6.9	4.20	A

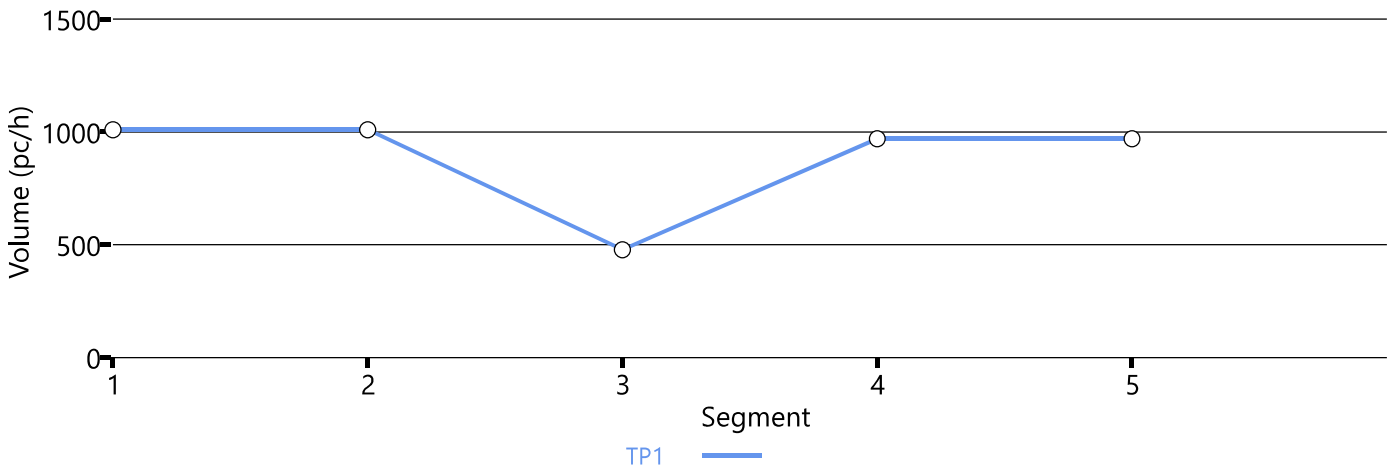
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.9
Average Travel Time, min	4.20	Density, pc/mi/ln	7.1

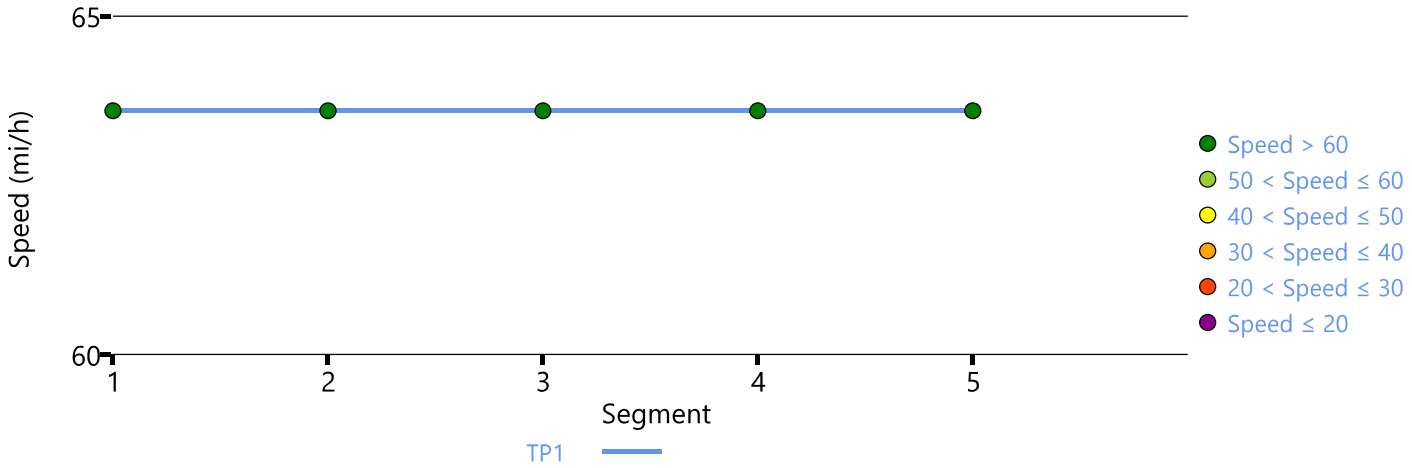
Messages

Comments

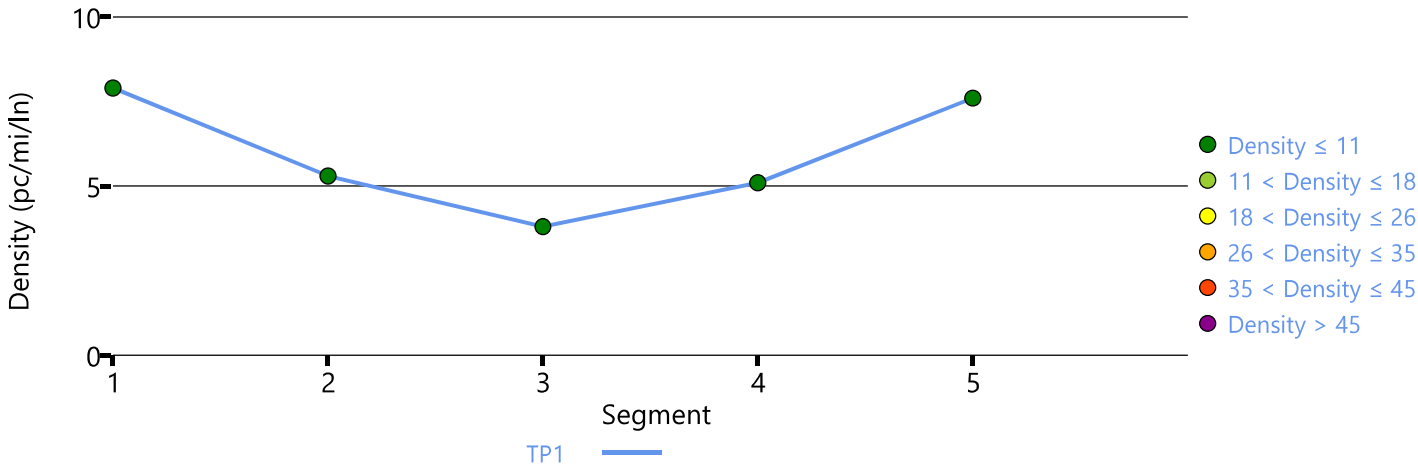
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1510	4387	0.34	63.6	11.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1510	525	6581	1784	0.23	0.29	63.6	63.6	7.9	7.9	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	985	4387	0.22	63.6	7.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1571	586	6581	1784	0.24	0.33	63.6	63.6	8.2	8.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1571	4387	0.36	63.6	12.4	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.1	10.9	4.20	B

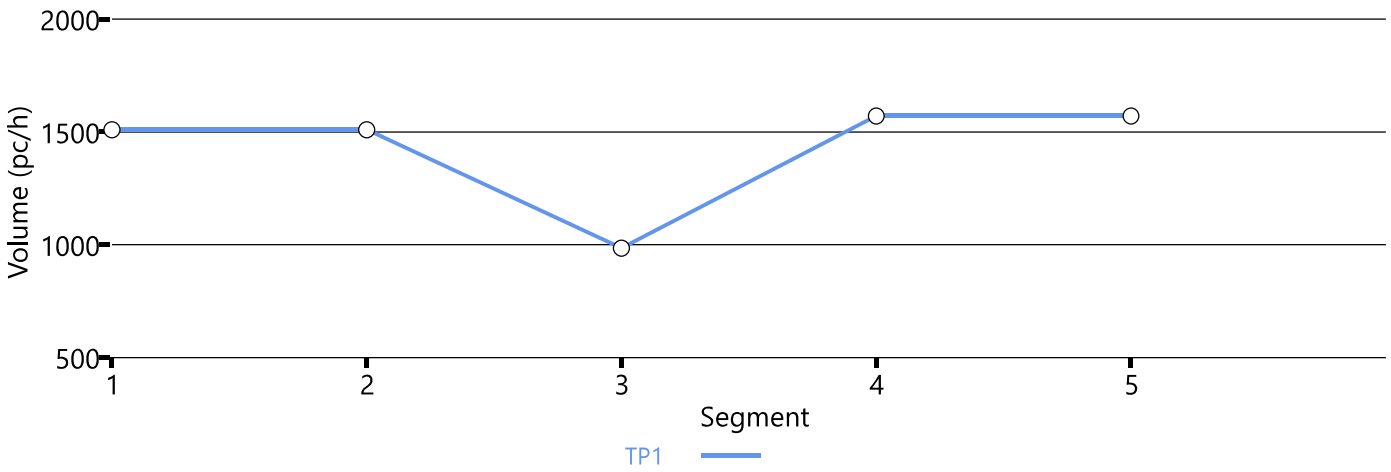
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.9
Average Travel Time, min	4.20	Density, pc/mi/ln	11.1

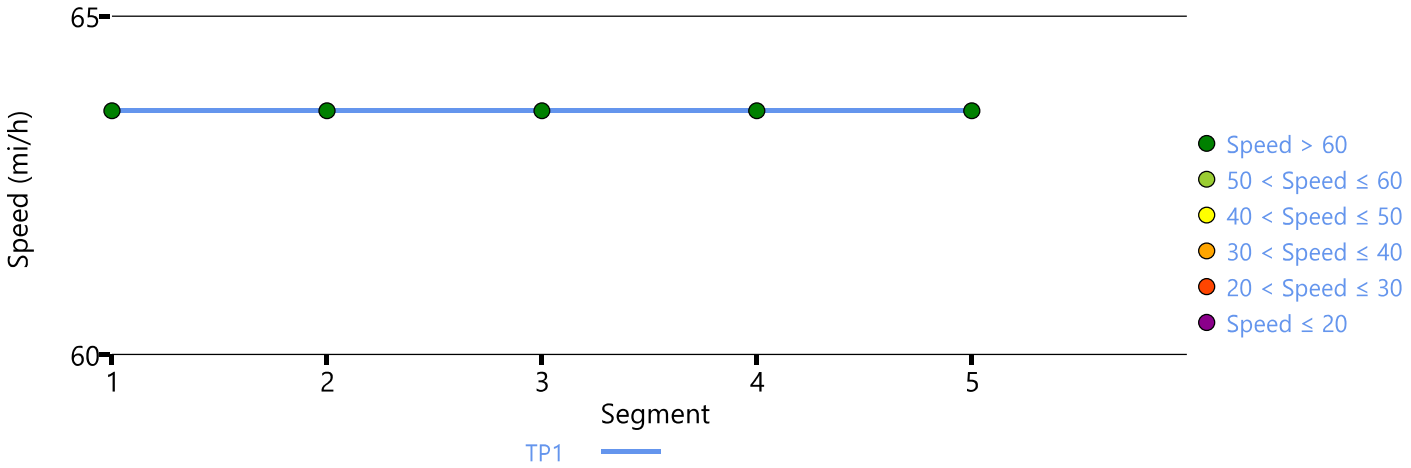
Messages

Comments

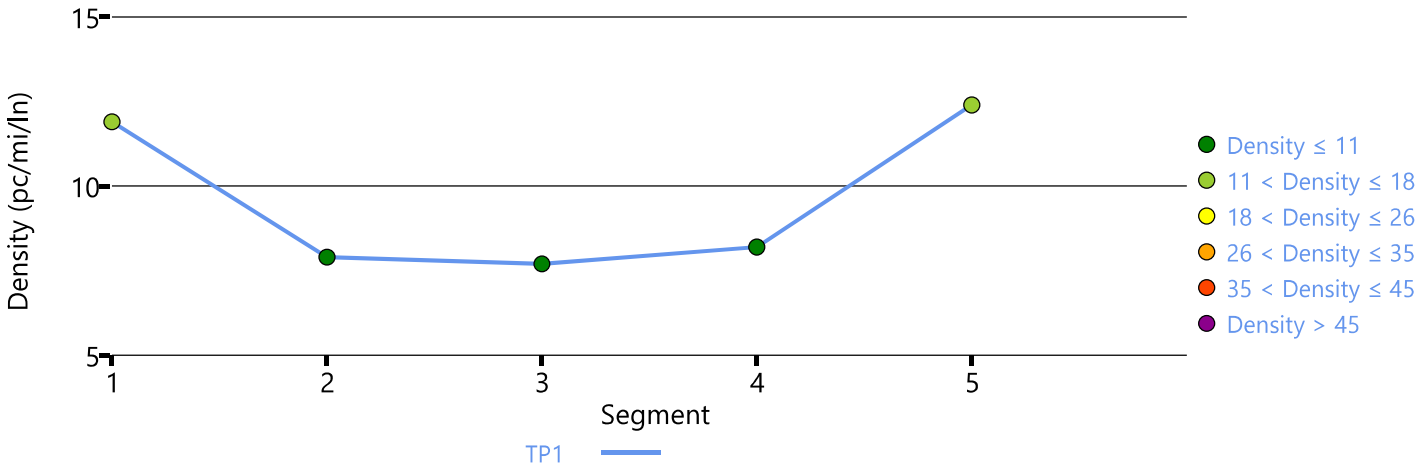
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1031	4387	0.24	63.6	8.1	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1031	541	6581	1784	0.16	0.30	63.6	63.6	5.4	5.4	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	490	4387	0.11	63.6	3.9	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	992	502	6581	1784	0.15	0.28	63.6	63.6	5.2	5.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	993	4387	0.23	63.6	7.8	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.2	7.1	4.20	A

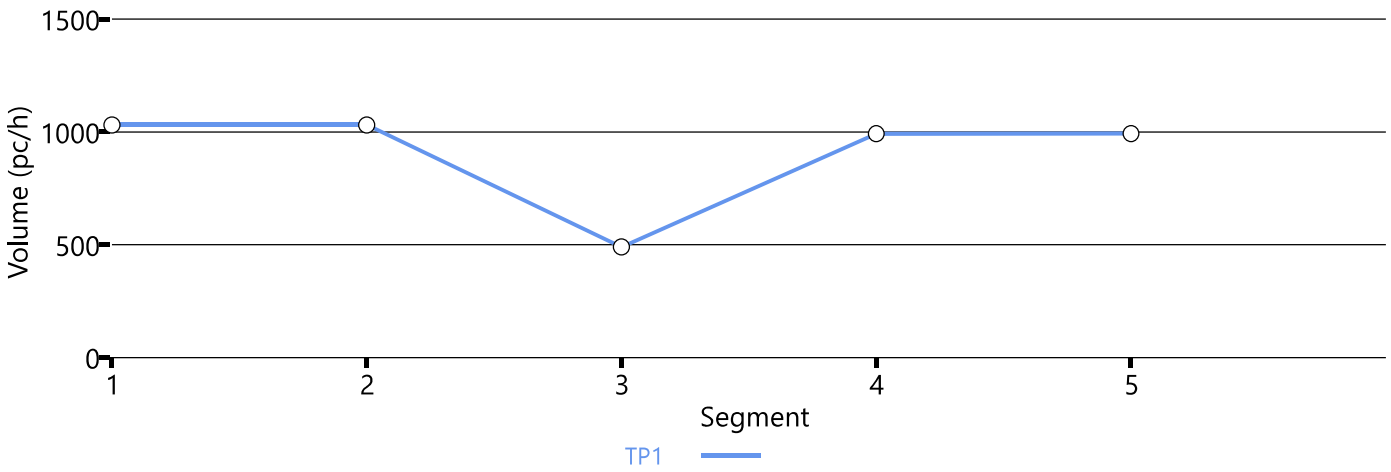
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	7.1
Average Travel Time, min	4.20	Density, pc/mi/ln	7.2

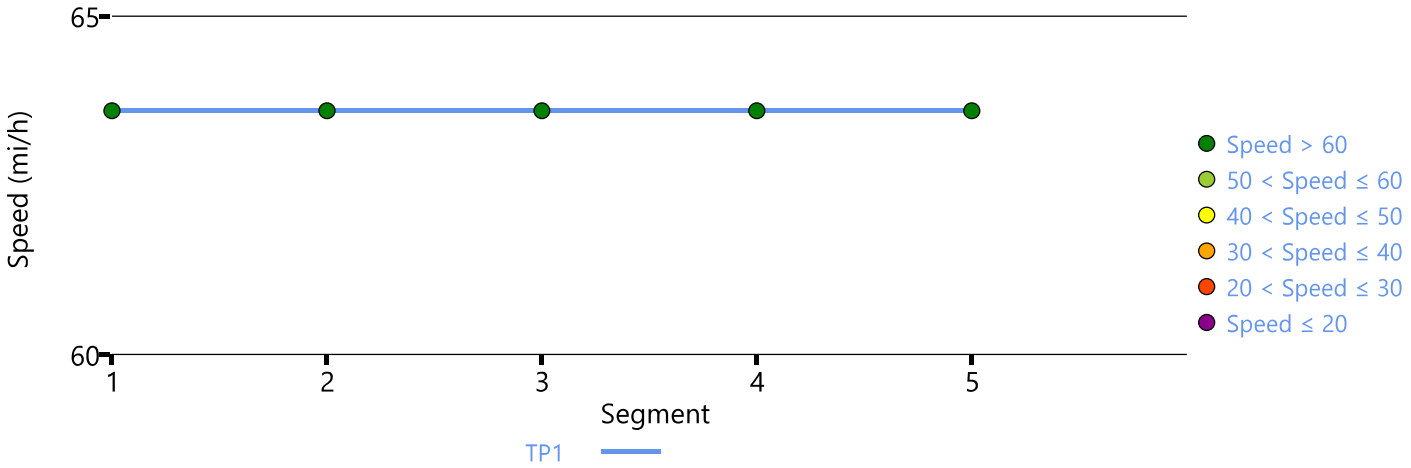
Messages

Comments

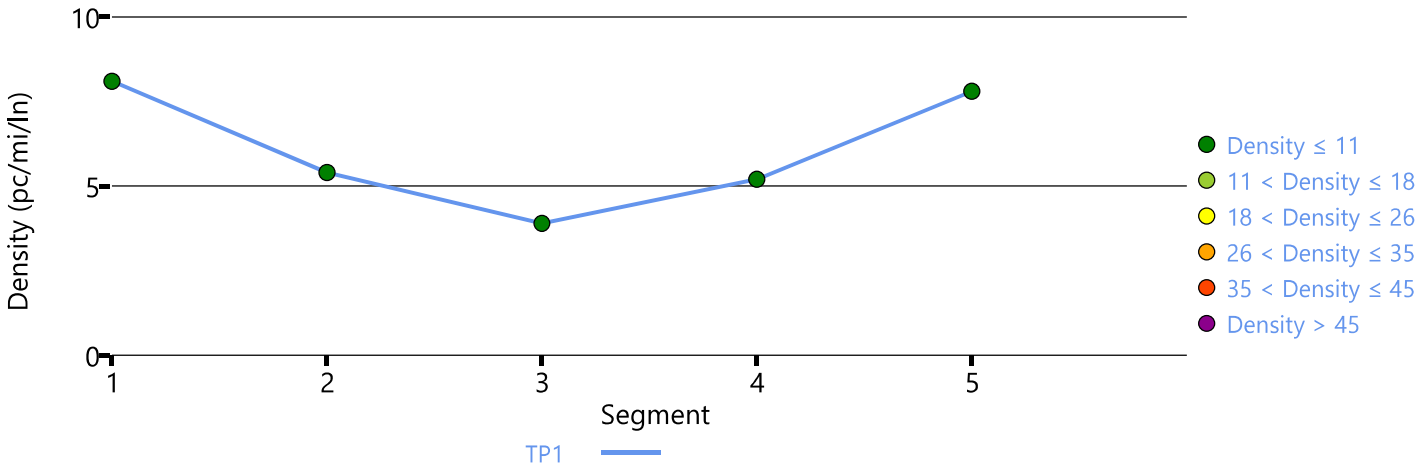
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1539	4387	0.35	63.6	12.1	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1539	535	6581	1784	0.23	0.30	63.6	63.6	8.1	8.1	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1005	4387	0.23	63.6	7.9	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1602	597	6581	1784	0.24	0.33	63.6	63.6	8.4	8.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1602	4387	0.37	63.6	12.6	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.3	11.0	4.20	B

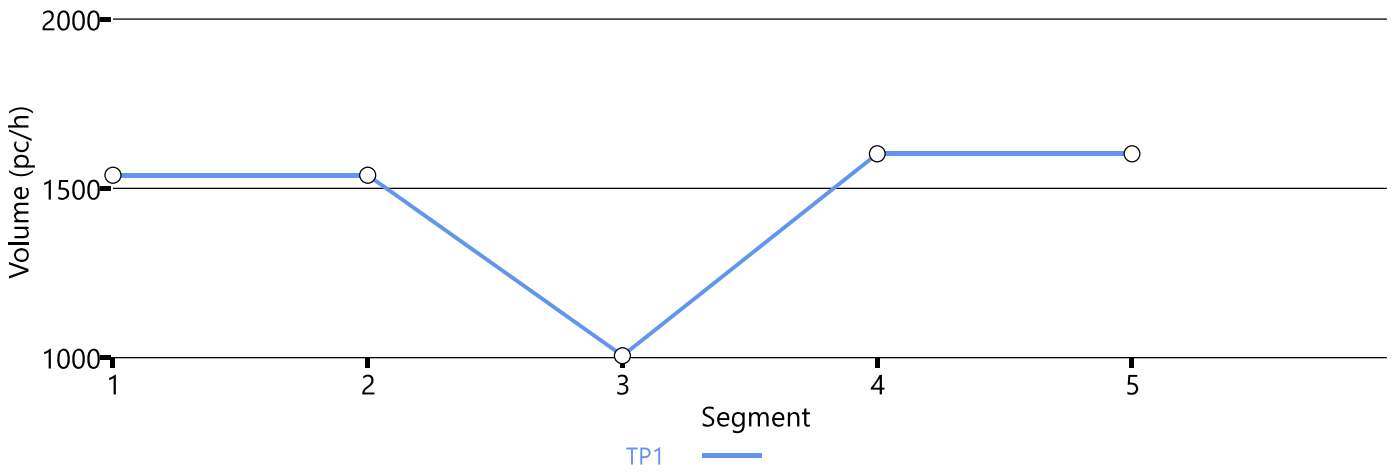
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.0
Average Travel Time, min	4.20	Density, pc/mi/ln	11.3

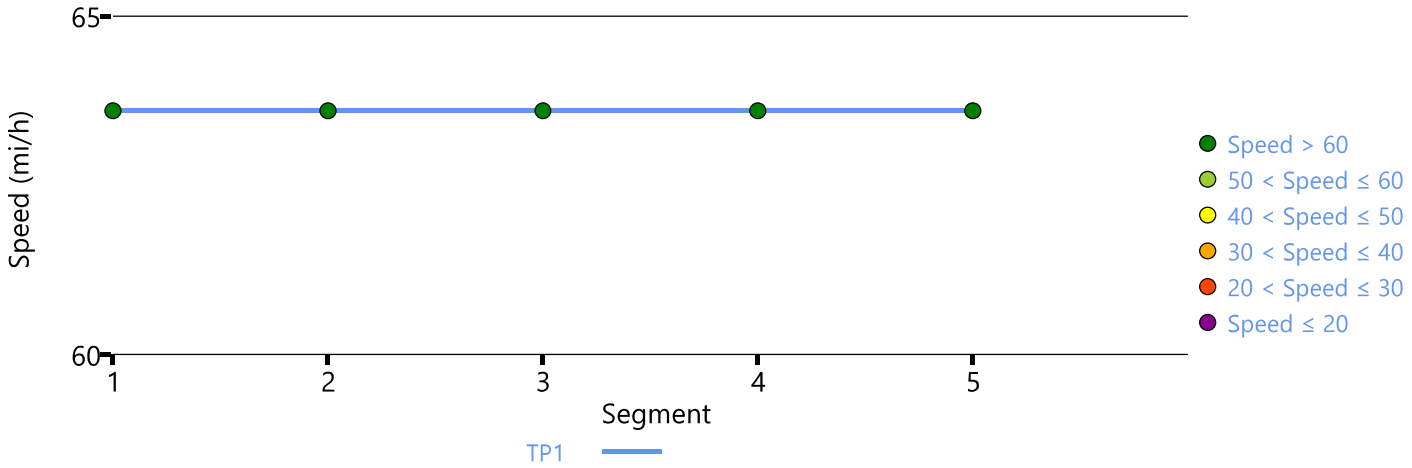
Messages

Comments

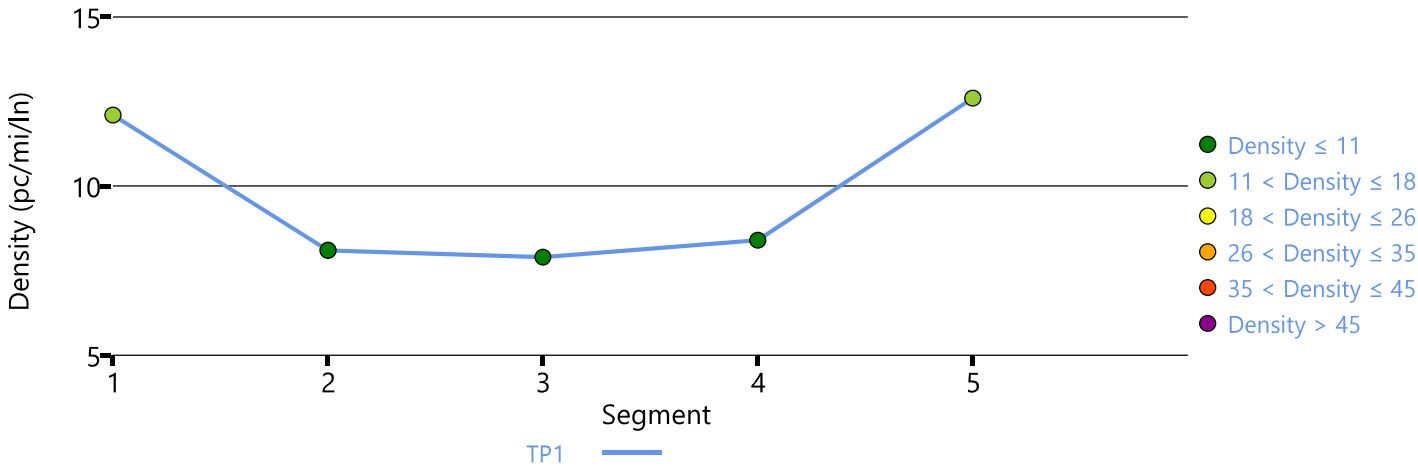
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1095	4387	0.25	63.6	8.6	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1095	568	6581	1784	0.17	0.32	63.6	63.6	5.7	5.7	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	527	4387	0.12	63.6	4.2	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1059	532	6581	1784	0.16	0.30	63.6	63.6	5.6	5.6	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1059	4387	0.24	63.6	8.3	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.7	7.5	4.20	A

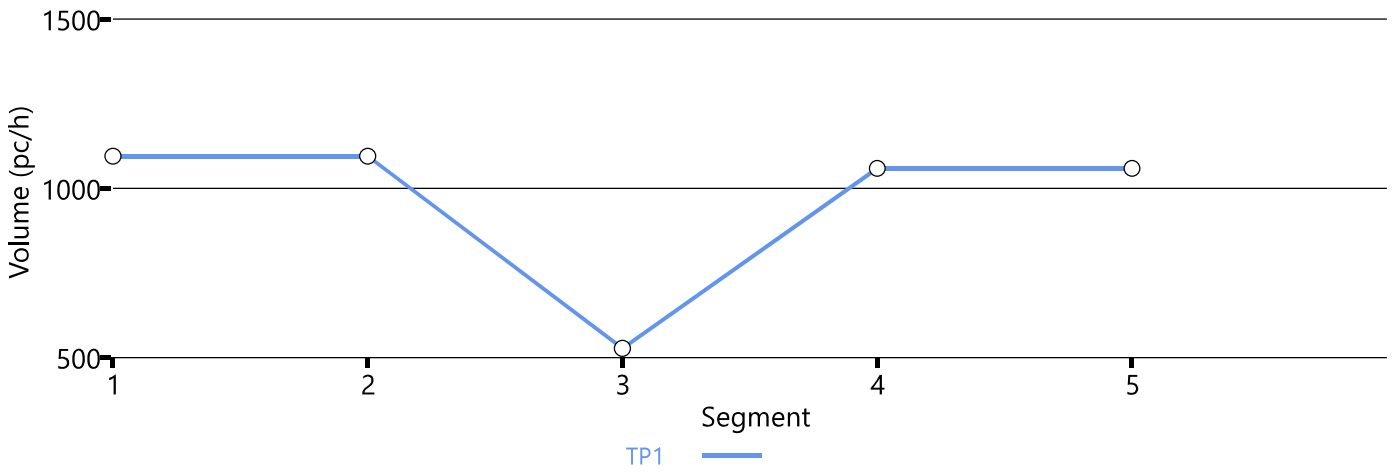
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	7.5
Average Travel Time, min	4.20	Density, pc/mi/ln	7.7

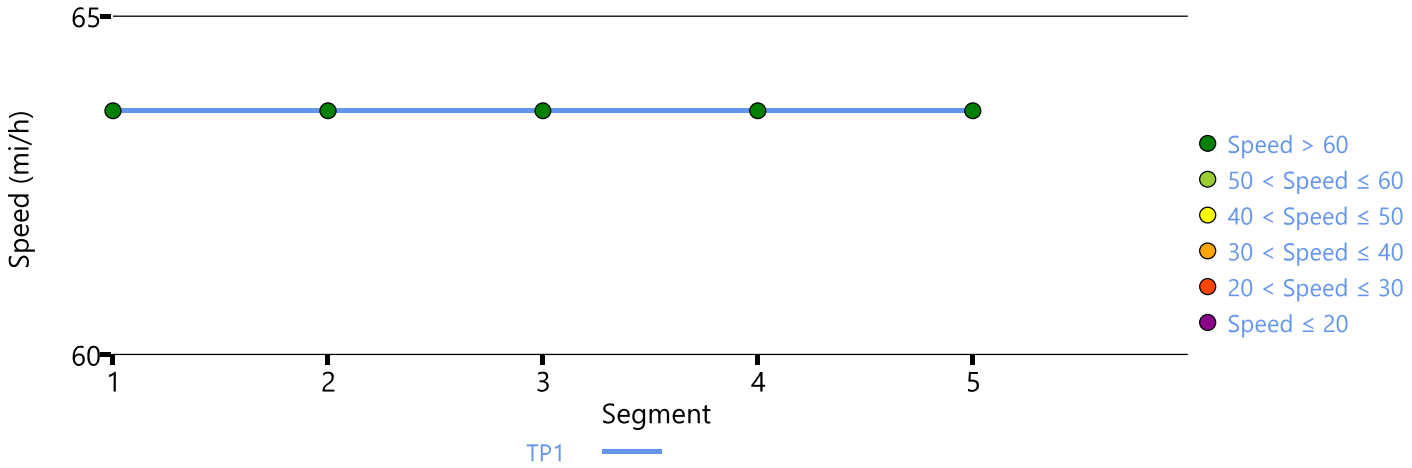
Messages

Comments

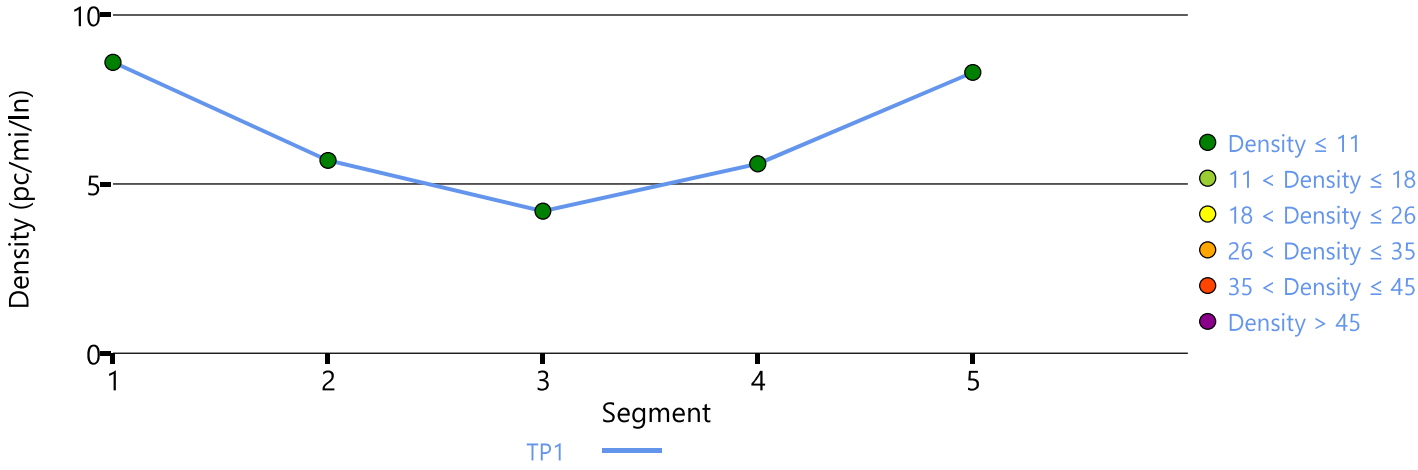
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1635	4387	0.37	63.6	12.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1635	568	6581	1784	0.25	0.32	63.6	63.6	8.6	8.6	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1067	4387	0.24	63.6	8.4	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1695	628	6581	1784	0.26	0.35	63.6	63.6	8.9	8.9	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1695	4387	0.39	63.6	13.3	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	12.0	11.7	4.20	B

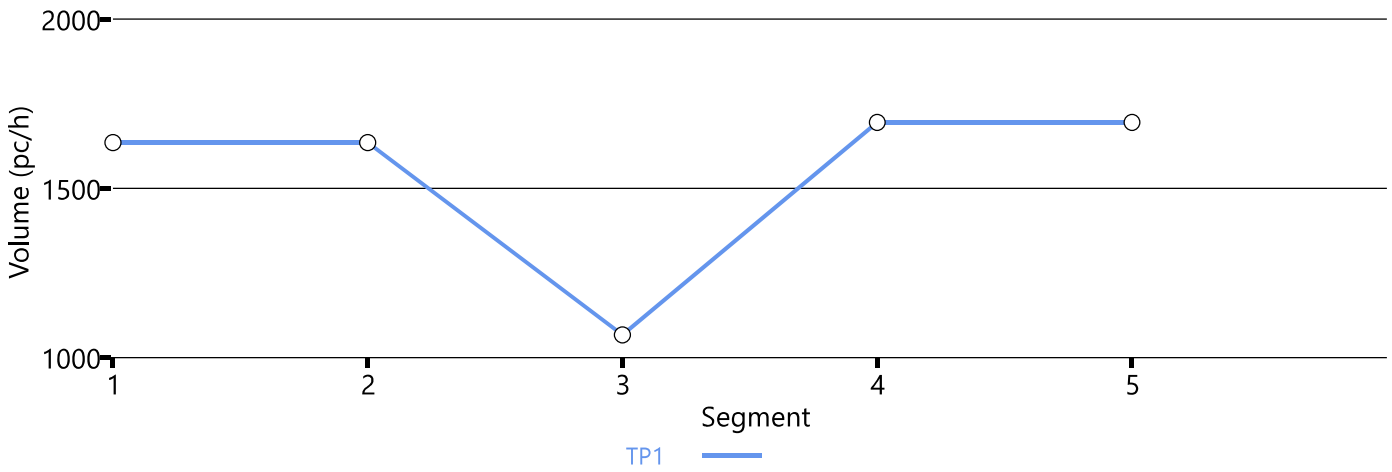
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.7
Average Travel Time, min	4.20	Density, pc/mi/ln	12.0

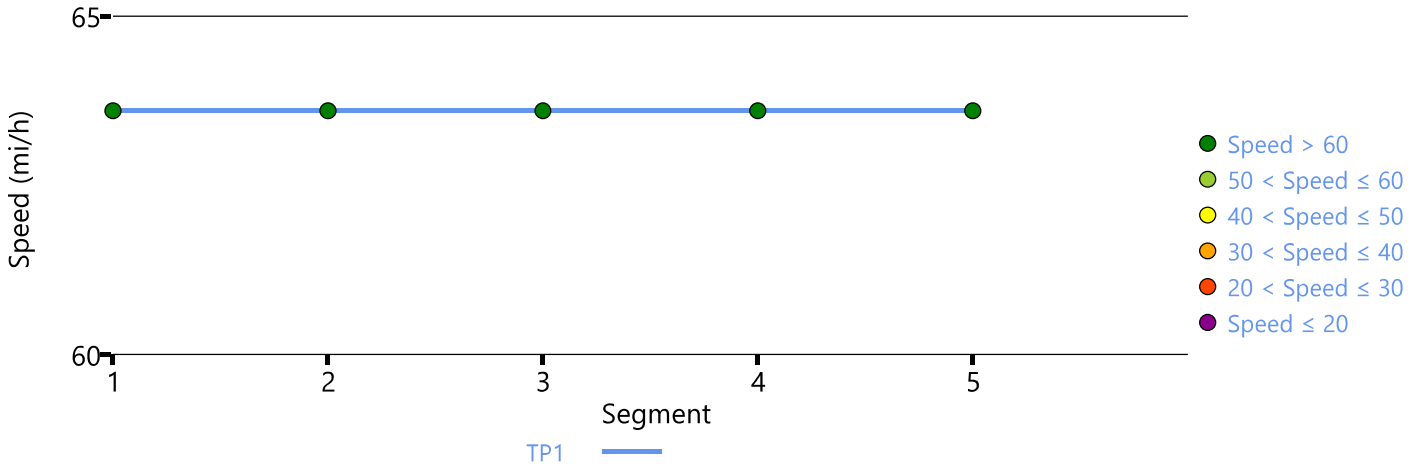
Messages

Comments

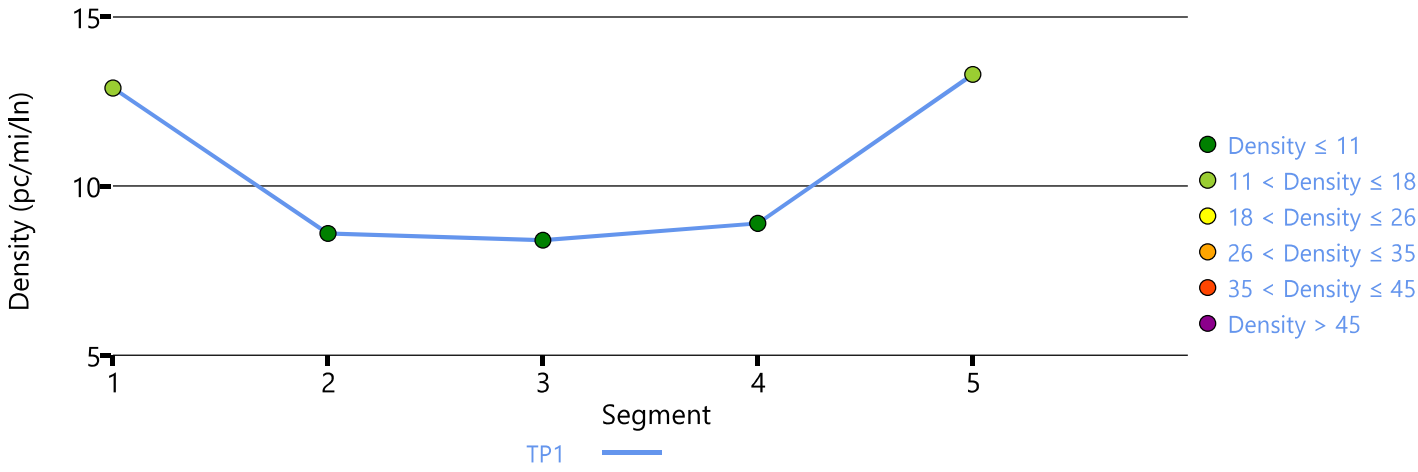
Volume Distribution



Speed Distribution



Density Distribution



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1	0.92	0.980	1220	4387	0.28	63.6	9.6	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.4	9.2	4.00	A

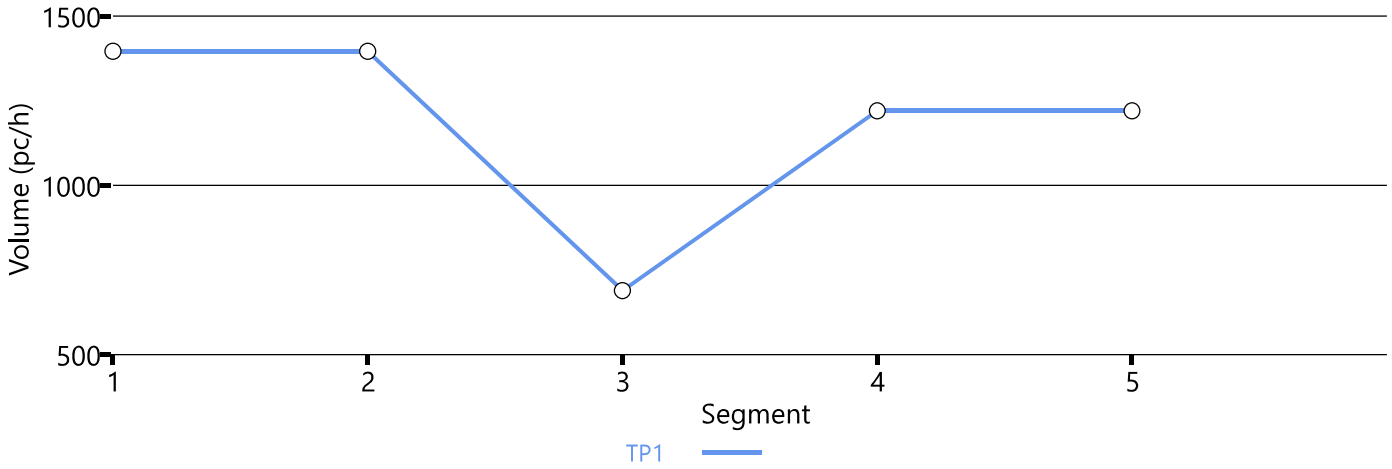
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.2
Average Travel Time, min	4.00	Density, pc/mi/ln	9.4

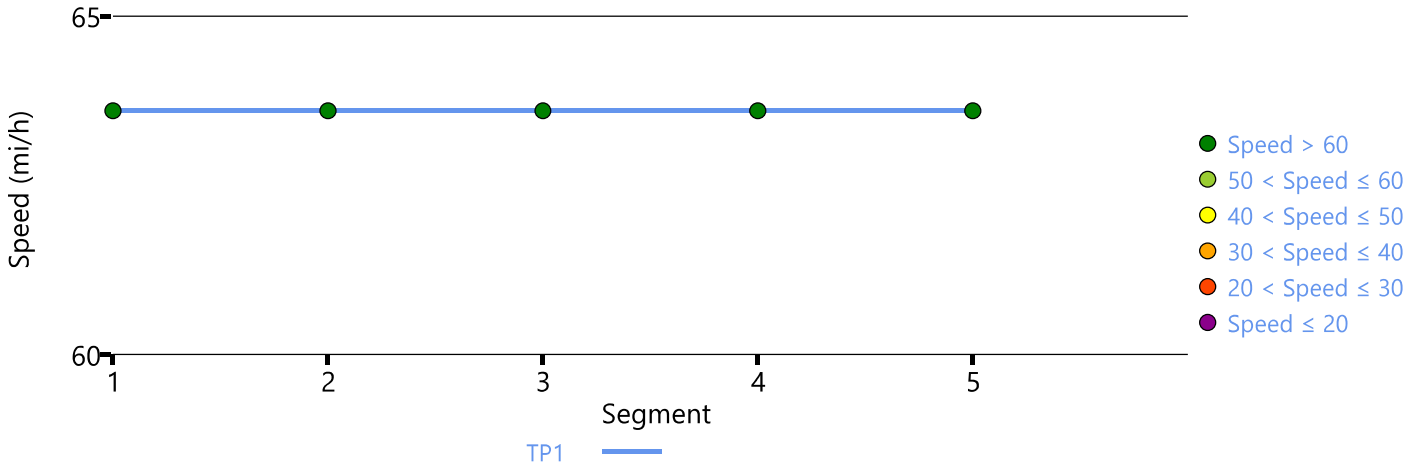
Messages

Comments

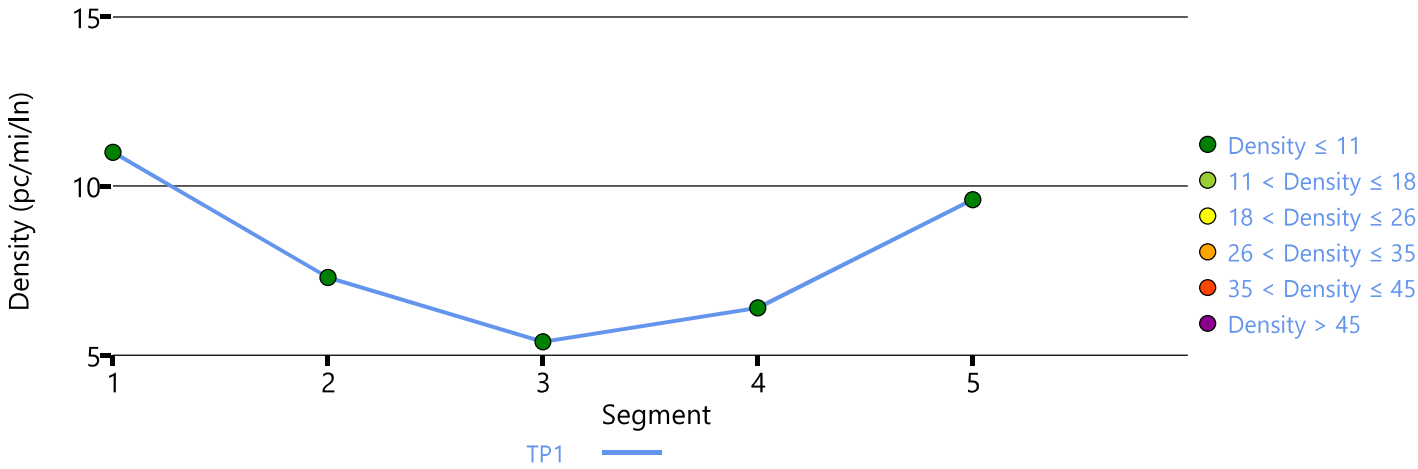
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/04/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1424	4387	0.32	63.6	11.2	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1424	405	6581	1784	0.22	0.23	63.6	63.6	7.5	7.5	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1019	4387	0.23	63.6	8.0	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1283	264	6581	1784	0.19	0.15	63.6	63.6	6.7	6.7	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1283	4387	0.29	63.6	10.1	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.8	9.6	4.00	A

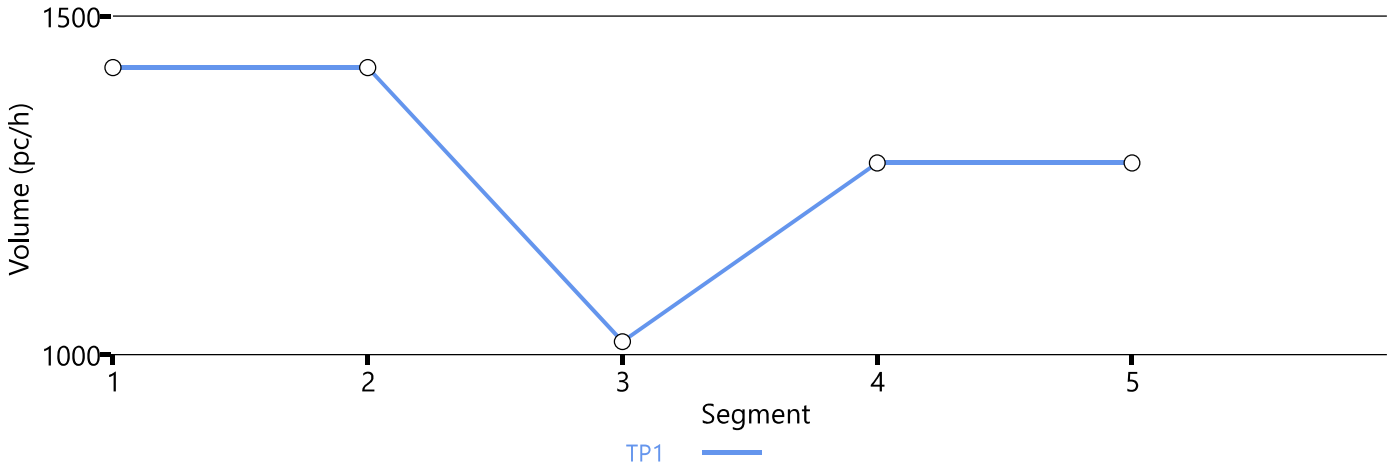
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.6
Average Travel Time, min	4.00	Density, pc/mi/ln	9.8

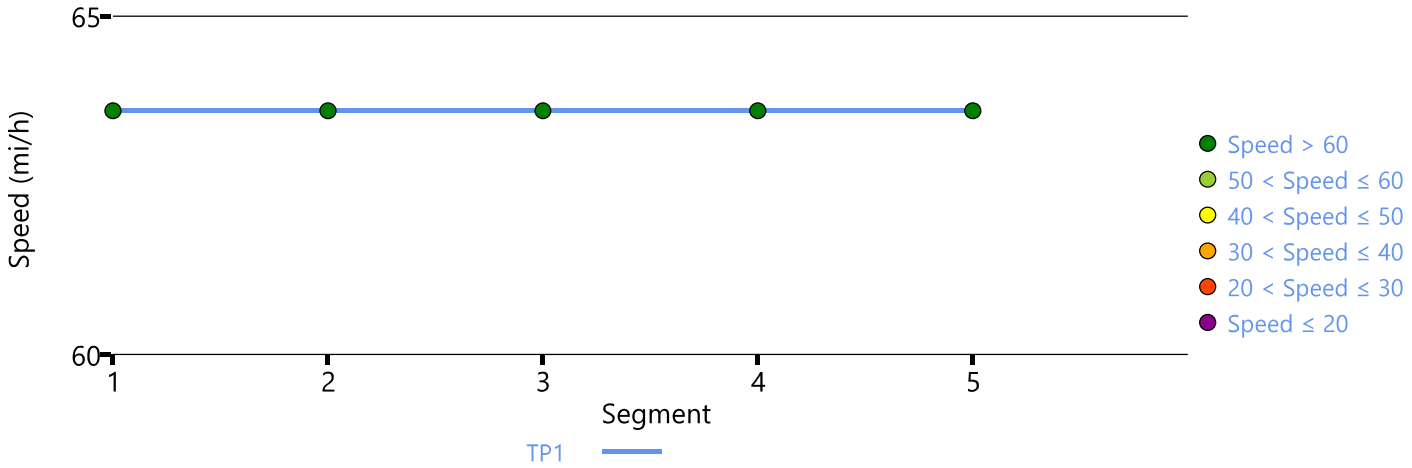
Messages

Comments

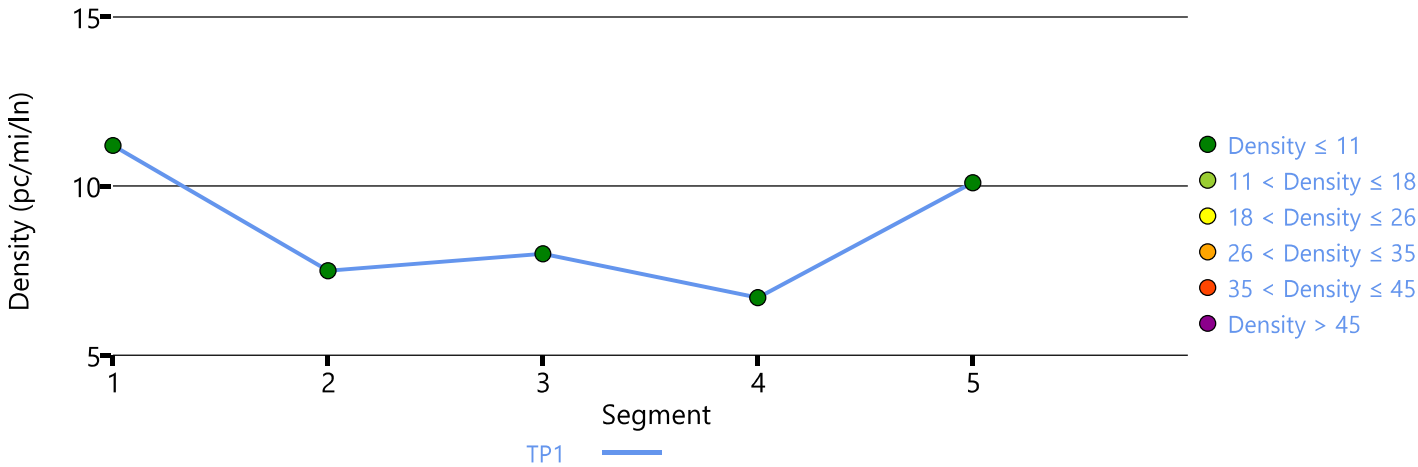
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1371	4387	0.31	63.6	10.8	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1371	721	6581	1784	0.21	0.40	63.6	63.6	7.2	7.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	650	4387	0.15	63.6	5.1	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1189	539	6581	1784	0.18	0.30	63.6	63.6	6.2	6.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1189	4387	0.27	63.6	9.3	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.1	9.0	4.00	A

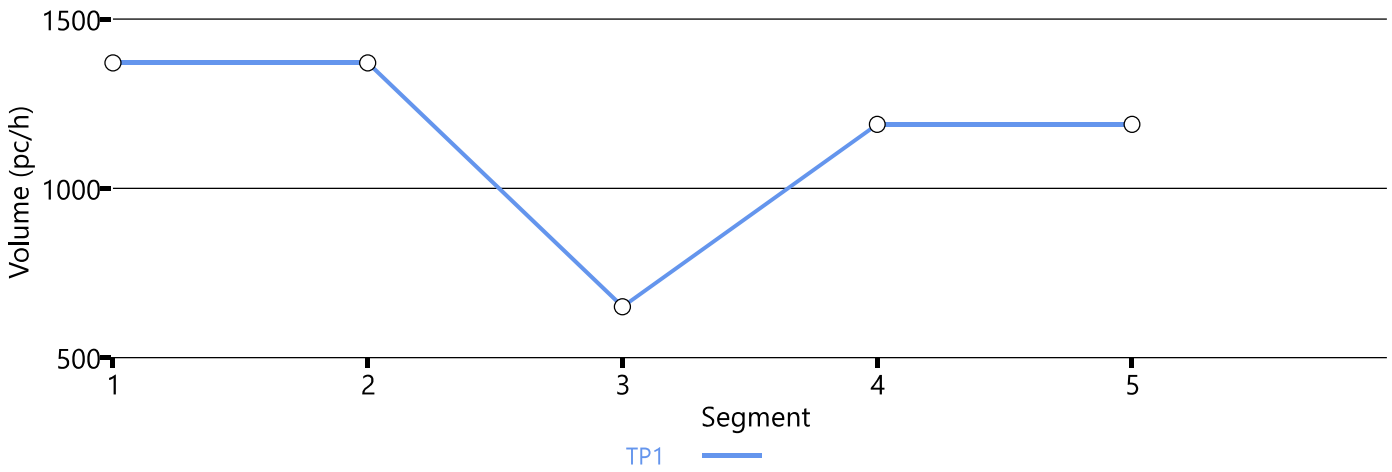
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.0
Average Travel Time, min	4.00	Density, pc/mi/ln	9.1

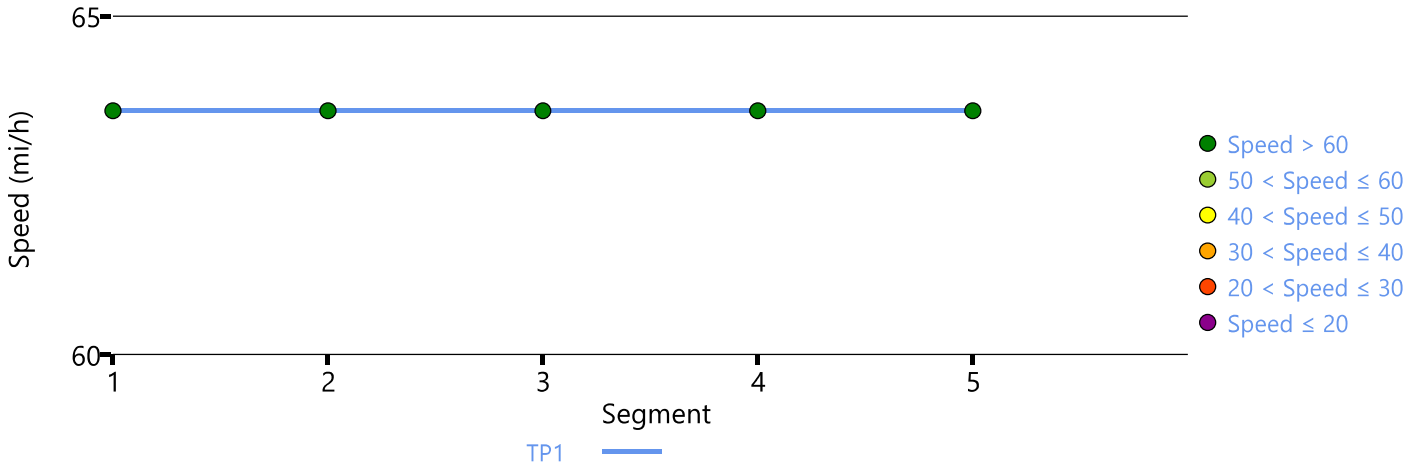
Messages

Comments

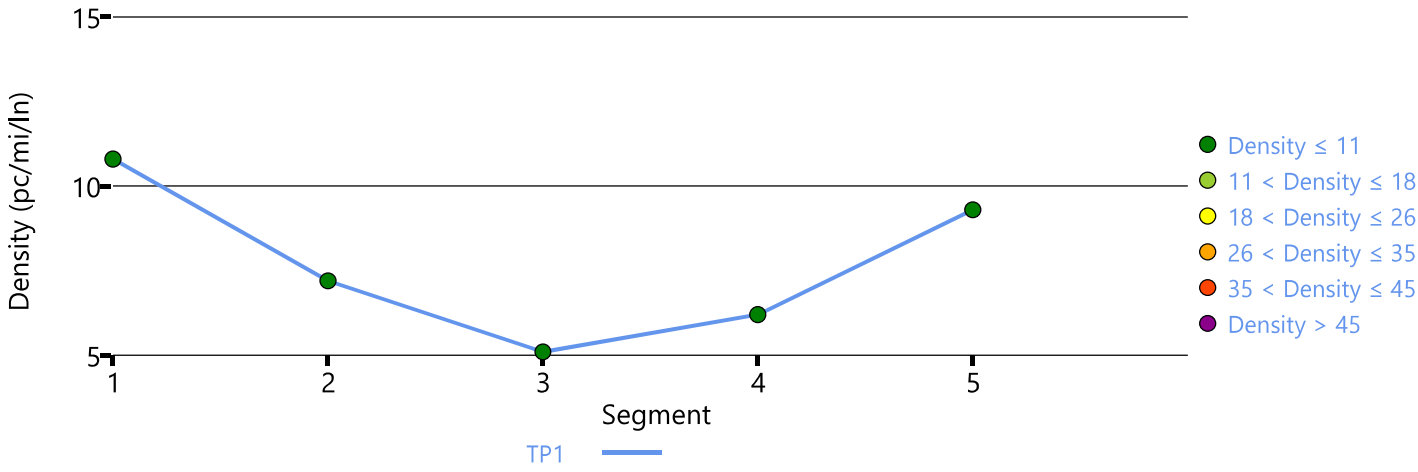
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1453	4387	0.33	63.6	11.4	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1453	411	6581	1784	0.22	0.23	63.6	63.6	7.6	7.6	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1041	4387	0.24	63.6	8.2	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1309	268	6581	1784	0.20	0.15	63.6	63.6	6.9	6.9	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1310	4387	0.30	63.6	10.3	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.0	9.8	4.00	A

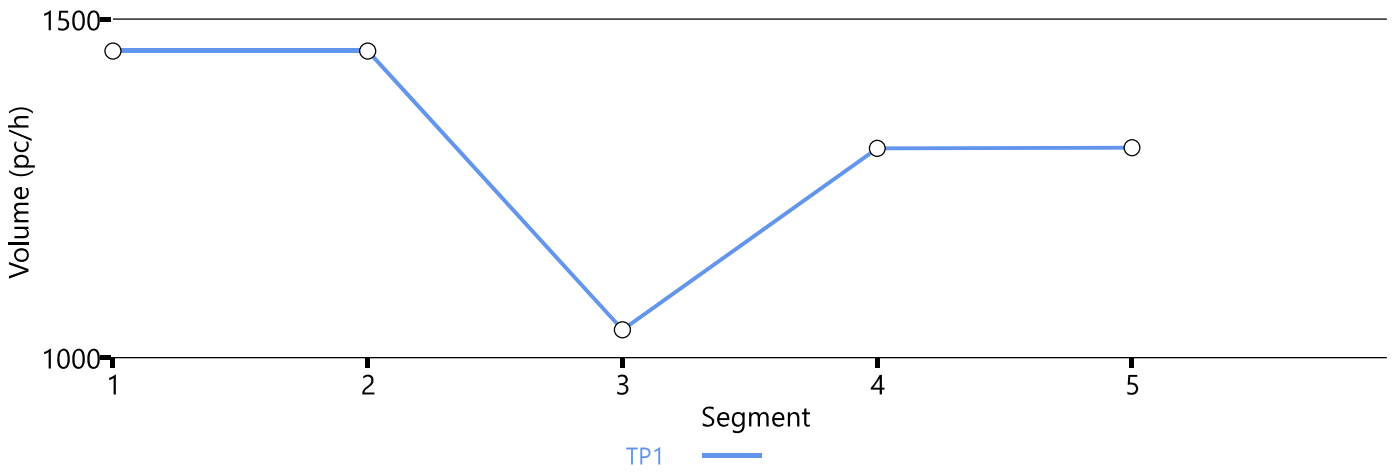
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.8
Average Travel Time, min	4.00	Density, pc/mi/ln	10.0

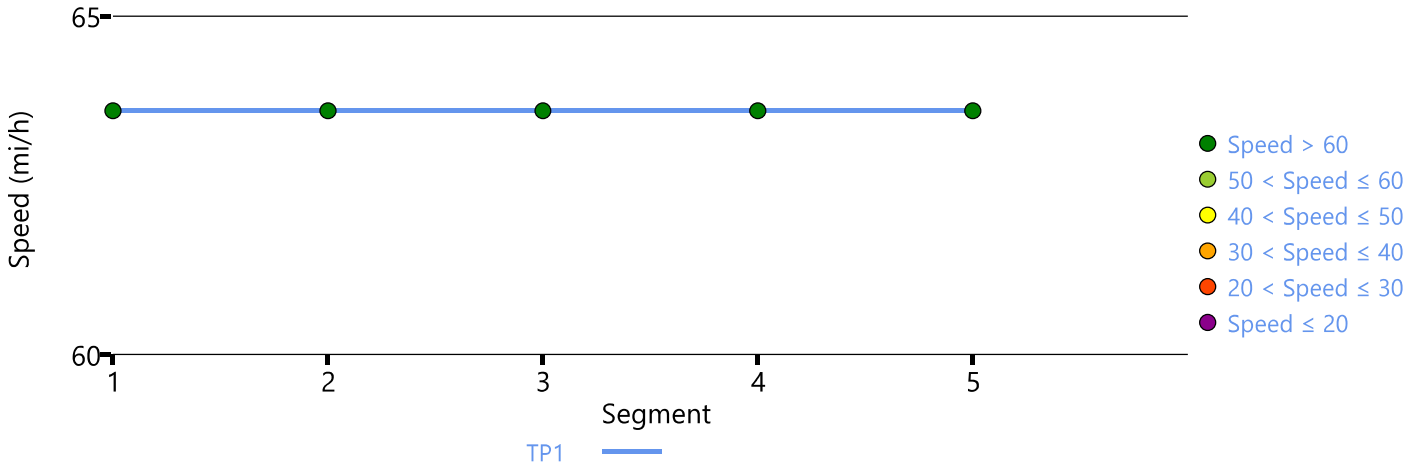
Messages

Comments

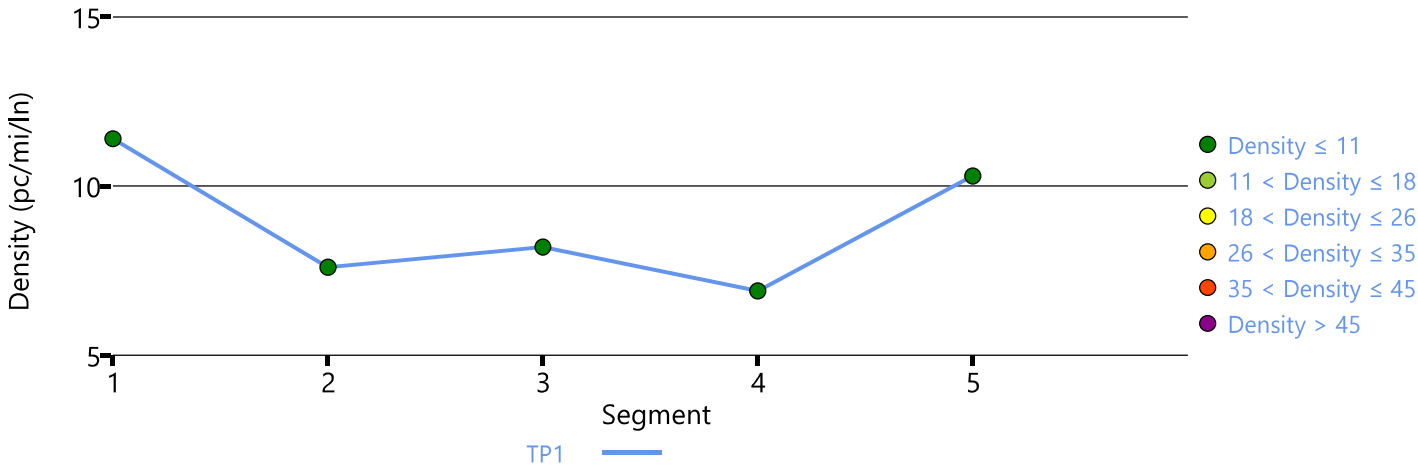
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	SOS	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1399	4387	0.32	63.6	11.0	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1399	735	6581	1784	0.21	0.41	63.6	63.6	7.3	7.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	663	4387	0.15	63.6	5.2	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1211	548	6581	1784	0.18	0.31	63.6	63.6	6.3	6.3	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1211	4387	0.28	63.6	9.5	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.3	9.1	4.00	A

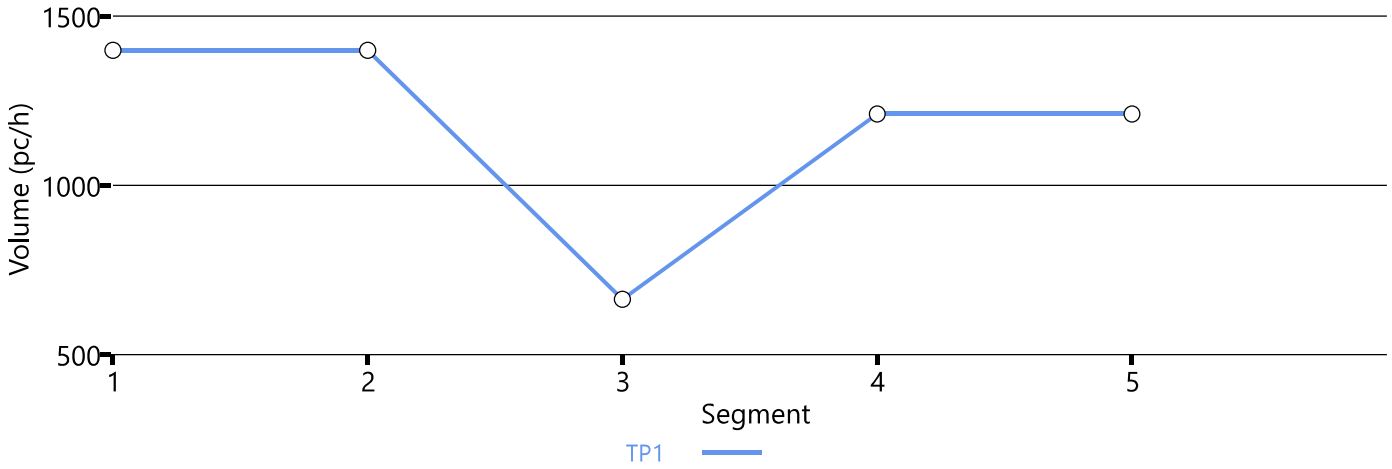
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.1
Average Travel Time, min	4.00	Density, pc/mi/ln	9.3

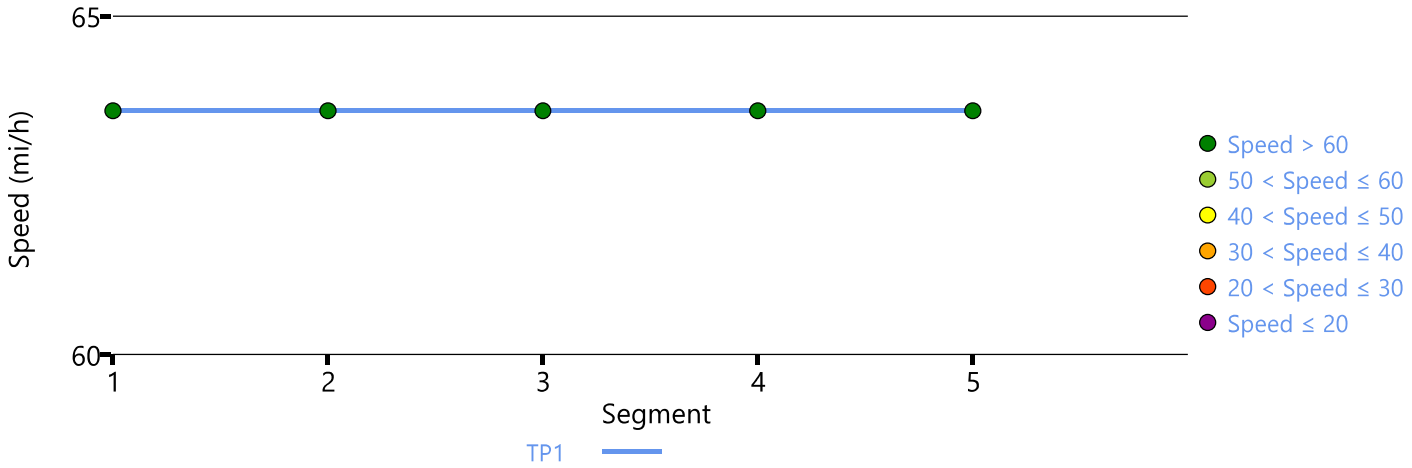
Messages

Comments

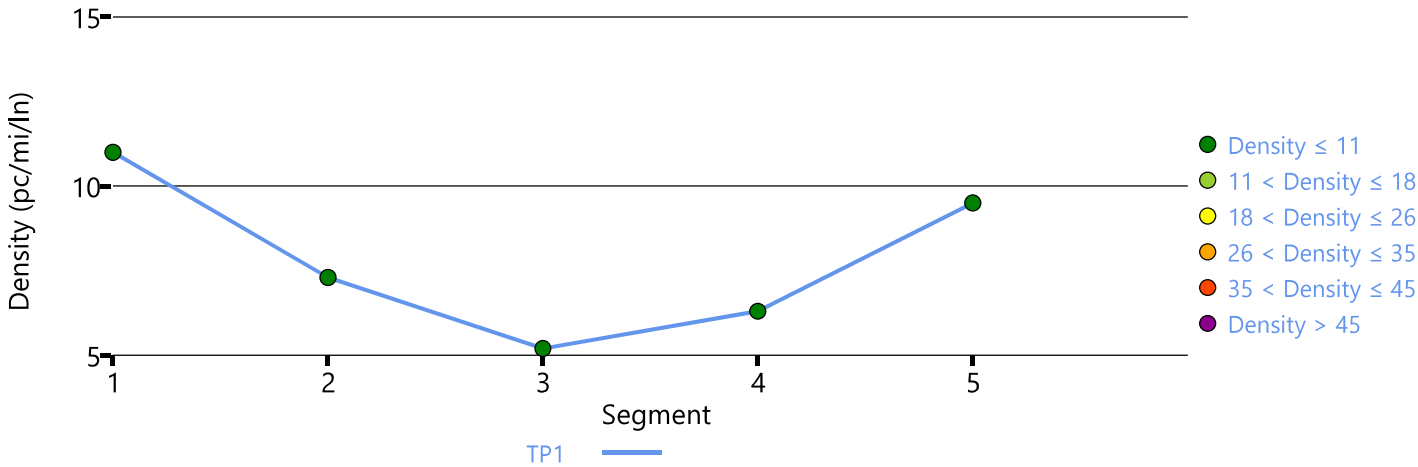
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1543	4387	0.35	63.6	12.1	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1543	433	6581	1784	0.23	0.24	63.6	63.6	8.1	8.1	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1110	4387	0.25	63.6	8.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1395	285	6581	1784	0.21	0.16	63.6	63.6	7.3	7.3	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1395	4387	0.32	63.6	11.0	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.6	10.5	4.00	A

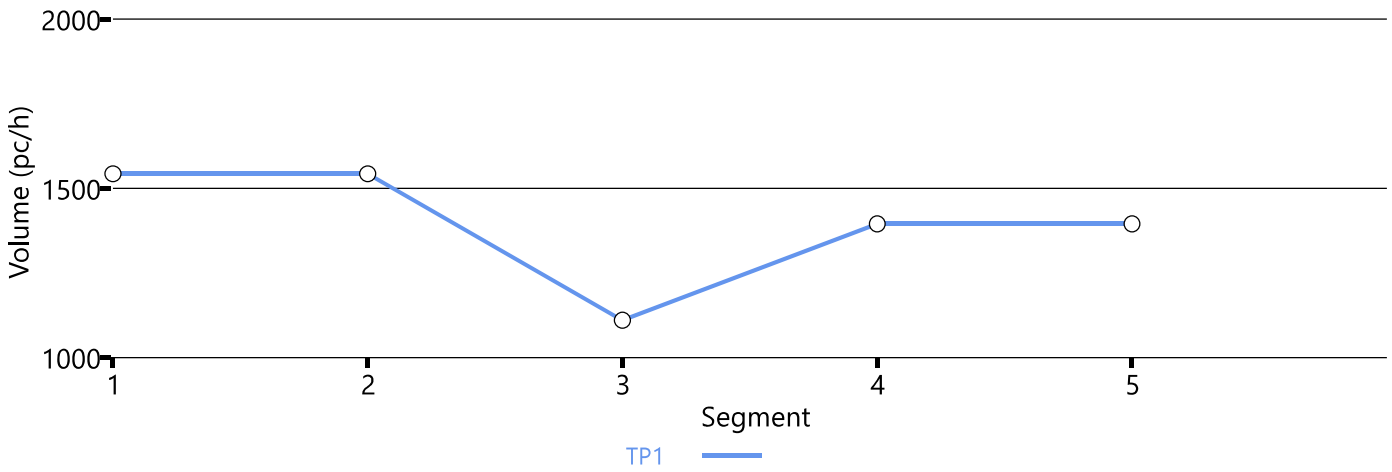
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.5
Average Travel Time, min	4.00	Density, pc/mi/ln	10.6

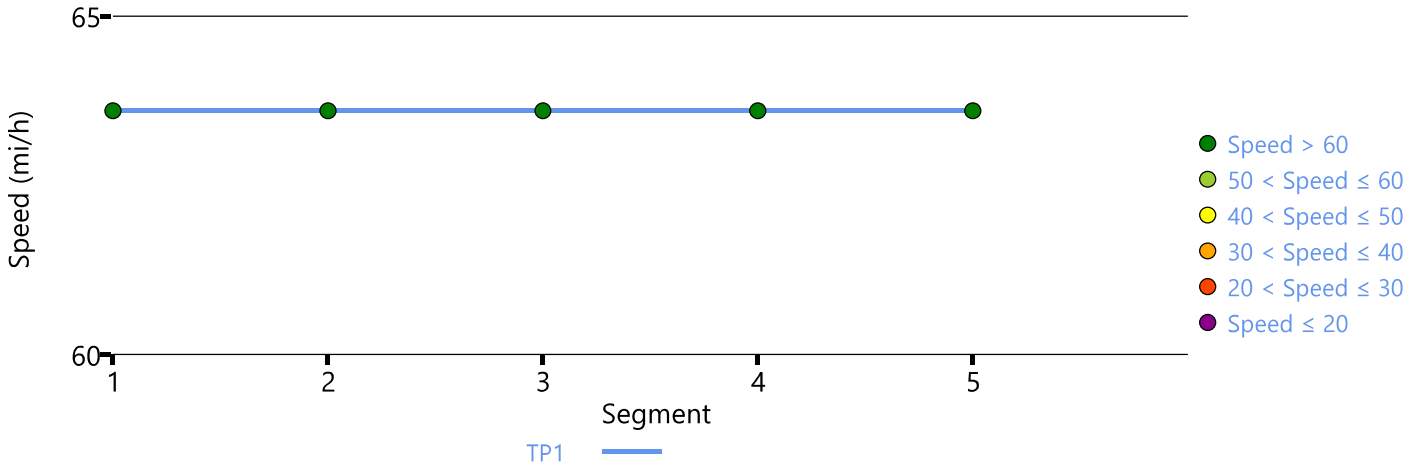
Messages

Comments

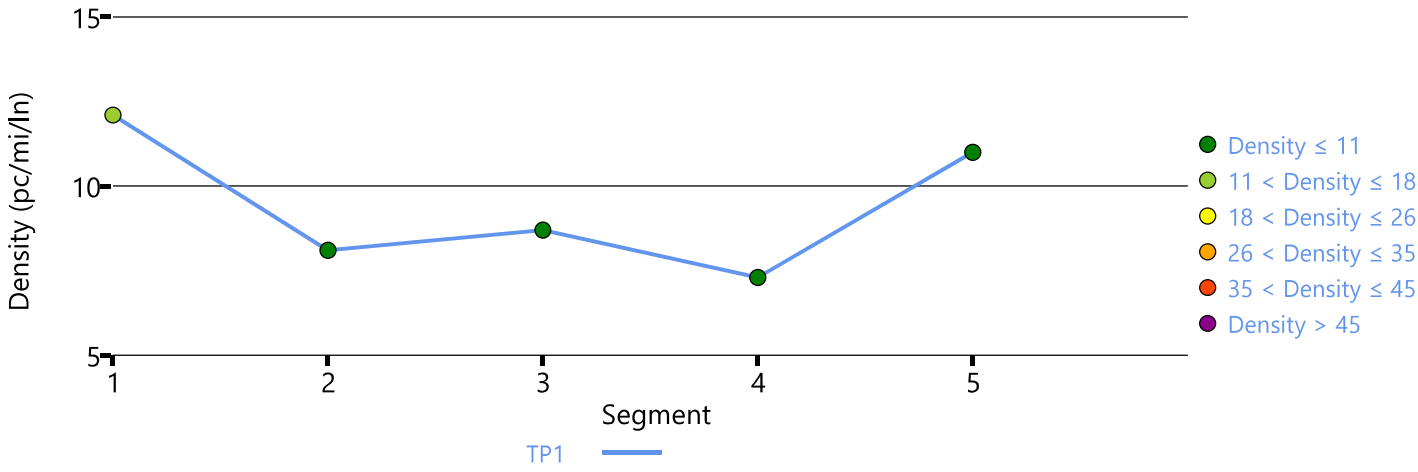
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1484	4387	0.34	63.6	11.7	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1484	780	6581	1784	0.23	0.44	63.6	63.6	7.8	7.8	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	704	4387	0.16	63.6	5.5	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1277	573	6581	1784	0.19	0.32	63.6	63.6	6.7	6.7	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1278	4387	0.29	63.6	10.0	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.9	9.7	4.00	A

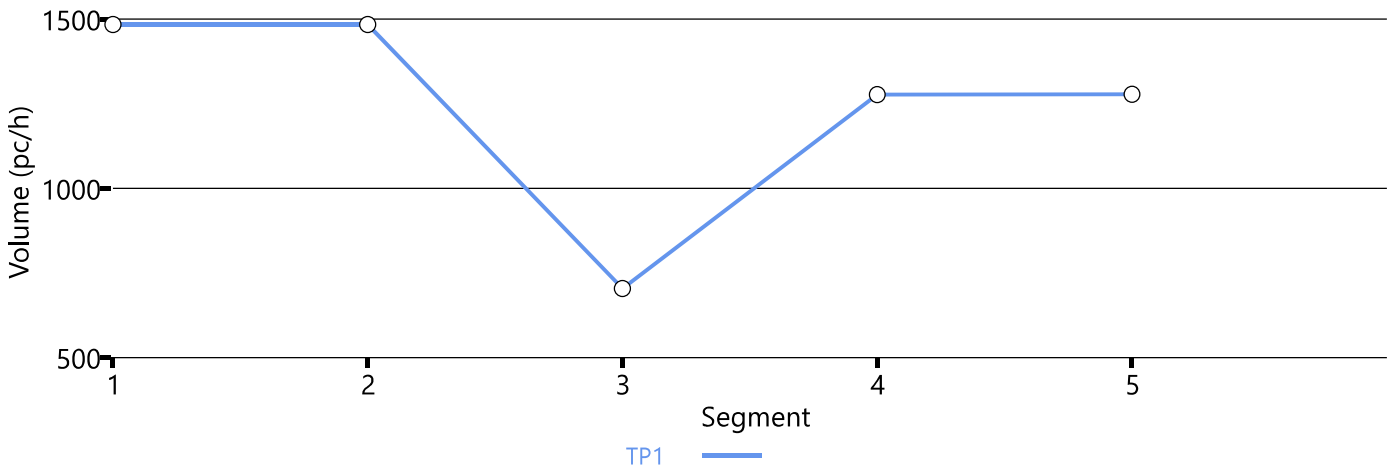
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.7
Average Travel Time, min	4.00	Density, pc/mi/ln	9.9

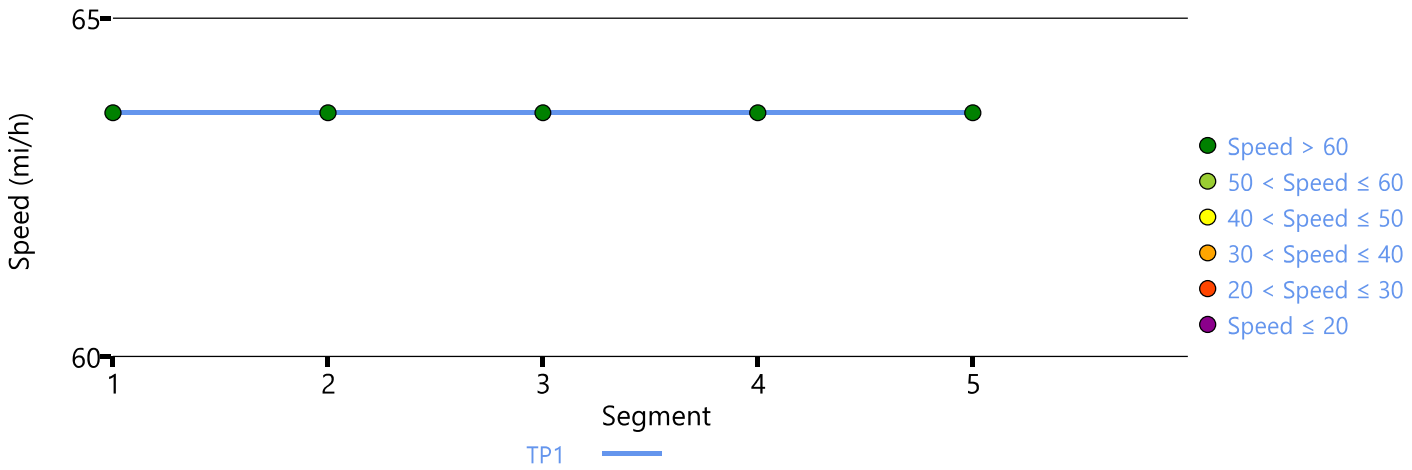
Messages

Comments

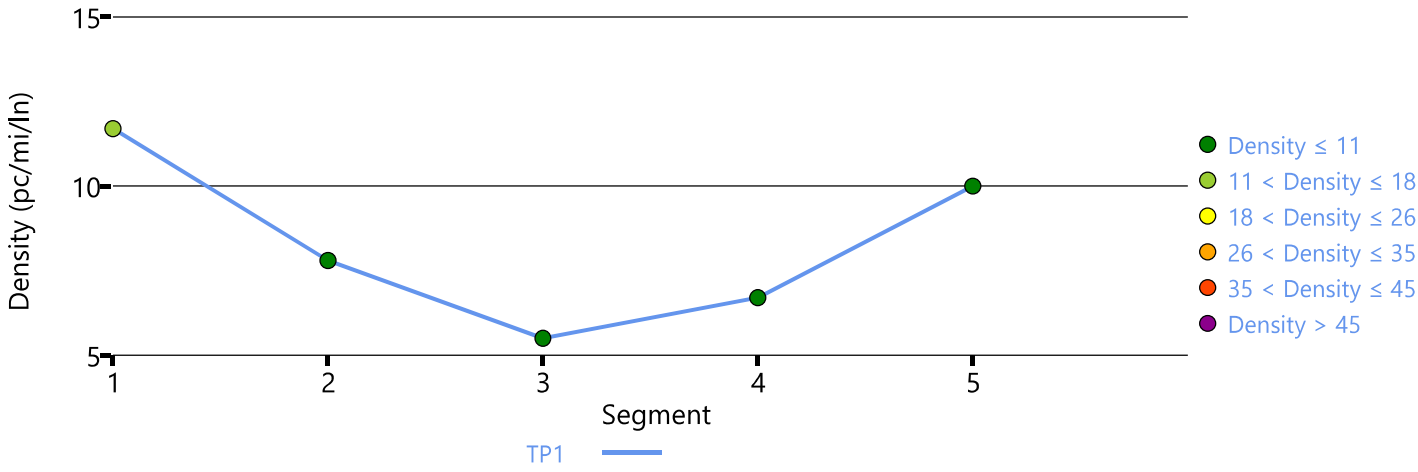
Volume Distribution



Speed Distribution



Density Distribution



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1	0.92	0.980	1258	4387	0.29	63.6	9.9	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.6	9.4	4.00	A

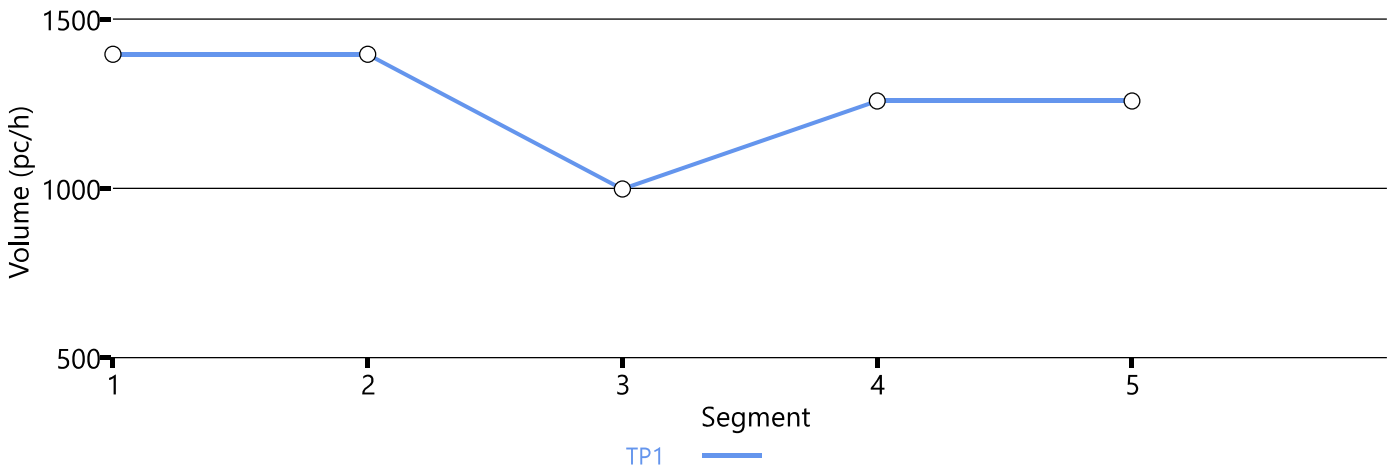
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.4
Average Travel Time, min	4.00	Density, pc/mi/ln	9.6

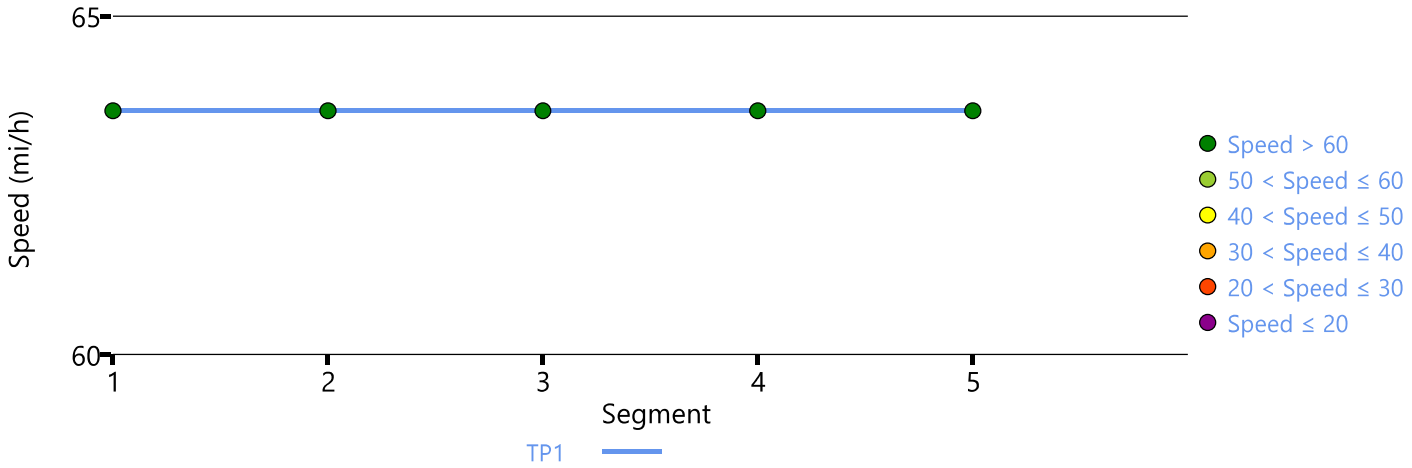
Messages

Comments

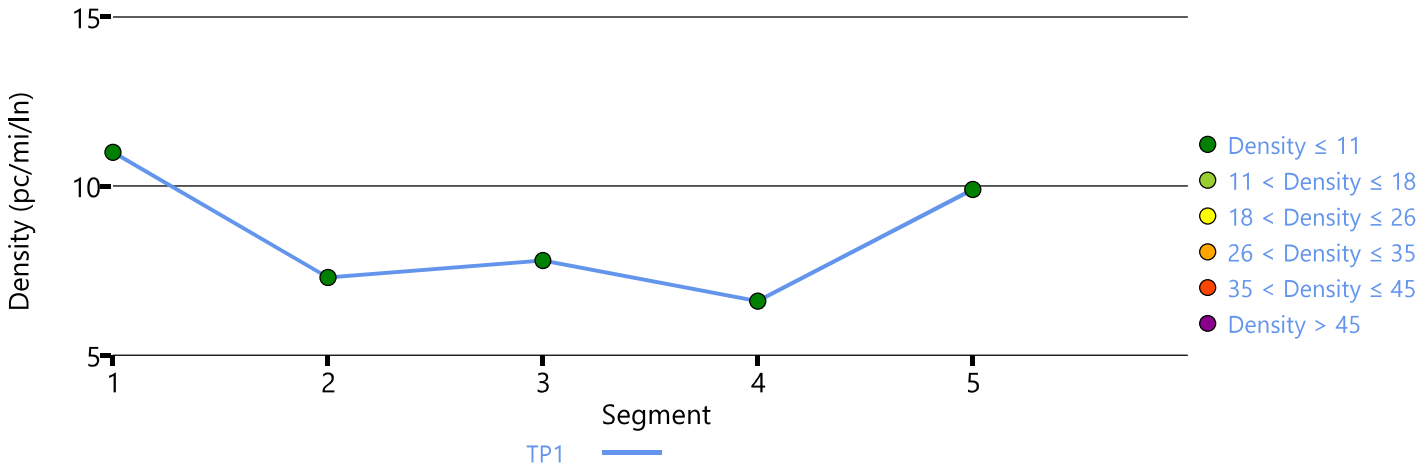
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	990	4387	0.23	63.6	7.8	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	990	525	6581	1784	0.15	0.29	63.6	63.6	5.2	5.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	466	4387	0.11	63.6	3.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	950	484	6581	1784	0.14	0.27	63.6	63.6	5.0	5.0	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	949	4387	0.22	63.6	7.5	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.0	6.8	4.20	A

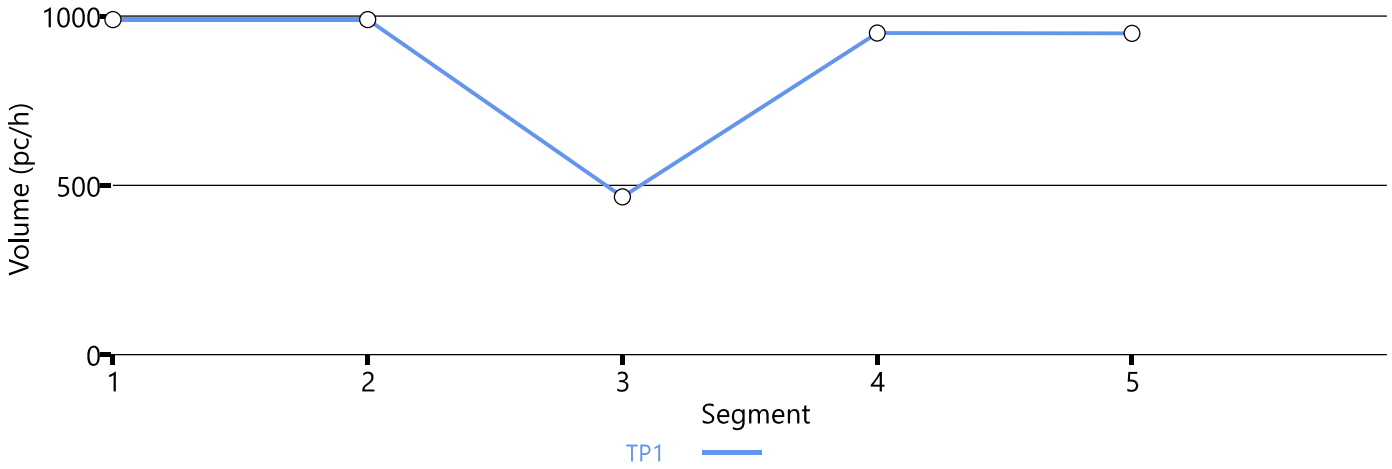
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.8
Average Travel Time, min	4.20	Density, pc/mi/ln	7.0

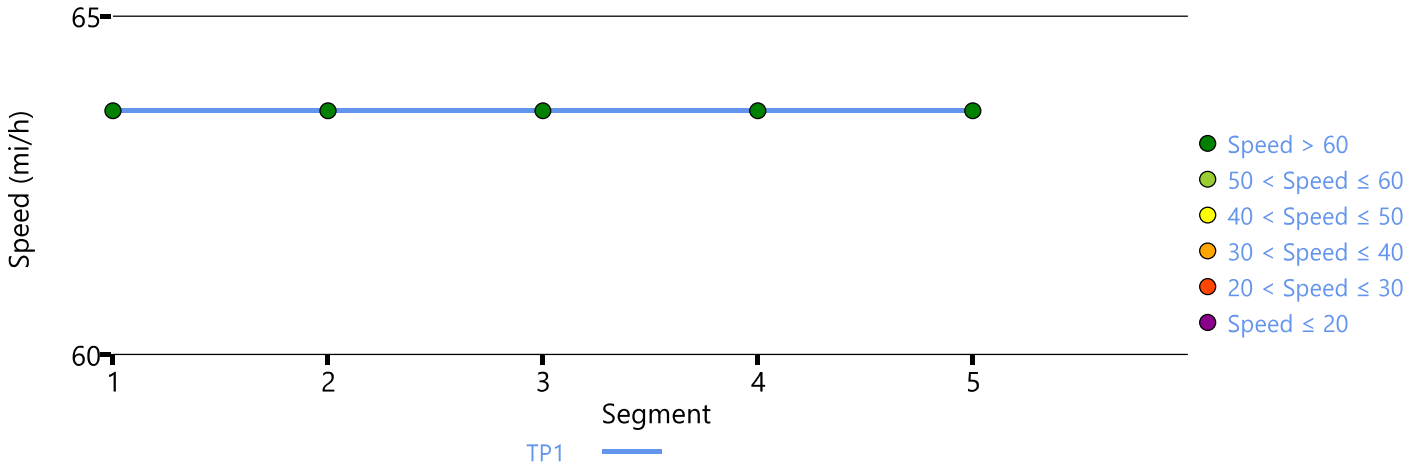
Messages

Comments

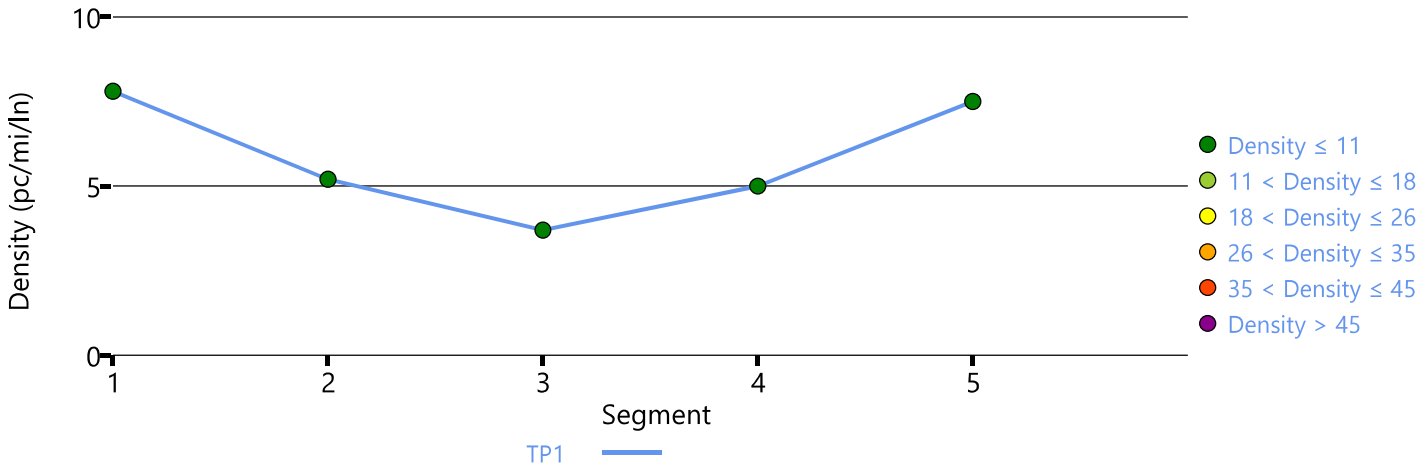
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1480	4387	0.34	63.6	11.6	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1480	516	6581	1784	0.22	0.29	63.6	63.6	7.8	7.8	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	964	4387	0.22	63.6	7.6	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1540	576	6581	1784	0.23	0.32	63.6	63.6	8.1	8.1	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1539	4387	0.35	63.6	12.1	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.8	10.6	4.20	A

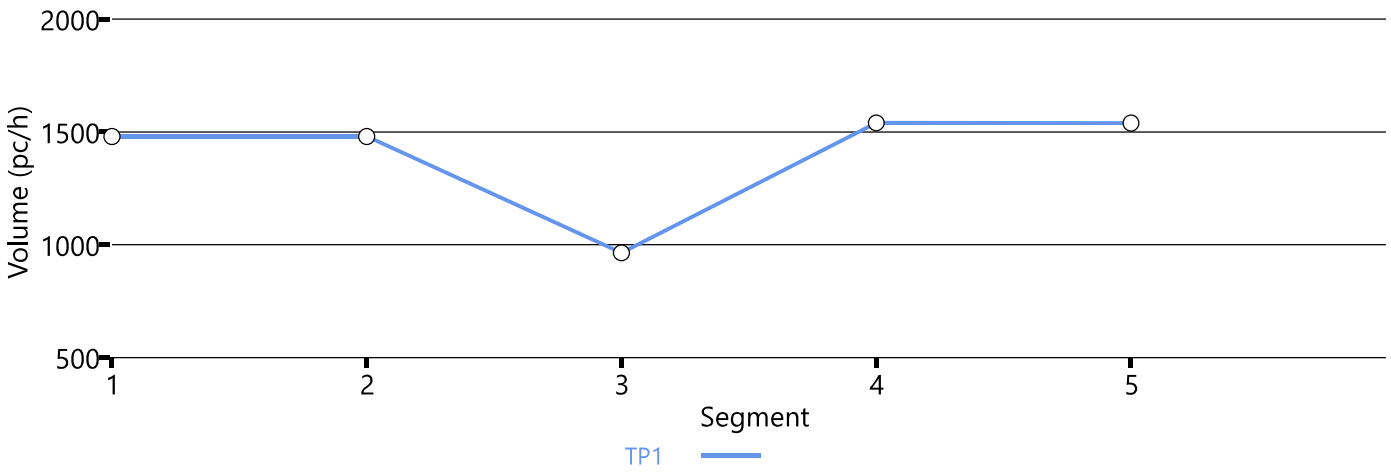
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.6
Average Travel Time, min	4.20	Density, pc/mi/ln	10.8

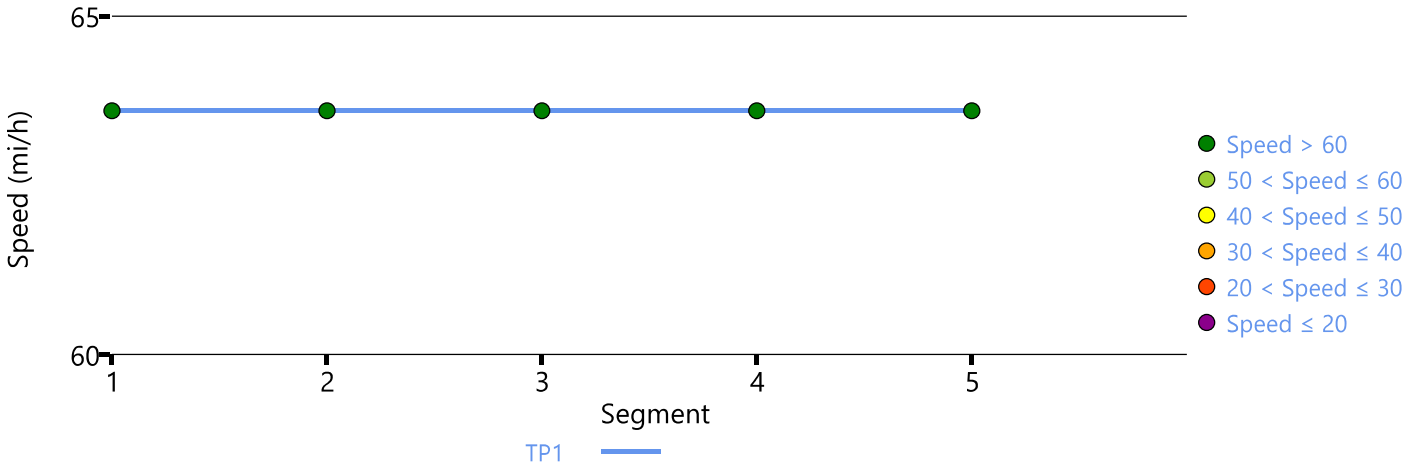
Messages

Comments

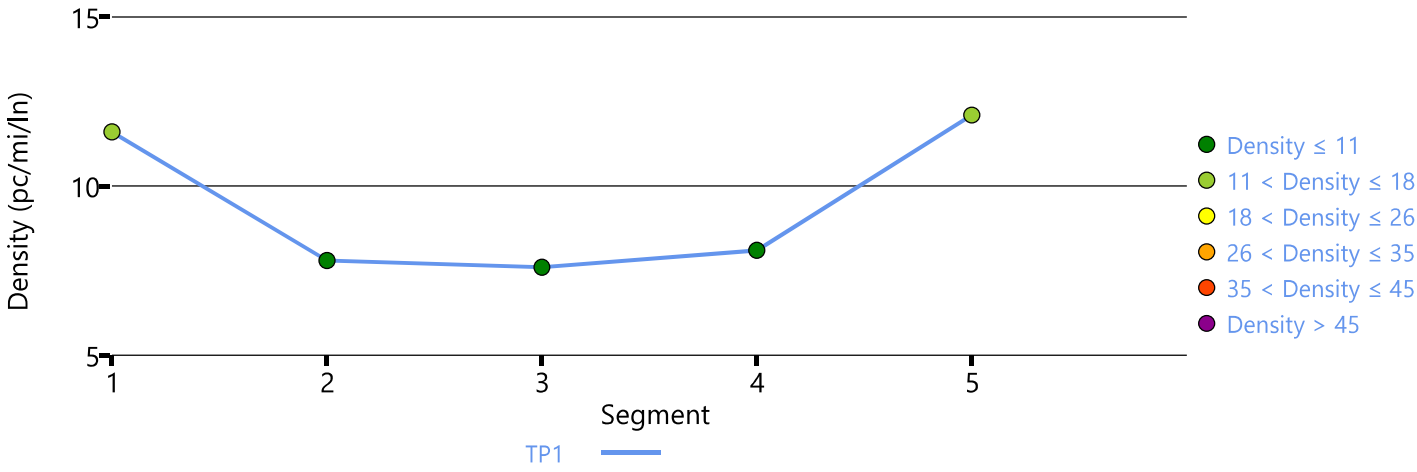
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1010	4387	0.23	63.6	7.9	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1010	532	6581	1784	0.15	0.30	63.6	63.6	5.3	5.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	478	4387	0.11	63.6	3.8	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	970	492	6581	1784	0.15	0.28	63.6	63.6	5.1	5.1	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	970	4387	0.22	63.6	7.6	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.1	6.9	4.20	A

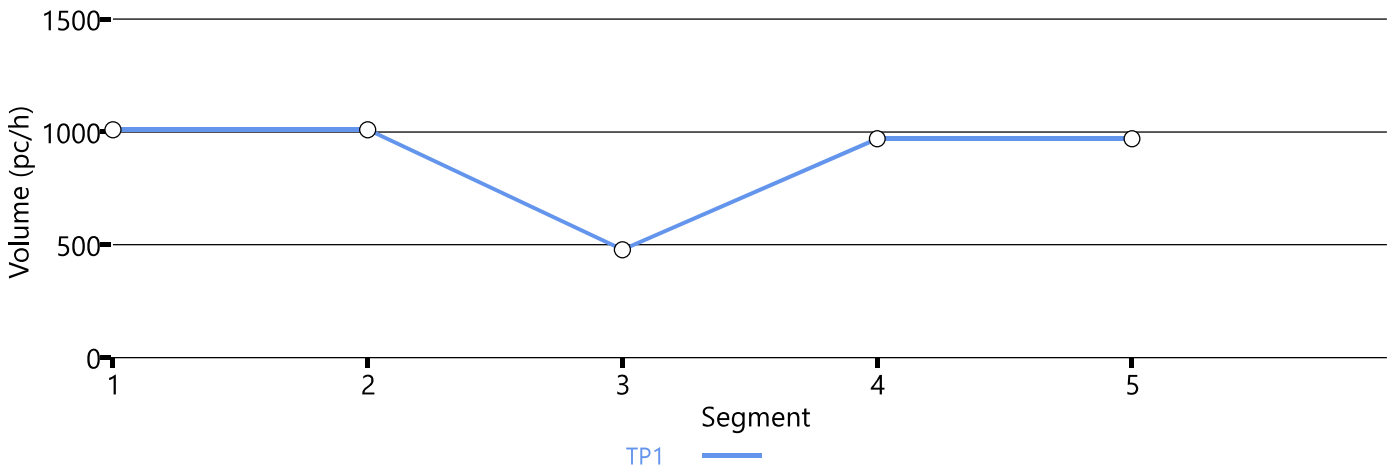
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.9
Average Travel Time, min	4.20	Density, pc/mi/ln	7.1

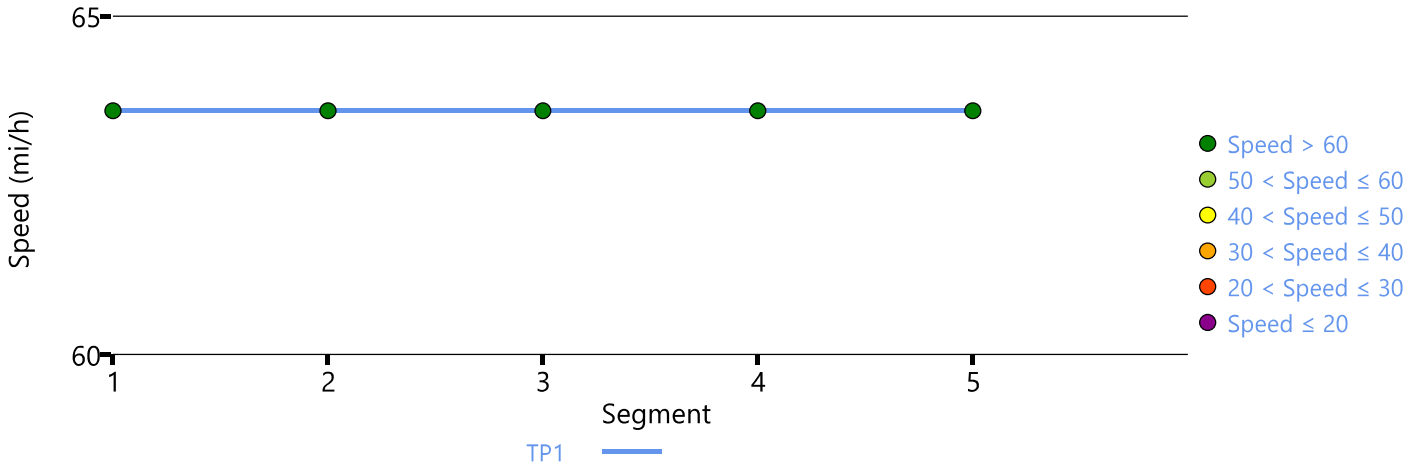
Messages

Comments

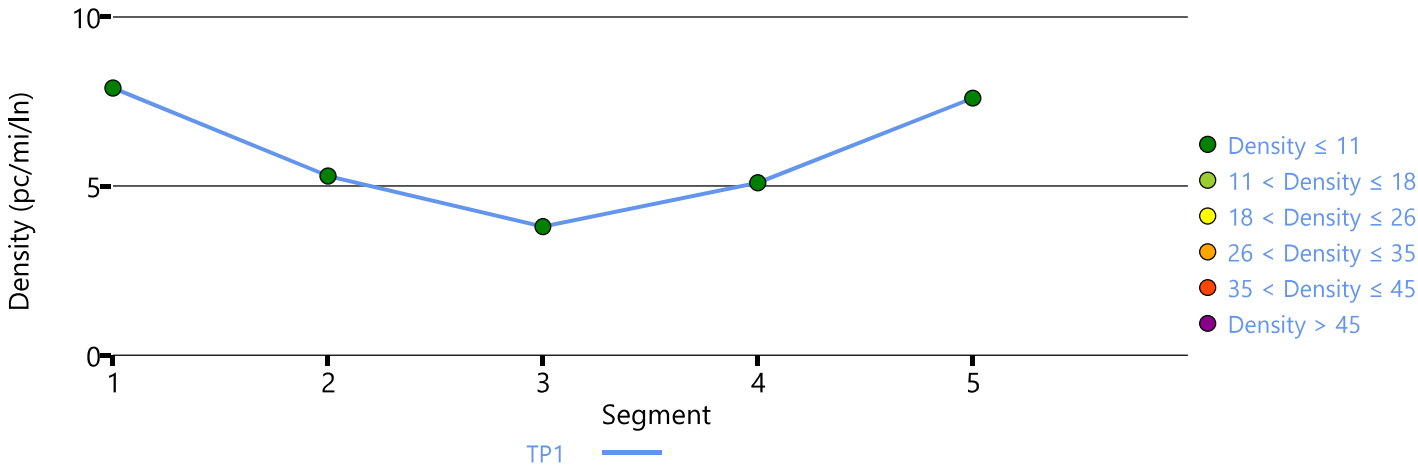
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1510	4387	0.34	63.6	11.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1510	525	6581	1784	0.23	0.29	63.6	63.6	7.9	7.9	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	985	4387	0.22	63.6	7.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1571	586	6581	1784	0.24	0.33	63.6	63.6	8.2	8.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1571	4387	0.36	63.6	12.4	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.1	10.9	4.20	B

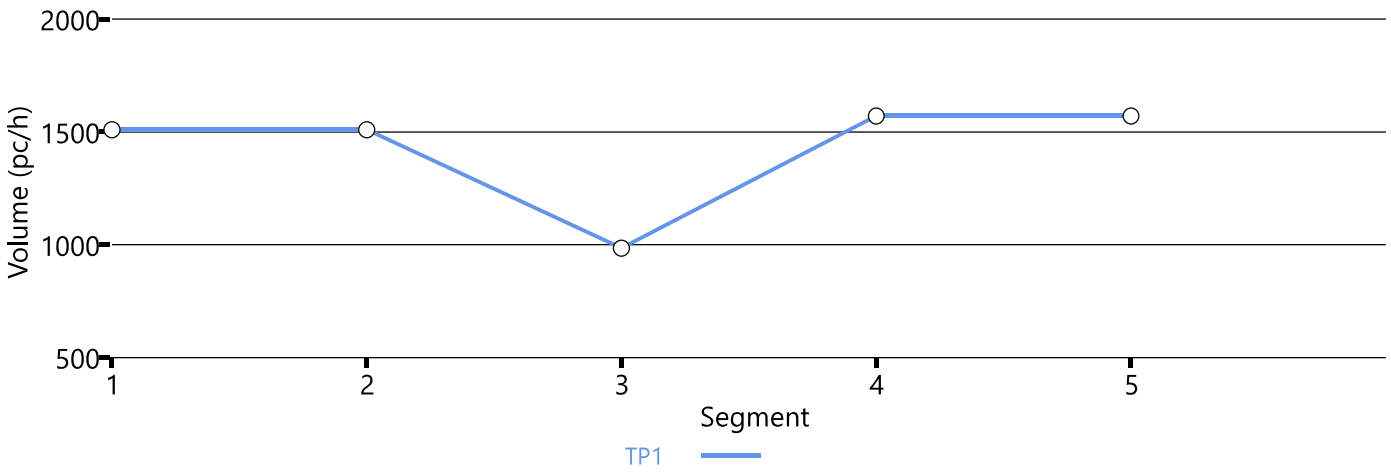
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.9
Average Travel Time, min	4.20	Density, pc/mi/ln	11.1

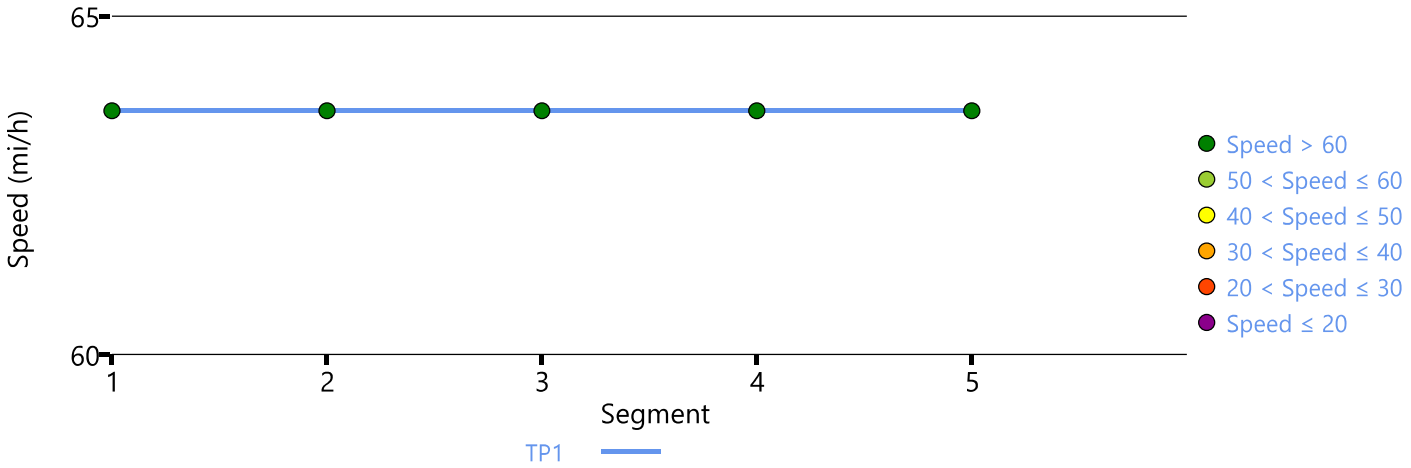
Messages

Comments

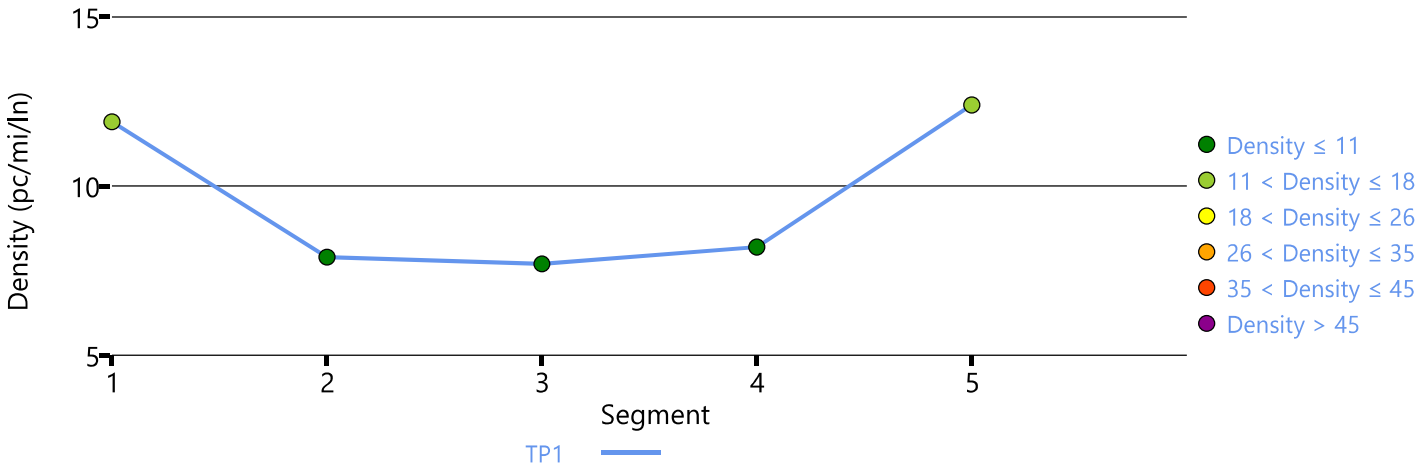
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1031	4387	0.24	63.6	8.1	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1031	541	6581	1784	0.16	0.30	63.6	63.6	5.4	5.4	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	490	4387	0.11	63.6	3.9	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	992	502	6581	1784	0.15	0.28	63.6	63.6	5.2	5.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	993	4387	0.23	63.6	7.8	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.2	7.1	4.20	A

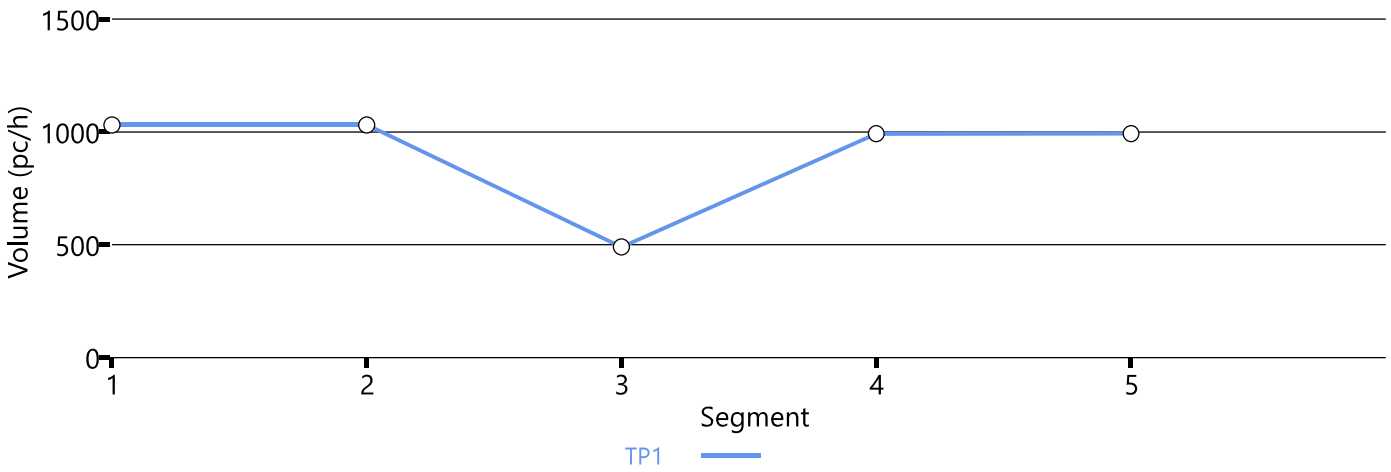
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	7.1
Average Travel Time, min	4.20	Density, pc/mi/ln	7.2

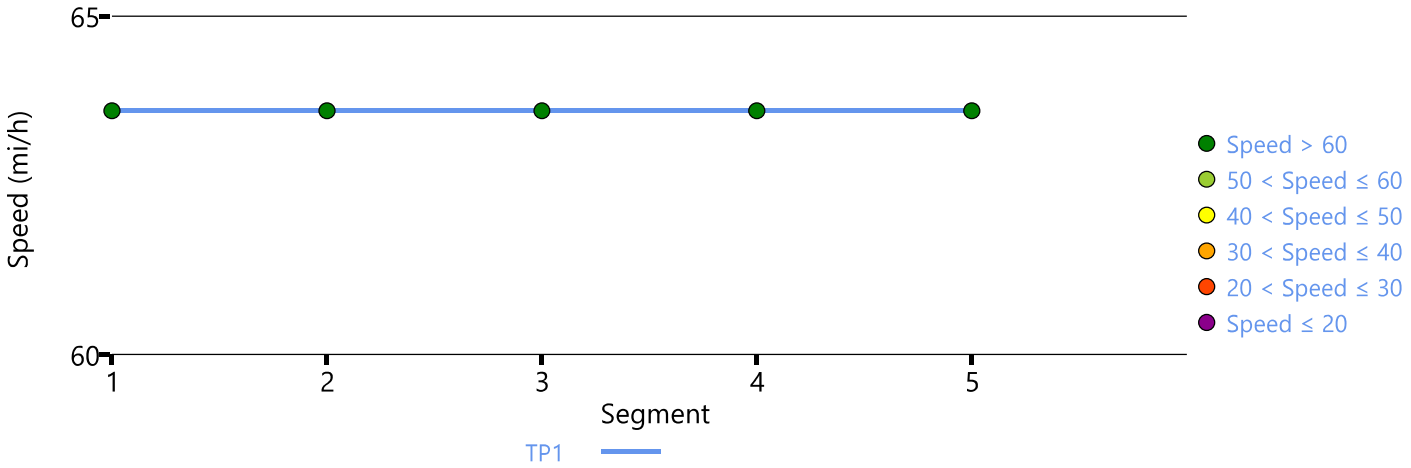
Messages

Comments

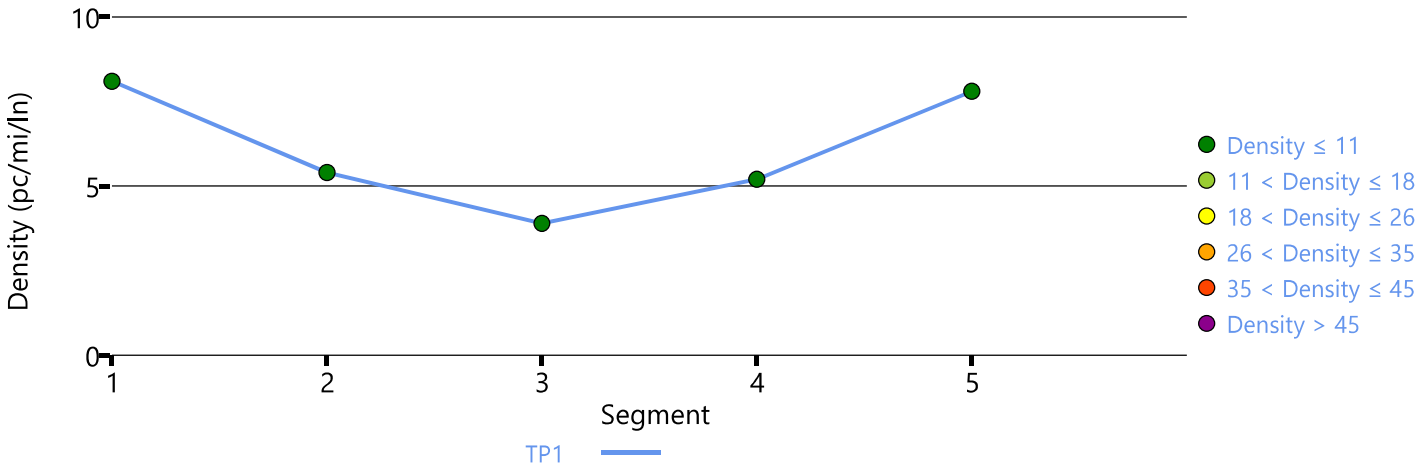
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1539	4387	0.35	63.6	12.1	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1539	535	6581	1784	0.23	0.30	63.6	63.6	8.1	8.1	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1005	4387	0.23	63.6	7.9	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1602	597	6581	1784	0.24	0.33	63.6	63.6	8.4	8.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1602	4387	0.37	63.6	12.6	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.3	11.0	4.20	B

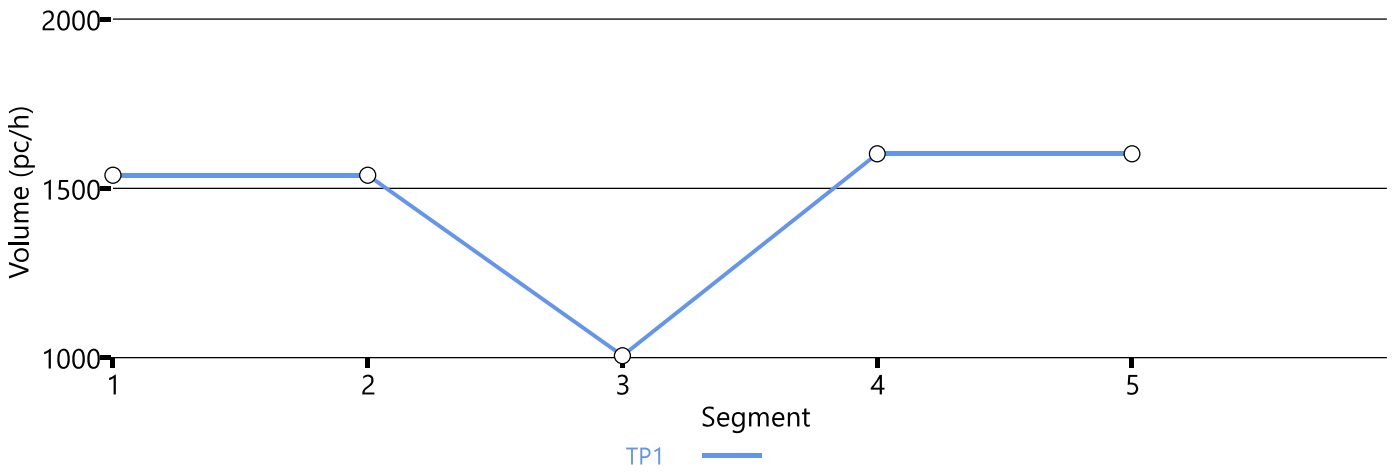
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.0
Average Travel Time, min	4.20	Density, pc/mi/ln	11.3

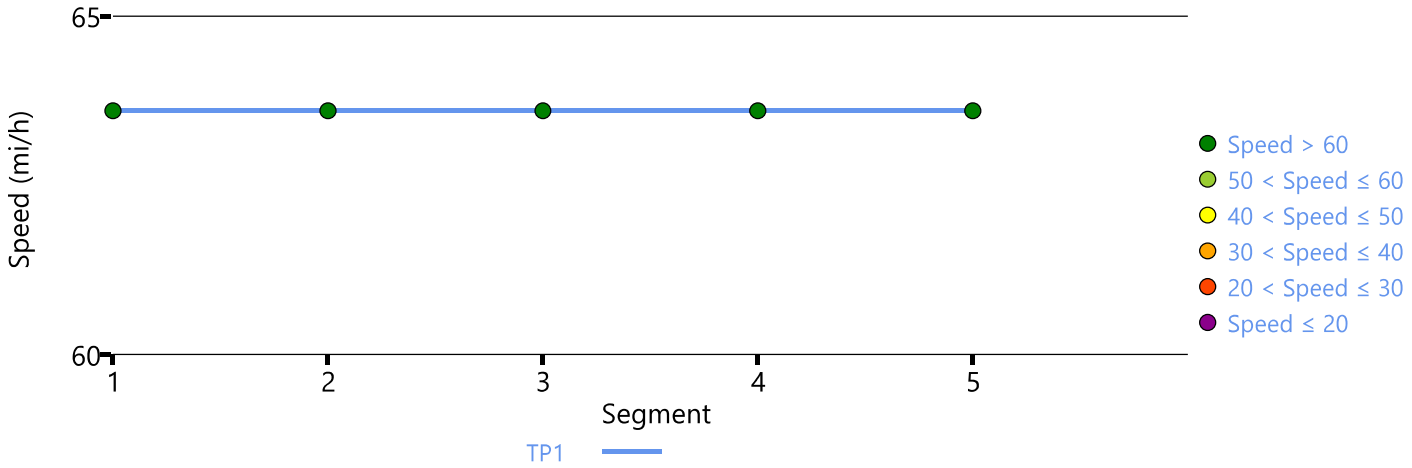
Messages

Comments

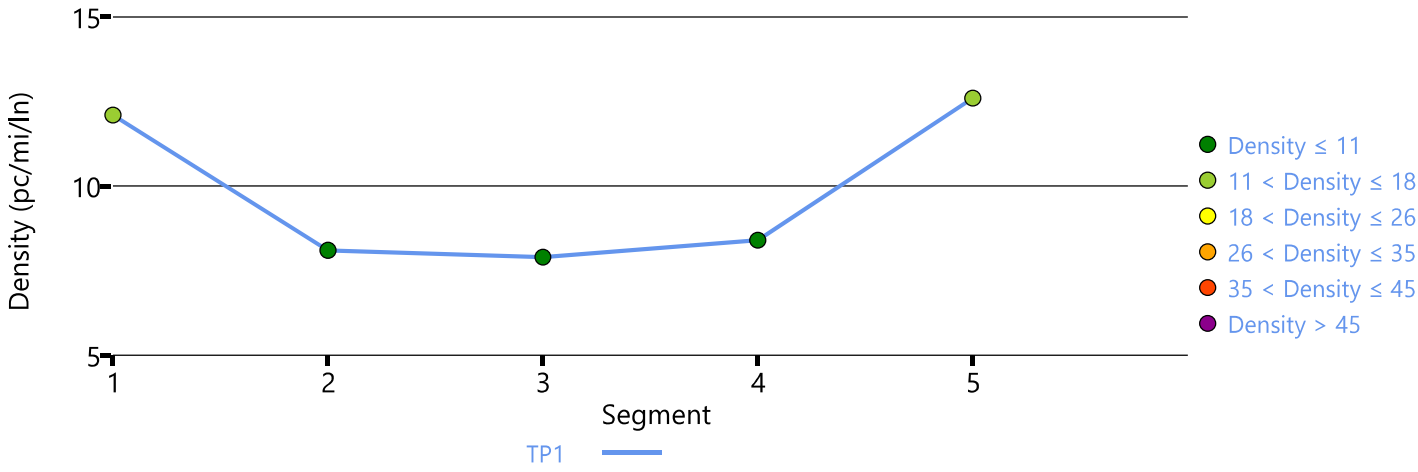
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1095	4387	0.25	63.6	8.6	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1095	568	6581	1784	0.17	0.32	63.6	63.6	5.7	5.7	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	527	4387	0.12	63.6	4.2	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1059	532	6581	1784	0.16	0.30	63.6	63.6	5.6	5.6	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1059	4387	0.24	63.6	8.3	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.7	7.5	4.20	A

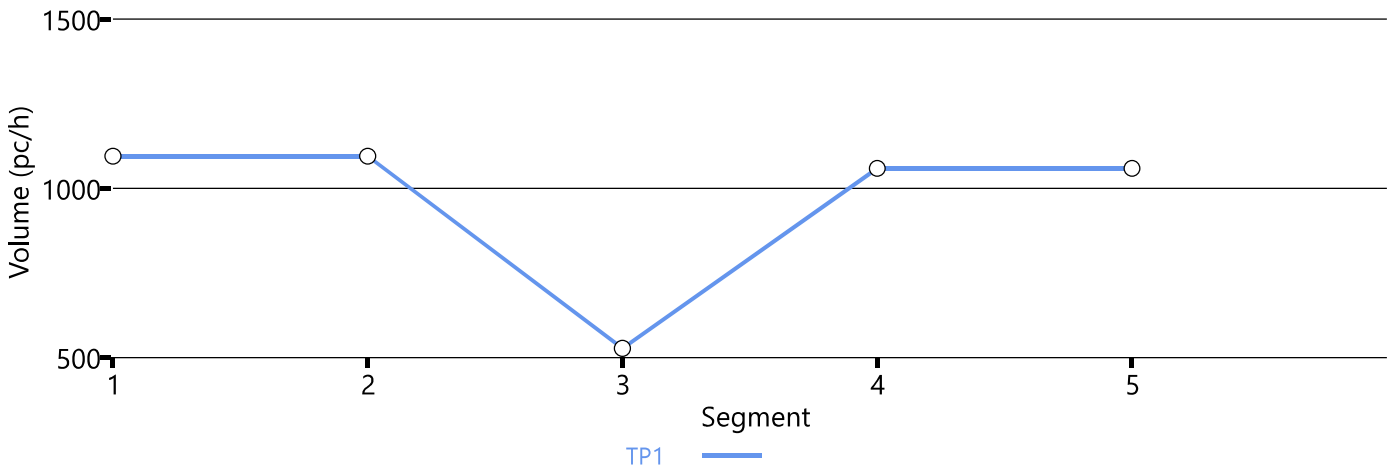
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	7.5
Average Travel Time, min	4.20	Density, pc/mi/ln	7.7

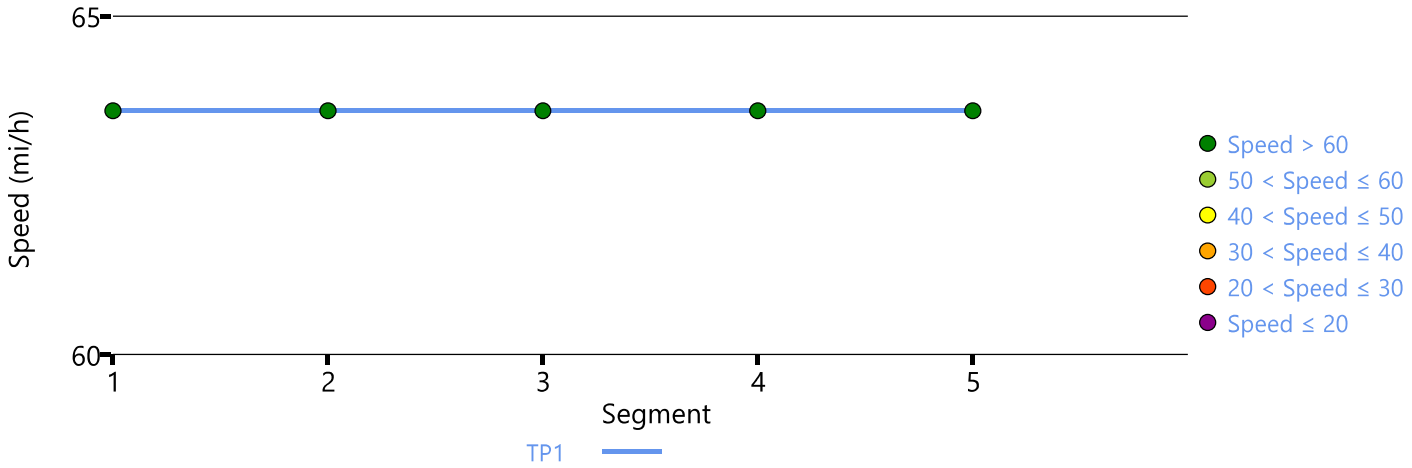
Messages

Comments

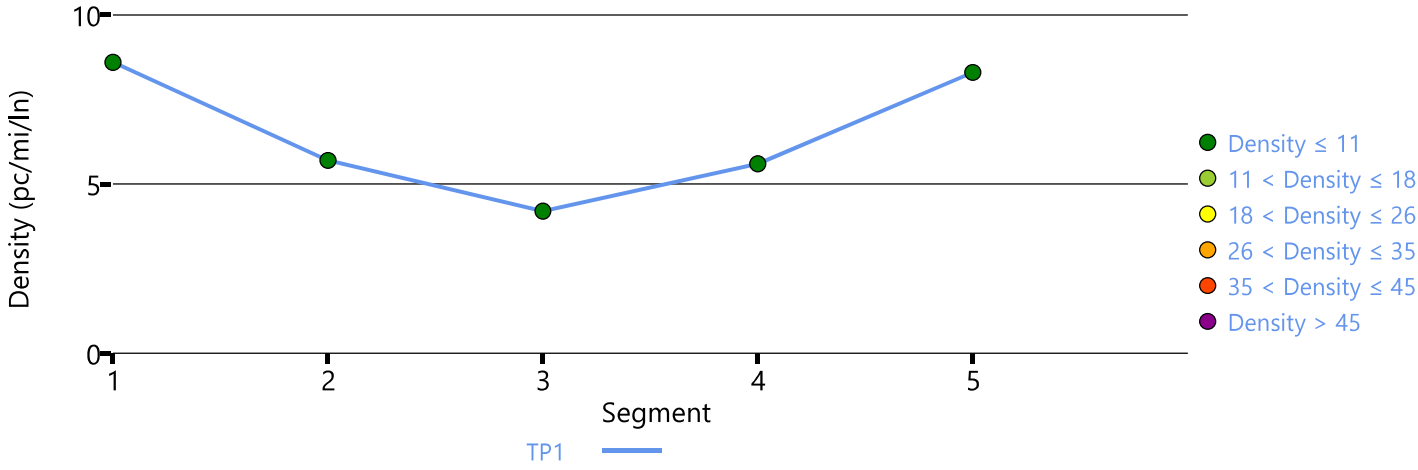
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1635	4387	0.37	63.6	12.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1635	568	6581	1784	0.25	0.32	63.6	63.6	8.6	8.6	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1067	4387	0.24	63.6	8.4	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1695	628	6581	1784	0.26	0.35	63.6	63.6	8.9	8.9	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1695	4387	0.39	63.6	13.3	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	12.0	11.7	4.20	B

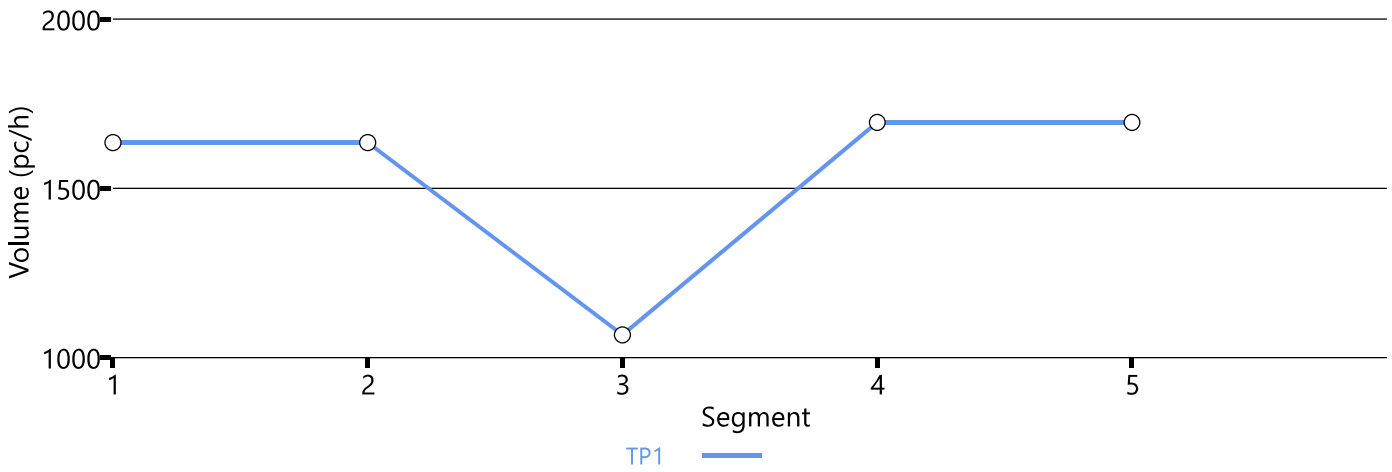
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.7
Average Travel Time, min	4.20	Density, pc/mi/ln	12.0

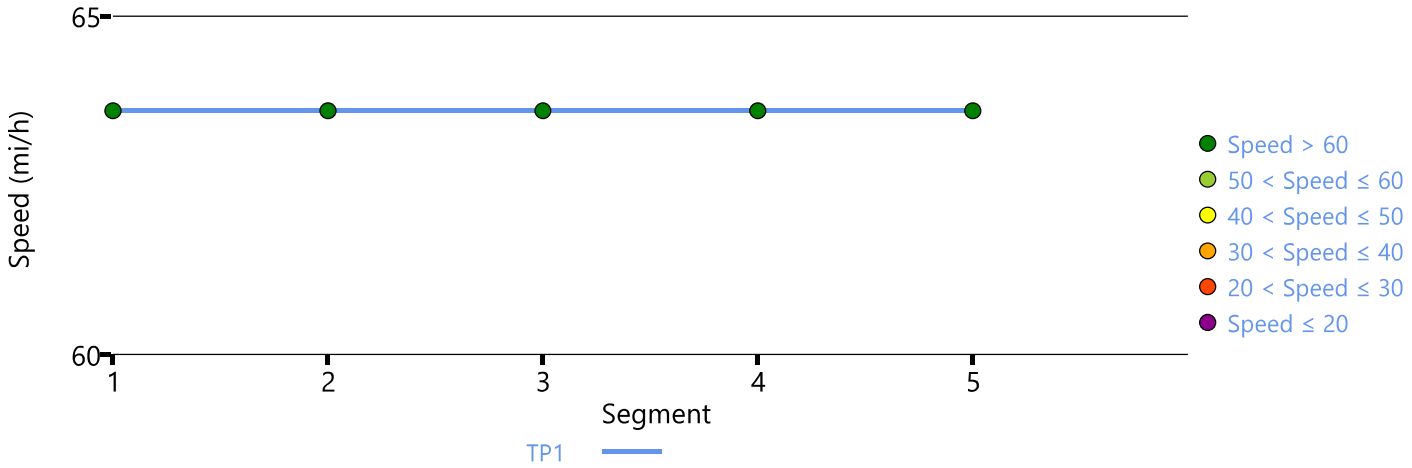
Messages

Comments

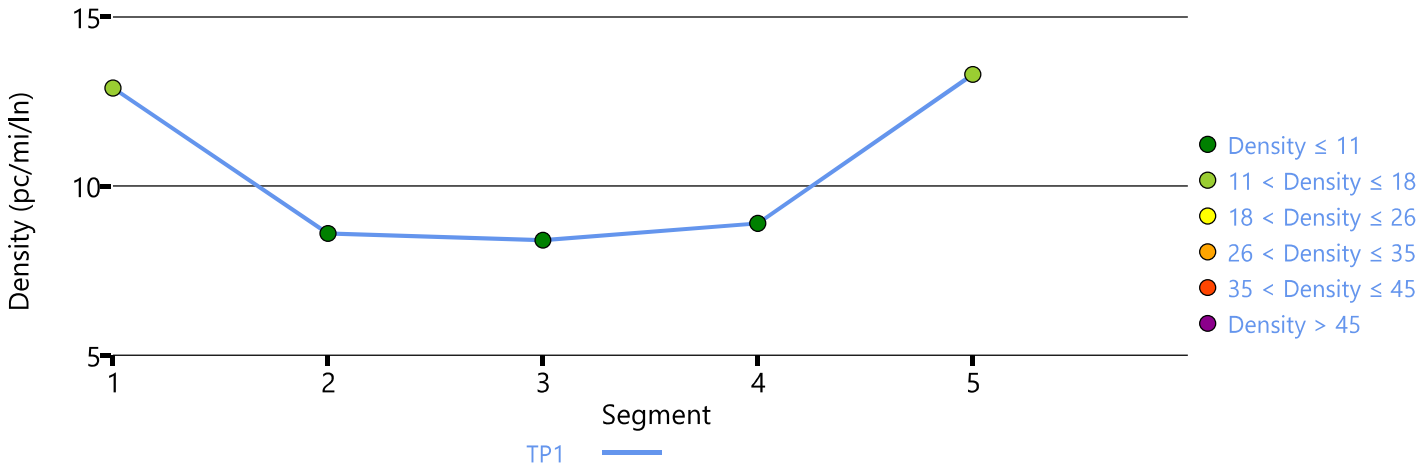
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	990	4387	0.23	63.6	7.8	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	990	525	6581	1784	0.15	0.29	63.6	63.6	5.2	5.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	466	4387	0.11	63.6	3.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	950	484	6581	1784	0.14	0.27	63.6	63.6	5.0	5.0	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	949	4387	0.22	63.6	7.5	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.0	6.8	4.20	A

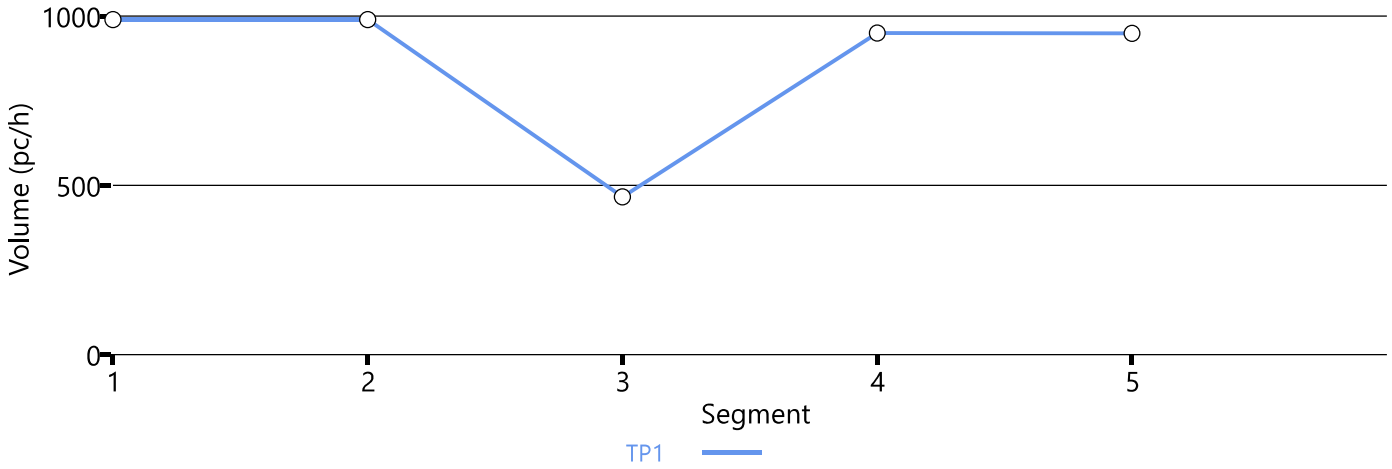
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.8
Average Travel Time, min	4.20	Density, pc/mi/ln	7.0

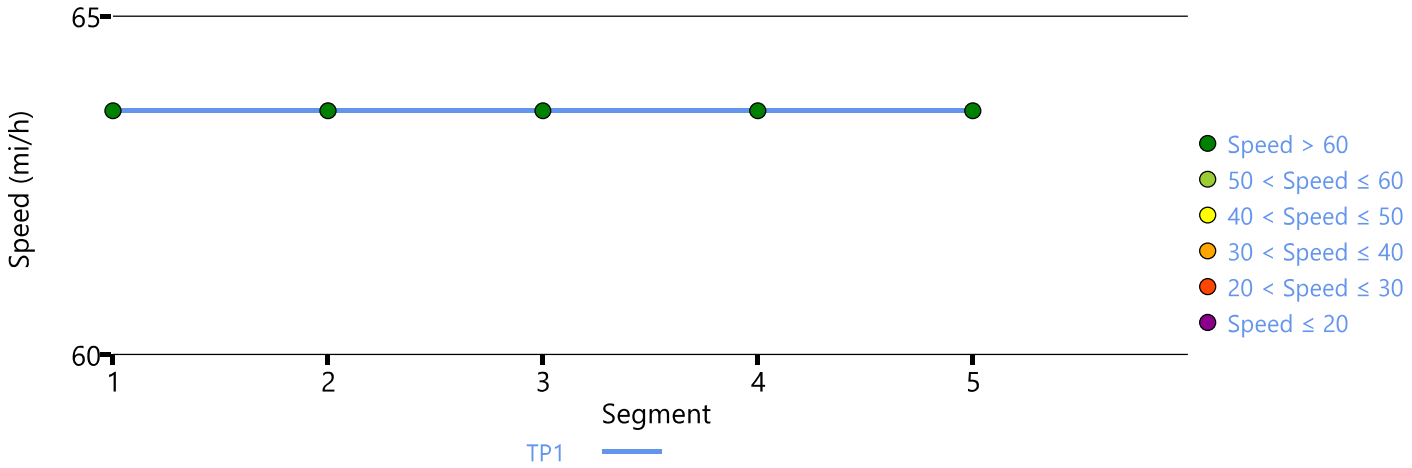
Messages

Comments

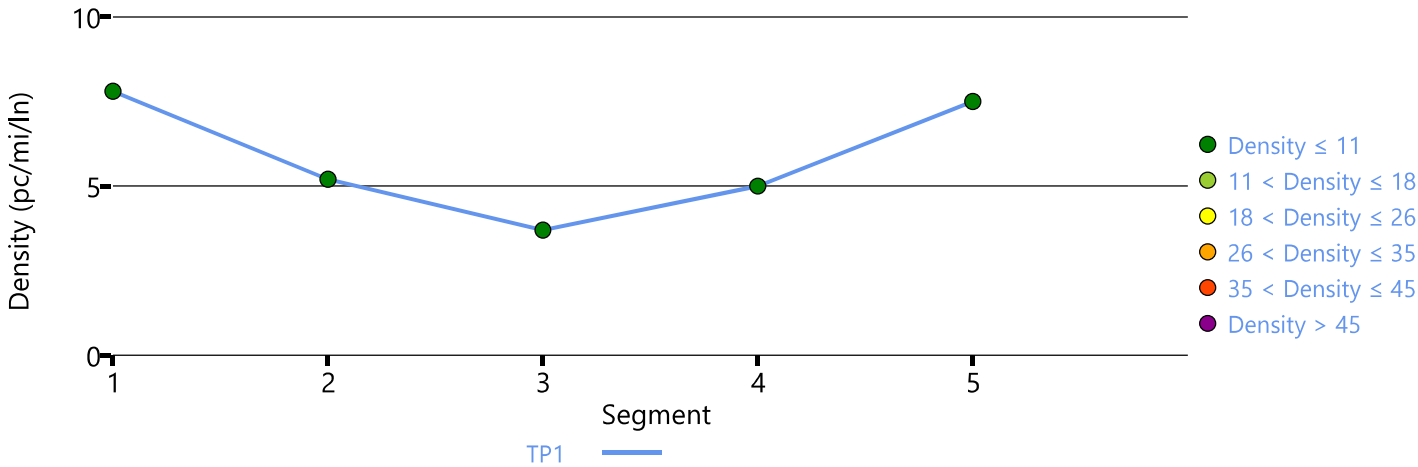
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Background 2028 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1480	4387	0.34	63.6	11.6	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1480	516	6581	1784	0.22	0.29	63.6	63.6	7.8	7.8	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	964	4387	0.22	63.6	7.6	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1540	576	6581	1784	0.23	0.32	63.6	63.6	8.1	8.1	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1539	4387	0.35	63.6	12.1	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.8	10.6	4.20	A

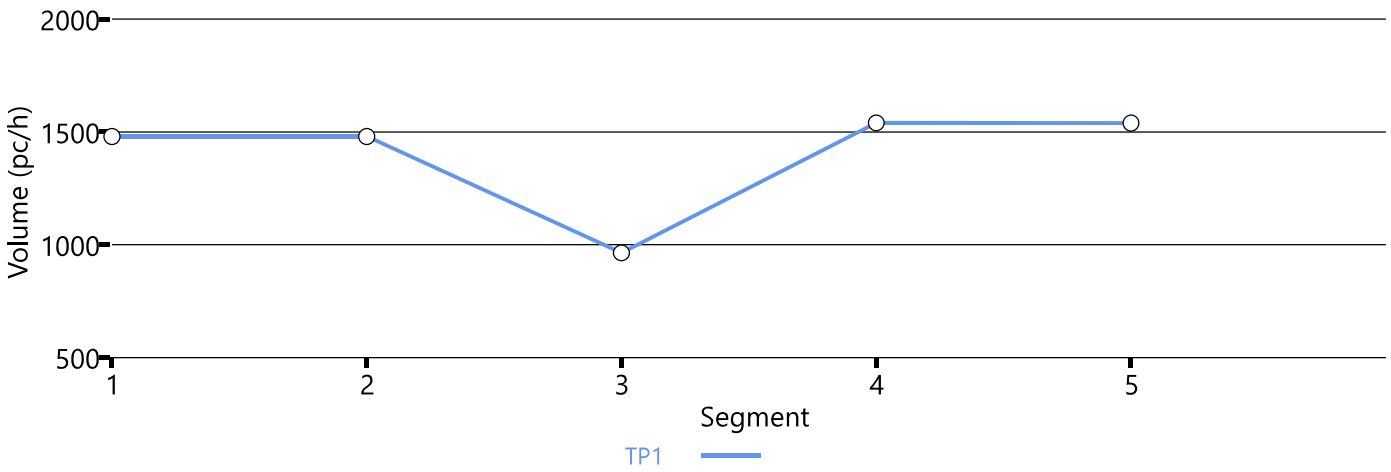
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.6
Average Travel Time, min	4.20	Density, pc/mi/ln	10.8

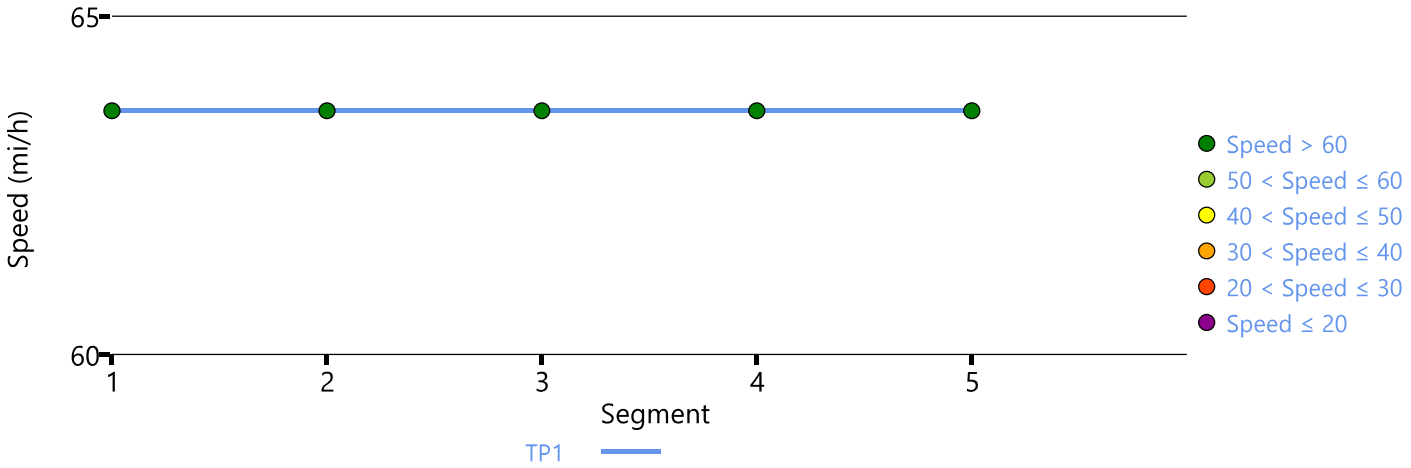
Messages

Comments

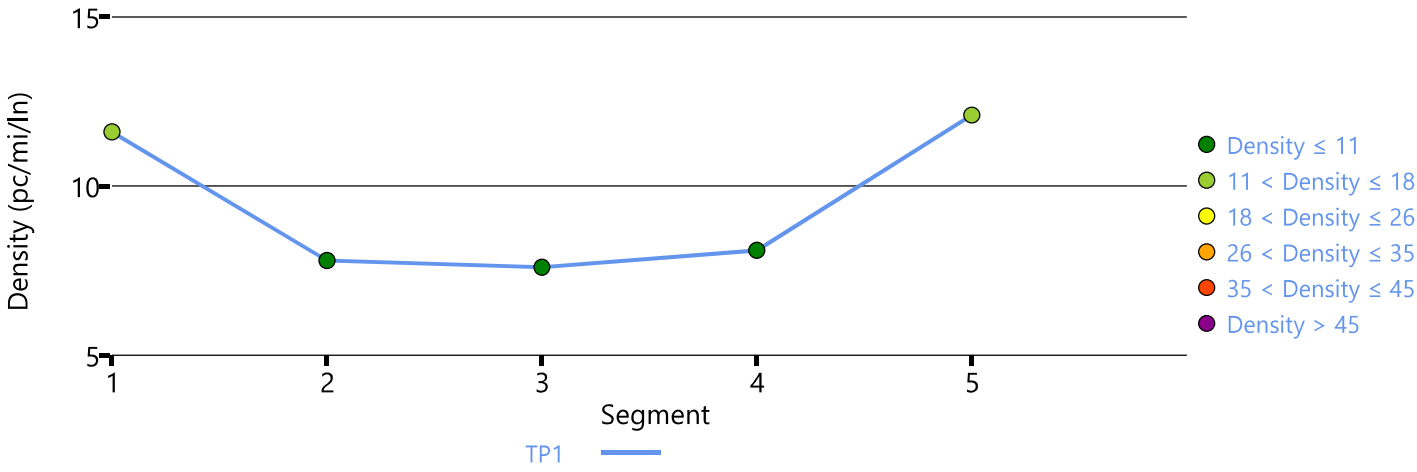
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1010	4387	0.23	63.6	7.9	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1010	532	6581	1784	0.15	0.30	63.6	63.6	5.3	5.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	478	4387	0.11	63.6	3.8	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	970	492	6581	1784	0.15	0.28	63.6	63.6	5.1	5.1	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	970	4387	0.22	63.6	7.6	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.1	6.9	4.20	A

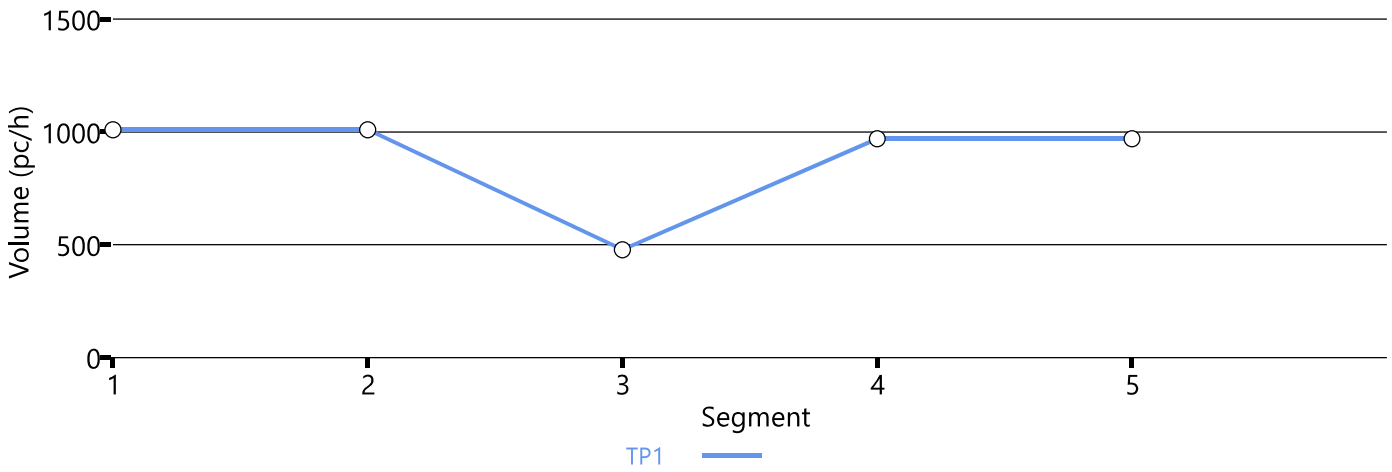
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.9
Average Travel Time, min	4.20	Density, pc/mi/ln	7.1

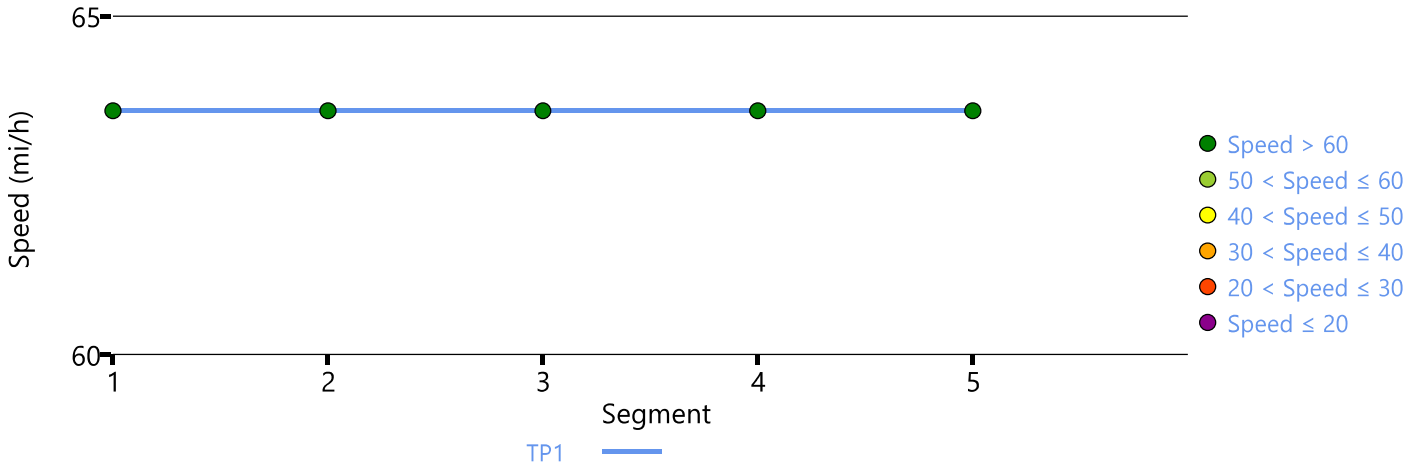
Messages

Comments

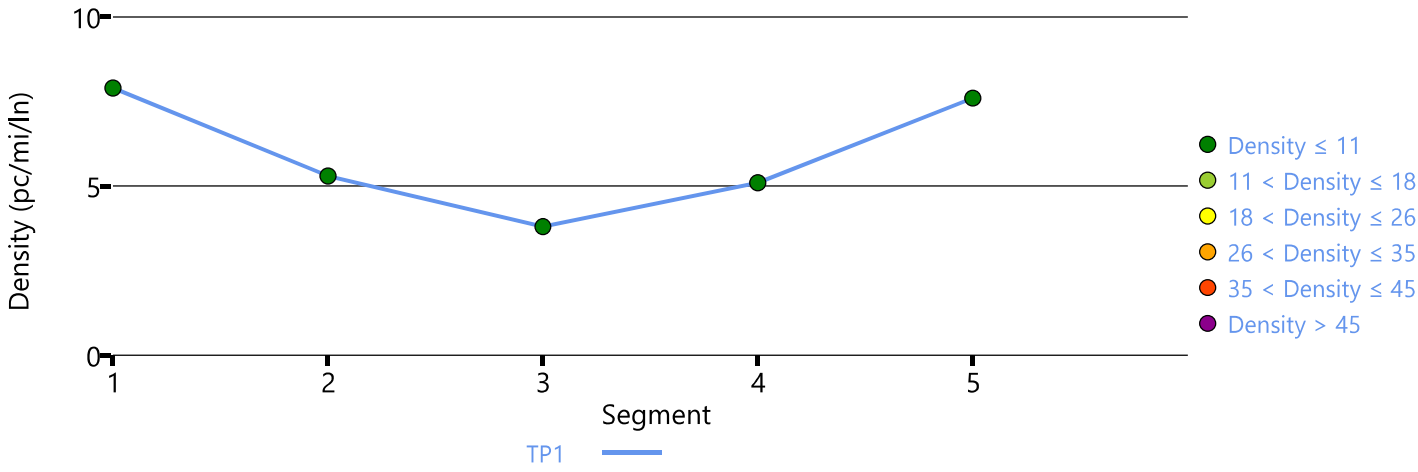
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Background 2030 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1510	4387	0.34	63.6	11.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1510	525	6581	1784	0.23	0.29	63.6	63.6	7.9	7.9	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	985	4387	0.22	63.6	7.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1571	586	6581	1784	0.24	0.33	63.6	63.6	8.2	8.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1571	4387	0.36	63.6	12.4	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.1	10.9	4.20	B

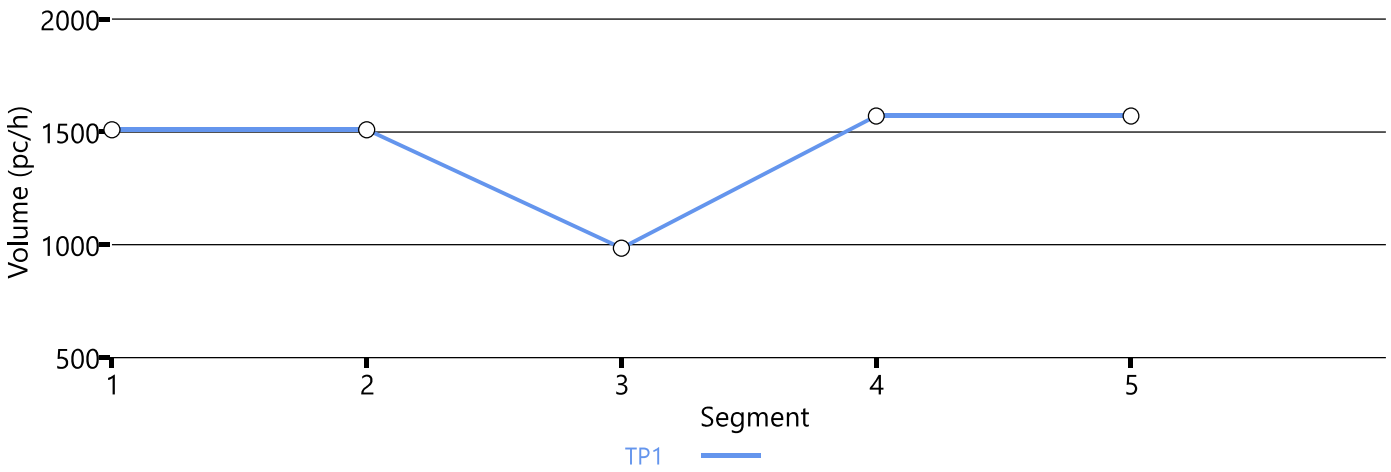
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.9
Average Travel Time, min	4.20	Density, pc/mi/ln	11.1

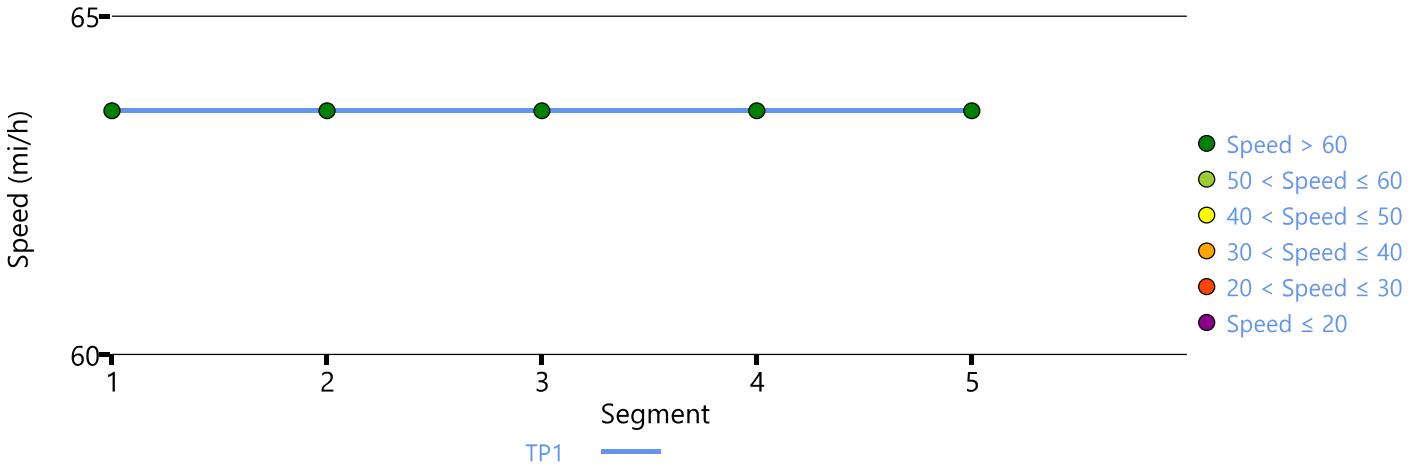
Messages

Comments

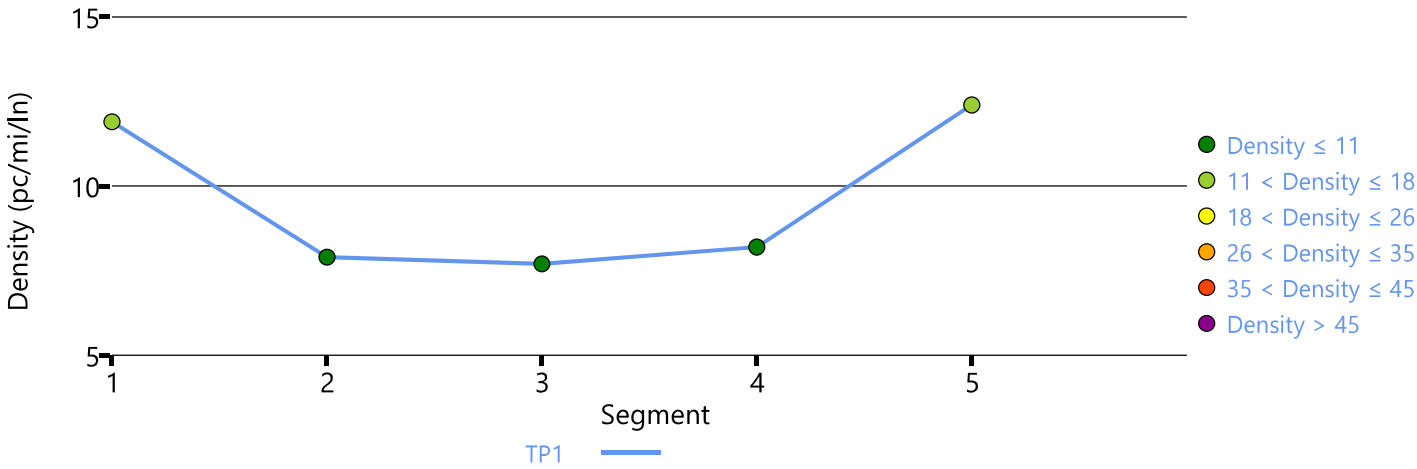
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1031	4387	0.24	63.6	8.1	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1031	541	6581	1784	0.16	0.30	63.6	63.6	5.4	5.4	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	490	4387	0.11	63.6	3.9	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	992	502	6581	1784	0.15	0.28	63.6	63.6	5.2	5.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	993	4387	0.23	63.6	7.8	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.2	7.1	4.20	A

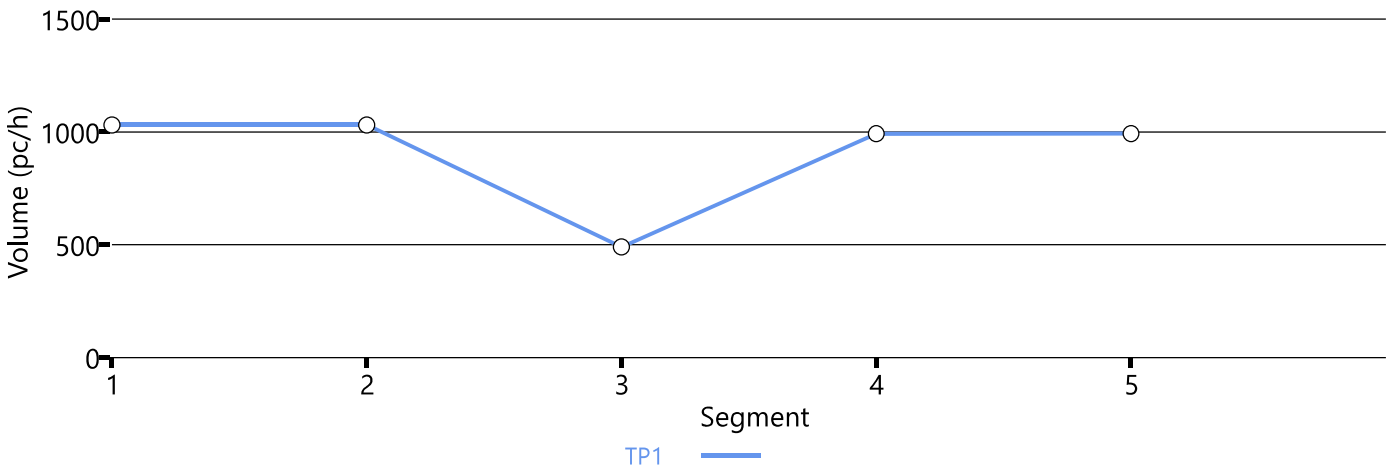
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	7.1
Average Travel Time, min	4.20	Density, pc/mi/ln	7.2

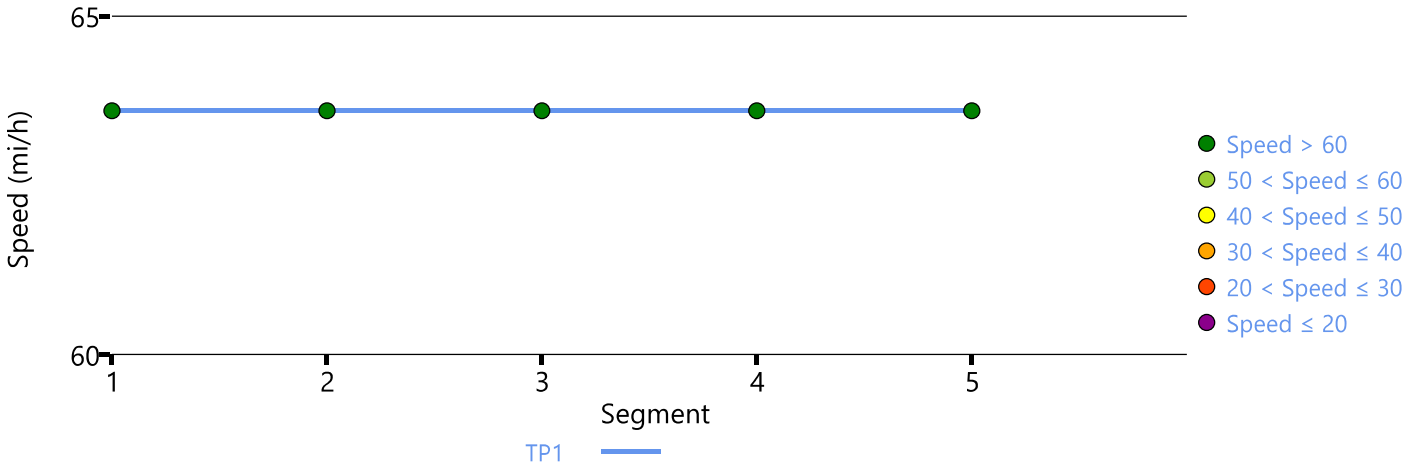
Messages

Comments

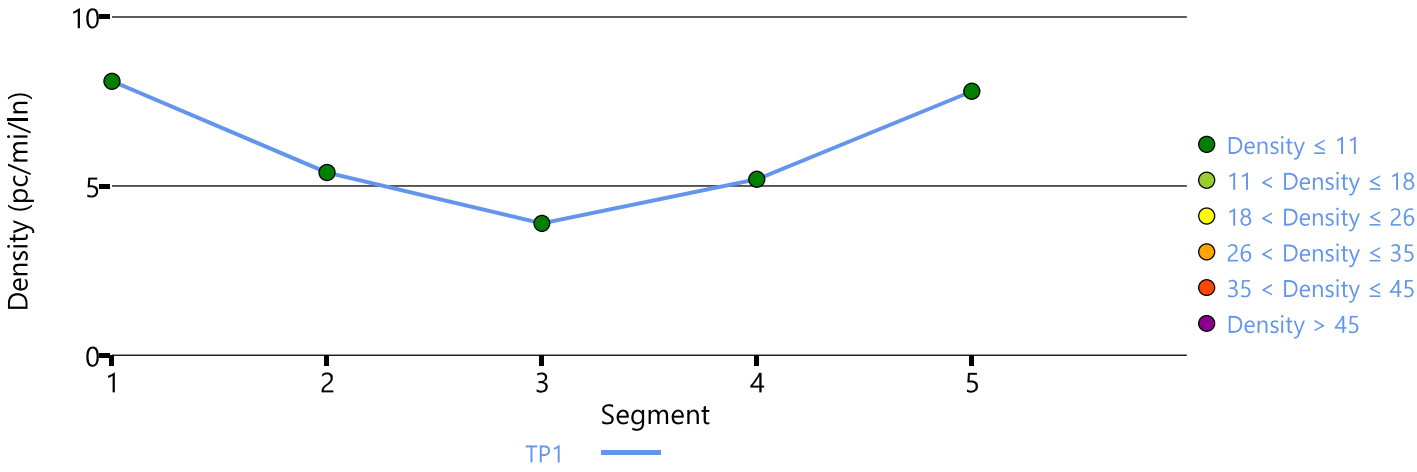
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Background 2032 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1539	4387	0.35	63.6	12.1	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1539	535	6581	1784	0.23	0.30	63.6	63.6	8.1	8.1	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1005	4387	0.23	63.6	7.9	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1602	597	6581	1784	0.24	0.33	63.6	63.6	8.4	8.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1602	4387	0.37	63.6	12.6	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.3	11.0	4.20	B

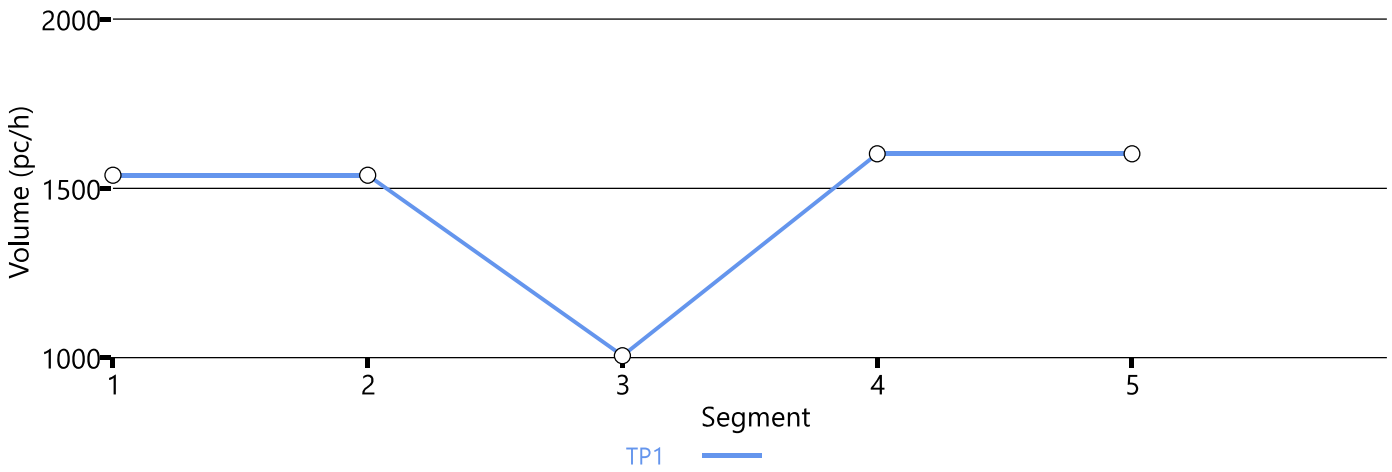
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.0
Average Travel Time, min	4.20	Density, pc/mi/ln	11.3

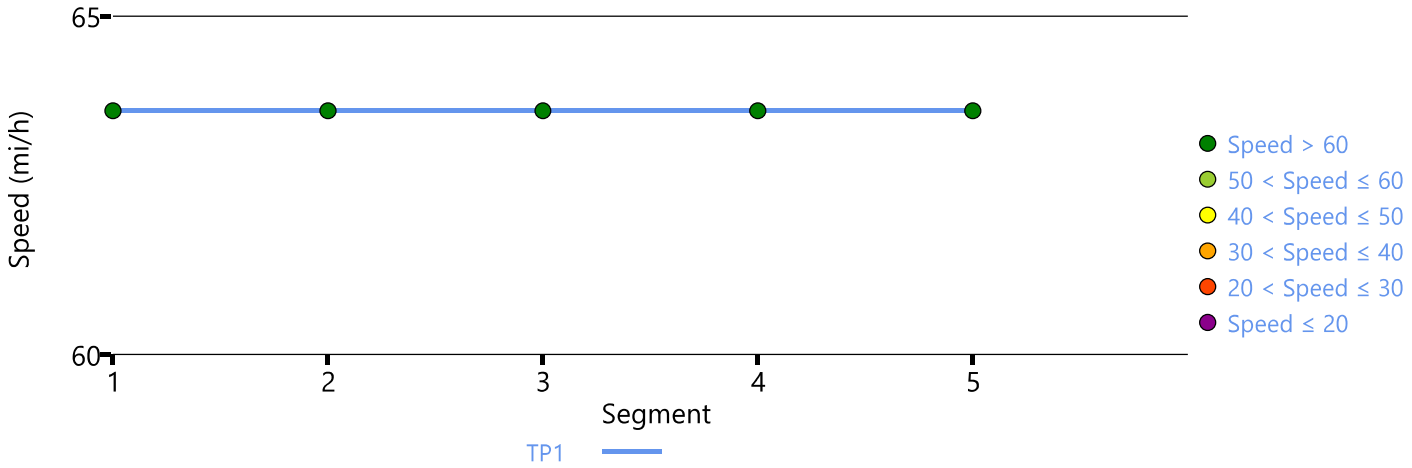
Messages

Comments

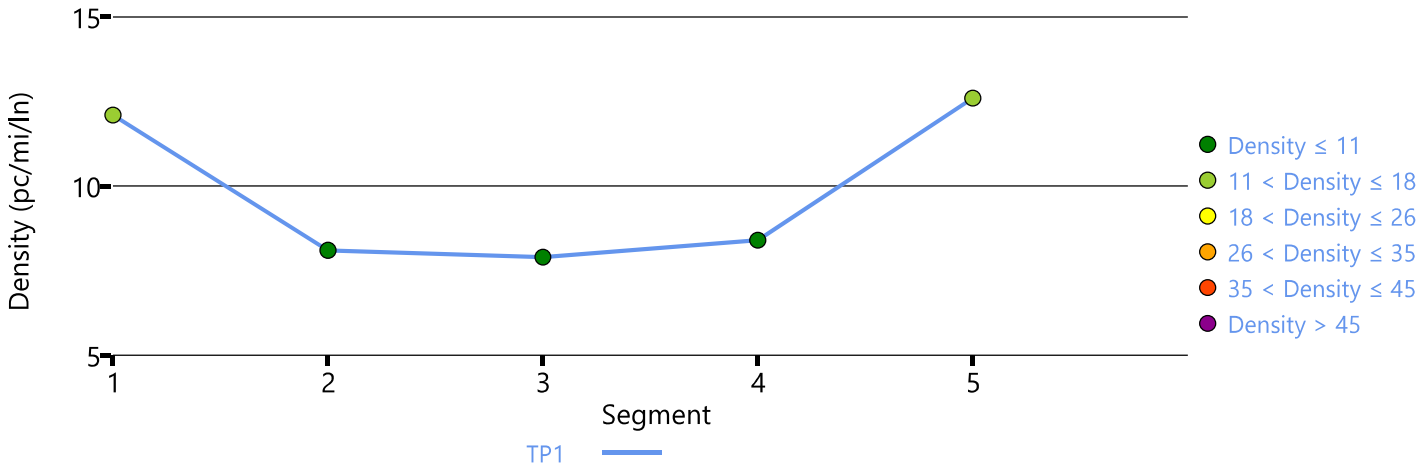
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1095	4387	0.25	63.6	8.6	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1095	568	6581	1784	0.17	0.32	63.6	63.6	5.7	5.7	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	527	4387	0.12	63.6	4.2	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1059	532	6581	1784	0.16	0.30	63.6	63.6	5.6	5.6	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1059	4387	0.24	63.6	8.3	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.7	7.5	4.20	A

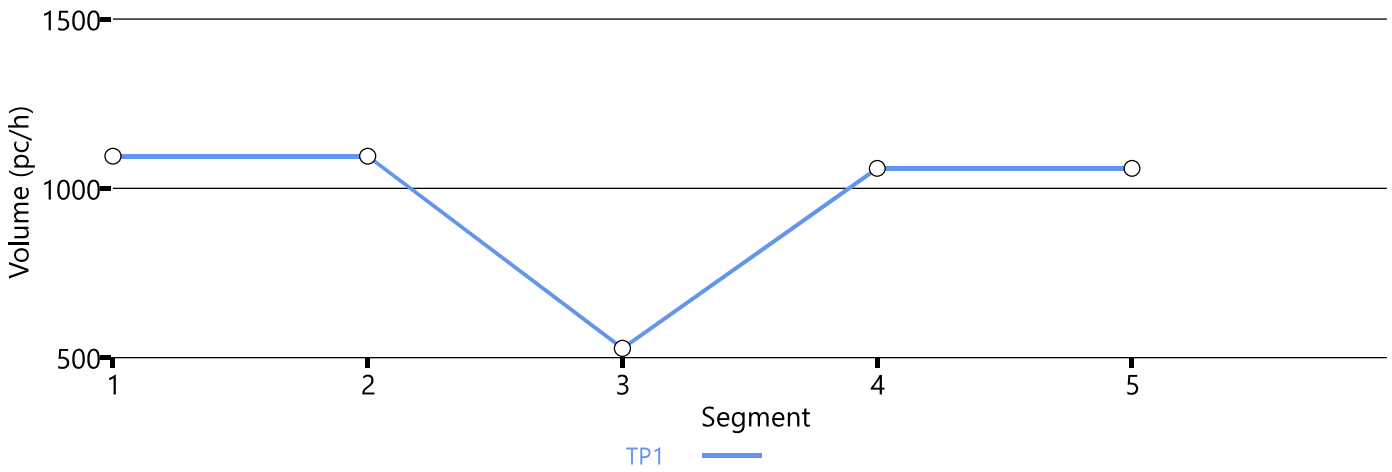
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	7.5
Average Travel Time, min	4.20	Density, pc/mi/ln	7.7

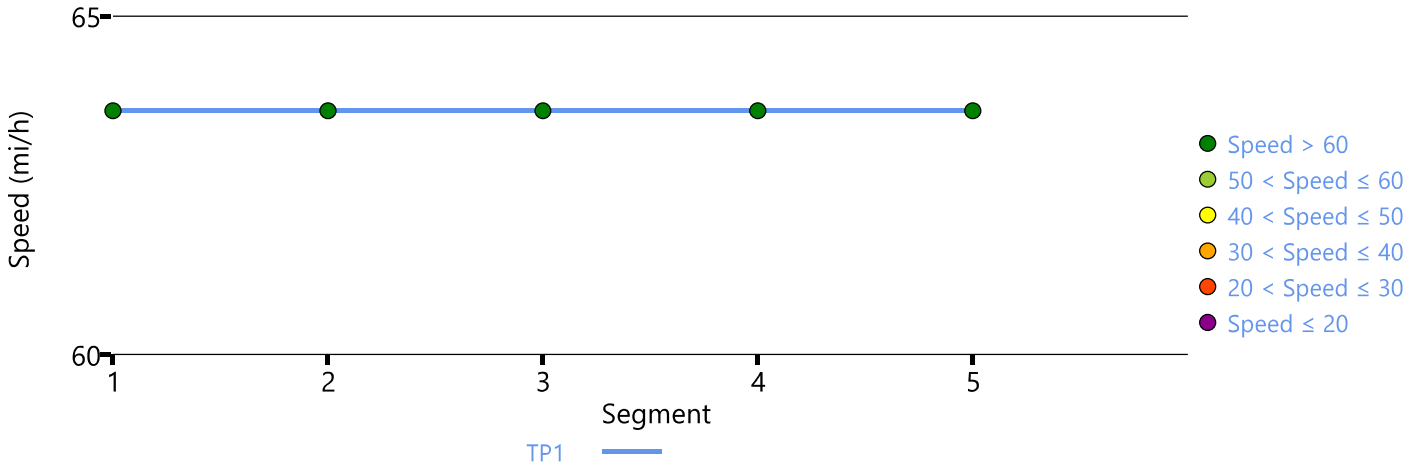
Messages

Comments

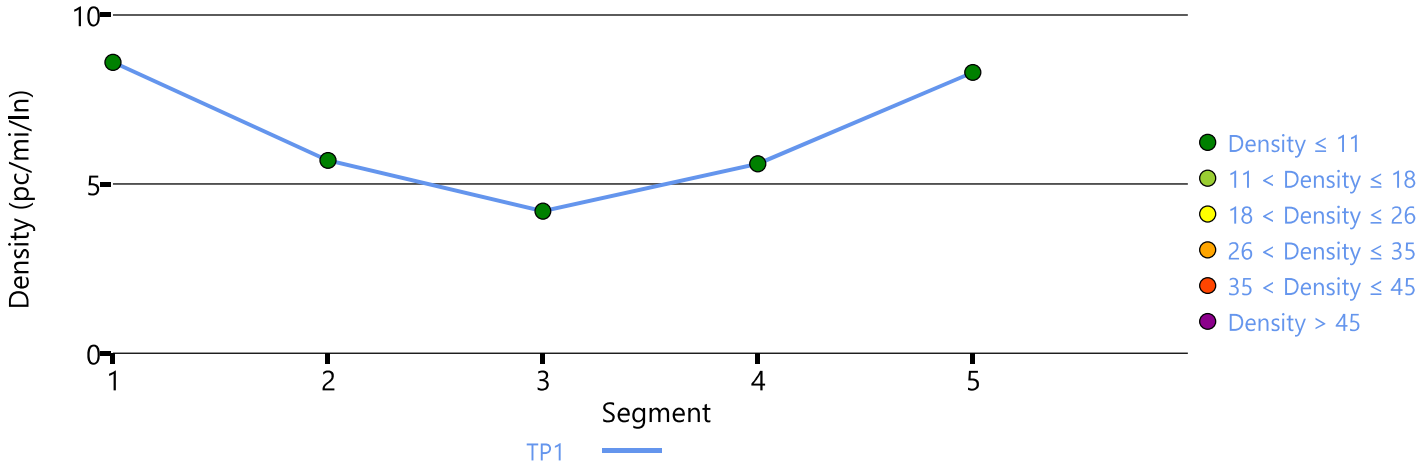
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Background 2038 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1635	4387	0.37	63.6	12.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1635	568	6581	1784	0.25	0.32	63.6	63.6	8.6	8.6	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1067	4387	0.24	63.6	8.4	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1695	628	6581	1784	0.26	0.35	63.6	63.6	8.9	8.9	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1695	4387	0.39	63.6	13.3	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	12.0	11.7	4.20	B

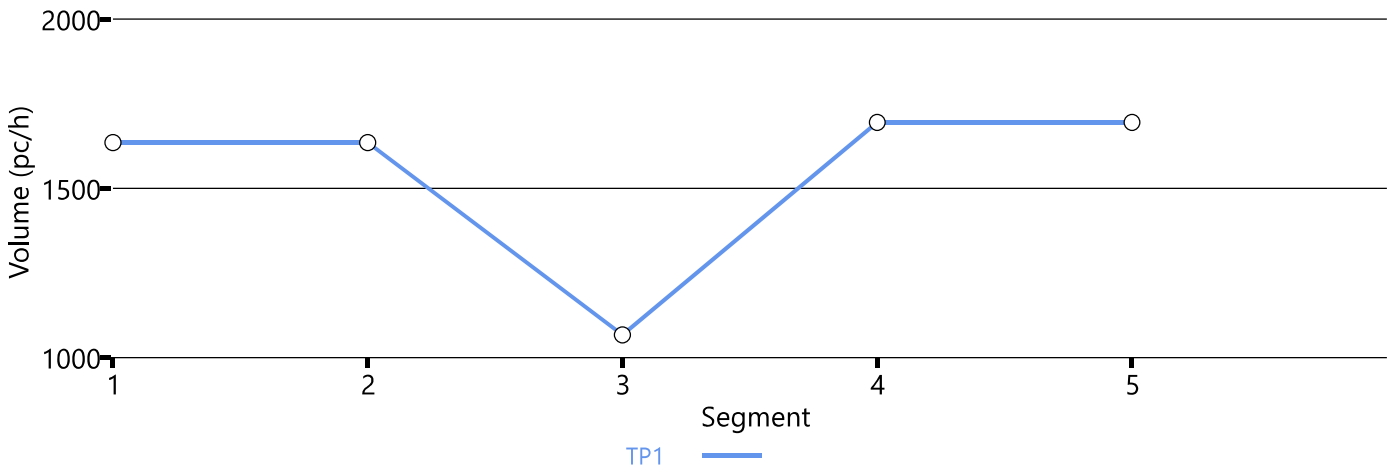
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.7
Average Travel Time, min	4.20	Density, pc/mi/ln	12.0

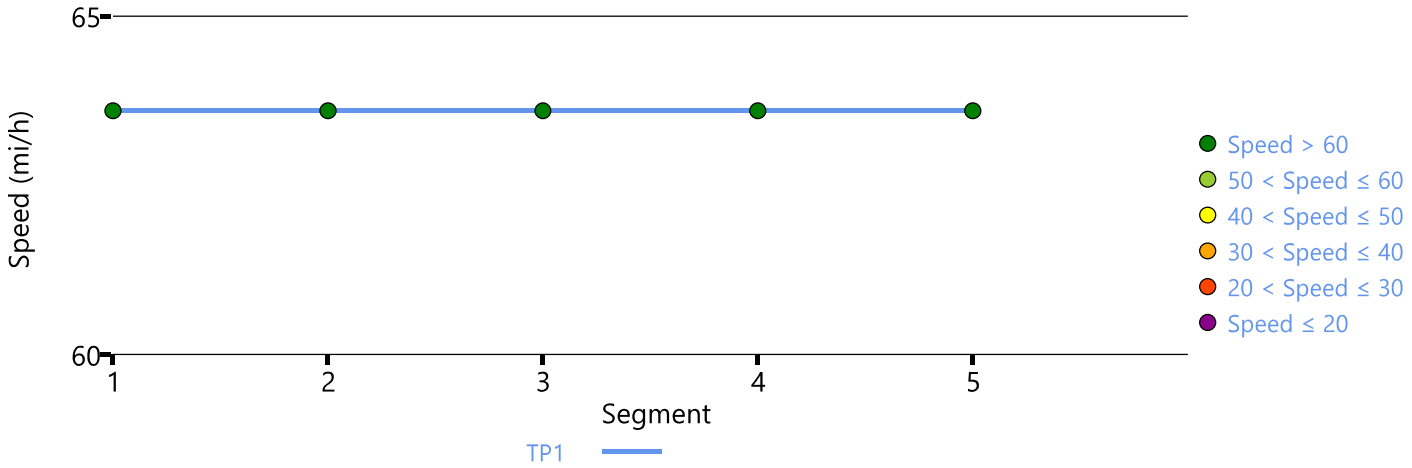
Messages

Comments

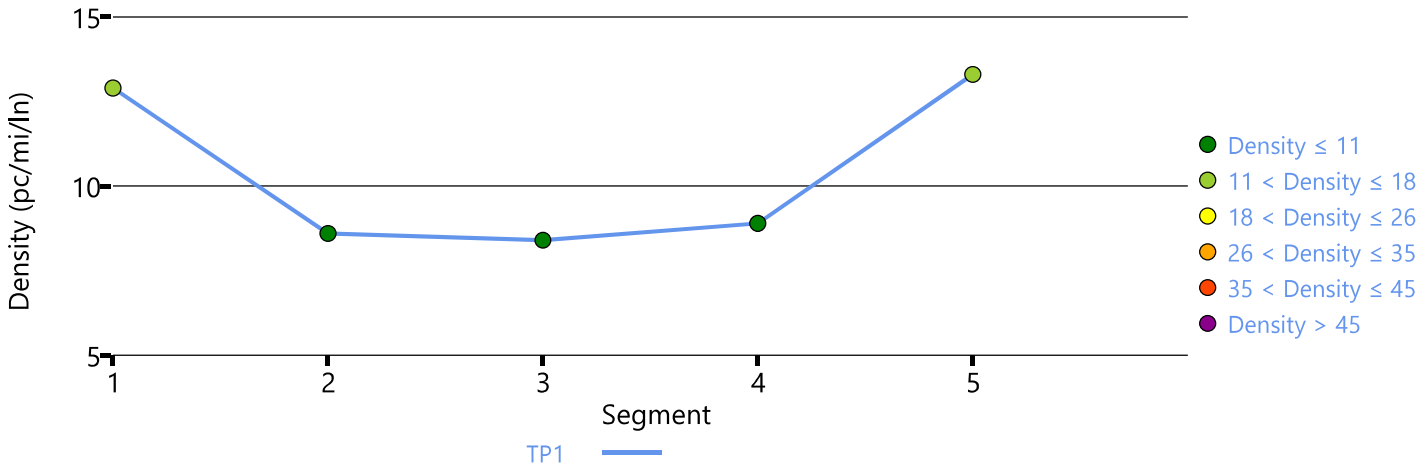
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Total 2028 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1396	4387	0.32	63.6	11.0	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1396	429	6581	1784	0.21	0.24	63.6	63.6	7.3	7.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	967	4387	0.22	63.6	7.6	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1332	365	6581	1784	0.20	0.20	63.6	63.6	7.0	7.0	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1332	4387	0.30	63.6	10.5	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.9	9.8	4.00	A

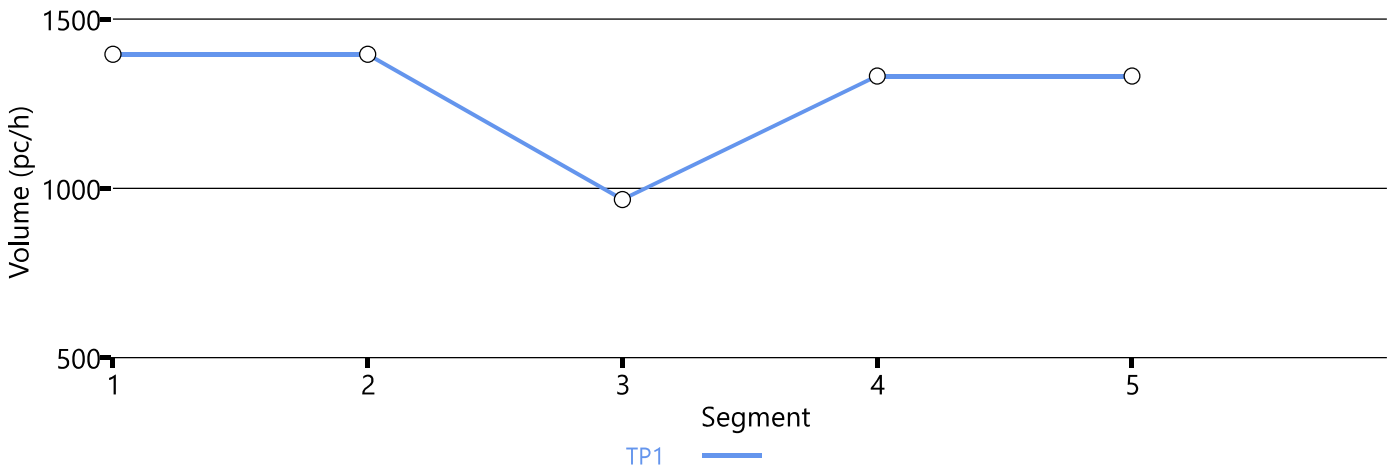
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.8
Average Travel Time, min	4.00	Density, pc/mi/ln	9.9

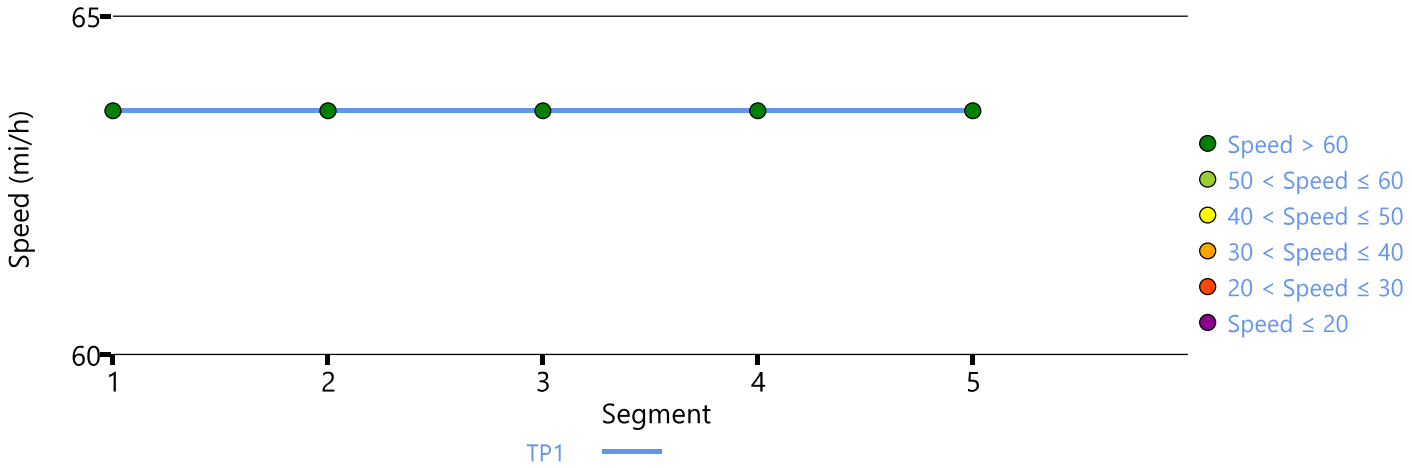
Messages

Comments

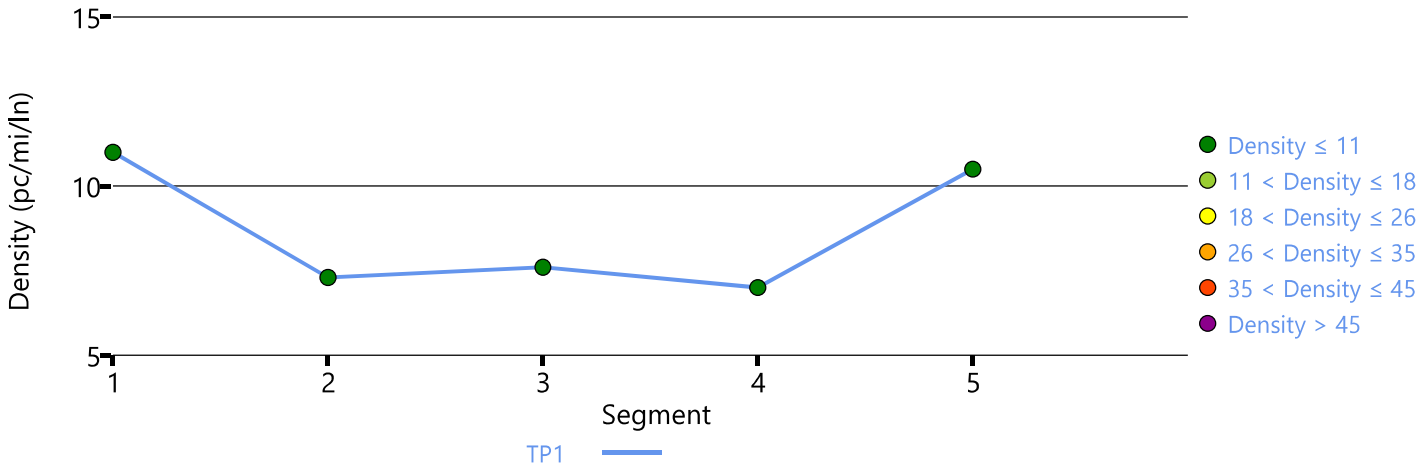
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Total 2028 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1344	4387	0.31	63.6	10.6	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1344	755	6581	1784	0.20	0.42	63.6	63.6	7.0	7.0	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	589	4387	0.13	63.6	4.6	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1219	630	6581	1784	0.19	0.35	63.6	63.6	6.4	6.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1219	4387	0.28	63.6	9.6	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.2	9.0	4.00	A

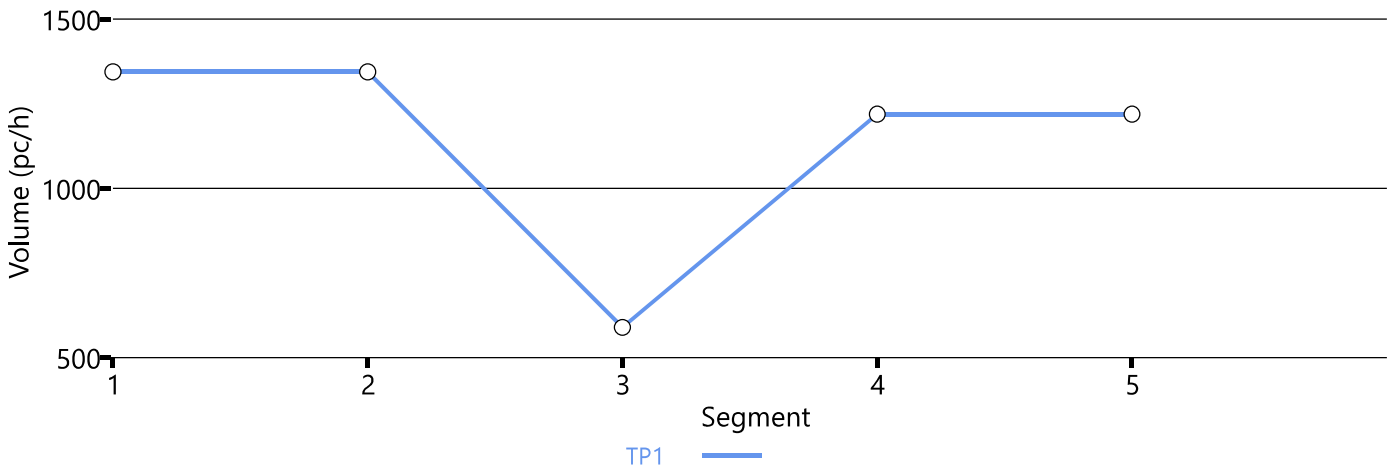
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.0
Average Travel Time, min	4.00	Density, pc/mi/ln	9.2

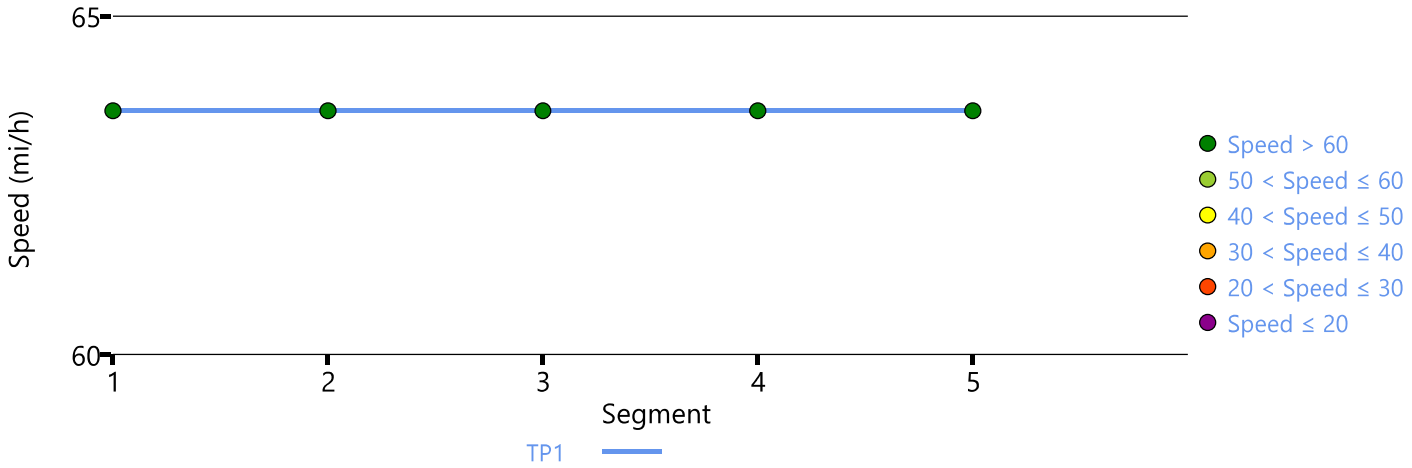
Messages

Comments

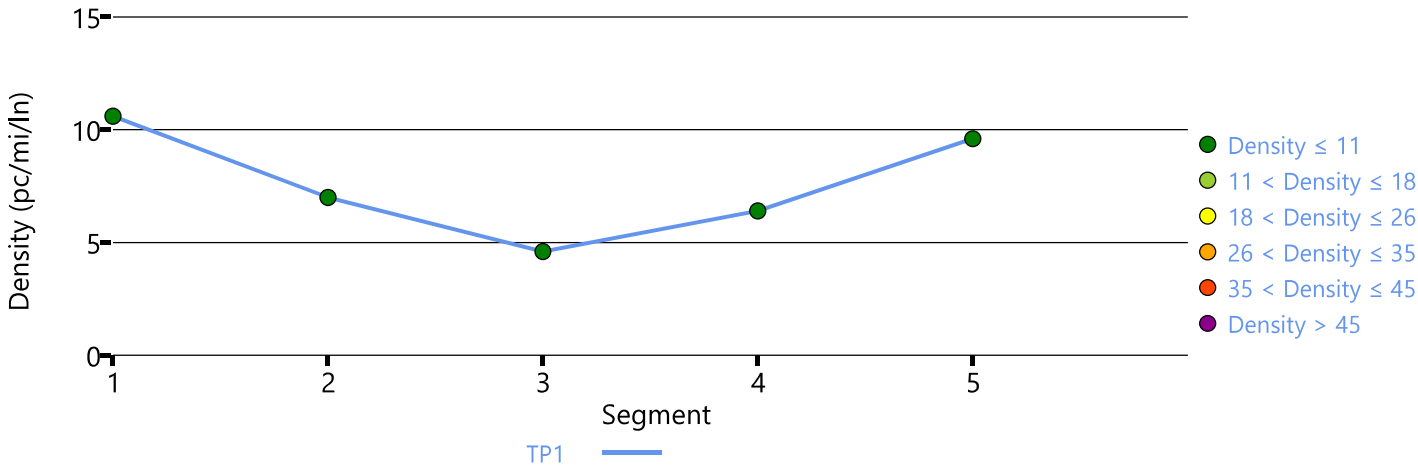
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Total 2030 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1424	4387	0.32	63.6	11.2	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1424	445	6581	1784	0.22	0.25	63.6	63.6	7.5	7.5	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	979	4387	0.22	63.6	7.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1398	419	6581	1784	0.21	0.23	63.6	63.6	7.3	7.3	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1399	4387	0.32	63.6	11.0	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.3	10.1	4.00	A

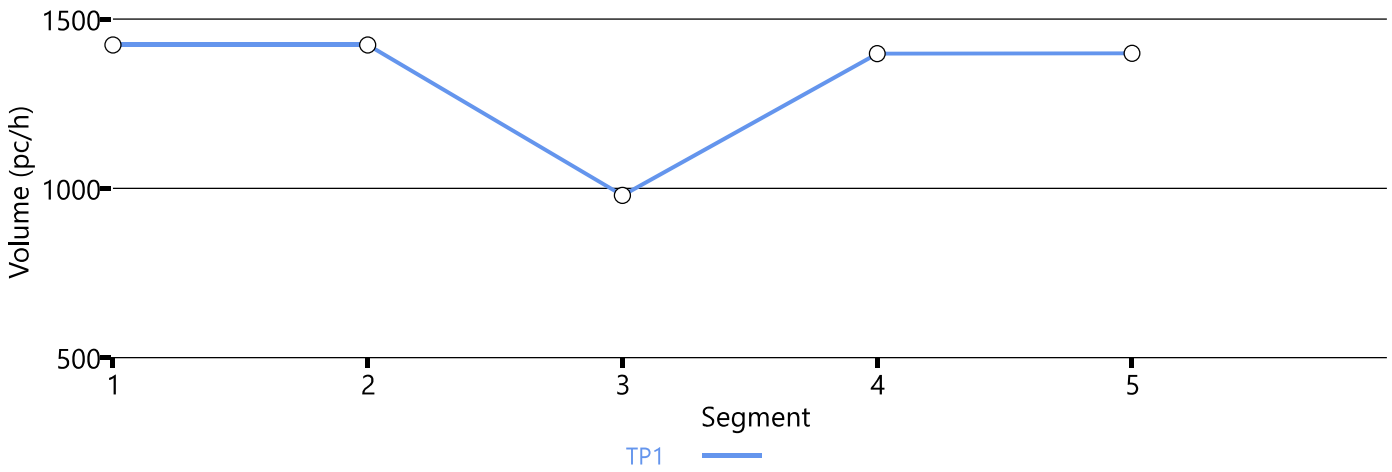
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.1
Average Travel Time, min	4.00	Density, pc/mi/ln	10.3

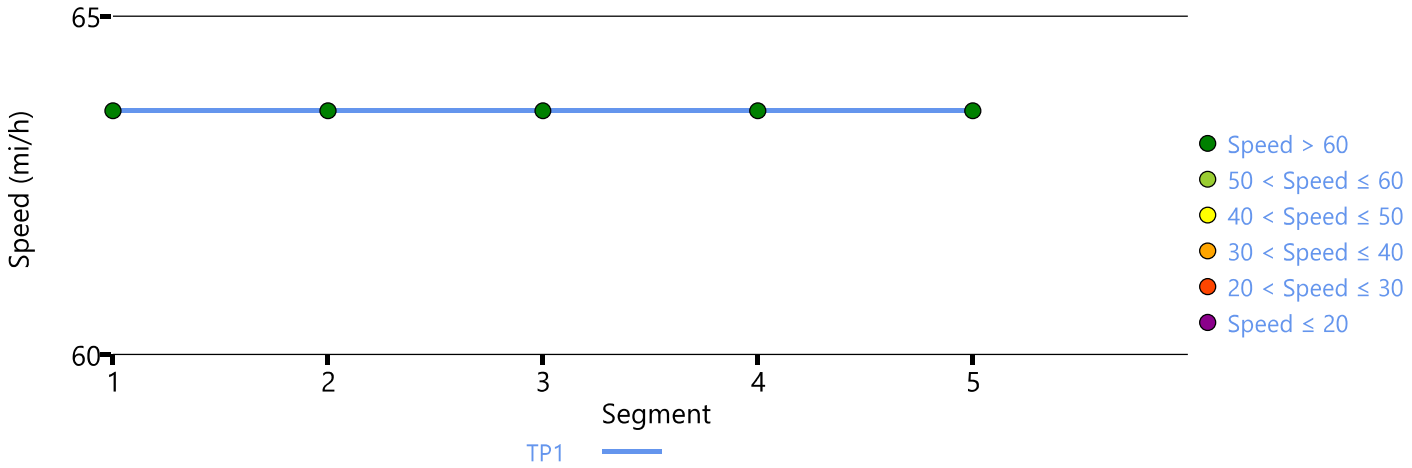
Messages

Comments

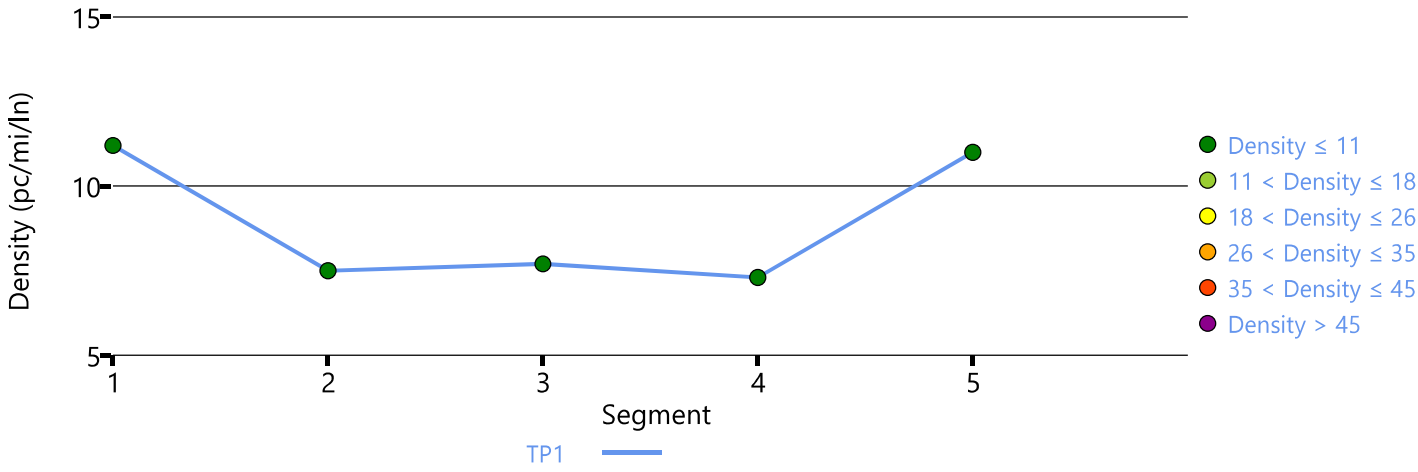
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Total 2030 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1371	4387	0.31	63.6	10.8	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1371	792	6581	1784	0.21	0.44	63.6	63.6	7.2	7.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	579	4387	0.13	63.6	4.6	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1251	672	6581	1784	0.19	0.38	63.6	63.6	6.6	6.6	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1251	4387	0.29	63.6	9.8	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.4	9.2	4.00	A

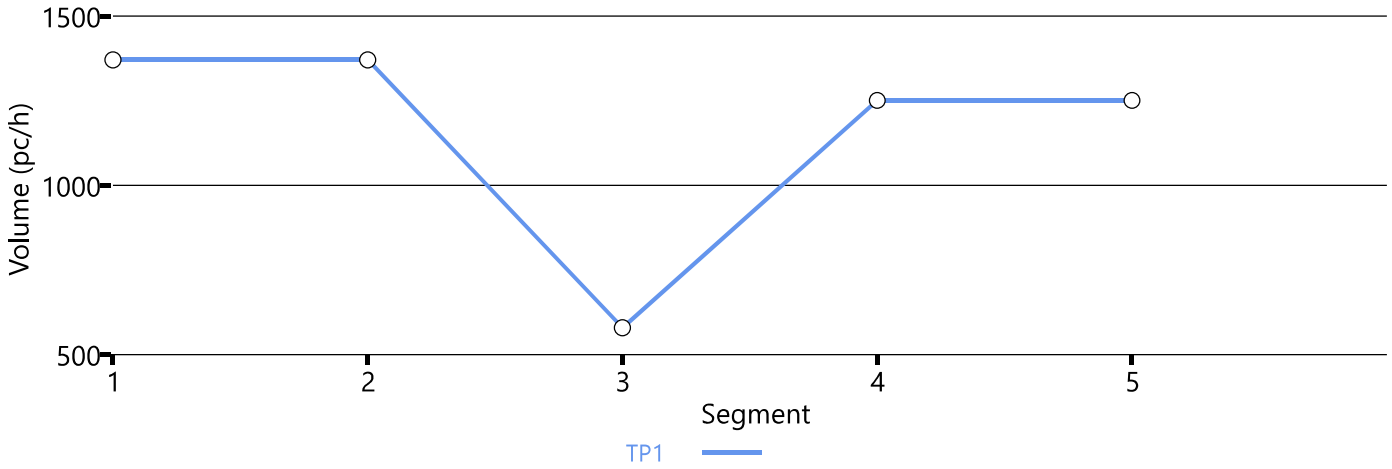
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.2
Average Travel Time, min	4.00	Density, pc/mi/ln	9.4

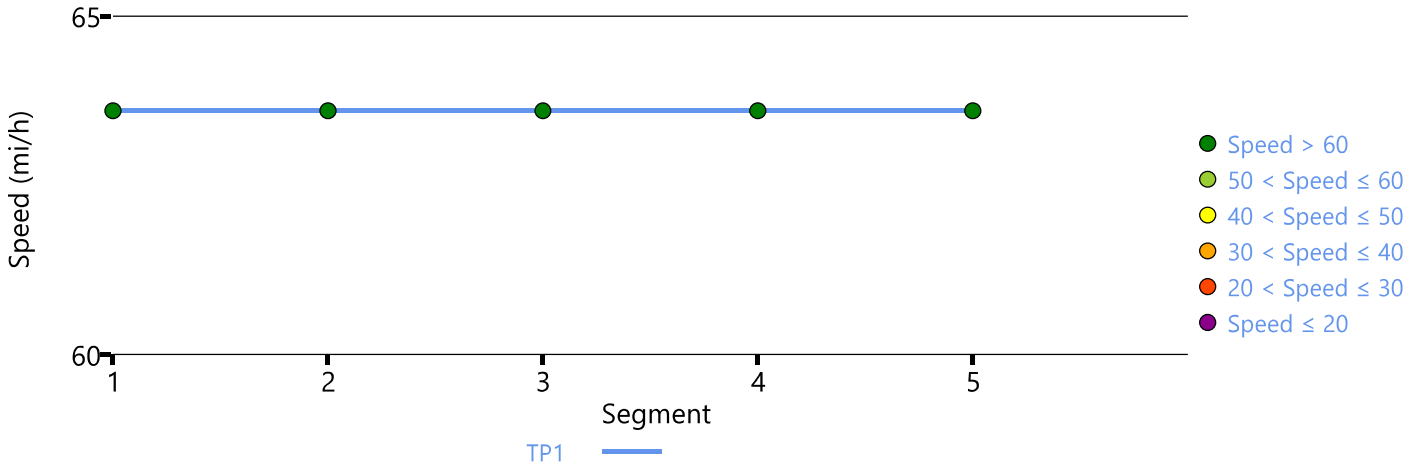
Messages

Comments

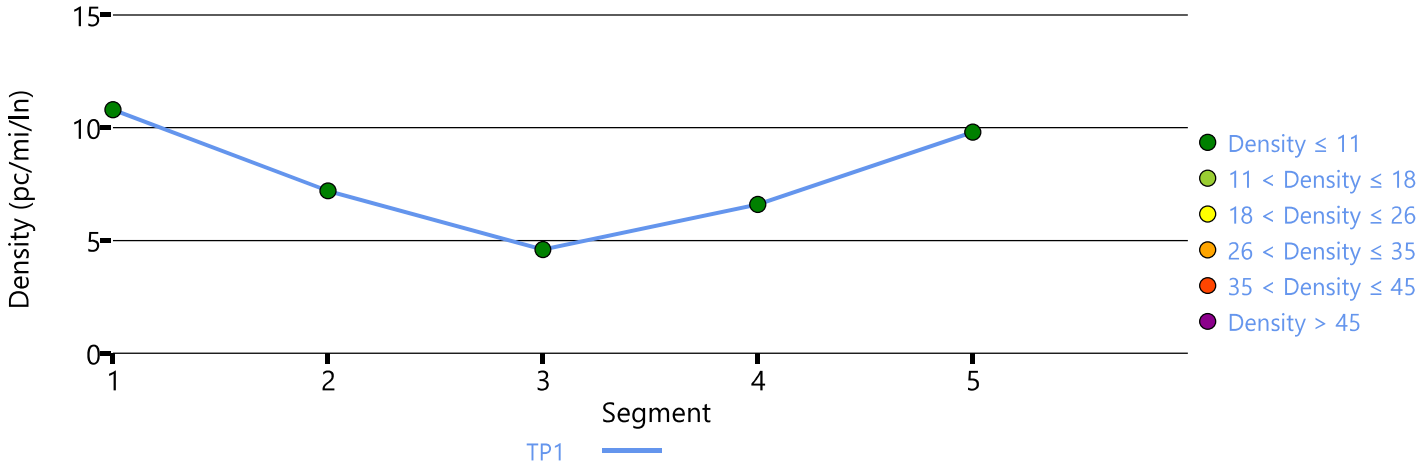
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Total 2032 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1453	4387	0.33	63.6	11.4	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1453	526	6581	1784	0.22	0.29	63.6	63.6	7.6	7.6	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	927	4387	0.21	63.6	7.3	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1479	552	6581	1784	0.22	0.31	63.6	63.6	7.8	7.8	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1480	4387	0.34	63.6	11.6	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.7	10.5	4.00	A

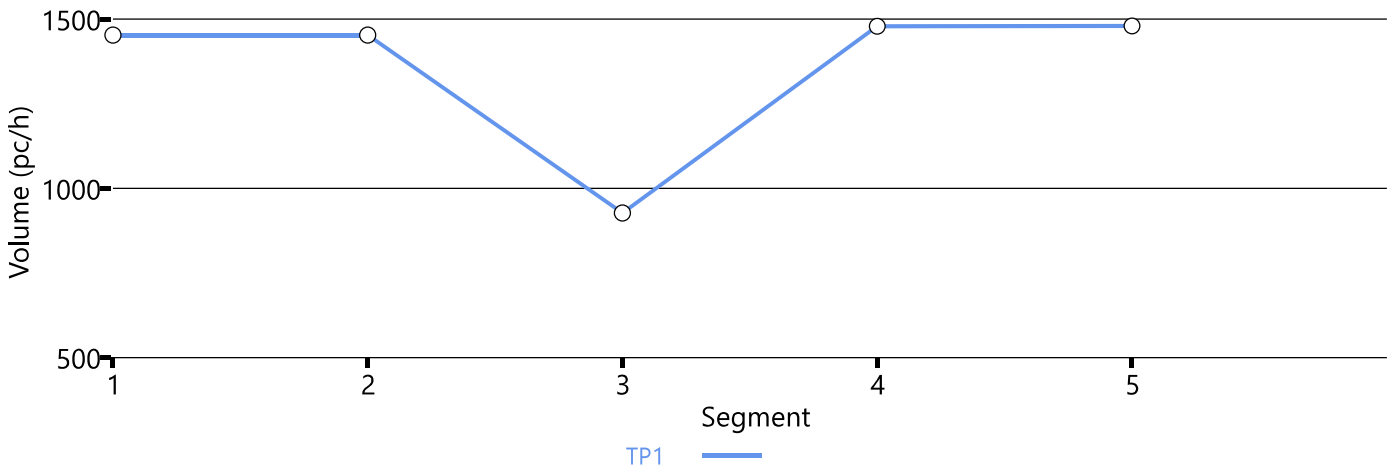
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.5
Average Travel Time, min	4.00	Density, pc/mi/ln	10.7

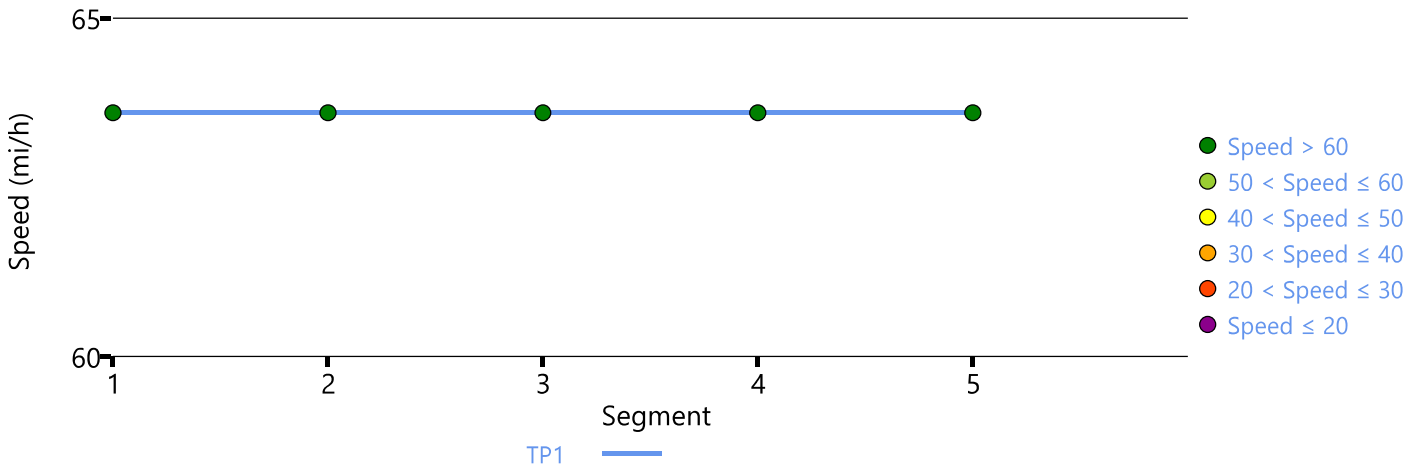
Messages

Comments

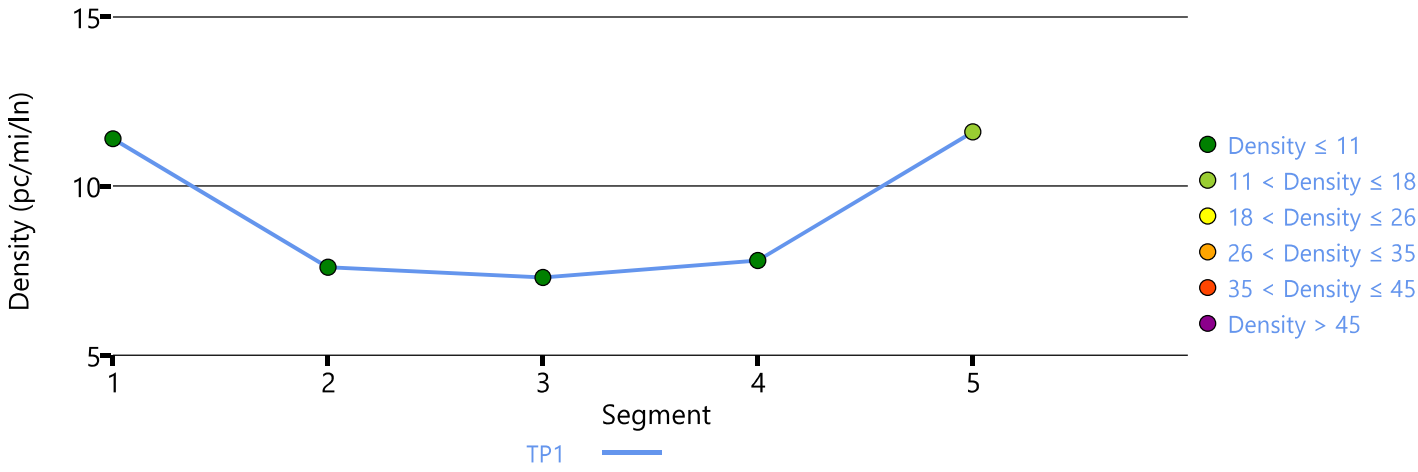
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Total 2032 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1399	4387	0.32	63.6	11.0	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1399	847	6581	1784	0.21	0.47	63.6	63.6	7.3	7.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	551	4387	0.13	63.6	4.3	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1342	791	6581	1784	0.20	0.44	63.6	63.6	7.0	7.0	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1342	4387	0.31	63.6	10.6	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	9.9	9.7	4.00	A

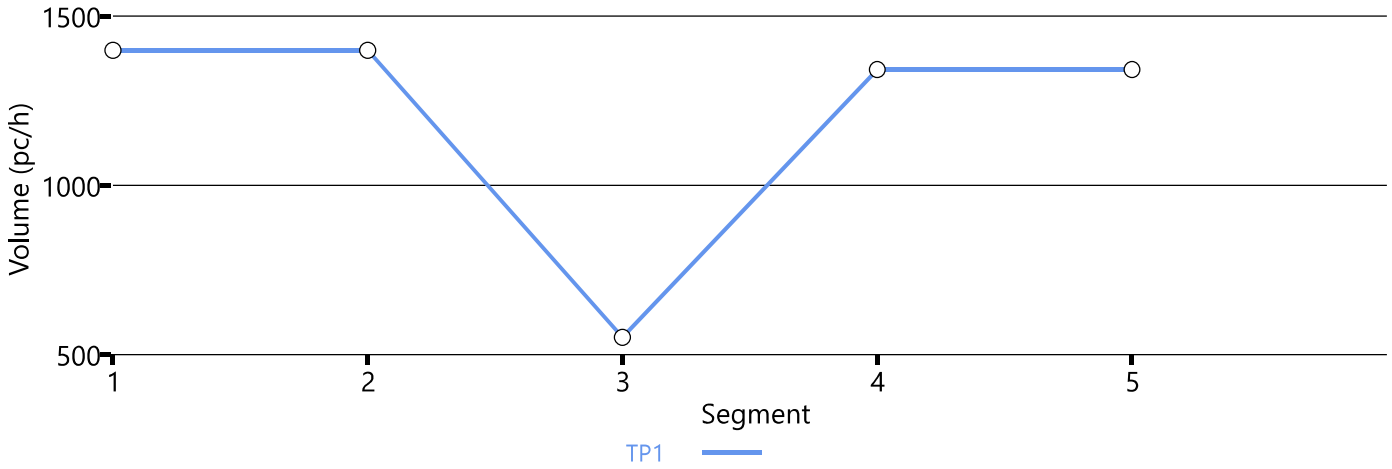
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	9.7
Average Travel Time, min	4.00	Density, pc/mi/ln	9.9

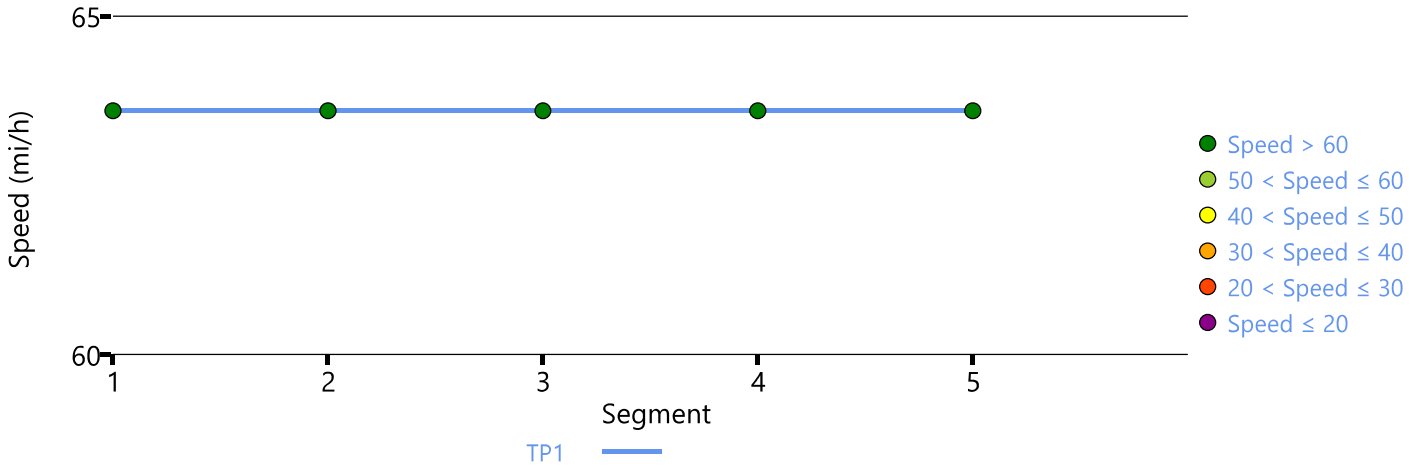
Messages

Comments

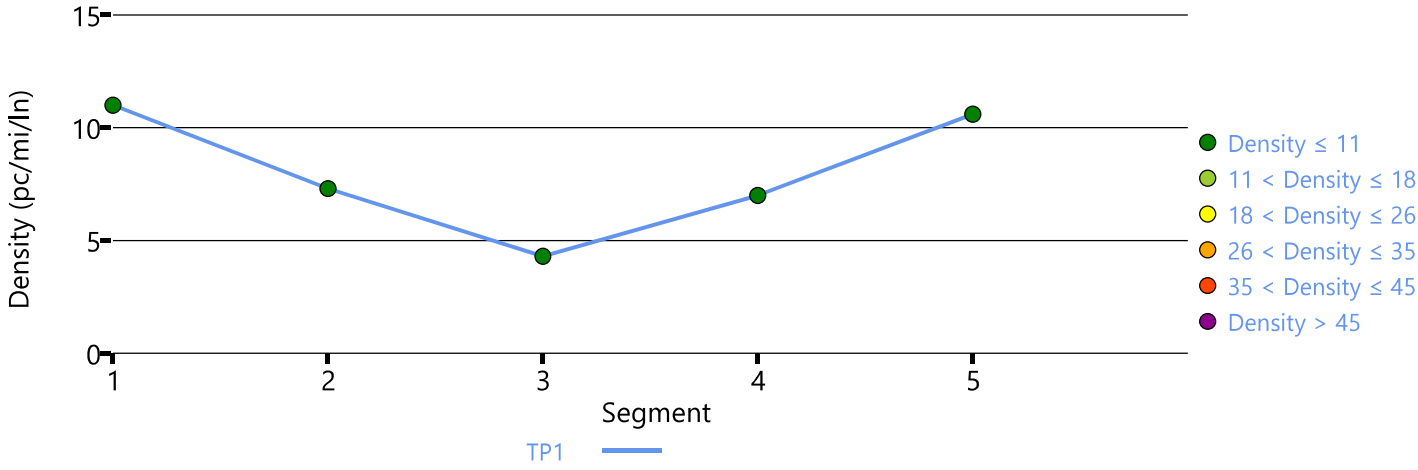
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Total 2038 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1543	4387	0.35	63.6	12.1	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1543	547	6581	1784	0.23	0.31	63.6	63.6	8.1	8.1	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	996	4387	0.23	63.6	7.8	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1565	569	6581	1784	0.24	0.32	63.6	63.6	8.2	8.2	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1565	4387	0.36	63.6	12.3	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.4	11.2	4.00	B

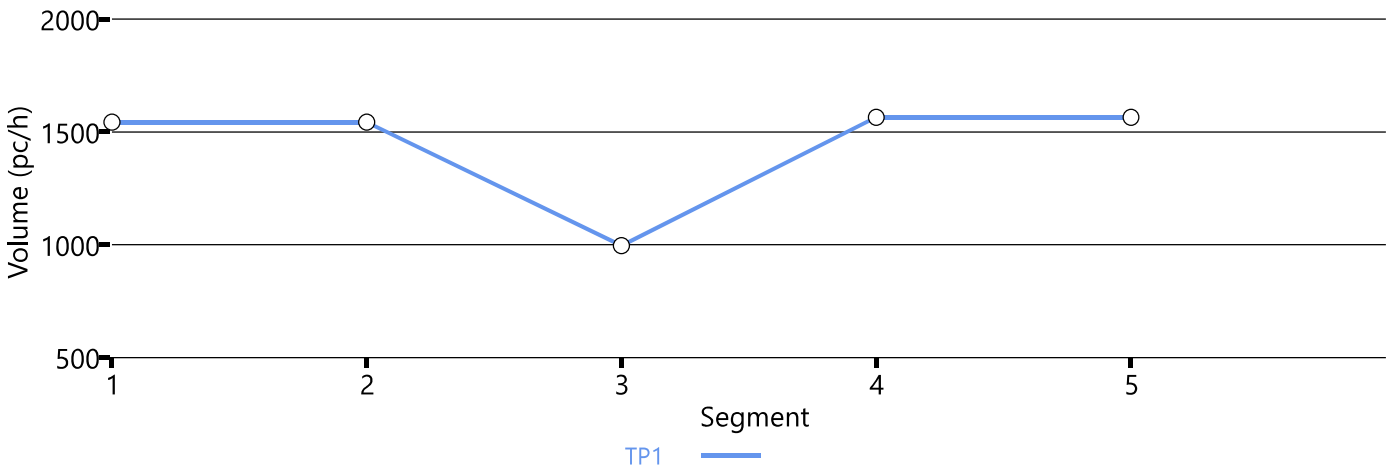
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.2
Average Travel Time, min	4.00	Density, pc/mi/ln	11.4

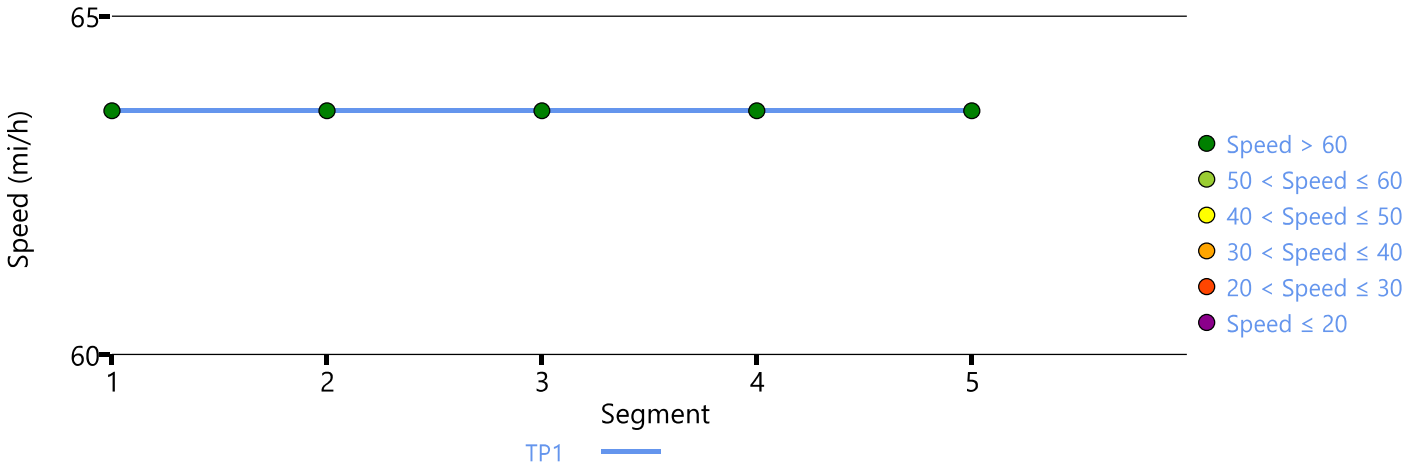
Messages

Comments

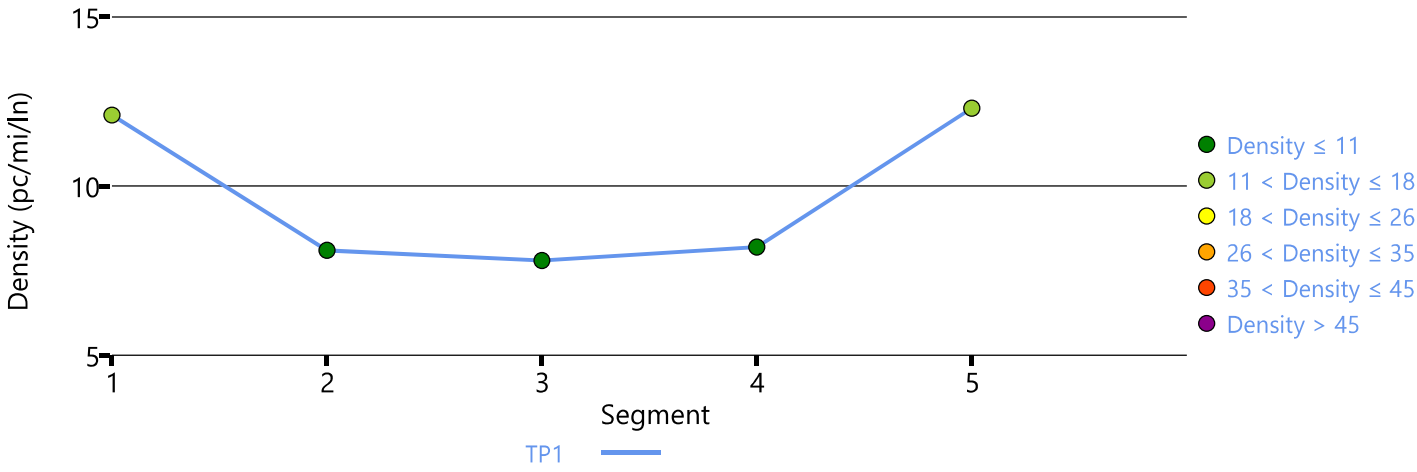
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Total 2038 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.29		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	NB Route 199	7000	2
2	Diverge	Basic	NB Off to EB	1500	3
3	Basic	Basic	In Between NB Ramps	650	2
4	Merge	Basic	WB On Ramp to NB 199	1500	3
5	Basic	Basic	NB Route 199	12000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1484	4387	0.34	63.6	11.7	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1484	892	6581	1784	0.23	0.50	63.6	63.6	7.8	7.8	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	592	4387	0.13	63.6	4.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1408	816	6581	1784	0.21	0.46	63.6	63.6	7.4	7.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1409	4387	0.32	63.6	11.1	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.5	10.3	4.00	A

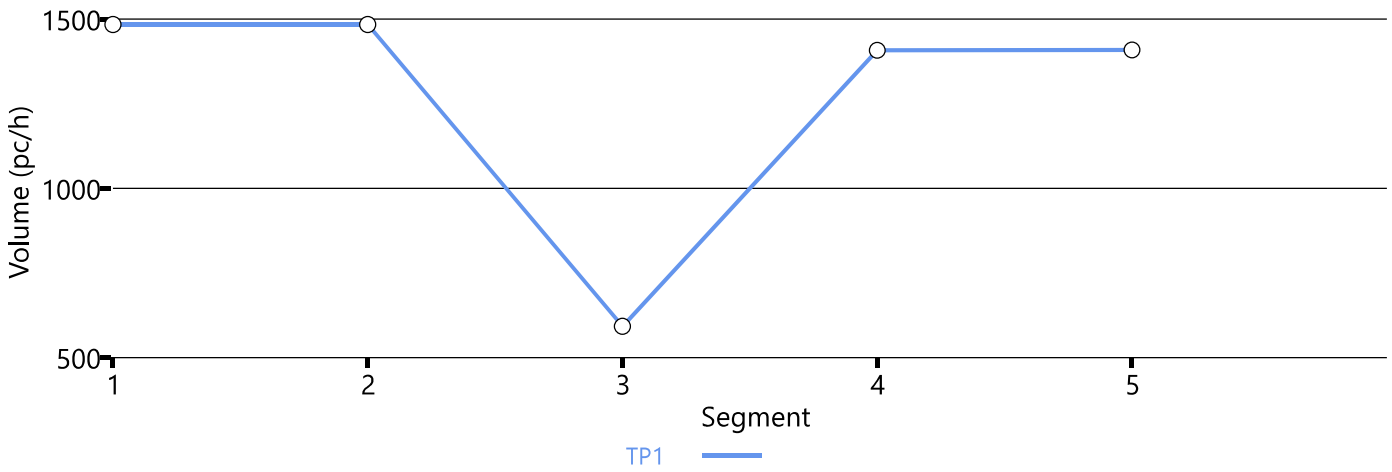
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.3
Average Travel Time, min	4.00	Density, pc/mi/ln	10.5

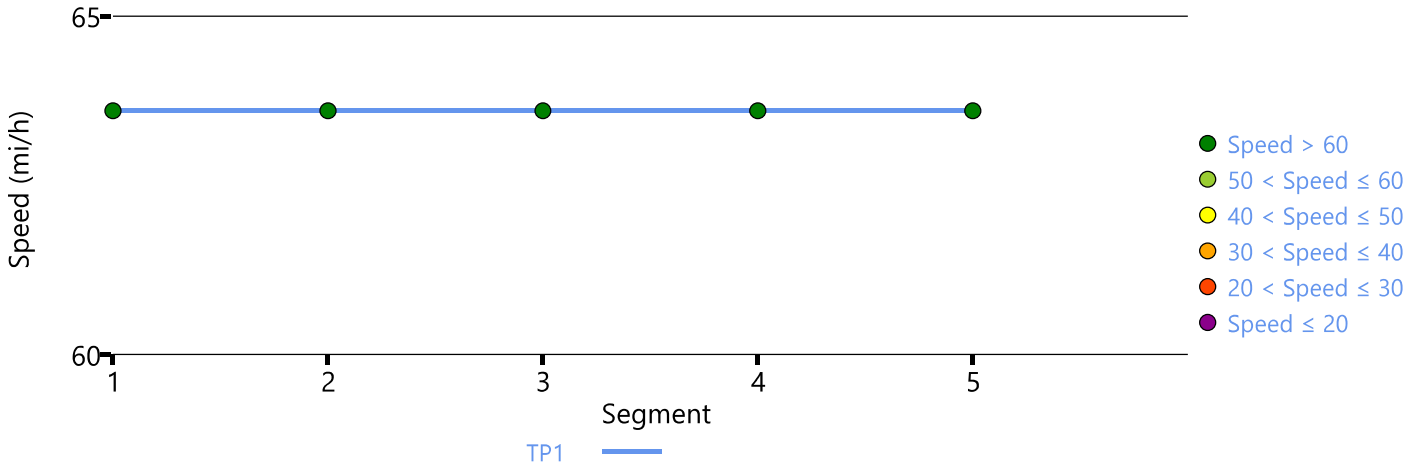
Messages

Comments

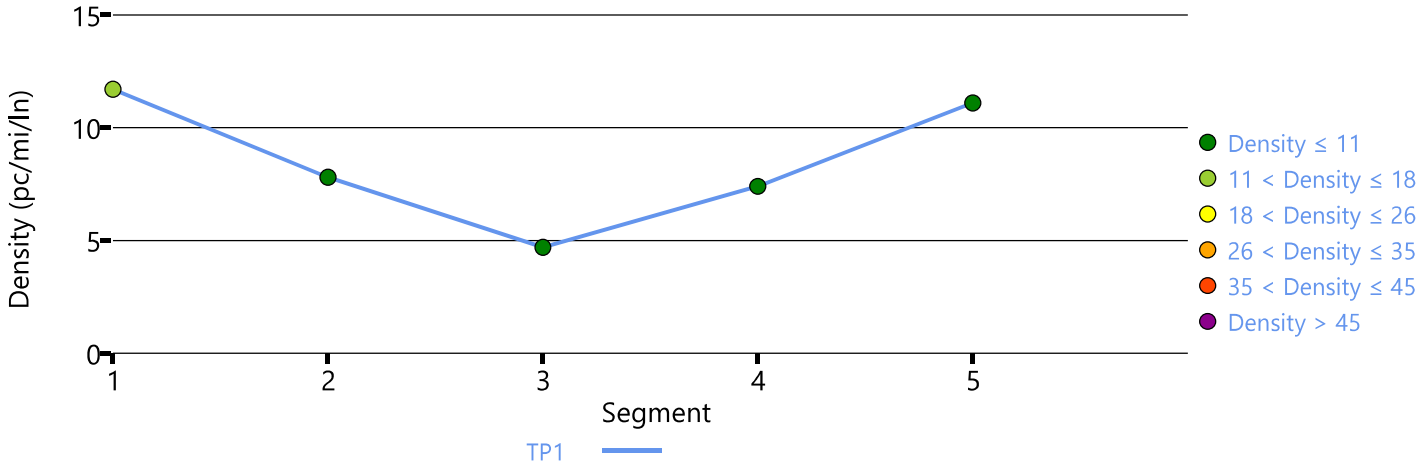
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Total 2028 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	990	4387	0.23	63.6	7.8	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	990	597	6581	1784	0.15	0.33	63.6	63.6	5.2	5.2	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	394	4387	0.09	63.6	3.1	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	922	528	6581	1784	0.14	0.30	63.6	63.6	4.8	4.8	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	922	4387	0.21	63.6	7.2	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	6.8	6.7	4.20	A

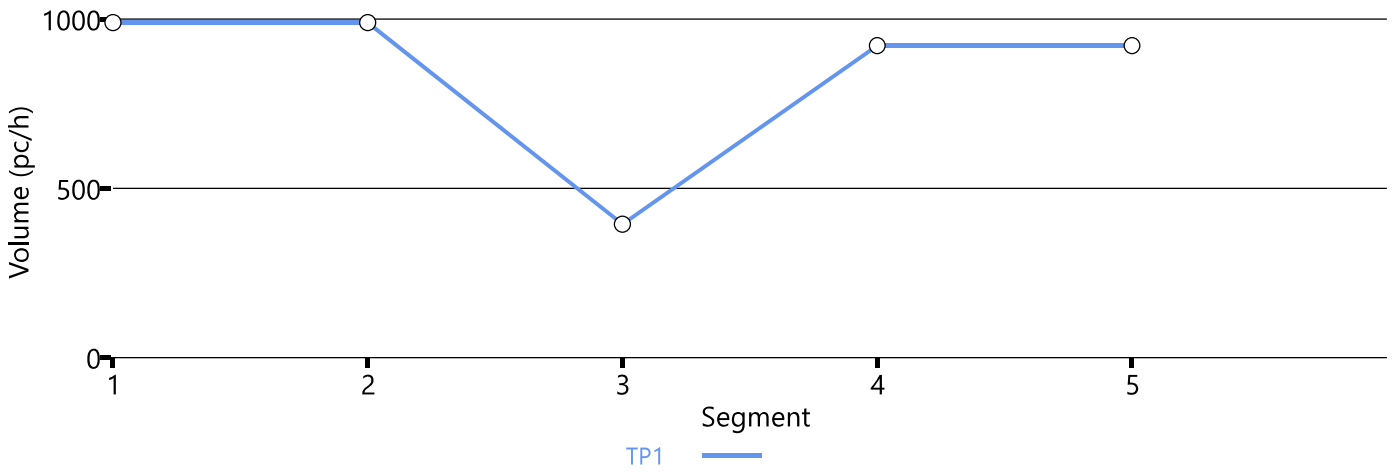
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.7
Average Travel Time, min	4.20	Density, pc/mi/ln	6.8

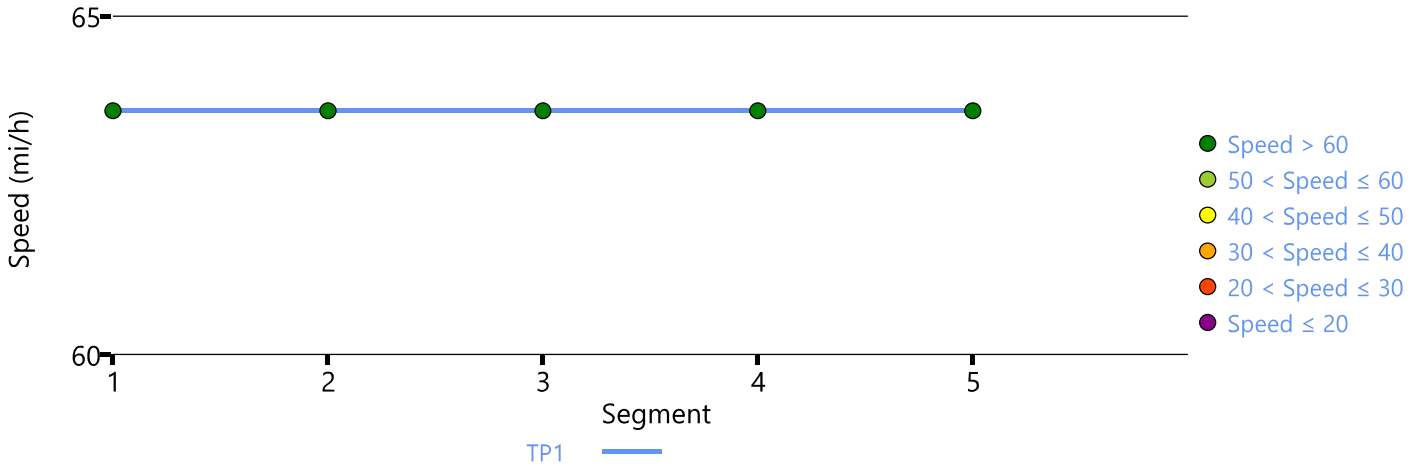
Messages

Comments

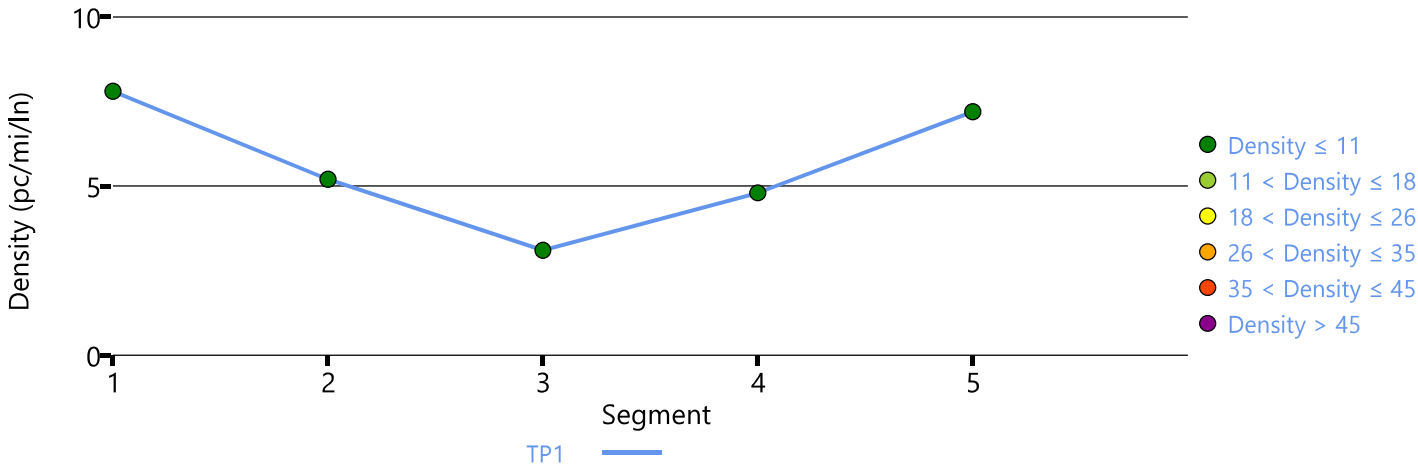
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2028
Jurisdiction	James City County	Time Analyzed	Total 2028 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1480	4387	0.34	63.6	11.6	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1480	627	6581	1784	0.22	0.35	63.6	63.6	7.8	7.8	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	853	4387	0.19	63.6	6.7	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1471	618	6581	1784	0.22	0.35	63.6	63.6	7.7	7.7	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1471	4387	0.34	63.6	11.6	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.6	10.4	4.20	A

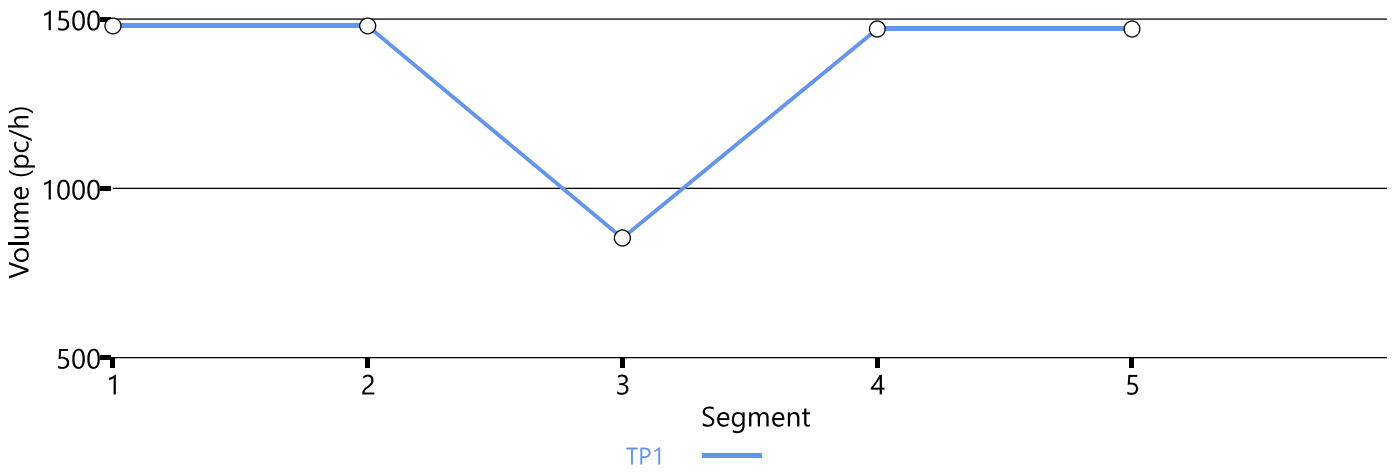
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.4
Average Travel Time, min	4.20	Density, pc/mi/ln	10.6

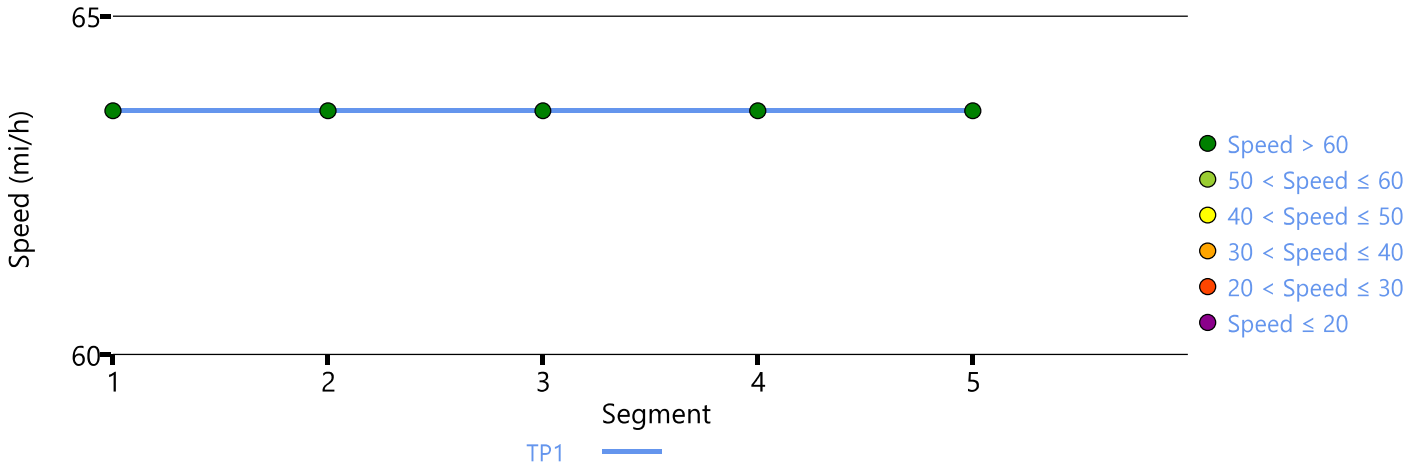
Messages

Comments

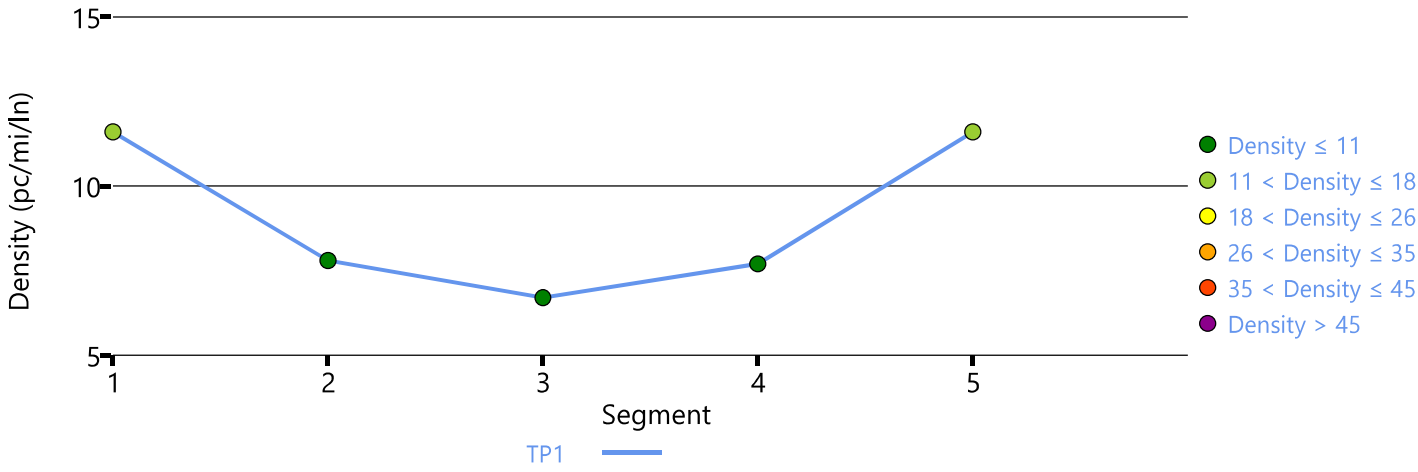
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Total 2030 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1010	4387	0.23	63.6	7.9	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1010	623	6581	1784	0.15	0.35	63.6	63.6	5.3	5.3	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	387	4387	0.09	63.6	3.1	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	945	558	6581	1784	0.14	0.31	63.6	63.6	5.0	5.0	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	945	4387	0.22	63.6	7.4	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.0	6.8	4.20	A

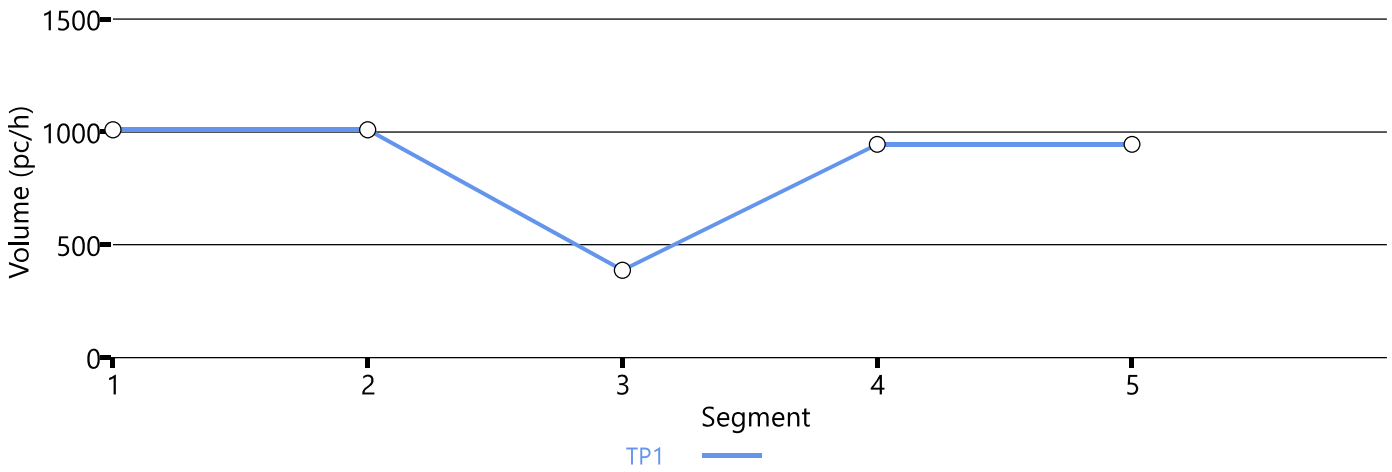
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.8
Average Travel Time, min	4.20	Density, pc/mi/ln	7.0

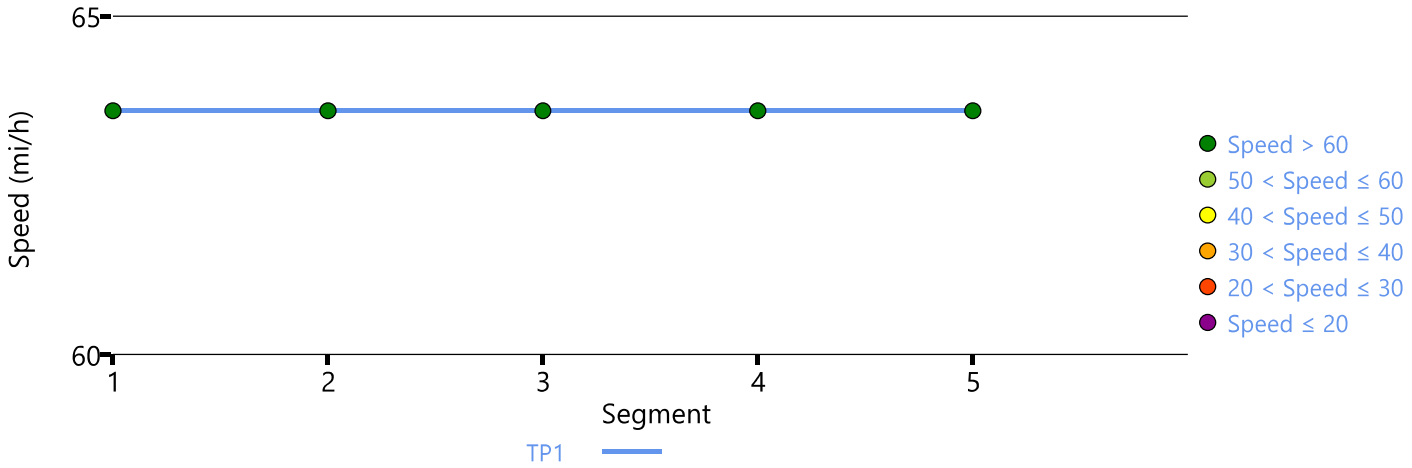
Messages

Comments

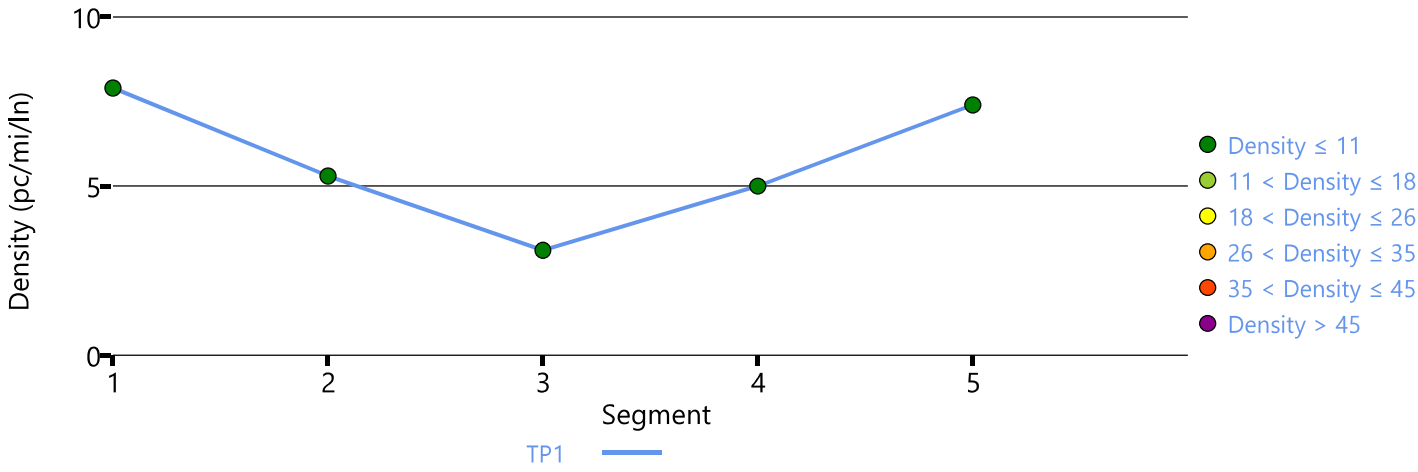
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2030
Jurisdiction	James City County	Time Analyzed	Total 2030 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1510	4387	0.34	63.6	11.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1510	689	6581	1784	0.23	0.39	63.6	63.6	7.9	7.9	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	821	4387	0.19	63.6	6.4	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1464	643	6581	1784	0.22	0.36	63.6	63.6	7.7	7.7	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1464	4387	0.33	63.6	11.5	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.7	10.5	4.20	A

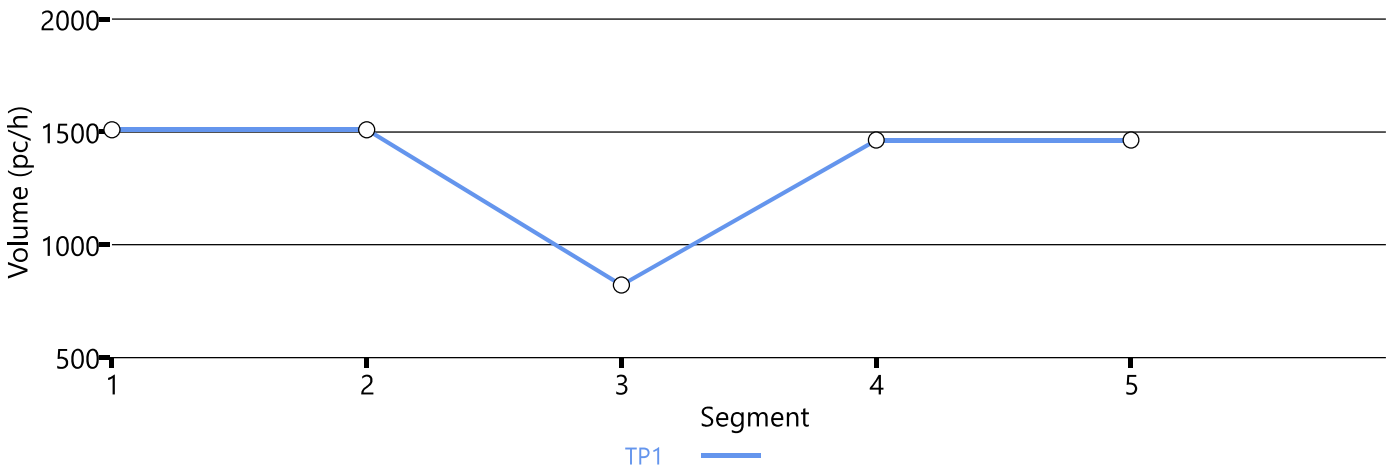
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.5
Average Travel Time, min	4.20	Density, pc/mi/ln	10.7

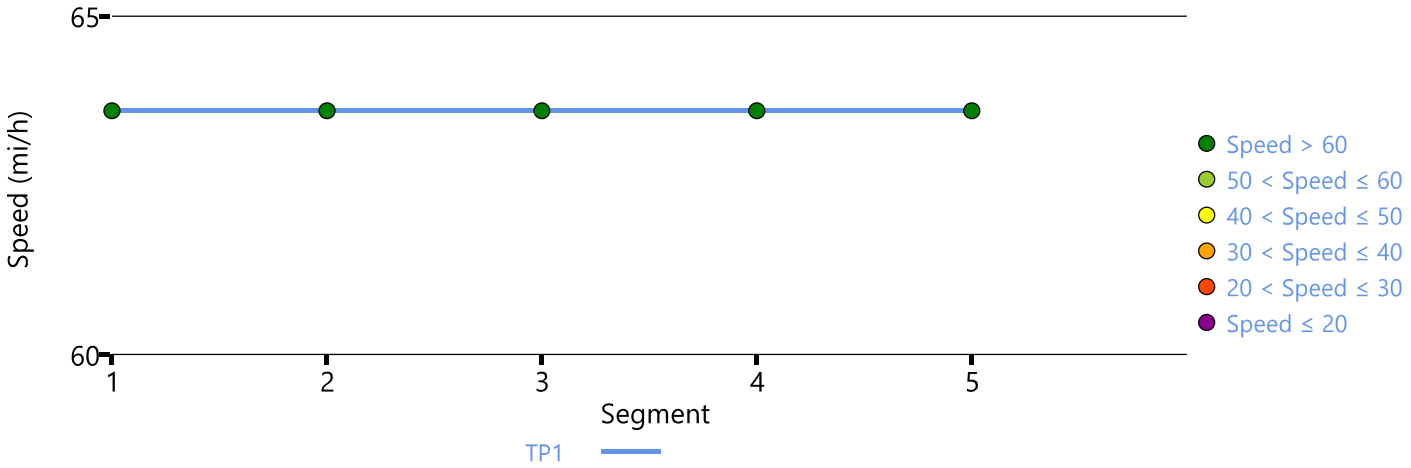
Messages

Comments

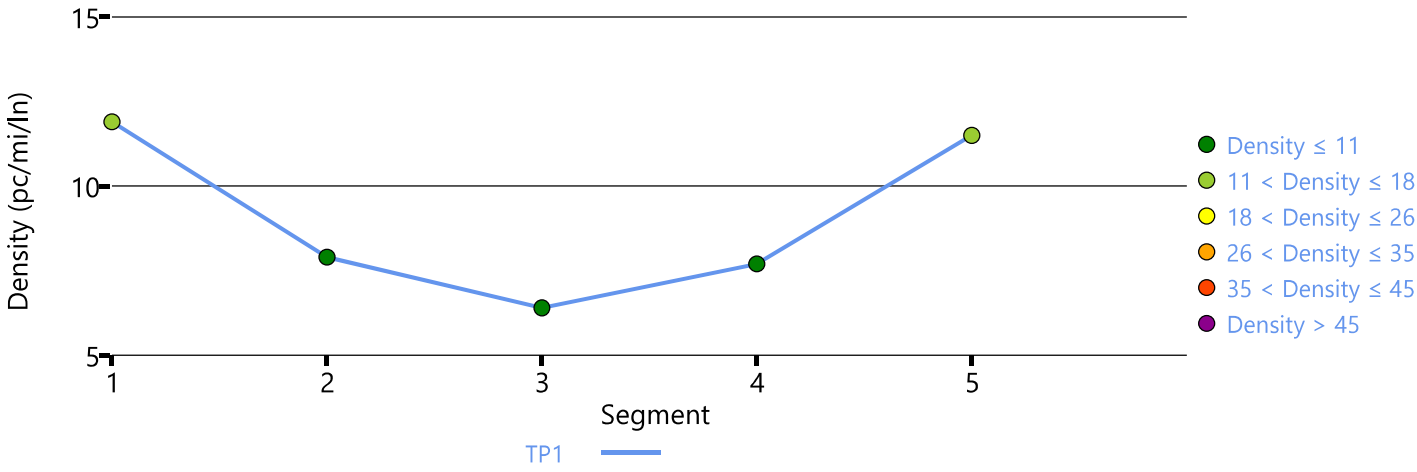
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Total 2032 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1031	4387	0.24	63.6	8.1	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1031	807	6581	1784	0.16	0.45	63.6	63.6	5.4	5.4	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	224	4387	0.05	63.6	1.8	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	847	623	6581	1784	0.13	0.35	63.6	63.6	4.4	4.4	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	847	4387	0.19	63.6	6.7	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	6.7	6.6	4.20	A

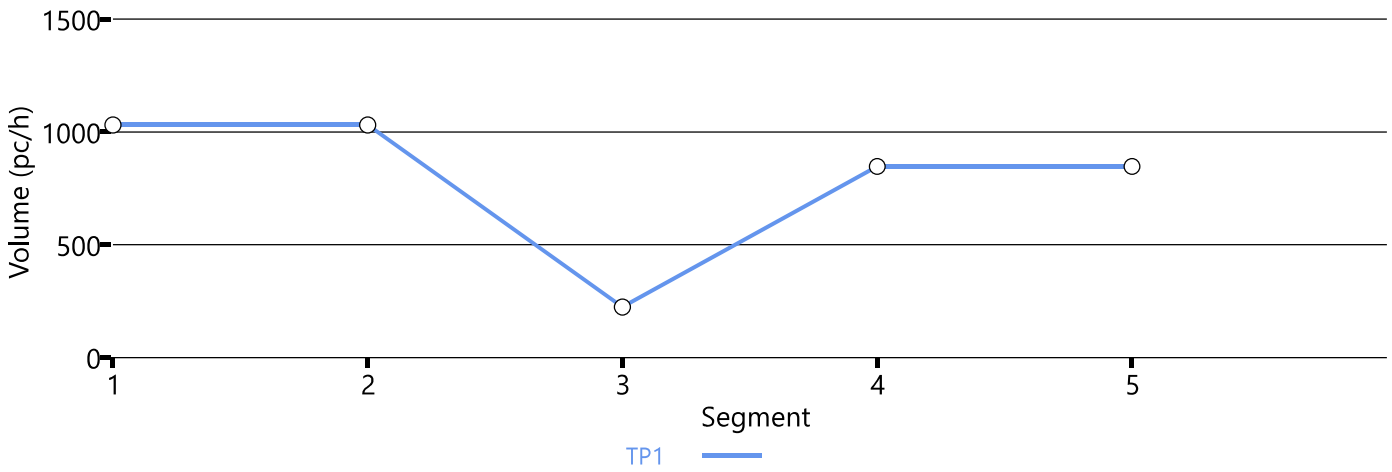
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	6.6
Average Travel Time, min	4.20	Density, pc/mi/ln	6.7

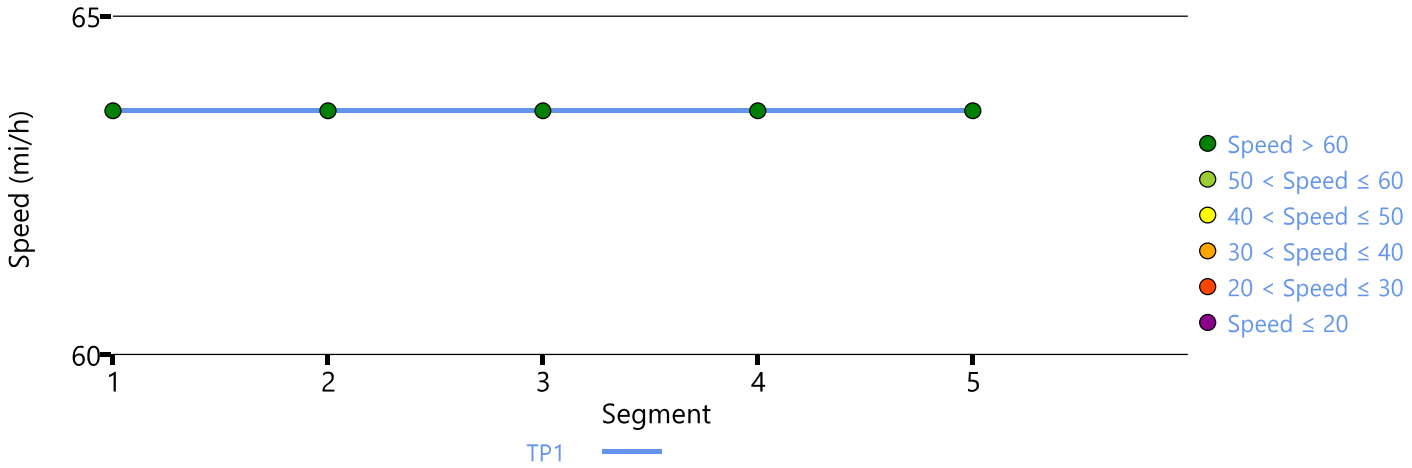
Messages

Comments

Volume Distribution



Speed Distribution



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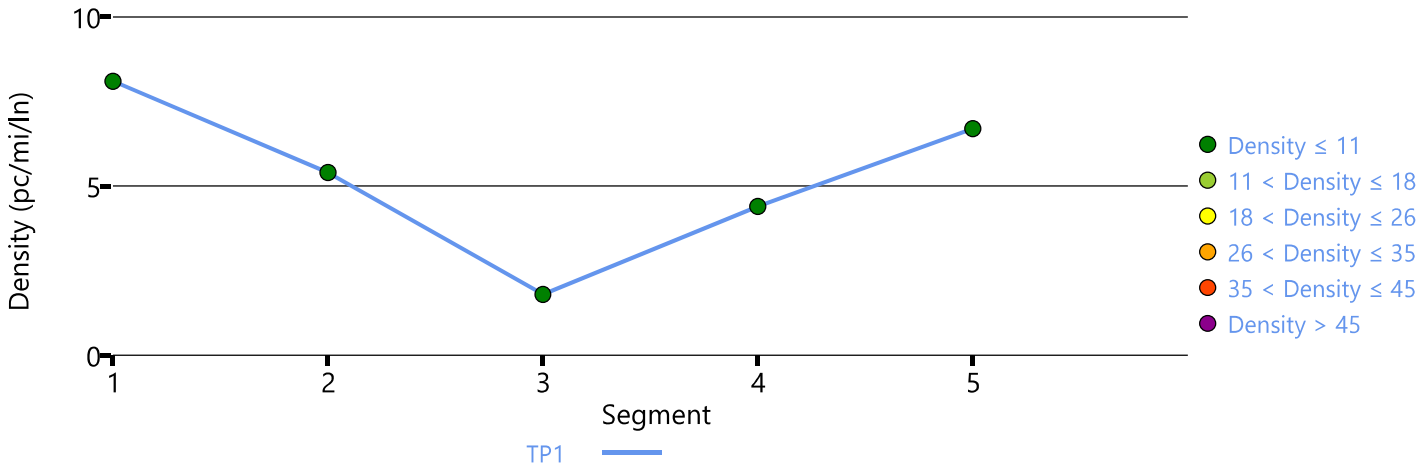

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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2032
Jurisdiction	James City County	Time Analyzed	Total 2032 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1539	4387	0.35	63.6	12.1	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1539	795	6581	1784	0.23	0.45	63.6	63.6	8.1	8.1	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	744	4387	0.17	63.6	5.8	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1445	701	6581	1784	0.22	0.39	63.6	63.6	7.6	7.6	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1445	4387	0.33	63.6	11.4	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	10.7	10.5	4.20	A

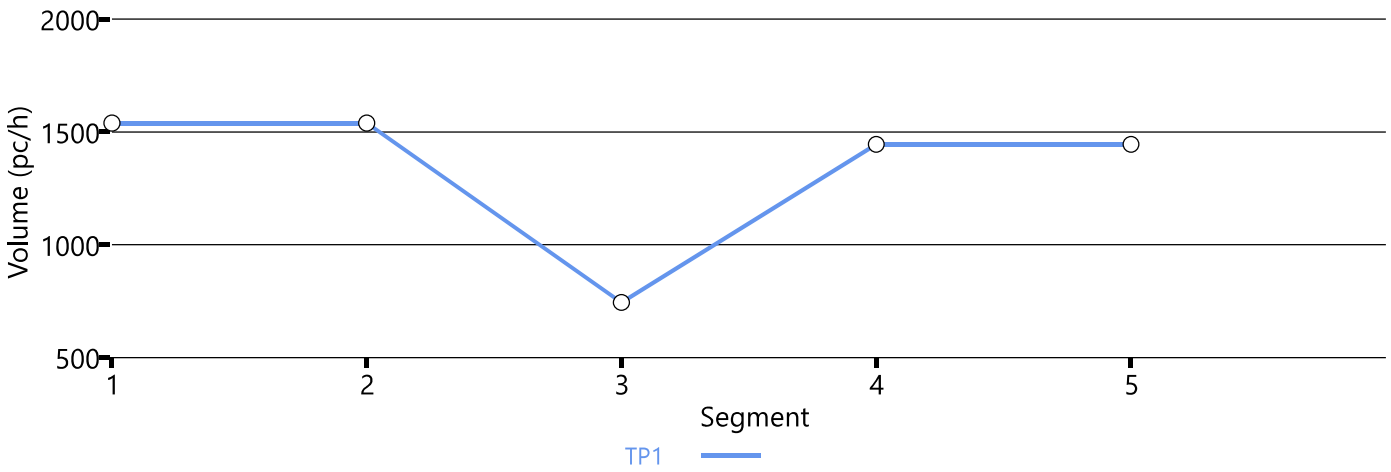
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	10.5
Average Travel Time, min	4.20	Density, pc/mi/ln	10.7

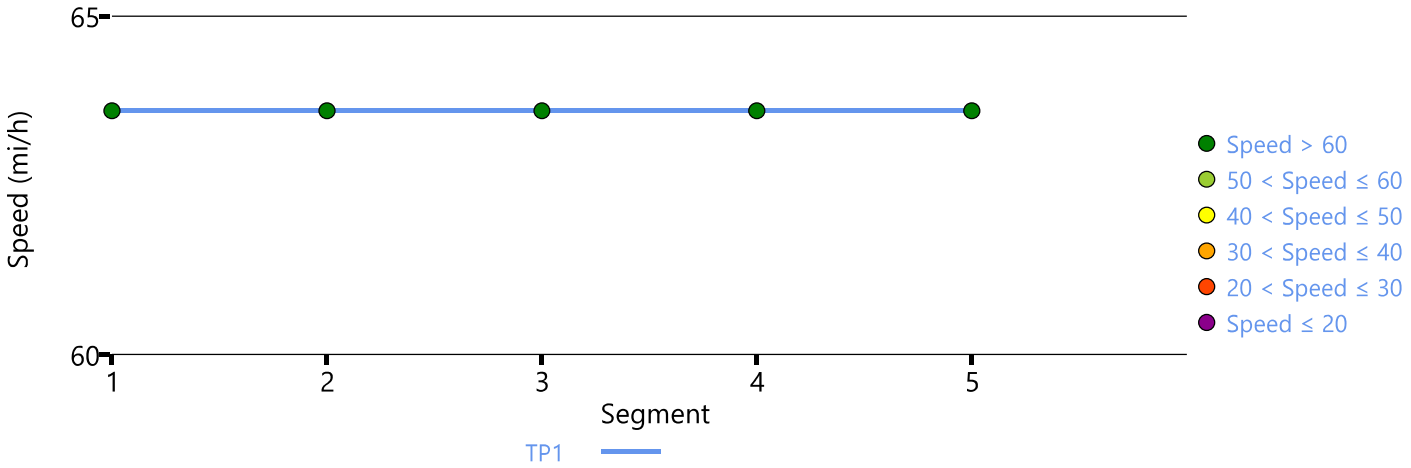
Messages

Comments

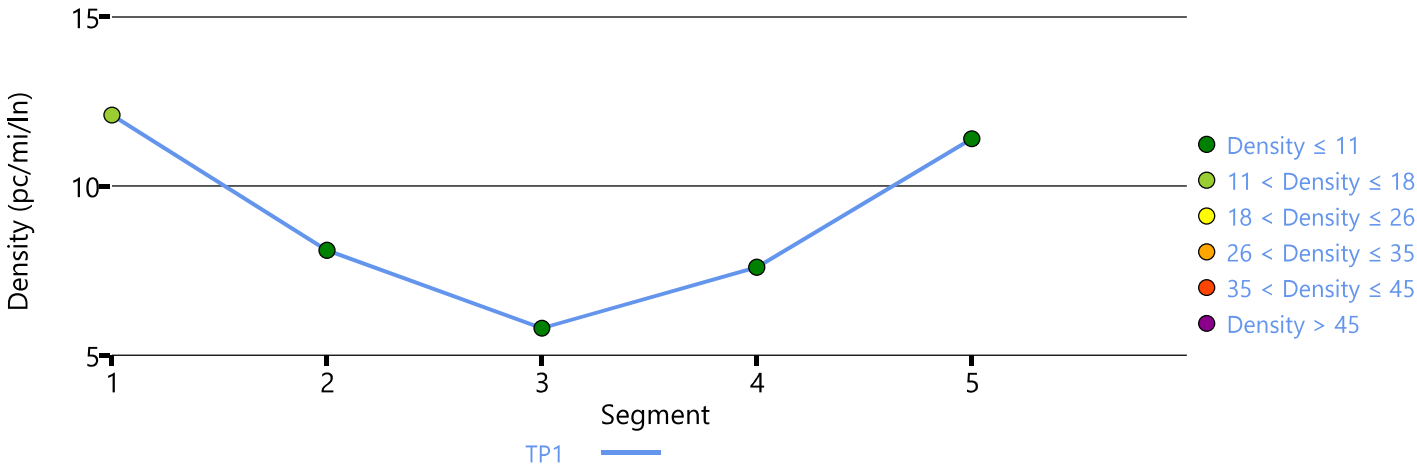
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Total 2038 AM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1095	4387	0.25	63.6	8.6	A

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1095	834	6581	1784	0.17	0.47	63.6	63.6	5.7	5.7	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	261	4387	0.06	63.6	2.0	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	914	653	6581	1784	0.14	0.37	63.6	63.6	4.8	4.8	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	914	4387	0.21	63.6	7.2	A

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	7.2	7.0	4.20	A

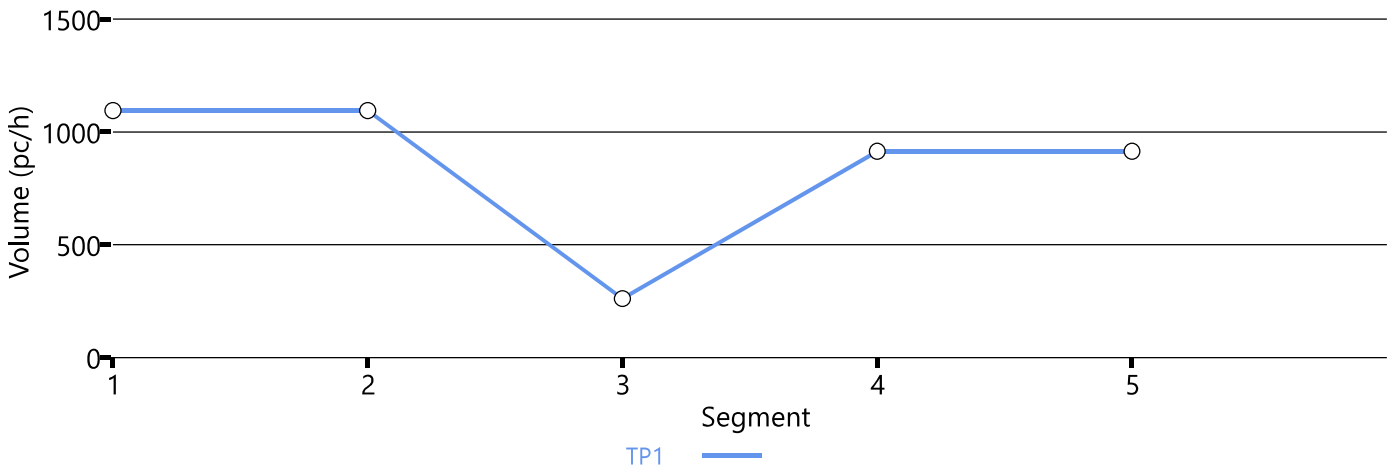
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	7.0
Average Travel Time, min	4.20	Density, pc/mi/ln	7.2

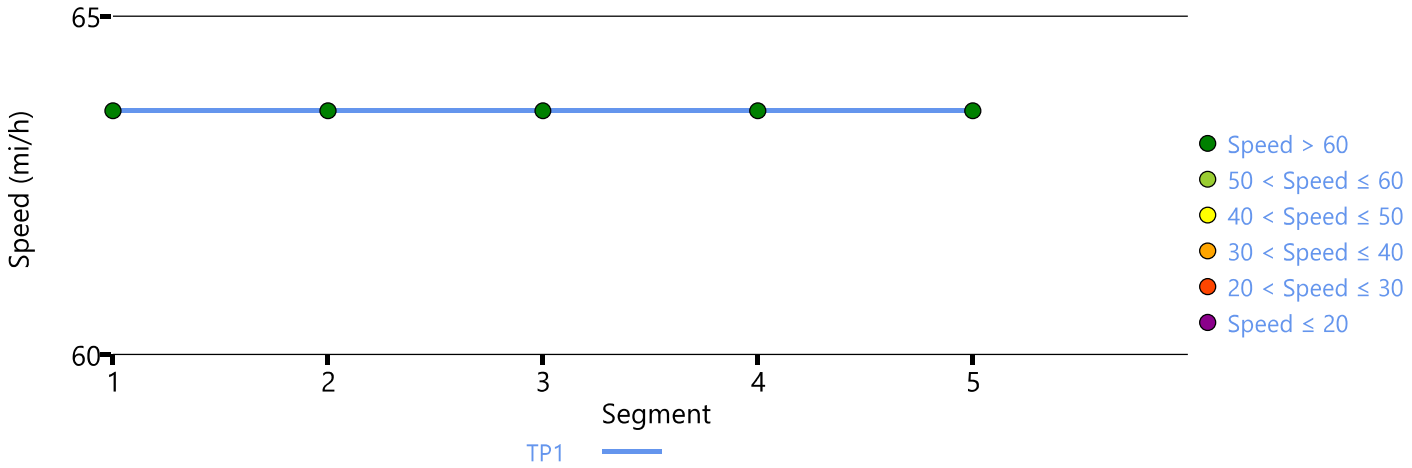
Messages

Comments

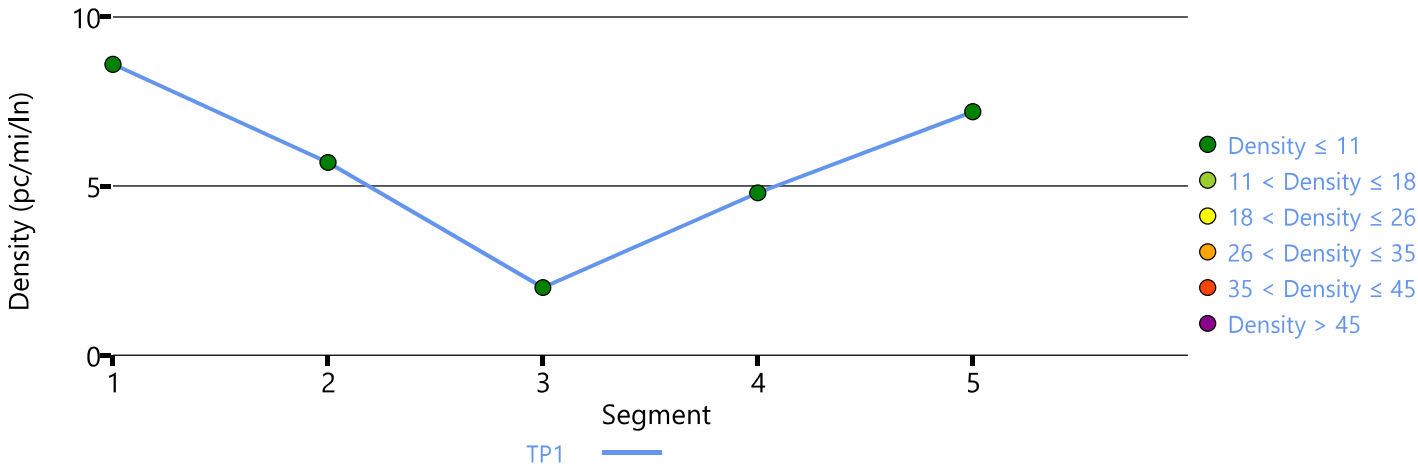
Volume Distribution



Speed Distribution



Density Distribution



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HCS7 Freeway Facilities Report

Project Information

Analyst	ML	Date	08/01/2025
Agency	Timmons Group	Analysis Year	2038
Jurisdiction	James City County	Time Analyzed	Total 2038 PM Peak Hour
Project Description	Cardinal Ridge	Units	U.S. Customary

Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	5
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	4.48		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SB Route 199	12000	2
2	Diverge	Basic	SB Off to WB	1500	3
3	Basic	Basic	In Between SB Ramps	1675	2
4	Merge	Basic	EB On Ramp to SB 199	1500	3
5	Basic	Basic	SB Route 199	7000	2

Facility Segment Data

Segment 1: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	1635	4387	0.37	63.6	12.9	B

Segment 2: Diverge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1635	826	6581	1784	0.25	0.46	63.6	63.6	8.6	8.6	A

Segment 3: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.92	0.980	809	4387	0.18	63.6	6.4	A

Segment 4: Merge

AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R	Freeway	Ramp	
1	0.92	0.92	0.980	0.980	1541	732	6581	1784	0.23	0.41	63.6	63.6	8.1	8.1	A

Segment 5: Basic

AP	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.92	0.980	1541	4387	0.35	63.6	12.1	B

Facility Analysis Results

AP	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	63.6	11.4	11.2	4.20	B

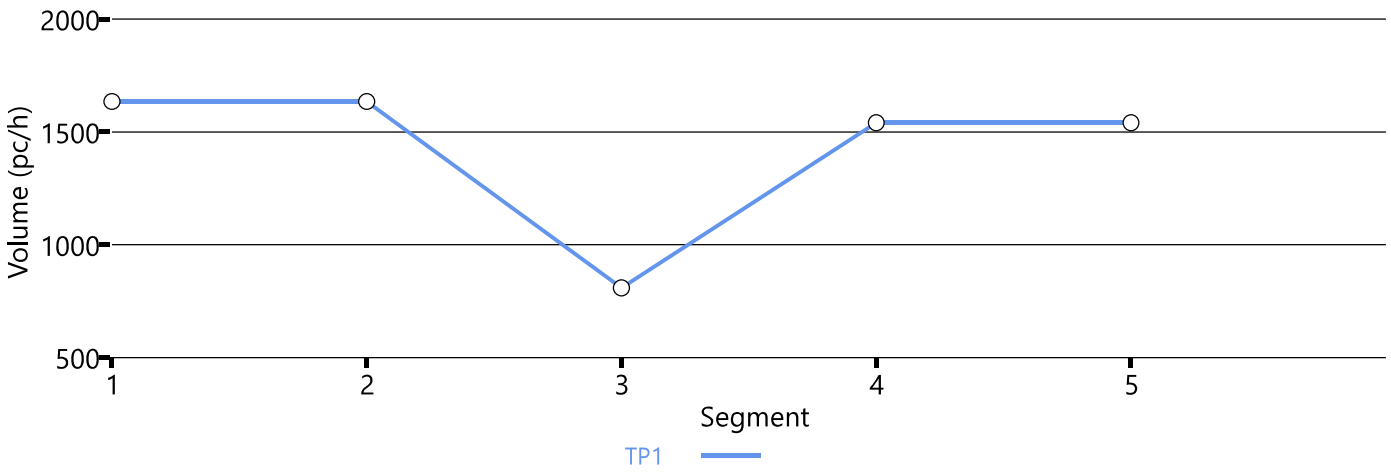
Facility Overall Results

Space Mean Speed, mi/h	63.6	Density, veh/mi/ln	11.2
Average Travel Time, min	4.20	Density, pc/mi/ln	11.4

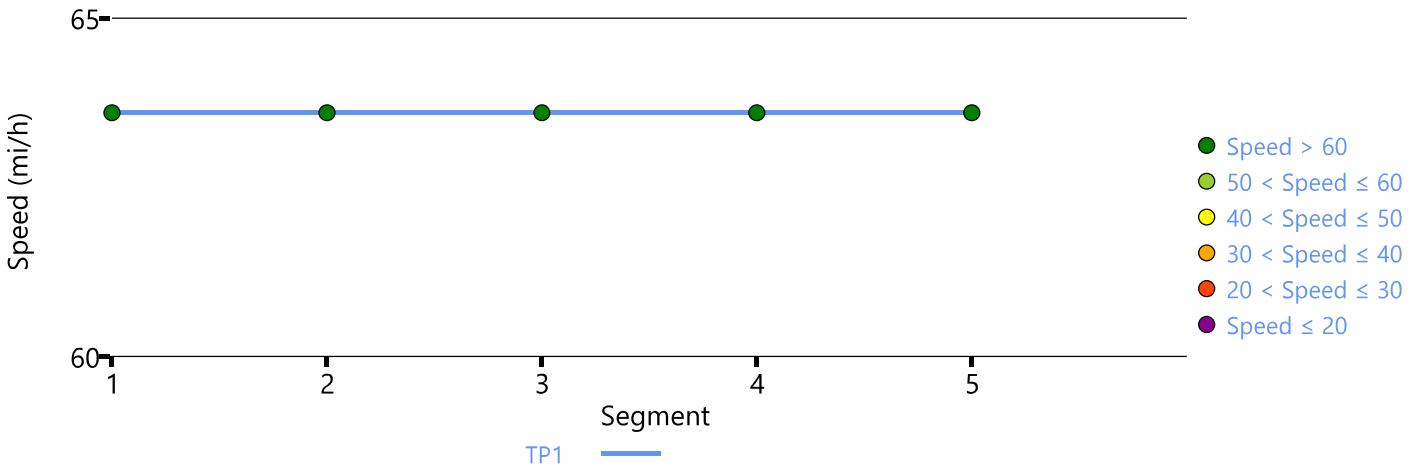
Messages

Comments

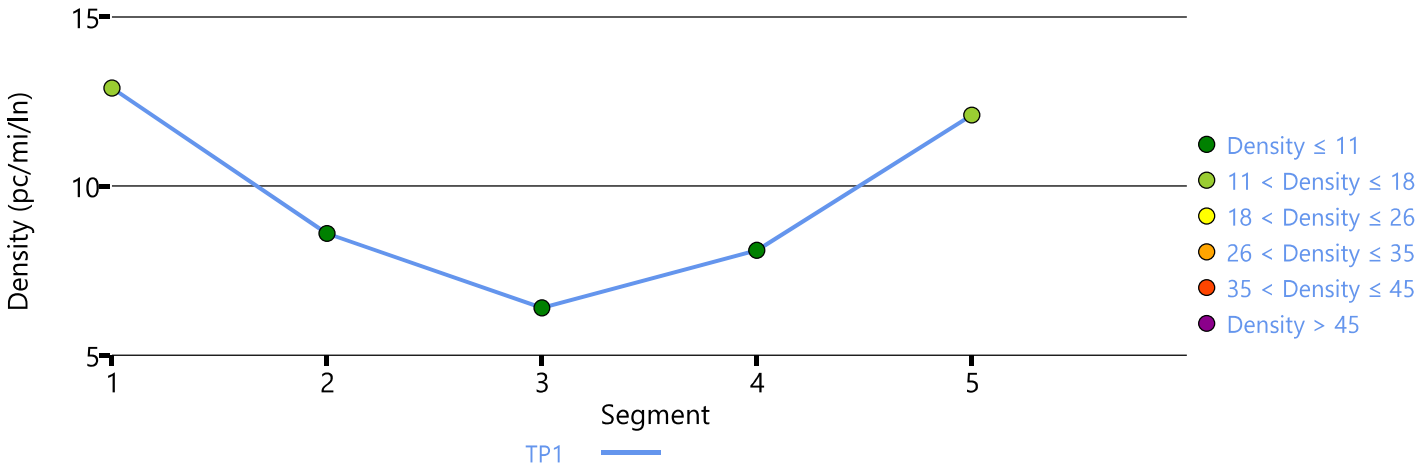
Volume Distribution



Speed Distribution



Density Distribution



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Appendix J
Supplemental Counts/Analysis

TRAFFIC DATA COLLECTION

File Name : James City (DePue and Ashbury)
Site Code :
Start Date : 10/9/2025
Page No : 1

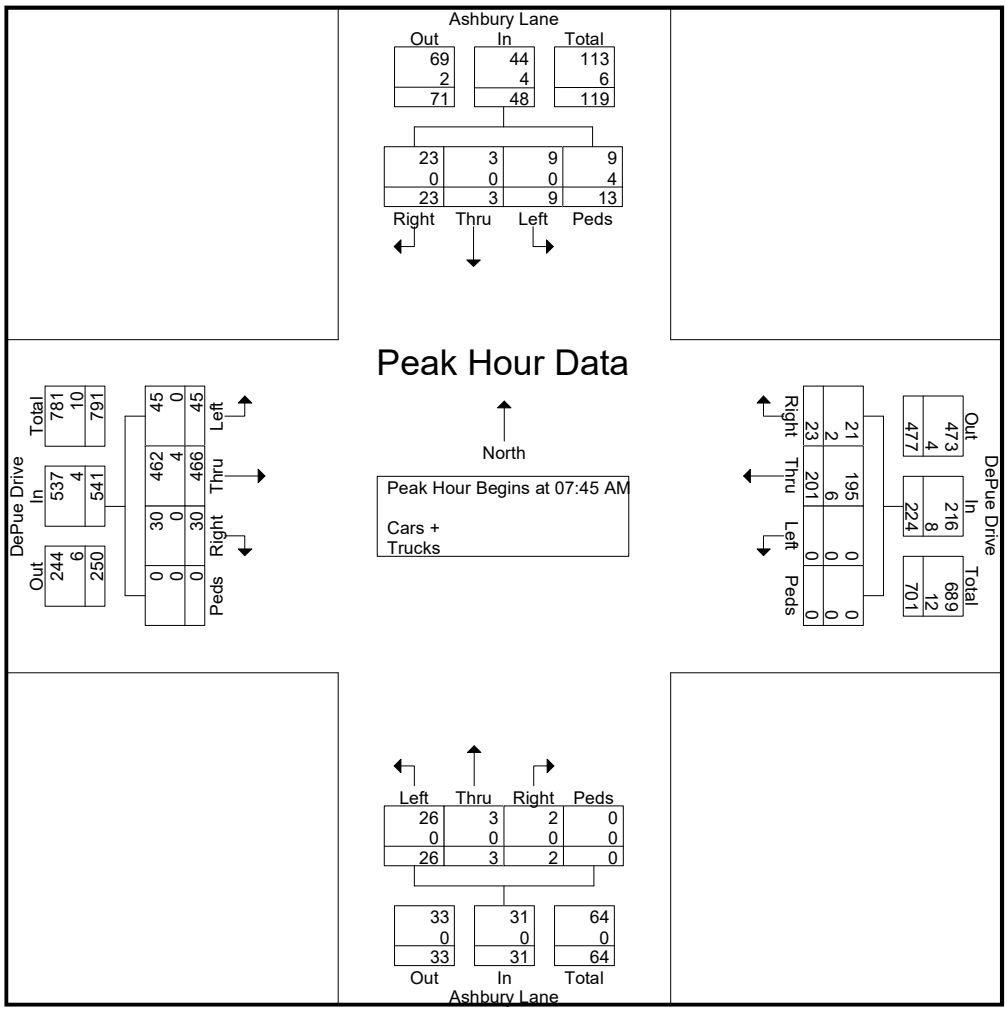
Groups Printed- Cars + - Trucks

	Ashbury Lane Southbound					DePue Drive Westbound					Ashbury Lane Northbound					DePue Drive Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	4	2	3	0	9	1	21	4	0	26	8	0	1	0	9	2	68	8	0	78	122
07:15 AM	2	1	11	0	14	2	36	0	0	38	0	0	0	0	0	12	100	19	0	131	183
07:30 AM	6	2	9	1	18	1	27	6	0	34	10	0	0	0	10	4	103	12	0	119	181
07:45 AM	3	1	6	3	13	0	61	6	0	67	10	1	0	0	11	19	148	15	0	182	273
Total	15	6	29	4	54	4	145	16	0	165	28	1	1	0	30	37	419	54	0	510	759
08:00 AM	2	0	2	3	7	0	59	4	0	63	7	0	0	0	7	3	105	8	0	116	193
08:15 AM	3	0	8	6	17	0	32	5	0	37	5	0	1	0	6	13	106	7	0	126	186
08:30 AM	1	2	7	1	11	0	49	8	0	57	4	2	1	0	7	10	107	0	0	117	192
08:45 AM	4	0	5	4	13	0	46	8	0	54	4	0	1	0	5	11	122	3	0	136	208
Total	10	2	22	14	48	0	186	25	0	211	20	2	3	0	25	37	440	18	0	495	779
Grand Total	25	8	51	18	102	4	331	41	0	376	48	3	4	0	55	74	859	72	0	1005	1538
Apprch %	24.5	7.8	50	17.6		1.1	88	10.9	0		87.3	5.5	7.3	0		7.4	85.5	7.2	0		
Total %	1.6	0.5	3.3	1.2	6.6	0.3	21.5	2.7	0	24.4	3.1	0.2	0.3	0	3.6	4.8	55.9	4.7	0	65.3	
Cars +	25	8	51	14	98	4	321	37	0	362	48	3	4	0	55	73	850	72	0	995	1510
% Cars +	100	100	100	77.8	96.1	100	97	90.2	0	96.3	100	100	100	0	100	98.6	99	100	0	99	98.2
Trucks	0	0	0	4	4	0	10	4	0	14	0	0	0	0	0	1	9	0	0	10	28
% Trucks	0	0	0	22.2	3.9	0	3	9.8	0	3.7	0	0	0	0	0	1.4	1	0	0	1	1.8

TRAFFIC DATA COLLECTION

File Name : James City (DePue and Ashbury)
Site Code :
Start Date : 10/9/2025
Page No : 2

	Ashbury Lane Southbound					DePue Drive Westbound					Ashbury Lane Northbound					DePue Drive Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**3**	1	6	3	13	0	**61**	6	0	**67**	**10**	1	0	0	**11**	**19**	**148**	**15**	0	**182**	**273**
08:00 AM	2	0	2	3	7	0	59	4	0	63	7	0	0	0	7	3	105	8	0	116	193
08:15 AM	3	0	**8**	**6**	**17**	0	32	5	0	37	5	0	**1**	0	6	13	106	7	0	126	186
08:30 AM	1	**2**	7	1	11	0	49	**8**	0	57	4	**2**	1	0	7	10	107	0	0	117	192
Total Volume	9	3	23	13	48	0	201	23	0	224	26	3	2	0	31	45	466	30	0	541	844
% App. Total	18.8	6.2	47.9	27.1		0	89.7	10.3	0		83.9	9.7	6.5	0		8.3	86.1	5.5	0		
PHF	.750	.375	.719	.542	.706	.000	.824	.719	.000	.836	.650	.375	.500	.000	.705	.592	.787	.500	.000	.743	.773
Cars +	9	3	23	9	44	0	195	21	0	216	26	3	2	0	31	45	462	30	0	537	828
% Cars +	100	100	100	69.2	91.7	0	97.0	91.3	0	96.4	100	100	100	0	100	100	99.1	100	0	99.3	98.1
Trucks	0	0	0	4	4	0	6	2	0	8	0	0	0	0	0	0	4	0	0	4	16
% Trucks	0	0	0	30.8	8.3	0	3.0	8.7	0	3.6	0	0	0	0	0	0	0.9	0	0	0.7	1.9



TRAFFIC DATA COLLECTION

File Name : James City (DePue and Ashbury)
Site Code :
Start Date : 10/9/2025
Page No : 1

Groups Printed- Cars + - Trucks

	Ashbury Lane Southbound					DePue Drive Westbound					Ashbury Lane Northbound					DePue Drive Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	3	0	4	2	9	1	111	5	0	117	22	1	7	0	30	9	88	0	0	97	253
04:15 PM	4	0	8	5	17	0	101	8	0	109	5	0	1	0	6	4	87	2	0	93	225
04:30 PM	5	0	14	1	20	0	106	11	0	117	5	1	0	0	6	11	80	4	0	95	238
04:45 PM	9	0	8	0	17	1	114	10	0	125	7	0	0	0	7	15	118	1	0	134	283
Total	21	0	34	8	63	2	432	34	0	468	39	2	8	0	49	39	373	7	0	419	999
05:00 PM	5	0	9	0	14	0	156	13	0	169	10	1	0	0	11	9	109	1	0	119	313
05:15 PM	9	0	9	2	20	1	124	16	0	141	0	1	0	0	1	24	89	0	0	113	275
05:30 PM	9	0	9	3	21	0	110	6	0	116	2	0	0	0	2	11	81	1	0	93	232
05:45 PM	5	0	14	4	23	0	70	8	0	78	4	1	0	0	5	14	89	2	0	105	211
Total	28	0	41	9	78	1	460	43	0	504	16	3	0	0	19	58	368	4	0	430	1031
Grand Total	49	0	75	17	141	3	892	77	0	972	55	5	8	0	68	97	741	11	0	849	2030
Apprch %	34.8	0	53.2	12.1		0.3	91.8	7.9	0		80.9	7.4	11.8	0		11.4	87.3	1.3	0		
Total %	2.4	0	3.7	0.8	6.9	0.1	43.9	3.8	0	47.9	2.7	0.2	0.4	0	3.3	4.8	36.5	0.5	0	41.8	
Cars +	49	0	75	13	137	3	884	74	0	961	55	5	8	0	68	97	735	10	0	842	2008
% Cars +	100	0	100	76.5	97.2	100	99.1	96.1	0	98.9	100	100	100	0	100	100	99.2	90.9	0	99.2	98.9
Trucks	0	0	0	4	4	0	8	3	0	11	0	0	0	0	0	0	6	1	0	7	22
% Trucks	0	0	0	23.5	2.8	0	0.9	3.9	0	1.1	0	0	0	0	0	0	0.8	9.1	0	0.8	1.1

TRAFFIC DATA COLLECTION

File Name : James City (DePue and Ashbury)
Site Code :
Start Date : 10/9/2025
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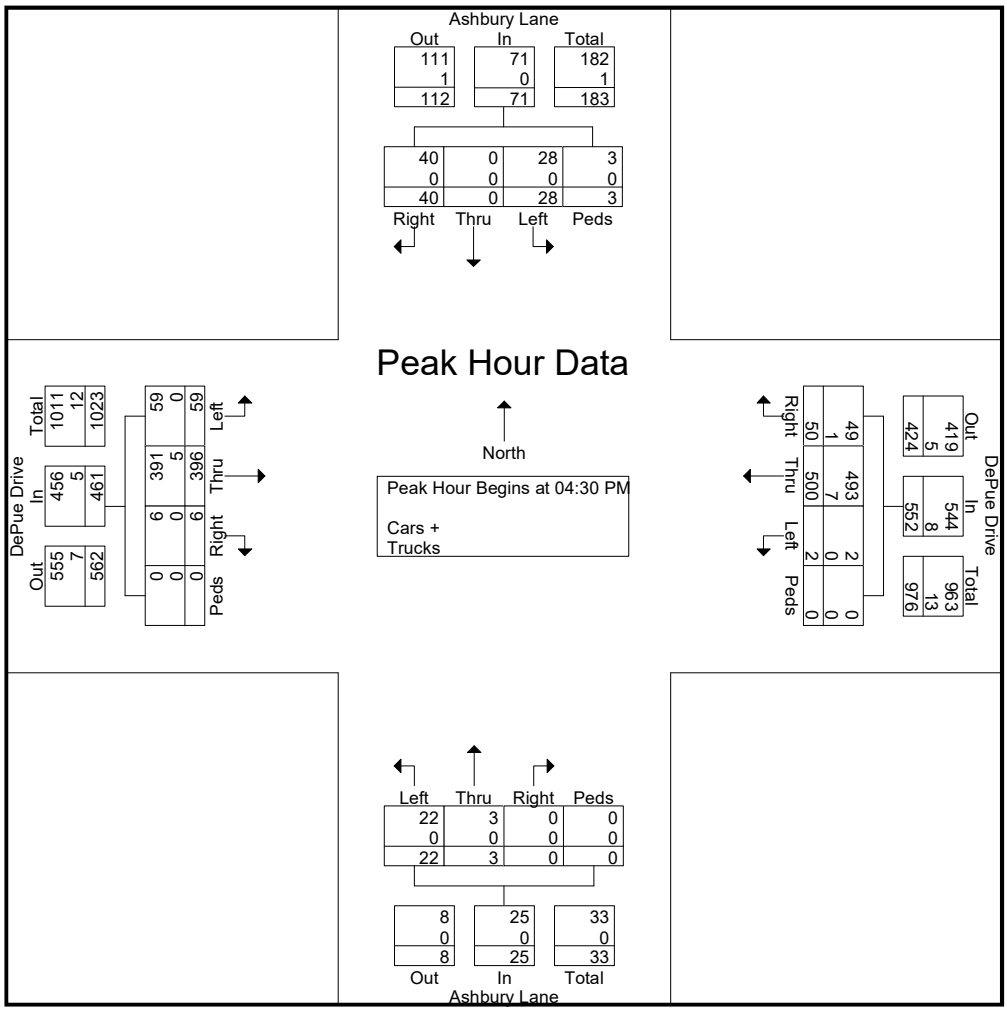
	Ashbury Lane Southbound					DePue Drive Westbound					Ashbury Lane Northbound					DePue Drive Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	5	0	**14**	1	**20**	0	106	11	0	117	5	**1**	0	0	6	11	80	**4**	0	95	238
04:45 PM	**9**	0	8	0	17	**1**	114	10	0	125	7	0	0	0	7	15	**118**	1	0	**134**	283
05:00 PM	5	0	9	0	14	0	**156**	13	0	**169**	**10**	1	0	0	**11**	9	109	1	0	119	**313**
05:15 PM	9	0	9	**2**	20	1	124	**16**	0	141	0	1	0	0	1	**24**	89	0	0	113	275
Total Volume	28	0	40	3	71	2	500	50	0	552	22	3	0	0	25	59	396	6	0	461	1109
% App. Total	39.4	0	56.3	4.2		0.4	90.6	9.1	0		88	12	0	0		12.8	85.9	1.3	0		
PHF	.778	.000	.714	.375	.888	.500	.801	.781	.000	.817	.550	.750	.000	.000	.568	.615	.839	.375	.000	.860	.886
Cars +	28	0	40	3	71	2	493	49	0	544	22	3	0	0	25	59	391	6	0	456	1096
% Cars +	100	0	100	100	100	100	98.6	98.0	0	98.6	100	100	0	0	100	100	98.7	100	0	98.9	98.8
Trucks	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	5	0	0	5	13
% Trucks	0	0	0	0	0	0	1.4	2.0	0	1.4	0	0	0	0	0	0	1.3	0	0	1.1	1.2



TRAFFIC DATA COLLECTION

File Name : James City (DePue and Longhill)
Site Code :
Start Date : 10/9/2025
Page No : 1

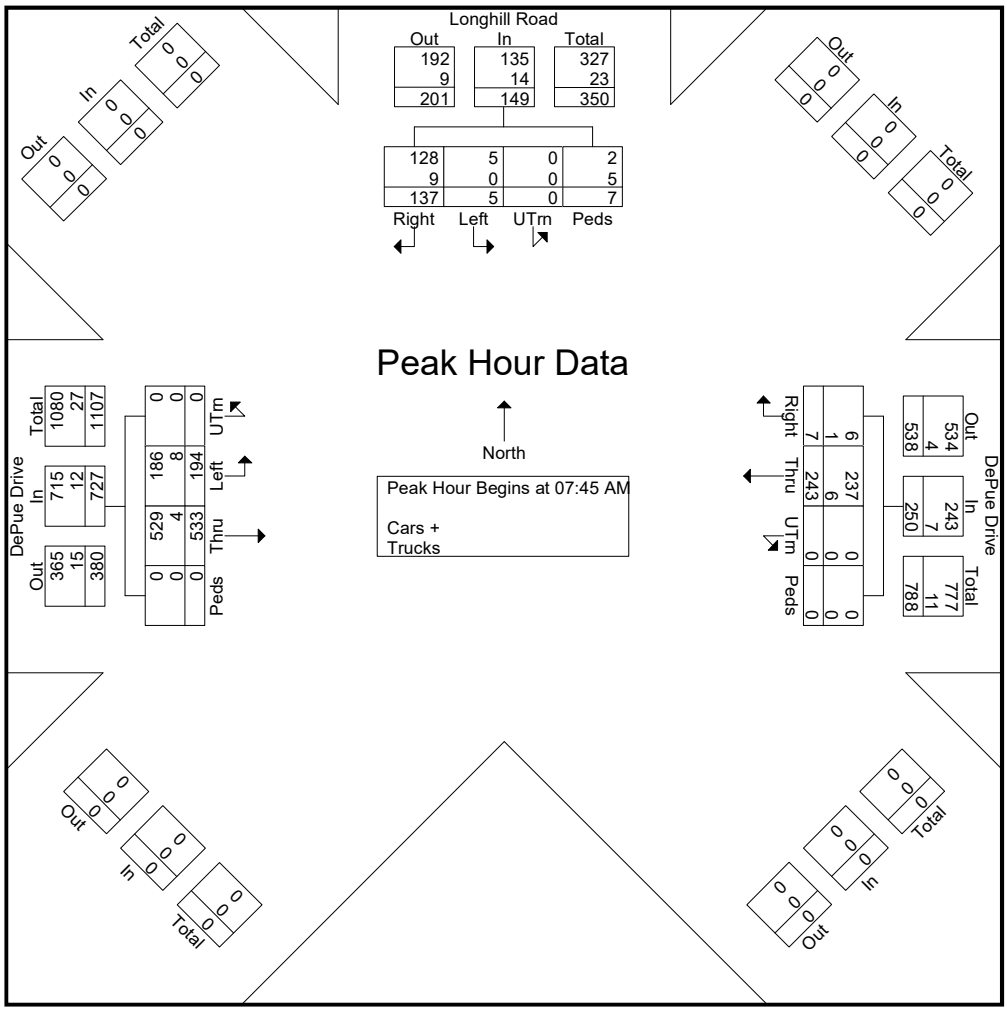
Groups Printed- Cars + - Trucks

	Longhill Road Southbound					DePue Drive Westbound					DePue Drive Eastbound					
Start Time	UTrn	Left	Right	Peds	App. Total	UTrn	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Peds	App. Total	Int. Total
07:00 AM	0	1	30	0	31	0	31	1	0	32	0	28	77	0	105	168
07:15 AM	0	2	25	0	27	0	47	1	0	48	0	40	130	0	170	245
07:30 AM	0	1	35	0	36	0	44	0	0	44	0	44	118	0	162	242
07:45 AM	0	2	32	3	37	0	76	3	0	79	0	86	177	0	263	379
Total	0	6	122	3	131	0	198	5	0	203	0	198	502	0	700	1034
08:00 AM	0	0	37	1	38	0	66	1	0	67	0	31	116	0	147	252
08:15 AM	0	2	30	2	34	0	44	2	0	46	0	32	131	0	163	243
08:30 AM	0	1	38	1	40	0	57	1	0	58	0	45	109	0	154	252
08:45 AM	0	0	33	1	34	0	55	2	0	57	0	51	141	0	192	283
Total	0	3	138	5	146	0	222	6	0	228	0	159	497	0	656	1030
Grand Total	0	9	260	8	277	0	420	11	0	431	0	357	999	0	1356	2064
Apprch %	0	3.2	93.9	2.9		0	97.4	2.6	0		0	26.3	73.7	0		
Total %	0	0.4	12.6	0.4	13.4	0	20.3	0.5	0	20.9	0	17.3	48.4	0	65.7	
Cars +	0	9	242	3	254	0	410	10	0	420	0	336	989	0	1325	1999
% Cars +	0	100	93.1	37.5	91.7	0	97.6	90.9	0	97.4	0	94.1	99	0	97.7	96.9
Trucks	0	0	18	5	23	0	10	1	0	11	0	21	10	0	31	65
% Trucks	0	0	6.9	62.5	8.3	0	2.4	9.1	0	2.6	0	5.9	1	0	2.3	3.1

TRAFFIC DATA COLLECTION

File Name : James City (DePue and Longhill)
Site Code :
Start Date : 10/9/2025
Page No : 2

	Longhill Road Southbound					DePue Drive Westbound					DePue Drive Eastbound					
Start Time	UTrn	Left	Right	Peds	App. Total	UTrn	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 07:45 AM																
07:45 AM	0	**2**	32	**3**	37	0	**76**	**3**	0	**79**	0	**86**	**177**	0	**263**	**379**
08:00 AM	0	0	37	1	38	0	66	1	0	67	0	31	116	0	147	252
08:15 AM	0	2	30	2	34	0	44	2	0	46	0	32	131	0	163	243
08:30 AM	0	1	**38**	1	**40**	0	57	1	0	58	0	45	109	0	154	252
Total Volume	0	5	137	7	149	0	243	7	0	250	0	194	533	0	727	1126
% App. Total	0	3.4	91.9	4.7		0	97.2	2.8	0		0	26.7	73.3	0		
PHF	.000	.625	.901	.583	.931	.000	.799	.583	.000	.791	.000	.564	.753	.000	.691	.743
Cars +	0	5	128	2	135	0	237	6	0	243	0	186	529	0	715	1093
% Cars +	0	100	93.4	28.6	90.6	0	97.5	85.7	0	97.2	0	95.9	99.2	0	98.3	97.1
Trucks	0	0	9	5	14	0	6	1	0	7	0	8	4	0	12	33
% Trucks	0	0	6.6	71.4	9.4	0	2.5	14.3	0	2.8	0	4.1	0.8	0	1.7	2.9



TRAFFIC DATA COLLECTION

File Name : James City (DePue and Longhill)
Site Code :
Start Date : 10/9/2025
Page No : 1

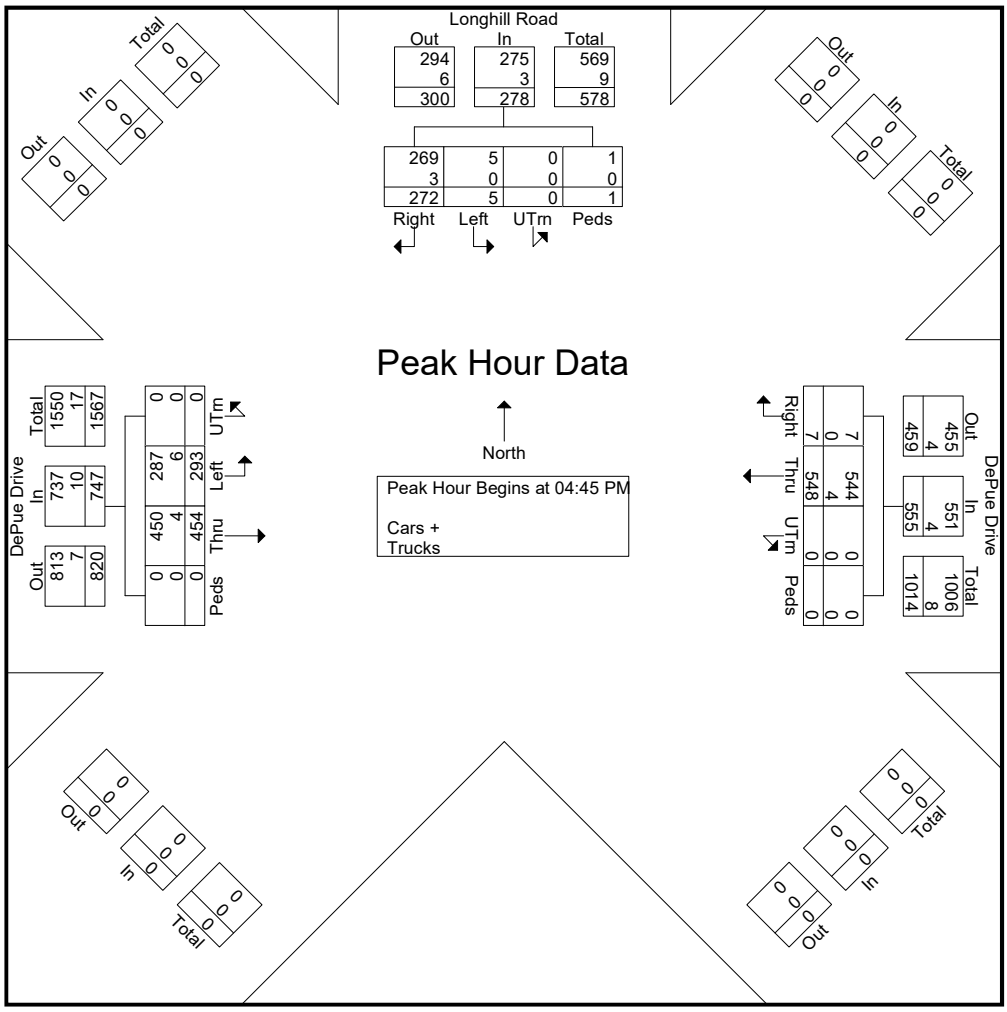
Groups Printed- Cars + - Trucks

	Longhill Road Southbound					DePue Drive Westbound					DePue Drive Eastbound					
Start Time	UTrn	Left	Right	Peds	App. Total	UTrn	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Peds	App. Total	Int. Total
04:00 PM	0	2	57	1	60	0	133	3	0	136	0	47	93	0	140	336
04:15 PM	0	2	63	0	65	0	109	7	0	116	1	52	96	0	149	330
04:30 PM	0	1	59	1	61	0	124	2	0	126	0	52	90	0	142	329
04:45 PM	0	1	64	0	65	0	124	1	0	125	0	58	137	0	195	385
Total	0	6	243	2	251	0	490	13	0	503	1	209	416	0	626	1380
05:00 PM	0	1	82	0	83	0	173	3	0	176	0	65	113	0	178	437
05:15 PM	0	2	69	1	72	0	134	2	0	136	0	100	115	0	215	423
05:30 PM	0	1	57	0	58	0	117	1	0	118	0	70	89	0	159	335
05:45 PM	0	1	54	1	56	0	88	2	0	90	0	51	104	0	155	301
Total	0	5	262	2	269	0	512	8	0	520	0	286	421	0	707	1496
Grand Total	0	11	505	4	520	0	1002	21	0	1023	1	495	837	0	1333	2876
Apprch %	0	2.1	97.1	0.8		0	97.9	2.1	0		0.1	37.1	62.8	0		
Total %	0	0.4	17.6	0.1	18.1	0	34.8	0.7	0	35.6	0	17.2	29.1	0	46.3	
Cars +	0	11	498	3	512	0	994	21	0	1015	1	485	829	0	1315	2842
% Cars +	0	100	98.6	75	98.5	0	99.2	100	0	99.2	100	98	99	0	98.6	98.8
Trucks	0	0	7	1	8	0	8	0	0	8	0	10	8	0	18	34
% Trucks	0	0	1.4	25	1.5	0	0.8	0	0	0.8	0	2	1	0	1.4	1.2

TRAFFIC DATA COLLECTION

File Name : James City (DePue and Longhill)
Site Code :
Start Date : 10/9/2025
Page No : 2

	Longhill Road Southbound					DePue Drive Westbound					DePue Drive Eastbound					
Start Time	UTrn	Left	Right	Peds	App. Total	UTrn	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 04:45 PM																
04:45 PM	0	1	64	0	65	0	124	1	0	125	0	58	**137**	0	195	385
05:00 PM	0	1	**82**	0	**83**	0	**173**	**3**	0	**176**	0	65	113	0	178	**437**
05:15 PM	0	**2**	69	**1**	72	0	134	2	0	136	0	**100**	115	0	**215**	423
05:30 PM	0	1	57	0	58	0	117	1	0	118	0	70	89	0	159	335
Total Volume	0	5	272	1	278	0	548	7	0	555	0	293	454	0	747	1580
% App. Total	0	1.8	97.8	0.4		0	98.7	1.3	0		0	39.2	60.8	0		
PHF	.000	.625	.829	.250	.837	.000	.792	.583	.000	.788	.000	.733	.828	.000	.869	.904
Cars +	0	5	269	1	275	0	544	7	0	551	0	287	450	0	737	1563
% Cars +	0	100	98.9	100	98.9	0	99.3	100	0	99.3	0	98.0	99.1	0	98.7	98.9
Trucks	0	0	3	0	3	0	4	0	0	4	0	6	4	0	10	17
% Trucks	0	0	1.1	0	1.1	0	0.7	0	0	0.7	0	2.0	0.9	0	1.3	1.1



TRAFFIC DATA COLLECTION

File Name : James City (DePue and VA 199 Ramps)
Site Code :
Start Date : 10/9/2025
Page No : 1

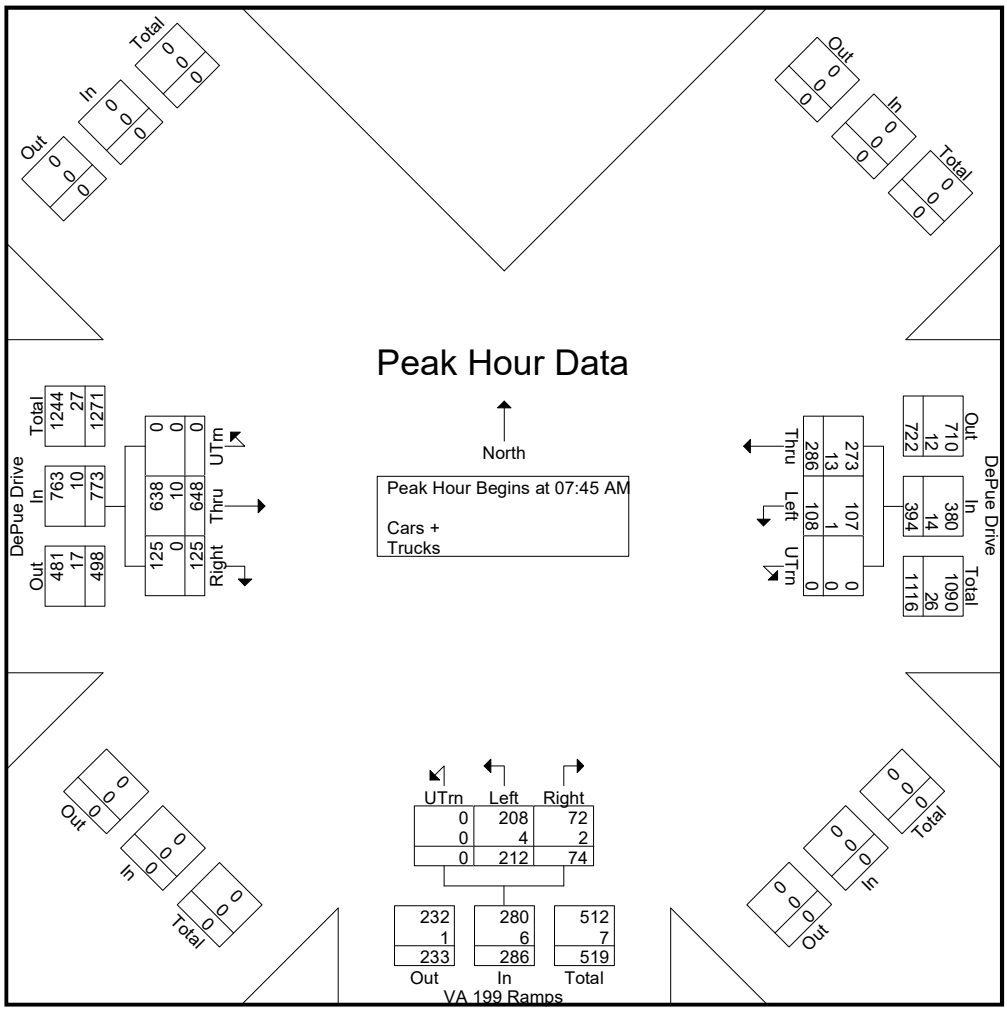
Groups Printed- Cars + - Trucks

	DePue Drive Westbound				VA 199 Ramps Northbound				DePue Drive Eastbound				
Start Time	UTrn	Left	Thru	App. Total	UTrn	Left	Right	App. Total	UTrn	Thru	Right	App. Total	Int. Total
07:00 AM	0	18	50	68	0	63	7	70	2	108	30	140	278
07:15 AM	0	22	51	73	0	30	13	43	0	154	24	178	294
07:30 AM	0	23	59	82	0	35	13	48	0	150	31	181	311
07:45 AM	0	31	84	115	0	51	39	90	0	218	30	248	453
Total	0	94	244	338	0	179	72	251	2	630	115	747	1336
08:00 AM	0	30	72	102	0	65	14	79	0	130	33	163	344
08:15 AM	0	26	53	79	0	46	12	58	0	150	28	178	315
08:30 AM	0	21	77	98	0	50	9	59	0	150	34	184	341
08:45 AM	0	21	72	93	0	66	16	82	0	173	32	205	380
Total	0	98	274	372	0	227	51	278	0	603	127	730	1380
Grand Total	0	192	518	710	0	406	123	529	2	1233	242	1477	2716
Apprch %	0	27	73		0	76.7	23.3		0.1	83.5	16.4		
Total %	0	7.1	19.1	26.1	0	14.9	4.5	19.5	0.1	45.4	8.9	54.4	
Cars +	0	190	493	683	0	398	120	518	2	1206	241	1449	2650
% Cars +	0	99	95.2	96.2	0	98	97.6	97.9	100	97.8	99.6	98.1	97.6
Trucks	0	2	25	27	0	8	3	11	0	27	1	28	66
% Trucks	0	1	4.8	3.8	0	2	2.4	2.1	0	2.2	0.4	1.9	2.4

TRAFFIC DATA COLLECTION

File Name : James City (DePue and VA 199 Ramps)
Site Code :
Start Date : 10/9/2025
Page No : 2

	DePue Drive Westbound				VA 199 Ramps Northbound				DePue Drive Eastbound				
Start Time	UTrn	Left	Thru	App. Total	UTrn	Left	Right	App. Total	UTrn	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	0	**31**	**84**	**115**	0	51	**39**	**90**	0	**218**	30	**248**	**453**
08:00 AM	0	30	72	102	0	**65**	14	79	0	130	33	163	344
08:15 AM	0	26	53	79	0	46	12	58	0	150	28	178	315
08:30 AM	0	21	77	98	0	50	9	59	0	150	**34**	184	341
Total Volume	0	108	286	394	0	212	74	286	0	648	125	773	1453
% App. Total	0	27.4	72.6		0	74.1	25.9		0	83.8	16.2		
PHF	.000	.871	.851	.857	.000	.815	.474	.794	.000	.743	.919	.779	.802
Cars +	0	107	273	380	0	208	72	280	0	638	125	763	1423
% Cars +	0	99.1	95.5	96.4	0	98.1	97.3	97.9	0	98.5	100	98.7	97.9
Trucks	0	1	13	14	0	4	2	6	0	10	0	10	30
% Trucks	0	0.9	4.5	3.6	0	1.9	2.7	2.1	0	1.5	0	1.3	2.1



TRAFFIC DATA COLLECTION

File Name : James City (DePue and VA 199 Ramps)
Site Code :
Start Date : 10/9/2025
Page No : 1

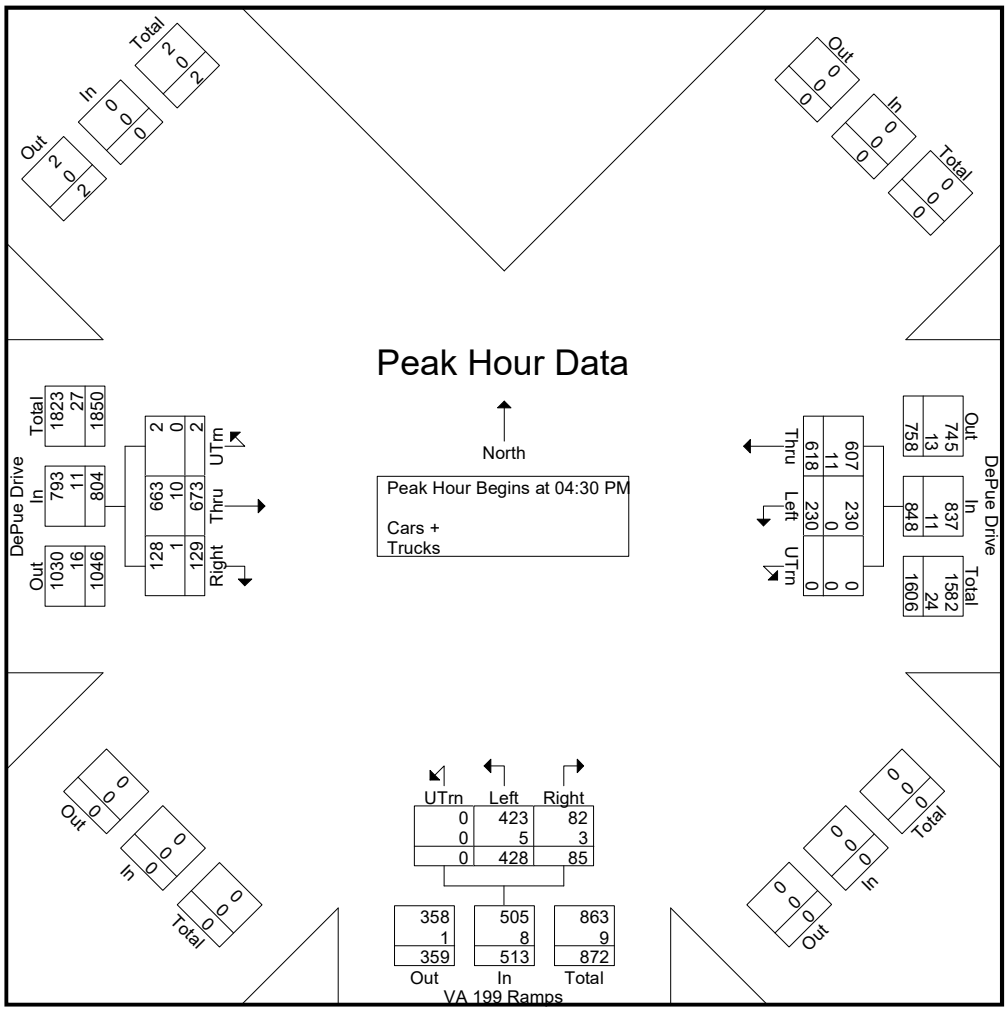
Groups Printed- Cars + - Trucks

	DePue Drive Westbound				VA 199 Ramps Northbound				DePue Drive Eastbound				
Start Time	UTrn	Left	Thru	App. Total	UTrn	Left	Right	App. Total	UTrn	Thru	Right	App. Total	Int. Total
04:00 PM	0	67	124	191	0	94	16	110	0	124	27	151	452
04:15 PM	0	30	142	172	0	102	15	117	0	134	29	163	452
04:30 PM	0	61	126	187	0	93	21	114	1	125	35	161	462
04:45 PM	0	42	158	200	0	111	20	131	0	179	29	208	539
Total	0	200	550	750	0	400	72	472	1	562	120	683	1905
05:00 PM	0	73	186	259	0	117	17	134	1	166	35	202	595
05:15 PM	0	54	148	202	0	107	27	134	0	203	30	233	569
05:30 PM	0	40	132	172	0	110	14	124	0	136	24	160	456
05:45 PM	0	23	114	137	0	76	11	87	0	148	20	168	392
Total	0	190	580	770	0	410	69	479	1	653	109	763	2012
Grand Total	0	390	1130	1520	0	810	141	951	2	1215	229	1446	3917
Apprch %	0	25.7	74.3		0	85.2	14.8		0.1	84	15.8		
Total %	0	10	28.8	38.8	0	20.7	3.6	24.3	0.1	31	5.8	36.9	
Cars +	0	389	1116	1505	0	805	138	943	2	1201	226	1429	3877
% Cars +	0	99.7	98.8	99	0	99.4	97.9	99.2	100	98.8	98.7	98.8	99
Trucks	0	1	14	15	0	5	3	8	0	14	3	17	40
% Trucks	0	0.3	1.2	1	0	0.6	2.1	0.8	0	1.2	1.3	1.2	1

TRAFFIC DATA COLLECTION

File Name : James City (DePue and VA 199 Ramps)
Site Code :
Start Date : 10/9/2025
Page No : 2

	DePue Drive Westbound				VA 199 Ramps Northbound				DePue Drive Eastbound				
Start Time	UTrn	Left	Thru	App. Total	UTrn	Left	Right	App. Total	UTrn	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	0	61	126	187	0	93	21	114	**1**	125	**35**	161	462
04:45 PM	0	42	158	200	0	111	20	131	0	179	29	208	539
05:00 PM	0	**73**	**186**	**259**	0	**117**	17	**134**	1	166	35	202	**595**
05:15 PM	0	54	148	202	0	107	**27**	134	0	**203**	30	**233**	569
Total Volume	0	230	618	848	0	428	85	513	2	673	129	804	2165
% App. Total	0	27.1	72.9		0	83.4	16.6		0.2	83.7	16		
PHF	.000	.788	.831	.819	.000	.915	.787	.957	.500	.829	.921	.863	.910
Cars +	0	230	607	837	0	423	82	505	2	663	128	793	2135
% Cars +	0	100	98.2	98.7	0	98.8	96.5	98.4	100	98.5	99.2	98.6	98.6
Trucks	0	0	11	11	0	5	3	8	0	10	1	11	30
% Trucks	0	0	1.8	1.3	0	1.2	3.5	1.6	0	1.5	0.8	1.4	1.4



Cardinal Ridge Count Comparison

Intersection #2 (Longhill Road at NB Route 199 Ramps)													
Street Name	EB - Longhill Road			WB - Longhill Road			NB - Route 199 NB Ramps			SB - N/A			Int. Total
Peak Hour	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing AM Peak Hour													
October 2025 Counts		648	125	108	286		212		74				1,453
Previous Counts (2022)		625	108	100	275		206		67				1,381
Previous Counts (Grown to 2025)		644	111	103	283		212		69				1,422
% change (October 2025 to grown 2025)		1%	13%	5%	1%		0%		7%				2%
Existing AM Peak Hour													
October 2025 Counts		673	129	230	618		428		85				2,163
Previous Counts (2022)		545	95	255	629		452		132				2,108
Previous Counts (Grown to 2025)		562	98	263	648		466		136				2,173
% change (October 2025 to grown 2025)		20%	32%	-13%	-5%		-8%		-38%				0%

Intersection #3 (Longhill Road at Longhill Connector/Depue Drive)													
Street Name	EB - Longhill Road			WB - DePue Drive			NB - N/A			SB - Longhill Connector			Int. Total
Peak Hour	Left	Thru	Right	Left	Thru	Right	Left		Right	Left	Thru	Right	
Existing AM Peak Hour													
October 2025 Counts	194	533			243	7				5		137	1,119
Previous Counts (2022)	176	502			209	2				5		140	1,034
Previous Counts (Grown to 2025)	181	517			215	2				5		144	1,064
% change (October 2025 to grown 2025)	7%	3%			13%	250%				0%		-5%	5%
Existing AM Peak Hour													
October 2025 Counts	275	455			555	8				5		274	1,572
Previous Counts (2022)	225	462			600	7				9		259	1,562
Previous Counts (Grown to 2025)	232	476			618	7				9		267	1,609
% change (October 2025 to grown 2025)	19%	-4%			-10%	14%				-44%		3%	-2%

Intersection #4 (DePue Drive at Ashbury Lane)													
Street Name	EB - DePue Drive			WB - DePue Drive			NB - Ashbury Lane			SB - Ashbury Lane			Int. Total
Peak Hour	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing AM Peak Hour													
October 2025 Counts	45	466	30	0	201	23	26	3	2	9	3	23	831
Previous Counts (2022)	28	451	30	4	178	19	12	1	0	26	1	25	775
Previous Counts (Grown to 2025)	29	465	31	4	183	20	12	1	0	27	1	26	799
% change (October 2025 to grown 2025)	55%	0%	-3%	-100%	10%	15%	117%	200%	200%	-67%	200%	-12%	4%
Existing AM Peak Hour													
October 2025 Counts	59	396	6	2	500	50	22	3	0	28	0	40	1,106
Previous Counts (2022)	93	368	6	2	515	49	19	2	5	28	1	72	1,160
Previous Counts (Grown to 2025)	96	379	6	2	531	50	20	2	5	29	1	74	1,195
% change (October 2025 to grown 2025)	-39%	4%	0%	0%	-6%	0%	10%	50%	-100%	-3%	-100%	-46%	-7%

MOVEMENT SUMMARY

Site: 101 [Int 3 2038 Total AM Peak - New Counts (Site Folder: TF)]

Cardinal Ridge TIA
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Future Access (NB)														
3	L2	232	2.0	249	2.0	0.295	10.4	LOS B	1.5	37.8	0.76	0.77	0.77	23.2
8	T1	33	2.0	35	2.0	0.295	9.0	LOS A	1.5	37.8	0.76	0.76	0.76	22.2
18	R2	66	2.0	71	2.0	0.295	9.0	LOS A	1.5	37.8	0.76	0.76	0.76	22.6
Approach		331	2.0	356	2.0	0.295	10.0	LOS A	1.5	37.8	0.76	0.77	0.77	23.0
East: Longhill Road (WB)														
1	L2	45	2.0	48	2.0	0.380	8.6	LOS A	2.0	49.2	0.63	0.61	0.64	35.9
6	T1	605	0.0	651	0.0	0.380	8.1	LOS A	2.0	50.0	0.63	0.59	0.63	36.6
16	R2	8	0.0	9	0.0	0.380	7.8	LOS A	2.0	50.0	0.62	0.58	0.62	35.7
Approach		658	0.1	708	0.1	0.380	8.1	LOS A	2.0	50.0	0.63	0.59	0.63	36.5
North: Longhill Road Connector (SB)														
7	L2	6	0.0	6	0.0	0.159	6.6	LOS A	0.7	16.9	0.62	0.61	0.62	24.9
4	T1	45	2.0	48	2.0	0.159	6.8	LOS A	0.7	16.9	0.62	0.61	0.62	23.1
14	R2	174	5.0	187	5.0	0.159	6.3	LOS A	0.7	17.7	0.61	0.59	0.61	23.6
Approach		225	4.3	242	4.3	0.159	6.4	LOS A	0.7	17.7	0.61	0.60	0.61	23.5
West: Longhill Road8 (EB)														
5	L2	324	2.0	348	2.0	0.656	11.4	LOS B	5.9	150.4	0.46	0.26	0.46	33.5
2	T1	966	1.0	1039	1.0	0.656	11.2	LOS B	6.0	150.7	0.46	0.26	0.46	34.2
12	R2	273	2.0	294	2.0	0.656	11.1	LOS B	6.0	150.7	0.45	0.25	0.45	33.6
Approach		1563	1.4	1681	1.4	0.656	11.3	LOS B	6.0	150.7	0.46	0.26	0.46	34.0
All Vehicles		2777	1.4	2986	1.4	0.656	10.0	LOS A	6.0	150.7	0.55	0.42	0.55	31.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Int 3 2038 Total PM Peak - New Counts (Site Folder: TF)]

Cardinal Ridge TIA
Site Category: (None)
Roundabout

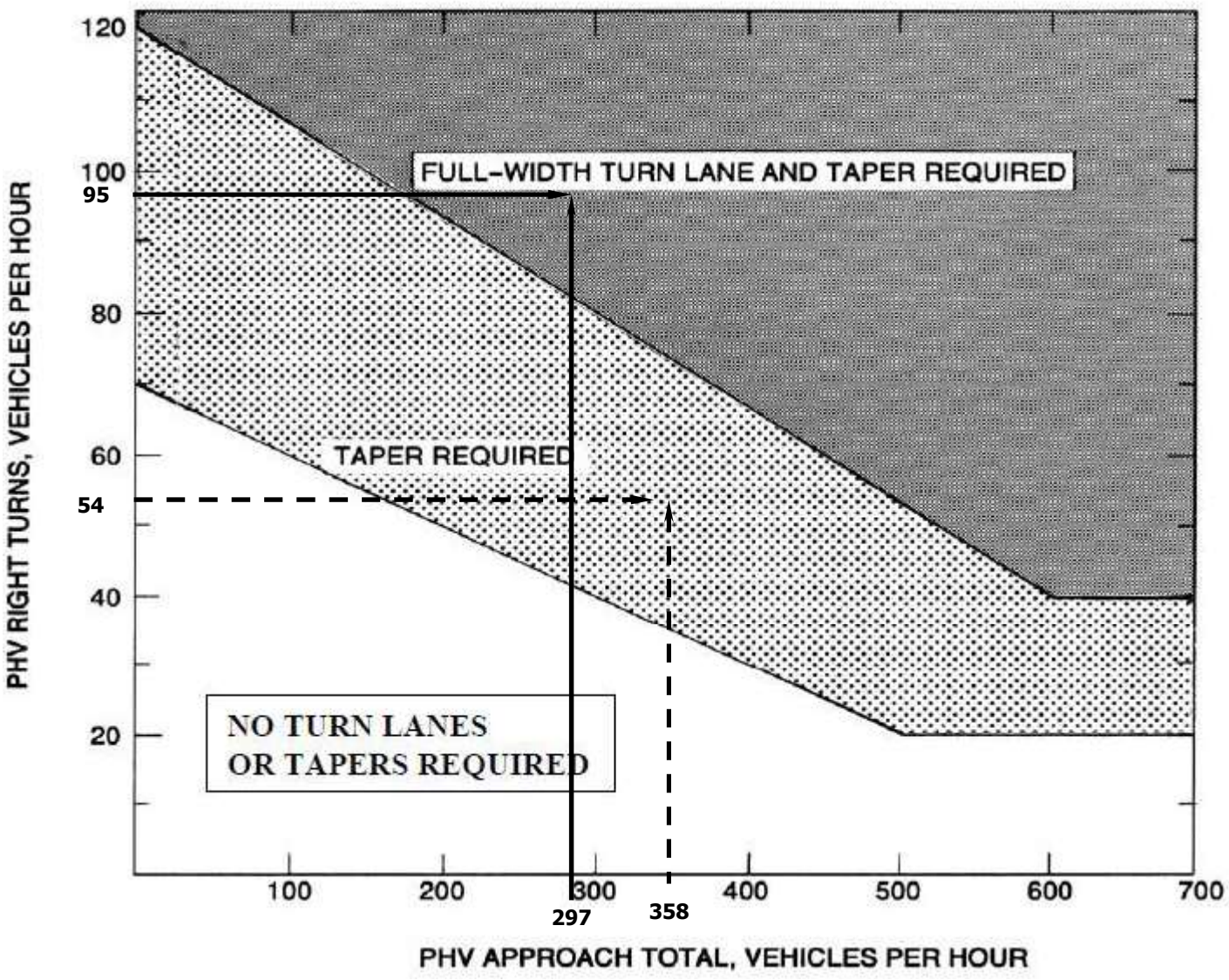
Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Future Access (NB)														
3	L2	297	2.0	319	2.0	0.400	12.5	LOS B	2.4	59.7	0.79	0.88	0.98	22.8
8	T1	28	2.0	30	2.0	0.400	10.9	LOS B	2.4	59.7	0.79	0.87	0.96	21.8
18	R2	123	2.0	132	2.0	0.400	10.9	LOS B	2.4	59.7	0.79	0.87	0.96	22.2
Approach		448	2.0	482	2.0	0.400	11.9	LOS B	2.4	59.7	0.79	0.88	0.97	22.6
East: Longhill Road (WB)														
1	L2	121	2.0	130	2.0	0.678	17.3	LOS C	7.0	181.1	0.81	1.02	1.45	31.2
6	T1	944	2.0	1015	2.0	0.678	15.9	LOS C	7.6	189.1	0.81	1.01	1.42	32.5
16	R2	9	2.0	10	2.0	0.678	15.0	LOS C	7.6	189.1	0.80	1.01	1.39	31.9
Approach		1074	2.0	1155	2.0	0.678	16.0	LOS C	7.6	189.1	0.81	1.01	1.42	32.3
North: Longhill Road Connector (SB)														
7	L2	6	11.0	6	11.0	0.455	17.3	LOS C	2.6	65.9	0.81	0.95	1.13	22.6
4	T1	25	2.0	27	2.0	0.455	16.1	LOS C	2.6	65.9	0.81	0.95	1.13	21.0
14	R2	428	3.0	460	3.0	0.455	14.3	LOS B	2.8	72.2	0.82	0.95	1.11	21.8
Approach		459	3.1	494	3.1	0.455	14.4	LOS B	2.8	72.2	0.82	0.95	1.11	21.7
West: Longhill Road (EB)														
5	L2	347	2.0	373	2.0	0.637	11.5	LOS B	5.6	143.5	0.58	0.38	0.58	33.2
2	T1	858	2.0	923	2.0	0.637	11.3	LOS B	5.7	144.8	0.58	0.38	0.58	34.1
12	R2	213	2.0	229	2.0	0.637	11.1	LOS B	5.7	144.8	0.57	0.37	0.57	33.6
Approach		1418	2.0	1525	2.0	0.637	11.3	LOS B	5.7	144.8	0.58	0.38	0.58	33.8
All Vehicles		3399	2.1	3655	2.1	0.678	13.3	LOS B	7.6	189.1	0.71	0.72	0.97	29.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix K
Turn Lane Warrant Analysis

GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)
FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F

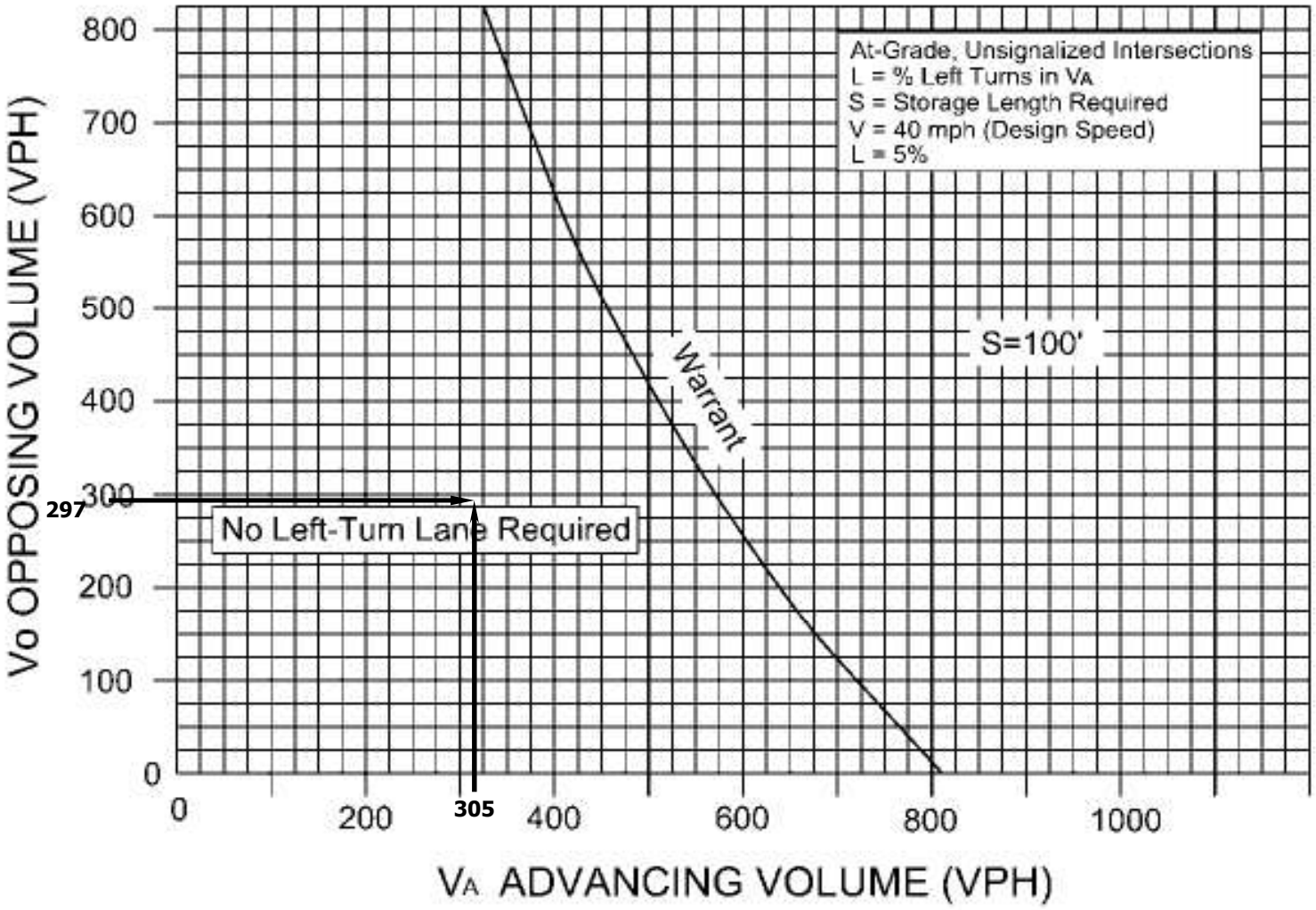


RIGHT TURN LANE AND TAPER REQUIRED

LEGEND
AM Peak Hour
PM Peak Hour

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Right-Turn Lane Guideline 2032 Future Volumes SBR at Commercial Access	Figure K.1

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (40 MPH)
FIGURE 3-4 VDOT ROAD DESIGN MANUAL APPENDIX F

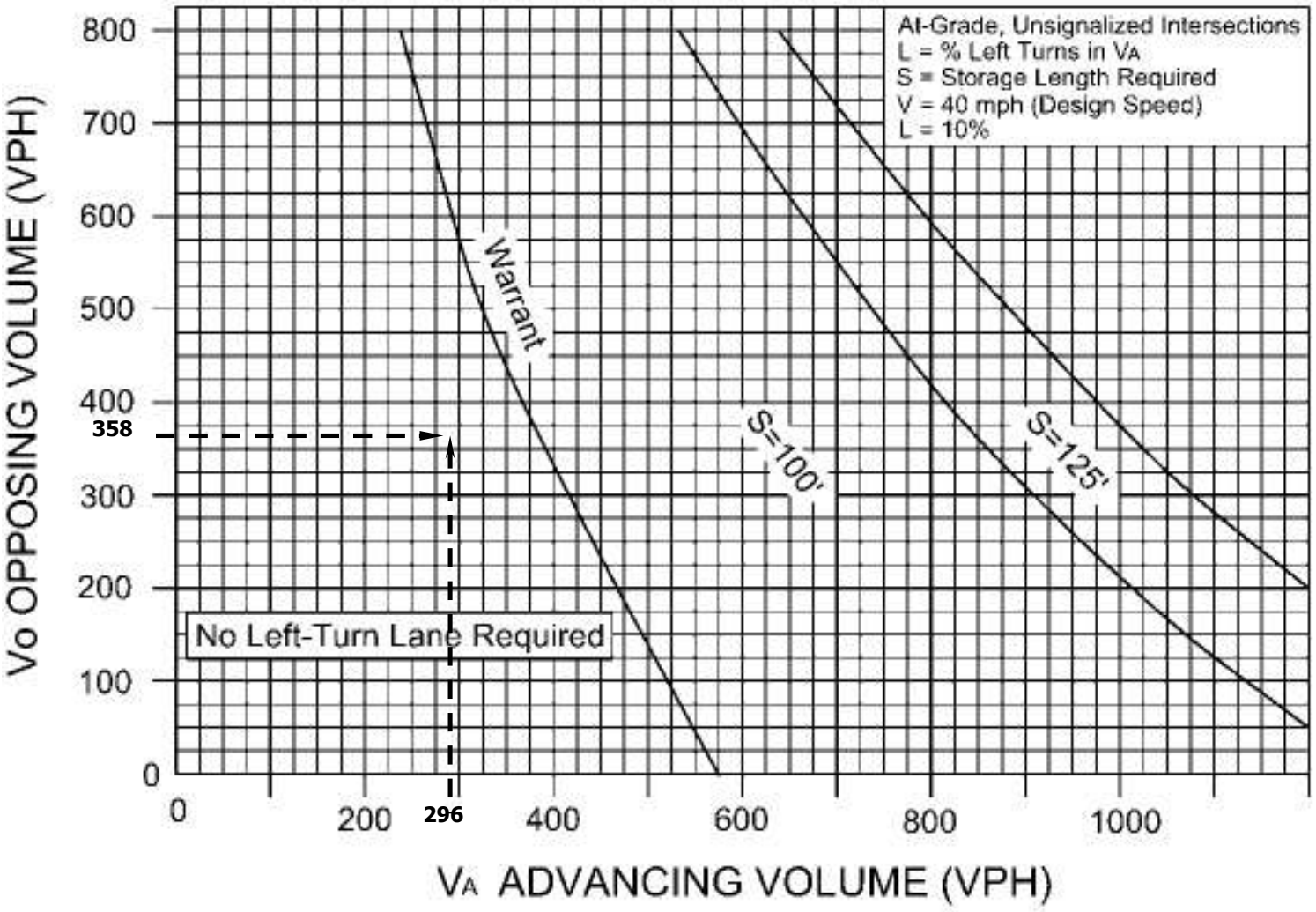


LEGEND
AM Peak Hour

NO LEFT TURN LANE REQUIRED

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Left-Turn Lane Warrant 2032 Total Future Volumes – AM Peak NBL at Commercial Access	Figure K.2

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (40 MPH)
FIGURE 3-5 VDOT ROAD DESIGN MANUAL APPENDIX F

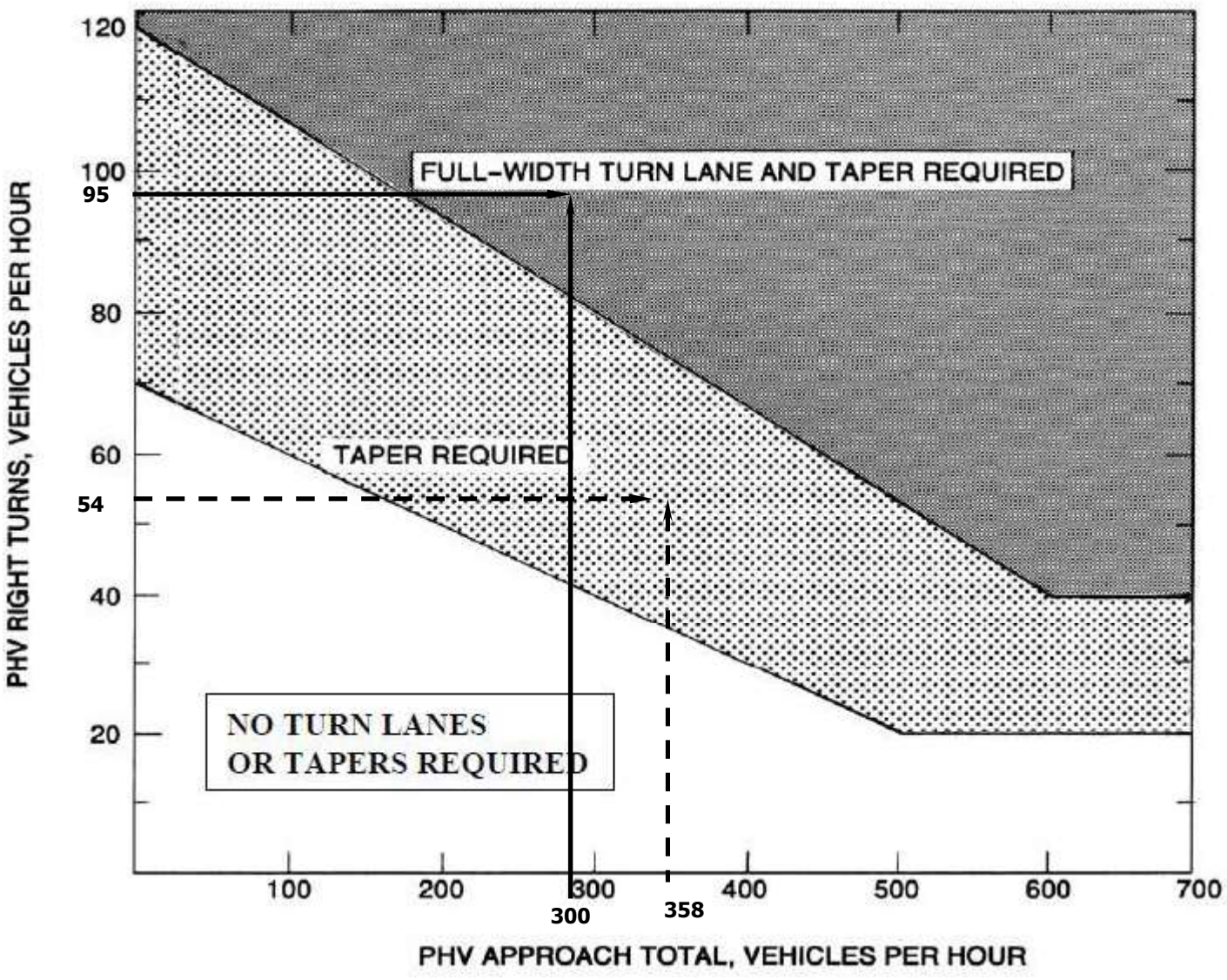


LEGEND
- - - - PM Peak Hour

NO LEFT TURN LANE REQUIRED

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Left-Turn Lane Warrant 2032 Total Future Volumes – PM Peak NBL at Commercial Access	Figure K.3

GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)
FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F



RIGHT TURN LANE AND TAPER REQUIRED

LEGEND

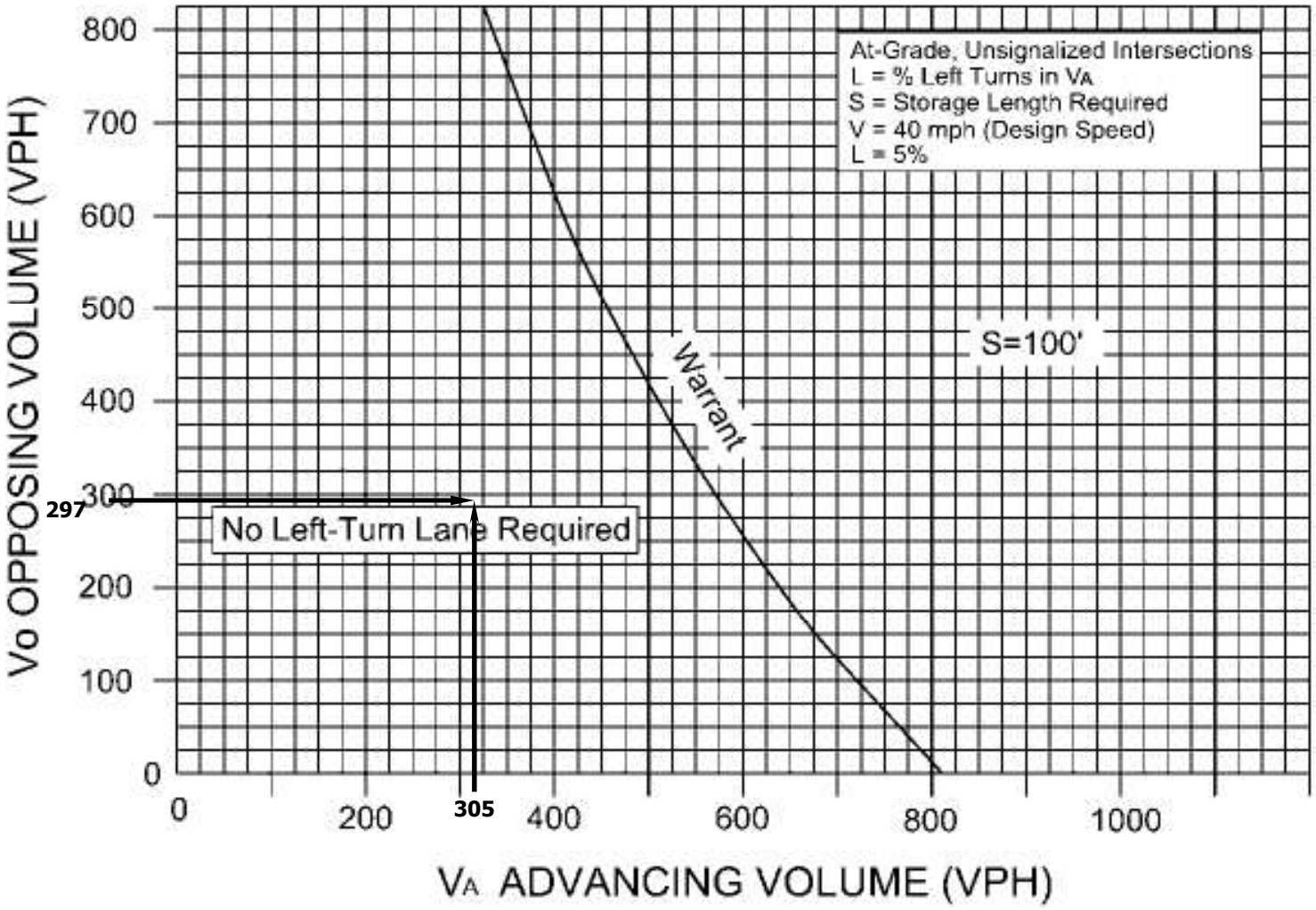
———	AM Peak Hour
- - - -	PM Peak Hour
30*	Adjusted Right Turns

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Right-Turn Lane Guideline
2038 Future Volumes
SBR at Commercial Access

Figure
K.4

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (40 MPH)
FIGURE 3-4 VDOT ROAD DESIGN MANUAL APPENDIX F

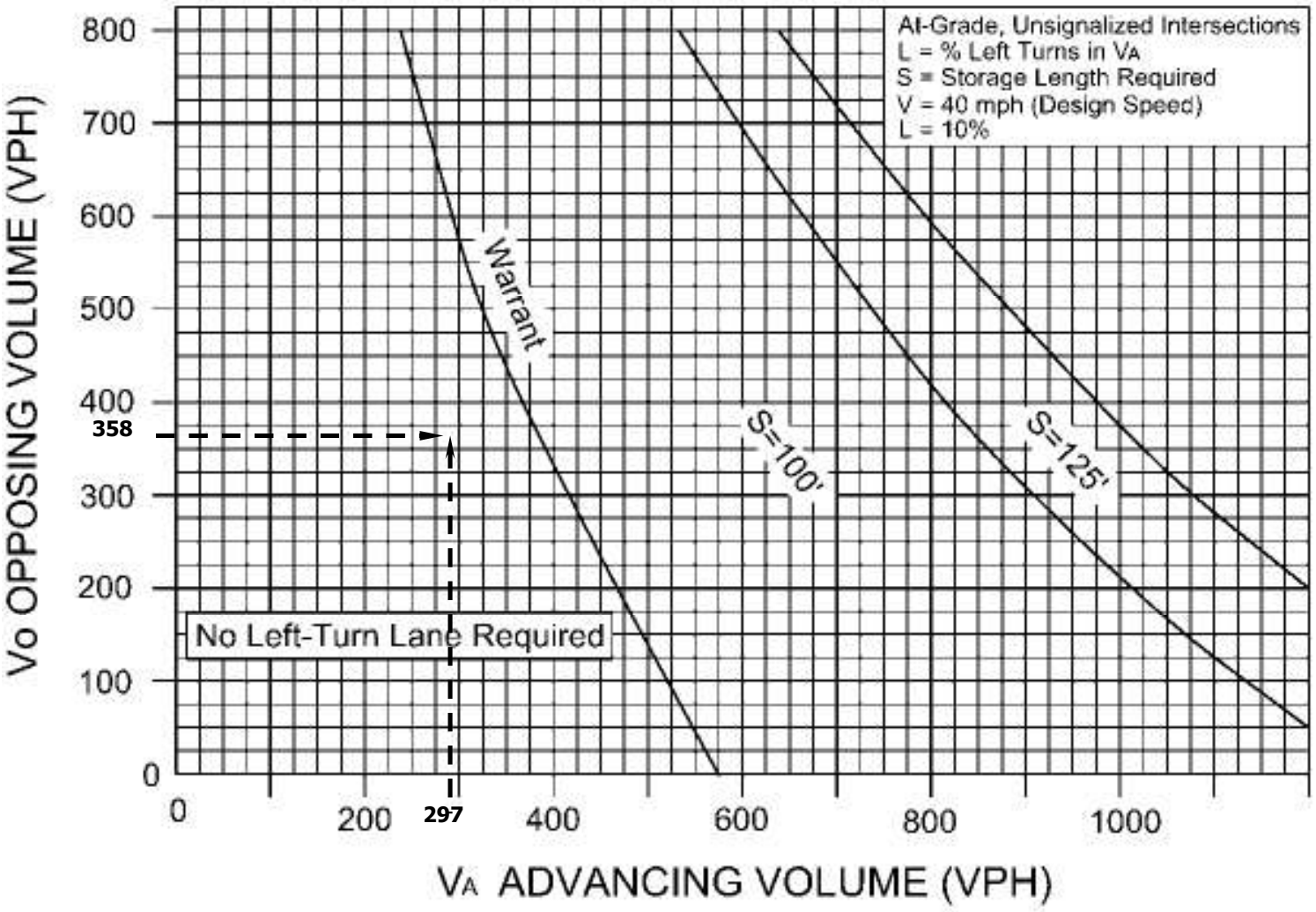


LEGEND
AM Peak Hour

NO LEFT TURN LANE REQUIRED

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Left-Turn Lane Warrant 2038 Total Future Volumes – AM Peak NBL at Commercial Access	Figure K.5

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (40 MPH)
FIGURE 3-5 VDOT ROAD DESIGN MANUAL APPENDIX F

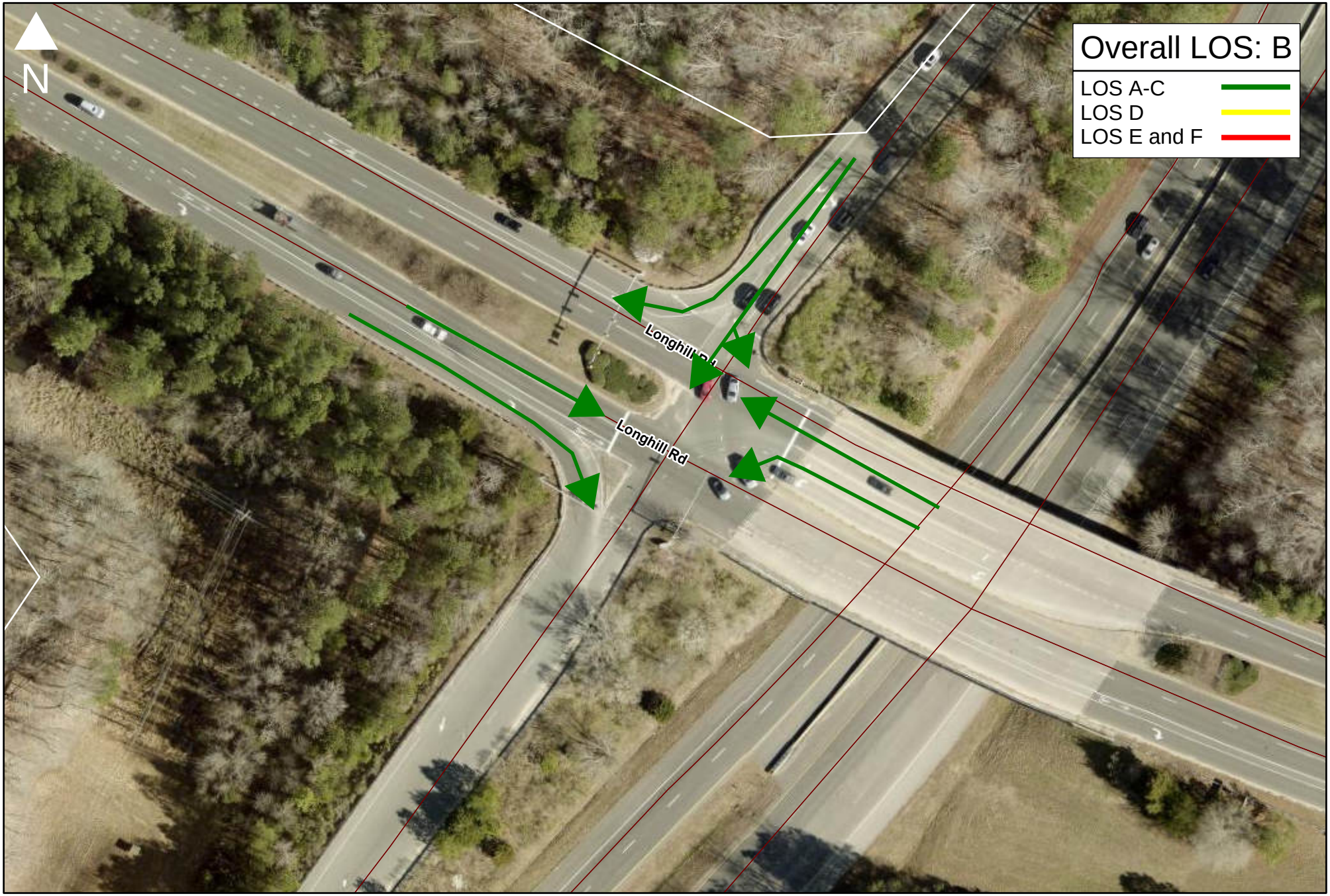


LEGEND
- - - - PM Peak Hour

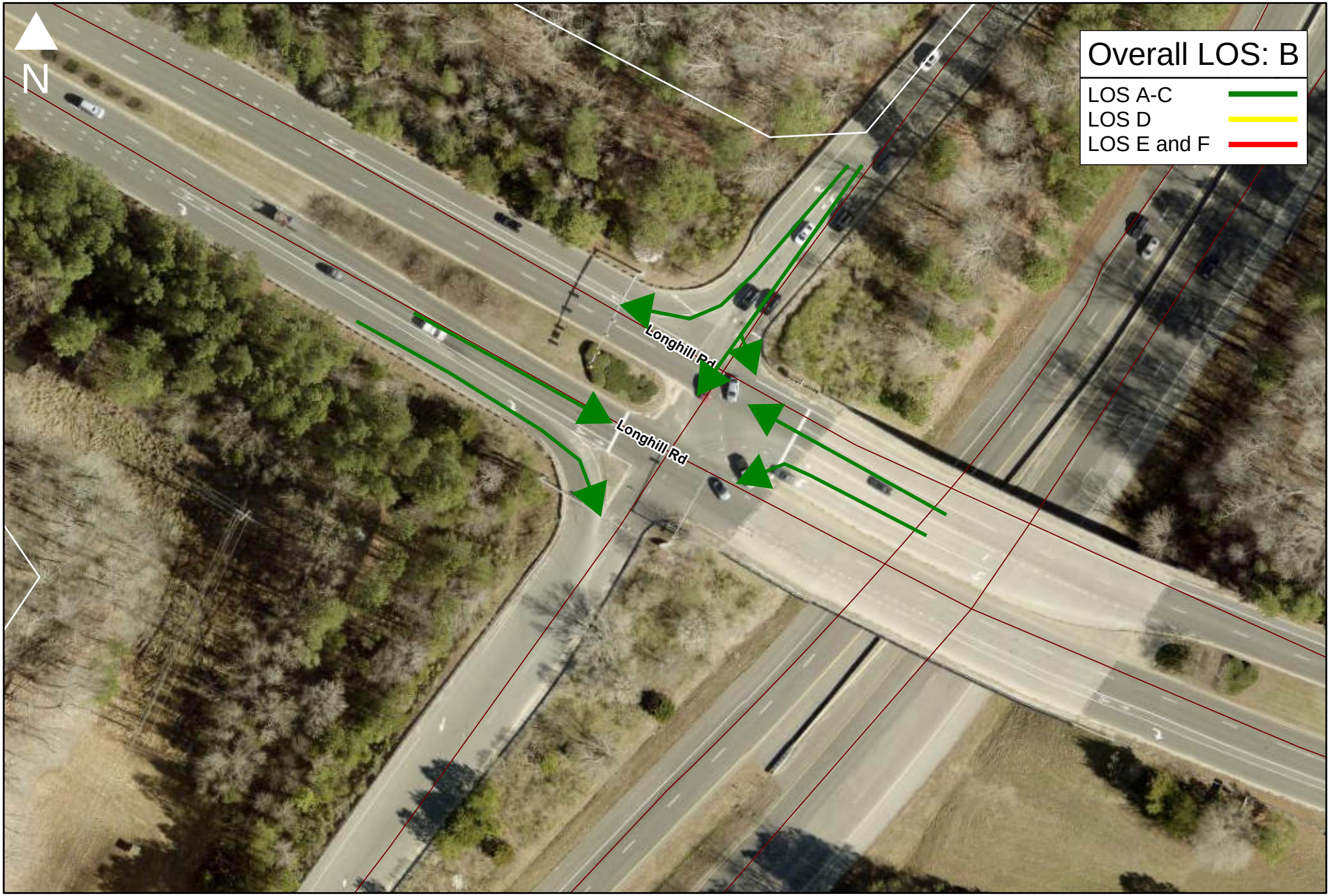
NO LEFT TURN LANE REQUIRED

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Left-Turn Lane Warrant 2038 Total Future Volumes – PM Peak NBL at Commercial Access	Figure K.6

2032 Build Level of Service: AM Peak Hour
Longhill Road (E-W) at Route 199 SB Ramps



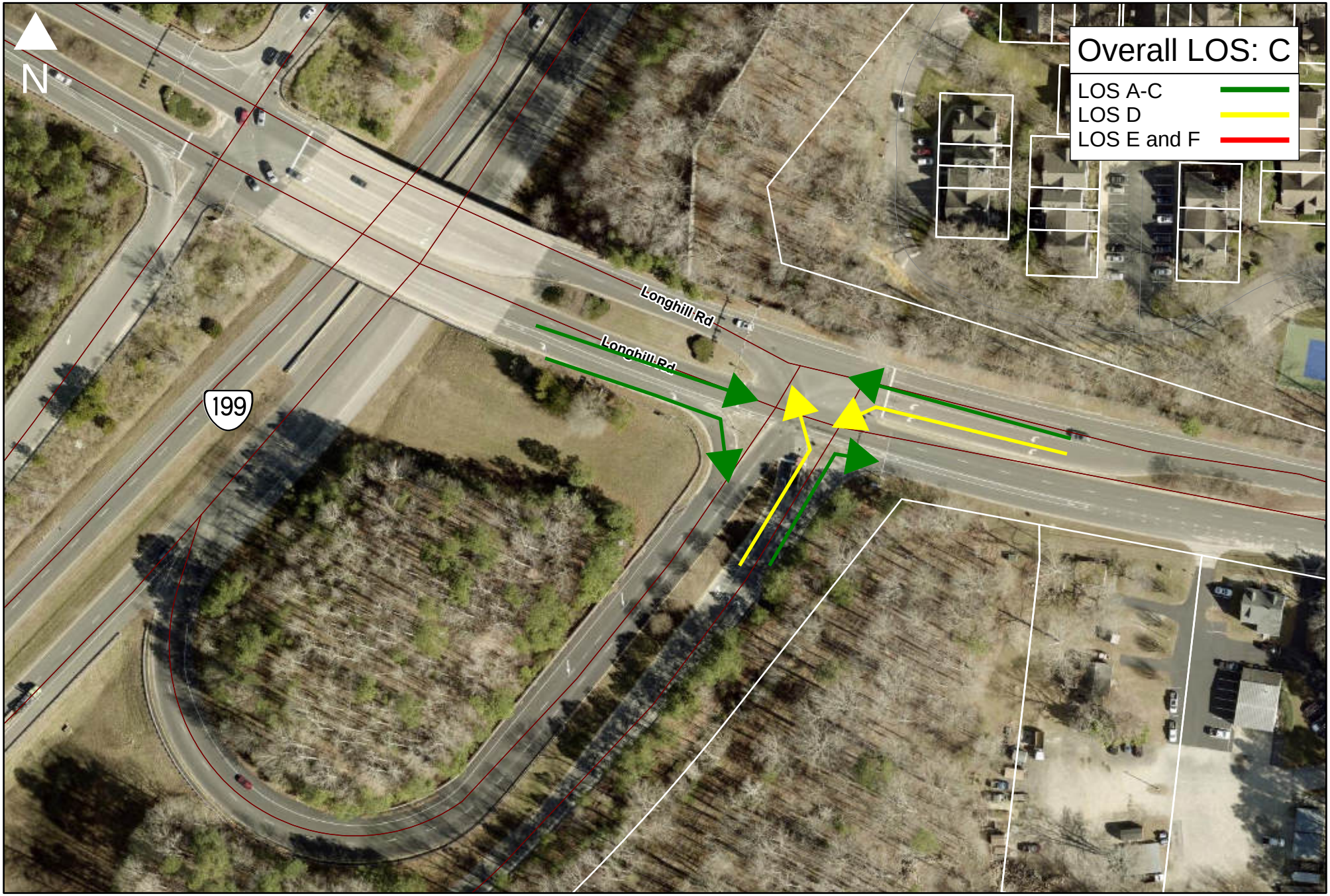
2032 Build Level of Service: PM Peak Hour
Longhill Road (E-W) at Route 199 SB Ramps



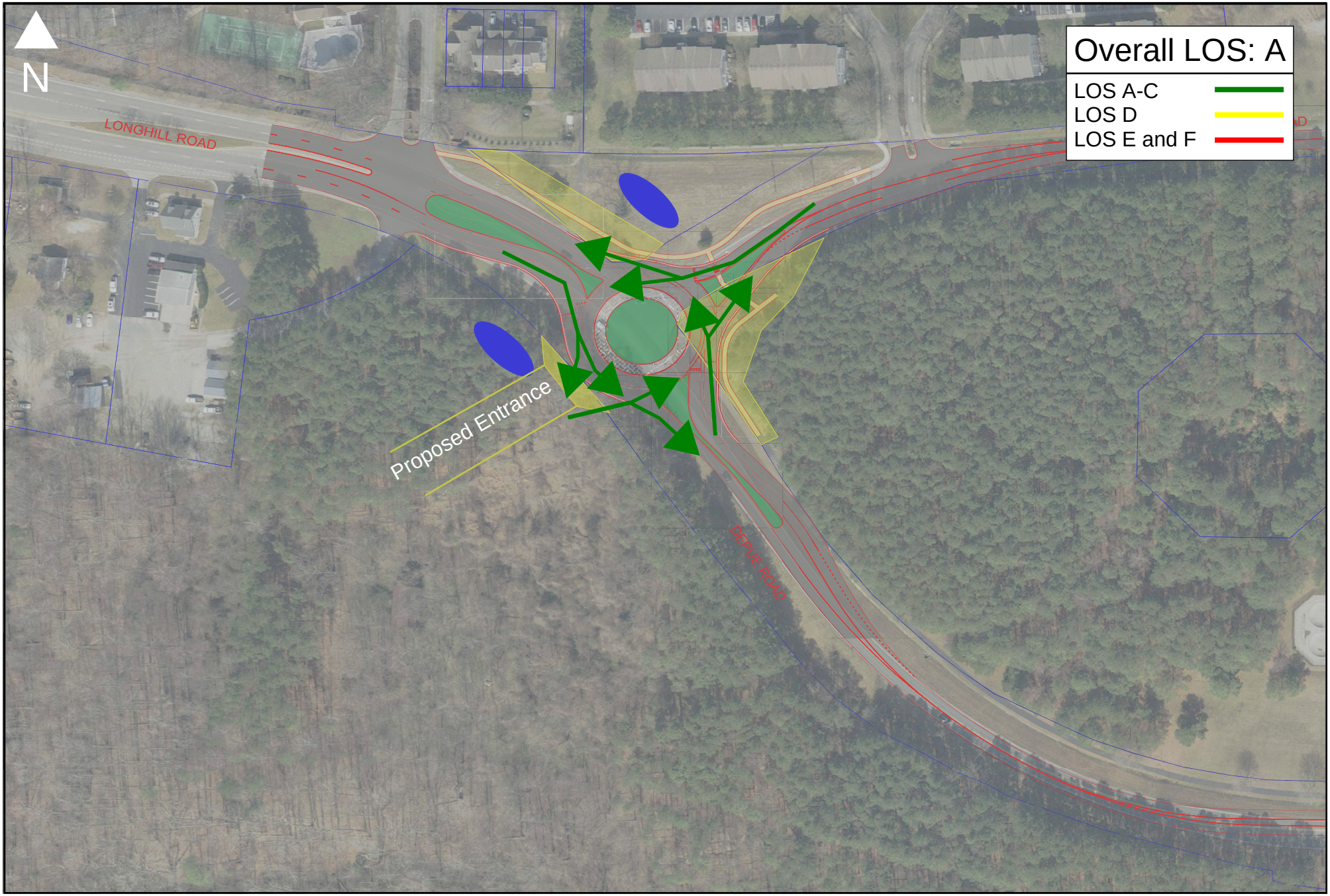
2032 Build Level of Service: AM Peak Hour
Longhill Road (E-W) at Route 199 NB Ramps



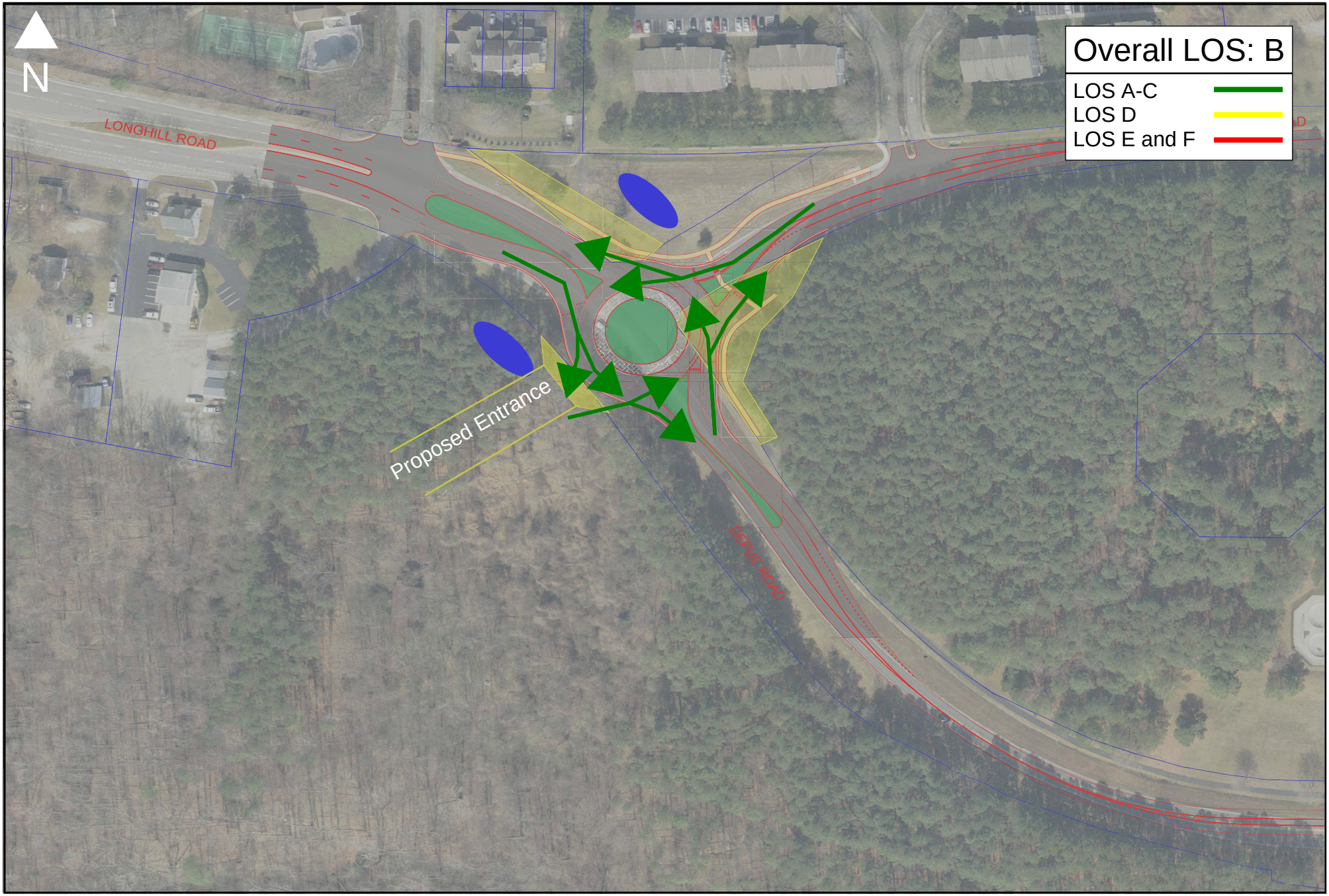
2032 Build Level of Service: PM Peak Hour
Longhill Road (E-W) at Route 199 NB Ramps



2032 Build Level of Service: AM Peak Hour
Longhill Road (E-W) at DePue Drive (Future Access)



2032 Build Level of Service: PM Peak Hour
Longhill Road (E-W) at DePue Drive (Future Access)



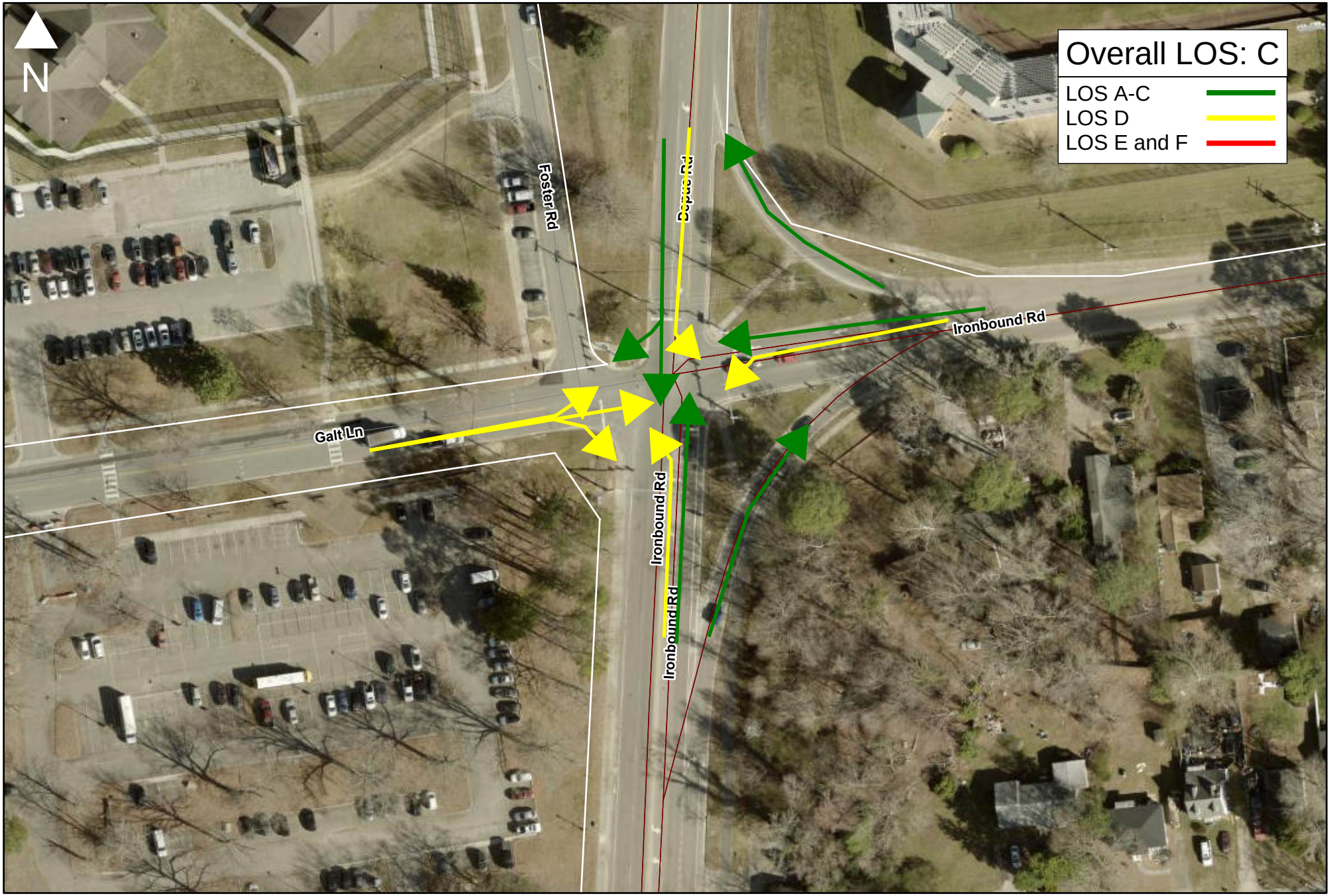
2032 Build Level of Service: AM Peak Hour
Longhill Road (E-W) at DePue Drive (Future Access)



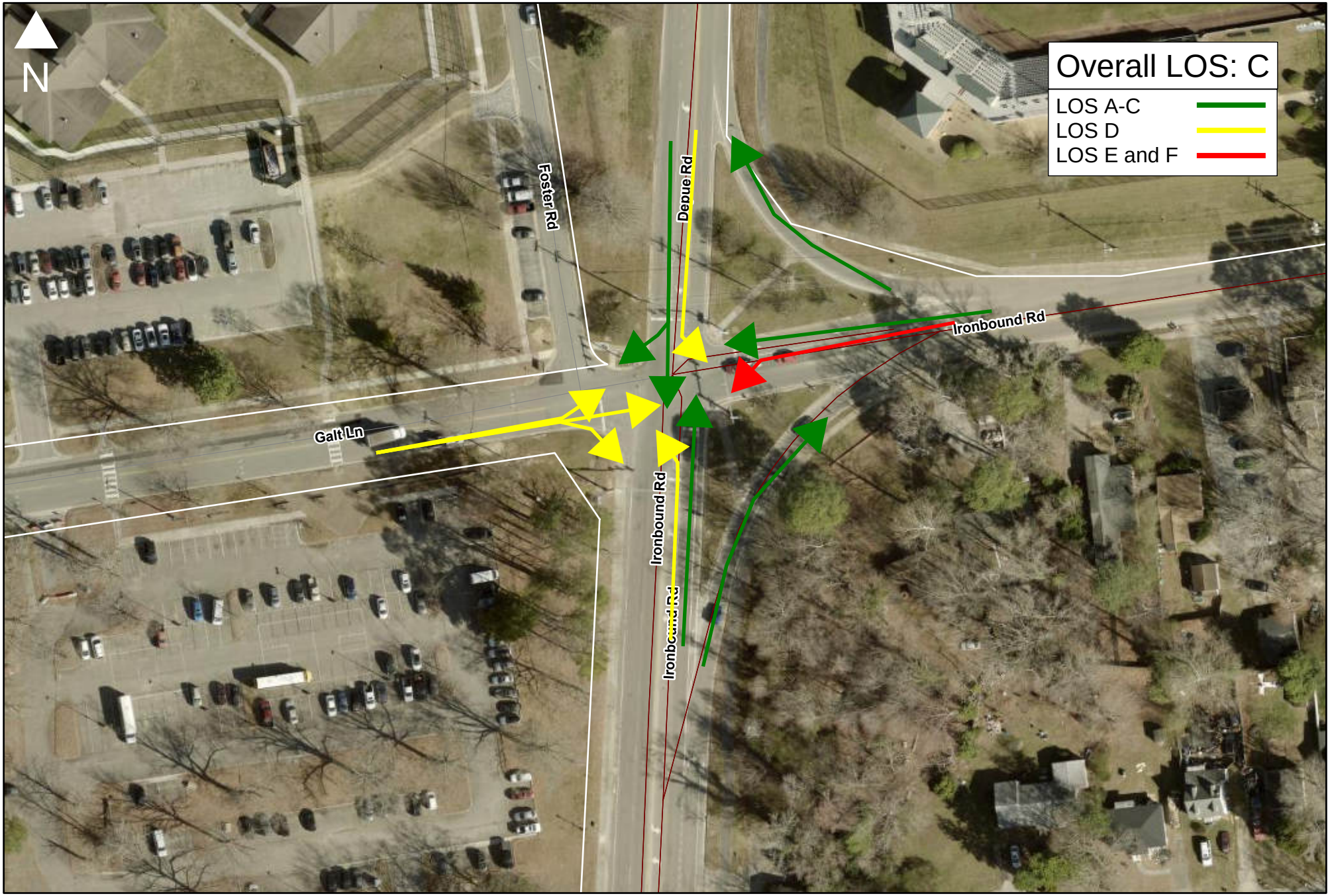
2032 Build Level of Service: PM Peak Hour
Longhill Road (E-W) at DePue Drive (Future Access)



2032 Build Level of Service: AM Peak Hour
DePue Drive (N-S) at Ironbound Road/Galt Lane (E-W)



2032 Build Level of Service: PM Peak Hour
DePue Drive (N-S) at Ironbound Road/Galt Lane (E-W)



FISCAL IMPACT RESULTS	**STAFF REPORT**
PROJECT NAME	**JCC PROJECT LEVEL MODEL FY25**
Fiscal Analysis Zone	**Central**

NET FISCAL IMPACT	Cardinal Ridge Default Scenario	%	Cardinal Ridge Applicant Scenario	%
PROJECTED REVENUES				
General Property Taxes	$81,562,975	78%	$96,686,803	81%
Other Local Taxes	$17,041,012	16%	$17,549,451	15%
Licenses, Permits & Fees	$930,270	1%	$1,124,781	1%
Fines & Forfeitures	$75,419	0%	$75,419	0%
Use of Money & Prop	$0	0%	$0	0%
Commonwealth	$0	0%	$0	0%
Federal Government	$0	0%	$0	0%
Charges for Services	$4,451,732	4%	$4,451,732	4%
Miscellaneous	$0	0%	$0	0%
Total General Fund Revenue	$104,061,407	100%	$119,888,186	100%
Schools Revenues (Non-Cou	$29,809,274		$29,809,274	
GRAND TOTAL REVENUES	**$133,870,681**		**$149,697,460**	
PROJECTED EXPENDITURES				
Operating Expenditures				
General Adminstration	$207,566	0%	$207,566	0%
Court Services	$280,493	0%	$280,493	0%
Public Safety	$15,236,517	16%	$15,236,517	16%
Financial Administration	$533,616	1%	$533,616	1%
Info Resources Management	$321,419	0%	$321,419	0%
Community Development	$131,036	0%	$131,036	0%
General Services	$3,427,448	4%	$3,427,448	4%
Parks & Recreation	$420,223	0%	$420,223	0%
Other Contributions And Trai	$7,685,852	8%	$7,685,852	8%
Total General Fund Expendit	$28,244,171	29%	$28,244,171	29%
School Operating Expenditur	$68,565,458	71%	$68,565,458	71%
GRAND TOTAL OPERATIN	**$96,809,629**	**100%**	**$96,809,629**	**100%**
Capital Expenditures				

Non-Schools Capital	$5,248,109	32%	$5,248,109	32%
Schools Capital	$10,904,400	68%	$10,904,400	68%
GRAND TOTAL OPERATIN	**$16,152,509**	**100%**	**$16,152,509**	**100%**
GRAND TOTAL EXPENDITURES	**$112,962,138**		**$112,962,138**	
CUMULATIVE NET FISCAL IMPAC	**$20,908,543**		**$36,735,322**	
Average Annual Net Fiscal Impact	*$836,342*		*$1,469,413*	

^ Includes Stormwater Capital impacts

MODEL: Filename: James City Co_FIA Project Level_FY2025_10.07.2024_110824.xlsm

RUN DATE: 12/6/2024

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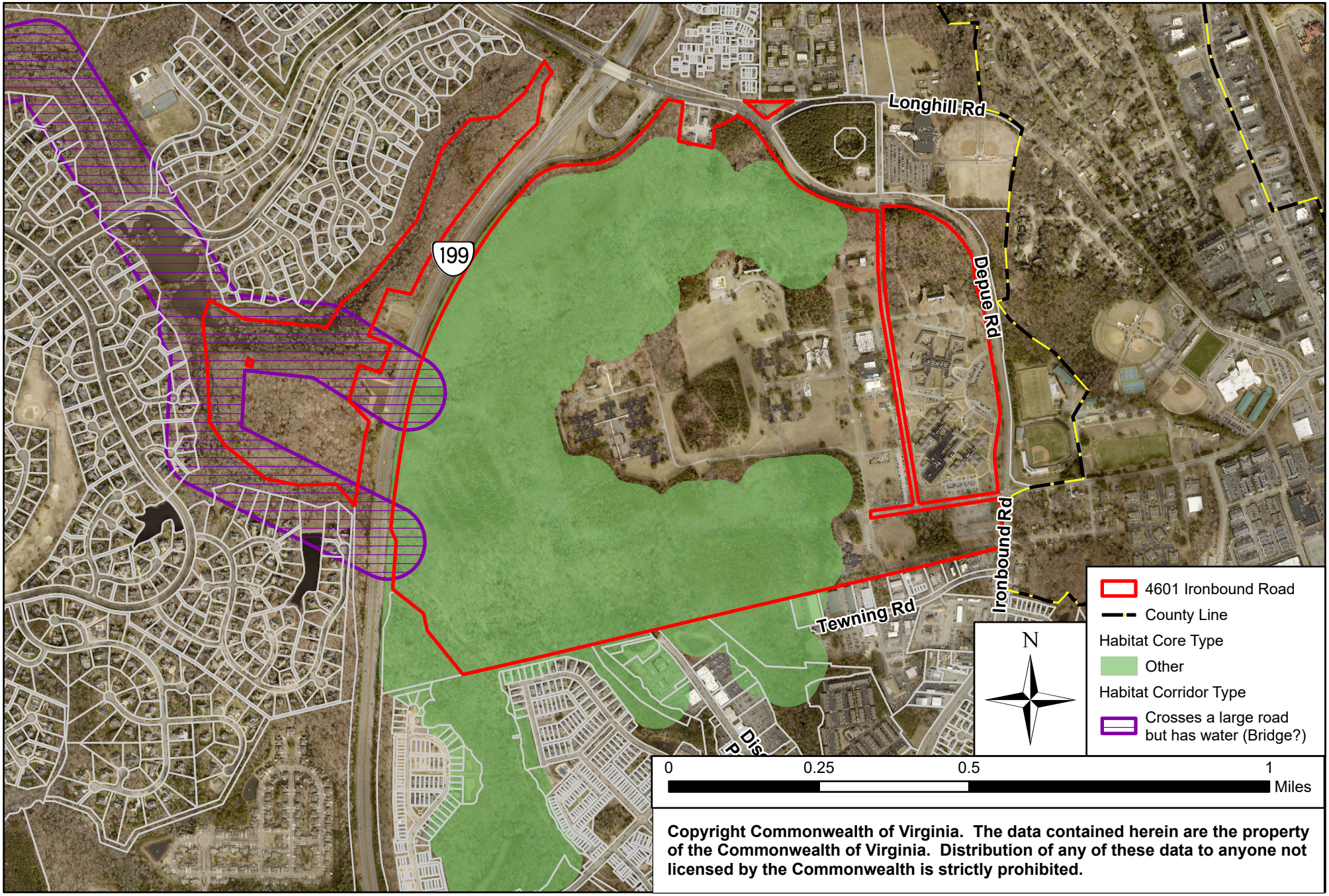
CAPITAL IMPACTS PER UNIT		Cardinal Ridge Default Scenario
Transportation		
	Single Family Detached	$ 33.41
	Single Family Attached	$ 25.51
	Multifamily	$ 16.09
Parks and Recreation		
	Single Family Detached	$ 3,154.78
	Single Family Attached	$ 2,081.90
	Multifamily	$ 2,184.08
Fire and Emergency Services		
	Single Family Detached	$ 987.72
	Single Family Attached	$ 651.82
	Multifamily	$ 683.81
Police		
	Single Family Detached	$ 324.28
	Single Family Attached	$ 214.00
	Multifamily	$ 224.50
Library		
	Single Family Detached	$ 460.15
	Single Family Attached	$ 303.66
	Multifamily	$ 318.56
General Government		
	Single Family Detached	$ 222.24
	Single Family Attached	$ 146.66
	Multifamily	$ 153.86
General Services		
	Single Family Detached	$ 210.06
	Single Family Attached	$ 138.62
	Multifamily	$ 145.42
Courts		
	Single Family Detached	$ 836.89
	Single Family Attached	$ 552.28
	Multifamily	$ 579.39
Schools		
	Single Family Detached	$ 17,654.89
	Single Family Attached	$ 9,275.61
	Multifamily	$ 7,046.44
TOTAL		
	Single Family Detached	**$ 23,884.40**
	Single Family Attached	**$ 13,390.05**
	Multifamily	**$ 11,352.13**

JCC Z-23-0008 Cardinal Ridge Rezoning
Habitat Core and Habitat Core Map



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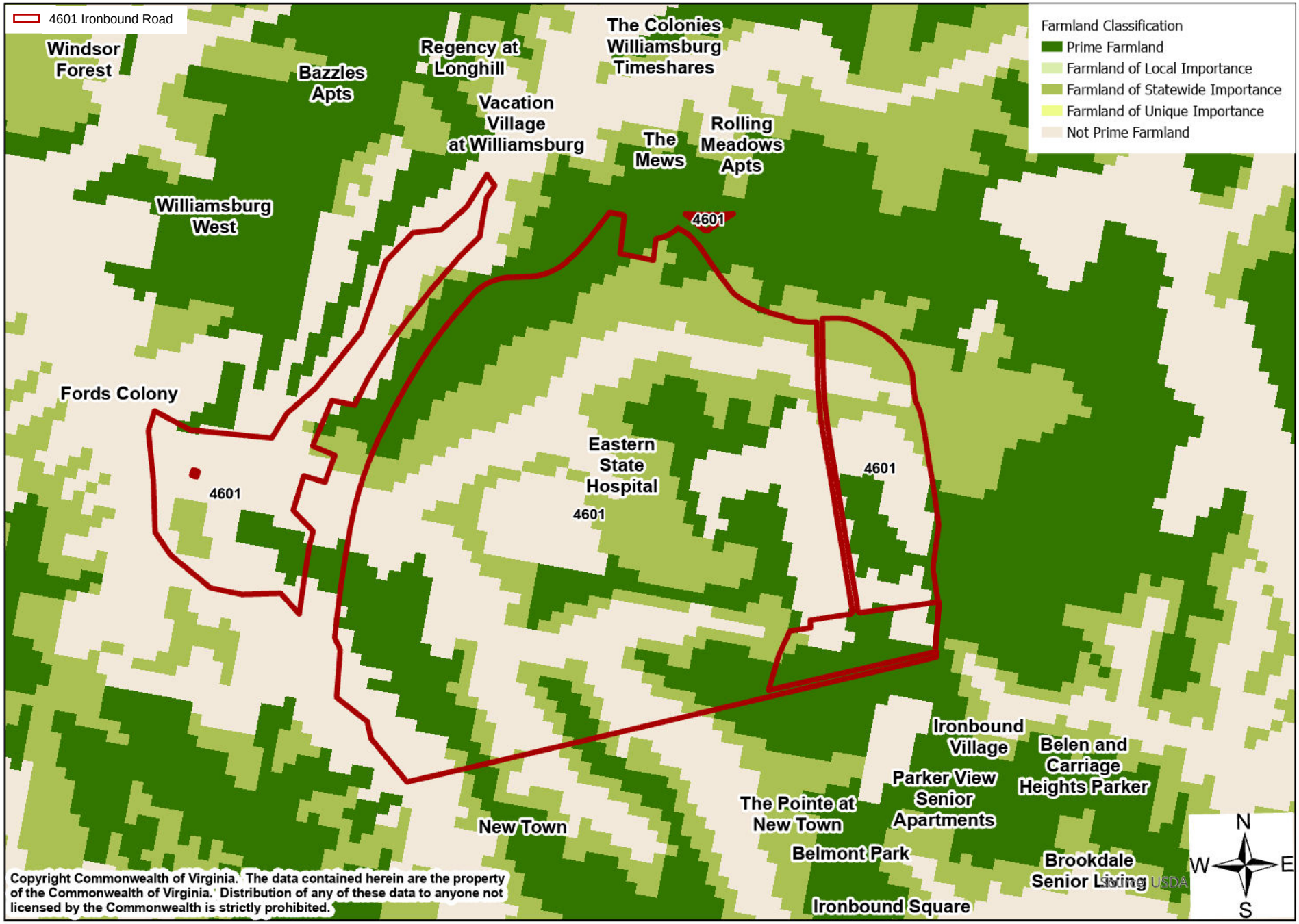
Z-23-0008 4601 Ironbound Road
Cardinal Ridge Rezoning - Farmland Classification





Cardinal Ridge

Comparative Revenue Analysis

James City County, Virginia

Prepared by

Ted Figura Consulting, Inc.

for

D.R. Horton

Midlothian, Virginia

July 23, 2025

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Cardinal Ridge: Comparative Revenue Analysis

Executive Summary

D.R. Horton, the applicant, is seeking a rezoning of 368.4 acres of the western portion of the Eastern State Hospital property (the Site") in James City County from Public Land (PL) zoning to Mixed-Use (MU) zoning to permit the construction of a multi-use development consisting of 294 single-family detached homes, 235 townhouses, 450 apartments, associated improvements, and approximately 100,000 square feet of commercial space ("Cardinal Ridge"). Based upon a fiscal impact analysis performed by this consultant in November, 2023 for Cardinal Ridge, then having a different but similar scope, Cardinal Ridge as currently proposed is projected to have an overall positive fiscal impact on the County over an initial ten-year analysis period and in its stabilization year.

The applicant has informally proposed that it donate the commercial parcel of the Site ("the Market District") to the County as an alternative means of complying with the requirements of the County's Mixed Use Construction Phasing Policy ("the Phasing Policy"). The County would presumably sell this parcel to a commercial developer and receive the net proceeds from that sale.

The applicant has asked this consultant to perform a comparative revenue analysis ("the analysis) of both scenarios: the development of the Market District by the applicant in accordance with the Phasing Policy ("scenario one") and the donation of the commercial parcel to the County to permit a sale of that property to an independent commercial developer ("scenario two"). The methodologies employed to conduct this analysis are described below and in the Appendix.

The analysis concludes that, independent of the net proceeds from the sale of the commercial parcel by the County, the County would receive almost $225,000 more in revenue during the analysis period from scenario two than from scenario one. Since revenue received in the stabilization year is equal in both scenarios, this is due to the faster development of the Market District under scenario two and the stabilization year being achieved earlier. Additionally, it is anticipated that the County would receive more than $7.6 million in net proceeds from the sale of the commercial parcel.

A more detailed analysis follows.

Background

D.R. Horton ("the applicant") has proposed a multi-use development consisting of 1,004 residential units and approximately 100,000 square feet of commercial space to be located in James City County ("the County"). A positive fiscal impact analysis was completed by this consultant dated November 10, 2023. This fiscal impact analysis was based on the development of 946 residential units and 85,000 square feet of commercial space. Although the residential mix proposed by the applicant has changed, the fiscal impact of the residential component of Cardinal Ridge is still deemed positive, based upon the considerable revenue surplus calculated in the previously submitted fiscal impact analysis. More detail concerning the proposed development is provided in the attached Appendix.

As an alternative means of satisfying the requirements of the County's Mixed Use Construction Phasing Policy ("the Phasing Policy"), the applicant has proposed a proffer requiring the donation of the land containing the commercial portion Cardinal Ridge ("the Market District," or "the Site") to the County with the intent that the County would sell the Site to a commercial developer, although the County could make any use of the Site that it wishes. Under this scenario, the County would receive a substantial sum when the Site is sold by the County.

The applicant has requested a comparative revenue analysis ("the analysis") of its proposed donation of the Site to the County versus its retention of the Site, developing it following the requirements of the Phasing Policy. The analysis estimates only revenues to be received by the County under the two scenarios since: 1) based on the original fiscal impact analysis, the fiscal impact of Cardinal Ridge's commercial component is highly positive and 2) costs to the County will be the substantially the same under both scenarios, the only difference being in the timing of when these costs are first incurred. Adherence to the Phasing Policy by the applicant is designated as "scenario one" in the analysis and the proposed donation of the Site to the County by the applicant is designated as "scenario two."

Methodology

The revenue impact on James City County of each scenario for the commercial component of Cardinal Ridge was calculated using the methodology described below. The basic assumptions used for the calculation of revenue to be received by the County are equal for both scenarios with the exception of those factors distinguishing the two scenarios. Specifically, the following metrics are held constant for both scenarios:

- the number and size of the commercial buildings;
- the mix of commercial types at buildout;
- the number of businesses (tenants) at buildout;
- all metrics regarding property assessments and sales per square foot; and
- County tax rates and fee structure.

Therefore, revenue to be received by the County in the stabilization year of each scenario is equal.

The revenue impact of this project was calculated over a ten-year period. This period was chosen because the proposed development's stabilization year for each scenario occurs within a second five-year increment. The stabilization year is the year beyond which the fiscal cash flow from the development does not change, all costs and revenues being stabilized. To ensure equitable comparison, the analysis period for both scenarios is equal, from FY 2027 through FY 2036. For scenario one, revenues are first received by the County in FY 2027 and its stabilization year is FY 2035. For scenario two, revenues are first received by the County in FY 2028 and its stabilization year is FY 2033.

All revenue impact measures are presented in constant 2026 dollars, (i.e., inflation is not applied to either revenues or costs throughout the analysis period). A constant value in 2026 dollars was chosen because the analysis is substantially based on the revenue and tax rate assumptions contained in *James City County, Virginia FY2025-26 Adopted Operating Budget*.

The constant dollar approach does not make adjustments for potential increases in tax revenue to the County based upon increases in real estate assessments and does not project for increases in sales, meals or business license taxes based upon retail price increases. The practical implication of this approach is that any future systemic imbalances between rising revenues and rising costs are assumed to be adjusted through changes in the County's tax rate, either upward or downward.

A more detailed description of the methodology used in this analysis is presented in the Appendix.

Revenues estimated for Cardinal Ridge fall into two categories: one-time direct revenues and recurring (annual) direct revenues. The methodology does not use multipliers to calculate revenues that could be generated through a project's secondary impacts, as such multipliers are considered to be unreliable for small geographic areas. The methodology does not include revenues generated from spending by construction workers at the Market District, as such spending cannot reliably be said to occur within the County. The methodology also does not include revenues generated from spending by employees of businesses located in the Market District, since such spending cannot reliably be said to occur within the County.

One-time direct revenues are revenues to the County derived from the construction of the Market District and, in the case of the second scenario, from the sale of the Site by the County. They include all plan review fees, building permit and associated fees (electrical, mechanical and plumbing, etc.), and other development fees. Water and sewer facility fees as well as consumption charges are not included in the analysis as these accrue to the James City Service Authority, which is fiscally independent of the County and is not involved in the rezoning decision.

Recurring direct revenues are taxes and fees paid directly to the County by businesses and/or property owners. These consist of real estate property taxes, business personal property tax, utility consumption tax, and other fees paid by businesses to the County. Local option sales taxes, food and beverage (meals) taxes, and business license fees paid to the County by Market District businesses are included as recurring direct revenues, to the extent that they are net new taxes received by the County.

Since the Site is now owned by the Commonwealth of Virginia, there are no taxes currently paid on the assessed value of the Site. Taxes from the Market District are calculated based upon estimates of the assessed property values, the County's per-business user fees or other methodologies explained in the Appendix.

Two measures of revenue impact were used—revenue flow and cumulative revenue. Revenue flow shows the annual revenues for a sample of ramp up years through the stabilization year. Because revenues are reported in constant dollars, there is no change in the projected revenue flow after the stabilization year.

Cumulative revenue is the sum of annual revenue flows over the analysis period plus, in the case of scenario two, the net proceeds received by the County on the sale of the land donated to the County by the applicant. Revenue flow and cumulative revenue are shown below on a comparative basis.

Comparative Revenue Impact of the Cardinal Ridge Market District

D.R. Horton is seeking a rezoning of the Site to Mixed-Use (MU). This zoning would permit the development described above. The derivation of the revenues attributed to Cardinal Ridge's Market District for both development scenarios are described in the Methodology section, above, and in the Appendix. The revenue flow projected for Cardinal Ridge under both scenarios is shown in Table 1, below. The stabilization year for scenario one was chosen to designate the comparison stabilization year, in which the revenue flows of the two scenarios are equal. Table 1 shows revenue flows for each scenario and the difference between the two by subtracting scenario one revenue from scenario two revenue.

Table 1
Cardinal Ridge Market District
Projected Revenue Flow

	FY 2028	FY 2030	FY 2031	FY 2032	FY 2033	Stabilization Year FY 2035
Scenario One	$ 14,425	$133,525	$357,175	$457,875	$516,575	$524,225
Scenario Two	$7,686,450	$223,450	$417,250	$522,625	$524,225	$524,225
Difference	$7,672,000	$ 99,925	$ 60,075	$ 64,750	$ 7,675	$ 0

Figures rounded to the nearest $25.

We see in Table 1 that, aside from the large infusion of cash generated by the sale of the Site, scenario two delivers revenue to the County faster than scenario one. While, by the stabilization year, there is no difference in the revenue generated under the two scenarios, the faster revenue generation under scenario two means that cumulative revenue is larger under scenario two than under scenario one for the analysis period. This is displayed in Table 2 on the following page, which again shows metrics for each scenario and their difference by subtracting scenario one revenues from those of scenario two.

Table 2
Cardinal Ridge Market District
Projected Cumulative Revenues

Revenue Type	Scenario One	Scenario Two	Difference
Real Estate Property Tax, Land	$ 302,475	$ 289,100	$ (13,375)
Real Estate Property Tax, Improvements	$ 779,000	$ 766,975	$ (12,025)
Business Personal Property Tax	$ 251,850	$ 291,600	$ 39,750
Local Option Sales Tax	$ 882,800	$ 992,450	$ 109,650
Meals Tax	$ 600,675	$ 676,800	$ 76,125
Business License Fee	$ 193,550	$ 217,825	$ 24,275
Other Fees (including ALS/BLS)	$ 15,750	$ 17,850	$ 2.100
Utility Consumption Tax	$ 6,075	$ 6,900	$ 825
General Fund Annual Revenues	***$3,032,175***	***$3,259,500***	***$ 227,325***
Building Permit and Review Fees (including electric, mechanical and plumbing and CO)	$ 31,500	$ 31,325	$ (175)
Development Review and Other Fees (including Inspections)	$ 23,525	$ 19,575	$ (3,950)
General Fund One-time Revenues	$ 55,025	$ 50,900	***$ (4,125)***
Net Proceeds from Land Sale	$ 0	$ 7,666,500	$7,666,500
Subtotal One-time Revenues	***$ 55,025***	**$ 7,717,400**	**$7,662,375**
Total Revenues	**$3,087,200**	**$10,976,900**	**$7,889,700**

Figures rounded to the nearest $25.

We see from Table 2 that, independent of the proceeds from the sale of the Site, scenario two delivers almost $225,000 more revenue to the County during the analysis period, due to its faster development.

Cardinal Ridge Comparative Revenue Analysis

Appendix

Methodology

Approach

This comparative revenue analysis estimates the difference between all revenues to James City County ("the County") generated by the commercial component of the proposed development (Cardinal Ridge) under two scenarios. The first of these scenarios assumes that the applicant (also the developer) maintains control over Cardinal Ridge's commercial parcel ("the commercial parcel" or "Marketplace District") and causes it to be developed consistent with the County's Mixed Use Construction Phasing Policy ("the Phasing Policy"). The second scenario assumes that the applicant donates the commercial parcel to the County and that the County sells this parcel to one or more commercial developers. The assumptions made for these scenarios are provided in the next section of this Appendix, "Parameters and Assumptions."

Revenues include one-time direct revenues and annual direct revenues from Cardinal Ridge's commercial component (heretofore "the commercial component"). For both scenarios, one-time revenues include building permit fees and other development fees. For the second scenario, one-time revenues also includes the net proceeds received by the County from the sale of the commercial parcel. Revenues generated by water or sewer usage are not included in this comparative revenue analysis, as the James City Service Authority is a separate fiscal entity from the County.

Annual direct revenues include: the real estate property tax; business personal property tax; the local option sales tax, meals tax and business license fee paid by businesses at the Cardinal Ridge Market District on sales revenues; utility consumption tax; and various local government fees, fines and user charges.

All revenues are presented in constant fiscal year 2026 dollars. Inflation is not applied to revenues throughout the analysis period. The constant dollar approach also means that no assumptions are made about the rate of real estate assessment increases in the County. No assumptions are made about future increases in tax revenues from sales, meals or business license taxes based upon retail price increases.

Projected revenues attributable to each scenario are shown over the analysis period. The analysis period runs from the year in which development fees are first paid through the last year of the five-year period containing the stabilization year for the longest running scenario, which is the first scenario. The stabilization year is the year in which all revenues are realized. Because revenues are reported in constant dollars, there is no significant change in the projected revenue flow after the stabilization year. The analysis period is projected to be ten years, from FY 2027 to FY 2036.

Two measures of revenue impact are used. One is the annual revenue flow through the stabilization year. The second is the cumulative revenue over the ten-year analysis period.

All County revenue data, including tax rates, were derived from the *James City County, Virginia FY2026 Adopted Operating Budget* (the "*Budget*").

Parameters and Assumptions

Cardinal Ridge, or "the proposed development," is planned to be a multi-use community located on a portion of the Eastern State Hospital property that is no longer in use for that institution's purposes. Cardinal Ridge will be developed on the western portion of parcel 3910100152 comprising approximately 368.4 acres. Since this consultant's original fiscal impact analysis, the applicant has made a net addition of 58 residential units, and 15,000 commercial square feet. However, only the commercial parcel, the Marketplace District, is relevant to this comparative revenue analysis. The Marketplace District consists of approximately 33.2 acres located along the Longhill Connector Road (also known as DePue Road).

Up to 100,000 square feet of commercial space is planned for the Marketplace District. The commercial component would be supported by the 1,004 residential units planned for Cardinal Ridge in addition to general market demand from existing development. Additionally, the new government center, which is scheduled to begin construction this fiscal year, and the existing County recreation center will provide market support for the commercial development at the Marketplace District. For analysis purposes, it is assumed that 100,000 square feet of commercial space will be developed under both scenarios. The same commercial product mix is also assumed for each scenario for analysis purposes in order to provide a true "apples to apples" comparison. However, it is recognized that, in reality, the County's control of the commercial parcel under scenario two could yield a commercial mix that is more favorable to the County's interests, if the County chooses to attach certain requirements or restrictions on a sale of the property to a commercial developer(s).

For both scenarios, the following commercial product mix is assumed for the Market District. For analysis purposes, the commercial component will likely consist of a market-style grocery store ("grocery" or "market") and retail, restaurant and consumer services tenants. The market-style grocery anchor is assumed to occupy the 32,000 square foot building. The remaining 68,000 square feet is distributed among six buildings of 17,500, 15,000, 11,500, 9,000, and 7,500 (two buildings) square feet. Although the mix of general commercial is unknown at this point, for analysis purposes the mix was assumed to be 35% retail, 30% food establishments (restaurant, QSR, coffee shop, ice cream parlor, etc.) and 35% consumer services (beauty and nail salons, tax services, insurance agents, massage therapy, chiropractic, etc.). It is assumed that consumer service office space would occupy the 14,500 square feet of second story space in Market District buildings. It is highly likely that the grocer does not currently have a presence in James City County and this assumption was made.

The applicant estimates that sitework for the residential component of Cardinal Ridge ("the residential component") will begin at the start of the first quarter 2027 (third quarter of FY 2027) with construction beginning about one year later. Under scenario one, the schedule of commercial product construction and occupancy is based upon the phasing of the residential component supplied by the applicant and the requirements of the Phasing Policy. Under this scenario, only the minimum required amount of commercial development is assumed to occur, subject to the constraints of the size of the buildings to be constructed. Table A-1, below, shows the fiscal year in which each phase of commercial development will be completed, the square footage developed and the number of buildings in each commercial phase, and the commercial product type assumed for each commercial phase. It is assumed that all tenants will begin operation three months after the issuance of a certificate of occupancy (CO). It is assumed that, under the first scenario, completion of the commercial component will coincide with completion of the residential component. However, under the second scenario, construction completion of the Market District precedes construction completion of the residential component of Cardinal Ridge.

Table A-1
Scenario One Commercial Development Schedule

Phase	Fiscal Year Completed	Square Feet/Number of Buildings	Product Type(s)
One	FY 2029	0	N/A
Two	FY 2030	32,000/1	Market
Three	FY 2032	50,500 /5	Retail, Restaurant, Service
Four	FY 2034	17,500/1	Retail, Restaurant, Service

Under the second scenario, it is assumed that the County would begin marketing the commercial parcel as soon as the County obtains ownership but that a sale of the parcel would not be immediate. It is assumed that the commercial parcel would be sold in anticipation of the completion of the County's new government center, which is expected to occur in FY 2029, and when there is proof of a substantial new residential market (i.e., Cardinal Ridge). The municipal complex will be under construction and, therefore, its completion would be assured. In anticipation of its completion, a sale could occur in the FY 2028. Also, construction of the residential component of Cardinal Ridge will be under way by early 2028. It is, therefore, assumed that a sale of the property would occur in the second half of FY 2028.

An 18 month development period was assumed between the time of sale and the opening of the first business in the Market District (the market). It is also assumed that the County would turn to its Economic Development Authority (EDA) to handle the marketing of the property and its sale and that the EDA would, in turn, engage a commercial realtor to market the property and handle the sale. Therefore, a realtor's commission is deducted from the sale proceeds to be received by the County. It was assumed that this sale would be subject to the EDA's commission policy.

Under a scenario in which the County sells the commercial parcel to a developer, build-out and occupancy of the Market District is assumed to be accelerated compared to the first scenario in which development of the Market District proceeds according to the County's Phasing Policy. This is because the developer will have an incentive to maximize return on investment and not let land sit idle. For analysis purposes, it is assumed that the developer would construct the entire Market District at once and the 60% of the space would be occupied within months of construction completion and that the remainder of the space would be occupied within 15 months of construction completion. This is based upon the observation, confirmed with a local commercial realtor, that the commercial market in the County remains quite healthy, the premium location of the commercial parcel, and the assumed product mix for the Market District.

Under both scenarios, a 7% rolling vacancy rate is assumed for the non-anchor commercial space, meaning that, after achieving full lease-up, about 4,750 square feet of commercial space would be vacant each year. For analysis purposes, this vacancy was uniformly distributed across the three non-anchor commercial uses. In reality, year-to-year vacancy rates would be more "lumpy" but vacancies for individual tenant spaces are likely to be short-term.

It is recognized that the above description is based on a preliminary concept plan and details of the proposed development may change due to site considerations or changing market conditions. This representation is not a pledge or guarantee from the developer that the proposed development will exactly match this description. However, the final development plan is expected to not diverge from the above description to an extent that would materially change the results of this fiscal impact.

Revenue Calculations

Revenues estimated for Cardinal Ridge fall into two categories: one-time direct revenues and direct annual revenues. The methodology does not use multipliers to calculate revenues that could be generated through the project's secondary impacts. Such multipliers are considered to be unreliable when applied to small economic units, such as localities.

One-time Direct Revenues

One-time direct revenues are revenues to the County derived from the construction of the Cardinal Ridge Market District. One-time direct revenues are listed below and on the following page:

- all building permit fees (including electrical, mechanical, plumbing, fire prevention and administrative fee)
- building plan review
- certificate of occupancy (CO)
- fire protection acceptance tests
- land disturbance activity and erosion & sediment control plan review

- land sale net proceeds (for the scenario two)
- sign permits
- site plan review
- stormwater installation inspection
- stormwater plan review
- VSMP and
- water and sewer line inspections

Basic building permit fees were calculated assuming the building square footages delineated in Table A-2, below. Building sizes were supplied by the applicant. Building plan review fees were assumed to be levied on each building. For analysis purposes, it was assumed that scenarios one and two would have the same building configuration, although it is recognized that under scenario two a developer may choose a different configuration and is likely to build all of the shell space simultaneously or as a continuous building project. For analysis purposes under scenario two, although the first building is expected to be ready for tenant occupancy 18 months after the land sale, the construction time for completion of the entire development was estimated to take 24 months and occupied non-anchor commercial space is calculated from that date. Table A-2, below, shows the anticipated construction completion schedule for buildings under scenario one.

Table A-2
Commercial Building Construction Completion Schedule, Scenario One

Building	Fiscal Year Completed
Building 1, 32,000 sf	FY 2030, 1st Q
Building 2, 11,500 sf	FY 2030, 3rd Q
Building 6, 7,500 sf	FY 2030, 3rd Q
Building 4, 15,000 sf	FY 2031, 3rd Q
Building 5, 9,000 sf	FY 2032, 2nd Q
Building 7, 7,500 sf	FY 2032, 3rd Q
Building 3, 17,500 sf	FY 2033, 3rd Q

For calculating plumbing permit fees, the grocery was assumed to have two bathrooms, each with three fixtures. Restaurants were assumed to have two bathrooms, each with two fixtures. All other commercial tenants were assumed to have one unisex bathroom with two fixtures. Additionally, plumbing permit fees were calculated assuming one water heater per building. Roof drains were estimated to be placed on the four corners of larger building and on two corners of the smaller commercial buildings. Two manholes and two sewer drains were assumed based on based upon the concept plan, input from the applicant's civil engineer, and one manhole and sewer drain per 400 feet of sewer line.

For calculating electrical permit fees, a 1,000 amp service was assumed for the grocery and for each other commercial building an electrical service equal to 150 amps per tenant was assumed. Although some subcontractors may install temporary electrical services, for analysis purposes it was assumed that generators would be used and, therefore, no temporary electric service permits would be issued. An estimated cost of mechanical systems obtained from estimates for a similar development and used to calculate mechanical permits. These were applied on a square foot basis to the commercial buildings. Sprinkler system cost for the commercial buildings was estimated to be $2.00 per square foot. The two two-story buildings are assumed to have elevators, with each elevator costing $95,000.

Because there will likely be tenant buildout taking place after the shell construction is completed, a certificate of occupancy was assumed for each tenant space. Sign permits were calculated assuming one monument sign at the entrance to the Marketplace District (40 square feet), a directory sign, (24 square feet) and one sign per tenant (20 square feet, except the market, 40 square feet). Water and sewer line permits were calculated based on the estimated linear footage. The stormwater inspection fee was calculated based on the number of BMPs shown on the concept plan.

Net Proceeds from the Sale of the Commercial Parcel

As noted above, the commercial real estate market in James City County was determined to be vigorous and healthy so that there should be no inhibiting market factors standing in the way of a sale of the commercial parcel to a private developer. Furthermore, the commercial parcel is well-positioned within the market, being, figuratively, in the back yard of the New Town/Monticello Avenue area, the County's premier retail district. More broadly, the Site is situated within a polygon formed by Monticello Avenue, Route 199, Longhill Road, and Richmond Road. Besides the New Town area, two other "powerhouse" mixed-use communities, High Street and Midtown Row, are located within or proximate to this polygon.

In order to estimate a likely sale price for the commercial parcel, both commercial land currently on the market and recent commercial land sales were examined. Eight comparable commercial parcels currently on the market in James City County and upper York County were identified with an online search. Three commercial parcels sold within James City County from July 2024 to the present were identified using the County's parcel viewer website (a search was made from 2023 to the present but no earlier sales were identified).

Per-acre asking prices for land currently on the market ranged from $150,000 to $513,000, averaging $331,300 per acre. Per-acre prices for land recently sold ranged from $402,550 to $480,275, averaging $435,375 per acre. The average of all eleven parcels was $359,675 per acre. Parcel sizes of land on the market ranged from 1.54 acres to 21.97 acres, averaging 5.96 acres. Parcel sizes of recent sale were in a considerably smaller range, from 1.5616 acres to 2.36 acres, averaging 2.04 acres. While the smaller parcel sizes might explain the higher per-acre prices of land actually sold, overall, there was no statistically significant relationship between parcel size and per-acre price (asking or actual). There was also no statistically significant correlation between per-acre prices and traffic counts.

The comparable parcels were then subjectively rated for the desirability of their location on a scale of 1 to 5. Although there was no statistically significant correlation between these ratings and price-per-acre, the average per-acre price of parcels with an above-average location rating was somewhat higher than the average of all parcels, at $374,050 per acre. Given the premium location of the Cardinal Ridge commercial parcel, it was deemed reasonable to expect a sale price of $375,000 per useable acre, or $7,950,000. Applying the EDA's commission policy, $179,000 would be paid as a commission to the commercial realtor handling the sale of the property. An additional deduction of 1% of the sale price to cover other seller's costs was deducted from the proceeds, as well as $25,000 in marketing costs incurred by the EDA. Thus, net proceeds for the sale of the Cardinal Ridge commercial parcel are estimated to be $7,666,500.

Direct Annual Revenues

Direct annual revenues consist of those revenues paid directly to the County by the Cardinal Ridge businesses. These include real estate property taxes, business personal property tax, the local option sales tax, meals tax and business license fees paid by Market District businesses based on sales.

Real Estate Property Taxes

The estimated assessed value of the commercial buildings was based upon comparable properties in James City County. Five grocery-anchored shopping centers were identified as comparables: Ewell Station (5601 Richmond Road), Governor's Green (4511 John Tyler Hwy), Lightfoot Marketplace, Monticello Marketplace (excluding Target and the outparcels), and Settler's Market New Town. Two others, the Food Lion shopping center in Norge and Williamsburg Crossing (5251 John Tyler Hwy) were noted but considered too old to be comparables.

The average assessment per square foot for those comparables was $152.61, ranging from $94.75 to $201.01 per square foot. The average assessment per acre was $285,100, rounding to the nearest $100, ranging from $231,000 to $435,500 per acre. Undevelopable land was assumed to be assessed for $5,000 per acre. Those metrics were used to estimate the assessed values of the proposed commercial buildings ($15,261,150) and for the commercial site ($5,633,450), rounded to the nearest $50.

The Site is currently owned by the Commonwealth of Virginia and is tax exempt. Therefore, no taxes resulting from the existing assessment on the site need to be subtracted as a negative value in the fiscal impact analysis. Upon purchase by the applicant, it is assumed that the property would remain assessed at its current land value of $21,750 per acre until construction of the first building is complete, at which time the entire Marketplace District site would be reassessed at the commercial land value estimated above, proportional to the percent of space developed compared to full buildout.

Business Personal Property Taxes

Business personal property taxes paid by tenants of the Cardinal Ridge commercial component was calculated based upon an estimated business equipment assessment per square foot derived from data obtained by the consultant from the City of Newport News. After converting assessed values to original cost (Newport News assesses business equipment at one-third of original cost) and adjusting for inflation, the original cost of business personal property for the grocery tenants was estimated to be $107.30 per square foot of gross building size. For other commercial tenants, the original cost of business personal property was estimated to average $20.89 per square foot of gross building size. A 7% vacancy rate was assumed for non-grocery tenants. Thus, the original cost of business personal property in 2026 dollars was estimated to be $4,854,000. It was assumed that no business located at Cardinal Ridge would be a relocation from within the County and, therefore, all business personal property purchased by Cardinal Ridge businesses would represent a total net gain in business personal property assessment.

Local Option Sales and Meals Taxes; Business License Fee

Initial estimates of the sales, meals and business license fee tax revenues to be received by the County are based upon estimates of sales made by businesses to be located in the Market District A 2019 data set obtained from York County, Virginia was used to derive retail sales estimates per square foot. This data set was derived from multi-tenant properties with sales estimates extrapolated from business license fee revenue data. Based on this data, an initial estimate was made of retail sales equal to $311.04 per square foot in 2019 dollars. This estimate was inflated to 2026 dollars using the CPI for May 2025 and 2018 (27.77% increase), resulting in a sales estimate of $397.42 per-gross square foot. This was consistent with average per-square foot sales reported by BizStats.com for national brand retailers with store sizes averaging less than 10,000 square feet (for which the average sales per square foot was somewhat higher).

A 2019 report by Bloom Intelligence estimated sales per square foot for successful full service restaurants to be between $250 and $325 per square foot. Taking the mid-point of these sales yields an estimated sales metric of $287.50 per square foot. Applying the inflation factor calculated above brings this estimate to $367 per square foot. Data from the York County set, when adjusted for inflation, resulted in an estimate of $301.40 per square foot in restaurant sales. Recognizing the possibility that the restaurants in the York County set could be underperforming, the mid-point of the two estimates ($334.20) was taken as an estimate for per square foot restaurant sales at the Cardinal Ridge Market District restaurants.

The York County data led to an estimated $81.62 per square foot in gross receipts from service establishments. Applying the seven-year rate of inflation to convert this to 2026 dollars resulted in estimated gross receipts of $104.29 per square foot for service tenants at Cardinal Ridge Market District.

Estimates for grocery store sales were derived from the Food Industry Association's Food Marketing Institute. Dividing the annualized average weekly grocery store sales by the average grocery size yielded an average $667.13 per square foot in grocery sales in 2023. Applying the 2022-2025 inflation rate to the three years from 2023 to 2026 results in an estimated grocery sales per square foot of $733.71 in 2026 dollars.

For the calculation of business license fees on service establishments, 70% of tenants were assumed to be classified as general services and 30% were assumed to be classified as professional services. To calculate vacancies, a rolling 7% average was used distributed across all business classes, excluding the grocery tenant.

Adjustments to Business Income

Potentially, not all tax revenue generated by Cardinal Ridge commercial establishments will be new to James City County. A regression analysis study conducted by the consultant in Newport News, Virginia showed that market growth was the dominant factor in predicting increases in sales tax revenue for the City and that the addition of retail space had no effect on the growth of sales tax revenue. Given that retail supply does not create its own demand, new commercial establishments must compete with existing commercial establishments for market share, whether of the existing market base or for additional market demand associated with new residential development or reduced residential vacancies.

When a locality is the commercial center for a region, new businesses tend to compete with other businesses in that same locality, resulting in no increase in new business taxes generated from sales. However, when there is substantial retail leakage or when a new business is located near a locality's border—particularly when there is substantial commercial development in the neighboring locality—much of a new business' market share is likely to be derived from businesses located outside the locality, resulting in an increase in new business tax revenue. Businesses located in James City County typically compete not only with those located in that County, but with businesses located in the City of Williamsburg, York County and, in some cases, in the City of Newport News.

To the extent that sales are redirected to Cardinal Ridge businesses from businesses located outside James City County, the County will receive net new revenue from those sales. However, to the extent that sales are redirected to Cardinal Ridge businesses from businesses that are located in the County, the County will receive no net new revenue from those sales, since the County would have received revenue from that spending whether or not there were businesses located at Cardinal Ridge.

Modeling this redirection can be complex but a good proxy for redirection is the anticipated spending patterns of Cardinal Ridge residents, absent the presence of Cardinal Ridge businesses. It is more likely than not that residents who are likely to shop outside of James City County for goods and services that would be offered at the Cardinal Ridge Market District would redirect their spending to Cardinal Ridge businesses should that opportunity present itself. If Cardinal Ridge residents would be likely to shop at businesses in the County for goods and services offered by Market District businesses, redirection would occur from those businesses. On the other hand, if spending by Cardinal Ridge residents would occur outside the County for those goods and services offered by Market District businesses, once Market District businesses are open, spending would likely be redirected from those businesses. Market District customers residing closer to (or in) neighboring localities would be more likely to redirect from businesses located outside of the County and Market District customers residing further from neighboring localities (relative to the Site) would be less likely to redirect from businesses located outside the County and the most likely assumption is that those two groups would cancel each other out leaving the behavior of Cardinal Ridge residents as the best predictor of redirection.

Actual patterns of retail spending by James City County citizens are likely to be highly variable depending on the location of housing relative to shopping locations both within and outside James City County but would in any case include purchases at businesses located in York County, Williamsburg and Newport News. A location analysis was undertaken for Cardinal Ridge as the best predictor of Cardinal Ridge household spending retained within James City County. This location analysis was undertaken in late 2023 as part of a Fiscal Impact Analysis for Cardinal Ridge that has yet to be submitted to the County by the applicant. Spending patterns are assumed not to have changed significantly between 2023 and now.

A distance gradient was employed with each location given a score inversely proportional to the driving time distance from the proposed development (closer stores are exponentially more likely to be patronized). The cumulative score for James City County stores was then divided by the total score to derive the percentage of retail spending estimated to be retained within the County. Distance was measured by driving time using Bing Maps to arrive at driving times between the Site and the various retail locations.

The analysis concentrated on three retail sectors—grocery spending, restaurant spending and shopping goods spending. Grocery spending stores include general purpose stores with an extensive grocery section (i.e., Wal-Mart, Target). Based on driving times from the proposed development, twelve existing grocery stores and two buying clubs were identified as most likely to be patronized by residents of Cardinal Ridge. Two of the twelve stores are same-brand stores of roughly equal driving distance from the Site and those were weighted at 50% each.

The grocery stores are: Aldi on Richmond Road, Earth Fare (now Grocery Outlet) in Williamsburg, Food Lion on Richmond Road in Williamsburg, Food Lion on John Tyler Highway, Fresh Market on Monticello Avenue, Harris Teeter on John Tyler Highway, Kroger on George Washington Highway, Publix on Monticello Avenue, Trader Joes on Settlers Market Boulevard, Target on Monticello Avenue, the Wal-Mart neighborhood grocery on Casey Boulevard and Whole Foods in Newport News. The buying clubs are Sam's Club and Costco in Newport News.

The distance gradient scores for the buying clubs were averaged, as shoppers can be expected to belong to only one buying club. Only the closest same brand store was included in the analysis (unless stores were equally distant from the Site), as shoppers were assumed not to drive past the closer store to shop at another similar store. It is acknowledged that some shoppers may patronize a store closest to their workplace but such shopping was deemed to be minimal and not subject to estimation.

Including the new store at Cardinal Ridge, almost two-thirds of the grocery stores but none of the buying clubs are located in James City County. Six of the grocery stores in James City County (including Cardinal Ridge) are less than ten minutes from the Site but the three Williamsburg groceries are also less than ten minutes away from the Site. The cumulative score for James City County stores divided by the total score for all twelve existing store locations, plus the buying clubs, produced an estimate that 61.56% of grocery spending by Cardinal Ridge residents would occur within James City County. This metric was also applied to distribution of the cigarette tax, as cigarettes are generally bought at grocery stores or other food establishments (e.g., gas station convenience stores) located near grocery store anchored shopping centers.

Restaurants near Cardinal Ridge were identified based on a Google Maps search of the area. Restaurants were grouped into two categories: family-style and national chain restaurants and fine dining. Fast food establishments were not included in the location analysis, since no fast food establishments are assumed to be developed at the Market District. As with grocery stores, only closest same-brand restaurants were included. Diners were not expected to drive more than 10 minutes to patronize fast food restaurants. Fifty-two (52) family style, ethnic, quick casual or national chain restaurants were identified within a 20 minute driving distance. Twenty-nine (29) were located in James City County. Four fine dining restaurants were identified within a 20 minute drive from the Site. One of the fine dining restaurants were located in James City County.

The distance gradient scores for each restaurant subgroup were summed and then weighted according to a subjective estimate of frequency of patronage. The family style group was weighted about 82% and the fine dining group was weighted about 18%. The weighted totals were then summed and the percentage of restaurant spending estimated to be retained in James City County was calculated to be 54.74%.

The shopping goods analysis was undertaken calculating the distance from the proposed development to major retail centers located in the New Town area, Williamsburg Prime Outlets, the Lightfoot shopping area, Marquis Center and the Patrick Henry Mall area. The distance gradient scores for each retail center were augmented by a variety of weighting systems to account for the closest unique major tenants. The weights for home improvement stores were adjusted to take into account the substantially less spending done there by renters. These weighted scores were then averaged. This resulted in an estimated 56.57% of spending on shopping goods by Cardinal Ridge home owners and 60.2% of spending on shopping goods by Cardinal Ridge renters assumed to occur in James City County.

Grocery spending was used as a proxy for all convenience goods shopping. This is because convenience shopping tends to cluster around grocery-anchored strip shopping centers. Both shopping goods and convenience goods purchases within James City County were then adjusted for on-line shopping. For on-line shopping, the point-or-purchase is the residence of the purchaser and, therefore, all local sales tax from these purchases is remitted to the locality in which the purchaser resides. Since almost all online sellers now include sales tax in their sales, it was assumed that all online purchases by residents generate sales tax for the County.

About 15% of all purchases are now made online. Although some are grocery and restaurant delivery purchases, most were assumed to be purchases of other retail goods, particularly shopping goods. Thus, 15% of all shopping goods purchases were assumed to be generate sales tax revenue for James City County. Adjusting for this increases the share of shopping good spending occurring in James City County to 63.08% for Cardinal Ridge homeowners and 66.17% for Cardinal Ridge renters.

For analysis purposes, it was assumed that only 25% of convenience goods purchases were subject to online purchasing (i,e., 15% of 25% of convenience goods are online shopping; 0% of 75% of shopping goods are online shopping). With this adjustment to convenience goods purchases, 63% of convenience goods purchases by Cardinal Ridge residents and were attributed to James City County locations. The ratio of convenience to shopping goods spending was assumed to be 70%/30%. The blended retail retention rate for convenience and shopping goods was calculated to be 63.5% for Cardinal Ridge homeowners and renters combined.

Cardinal Ridge residents can be expected not to travel more than necessary for services and all personal service spending, as well as automotive and home repair services, were assumed to occur at establishments within a fifteen minute drive time of the Site. Again, the retention rate for grocery spending was used as a proxy for spending on services. Using the distance gradient model for grocery stores, this retention rate was adjusted by excluding retail site lying beyond the driving distance cut-off. With this modification, Cardinal Ridge residents can be expected to patronize James City County businesses for service 66.58% of the time.

With the location analysis model was run without the presence of Cardinal Ridge businesses in order to determine consumer patters (leakage of consumer dollars) as they currently exist, estimates were that 61.56% of grocery spending, 54.74% of restaurant spending (when fast food is excluded), 63% of other retail spending and 66.58% of service spending would be redirected from businesses located in the County. (It was assumed that the introduction of Cardinal Ridge businesses would have no effect on the online shopping patterns used to calculate these metrics.)

Therefore, 38.44% of projected Market District grocery store sales would bring net new tax revenue to the County. For Market District restaurants, 45.26% of sales would result in net new taxes for the County. Other retail at the Market District would derive 37% of sales redirected from businesses located outside of the County, thus generating net new revenue for the County. Consumer service tenants at the Market District would redirect 33.42% of sales from businesses located outside James City County producing net new revenue for the County. These adjustments apply equally to taxes received due to Market District sales under both of the scenarios being examined.

Other Tax Revenues

Revenue from the County's utility consumption fee was also calculated on a per household and per business basis. Per business revenue from this source is expected to be considerably higher than per household revenue. In order to adjust for the higher usage by businesses, U.S. Energy Information Agency data was used to estimate that an average business uses about six and one-third the amount of electricity as an average residence and the expected consumption tax per business was adjusted accordingly. Thus, the average consumption tax was estimated to be $40.25 annually per business.

User fees per business were calculated by dividing revenues estimated to be received in FY 2026 (as reported in the *Budget*) by the estimated number of households and businesses in the County. When revenues are generated by both households and businesses, the revenue per household and the revenue per business are assumed to be equal in most cases and are calculated according to the formula below:

$$R_{HH} \text{ or } R_B = R/(HH+B)$$

Where R_{HH} = Revenue per Household
R_B = Revenue per Business
R = Total Revenue
HH = the Number of Households
B = the Number of Businesses

Revenues collected from businesses are: ALS/BLS fees (emergency medical incidents occur at businesses), fees associated with the courts and public safety (Clerk excess fees, Clerk secure remote access fees, Commonwealth Attorney fee, Circuit Court, eSummons fees, fines and forfeitures, police fees, and Sheriff and jail fees), false alarm fees, and parking tickets (commercial vehicles can violate parking ordinances).

The number of households in the County was derived from the latest County annual operating budget. The number of business establishments in the County (2,246) was obtained from the Virginia Employment Commission's Quarterly Census of Employment and Wages 4th quarter 2024 and was used to calculate the per-business revenue. The business firm, rather than a per-employee measure, was deemed to be a more appropriate unit to measure the receipt of revenues by the City from the business community.

It was recognized that businesses are much more likely to generate false alarms than are households. In the absence of empirical data, it was assumed that businesses are five times more likely to generate false alarms than residential households and the per household revenue from these fees was adjusted accordingly with the above formula for the calculation of allocation to households and businesses adjusted by multiplying the number of businesses by the determined factor.

Table A-3, on below, details the County's revenues from the Cardinal Ridge Market District, other than those derived from the direct levy of taxes and utility taxes. Tax rates and fees found on the current James City County website and/or reported in the *Budget* were used and assumed to be accurate.

Table A-3
James City County Variable, Non-Direct Tax Revenues[1]
from Cardinal Ridge Market District Businesses, FY 2025-26

Item	Revenues	Revenue per Business
ALS/BLS Fee	$3,200,000	$ 90.79
Clerk Secure and Remote Access Fee	$ 40,000	$ 1.13
Commonwealth Attorney Fee Circuit Court	$ 5,000	$ 0.14
eSummons Fee	$ 16,000	$ 0.45
Excess Fee Circuit Court Clerk	$ 50,000	$ 1.42
False Alarm Violation Fees	$ 1,500	$ 0.17
Fines and Forfeitures	$ 170,000	$ 4.82
Parking Tickets	$ 3,500	$ 0.10
Police Fees	$ 3,000	$ 0.09
Sheriff and Jail Fees	$ 175,000	$ 4.97
Total	$3,667,000	$104.08
Total, Excluding EMS	$ 464,000	$ 13.29

[1]Does not include revenues directly assessed to the project
Revenue is rounded to the nearest $25.
Source: James City County, Virginia FY2026 Adopted Operating Budget

Approved minutes from December 3, 2025, Planning Commission Meeting.

Z-23-0008. Cardinal Ridge (Eastern State) Rezoning (PL, Public Lands to MU, Mixed Use)

Ms. Terry Costello, Senior Planner, addressed the Commission stating that Mr. Tim Trant of Kaufman & Canoles, had applied on behalf of D.R. Horton, Inc. to rezone an approximately 365.6 acre portion of property located at 4601 Ironbound Road. Ms. Costello explained that the property is currently zoned PL, Public Land, is inside the Primary service area, and is designated as Federal, State, or County Land on the 2045 Comprehensive Plan land use map.

Ms. Costello stated that this application requested to rezone the property from PL to MU, Mixed Use. Ms. Costello explained that the proposed development included a maximum of 1006 residential dwellings, of which 309 will be single-family detached units, 247 will be single-family attached units, and 450 apartments. Ms. Costello noted that this corresponds to a proposed residential density of 4.3 units per developable acre. Ms. Costello stated that 20% of the units, or 202, will be made affordable for those making up to 80 percent of the Area Median Income. Ms. Costello noted the proposal also includes a maximum of 162,000 square feet of commercial use and approximately 40.6 acres for public use.

Ms. Costello then discussed with the Commission the proposed recreational facilities, including clubhouses, pools, playgrounds, and trails. Ms. Costello then explained the required density bonus points, stating that the applicants proposal would equate to 4.5 bonus density points.

Ms. Costello explained that the property is in the Powhatan Creek Watershed and was reviewed for consistency with the watershed master plan. Ms. Costello noted that a contribution is proffered per unit to contribute to a stream restoration project in the area and the application also ensures the submission of a master stormwater plan with all stormwater management facility outfalls have outlet protection designed for 100-year storm events, and compliance with the most updated version of the County's Special Stormwater Criteria (SSCs). Ms. Costello stated that overall, staff found that the application was consistent with the Powhatan Creek Watershed Master Plan.

Ms. Costello explained that during the 2045 Comprehensive Plan update process, a land use application, LU-20-0003, was submitted requesting to change the land use designation for this portion of the property from Federal, State, or County Land to the Mixed Use – New Town designation. Ms. Costello stated that at its June 24, 2021 meeting, the Planning Commission recommended approval of the Comprehensive Plan including the land use application. Ms. Costello noted that following consideration by the Board of Supervisors, the land use application was deferred to be reviewed concurrently with the rezoning application and guidance was received to change the proposed land use designation to Mixed Use – Eastern State. Ms. Costello stated that staff finds that the application is consistent with the proposed draft language for the Mixed Use – Eastern State designation.

Ms. Costello then stated that staff finds that this application is not consistent with the Board of Supervisors adopted policy – Multiple Use Districts and Mixed-Use Construction Phasing Policy.

Ms. Costello then listed the factors that staff found favorable for the application, including its consistency with the Zoning Ordinance, adopted policies, fiscal impact, schools, and transportation.

Ms. Costello stated that staff recommends to that the Planning Commission recommend approval of the proposed rezoning application to the Board of Supervisors, subject to the proposed proffers.

Mr. Rodgers asked if the 20% of affordable residences would be apartments.

Ms. Costello explained that if committed to 82 apartments, the rest is undetermined at that point as the Comprehensive plan just states 20% and does not require a mix of residences.

Mr. Rodgers asked for clarification on how the application is not consistent with the Board of Supervisor's Multiple Use Districts and Mixed Use Construction Phasing Policy.

Ms. Costello read the criteria from the policy and explained that the application was not consistent because there was no guarantee that the development would be built to the percentages written in the phasing policy.

Discussion ensued.

Mr. Haldeman asked if the Commissioners had any disclosures to make.

Mr. Polster stated he had talked with Mr. Trant.

Mr. Haldeman stated he had talked with and emailed Mr. Trant.

Mr. Everson stated he had talked with Mr. Trant as well as staff from Planning and Stormwater.

Mr. Maye stated he had spoken with Mr. Trant.

Mr. Haldeman opened the Public Hearing.

Mr. Tim Trant, 4801 Courthouse Street, addressed the Commission stating he was representing the applicant team and made a presentation describing the proposed project.

Mr. Polster asked for clarification on why a middle school was used for a figure to calculate traffic impact.

Mr. Trant explained that the highest potential impact that could occur on the public use site would be from a middle school, and the traffic model was built based on that level of intensity.

Mr. Polster asked if the public land would be given to the County.

Mr. Trant stated that the public use site is proffered to be donated to the County after the applicant receives it.

Discussion ensued.

Mr. Polster asked if the commercial land would also be given to the County.

Mr. Trant stated that was correct.

Mr. Polster asked if the Commercial Property Owners Association would then be able to govern what the County could do with the property.

Mr. Trant explained that the commercial development is binded in the proffers in the event that the property is sold by the County and developed privately.

Mr. Polster asked if the HOA fee would be lower for residents living in the affordable housing units.

Mr. Trant stated there was no commitment made in the proffers that the affordable units would receive a different assessment for the HOA fee than the market rate units.

Discussion ensued.

Mr. Everson asked if the County would receive the amount listed in the fiscal analysis for the net proceeds if they were to sell the commercial land.

Mr. Trant stated that was correct, and explained that it was an estimated amount.

Mr. Everson asked Mr. Trant to speak about the Community Development Authority.

Mr. Trant stated that it was a financing vehicle for the infrastructure required, including the improvement of the roads.

Discussion ensued.

Mr. Haldeman asked if the affordable apartments will be built with the first homes.

Mr. Trant stated that was correct.

Mr. Haldeman asked if the amount stated in the net fiscal impact to the County was a total number and not an annual amount.

Mr. Trant stated he believed that was correct.

Discussion ensued.

Mr. Charles Swadley, 5316 Highgate Green, addressed the Commission stating he was a founding member of Hope Family Village and spoke in favor of the proposed project.

Ms. Jean Romadka, 5107 Scarborough Mews, addressed the Commission with concerns about the proposed project.

Ms. Shirley Otto, 4906 Whitby Mews, addressed the Commission with concerns about the proposed project.

Ms. Carol Matula, 113 Mid Ocean, addressed the Commission with concerns about the proposed project.

Mr. Harry Fahl, 5107 Scarborough Mews, addressed the Commission with concerns about the proposed project.

Mr. Bill Manning, 3405 North Chase, addressed the Commission with concerns about the proposed project.

Ms. Beth Filegar, 7242 Otey Drive, addressed the Commission stating she was representing Hope Family Village and spoke in support of the proposed project.

Mr. Andrew Huckabee, 115 Deerwood Drive, addressed the Commission with concerns about the proposed project.

Mr. Haldeman closed the Public Hearing.

Mr. Haldeman asked for clarification of Proffer No. 8 and how it pertains to Colonial Behavioral Health and Hope Family Village.

Mr. Trant explained that the Colonial Behavioral Health property is a part of the application and is bound by the master plan.

Mr. Polster asked if the application is denied, would Colonial Behavioral Health have to stop building their facility.

Mr. Trant explained that Colonial Behavioral Health's use is by right under its current zoning, PL, and would remain consistent if the land were to be rezoned to MU.

Mr. Polster asked if the same would apply to Hope Village.

Mr. Trant stated it would not.

Discussion continued.

Mr. Everson asked Ms. Costello if the County had ever owned commercial land to then sell.

Ms. Costello stated she did not know.

Mr. Polster discussed with the Commission his concerns with the Stormwater facility design and stated he did not find it reasonable to wait until the site plan phase to address known issues. Mr. Polster stated that the applicant should make the Commission aware of how they will mitigate the issues before approval is given.

Mr. Polster explained that the County is currently responsible for several stream restorations and recently increased their cost estimate for maintenance. Mr. Polster then asked why the County would take on this stream restoration when the developer and HOA are responsible for it.

Mr. Polster explained that he did not find the mixed use and density appropriate and did not support the development of 1,006 residential units in this area.

Mr. Everson stated that he found it reasonable for the County to be involved in the stream restoration if both Cardinal Ridge and the proposed Westwood development worked simultaneously to repair the stream. Mr. Everson noted that the County would be held accountable if the repairs were incorrectly done.

Mr. Polster noted that Westwood had not committed to stormwater improvements and questioned again why the County should bear responsibility for remediation when the issues are located on private property.

Discussion continued.

Mr. Polster expressed concerns about the traffic impacts from the proposed project.

Mr. Scott Dunn discussed how the proposed Government Center traffic impacts relate to the Cardinal Ridge development and explained that what is proffered for the roundabout for the Government Center will be in place for Cardinal Ridge as well.

Mr. Polster asked if the roundabout had four lanes.

Mr. Dunn stated that the roundabout only had two lanes.

Discussion ensued.

Mr. Polster stated that the Traffic Impact Analysis (TIA) did not account for the cumulative impact across the entire road.

Mr. Dunn stated that it was in the TIA and the intersections were analyzed.

Discussion ensued.

Mr. Trant stated that the impacts from the proposed project had been mitigated through the proffers, approved by VDOT, and were consistent with the Comprehensive Plan. Mr. Trant then stated that he believed the proffers proposed to remediate the Powhatan Creek Watershed were effective and

reasonable and they were committed to implementing the most modern SSCs to mitigate the issues brought upon by the State.

Mr. Polster stated he would have preferred if the specific SSCs they plan to follow were stated in the proffers as they were shown on the master plan.

Discussion ensued.

Mr. Mark Richardson, Timmons Group, stated that the SRP still had to review their Stormwater Master Plan and had not committed the applicant to specific SSCs. Mr. Richardson explained they are not in the proffers as to not bind the applicant to them, but shown on the master plan as a viable solution.

Mr. Polster explained he was looking for a commitment to the SSCs.

Mr. Richardson stated that the requirement to follow the SSCs are in the proffers.

Mr. Polster stated he wants the specific SSCs listed.

Discussion continued.

Mr. Rodgers stated that he trusted the Stormwater division to work with applicants at the site plan phase and ensure issues are mitigated. Mr. Rodgers also explained that he approved of development in the Primary Service Area (PSA) and supported creating workforce housing within the County.

Dr. Haskins stated that she was in support of increased enrollment in the surrounding public schools.

Mr. Maye stated that he supported the proposed project.

Mr. Haldeman explained that although he approved of the overall design and affordable housing, specifically that it was included in phase one of development, but he had concerns about the size of the development in accordance with the other growing developments and increased traffic and stated that he would not be in support of the project.

Mr. Everson stated he did not approve of the County being involved in the commercial retail business and had not decided his vote.

Mr. Polster stated that he trusted the Stormwater division but was looking for assurance from the applicant.

Mr. Trant stated that the applicant would be willing to make a change in the proffers to commit to one of the SSCs and explained that the high density of the proposed development is a result of trying to meet all the County requirements.

Mr. Polster stated that he would refer to the County Attorney's office.

Mr. Rodgers made a motion to recommend approval of Z-23-0008. Cardinal Ridge (Eastern State) Rezoning (PL, Public Lands to MU, Mixed Use) to the Board of Supervisors with conditions as proffered.

On a roll call vote the Commission voted to recommend approval. (4-2)

Dear JCC Supervisors and All JCC Pertinent Parties Regarding Cardinal Ridge

Good Morning All.

This message is a compilation of four months of my efforts, my fellow Mews residents, the general public in our community, the online petition and more objecting to the proposed Cardinal Ridge development. What I wrote is as in depth, factual and complete as I can make it. Therefore, I apologize for its length in advance, but I strongly encourage you to read it in its entirety.

I have created posters, informational 4x6 cards, and business cards. The posters went out to all local public places that allowed us to post them. The 4x6 cards were my primary handout. They were given to every individual at every meeting or function I was invited to and allowed to speak at. These meetings numbered well into the twenties. I gave the cards out, and included discussion as often as possible. I attempted to explain the good and not so good of CR when time allowed and at every opportunity. I stood outside of vote polling locations and spoke with people after they voted. I worked restaurants, Dr. offices, and literally every place that had someone who was willing to listen. How many individuals did I personally speak with? I know the approximate number by the number of cards I ordered, printed and gave out 1,200 single cards. Recently I attached a second card with general numbers of new housing developments either underway or tentative in JCC. Add that to the last 400 I distributed making the total number of citizens I spoke with is 1,600. I recently ordered another 400 cards which will be given out at functions and meetings I will be speaking at upon my return from our daughter's wedding in Norway.

Why are these numbers important. Each card handed to one individual can be given to another and then another. The outreach of this effort by myself and others was unbelievable. Everyone wanted to help! Our citizens are rallying to stop a community of this size from being approved and built. First, the meetings I spoke at. When I reached out to the meeting organizers they were very excited about my attendance with their group because they realized that the CR project was something they felt all would be interested in and no one would want. They were right! Of the 1,600 plus I spoke with I had EIGHT that felt CR was good thing. Numbers matter. Nearly all had no clue that the potential CR development was even being considered. Something of this size, magnitude and impact, and the general population isn't aware of it says something is wrong with the communication between government and citizens. Perhaps appropriate roadside signage and other means of spreading the word should be considered. If it remains as is, it will continue to be a disservice to our citizens. Continuing my outreach I wrote a letter to the editor of the Virginia Gazette and it was published. Ben Swenson from the Gazette then came to our home and interviewed Jean and myself for an article he will run after meeting

with other parties on the CR matter. We must always and continue to reach out. Please don't respond to this observation by saying, well it was posted in our calendar or something else as inane as that. Realistically, how many people are even aware of the calendar. There should be a physical notification on the property of any proposed development or change in zoning status for every project. Doing this will lend credence and a more positive attitude toward our government officials.

I must state that myself and many individuals I spoke with understand the value of the Eastern State Hospital property. Anyone who is familiar with it knows that it is lying fallow and should be given over to some type of development. I've gone back and looked at the platforms each of the supervisors ran on when campaigning for election or re-election and one theme stood out, INTELLIGENT GROWTH for JCC. Development that will benefit, not degrade the JCC community. I would hope none of them have forgotten what they stood for. In my opinion and thousands of others 1006 units IS NOT intelligent use of that land. Why not? First is traffic. D R Hortons own numbers show that after buildout the traffic load will increase by 7,000 vehicle trips per day just with CR. A planning commissioner feels it will be closer to 9,000. Couple that with the Government Center, the Library and other communities being considered or constructed outside of the immediate area but that will use Longhill, Depue, and Ironbound, intersecting with Galt and you have a dangerous nightmare traffic situation. According to Jack Haldeman, if all new communities already under construction or yet to be approved over the next eight to ten years it will generate 50,000 new trips per day in our community. Do you want to be responsible for that? Would you want to live on one of the most travelled roads in JCC? We don't. I am fully aware of the proposed VDOT changes with the traffic circles and possible future additions to those circles by Horton, but they are not going to reduce the numbers nor will they allow those in the Mews to enter or exit our community safely. If CR is allowed to proceed I predict the location in front of the Mews will be one of the most accident prone areas in the county. Again, are you willing to bear the fact that you allowed that? Will your conscience be affected after each crash? Now think about Ashbury and the crossing between the government and rec centers. It will be heavy! That road and the intersection at the far end at Ironbound are not sized or constructed for the numbers of vehicles it will receive. Add in the Skipwith Farms neighborhood. They already have traffic issues and recently persuaded the city to add signs to minimize the vehicle counts going through to Richmond Road. This is a family friendly neighborhood with children and safety should be of paramount importance. However, we all know that drivers will ignore those signs that say "Not A Through Road" to quickly access Richmond Road and the numbers will increase creating a dangerous situation for the Skipwith families. I'm well aware this is city but future CR

residents won't differentiate county from city when they want to get to Richmond Road. We owe city residents our respect when looking at future JCC developments.

Several weeks ago Lisa Thomas from the Hope Family Village project called and asked to meet with me. I agreed but asked that Horton attend. They also agreed. Our attendees included Mews Board member and interested parties. Lisa gave a presentation about the village. Before her presentation, myself and others had concerns that if CR didn't go through Hope wouldn't be constructed and that would stop the mental health aspect of the village. **None of us feel that concern any longer.** The village is not about mental health living. It's a co-housing village. There is no prerequisite regarding mental health to live there. Anyone can. There will be one common structure that will house four challenged individuals who will make their own rules or govern themselves. Lisa said, if they want to allow alcohol, sure. To promote Hope Family Village as a mental health community is simply not true. Want to live there? Yes! Simply apply then you can share with the grounds upkeep having one lawnmower in a shed. No one in particular will be responsible for property maintenance. Every sentence Lisa spoke drove each of us farther away from caring about New Hope Village.

Horton had seven individuals attend the Hope Family Village meeting. Tim Trant, legal, the project supervisor, the regional manager for this area of the U.S., three engineers including traffic and another two attendees who I don't recall their areas of responsibility. An all-out, full-blown presentations with maps, charts etc. It was a very well done "Sales Pitch". Did it change a single mind of those from the Mews board or other attendees? Nope! The traffic issue was the first topic. The traffic engineer and project manager tried to quantify how it was thought out. In reality it was thought out with no consideration for the surrounding communities or neighborhoods. That alone sends a clear message of selfishness, and corporate self centeredness. This gives me additional pause regarding their many promises to do the right thing. During our discussions that evening, Ms Thomas left and we continued for another hour discussing many factors of CR, they finally closed with comments asking if we would pull back our efforts to defeat this community. I responded, absolutely NOT! I stated the size of this development and the negative effects it will have on the citizens of JCC will empower me and others to defeat this abomination. Needless to say they were not happy.

The land donation issue. Horton seems very proud of this and at first glance it seems very generous. We all know that it's an incentive. They mention land for a school. Does the county have $1,000,000. the average price of a school? If not, and perhaps it's not needed. Therefore that portion of the land give-a-way has little value. The second part of their bribe is the 40+ acres along Longwood and DePue suggesting it could be for retail or office space.

Is the county in the position be a land developer? I think not. If developed and with all the vacant storefronts throughout JCC and Williamsburg it would soon fall the way of Newtowns retail streets. Another failed idea and blight on our community. I asked the Horton people about the sale price of the 365 acres. They stammered for a bit but it slipped out that the original asking price was $11 million but feels it may have gone up. They then backed off and talked among themselves and stated that they shouldn't give an answer as it may be confidential information. But let's say that the current figure is $16 million and the estimated value of the 40+ acres they want to give to the county is $6.5 million. It seemed like that figure might be inflated based on the total selling price. A false incentive? I asked the question and they said it was valued by an independent firm. I still have serious doubts about that value and feel it is inflated to generate more interest in approving Cardinal Ridge. On top of all that the entrance/exit of this would be directly into the traffic circle at Longwood and DePue. Another strike against The Mews and our neighbors.

A question often asked of me. what should be constructed on the hospital property.I believe a small office park servicing lokal businesses, or perhaps light manufacturing. Done correctly it would not be nearly as harmful to the watershed as housing. It would decrease traffic and add a solid tax base for the county. A small affordable housing neighborhood could be built close by to give the employees of the center a place to live. Please don't think I'm over simplifying, I'm not, I'm just giving food for thought.

Let's take a look at what I'm certain each of you might see attractive. First the reconstruction of the flow of rain and storm water. Right now the rivulets, small streams and other rainwater runoff is not bad! One may look at it and see meandering water flows but interpret it as a negative or devastation. I see it as nature's own way of controlling sediment runoff and erosion. Horton and most developers' solution is to take the extreme runoff occurring over the asphalt and concrete before and after development then channel it into, in this case 8 storm water management ponds. Those ponds which trap sediment, leaves, grass, road oils, and tire rubber plus all the lawn chemicals, soaps, and cleaning agents a normal household generates and holds it. The solids fall to the bottom, degrade and become sediment which slowly builds and decreases the required depth of each pond. Much of the other runoff I mentioned remain suspended in the pond and is sent downstream into the Powhatan watershed during the next rain. This is much more hazardous to our watershed than a normal stream flow. Point in fact, I hiked a good length of Chisel Run which has similar flows and has been flowing for decades on the west side of Rt 199 and is part of the land package. The flow follows its course as nature intended with minimal if any damage to the environment adjacent to it. Again, I'm not saying that storm water management should not be done. I am saying that the amount of open, natural

space in the developed area must be increased by major percentages. How? By decreasing the size of the development or changing the use of the land. I am aware of their plans to create a common natural area which will mitigate some of the damage they will create but not nearly enough. Another point must be considered here. Horton is planning on creating 3 HOA's with a 4th overseeing the other 3. So what happens when these ponds need to be maintained, serviced or dredged? Leaving the responsibility, it's management and the expense of 8 sediment control ponds to volunteers of the respective HOA's is a disaster waiting to happen for JCC. The Horton group will initially set up the HOA's then turn them over to the volunteers. Another disaster and unexpected expense is in the works and waiting to spring itself onto unsuspecting homeowners. I also asked about the initial proposal that separated the community into three distinct classes of residents. Those who wouldn't have access to recreational areas in the development, another limited to a certain section and the third to one dedicated to their type of home. One more ill thought-out part of the plan. I know this has since been deleted from the proposal but one would think that human class division would be far and away from a good planners thoughts. Obviously not at Horton. They were all very embarrassed by the fact they got caught doing this. All were at a loss for words.

Several citizens commented on the Next Door online comment site stating that the traffic won't be so bad because it will be an 8 to 10 year buildout. 8 to 10 years of trucks, construction equipment, personal crews vehicles, and general construction noise and much more. Just look at the government center and how much equipment is on site. Many or most of them entering or leaving from Ashbury. Another negative for the Mews. Then we have a full 7,000 vehicle trips per day to contend with.

I would like to go back to the Planning Commissioners meeting when the zoning change was approved. We listened to Mr. Tim Trant. A convincing presentation was given. However, several statements stood out. The first and most impactful was about the CDA. I wasn't familiar with that type of funding for the infrastructure so I began studying it. This was a non-starter for me and others who I explained it to. I'm assuming the supervisors felt the same as me. Hence, that requirement was discarded by Horton. Thank you for your wisdom in rejecting that. Initially Mr. Trant stated at that meeting without the CDA Horton could not afford to build CR. When I questioned their team at our meeting they were caught off guard. I asked if they would have to increase the price of the houses to compensate for their additional infrastructure construction costs. They all stated NO! So I asked if the initial CDA request was simply to increase their profit margins and they had to say, reluctantly and shamefacedly "Yes". Another strike against them.

One of the Mews board members picked up on the following while reviewing the commissioners video. Mr. Trant's closing statement included a comment **"The scale of the project is driven by the scale of the ask".** It seems to us Mr. Trant has it backwards. To our knowledge JCC did not ask for Horton to design and build this development. D R Horton is doing the asking for permission to build this development. We feel it is very arrogant of Horton to try to put a governing body in the position that they are asking too much. Finally, the vote of the commissioners. Haldeman-NO, Polster-NO, then the yes votes. Two of them stated that they wish the development was smaller, like 500 homes but they still voted yes. Where is their conscience? That's simply Disgusting! Jay Everson presented strong arguments in favor of the project and has not wavered from his stance even though he and I have had a number on one-on-one conversations. I've also met with Polster and Haldeman to discuss this project since the commissioners approval.

Let's go back to comments made by citizens of JCC and of those who do not live in the immediate vicinity but travel our roads and work in the affected areas. I have met, spoken with, or messaged with, quite a number of individuals who fit into the above category. One of them lives in Short Pump! He commutes every morning to Discovery Park Blvd. He fights the I 64 construction and now feels he will have to fight congestion on Longwood and DePue further minimizing his time at home with his family. This individual deserves something better while commuting in our community. There are others who fit similar circumstances and are dead set against this development. With the exception of a rare few, every single person I spoke with is against the additional traffic CR will generate. EVERY ONE!!! Will you listen to them through me? They are the voice of our government. I am simply their mouthpiece. Do not dismiss them simply because you don't hear them cry out.

One of the ways we created for people to respond is a petition. Change.org/nocardinalridge. Does it carry any weight with you? I would hope so. John McGlennon, when I asked you during your visit to our home if it held importance to you, you said not so much because many of the signatures may not be from the affected region. Well, that's not the case in here. We did not reach out beyond JCC. I believe the only signatures you would find from other areas are those I described above, commuters or those working here and affected by development. All others are concerned JCC citizens. As I write this the number is 1,360 signatures that oppose CR and the number keep rising every day as more people become aware. I'm also aware of the many emails that have been sent to you and the few responses that were sent back. Please go back and read each of them. These are your constituents speaking out. Please don't ignore their voice.

Our citizens are aware and watching the Cardinal Ridge issue. There are a few comments I didn't like hearing about the decision makers in JCC and came to your defense. But I heard them time and time again. They stated, "It makes no difference what I say the Supervisors will do whatever they want to do. They don't care about us, they will always support the developers, they have lost sight of what Williamsburg and James City County have always been proud of, community, atmosphere, neighborly". They feel that we are becoming Newport News West. I see the same thing. I experienced it watching the corridor from DC up through Philadelphia on to New York develop into one large, long megalopolis. We are in danger of being the same from Virginia Beach, Hampton, Newport News to Richmond. Where does it stop? You must not allow JCC to be another rung in that horizontal ladder. Let's work to become the missing rung. JCC and Williamsburg are unique. Don't destroy that. Let the large developments go around us and what development there is make certain it is looked at carefully, dissecting the information, then get the word out to our citizens and listen to them.

I mentioned earlier in this message that only eight individuals thought the project should go ahead. One of those was our state senator, Diggs. He approached me at one of the meetings I spoke at and suggested I should let the CR development be built. I told him I would not and that I would continue my efforts to stop or at least force a substantial decrease in size. I stated that the JCC populace deserve better than Cardinal Ridge and I will represent them in front of all who think otherwise. This makes me wonder, why would he attempt to influence me, to change my mind. I continued to ponder why Diggs would approach me. Does he have an agenda that included Cardinal Ridge? Now I question who else will he reach out to trying to convince them to allow CR to move forward. I would hope that if he reaches out to any JCC government official it would immediately be disclosed. Needless to say I am very concerned about this and will continue to search out his reasons for trying to dissuade me from pursuing the CR issue.

I'm nearing the end of this long missive and I apologize for the length. I felt you should be aware of the efforts that have gone into researching, reaching out, listening, writing and talking with those who live and work in JCC about Cardinal Ridge and the results of the that time spent. There is one last item you should be aware of. That's the number of past and ongoing class action lawsuits that Horton is defending themselves against including a federal investigation on possible RICO charges. Several of these have been brought to my attention via email. I will send them separate email. Please understand that I have not researched these myself but were done by a respected colleague.

I would like to thank each of you for the time you have given me and us. Every one of the supervisors took the time to meet at our home in the Mews. We had productive

discussions and we appreciated the time you took to hear us and our concerns. We thank you for your thoughtful responses. I thank Paul Holt for the time he took to listen and respond to our concerns regarding traffic and related topics. Brad Rinehimer, you were always a good listener during the times we spent together as brief as they were.

Our Best Regards

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