

FILE

AMENDMENT
TO INSTALL
45 L.F. OF ACU
DRAIN
O.K. (GEL)



TRANSMITTAL SHEET
ENGINEERING & RESOURCE PROTECTION → STORMWATER

Project: Landmark Auto

County Plan No.: SP-051-02

Assigned BMP No.: JR-059

BMP Type: Infiltration – Wet Pond

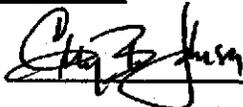
Information Enclosed:

X Computations

X Other: Project file information. Required final documents never provided. No remaining bond.

Name: Greg Johnson

Date: 12/31/2013

Signature: 

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 12th day of November, 2002,
between Hallmark Enterprises, LLC, and
all successors in interest, ("COVENANTOR(S),") owner(s) of the following property:
1720 Endeavor Drive

project name, Landmark Auto Parts,
Document No. 010001692, Deed Book _____, Page No. _____; Instrument
No. _____, and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other covenants, and all rights, titles and interests in the property described above, do hereby covenant with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.

2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.

4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.

5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.

Instrument NUMBER: 020031321
Recorded: Dec. 27, 2002 0224

6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

9. This COVENANT shall be recorded in the County Land Records.

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of the date first above written.

COVENANTOR(S)

COVENANTOR(S)

[Signature]

[Signature]

Print Name/Title

Jenna Ho Vice President

ATTEST:

Rhonda Reichert

COVENANTOR(S)

COVENANTOR(S)

Print Name/Title

ATTEST:

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Newport News

I hereby certify that on this 12th day of November, 2002, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of Newport News, aforesaid personally appeared Joanna Ho and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 12th day of November, 2002.

Rhonda R. Reichert
Notary Public

Rhonda R. Reichert
Notary Public

My Commission expires: 10-31-05

Approved as to form:

[Signature]
Asst. County Attorney

This Declaration of Covenants prepared by:

This Declaration of Covenants prepared by:

Rhonda R. Reichert
(Print Name)

Rhonda R. Reichert
(Print Name)

Admin Assit.
(Title)

Admin Assit.
(Title)

739 Thimble Shoals Blvd
(Address)

739 Thimble Shoals Blvd #304
(Address)

NN Va 23606
(City) (State) (Zip)

NN Va 23606
(City) (State) (Zip)

drainage.pre



Environmental Division
OCT 27 2011

James City County, Virginia
Environmental Division

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Stormwater Management / BMP Facilities
Record Drawing and Construction Certification Forms

POST-CONSTRUCTION CERTIFICATION

(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)

Section 1 - Site Information:

Project Name: LandMark Auto Parts
Structure/BMP Name: _____
Project Location: 1720 Endeavour Drive
BMP Location: South side of Parcel
County Plan No.: 3P - 51 - 02

Project Type: Residential Business Commercial Office
 Institutional Industrial Public Roadway Other _____
Tax Map/Parcel No.: 5920100052
BMP ID Code (if known): JR-059
Zoning District: M1
Land Use: Auto Parts Supplier
Site Area (sf or acres): 12.83

Brief Description of Stormwater Management/BMP Facility: Wet Pond with
Aguxetic Bench

Nearest Visible Landmark to SWM/BMP Facility: Building & Parking Lot

Nearest Vertical Ground Control (if known):
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other
Station Number or Name: _____
Datum or Reference Elevation: _____
Control Description: _____
Control Location from Subject Facility: _____

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: Yes No Unknown
Approx. Construction Start Date for SWM/BMP Facility: Spring 2003
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: H.B. Hankins
Name of Professional Firm Who Routinely Monitored Construction: _____
Date of Completion for SWM/BMP Facility: Summer 2004
Date of Record Drawing/Construction Certification Submittal: 11/23/04 10/27/11

(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)

Section 3 - Owner / Designer / Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*
Name: Endeavor Assoc., LLC
Mailing Address: 11848 Rock Landing Dr. Ste 202
Newport News, Va 23606
Business Phone: _____ Fax: _____
Contact Person: William Hawner Title: _____

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*
Firm Name: Richmond Engineering, Inc.
Mailing Address: 1643-C Herringwood Trail
Williamsburg, Va. 23185
Business Phone: 229-1776
Fax: 229-4683
Responsible Plan Preparer: Don Jennings / Steve Stafford
Title: Engineer
Plan Name: Landmark Auto Parts
Firm's Project No. 02104
Plan Date: 4/24/02
Sheet No.'s Applicable to SWM/BMP Facility: _____ / _____ / _____ / _____ / _____

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*
Name: H.B. Hankins, Inc
Mailing Address: 11828 Canon Blvd, Ste H
Newport News, Va
Business Phone: 873-2196
Fax: _____
Contact Person: Howard Hankins
Site Foreman/Supervisor: Hank Mullins
Specialty Subcontractors & Purpose (for BMP Construction Only): _____

Section 4 - Professional Certifications:

Certifying Professionals: (Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: _____
Mailing Address: _____
Business Phone: _____
Fax: _____

Name: _____
Title: _____

Signature: _____
Date: _____

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

Post-Construction Certification

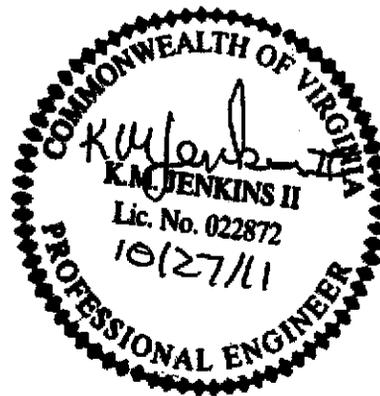
Firm Name: LandTech Resources, Inc
Mailing Address: 205-E Bulfinch Blvd
Williamsburg, Va 23188
Business Phone: 565-1677
Fax: 565-0782

Name: Kenneth Jenkins
Title: Senior Engineer

Signature: Kenneth Jenkins
Date: 10/27/11

See Attached Email dated 10/27/11

I hereby certify to the best of my knowledge and belief that this Stormwater Management/BMP facility was ~~monitored and~~ constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.



_____ (Seal)

Virginia Registered Professional Engineer
or Certified Land Surveyor

_____ (Seal)

Virginia Registered
Professional Engineer

Kenny Jenkins

From: Kenny Jenkins [kjenkins@landtechresources.com]
Sent: Thursday, October 27, 2011 9:39 AM
To: Joey Ritchie
Cc: joe buchite (jbuchite@james-city.va.us)
Subject: Keystone Auto Parts

Joey, I meet with Joe Buchite of the James City County Environmental Inspectors onsite this morning and he had the following items that need to be resolved in the field:

- 1) Clear all brush, vegetation, trees and sediment within a 10-foot radius of the retention pond/BMP outlet control structure and pond inlet sediment forebay.
- 2) Erosion appeared to be evident along the north, south and western edges of the BMP outlet structure. These areas should be backfilled with compacted material, reseeded and mulched or matted for stabilization.
- 3) Conversion of the BMP outlet control structure from temporary sediment basin mode to final BMP mode is incomplete. Install EW-11 grate instead of the ½"x1/2"-16 gauge galvanized steel WWF as shown on sheet C9 of the approved plans.

Kenneth M. Jenkins, II, P.E.
LandTech Resources, Inc.
205-E Bulifants Blvd.
Williamsburg, VA 23188
(757) 565-1677
(757) 565-0782 Fax



Environmental Division

FEB 17 2012

James City County, Virginia
Environmental Division

**Stormwater Management / BMP Facilities
Record Drawing and Construction Certification Forms**

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(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)

Section 1 - Site Information:

Project Name: LANDMARK AUTO PARTS / JAMES RIVER COMMERCE CNTR
Structure/BMP Name: _____
Project Location: 1720 ENDEAVOR DRIVE
BMP Location: ALONG SOUTHERN EDGE OF PARKING LOT
County Plan No.: _____

Project Type: Residential Business Commercial Office
 Institutional Industrial Public Roadway Other _____
Tax Map/Parcel No.: 5920100052
BMP ID Code (if known): _____
Zoning District: M-1
Land Use: _____
Site Area (sf or acres): 12.6280 AC.

Brief Description of Stormwater Management/BMP Facility:

"WET POND" COVERING APPROXIMATELY 0.5 AC.

Nearest Visible Landmark to SWM/BMP Facility: BUCKH GARDENS / JAMES RIVER COMMERCE CNTR.

Nearest Vertical Ground Control (if known): N/A
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other

Station Number or Name: _____

Datum or Reference Elevation: _____

Control Description: _____

Control Location from Subject Facility: _____

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: Yes No Unknown
Approx. Construction Start Date for SWM/BMP Facility: _____
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: Ritchie - Curbow
Name of Professional Firm Who Routinely Monitored Construction: _____
Date of Completion for SWM/BMP Facility: _____
Date of Record Drawing/Construction Certification Submittal: _____

(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)

Section 3 - Owner / Designer / Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*
Name: _____
Mailing Address: _____
Business Phone: _____ Fax: _____
Contact Person: _____ Title: _____

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*
Firm Name: RICHMOND ENGINEERING, INC.
Mailing Address: _____
Business Phone: _____
Fax: _____
Responsible Plan Preparer: STEVEN W. STAFFORD
Title: P.E.
Plan Name: LANDMARK AUTO PARTS / JAMES RIVER COMMERCE CNTR.
Firm's Project No. 02104
Plan Date: 03-25-2004
Sheet No.'s Applicable to SWM/BMP Facility: 04 / 09 / 011 / _____ / _____

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*
Name: Ritchie - Curbow Construction Co, Inc
Mailing Address: 11820 Fountain Way, Ste 202
Newport News, Va. 23606
Business Phone: 873-0123
Fax: 873-0467
Contact Person: Joey Ritchie
Site Foreman/Supervisor: _____
Specialty Subcontractors & Purpose (for BMP Construction Only): HB Hankins, Inc.
Hank Mullous

Section 4 - Professional Certifications:

Certifying Professionals: (Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)

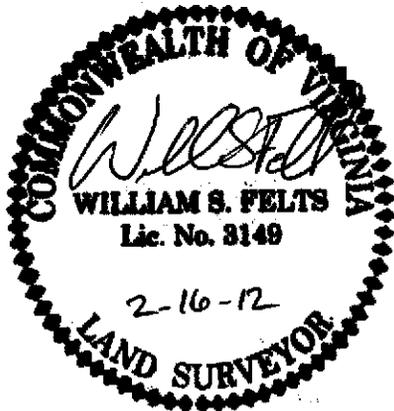
Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: LANOTECH RESOURCES, INC.
Mailing Address: 205-E BULLFANTS
BLVD WILLIAMSBURG VA 23188
Business Phone: 565-1677
Fax: 565-0782

Name: WILLIAM S. FELTS
Title: VICE PRESIDENT, SURVEY
COORDINATOR
Signature: Will S Felts
Date: 2-16-2012

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. ~~The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.~~ **FACILITY APPEARS TO BE UNDERSIZED. SEE PLAN.**



(Seal)
Virginia Registered Professional Engineer
or Certified Land Surveyor

Construction Certification

Firm Name: _____
Mailing Address: _____
Business Phone: _____
Fax: _____

Name: _____
Title: _____
Signature: _____
Date: _____

I hereby certify to the best of my knowledge and belief that this Stormwater Management/BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

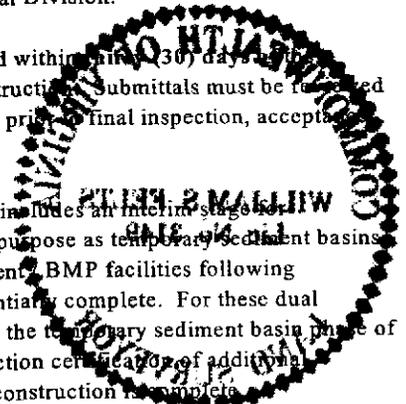
(Seal)
Virginia Registered
Professional Engineer

Section 5 - Record Drawing and Construction Certification Requirements and Instructions:

- PreConstruction Meeting - Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.
- A fully completed **STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM** and **RECORD DRAWING CHECKLIST**. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.
- The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.
- Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.
- Record Drawing and Construction Certifications are required within **thirty (30) days** of completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

Dual Purpose Facilities - Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

Interim Construction Certification is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.



Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

- Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*
- Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate "RECORD DRAWING" in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, *or similar forms thereof*, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.
- Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as *.dxf, *.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

I. Methods and Presentation: (Required for all Stormwater Management / BMP facilities.)

- INC 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.
- XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.
- XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).
- XX 4. All plan sheet revision blocks modified to indicate date and record drawing status.
- XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

II. Minimum Standards: (Required for all Stormwater Management / BMP facilities, as applicable.)

- XX 1. All requirements of Section I (Methods and Presentation) apply to this section.
- XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.
- XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.
- XX 4. Top widths, berm widths and embankment side slopes.
- INC 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.
- XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.
- XX 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.
- XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

- ~~XX~~ 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.
- ~~XX~~ 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.
- ~~XX~~ 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.
- NA 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**
- NA 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
- ~~XX~~ 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
- ~~XX~~ 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
- ~~XX~~ 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
- ~~XX~~ 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
- ~~XX~~ 18. Maintenance plan taken from approved design plan transposed onto record drawing set.
- NA 19. Fencing location and type, if applicable to facility.
- ~~XX~~ 20. BMP vicinity properly cleaned of stockpiles and construction debris.
- ~~XX~~ 21. No visual signs of erosion or channel degradation immediately downstream of facility.
- ~~XX~~ 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

III. Group A - Wet Ponds (Includes A-1 Small Wet Ponds; A-2 Wet Ponds; A-3 Wet Ext Det Ponds.)

- XX A1. All requirements of Section II, Minimum Standards, apply to Group A facilities.
- XX A2. Principal spillway consists of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.
- XX A3. Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.
- XX A4. Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.
- NA A5. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.
- NA A6. Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.
- XX A7. Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V).
- XX A8. No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.
- XX A9. Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.
- XX A10. Low flow orifice has a non-clogging mechanism.
- NA A11. A pond drain pipe with valve was provided.
- XX A12. Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.
- NA A13. End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

(Key for Checklist is as follows: **XX** Acceptable **N/A** Not Applicable **Inc** Incomplete)

X. Storm Drainage Systems (Associated with BMP's Only)

(Includes all incidental stormwater drainage conveyance systems associated with SWM/BMP facilities such as onsite or offsite storm drains, open channels, inlets, manholes, junctions, outlet protections, deflectors, etc. These facilities are external to the treatment function of, but are directly associated with drainage to and/or from a constructed SWM/BMP facility. The intent of this portion of the certification is to accurately identify the type and quantity of inflow or outflow points associated with the facility for future reference. The Professional may use his/her own discretion to determine inclusive facilities to meet the intent of this section. As a general rule, storm drainage systems would include incidental facilities to the nearest access structure upslope or downslope from the normal physical limits of the facility or 800 feet of storm drainage conveyance system length, whichever is less.)

- SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.
- SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.
- SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).
- SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.
- SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XII. Other Systems

(Includes any non-typical, specialty, manufactured or innovative stormwater management/BMP practices or systems generally accepted for use as or in conjunction with other acceptable stormwater management / BMP practices. Requires evidence of prior satisfactory industry use and prior Environmental Division approval, waiver or exception .)

- O1. All requirements of Section II, Minimum Standards, apply to this section.
- O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

XIII. References *(The James City County Record Drawing and Construction Certification Forms and Checklists for Stormwater Management / BMP facilities were developed using the following sources and references.)*

- Baltimore County, Maryland Soil Conservation District, As-Built Stormwater Management Pond Checklist.
- James City County, Virginia, Guidelines for Design and Construction of Stormwater Management BMP's (October 1999).
- James City County, Virginia, Stormwater Detention/Retention Basin Design Checklist and Erosion and Sediment Control and Stormwater Management Design Plan Checklists.
- James City County Stormwater Policy Framework, Final Report of the James City County BMP Policy Project, October 1998, The Center for Watershed Protection.
- Prince Georges County, Maryland, As-Built Requirements Retention or Detention Pond/Basin.
- Prince William County, Virginia, Stormwater Management Fact Sheet.
- Stafford County, Virginia, As-Built Plan Checklist.
- Stormwater Management Design Manual, NRCS Maryland Code No. 378, Pond Standards and Specifications.
- USEPA/Watershed Management Institute, Stormwater Management Inspection Forms.
- Virginia Impounding Structure Regulations (Dam Safety), Department of Conservation & Recreation, 1997.
- Virginia Erosion and Sediment Control Handbook, Third Edition 1992, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.
- Virginia Stormwater Management Handbook, 1999 edition, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.

File: Shared\SWMProg\BMP\CertifRDCC_fillable.wpd

✓ on:

- aquatic bench
- water elevation
- note as built elevations compared to plan.
- von pond shape
- manhole (sediment)



**James City County Engineering and Resource
Protection Division
Stormwater Management/BMP Record Drawing and
Construction Certification Review Tracking Form**

Project Name: LANDMARK ARGO Farms
 County Plan No. (List any amendments): SP-27-03
 Stormwater Management Facility Type: Wet Pond with Aquatic Benches (A-2, 8pt.)
 BMP Phase #: I II III

- Information Package Submittal Date: 10/27/2011
- Completeness Check:
 - Record Drawing Date/By: 2/16/12 William Felts
 - Construction Certification Date/By: 10/27/11 Kenneth Jenkins
(Ensure that all forms for the BMP type are included)
 - RD/CC Standard Forms # / Date: 02003/32/0224 12/27/2002
 - Insp/Maint Agreement Location: Pg 2 As Built
 - BMP Maintenance Plan
 - Special Considerations:

Standard E&SC Notes on Approved Plan Requiring RD/CC or County comment in plan review
 Location (sheet #): _____

- County BMP ID Code #: 11-031-12000-TR059
- Log into Division's "As-Built Tracking Log"
- Obtain basic site information (GPIN, Owner, Address, etc.)
- Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)
- Copy from Active Project File (correspondence, H&H, design computations, etc.)
- Create As-Built File using Project File information (File label, folder, copy plan/details/design information, etc.)

- Inspector Review of RD/CC (consult with Chief Engineer prior to completion of comments).
- Record Drawing Review against Approved Plan prior to Field Inspection.
- Final Site Inspection (FI) Performed Date: _____
- Record Drawing (RD) Review Date: 9/5/13
- Construction Certification (CC) Review Date: 9/15/13

- Actions:
 - No comments.
 - Comments. Letter Forwarded. Date: D-NOS ISSUE RESOLVED.
 - Record Drawing (RD)
 - Construction Certification (CC)
 - Construction-Related (CR)
 - Site Issues (SI)
 - Other : _____

- Resubmittal (# and date): _____
- Re-inspection (if necessary): _____
- Drainage System Information Acceptable (RD/CC/System Info). Ok for bond release.
- Complete "Surety Request Form".
- Final Inspection of active file copying any relevant information to "As-Built" file.
- On County BMP Inventory (Phase I, II or III).
- Copy Final Inspection Report into County BMP Inspection Program file.
- Provide Digital Photographs of BMP and save into County BMP Inventory.
- Request mylar/reproducible from As-Built plan preparer.
- Complete "As-built Tracking Log".
- Last check of BMP Access Database (County BMP Inventory).
- Add BMP to JCC Hydrology & Hydraulic database (optional).
- Add BMP to Municipal BMP list (if a County-owned facility)
- Add BMP to PRIDE BMP ratings database.

Final Sign-Off

Inspector: [Signature] Date: _____
 Chief Engineer: [Signature] Date: 10/17/13

*** See separate checklist, if needed.



Hallmark Enterprises LLC
701C Flagstone Way
Newport News, VA 23602

October 30, 2008

Re:

James City County County Plan No. SP-51-02
James City County County BMP ID Code: JR-059

Dear Ms Ho:

The Environmental Divisions has received a record drawing (as-built) for the above referenced project. The record drawing provides as-built information for a retention basin situated in the southeast side of the site.

Based on our review of the project and a concurrent field inspection as performed on October 24, 2008, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project:

Construction Certification:

1. In accordance with the Note # 4 on Sheet C4 of the approved plan, construction certification for the stormwater management/BMP facility is required. None was provided. The certification can be in letter format or by use of the certification statements in Section 4 of the JCC, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions.

Record Drawings (As-Built) and Construction Certifications are both required for newly constructed or modified stormwater management/BMP facilities. Certification activities shall be adequately coordinated and performed before, during and following construction in accordance with the current version of the James City County Environmental Division, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions. The contractor is responsible for all items associated with this note.

2. A professional engineer's seal and signature is required on construction certifications.

3. If possible add the following County identifiers to the construction certification documents:
County Plan Number SP-51-02 and BMP ID No. JR-059.

Record Drawing:

The record drawing set dated 11/23/04 is **not satisfactory**.

4. In accordance with the Note # 4 on Sheet C4 of the approved plan, a record (as-built) drawing was required for the stormwater management/BMP facility. The record drawing requires certification consistent with the provisions of Section 4 of the *James City County Environmental Division, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions*.
5. Along with the record drawing set, submit completed record drawing and construction certification forms, Sections 1 through 5, and applicable record drawing checklists from the *James City County, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions* (packet). The Environmental Division began use of the forms and checklists in this packet effective February 1st 2001.
6. Show the following additional information on the record drawing: contour or elevation data; low flow orifice data, riser data, outlet barrel data; emergency spillway data; forebay data; and outlet protection data; property or road data.
7. Add the approved maintenance plan from Sheet C9 of the approved plan to the record drawing.
8. A professional seal and signature is required on the revised record drawing.
9. If possible add the following County identifiers to the lower right hand corner of the record drawing: County Plan Number S-51-02 and BMP ID Code: JR-059.

Construction - Related Items:

10. Erosion was evident along the north, south, and western edges of the outlet structure. These areas should be backfilled with compacted material, reseeded and mulched or matted for stabilization.
11. Stabilize with topsoil, seed and mulch or matting all disturbed soil areas present along the emergency spillway.
12. Cattails present along the north of the concrete base adjacent to the riser structure should be removed. Remove these and any other vegetation, brush, debris and sediment within 25 feet of the principal flow control (riser) structure.
13. According to the record drawing, the pond was not built according to the approved plan. The permanent pool elevation is off and would apparently have a negative affect on water quality.
14. The manhole adjacent to the inflow pipe is approximately 1/3 full of water. Clean and remove sediment accumulations, vegetation, any trash or debris from the 18" storm drain pipe which

enters the basin, as it is choked with sediment and has covered the outlet protection pad. Flow into the facility shall not be obstructed.

15. Remove tires, plastic and other trash accumulation along the rock outlet protection pad at the downstream end of the pipe barrel. Trees greater than 1" in diameter should be removed along the outlet protection.
16. Conversion of the principal flow control structure (riser) from temporary sediment basin mode to final BMP mode is incomplete. The 1/2"x1/2" -16 gauge galvanized steel WWF as required on page C9 of the approved plan was not installed.
17. To prevent unauthorized access, a padlock be added to the hatch which provides access to the principal riser structure. Should a lock be added, provide an extra set of keys or combination for the lock to the Environmental Division office.

Once this work is satisfactorily completed, contact our office appropriately for reinspection. We can then proceed with final release of the surety and/or closing out the project. One reproducible and one blue/black line set of the record drawings will be required once the above items are adequately addressed.

Please contact me at 757-253-6851 if you have any further comments or questions.

Sincerely,

Amy Parker
Environmental Inspector II
Environmental Division

cc: Rickmond Engineering, Inc - via fax
H.B. Hankins, Inc- via fax

DRAINAGE AS-BUILTS

FOR

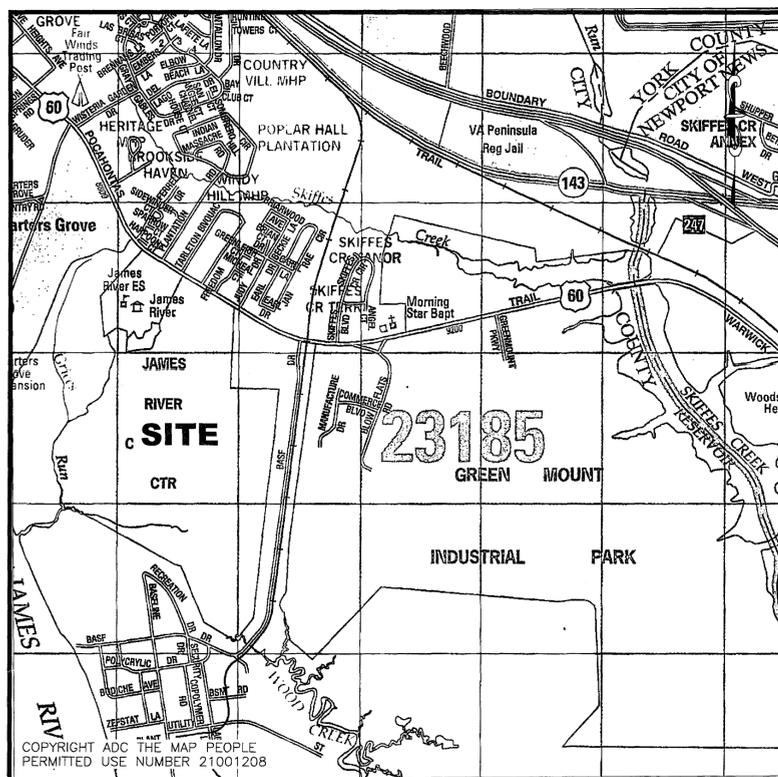
LANDMARK AUTO PARTS

JAMES RIVER COMMERCE CENTER

RECEIVED
FEB 17 2012
Environmental Division

RECEIVED

DRAINAGE AS-BUILTS
FOR
LANDMARK AUTO PARTS
JAMES RIVER COMMERCE CENTER
JAMES CITY COUNTY
VIRGINIA



VICINITY MAP
SCALE: 1"=2000'

SITE INFORMATION:

PARCEL I.D. #5920100052
ZONING DISTRICT: M-1

EXISTING ADDRESS:

1720 ENDEAVOR DRIVE
JAMES CITY COUNTY, VIRGINIA

GENERAL NOTES:

- 1) A TITLE REPORT HAS NOT BEEN FURNISHED TO THIS FIRM.
- 2) THIS FIRM MADE NO ATTEMPT TO VERIFY UNDERGROUND UTILITIES EXCEPT THOSE SHOWN.
- 3) TOPOGRAPHIC DATA AS SHOWN IS BASED ON A CURRENT FIELD SURVEY.
- 4) ELEVATIONS SHOWN ARE RELATIVE BUILDING FINISH FLOOR OF 38.00 AS SHOWN ON SITE PLAN.
- 5) PROPERTY LINES ARE APPROXIMATE AND ARE SHOWN PER SITE PLAN.
- 6) CURB SHOWN HEREON IS SHOWN PER APPROVED SITE PLAN.

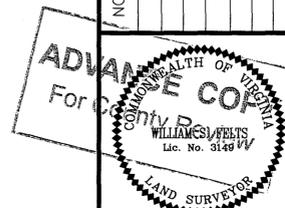
RECORD DRAWING CERTIFICATION:

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT / BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SHOWN HEREON.

ADVANCE COPY
For County Review
WILLIAM S. FELTS, LIC NO. 3149

02-16-2012
DATE

NO.	DATE	REVISION / COMMENT / NOTE



LandTech Resources, Inc.
Surveying • GPS • Engineering
205 Bulfinch Blvd., Ste. E, Williamsburg, VA 23188
Phone: (757) 565-1877 Fax: (757) 565-0782
web: landtechresources.com

RECORD DRAWING
SCALE: AS SHOWN
DATE: 02-16-2012
JOB: 12-023
DRAWN BY: WSF
SHEET: 1 OF 3
JCC-SP-0051-2002

WET POND MAINTENANCE PLAN

INSPECTION:
 THE WET POND SHOULD BE INSPECTED ON AN ANNUAL BASIS TO ENSURE THAT THE STRUCTURE OPERATES IN THE MANNER ORIGINALLY INTENDED. THE INSPECTIONS SHOULD BE CONDUCTED DURING WET WEATHER TO DETERMINE IF THE POND IS FUNCTIONING PROPERLY. INSPECTION PRIORITIES SHOULD INCLUDE CHECKING THE EMBANKMENT FOR SUBSIDENCE, EROSION, CRACKING, AND TREE GROWTH; THE CONDITION OF THE EMERGENCY SPILLWAY AND DRAIN; THE ACCUMULATION OF SEDIMENT, CLOGGING OF THE BARREL AND OUTLET; THE ADEQUACY OF THE DOWNSTREAM CHANNEL EROSION PROTECTION MEASURES; ANY MODIFICATIONS WHICH HAVE OCCURRED TO THE CONTRIBUTING WATERSHED AND THE POND STRUCTURE; AND THE STABILITY OF THE SIDE SLOPES. INSPECTIONS SHOULD BE CARRIED OUT WITH AS-BUILT POND PLANS IN HAND.

ROUTINE MAINTENANCE:

MOWING
 THE SIDE SLOPES AND EMERGENCY SPILLWAY OF THE WET POND MUST BE MOWED AT LEAST TWICE A YEAR TO PREVENT WOODY GROWTH AND CONTROL WEEDS.

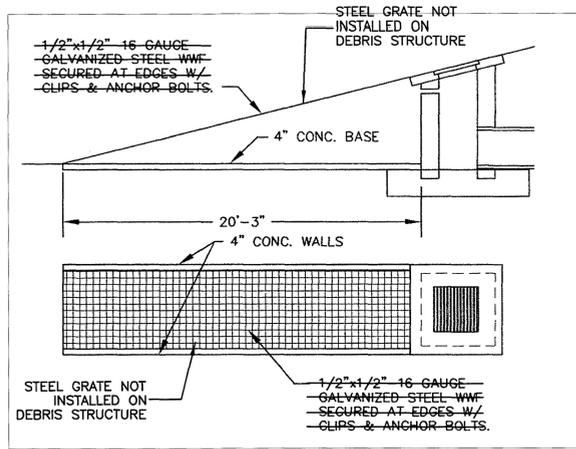
DEBRIS AND LITTER REMOVAL
 AS PART OF PERIODIC MOWING OPERATIONS, DEBRIS AND LITTER SHOULD BE REMOVED FROM THE SURFACE OF THE POND. PARTICULAR ATTENTION SHOULD BE PAID TO FLOATABLE DEBRIS AROUND THE RISER, AND THE OUTLET SHOULD BE CHECKED FOR POSSIBLE CLOGGING.

EROSION CONTROL
 THE POND SIDE SLOPES AND EMERGENCY SPILLWAY MAY PERIODICALLY SUFFER FROM SLUMPING AND EROSION. CORRECTIVE MEASURES SUCH AS REGRADING AND REVEGETATION MAY BE NECESSARY. SIMILARLY, THE RIP RAP PROTECTING THE CHANNEL BELOW THE OUTLET MAY NEED TO BE REPAIRED OR REPLACED.

NON-ROUTINE MAINTENANCE:

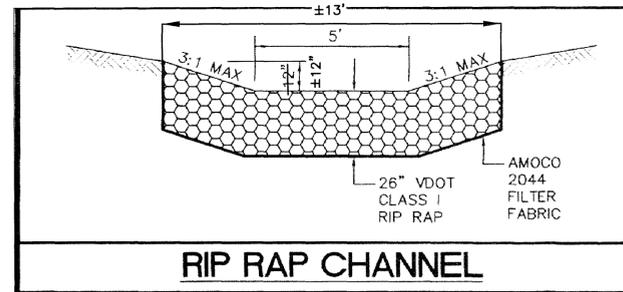
STRUCTURAL REPAIRS AND REPLACEMENT
 EVENTUALLY, THE VARIOUS INLET/OUTLET AND RISER WORKS IN A WET POND WILL DETERIORATE AND MUST BE REPLACED.

SEDIMENT REMOVAL
 WET PONDS WILL EVENTUALLY ACCUMULATE ENOUGH SEDIMENT TO SIGNIFICANTLY REDUCE STORAGE CAPACITY OF THE PERMANENT POOL. THE ACCUMULATED SEDIMENT REDUCES BOTH THE APPEARANCE AND POLLUTANT REMOVAL PERFORMANCE OF THE POND. THE BEST AVAILABLE ESTIMATE IS THAT APPROXIMATELY ONE PERCENT OF THE STORAGE VOLUME CAPACITY ASSOCIATED WITH THE TWO YEAR DESIGN STORM CAN BE LOST ANNUALLY. CLEAN-OUT SHOULD OCCUR WHEN THE SEDIMENT BUILD-UP REACHES ELEVATION 28.00.



OUTLET STRUCTURE DETAIL

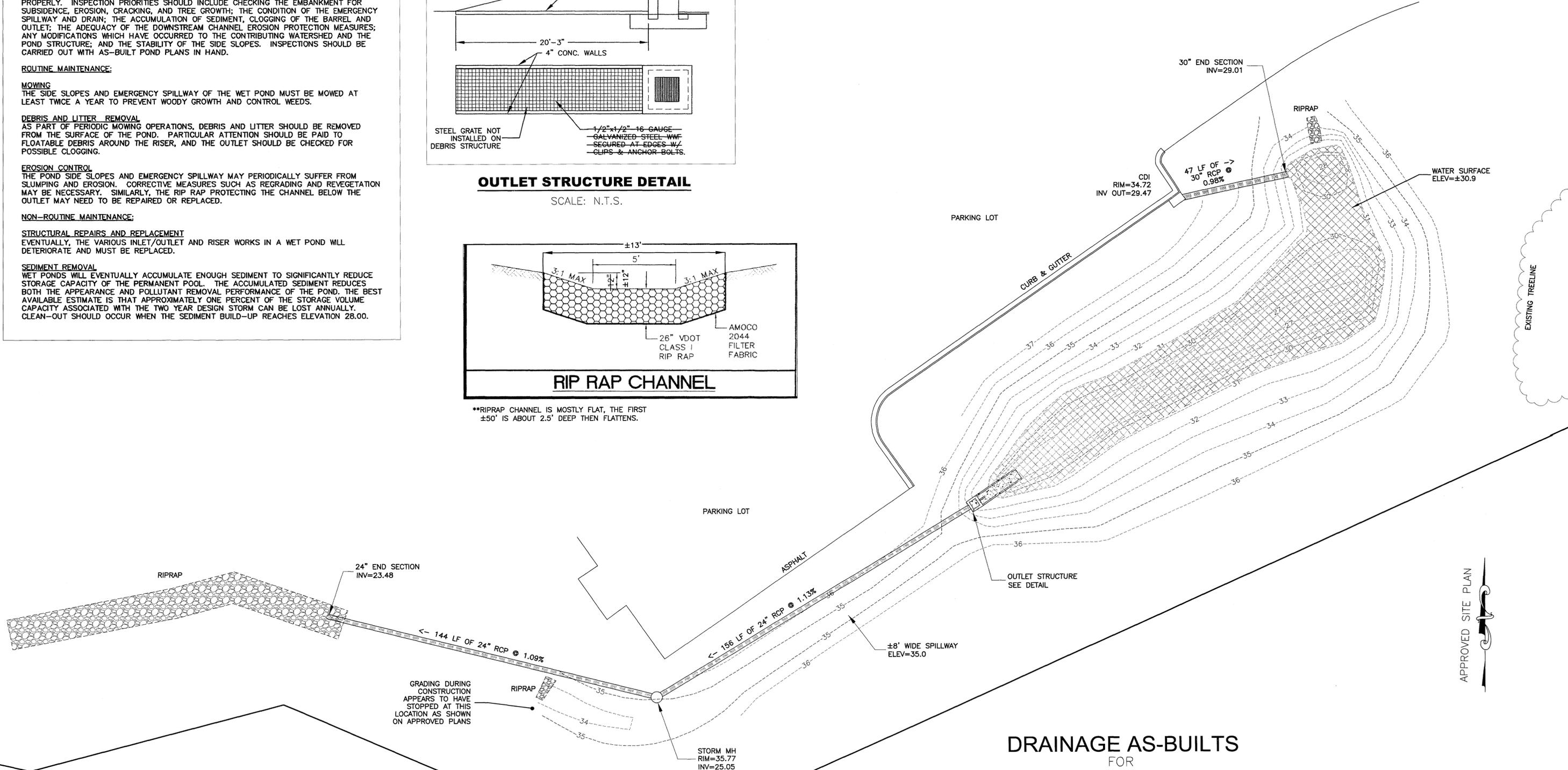
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RIP RAP CHANNEL

**RIPRAP CHANNEL IS MOSTLY FLAT, THE FIRST ±50' IS ABOUT 2.5' DEEP THEN FLATTENS.

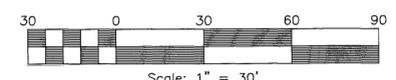
- NOTES:**
1. POND IS SURROUNDED BY MEDIUM TO DENSE VEGETATION
 2. DETAILS ARE SHOWN PER APPROVED SITE PLAN, THIS FIRM HAS ONLY VERIFIED THAT INFORMATION SHOWN IN BOLD FONT.
 3. MAINTENANCE PLAN IS SHOWN PER APPROVED SITE PLAN.



APPROVED SITE PLAN

DRAINAGE AS-BUILTS
 FOR
LANDMARK AUTO PARTS
 JAMES RIVER COMMERCE CENTER
 JAMES CITY COUNTY VIRGINIA

RECORD DRAWING
 JCC-SP-0051-2002

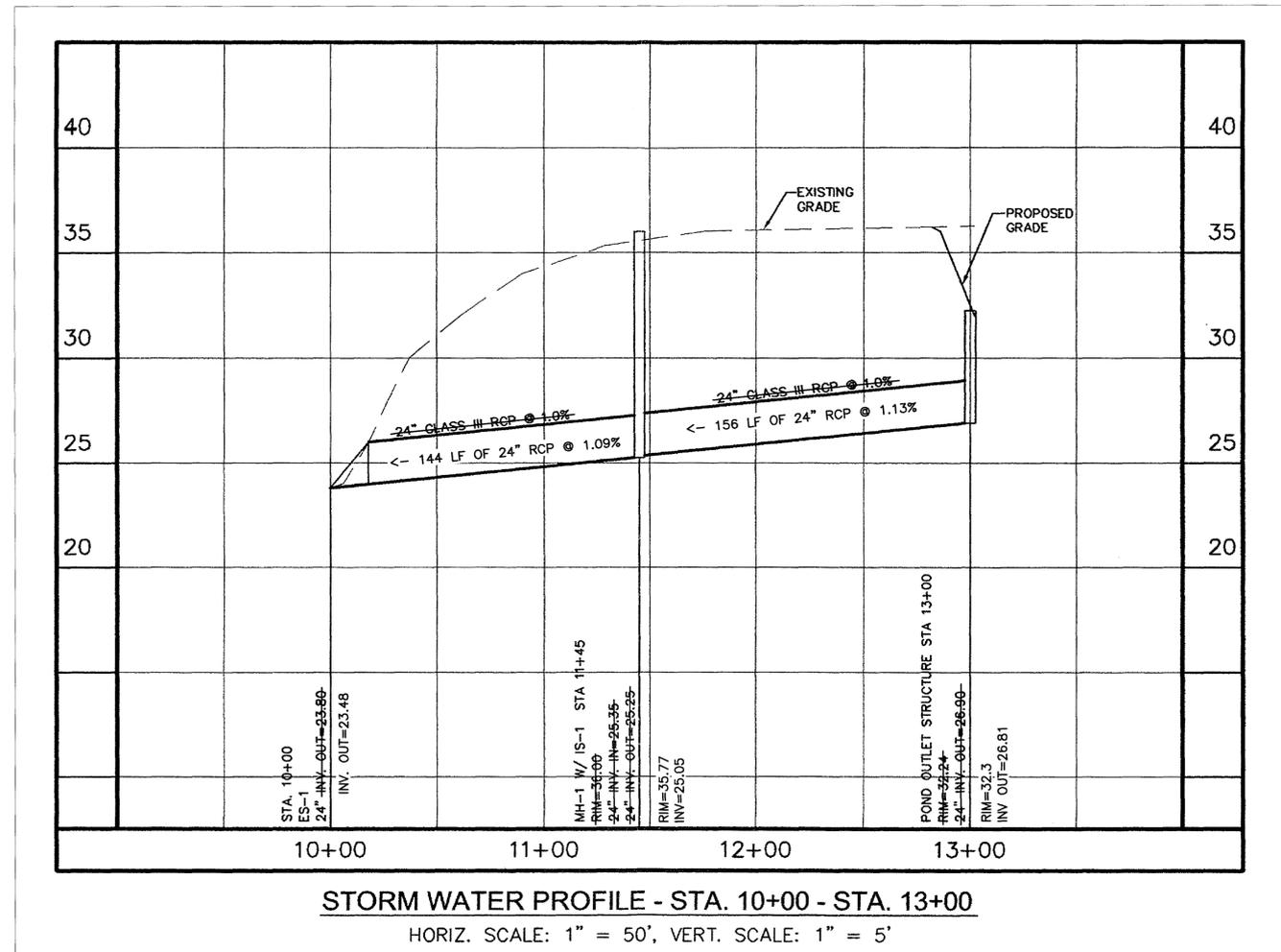
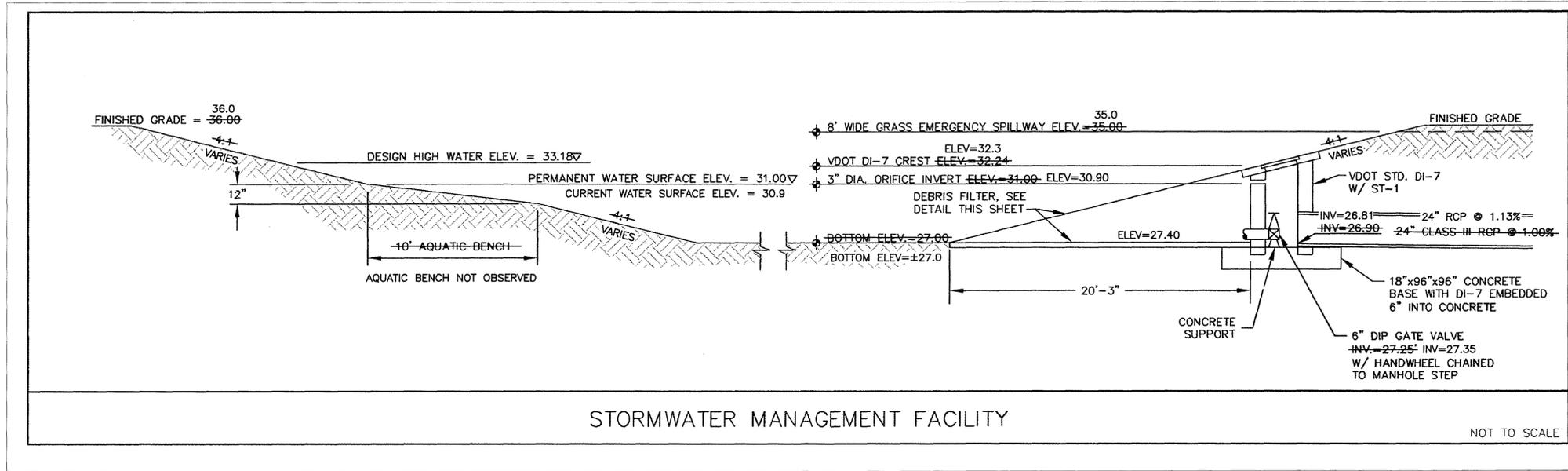


SCALE: AS SHOWN
 DATE: 02-16-2012
 JOB: 12-023
 DRAWN BY: WSF
 SHEET: 2 OF 3

LandTech Resources, Inc.
 Surveying • GPS • Engineering
 205 Bulifants Blvd., Ste. E, Williamsburg, VA 23188
 Phone: (757) 565-1677 Fax: (757) 565-0782
 web: landtechresources.com



NO.	DATE	REVISION / COMMENT / NOTE



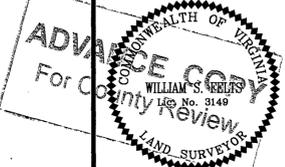
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 2. DETAILS AND PROFILE ARE SHOWN PER APPROVED SITE PLAN, THIS FIRM HAS ONLY VERIFIED THAT INFORMATION SHOWN IN BOLD FONT.

DRAINAGE AS-BUILTS
 FOR
LANDMARK AUTO PARTS
 JAMES RIVER COMMERCE CENTER

JAMES CITY COUNTY

VIRGINIA

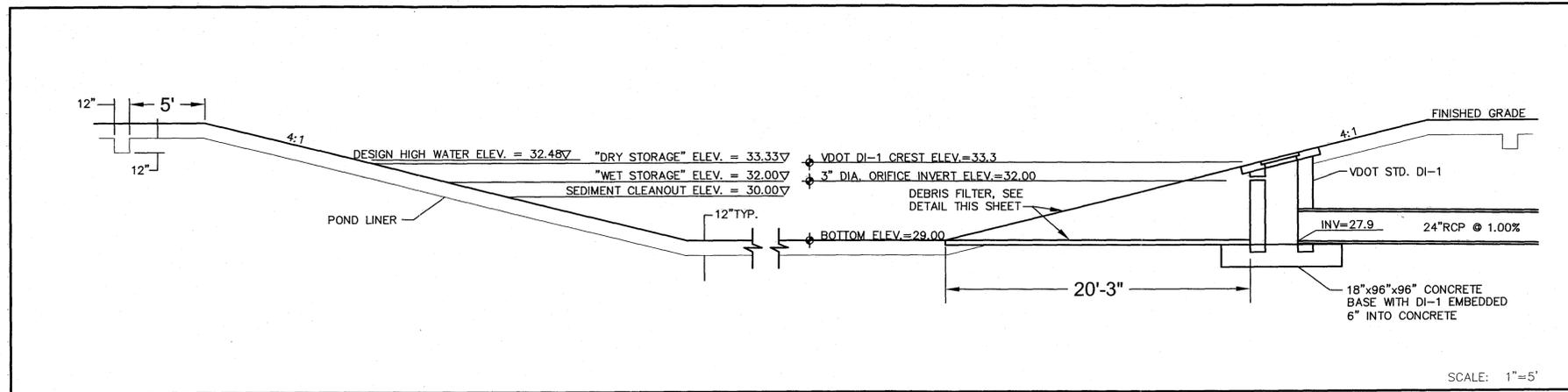
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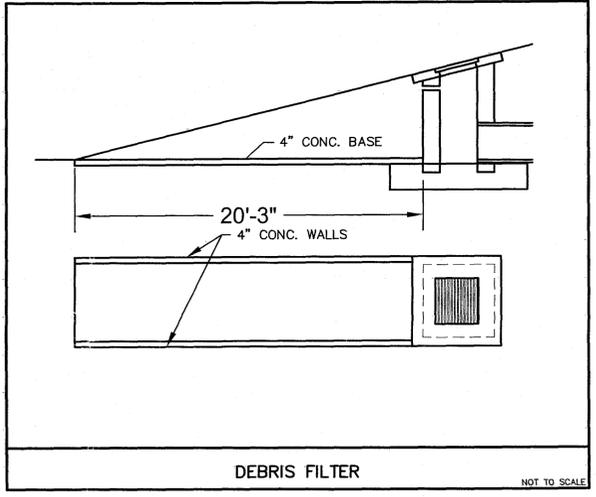
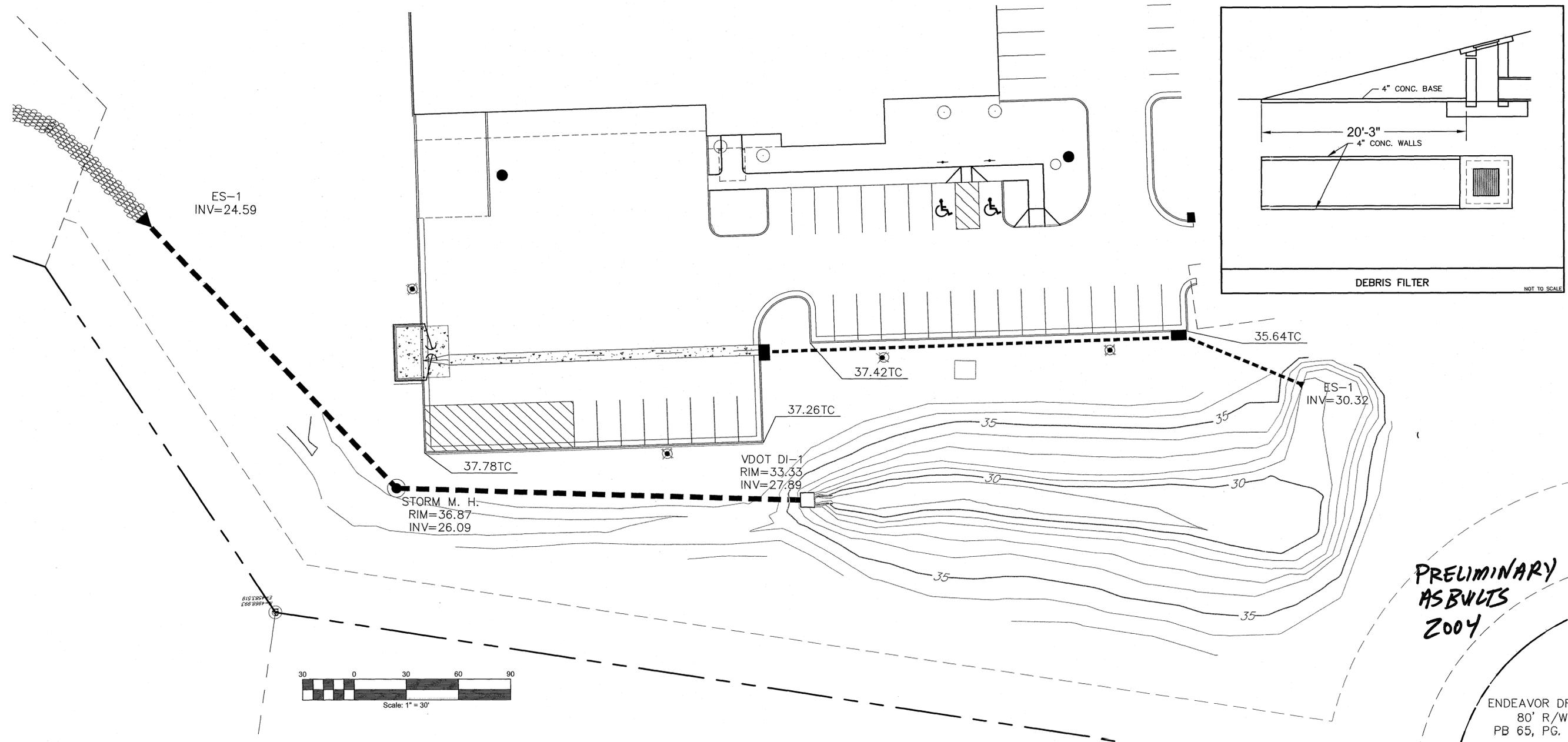
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 DATE: 02-16-2012
 JOB: 12-023
 DRAWN BY: WSF
 SHEET: 3 OF 3

RECORD DRAWING
 JCC-SP-0051-2002



STORMWATER MANAGEMENT FACILITY/SEDIMENT DETENTION BASIN

SCALE: 1"=5'



Rickmond Engineering, Inc.
 Engineering Land Planning
 Surveying
 1643 Merrimac Trail
 Williamsburg, VA 23185
 Phone: (757)229-1776
 Fax: (757)229-4683
 www.rickmond.com

Designed By: MJB
 Drawn By: MCG
 Scale: AS NOTED
 Date: 11/23/04



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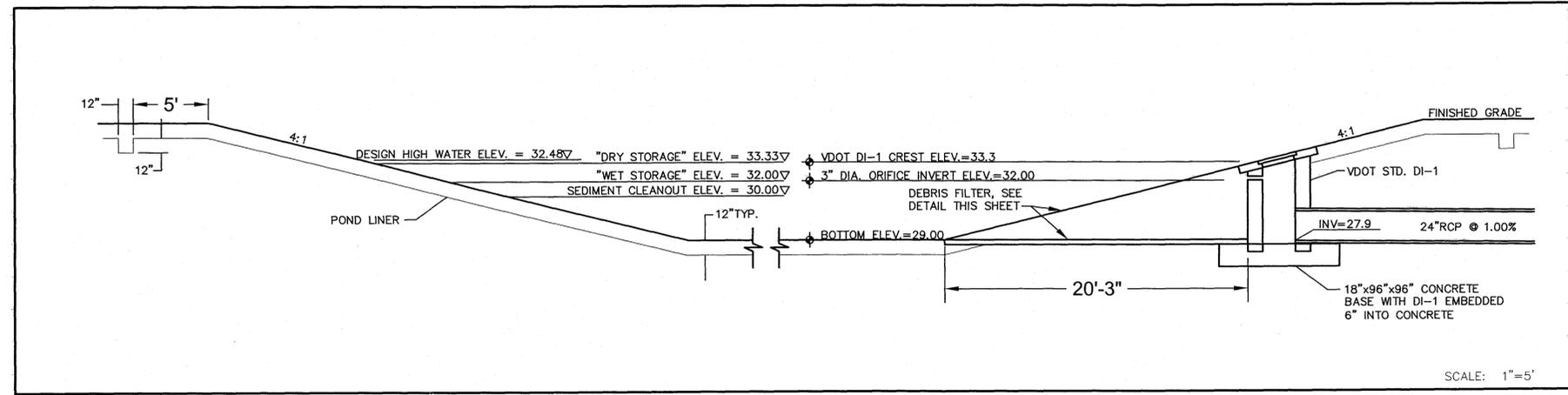
LANDMARK AUTO PARTS
 POND AS-BUILT
 DETAILS

JAMES CITY COUNTY VIRGINIA

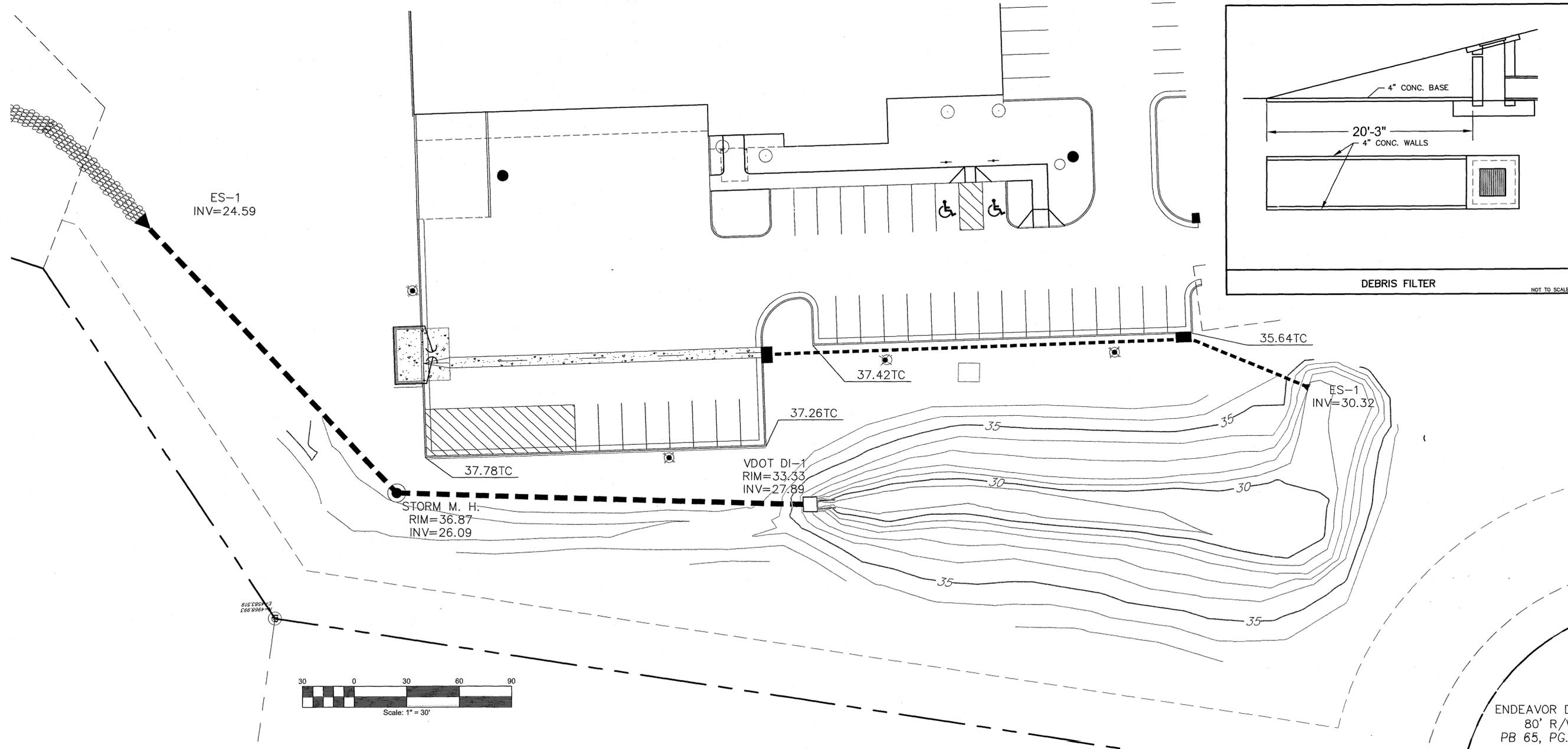
PRELIMINARY
 AS-BUILTS
 2004

ENDEAVOR DRIVE
 80' R/W
 PB 65, PG. 90

Job Number 02104	Sheet No. C6
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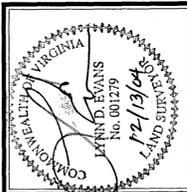


STORMWATER MANAGEMENT FACILITY/SEDIMENT DETENTION BASIN



Rickmond Engineering, Inc.
 Surveying
 Land Planning
 Engineering
 1643 Merrimac Trail
 Williamsburg, VA 23185
 Voice: (757) 229-1776
 Fax: (757) 229-4683
 www.rickmond.com

Rickmond
 Designed By: M.M.B.
 Drawn By: MCC
 Date: 11/23/04
 Scale: AS NOTED



No.	By	Revision	App.	Date
1				

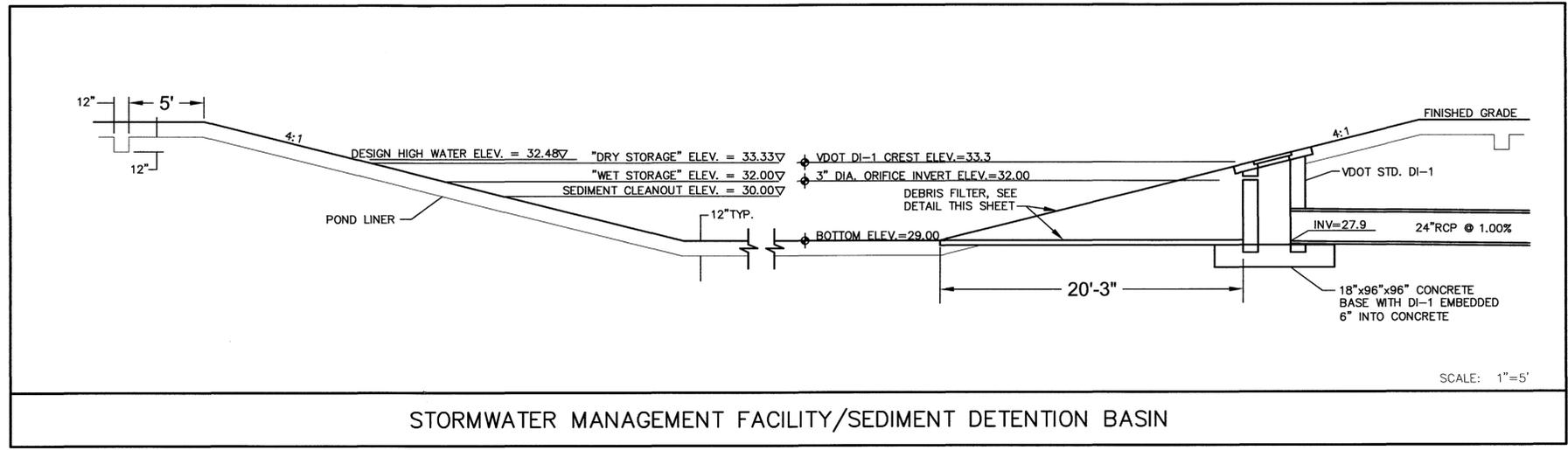
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LANDMARK AUTO PARTS
 POND AS-BUILT
 DETAILS
 JAMES CITY COUNTY VIRGINIA

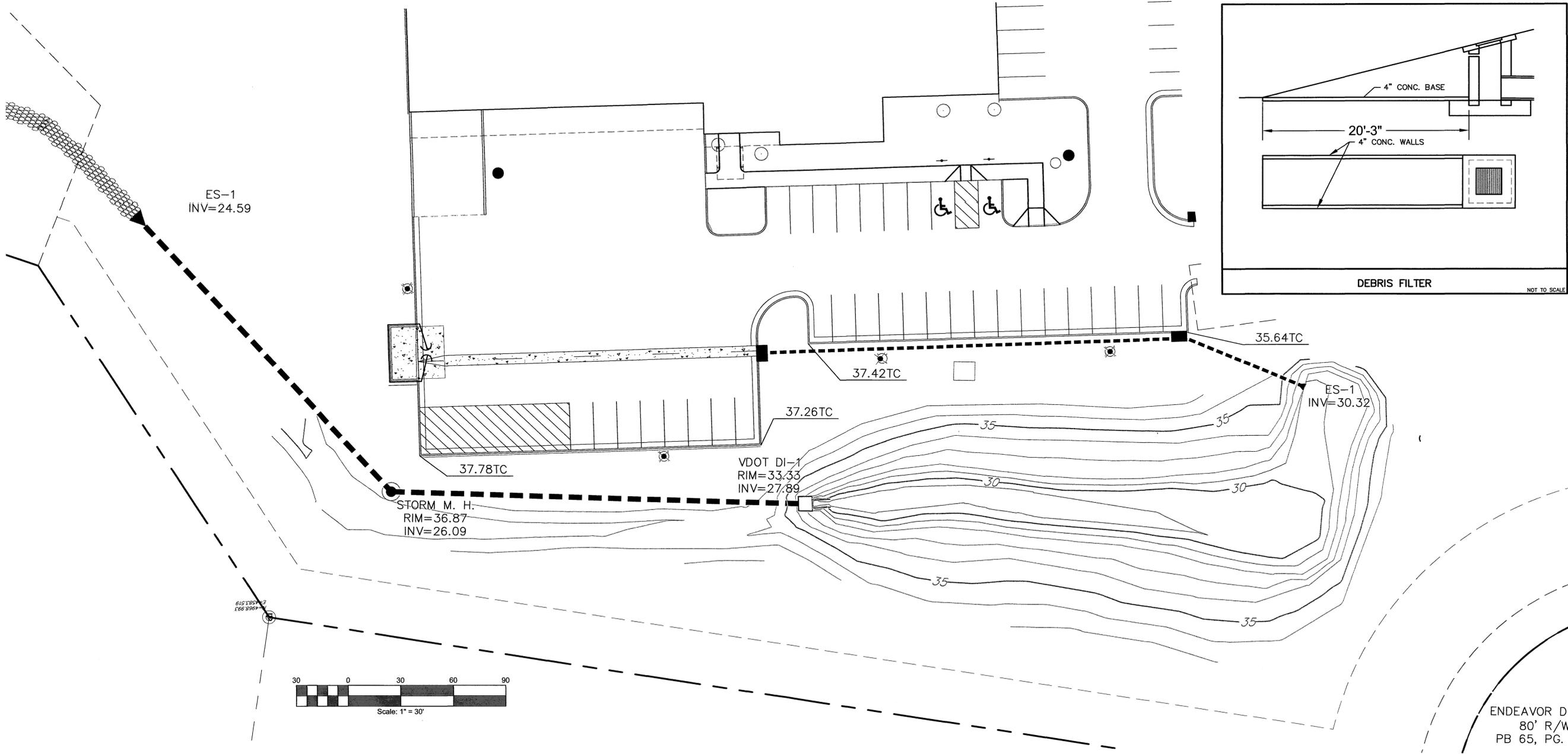
Job Number 02104	Sheet No. C6
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ENDEAVOR DRIVE
 80' R/W
 PB 65, PG. 90

PRELIM 2004



STORMWATER MANAGEMENT FACILITY/SEDIMENT DETENTION BASIN



Rickmond Engineering, Inc.
 Engineering Surveying Land Planning
 1643 Merrimac Trail Vint Hill • P.O. Box 861647
 Williamsburg, VA 23185 Warrenton, VA 20187
 Voice: (757)229-1776 Voice: (540)349-7730
 Fax: (757)229-4683 Fax: (540)349-7731
 www.rickmond.com

Designed By: MdB
 Drawn By: MCG
 Scale: AS NOTED
 Date: 11/23/04

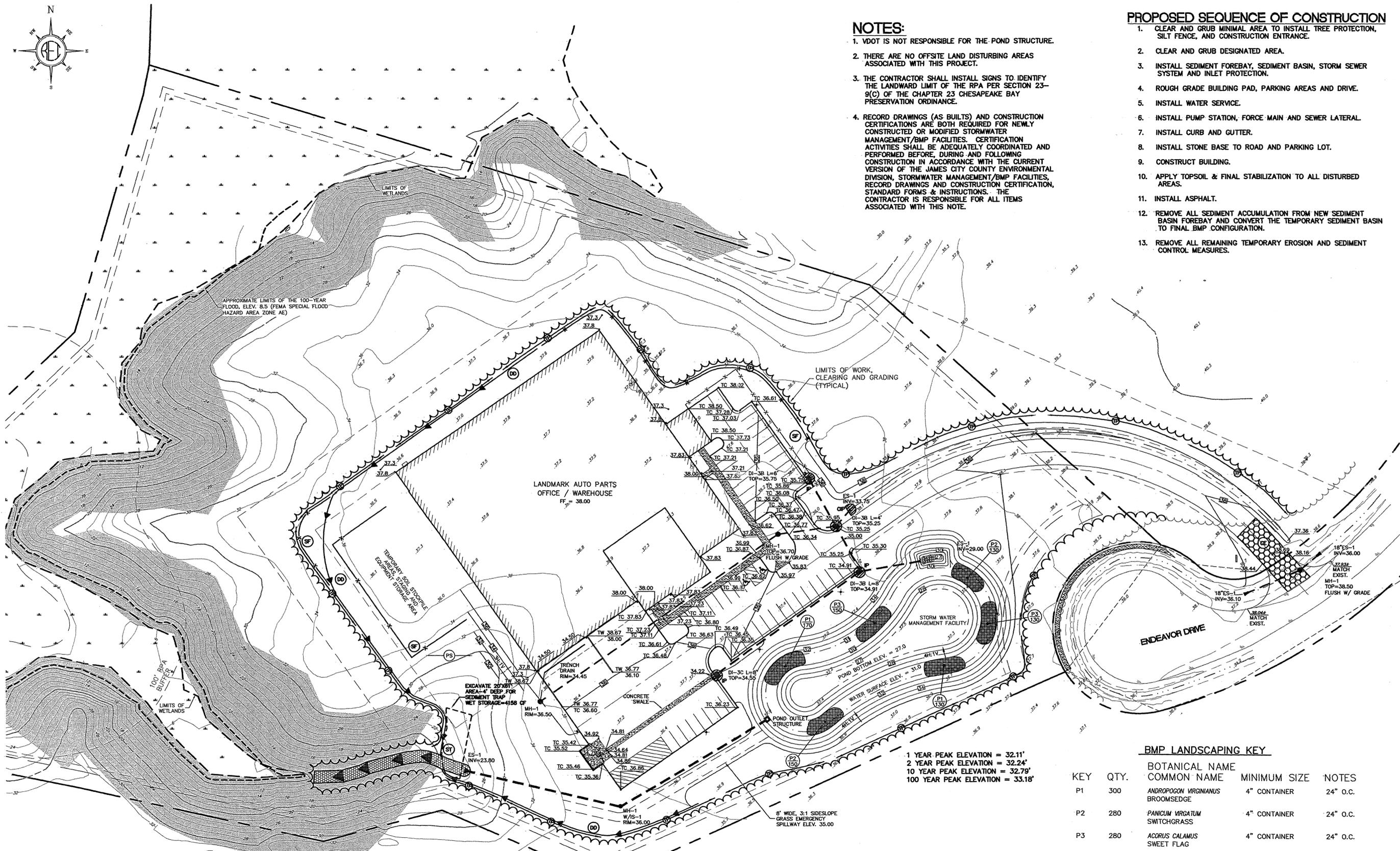
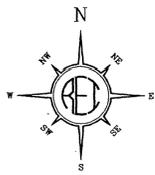


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		DEC. 13 2004		
		ENVIRONMENTAL DIVISION		

LANDMARK AUTO PARTS
 POND AS-BUILT
 DETAILS
 JAMES CITY COUNTY VIRGINIA

Job Number	Sheet No.
02104	C6

PRELIM 2004



NOTES:

1. VDOT IS NOT RESPONSIBLE FOR THE POND STRUCTURE.
2. THERE ARE NO OFFSITE LAND DISTURBING AREAS ASSOCIATED WITH THIS PROJECT.
3. THE CONTRACTOR SHALL INSTALL SIGNS TO IDENTIFY THE LANDWARD LIMIT OF THE RPA PER SECTION 23-9(C) OF THE CHAPTER 23 CHESAPEAKE BAY PRESERVATION ORDINANCE.
4. RECORD DRAWINGS (AS BUILTS) AND CONSTRUCTION CERTIFICATIONS ARE BOTH REQUIRED FOR NEWLY CONSTRUCTED OR MODIFIED STORMWATER MANAGEMENT/BMP FACILITIES. CERTIFICATION ACTIVITIES SHALL BE ADEQUATELY COORDINATED AND PERFORMED BEFORE, DURING AND FOLLOWING CONSTRUCTION IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER MANAGEMENT/BMP FACILITIES, RECORD DRAWINGS AND CONSTRUCTION CERTIFICATION, STANDARD FORMS & INSTRUCTIONS. THE CONTRACTOR IS RESPONSIBLE FOR ALL ITEMS ASSOCIATED WITH THIS NOTE.

PROPOSED SEQUENCE OF CONSTRUCTION

1. CLEAR AND GRUB MINIMAL AREA TO INSTALL TREE PROTECTION, SILT FENCE, AND CONSTRUCTION ENTRANCE.
2. CLEAR AND GRUB DESIGNATED AREA.
3. INSTALL SEDIMENT FOREBAY, SEDIMENT BASIN, STORM SEWER SYSTEM AND INLET PROTECTION.
4. ROUGH GRADE BUILDING PAD, PARKING AREAS AND DRIVE.
5. INSTALL WATER SERVICE.
6. INSTALL PUMP STATION, FORCE MAIN AND SEWER LATERAL.
7. INSTALL CURB AND GUTTER.
8. INSTALL STONE BASE TO ROAD AND PARKING LOT.
9. CONSTRUCT BUILDING.
10. APPLY TOPSOIL & FINAL STABILIZATION TO ALL DISTURBED AREAS.
11. INSTALL ASPHALT.
12. REMOVE ALL SEDIMENT ACCUMULATION FROM NEW SEDIMENT BASIN FOREBAY AND CONVERT THE TEMPORARY SEDIMENT BASIN TO FINAL BMP CONFIGURATION.
13. REMOVE ALL REMAINING TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES.

APPROXIMATE LIMITS OF THE 100-YEAR FLOOD, ELEV. 8.5 (FEMA SPECIAL FLOOD HAZARD AREA ZONE AE)

LIMITS OF WORK, CLEARING AND GRADING (TYPICAL)

LANDMARK AUTO PARTS OFFICE / WAREHOUSE
FF = 38.00

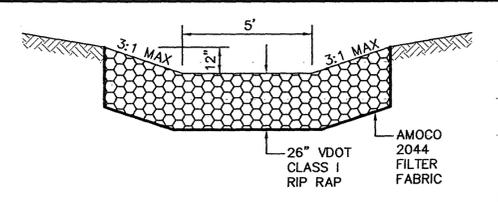
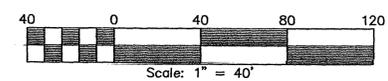
TEMPORARY SOIL STOCKPILE EQUIPMENT STORAGE AREA

EXCAVATE 20'X10' AREA 4' DEEP FOR SEDIMENT TRAP
NET STORAGE=4158 CF

1 YEAR PEAK ELEVATION = 32.11'
2 YEAR PEAK ELEVATION = 32.24'
10 YEAR PEAK ELEVATION = 32.79'
100 YEAR PEAK ELEVATION = 33.18'

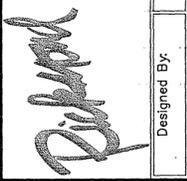
BMP LANDSCAPING KEY

KEY	QTY.	BOTANICAL NAME COMMON NAME	MINIMUM SIZE	NOTES
P1	300	ANDROPOGON VIRGINIANUS BROOMSEDGE	4" CONTAINER	24" O.C.
P2	280	PANICUM VIRGATUM SWITCHGRASS	4" CONTAINER	24" O.C.
P3	280	ACORUS CALAMUS SWEET FLAG	4" CONTAINER	24" O.C.



RIP RAP CHANNEL

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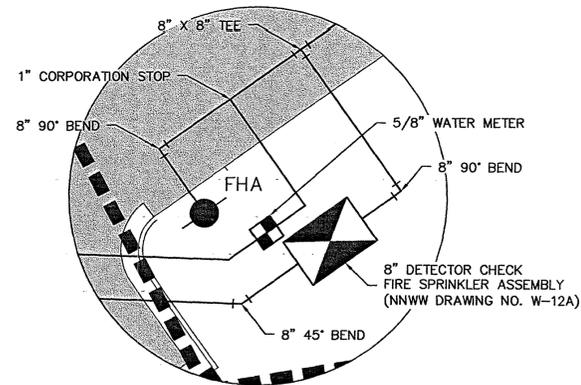
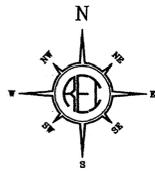
No.	By	Revision	Date
5	DWD	LOADING DOCK EXPANDED (PER CLIENT REQ.)	MJB 2/26/03
4	DWD	BUILDING FINISH FLOOR LOWERED 1 FOOT	MJB 2/05/03
3	DAS	REV. PER JCC COMMENT LTR DTD 9/25/02	MJB 9/30/02
2	KWJ	REV. PER JCC COMMENT LTR DTD 9/15/02	MJB 9/19/02
1	DAS	REV. PER JCC COMMENT LTR DTD 5/08/02	MJB 8/16/02

**LANDMARK AUTO PARTS
JAMES RIVER COMMERCE CENTER**
GRADING PLAN

Job Number: 02104
Sheet No.: 4

BEFORE DIGGING CALL "MISS UTILITY" OF VIRGINIA AT 1-800-552-7001

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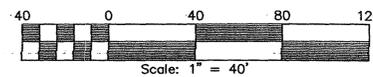
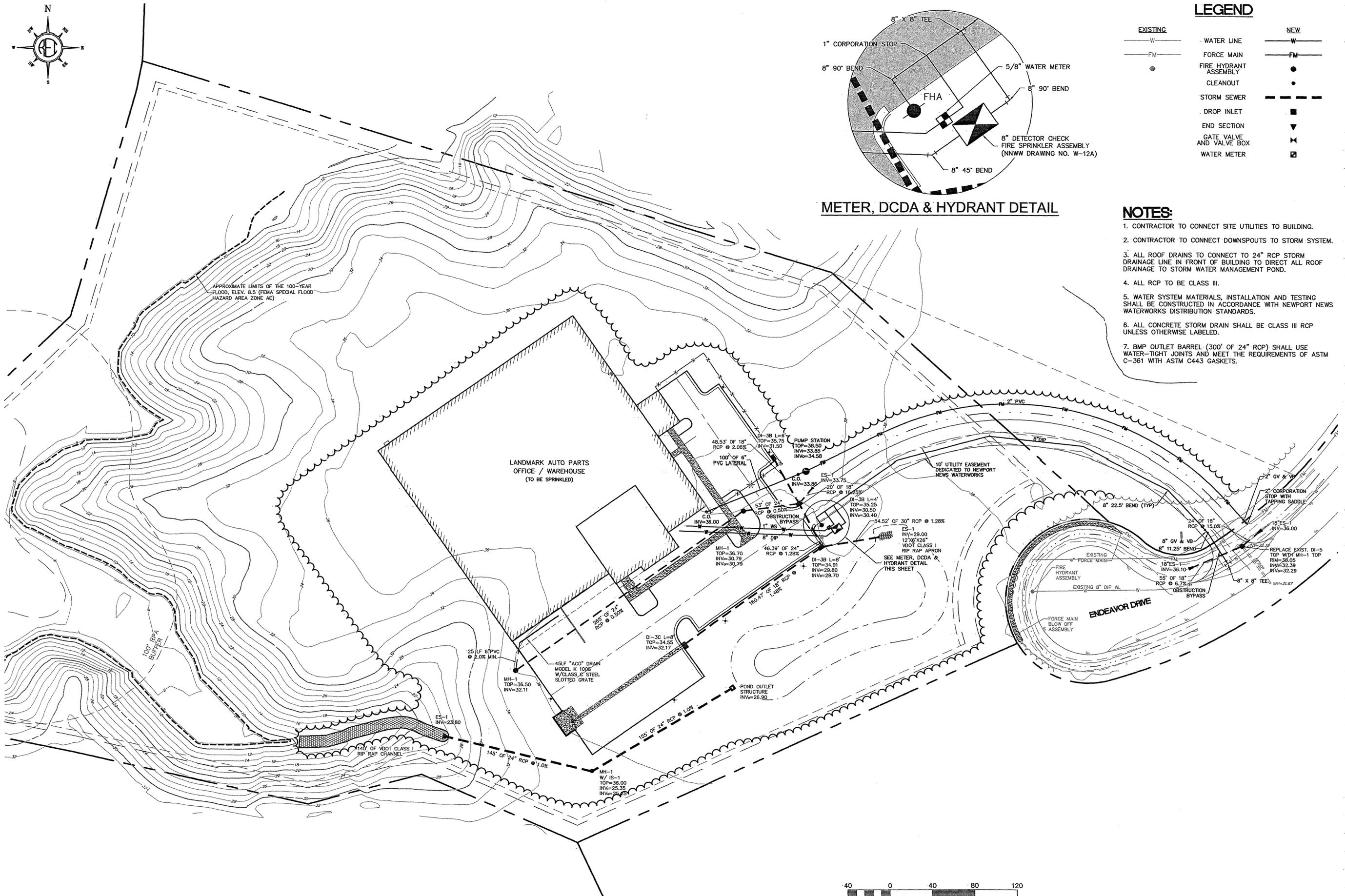
METER, DCDA & HYDRANT DETAIL

LEGEND

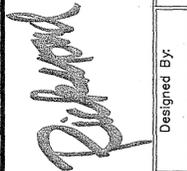
EXISTING		NEW
— W —	WATER LINE	— W —
— FM —	FORCE MAIN	— FM —
●	FIRE HYDRANT ASSEMBLY	●
○	CLEANOUT	○
— S —	STORM SEWER	— S —
— DI —	DROP INLET	— DI —
— ES —	END SECTION	— ES —
— GV —	GATE VALVE AND VALVE BOX	— GV —
— WM —	WATER METER	— WM —

NOTES:

1. CONTRACTOR TO CONNECT SITE UTILITIES TO BUILDING.
2. CONTRACTOR TO CONNECT DOWNSPOUTS TO STORM SYSTEM.
3. ALL ROOF DRAINS TO CONNECT TO 24" RCP STORM DRAINAGE LINE IN FRONT OF BUILDING TO DIRECT ALL ROOF DRAINAGE TO STORM WATER MANAGEMENT POND.
4. ALL RCP TO BE CLASS III.
5. WATER SYSTEM MATERIALS, INSTALLATION AND TESTING SHALL BE CONSTRUCTED IN ACCORDANCE WITH NEWPORT NEWS WATERWORKS DISTRIBUTION STANDARDS.
6. ALL CONCRETE STORM DRAIN SHALL BE CLASS III RCP UNLESS OTHERWISE LABELED.
7. BMP OUTLET BARREL (300' OF 24" RCP) SHALL USE WATER-TIGHT JOINTS AND MEET THE REQUIREMENTS OF ASTM C-361 WITH ASTM C443 GASKETS.



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DESIGNED BY: [Signature]
 DRAWN BY: [Signature]
 DATE: 4/24/02

No.	By	Revision	Date
5	DWD	LOADING DOCK EXPANDED (PER CLIENT REQ.)	M/J 2/26/03
4	DWD	BUILDING FINISH FLOOR LOWERED 1 FOOT	M/J 2/05/03
3	DAS	REV. PER JCC COMMENT LTR DTD 9/23/02	M/J 9/30/02
2	KWJ	REV. PER JCC COMMENT LTR DTD 9/16/02	M/J 9/19/02
1	DAS	REV. PER JCC COMMENT LTR DTD 5/06/02	M/J 8/16/02

**LANDMARK AUTO PARTS
 JAMES RIVER COMMERCE CENTER**
 UTILITY PLAN
 JAMES CITY COUNTY, VIRGINIA

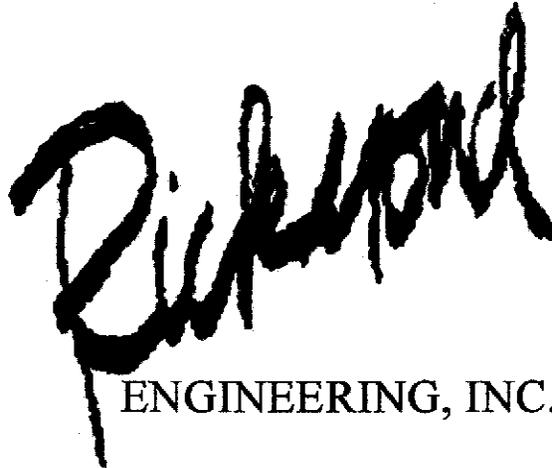
Job Number: 02104
 Sheet No.: 05

BEFORE DIGGING CALL "MISS UTILITY"
 OF VIRGINIA AT 1-800-552-7001

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LANDMARK AUTO PARTS
EROSION AND SEDIMENT CONTROL PLAN

April 24, 2002
(Revised August 16, 2002)


ENGINEERING, INC.

Project No. 02104

SP-51-02
2ND SUB
JROS9

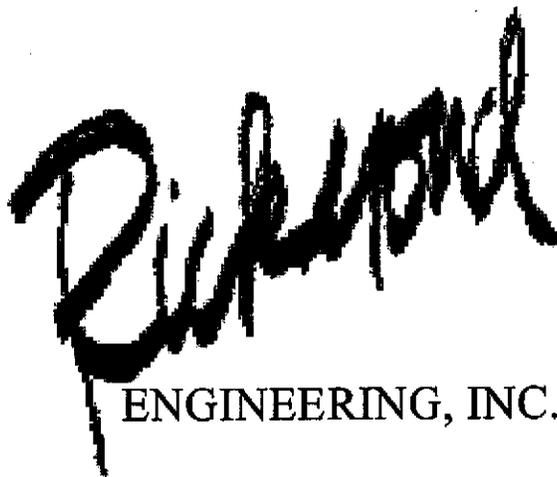
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LANDMARK AUTO PARTS
EROSION AND SEDIMENT CONTROL PLAN

April 24, 2002
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LANDMARK AUTO PARTS
EROSION AND SEDIMENT CONTROL PLAN
REI PROJECT NO. 02104

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE NO.</u>
PROJECT DESCRIPTION	1
EXISTING SITE CONDITIONS	1
ADJACENT AREAS	1
OFF-SITE AREA	1
SOILS	3
Craven-Uchee Complex (11C)	3
Emporia Complex (15F)	4
Peawick Silt loam (27)	4
CRITICAL EROSION AREAS	6
EROSION AND SEDIMENT CONTROL MEASURES	6
STRUCTURAL PRACTICES	6
Temporary Stone Construction Entrance – 3.02	6
Silt Fence – 3.05	7
Storm Drain Inlet Protection – 3.07	7
Culvert Inlet Protection – 3.08	7
Temporary Diversion Dike – 3.09	7
Temporary Sediment Trap – 3.13	7
Temporary Sediment Basin – 3.14	8
Topsoiling – 3.30	8
VEGETATIVE PRACTICES	8
Permanent Seeding – 3.32	8
MANAGEMENT STRATEGIES	8

PERMANENT STABILIZATION	9
STORMWATER MANAGEMENT	9
CALCULATIONS	10
MAINTENANCE	10
Temporary Stone Construction Entrance – 3.02	10
Silt Fence – 3.05	10
Storm Drain Inlet Protection – 3.07	11
Culvert Inlet Protection – 3.08	11
Temporary Diversion Dike – 3.09	11
Temporary Sediment Trap – 3.13	12
Temporary Sediment Basin – 3.14	12
Permanent Seeding – 3.32	12
Tree Preservation and Protection – 3.38	12

FIGURES

VICINITY MAP	FIGURE 1
SOILS MAP	FIGURE 2

APPENDICES

PRE-DEVELOPMENT CALCULATIONS	APPENDIX A
POST-DEVELOPMENT CALCULATIONS	APPENDIX B
STORM SEWER CONVEYANCE SYSTEM	APPENDIX C
SEDIMENT BASIN AND STORMWATER FACILITY DESIGN CALCULATIONS	APPENDIX D

PROJECT DESCRIPTION

The project consists of a 51,390 square foot building, parking lot, sidewalks, water service, sanitary sewer service, stormwater management facilities and associated appurtenances. The site contains 12.628 acres of which 5.3 acres will be disturbed during the construction process. The site is further identified as Parcel No. 10 of the James River Commerce Park, located in James City County, Virginia.

EXISTING CONDITIONS

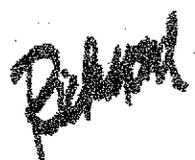
Currently, the site contains approximately 12 acres of scrub pines and mature hardwoods. The high point of the site is along the eastern property line and drains through ravines to the western side of the property as depicted in Figure 1 of this Erosion and Sediment (E&S) Control Plan.

ADJACENT AREAS

The site is surrounded by woods on the northwestern and southern sides. Grices Run (creek) borders Landmark Auto Parts to the northwest. The eastern side is adjacent to the extension of Endeavor Drive, which is currently under construction.

OFF-SITE AREA

There are no off-site areas of disturbance expected to be associated with this project. However, should off-site areas of disturbance become necessary, the selected contractor would be required to develop an E&S Control Plan for review and approval by the authorities having jurisdiction.



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LANDMARK AUTO

VICINITY MAP

PROJ. NO: 02104
DWG: 02104 VICINITY
DATE: 3/25/01
SCALE: 1" = 2000'
SHEET 1 OF 1

FIGURE 1

SOILS

According to the "Soil Survey of James City and York counties and the City of Williamsburg, Virginia, the on-site soils consist of Craven-Uchee (11C), Emporia Complex (15F), and Peawick Silt Loam (27) and are depicted on Figure 2.

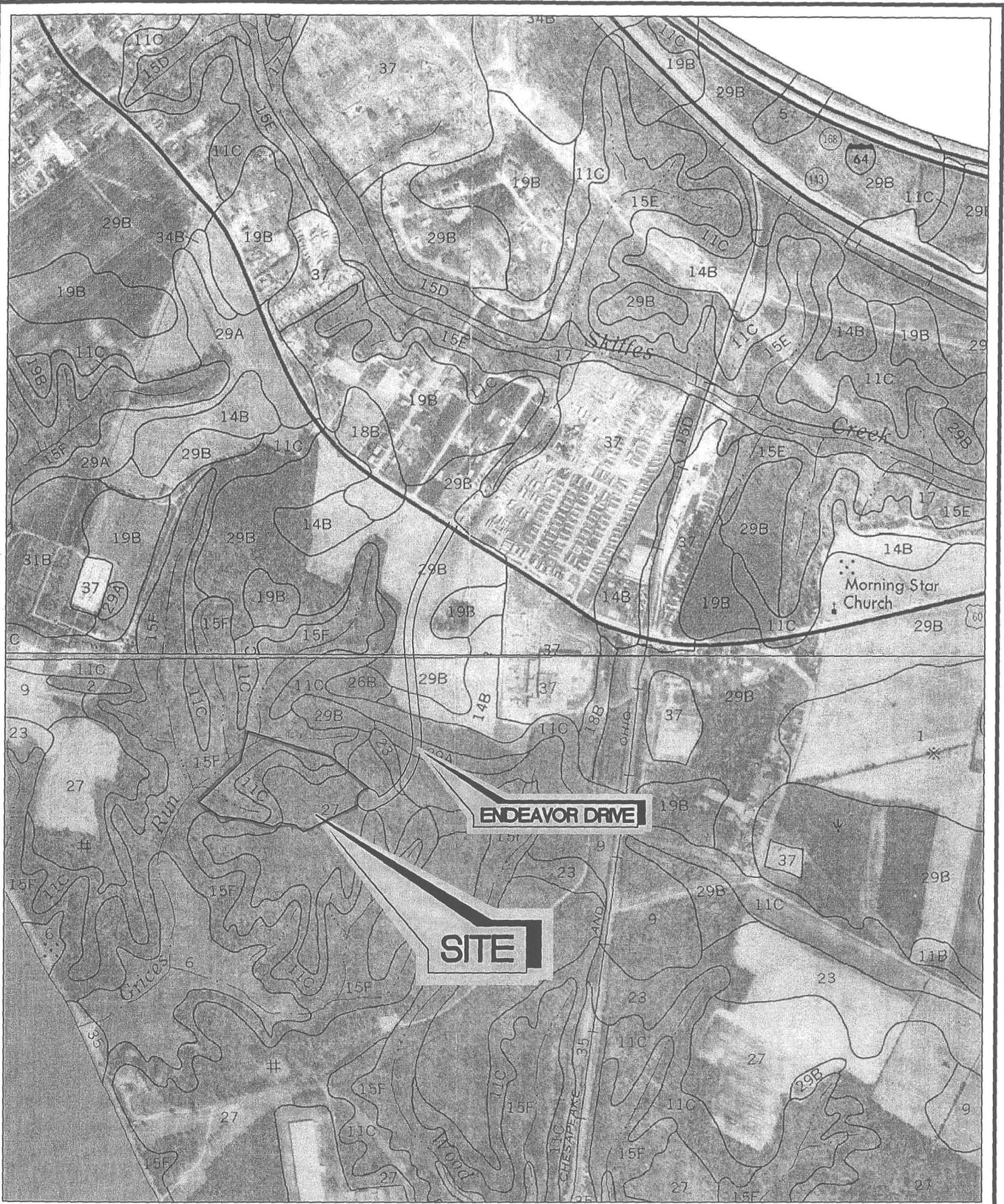
Craven-Uchee (11C)

Craven-Uchee complex consists of moderately well drained Craven soils and well-drained Uchee soils.

Typically, the surface layer of the Craven soils is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is pale olive fine sandy loam 5 inches thick. The subsoil extends to a depth of 42 inches. It is yellowish brown clay in the upper part and yellowish brown sandy clay loam mottled with gray in the middle and lower parts. The substratum extends to a depth of at least 72 inches. It is brownish yellow fine sandy loam mottled with gray in the upper part and gray loamy fine sand with yellow mottles in the lower part.

Typically, the surface layer of the Uchee soils is dark grayish brown loamy fine sand about 5 inches thick. The subsurface layer is light yellowish brown and very pale brown loamy fine sand 19 inches thick. The subsoil extends to a depth of 56 inches. It is strong brown sandy clay loam above a depth of 36 inches and strong brown sandy clay loam and clay mottled with gray and red from 36 to 56 inches. The substratum from 56 to at least 65 inches is variegated red, brown, and gray stratified sandy loam and sandy clay loam.

Craven soil permeability is slow and the erosion hazard is severe. Uchee soil permeability is moderate in the upper part of the subsoil and moderately slow in the lower part.



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LANDMARK AUTO

SOILS MAP

PROJ. NO: 02104
 DWG: 02104 VICINITY
 DATE: 5/16/02
 SCALE: 1" = 1000'
 FIGURE 2

Emporia Complex (15F)

Emporia complex consists of areas of deep, very steep well-drained Emporia soils.

Typically, the surface layer of Emporia soils is dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer is pale brown loam 3 inches thick. The subsoil extends to a depth of 45 inches. It is yellowish brown loam with mostly strong brown mottles in the upper part; yellowish brown, firm sandy clay loam with strong brown and gray mottles in the middle part; and mottled gray and brown, firm sandy clay loam in the lower part. The substratum is variegated brown, red, and gray, firm sandy clay loam to a depth of at least 75 inches.

Emporia soils permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. The erosion hazard is severe.

Peawick Silt Loam (27)

This soil is deep, nearly level, and moderately well drained. It is on broad ridges of high stream terraces. Areas of this soil are elongated, irregularly rectangular, or oval. They range from about 3 to 100 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer of this soil is dark grayish brown silt loam about 2 inches thick. The upper 14 inches of the subsoil is light yellowish brown silty clay loam and yellowish brown silty clay. The next 25 inches of the subsoil is mottled brown and gray silty clay. The lower part of the subsoil is mostly mottled, gray silty clay and clay to a depth of at least 99 inches.

Included with this soil in mapping are small areas of well-drained Pamunkey soils, moderately well drained Dogue soils, somewhat poorly drained Newflat soils, and poorly drained Chickahominy soils.

The Pamunkey soils are in slightly higher areas, and the Dogue soils are throughout the unit. The Newflat and Chickahominy soils are in lower areas, in slight depressions, and near drainageways. Also included in mapping are large, intermingled areas of soils that are similar to the Peawick soil but have a thinner subsoil. Included soils make up about 20 percent of this unit.

The permeability of this Peawick soil is very slow, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The surface layer is friable but is thin in most areas. The subsoil has high shrink-well potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It is extremely acid of very strongly acid, but reaction in the surface layer varies because of local liming practices. In winter and early in spring, a perched high water table is at a depth of 1½ to 3 feet.

In most areas, this soil is in woodland. In a few areas it is farmed, and some are in pasture.

The soil is moderately well suited to cultivated crops. However, in most areas the thin surface layer and the high clay content of the upper part of the subsoil hinder cultivation, especially when the soil is too wet. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and use of crop residue help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is moderately well suited to pasture and hay crops. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational grazing of pasture, deferred grazing, and use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet often cut up and compact the surface layer, thereby reducing yields and increasing the erosion hazard.

The potential for trees on this soil is moderately high, especially for loblolly pine. Seeds and seedlings grow well if competing vegetation is controlled. The use of heavy timber equipment on this soil is limited during wet periods.

The seasonal high water table and the high shrink-well potential and slow permeability of the subsoil are the main limitations if the soil is used for community development. The seasonal high water table and the high shrink-swell potential and slow permeability of the subsoil limit use of the soil as a building site or site for sanitary landfills or septic tank absorption fields and for many types of recreation. Low strength limits the use of the soil for subgrade material for local roads and streets.

This soil is in capability subclass IIw.

CRITICAL EROSION AREAS

The critical erosion areas on this site are the drainage ravines located on the west side of the project. To prevent sediment from leaving the site through these areas, it is imperative that the contractor installs all E&S control measures shown on these plans before any land disturbing activities commence. Regular inspection and maintenance are also required for all erosion and sediment control measures to keep them functioning as designed.

EROSION AND SEDIMENT CONTROL MEASURES

Unless otherwise indicated, all structural and vegetative E&S control practices shall be constructed and maintained according to minimum standards and specifications of the latest edition of the "Virginia Erosion and Sediment Control Handbook (VESCH), 1992". The minimum standards shall be adhered to unless otherwise waived or approved by a variance.

STRUCTURAL PRACTICES

Temporary Stone Construction Entrance – 3.02

A construction entrance shall be provided at the point of ingress and egress to reduce the amount of mud transported onto paved public roads by motor vehicles and runoff.

Silt Fence – 3.05

Silt fence shall be placed around the limits of clearing to intercept and detain small amounts of sediment from disturbed areas during construction operations and to direct sediment-laden runoff to a sediment-trapping facility.

Storm Drain Inlet Protection – 3.07

Storm drain inlet protection is to be installed at all drainage inlets to prevent sediment from entering the storm drainage systems prior to permanent stabilization of the disturbed areas.

Culvert Inlet Protection – 3.08

Culvert inlet protection is to be installed at the inlet to storm sewer culverts as depicted on the plans.

Temporary Diversion Dike – 3.09

Temporary diversion dikes shall be placed at the top and base of disturbed areas to divert sediment-laden runoff from disturbed areas to a sediment-trapping facility.

Temporary Sediment Trap – 3.13

A temporary sediment trap shall be installed at the location depicted on the plans to detain sediment-laden runoff from the disturbed areas. The sediment basin should be maintained with “wet” and “dry” storage to allow for the majority of the sediment to settle in the trap.

Temporary Sediment Basin – 3.14

A temporary sediment basin shall be installed at the location depicted on the plans to detain sediment-laden runoff from the disturbed areas. The sediment basin should be maintained with “wet” and “dry” storage to allow for the majority of the sediment to settle in the basin.

Topsoiling – 3.30

Topsoil shall be installed to all disbursed areas outside of the impervious areas depicted on plans.

VEGETATIVE PRACTICES

Permanent Seeding – 3.32

All denuded areas, which will be left dormant for extended periods of time, shall be seeded with permanent vegetation immediately following grading. Selection of the seed mixture will depend on the time of year it is applied.

MANAGEMENT STRATEGIES

- Sediment trapping measures will be installed as the first step in grading and will be seeded and mulched immediately following installation.
- Temporary seeding or other stabilization will follow immediately after grading.
- The Contractor shall be responsible for the installation and maintenance of all erosion and sediment control practices depicted on the Plans.
- After achieving adequate stabilization, the temporary controls will be cleaned and removed. Any areas disturbed in the removal process shall be graded, topsoiled, and seeded accordingly.

PERMANENT STABILIZATION

All areas disturbed by construction shall be stabilized with permanent seeding immediately following finish grading. Seeding shall be accomplished with Kentucky 31 Tall Fescue according to Standards and Specifications 3.32, Permanent Seeding of the VESCH. Soil stabilization blankets will be installed over slopes, which have been brought to final grade and have been seeded to protect the slopes from rill and gully erosion and to allow seed to germinate properly. Mulch (straw or fiber) will be used on relatively flat areas. In all seeding operations, seed, fertilizer and lime will be applied prior to mulching.

STORMWATER MANAGEMENT

James City County's 10-Point Best Management Practice (BMP) requirements for compliance with the Chesapeake Bay Preservation Act (CBPA) would be satisfied by the combined use of conservation areas and BMPs. A total of 6.208 acres of the 12.628-acre site are proposed to be preserved as conservation areas. An oversized wet pond is proposed to be constructed at the front of the property to receive and treat stormwater runoff from the developed site. The combination of conservation areas and structural BMPs provides 10.03 points as calculated according to the James City County BMP worksheet provided in Appendix A.

CALCULATIONS

The CBPA and stormwater management calculations pertaining to the proposed BMP and storm sewer conveyance system associated with the proposed project are provided as Appendices to this report. Appendix A contains calculations pertaining to pre-development conditions. Appendix B contains calculations to support the design of the BMP based on post-development conditions. The BMP is designed to meet the criteria of both the CBPA and the James City County stream channel protection ordinance requiring that the runoff generated by the 1-year, 24-hour duration storm event is detained for 24 hours. Appendix C contains design calculations for the storm sewer conveyance system. Appendix D contains design calculations for the sediment basin as outlined by the VESCH.

MAINTENANCE

In general, all erosion and sediment control measures will be checked daily and after each significant rainfall. The following items will be checked in particular:

Temporary Stone Construction Entrance – 3.02

The entrance shall be maintained in a condition, which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with additional stone or the washing and reworking of existing stone as conditions demand and repair and/or cleanout of any structures used to trap sediment. All materials spilled, dropped, washed, or tracked from vehicles onto roadways or into storm drains must be removed immediately. The use of water trucks to remove materials dropped, washed, or tracked onto roadways will not be permitted under any circumstances.

Silt Fence – 3.05

Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.

Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting.

Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still is necessary, the fabric shall be replaced promptly.

Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.

Any sediment deposits remaining in place after the silt fence is no longer required should be dressed to conform to the existing grade, prepared and seeded.

Storm Drain Inlet Protection – 3.07

The structure shall be inspected after each rain and repairs made as needed.

Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.

Structures shall be removed and the area stabilized when the remaining drainage area has been properly stabilized.

Culvert Inlet Protection – 3.08

The structure shall be inspected after each rain and repairs made as needed.

Aggregate shall be replaced or cleaned when inspection reveals that clogged voids are causing ponding protections, which interfere with on-site construction.

Sediment shall be removed and the impoundment restored to its original dimensions when sediment has accumulated to one-half the design depth. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems.

Temporary structures shall be removed when they have served their useful purpose but not before the upslope area has been permanently stabilized.

Temporary Diversion Dike – 3.09

The measure shall be inspected after every storm and repairs made to the dike, flow channel, outlet or sediment trapping facility, as necessary. Once every two weeks, whether a storm event has occurred or not, the measure shall be inspected and repairs made if needed. Damages caused by construction traffic or other activity must be repaired before the end of each working day.

~~TRAD~~
Temporary Sediment Basin – 3.13

The basin embankment should be checked regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment.

The basin should be checked after each runoff-producing rainfall for sediment cleanout. When the sediment reaches the clean-out level, it shall be removed and properly disposed of.

Temporary Sediment Basin – 3.14

The basin embankment should be checked regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment.

The basin should be checked after each runoff-producing rainfall for sediment cleanout. When the sediment reaches the clean-out level, it shall be removed and properly disposed of.

Permanent Seeding – 3.32

The seeded/mulched areas should be checked regularly to ensure that a good stand is established and maintained. Areas should be fertilized, mulched and re-seeded as needed. When it is clear that plants have not germinated on an area or have died, these areas must be re-seeded immediately to prevent erosion damage. However, it is extremely important to determine for what reason germination did not take place and make any corrective action necessary prior to re-seeding the area.

Tree Preservation and Protection - 3.38

In spite of precautions, some damage to protected trees may occur. In such cases, the following maintenance guidelines should be followed:

Soil Aeration

If the soil has become compacted over the root zone of any tree, the ground shall be aerated by punching holes with an iron bar. The bar shall be driven 1 foot deep and then moved back and forth until the soil is loosened. This procedure shall be repeated every 18 inches until all of the compacted soil beneath the crown of the tree has been loosened.

Repair of Damage

- Any damage to the crown, trunk, or root system of any tree retained on the site shall be repaired immediately.
- Whenever major root or bark damage occurs, remove some foliage to reduce the demand for water and nutrients.
- Damaged roots shall immediately be cut off cleanly inside the exposed or damaged area. Cut surfaces shall be painted with approved tree paint, and moist peat moss, burlap, or topsoil shall be spread over the exposed area.
- To treat bark damage, carefully cut away all loosened bark back into the undamaged area, taper the cut at the top and bottom, and provide drainage at the base of the wound
- All tree limbs damaged during construction or removed for any other reason shall be cut off above the collar at the preceding branch junction.
- Care for serious injuries shall be prescribed by a forester or a tree specialist.

Fertilization

- Broadleaf trees that have been stressed or damaged shall receive a heavy application of fertilizer to aid their recovery.
- Trees shall be fertilized in the late fall (after October 1) or the early spring (from the time frost is out of the ground until May 1). Fall applications are preferred, as the nutrients will be made available over a longer period of time.
- Fertilizer shall be applied to the soil over the feeder roots. In no case should it be applied closer than 3 feet to the trunk.
- The root system of conifers extends some distance beyond the drip line. Increase the area to be fertilized by one-fourth the area of the crown.
- Fertilizer shall be applied using approved fertilization methods and equipment.
- Formulations and application rates shall conform to the guidelines given in VESCH.
- Maintain a ground cover of organic mulch around trees that is adequate to prevent erosion, protect roots, and hold water.

APPENDIX A
PRE-DEVELOPMENT CALCULATIONS

Worksheet 2: Runoff curve number and runoff

Project LANDMARK AUTO PARTS	By DWD	Date 8/8/02
Location J.C.C.	Checked	Date

Check one: Present Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ^{1/}			Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Figure 2-3	Figure 2-4		
CRAVEN "C"	SLOPED AREAS	70			0.404	33.88
PEAWICK "D"	WOODS	77			4.225	325.33

^{1/} Use only one CN source per line

Totals ➔ **4.709** **359.21**

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{359.21}{4.709} = 76.28$; **Use CN** ➔ **76**

2. Runoff

	Storm #1	Storm #2	Storm #3/4	
Frequency yr	1	2	10	100
Rainfall, P (24-hour) in	2.8	3.5	5.8	8.0
Runoff, Q in	0.9	1.4	3.2	5.1

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 3: Time of Concentration (T_C) or travel time (T_t)

Project <i>LANDMARK AUTO PARTS</i>	By <i>DWD</i>	Date <i>8/8/02</i>
Location <i>S.C.C.</i>	Checked	Date

Check one: Present Developed

Check one: T_C T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_C only)

	Segment ID	
1. Surface description (table 3-1)	<i>UNPAVED</i>	
2. Manning's roughness coefficient, n (table 3-1)	<i>0.40</i>	
3. Flow length, L (total L \leq 300 ft)	<i>100</i>	
4. Two-year 24-hour rainfall, P_2	<i>3.5</i>	
5. Land slope, s	<i>.0125</i>	
6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T_t	<i>0.41</i>	+ <input type="text"/> = <input type="text"/>

Shallow concentrated flow

	Segment ID	
7. Surface description (paved or unpaved)	<i>UNPAVED</i>	
8. Flow length, L	<i>300</i>	
9. Watercourse slope, s	<i>.087</i>	
10. Average velocity, V (figure 3-1)	<i>4.7</i>	
11. $T_t = \frac{L}{3600 V}$ Compute T_t	<i>0.02</i>	+ <input type="text"/> = <input type="text"/>

Channel flow

	Segment ID	
12. Cross sectional flow area, a		
13. Wetted perimeter, p_w		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r		
15. Channel slope, s		
16. Manning's roughness coefficient, n		
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V		
18. Flow length, L		
19. $T_t = \frac{L}{3600 V}$ Compute T_t		+ <input type="text"/> = <input type="text"/>
20. Watershed or subarea T_C or T_t (add T_t in steps 6, 11, and 19)		Hr <input type="text"/>

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PreDevelopment

Date: 08-08-02
Time: 10:46:54

UNIT HYDROGRAPH REPORT

Hydrograph Number:1
Name: PreDevelopment
Type: SCS Curvilinear

[UNIT HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 12.33 (cfs)
Time to Peak (Tp) = 17.33 (min)
Time of Base (Tb) = 86.67 (min)
Volume = 0.39 (ac-ft)
Shape Factor = 484.00
Time Step = 5.00 (min)
Excess Rain = 1.00 (in)
Storm Duration = 3.46 (min)
Lag Time = 15.60 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	4.71	76

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 26.00 (min)

[Unit Hydrograph Flow Values: Time vs. Flow]
[The time interval is 5.00 min]

Time Interval	Time (min)	Flow (cfs)
1	5.00	2.21
2	10.00	7.60
3	15.00	11.95
4	20.00	11.81
5	25.00	9.09
6	30.00	5.40
7	35.00	3.36
8	40.00	2.15
9	45.00	1.33
10	50.00	0.83
11	55.00	0.52
12	60.00	0.33
13	65.00	0.20
14	70.00	0.13
15	75.00	0.09
16	80.00	0.05
17	85.00	0.01
18	86.67	0.00

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PreDevelopment

Date: 08-08-02
Time: 10:51:33

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 1
Name: PreDev 1-yr
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	3.61 (cfs)
Time to Peak (Tp)	=	730.00 (min)
Time of Base (Tb)	=	1525.19 (min)
Volume	=	0.34 (ac-ft)
Time Step	=	5.00 (min)

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 2
Name: PreDev 2-yr
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	5.80 (cfs)
Time to Peak (Tp)	=	730.00 (min)
Time of Base (Tb)	=	1525.19 (min)
Volume	=	0.53 (ac-ft)
Time Step	=	5.00 (min)

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 3
Name: PreDev 10-yr
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	13.98 (cfs)
Time to Peak (Tp)	=	730.00 (min)
Time of Base (Tb)	=	1525.19 (min)
Volume	=	1.26 (ac-ft)
Time Step	=	5.00 (min)

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 4
Name: PreDev 100-yr
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	22.36 (cfs)
Time to Peak (Tp)	=	730.00 (min)
Time of Base (Tb)	=	1525.19 (min)
Volume	=	2.02 (ac-ft)
Time Step	=	5.00 (min)

APPENDIX B
POST-DEVELOPMENT CALCULATIONS

Worksheet 2: Runoff curve number and runoff

Project LANDMARK AUTO PARTS	By DWD	Date 8/3/02
Location D.C.C.	Checked	Date

Check one: Present Developed **DRAINS TO BMP**

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ^{1/}			Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Figure 2-3	Figure 2-4		
	IMPERVIOUS	98			2.754	269.892
C	LANDSCAPED AREA	74			1.898	140.452

^{1/} Use only one CN source per line

Totals ➔ **4.652 410.344**

$$CN \text{ (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{410.344}{4.652} = 88.2$$

Use CN ➔ **88**

2. Runoff

	Storm #1	Storm #2	Storm #3/4	
Frequency yr	1	2	10	100
Rainfall, P (24-hour) in	2.8	3.5	5.8	8.0
Runoff, Q in	1.6	2.3	4.4	6.6

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project LANDMARK AUTO PARTS	By DWD	Date 8/12/02
Location S.C.C.	Checked	Date

Check one: Present Developed

Check one: T_c T_t through subarea

DRAINS TO BMP

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

	Segment ID	
1. Surface description (table 3-1)	PAVED	
2. Manning's roughness coefficient, n (table 3-1)011	
3. Flow length, L (total L \neq 300 ft)	200	ft
4. Two-year 24-hour rainfall, P_2	3.5	in
5. Land slope, s01	ft/ft
6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T_t04	hr

+ [] = .04

Shallow concentrated flow

	Segment ID	
7. Surface description (paved or unpaved)	UNPAVED	UNPAVED
8. Flow length, L	300	300
9. Watercourse slope, s087	.015
10. Average velocity, V (figure 3-1)	4.7	2.0
11. $T_t = \frac{L}{3600 V}$ Compute T_t	0.02	0.04

+ [] = .06

Channel flow

	Segment ID	
12. Cross sectional flow area, a		ft ²
13. Wetted perimeter, P_w		ft
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r		ft
15. Channel slope, s		ft/ft
16. Manning's roughness coefficient, n		
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V		ft/s
18. Flow length, L		ft
19. $T_t = \frac{L}{3600 V}$ Compute T_t		hr
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)		hr

+ [] = .10

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-12-02
Time: 14:07:22

UNIT HYDROGRAPH REPORT

Hydrograph Number:1 - Area that drains to the proposed BMP
Name: PostDev-BMP
Type: SCS Curvilinear

[UNIT HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	52.77 (cfs)
Time to Peak (Tp)	=	4.00 (min)
Time of Base (Tb)	=	20.00 (min)
Volume	=	0.39 (ac-ft)
Shape Factor	=	484.00
Time Step	=	2.00 (min)
Excess Rain	=	1.00 (in)
Storm Duration	=	0.80 (min)
Lag Time	=	3.60 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
Overall Approximation	4.65	88

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc)	=	6.00 (min)
----------------------------	---	------------

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 4
Name: PostDev 1-yr BMP
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 13.15 (cfs)
Time to Peak (Tp) = 718.00 (min)
Time of Base (Tb) = 1459.59 (min)
Volume = 0.57 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 1
Type = SCS Curvilinear
Peak Flow (Qp) = 52.77 (cfs)
Time to Peak (Tp) = 4.00 (min)
Time of Base (Tb) = 20.00 (min)
Volume = 0.39 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 6.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	4.65	88

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 6.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 2.80 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 7
Name: PostDev 2-yr BMP
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 17.90 (cfs)
Time to Peak (Tp) = 718.00 (min)
Time of Base (Tb) = 1459.59 (min)
Volume = 0.80 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 1
Type = SCS Curvilinear
Peak Flow (Qp) = 52.77 (cfs)
Time to Peak (Tp) = 4.00 (min)
Time of Base (Tb) = 20.00 (min)
Volume = 0.39 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 6.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	4.65	88

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 6.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 3.50 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 10
Name: PostDev 10-yr BMP
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 33.55 (cfs)
Time to Peak (Tp) = 718.00 (min)
Time of Base (Tb) = 1459.59 (min)
Volume = 1.58 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 1
Type = SCS Curvilinear
Peak Flow (Qp) = 52.77 (cfs)
Time to Peak (Tp) = 4.00 (min)
Time of Base (Tb) = 20.00 (min)
Volume = 0.39 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 6.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	4.65	88

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 6.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 5.80 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 13
Name: PostDev 100-yr BMP
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 48.35 (cfs)
Time to Peak (Tp) = 718.00 (min)
Time of Base (Tb) = 1459.59 (min)
Volume = 2.35 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 1
Type = SCS Curvilinear
Peak Flow (Qp) = 52.77 (cfs)
Time to Peak (Tp) = 4.00 (min)
Time of Base (Tb) = 20.00 (min)
Volume = 0.39 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 6.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	4.65	88

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 6.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 8.00 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

Worksheet 2: Runoff curve number and runoff

Project LANDMARK AUTO PARTS	By DWD	Date 8/8/02
Location J.C.C.	Checked	Date

Check one: Present Developed **BYPASSES BMP**

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ^{1/}			Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Figure 2-3	Figure 2-4		
C	LANDSCAPED	74			0.790	58.46
CRAVEN "C"	NATURAL SLOPED AREA	70			0.369	23.83

^{1/} Use only one CN source per line **Totals** ➔ **1.159** **84.29**

$$CN \text{ (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{84.29}{1.159} = 72.7 ; \text{ Use CN } \boxed{73}$$

2. Runoff

	Storm #1	Storm #2	Storm #3/4	
Frequency yr	1	2	10	100
Rainfall, P (24-hour) in	2.8	3.5	5.8	8.0
Runoff, Q in	0.7	1.2	2.9	4.8

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project LANDMARK AUTO PARTS	By DWD	Date 8/12/02
Location J.C.C.	Checked	Date

Check one: Present Developed **BYPASSES BMP**

Check one: T_c T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

	Segment ID	
1. Surface description (table 3-1)		GRASS
2. Manning's roughness coefficient, n (table 3-1)		0.20
3. Flow length, L (total L > 300 ft) ft		200
4. Two-year 24-hour rainfall, P ₂ in		3.5
5. Land slope, s ft/ft		0.01
6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T _t hr	+	= 0.45

Shallow concentrated flow

	Segment ID	
7. Surface description (paved or unpaved)		GRASS
8. Flow length, L ft		120
9. Watercourse slope, s ft/ft		0.12
10. Average velocity, V (figure 3-1) ft/s		5.5
11. $T_t = \frac{L}{3600 V}$ Compute T _t hr	+	= 0.01

Channel flow

	Segment ID	
12. Cross sectional flow area, a ft ²		
13. Wetted perimeter, p _w ft		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft		
15. Channel slope, s ft/ft		
16. Manning's roughness coefficient, n		
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ft/s		
18. Flow length, L ft		
19. $T_t = \frac{L}{3600 V}$ Compute T _t hr	+	=
20. Watershed or subarea T _c or T _t (add T _t in steps 6, 11, and 19) Hr		0.46 = 27 MIN.

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-12-02
Time: 14:07:22

UNIT HYDROGRAPH REPORT

Hydrograph Number:2 - Area that bypasses the proposed BMP
Name: PostDev-Bypass
Type: SCS Curvilinear

[UNIT HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 2.92 (cfs)
Time to Peak (Tp) = 18.00 (min)
Time of Base (Tb) = 90.00 (min)
Volume = 0.10 (ac-ft)
Shape Factor = 484.00
Time Step = 2.00 (min)
Excess Rain = 1.00 (in)
Storm Duration = 3.59 (min)
Lag Time = 16.20 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
Overall Approximation	1.16	73

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 27.00 (min)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 5
Name: PostDev 1-yr Bypass
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 0.70 (cfs)
Time to Peak (Tp) = 730.00 (min)
Time of Base (Tb) = 1526.40 (min)
Volume = 0.07 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 2
Type = SCS Curvilinear
Peak Flow (Qp) = 2.92 (cfs)
Time to Peak (Tp) = 18.00 (min)
Time of Base (Tb) = 90.00 (min)
Volume = 0.10 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 27.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	1.16	73

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 27.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 2.80 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 8
Name: PostDev 2-yr Bypass
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 1.19 (cfs)
Time to Peak (Tp) = 730.00 (min)
Time of Base (Tb) = 1526.40 (min)
Volume = 0.11 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 2
Type = SCS Curvilinear
Peak Flow (Qp) = 2.92 (cfs)
Time to Peak (Tp) = 18.00 (min)
Time of Base (Tb) = 90.00 (min)
Volume = 0.10 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 27.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	1.16	73

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 27.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 3.50 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 11
Name: PostDev 10-yr Bypass
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 3.12 (cfs)
Time to Peak (Tp) = 730.00 (min)
Time of Base (Tb) = 1526.40 (min)
Volume = 0.28 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 2
Type = SCS Curvilinear
Peak Flow (Qp) = 2.92 (cfs)
Time to Peak (Tp) = 18.00 (min)
Time of Base (Tb) = 90.00 (min)
Volume = 0.10 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 27.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	1.16	73

[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 27.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 5.80 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 14
Name: PostDev 100-yr Bypass
Type: Computed Flood

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 5.16 (cfs)
Time to Peak (Tp) = 728.00 (min)
Time of Base (Tb) = 1526.40 (min)
Volume = 0.46 (ac-ft)
Time Step = 2.00 (min)
Flow Multiplier = 1.00

[UNIT HYDROGRAPH INFORMATION]

Number = 2
Type = SCS Curvilinear
Peak Flow (Qp) = 2.92 (cfs)
Time to Peak (Tp) = 18.00 (min)
Time of Base (Tb) = 90.00 (min)
Volume = 0.10 (ac-ft)
Shape Factor = 484.00
Time Step: = 2.00 (min)
Excess Rain = 0.00 (in)
Lag Time = 27.00 (min)

[BASIN INFORMATION]

[WEIGHTED WATERSHED AREA]

Description	Area	CN
<None>		
Overall Approximation	1.16	73

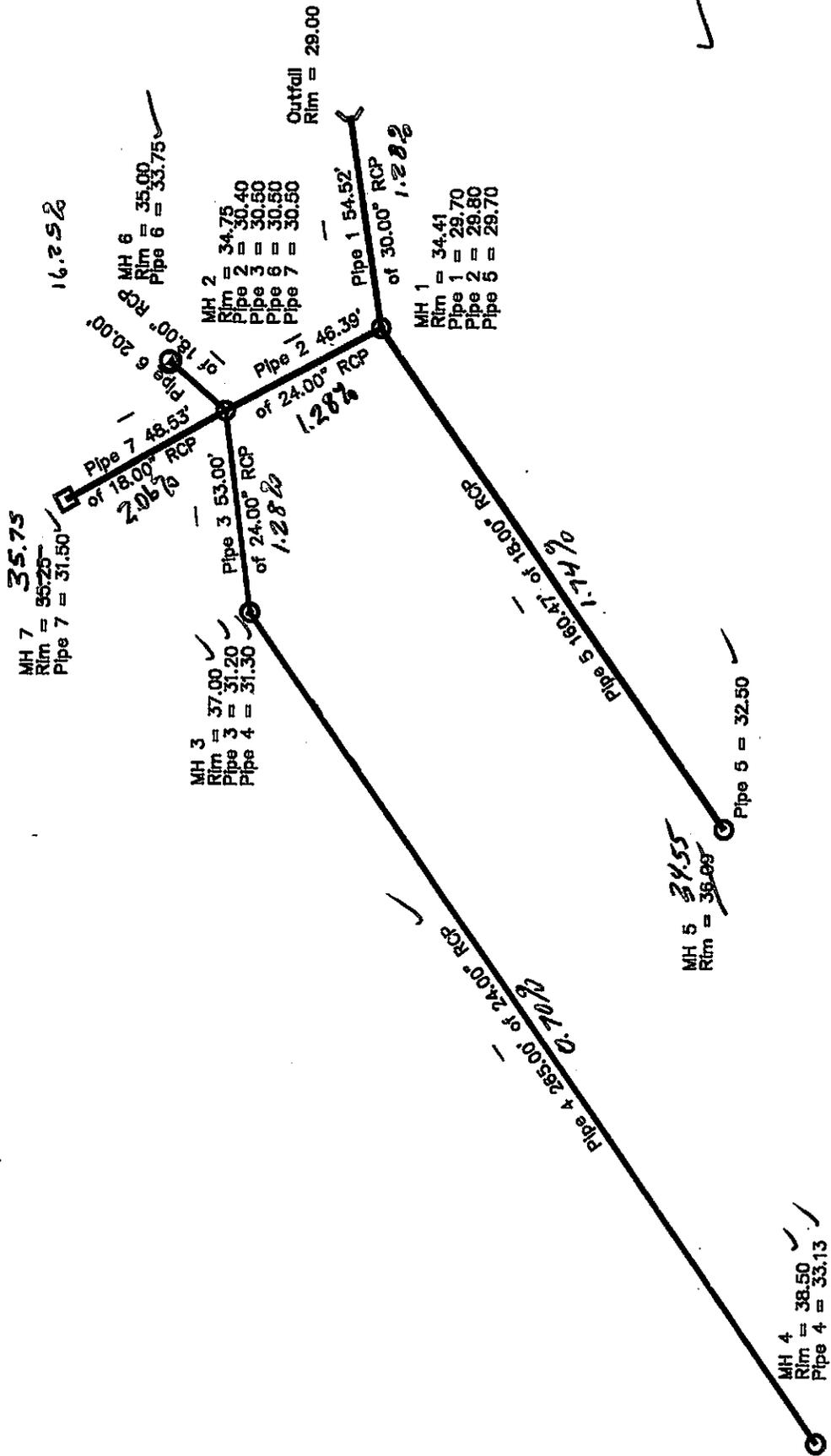
[TIME CONCENTRATION -- User Defined]

Time of Concentration (Tc) = 27.00 (min)

[RAINFALL DESCRIPTION]

Distribution Type = SCS II
Total Precipitation = 8.00 (in)
Return Period = 2 (yr)
Storm Duration = 24.00 (hr)

APPENDIX C
STORM SEWER CONVEYANCE SYSTEM



User Name: mbaust
 Project: 02104 Landmark Pond Design
 Network: 01 - storm sewer network

Date: 08-15-02
 Time: 13:09:51
 Page: 1

Rickmond Pipe Report

Junct	Pipe	Pipe Mat	Plan Len (ft)	Pipe Dim (in)	Dn Inv El	Up Inv El	Up Rim El	Inv S Plan (%)	Inl Inp Q (cfs)	Pipe Cap (cfs)	Tot Flow (cfs)	HGL Dn	HGL Up	Dn V (ft/s)
MH 1	Pipe 1	RCP	54.52	30.00	29.00	29.70	34.41	1.28	1.50	47.33	16.10	31.00	31.06	3.82
MH 2	Pipe 2	RCP	46.39	24.00	29.80	30.40	34.75	1.29	0.26	26.90	12.26	31.69	31.66	3.98
MH 3	Pipe 3	RCP	53.00	24.00	30.50	31.20	37.00	1.32	0.00	27.03	10.43	32.24	32.36	3.59
MH 4	Pipe 4	RCP	265.00	24.00	31.30	33.13	38.50	0.69	10.43	18.92	10.43	33.07	34.52	3.55
MH 5	Pipe 5	RCP	160.47	18.00	29.70	32.50	36.09	1.74	2.34	14.04	2.34	31.59	33.19	1.32
MH 6	Pipe 6	RCP	20.00	18.00	30.50	33.75	35.00	16.25	0.63	46.85	0.63	31.66	34.10	0.43
MH 7	Pipe 7	RCP	48.53	18.00	30.50	31.50	35.25	2.06	0.94	15.73	0.94	32.05	32.06	0.53

34.91
 35.25
 37.00
 38.50
 34.55
 - -
 35.75

User Name: mbaust
Date: 08-15-02
Project: 02104 Landmark Pond Design
Time: 13:39:09

Page: 1

Hec22 Calculation Report: Drainage Area 2

=====

Results:

Flow Intercepted:	2.34	cfs
Flow Bypassed:	0.00	cfs
Inlet Length:	12.00	ft
Splash-over Velocity:	0.00	ft/s
Ponding Width:	9.00	ft
Depth at Curb:	0.16	ft

Efficiency:

Curb	100.00	%
Grate	*	%
Slotted	*	%
Total:	100.00	%

Flow Data Input:

Input Method:	Known Flow	
Known Flow:	2.34	cfs

Inlet Parameters:

Computation Type:	Sag	
Inlet Type:	Curb	
Longitudinal Slope:	0.00	ft/ft
Manning's n:	0.013	
Pavement Cross Slope:	0.02	ft/ft
Gutter Cross Slope:	0.08	ft/ft
Local Depression:	2.00	in
Gutter Width:	2.00	ft

Curb Opening Length:	12.00	ft
Curb Throat Type:	Horizontal	
Inclined Throat Angle:	90.0000	deg
Inlet Opening Height:	5.00	in
Curb Weir Coefficient:	2.300	
Curb Orifice Coefficient:	0.670	

Rickmond

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PROJECT NO. 02104
 PROJECT NAME LAND MARK AUTO PARTS
 SHEET NO. _____ OF _____
 CALCULATED BY _____ DATE _____
 CHECKED BY _____ DATE _____
 SCALE _____

DA-3		C	A	CA
		roof top		
C= 0.9		grass		
A= 0.26		road		
<u>OVERLAND FLOW</u>		<u>SHALLOW CONCENTRATED FLOW</u>		
L= 20 ft	38.8	V= 3 ft/s	T= $\frac{L}{60V}$	$\frac{65}{60(3)} = 0.4 \text{ min}$
S= 6.5 %	37.5	L= 65 ft		
T _c = 5 min	1.3	S= 2.5 %		
<u>CHANNEL FLOW</u>		h= 1.40 ft		
	35.75		37.15	
H= 1.34 ft	34.41		35.75	
L= 130 ft	1.34		1.40	
T _c = 2 x 2 = 4 (x 2 ft paved)				
T _c = 9.4				
i= 6.4				
Q = CAI (0.9)(0.26Ac)(6.4 in/hr)(C _i 1.0)		C _i storms 25 yr+ (VDOT Page 1-11)		
Q = 1.50 cfs				

Hec22 Calculation Report: DRAINAGE AREA 3

Results:

Flow Intercepted: 1.50 cfs
Flow Bypassed: 0.00 cfs
Inlet Length: 10.00 ft
Splash-over Velocity: 0.00 ft/s
Ponding Width: 8.82 ft
Depth at Curb: 0.18 ft

Efficiency:

Curb 100.00 %
Grate * %
Slotted * %
Total: 100.00 %

Flow Data Input:

Input Method: Known Flow
Known Flow: 1.50 cfs

Inlet Parameters:

Computation Type: Sag
Inlet Type: Curb
Longitudinal Slope: 0.00 ft/ft
Manning's n: 0.013
Pavement Cross Slope: 0.02 ft/ft
Gutter Cross Slope: 0.08 ft/ft
Local Depression: 2.00 in
Gutter Width: 2.00 ft

Curb Opening Length: 10.00 ft
Curb Throat Type: Horizontal
Inclined Throat Angle: 90.0000 deg
Inlet Opening Height: 0.50 in
Curb Weir Coefficient: 2.300
Curb Orifice Coefficient: 0.670

Hec22 Calculation Report: DRAINAGE AREA 4

Results:

Flow Intercepted: 0.94 cfs
Flow Bypassed: 0.00 cfs
Inlet Length: 6.00 ft
Splash-over Velocity: 0.00 ft/s
Ponding Width: 10.86 ft
Depth at Curb: 0.22 ft

Efficiency:

Curb 100.00 %
Grate * %
Slotted * %
Total: 100.00 %

Flow Data Input:

Input Method: Known Flow
Known Flow: 0.94 cfs

Inlet Parameters:

Computation Type: Sag
Inlet Type: Curb
Longitudinal Slope: 0.00 ft/ft
Manning's n: 0.016
Pavement Cross Slope: 0.02 ft/ft
Gutter Cross Slope: 0.08 ft/ft
Local Depression: 2.00 in
Gutter Width: 2.00 ft

Curb Opening Length: 6.00 ft
Curb Throat Type: Horizontal
Inclined Throat Angle: 90.0000 deg
Inlet Opening Height: 0.50 in
Curb Weir Coefficient: 2.300
Curb Orifice Coefficient: 0.670

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Landmark Auto Parts

Comment: DA-6 Culvert Pipe

Solve For Actual Depth

Given Input Data:

Diameter.....	1.50 ft
Slope.....	16.2500 ft/ft
Manning's n.....	0.013
Discharge.....	0.63 cfs

Computed Results:

Depth.....	0.04 ft
Velocity.....	43.04 fps
Flow Area.....	0.01 sf
Critical Depth....	0.29 ft
Critical Slope....	0.0051 ft/ft
Percent Full.....	2.89 %
Full Capacity.....	423.44 cfs
QMAX @.94D.....	455.50 cfs
Froude Number.....	44.45 (flow is Supercritical)

Hec22 Calculation Report: DRAINAGE AREA 6

Results:

Flow Intercepted:	0.26	cfs
Flow Bypassed:	0.00	cfs
Inlet Length:	4.00	ft
Splash-over Velocity:	0.00	ft/s
Ponding Width:	1.57	ft
Depth at Curb:	0.13	ft
Efficiency:		
Curb	100.00	%
Grate	*	%
Slotted	*	%
Total:	100.00	%

Flow Data Input:

Input Method:	Known Flow	
Known Flow:	0.26	cfs

Inlet Parameters:

Computation Type:	Grade	
Inlet Type:	Curb	
Longitudinal Slope:	0.02	ft/ft
Manning's n:	0.016	
Pavement Cross Slope:	0.02	ft/ft
Gutter Cross Slope:	0.08	ft/ft
Local Depression:	2.00	in
Gutter Width:	2.00	ft
Curb Opening Length:	4.00	ft
Curb Throat Type:	Horizontal	
Inclined Throat Angle:	90.0000	deg
Inlet Opening Height:	0.50	in
Curb Weir Coefficient:	2.300	
Curb Orifice Coefficient:	0.670	

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Project Number: 02104

Project Name: Landmark Auto

By: KWJ Checked By: _____

Date: 8/15/02

Sheet Number: _____ of _____

Scale: _____

ENTRANCE CULVERT

The existing pipe from the existing DI-5
at the proposed entrance is an 18" RCP.
Therefore the proposed entrance pipe will
be an 18" RCP on each side of the
converted MH-1.

**APPENDIX D
SEDIMENT BASIN AND
STORMWATER MANAGEMENT FACILITY
DESIGN CALCULATIONS**

Pond Sizing Calculations

5-51-07

DA = 4.652 AC. POST.
 IMPERV 2.754 AC.
 SITE = 12.628 AC.

Worksheet for BMP Point System

A. STRUCTURAL BMP POINT ALLOCATION

<u>BMP</u>	<u>BMP Points</u>		<u>Fraction of Site Served by BMP</u>		<u>Weighted BMP Points</u>
<u>A-2</u>	<u>8</u>	x	<u>(4.652 AC) 0.368</u>	=	<u>2.94</u>
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 2.94

B. NATURAL OPEN SPACE CREDIT

RPA = 0.743 AC. (EXTRA 0.15 pt)
 5.465 AC.

<u>Fraction of Site</u>		<u>Natural Open Space Credit</u>		<u>Points for Natural Open Space</u>
RPA: <u>(0.743 AC.) 5.9%</u>	x	<u>0.10</u> (0.1 per 1%)	=	<u>0.59</u>
<u>(5.465 AC.) 43.3%</u>	x	<u>0.15</u> (0.15 per 1%)	=	<u>6.50</u>

6.208 AC.

TOTAL NATURAL OPEN SPACE CREDIT: 7.09

C. TOTAL WEIGHTED POINTS

$$\frac{2.94}{\text{Structural BMP Points}} + \frac{7.09}{\text{Natural Open Space Points}} = \frac{10.03}{\text{Total}}$$

A-2 wet pond
 2" PER IMPERV AC.
 8 ac BMP

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Project Number: 02104

Project Name: LANDMARK AUTO PARTS

By: DWD Checked By: _____

Date: 8/12/02

Sheet Number: _____ of _____

Scale: _____

DESIGN BMP A-2 WET POND

TREATMENT VOLUME = 2.0 IN / IMPERVIOUS ACRE

IMPERVIOUS AREA = 2.754 AC. *

$$WQV = 2.754 \text{ AC} \times \frac{43,560 \text{ SF}}{\text{AC}} \times \frac{2.0 \text{ IN} \times \frac{1 \text{ FT}}{12 \text{ IN}} = 19,994 \text{ CF}$$

* INCLUDES FUTURE ADDITION TO BUILDING

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Scale: _____

COMPUTE STREAM CHANNEL PROTECTION VOLUME

STEP 1. DEVELOP SMC HYDRAULIC & TR-55 INPUT PARAMETERS

CONDITION	CN	T_c (hrs)	Q_a -1yr (in)	Q 1-yr	Q 2-yr	Q 10-yr	Q 100-yr
① PRE-DEVELOPED	74	0.43	0.9	3.61	5.80	13.98	22.36
② DEVELOPED	88	0.10	1.6	13.15	17.90	33.55	48.35

① SEE APPENDIX "A"

② SEE APPENDIX "B"

STEP 2. UTILIZE MIDE METHOD TO COMPUTE STORAGE VOLUME

INITIAL ABSTRACTION (I_a) FOR CN = 88 IS 0.273

$Q_a/P = 0.273/2.8 = 0.0975$

$T_c = 0.10$ HR

FROM TR-55, EXHIBIT A-II $q_u = 1000$

$Q_0/Q_c = 0.018$

FROM TR-55, FIG. 6-1 FOR TYPE II RAINFALL:

$$V_s/V_r = 0.683 - (Q_0/Q_c) + 1.64(Q_0/Q_c)^2 - 0.804(Q_0/Q_c)^3$$

$$= 0.683 - (0.018) + 1.64(0.018)^2 - 0.804(0.018)^3$$

$$= 0.665$$

$V_s = (0.665)(1.6)(1/12)(4.652) = 0.4125$ AC-FT = 17,968 CF

STEP 3. DETERMINE AVERAGE E.O. RELEASE RATE

$Q_0 = (0.018)(13.15) = 0.24$ cfs

STAGE STORAGE

Elev	ΔElev	Area	Storage	Accum Storage	Storage above Elev. 31.0
27.00		4319		0	
	1.00		5168		
28.00		6017		5168	
	1.00		6916		
29.00		7815		12084	
	1.00		8765		
30.00		9714		20849	
	1.00		12308		
31.00		14902		33157	0
	0.65		10136		
31.65		16285		43292	10136
	0.35		5851		
32.00		17152		49144	15987
	0.12		2092		
32.12		17707		51235	18079
	0.88		16373		
33.00		19504		67608	34452
	1.00		20730		
34.00		21956		88338	55182

Permanent water surface Elev. = 31.0

One half of Water Quality Volume of 19,994cf (=9,997cf) rises to Elev. 31.65
 Channel Protection Elev. = 32.12

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Project Name: LANDMARK AUTO PARTS

By: DWD Checked By: _____

Date: _____

Sheet Number: _____ of _____

Scale: _____

DESIGN FOREBAY

REQ. 0.1in/IMPERVIOUS ACRES
IMPERVIOUS AREA = 2.754 AC.

$$VOL = 2.754 \times 0.1in \times \frac{1ft}{12in} \times \frac{43,560sq}{Ac}$$
$$= 998 cf$$

<u>ELEV</u>	<u>AREA</u>	<u>STORAGE</u>	<u>ACCOM</u>
27	30		
		71	71
28	112		
		171	242
29	229		
		304	546
30	379		
		470	1016 ✓
31	561		

Outlet Structure Design

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Project Name: LANDMARK AUTO PARTS

By: DWD Checked By: _____

Date: 8/12/02

Sheet Number: _____ of _____

Scale: _____

DESIGN ORIFICE TO PASS 1-YEAR, POST-DEVELOPMENT
STORM OVER 24-HOUR PERIOD

ORIFICE EQUATION: $Q = 0.6A\sqrt{2gh}$

$Q = 0.24$??

0.24 cfs from where

$h = 32.12 - 31.00 = 1.12'$

SOLVE FOR A:

$0.24 = 0.6A\sqrt{2(32.2)(1.12)}$

$A = \pi r^2 = 0.0471 ft^2$

$r = .1224'$

USE 3" DIA ORIFICE ✓

AT ELEV. 31.00, $A = 0.0491 ft^2$

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 08:36:46

OUTLET STRUCTURE REPORT

Structure Number : 1
Type : Stand Pipe
Name : Outlet Structure

[RATING CURVE LIMIT]

Minimum Elevation	=	26.90	(ft)
Maximum Elevation	=	34.00	(ft)
Elevation Increment	=	0.10	(ft)

[STAND PIPE INFORMATION]

[ORIFICE INFORMATION] (VDOT STANDARD DI-7)

Height	=	3.00	(ft)
Width	=	3.00	(ft)
Crest Length	=	12.00	(ft)
Effective Crest Length	=	12.00	(ft)
Orifice Coefficient	=	0.60	
Fractional Open Area	=	1.00	

[ORIFICE EQUATION]

$$Q = C_o * A * (2gh / k)^{0.5}$$

[DEFINITIONS]

Co = Orifice Coefficient
A = Wetted Area, (sq ft)

[WEIR INFORMATION]

Crest Elevation	=	32.12	(ft)
Weir Coefficient	=	3.10	
Exponential	=	1.50	

[WEIR EQUATION]

$$Q = C_w * L * H^{exp}$$

[DEFINITIONS]

Cw = Weir Coefficient
H = Headwater depth above inlet control section invert ft
L = Crest length ft

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 08:36:46

OUTLET STRUCTURE REPORT

[OPTIONAL ORIFICE INFORMATION]

Structure Number : 1
Type : Circular Orifice

[OPTIONAL ORIFICE INFORMATION]

Diameter = 0.25 (ft)
Invert Elevation = 31.00 (ft)
Orifice Coefficient = 0.60
Number of Openings = 1

[ORIFICE EQUATION]

$$Q = Co * A * (2gh / k)^{0.5}$$

[DEFINITIONS]

Co = Orifice Coefficient
A = Wetted Area, (cfs)
k = 1

[CULVERT INFORMATION]

Type : Circular Concrete - Square Edge with Headwall

[OUTLET STRUCTURE INFORMATION]

Diameter = 24.00 ✓ (in)
Invert Elevation = 26.90 (ft)
Pipe Length = 300.00 ✓ (ft)
Slope = 0.01
Manning's n Value = 0.01 ✓
Orifice Coefficient = 0.60
Tailwater Elevation = 25.50 (ft)
Number of Barrels = 1

[UNSUBMERGED EQUATION]

$H/Diam = Hc/Diam + K * (Q / (A * Diam^{0.5}))^{M-0.5} * S$
Coefficient K = 0.01
Coefficient M = 2.00
Q Maximum = 15.55

[SUBMERGED EQUATION]

$H/Diam = c * (Q / (A * Diam^{0.5}))^{2+Y-0.5} * S$
Coefficient c = 0.04
Coefficient Y = 0.67
Q Minimum = 17.77

[DEFINITIONS]

H = Headwater depth above inlet control section invert, (ft)
Diam = Interior height of culvert barrel, (ft)
Hc = Specific head at critical depth $(dc + Vc^2 / 2g)$, (ft)
Q = Discharge, (cfs)
A = Full cross sectional area of culvert barrel, (sq ft)
S = Culvert barrel slope, (ft/ft)

User Name: ddelano
 Project: 02104 Landmark Pond Design
 Scenario: PostDevelopment

Date: 08-13-02
 Time: 08:36:46

[STAND PIPE STAGE VS. DISCHARGE]

Elevation (ft)	Stage (ft)	Weirs (cfs)	Orifices (cfs)	Stand Pipe (cfs)	Culvert (cfs)	Total (cfs)
26.90	0.00	0.00	0.00	0.00	0.00	0.00
27.00	0.10	0.00	0.00	0.00	0.06	0.00
27.10	0.20	0.00	0.00	0.00	0.21	0.00
27.20	0.30	0.00	0.00	0.00	0.46	0.00
27.30	0.40	0.00	0.00	0.00	0.78	0.00
27.40	0.50	0.00	0.00	0.00	1.20	0.00
27.50	0.60	0.00	0.00	0.00	1.69	0.00
27.60	0.70	0.00	0.00	0.00	2.25	0.00
27.70	0.80	0.00	0.00	0.00	2.85	0.00
27.80	0.90	0.00	0.00	0.00	3.52	0.00
27.90	1.00	0.00	0.00	0.00	4.25	0.00
28.00	1.10	0.00	0.00	0.00	5.03	0.00
28.10	1.20	0.00	0.00	0.00	5.83	0.00
28.20	1.30	0.00	0.00	0.00	6.65	0.00
28.30	1.40	0.00	0.00	0.00	7.50	0.00
28.40	1.50	0.00	0.00	0.00	8.38	0.00
28.50	1.60	0.00	0.00	0.00	9.26	0.00
28.60	1.70	0.00	0.00	0.00	10.14	0.00
28.70	1.80	0.00	0.00	0.00	11.02	0.00
28.80	1.90	0.00	0.00	0.00	11.94	0.00
28.90	2.00	0.00	0.00	0.00	12.82	0.00
29.00	2.10	0.00	0.00	0.00	13.70	0.00
29.10	2.20	0.00	0.00	0.00	14.58	0.00
29.20	2.30	0.00	0.00	0.00	15.46	0.00
29.30	2.40	0.00	0.00	0.00	15.55	0.00
29.40	2.50	0.00	0.00	0.00	16.66	0.00
29.50	2.60	0.00	0.00	0.00	17.77	0.00
29.60	2.70	0.00	0.00	0.00	18.43	0.00
29.70	2.80	0.00	0.00	0.00	19.09	0.00
29.80	2.90	0.00	0.00	0.00	19.73	0.00
29.90	3.00	0.00	0.00	0.00	20.35	0.00
30.00	3.10	0.00	0.00	0.00	20.95	0.00
30.10	3.20	0.00	0.00	0.00	21.53	0.00
30.20	3.30	0.00	0.00	0.00	22.10	0.00
30.30	3.40	0.00	0.00	0.00	22.66	0.00
30.40	3.50	0.00	0.00	0.00	23.20	0.00
30.50	3.60	0.00	0.00	0.00	23.73	0.00
30.60	3.70	0.00	0.00	0.00	24.03	0.00
30.70	3.80	0.00	0.00	0.00	24.31	0.00
30.80	3.90	0.00	0.00	0.00	24.55	0.00
30.90	4.00	0.00	0.00	0.00	24.79	0.00
31.00	4.10	0.00	0.00	0.00	25.02	0.00
31.10	4.20	0.00	0.02	0.00	25.26	0.02
31.20	4.30	0.00	0.06	0.00	25.48	0.06
31.30	4.40	0.00	0.10	0.00	25.71	0.10
31.40	4.50	0.00	0.12	0.00	25.94	0.12
31.50	4.60	0.00	0.14	0.00	26.16	0.14
31.60	4.70	0.00	0.16	0.00	26.38	0.16
31.70	4.80	0.00	0.18	0.00	26.60	0.18
31.80	4.90	0.00	0.19	0.00	26.82	0.19
31.90	5.00	0.00	0.21	0.00	27.04	0.21
32.00	5.10	0.00	0.22	0.00	27.26	0.22
32.10	5.20	0.00	0.23	0.00	27.47	0.23
32.20	5.30	0.40	0.24	0.84	27.69	1.09
32.30	5.40	1.72	0.26	2.84	27.90	3.10
32.40	5.50	3.56	0.27	5.51	28.11	5.78
32.50	5.60	5.81	0.28	8.71	28.32	8.99
32.60	5.70	8.39	0.29	12.37	28.52	12.66

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 08:36:46

[STAND PIPE STAGE VS. DISCHARGE]

Elevation (ft)	Stage (ft)	Weirs (cfs)	Orifices (cfs)	Stand Pipe (cfs)	Culvert (cfs)	Total (cfs)
32.70	5.80	11.26	0.30	16.43	28.73	16.73
32.80	5.90	14.41	0.31	20.86	28.93	21.17
32.90	6.00	17.81	0.31	25.63	29.13	25.94
33.00	6.10	21.44	0.32	30.71	29.34	29.34
33.10	6.20	25.28	0.33	35.29	29.54	29.54
33.20	6.30	29.33	0.34	39.11	29.74	29.74
33.30	6.40	33.58	0.35	42.92	29.93	29.93
33.40	6.50	38.01	0.36	46.74	30.13	30.13
33.50	6.60	42.63	0.36	50.56	30.32	30.32
33.60	6.70	47.41	0.37	52.70	30.52	30.52
33.70	6.80	52.37	0.38	54.45	30.71	30.71
33.80	6.90	57.48	0.39	56.15	30.91	30.91
33.90	7.00	62.76	0.39	57.79	31.10	31.10
34.00	7.10	0.00	0.40	59.39	31.28	31.28

Storm Routing

User Name: ddelano
 Project: 02104 Landmark Pond Design
 Scenario: PostDevelopment

Date: 08-13-02
 Time: 08:53:05

RESERVOIR REPORT

Reservoir Number: 1
 Name: Pond

[RATING CURVE LIMIT]

Minimum Elevation = 26.90 (ft)
 Maximum Elevation = 34.00 (ft)
 Elevation Increment = 0.10 (ft)

[DISCHARGE INFORMATION]

Structure Number: 1
 Type:
 Name: Outlet Structure

[RESERVOIR STAGE STORAGE/DISCHARGE]

Elevation (ft)	Stage (ft)	Area (sq ft)	Storage (cu ft)	Discharge (cfs)
26.90	0.00	0.00	0.00	0.00
27.00	0.10	0.00	0.00	0.00
27.10	0.20	0.00	0.00	0.00
27.20	0.30	0.00	0.00	0.00
27.30	0.40	0.00	0.00	0.00
27.40	0.50	0.00	0.00	0.00
27.50	0.60	0.00	0.00	0.00
27.60	0.70	0.00	0.00	0.00
27.70	0.80	0.00	0.00	0.00
27.80	0.90	0.00	0.00	0.00
27.90	1.00	0.00	0.00	0.00
28.00	1.10	0.00	0.00	0.00
28.10	1.20	0.00	0.00	0.00
28.20	1.30	0.00	0.00	0.00
28.30	1.40	0.00	0.00	0.00
28.40	1.50	0.00	0.00	0.00
28.50	1.60	0.00	0.00	0.00
28.60	1.70	0.00	0.00	0.00
28.70	1.80	0.00	0.00	0.00
28.80	1.90	0.00	0.00	0.00
28.90	2.00	0.00	0.00	0.00
29.00	2.10	0.00	0.00	0.00
29.10	2.20	0.00	0.00	0.00
29.20	2.30	0.00	0.00	0.00
29.30	2.40	0.00	0.00	0.00
29.40	2.50	0.00	0.00	0.00
29.50	2.60	0.00	0.00	0.00
29.60	2.70	0.00	0.00	0.00
29.70	2.80	0.00	0.00	0.00
29.80	2.90	0.00	0.00	0.00
29.90	3.00	0.00	0.00	0.00
30.00	3.10	0.00	0.00	0.00
30.10	3.20	0.00	0.00	0.00
30.20	3.30	0.00	0.00	0.00
30.30	3.40	0.00	0.00	0.00
30.40	3.50	0.00	0.00	0.00
30.50	3.60	0.00	0.00	0.00
30.60	3.70	0.00	0.00	0.00
30.70	3.80	0.00	0.00	0.00
30.80	3.90	0.00	0.00	0.00
30.90	4.00	0.00	0.00	0.00
31.00	4.10	14902.00	745.10	0.00

User Name: ddelano
 Project: 02104 Landmark Pond Design
 Scenario: PostDevelopment

Date: 08-13-02
 Time: 08:53:05

Elevation (ft)	Stage (ft)	Area (sq ft)	Storage (cu ft)	Discharge (cfs)
31.10	4.20	15127.00	2246.55	0.02
31.20	4.30	15352.00	3770.50	0.06
31.30	4.40	15577.00	5316.95	0.10
31.40	4.50	15802.00	6885.90	0.12
31.50	4.60	16027.00	8477.35	0.14
31.60	4.70	16252.00	10091.30	0.16
31.70	4.80	16477.00	11727.75	0.18
31.80	4.90	16702.00	13386.70	0.19
31.90	5.00	16927.00	15068.15	0.21
32.00	5.10	17152.00	16772.10	0.22
32.10	5.20	17387.20	18499.06	0.23
32.20	5.30	17622.40	20249.54	0.24
32.30	5.40	17857.60	22023.54	0.80
32.40	5.50	18092.80	23821.06	2.65
32.50	5.60	18328.00	25642.10	5.21
32.60	5.70	18563.20	27486.66	8.32
32.70	5.80	18798.40	29354.74	11.90
32.80	5.90	19033.60	31246.34	15.90
32.90	6.00	19268.80	33161.46	20.26
33.00	6.10	19504.00	35100.10	24.97
33.10	6.20	19749.20	37062.76	29.54
33.20	6.30	19994.40	39049.94	29.74
33.30	6.40	20239.60	41061.64	29.93
33.40	6.50	20484.80	43097.86	30.13
33.50	6.60	20730.00	45158.60	30.32
33.60	6.70	20975.20	47243.86	30.52
33.70	6.80	21220.40	49353.64	30.71
33.80	6.90	21465.60	51487.94	30.91
33.90	7.00	21710.80	53646.76	31.10
34.00	7.10	21956.00	55830.10	31.28

Maximum Storage = 55830.10 (cu ft)
 Maximum Discharge = 31.29 (cfs)

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

=====

Number	Name	Type	Defined
1	Routed 1-yr PostDev	Reservoir: Storage	Yes
2	Routed 100-yr PostDev	Reservoir: Storage	Yes
3	Routed 10-yr PostDev	Reservoir: Storage	Yes
4*	PostDev 1-yr BMP	Computed Flood	Yes
5*	PostDev 1-yr Bypass	Computed Flood	Yes
6	PostDev 1-yr combined	Combined	Yes
7*	PostDev 2-yr BMP	Computed Flood	Yes
8*	PostDev 2-yr Bypass	Computed Flood	Yes
9	PostDev 2-yr Combined	Combined	Yes
10*	PostDev 10-yr BMP	Computed Flood	Yes
11*	PostDev 10-yr Bypass	Computed Flood	Yes
12	PostDev 10-yr Combined	Combined	Yes
13*	PostDev 100-yr BMP	Computed Flood	Yes
14*	PostDev 100-yr Bypass	Computed Flood	Yes
15	PostDev 100-yr Combined	Combined	Yes
16	Routed 2-yr PostDev	Reservoir: Storage	Yes

* See Appendix "B" for non-routed, post-development hydrographs.

Hydrographs 1, 2, 3 & 16 represent the area draining to BMP routed through the detention pond.

Hydrographs 6, 9, 12, & 15 represent the combination of the hydrographs for the area bypassing the BMP with the routed hydrographs for the area draining to the BMP.

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 1
Name: Routed 1-yr PostDev
Type: Reservoir: Storage Indication

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 0.33 (cfs)
Time to Peak (Tp) = 906.00 (min)
Time of Base (Tb) = 2880.00 (min)
Volume = 0.50 (ac-ft)
Time Step = 2.00 (min)
Peak Elevation = 32.11 (ft)
Detention Time = NA

[RESERVOIR STRUCTURE INFORMATION]

Number = 1
Name = Pond
Storage Type = User-Defined Area
Maximum Storage = 55830.10 (cu ft)
Maximum Discharge = 31.29 (cfs)

[INFLOW HYDROGRAPH INFORMATION]

Number = 4
Name = PostDev 1-yr BMP
Peak Flow (Qp) = 13.15 (cfs)
Time to Peak (Tp) = 718.00 (min)
Time of Base (Tb) = 1459.59 (min)
Volume = 0.57 (ac-ft)
Flow Multiplier = 1.00

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 16
Name: Routed 2-yr PostDev
Type: Reservoir: Storage Indication

**2 YEAR
OUT**

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	1.86 (cfs)
Time to Peak (Tp)	=	742.00 (min)
Time of Base (Tb)	=	2880.00 (min)
Volume	=	0.72 (ac-ft)
Time Step	=	2.00 (min)
Peak Elevation	=	32.24 (ft)
Detention Time	=	NA

[RESERVOIR STRUCTURE INFORMATION]

Number	=	1
Name	=	Pond
Storage Type	=	User-Defined Area
Maximum Storage	=	55830.10 (cu ft)
Maximum Discharge	=	31.29 (cfs)

[INFLOW HYDROGRAPH INFORMATION]

Number	=	7
Name	=	PostDev 2-yr BMP
Peak Flow (Qp)	=	17.90 (cfs)
Time to Peak (Tp)	=	718.00 (min)
Time of Base (Tb)	=	1459.59 (min)
Volume	=	0.80 (ac-ft)
Flow Multiplier	=	1.00

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 3
Name: Routed 10-yr PostDev
Type: Reservoir: Storage Indication

**10-YEAR
OVT**

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	20.70 (cfs)
Time to Peak (Tp)	=	722.00 (min)
Time of Base (Tb)	=	2880.00 (min)
Volume	=	1.50 (ac-ft)
Time Step	=	2.00 (min)
Peak Elevation	=	32.79 (ft)
Detention Time	=	NA

[RESERVOIR STRUCTURE INFORMATION]

Number	=	1
Name	=	Pond
Storage Type	=	User-Defined Area
Maximum Storage	=	55830.10 (cu ft)
Maximum Discharge	=	31.29 (cfs)

[INFLOW HYDROGRAPH INFORMATION]

Number	=	10
Name	=	PostDev 10-yr BMP
Peak Flow (Qp)	=	33.55 (cfs)
Time to Peak (Tp)	=	718.00 (min)
Time of Base (Tb)	=	1459.59 (min)
Volume	=	1.58 (ac-ft)
Flow Multiplier	=	1.00

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 2
Name: Routed 100-yr PostDev
Type: Reservoir: Storage Indication

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	29.69 (cfs)
Time to Peak (Tp)	=	722.00 (min)
Time of Base (Tb)	=	2880.00 (min)
Volume	=	2.27 (ac-ft)
Time Step	=	2.00 (min)
Peak Elevation	=	33.18 (ft) <i>DHW</i>
Detention Time	=	NA

[RESERVOIR STRUCTURE INFORMATION]

Number	=	1
Name	=	Pond
Storage Type	=	User-Defined Area
Maximum Storage	=	55830.10 (cu ft)
Maximum Discharge	=	31.29 (cfs)

[INFLOW HYDROGRAPH INFORMATION]

Number	=	13
Name	=	PostDev 100-yr BMP
Peak Flow (Qp)	=	48.35 (cfs)
Time to Peak (Tp)	=	718.00 (min)
Time of Base (Tb)	=	1459.59 (min)
Volume	=	2.35 (ac-ft)
Flow Multiplier	=	1.00

*BMP ROUTED
100-YEAR*

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 6
Name: PostDev 1-yr combined
Type: Combined

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	0.90 (cfs)
Time to Peak (Tp)	=	730.00 (min)
Time of Base (Tb)	=	2880.00 (min)
Volume	=	0.56 (ac-ft)
Time Step	=	2.00 (min)

[COMBINED HYDROGRAPH RECORDS]

Hydrograph Number:1		
Name:	Routed 1-yr PostDev	
Type:	Reservoir: Storage Indication	
Peak Flow (Qp)	=	0.33 (cfs)
Time to Peak (Tp)	=	906.00 (min)
Time Step	=	2.00 (min)
Hydrograph Number:5		
Name:	PostDev 1-yr Bypass	
Type:	Computed Flood	
Peak Flow (Qp)	=	0.70 (cfs)
Time to Peak (Tp)	=	730.00 (min)
Time Step	=	2.00 (min)

COMBINED BMP + UNCONT.
← 1-YR PRE
0.90 ← 3.61

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 9
Name: PostDev 2-yr Combined
Type: Combined

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	1.71 (cfs)
Time to Peak (Tp)	=	734.00 (min)
Time of Base (Tb)	=	2880.00 (min)
Volume	=	0.82 (ac-ft)
Time Step	=	2.00 (min)

[COMBINED HYDROGRAPH RECORDS]

Hydrograph Number: 8	
Name: PostDev 2-yr Bypass	
Type: Computed Flood	
Peak Flow (Qp)	= 1.19 (cfs)
Time to Peak (Tp)	= 730.00 (min)
Time Step	= 2.00 (min)
Hydrograph Number: 16	
Name: Routed 2-yr PostDev	
Type: Reservoir: Storage Indication	
Peak Flow (Qp)	= 1.86 (cfs)
Time to Peak (Tp)	= 742.00 (min)
Time Step	= 2.00 (min)

1.71 < 3.80 cfs OK

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 12
Name: PostDev 10-yr Combined
Type: Combined

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	21.50 (cfs)
Time to Peak (Tp)	=	722.00 (min)
Time of Base (Tb)	=	2880.00 (min)
Volume	=	1.77 (ac-ft)
Time Step	=	2.00 (min)

[COMBINED HYDROGRAPH RECORDS]

Hydrograph Number: 3		
Name: Routed 10-yr PostDev		
Type: Reservoir: Storage Indication		
Peak Flow (Qp)	=	20.70 (cfs)
Time to Peak (Tp)	=	722.00 (min)
Time Step	=	2.00 (min)
Hydrograph Number: 11		
Name: PostDev 10-yr Bypass		
Type: Computed Flood		
Peak Flow (Qp)	=	3.12 (cfs)
Time to Peak (Tp)	=	730.00 (min)
Time Step	=	2.00 (min)

~~21.50~~
21.57 13.98
∴ NEED ENGINEERED
CHANNEL.

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: PostDevelopment

Date: 08-13-02
Time: 09:14:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 15
Name: PostDev 100-yr Combined
Type: Combined

[HYDROGRAPH INFORMATION]

Peak Flow (Qp)	=	34.64 (cfs)
Time to Peak (Tp)	=	726.00 (min)
Time of Base (Tb)	=	2880.00 (min)
Volume	=	2.72 (ac-ft)
Time Step	=	2.00 (min)

[COMBINED HYDROGRAPH RECORDS]

Hydrograph Number:2		
Name:	Routed 100-yr PostDev	
Type:	Reservoir: Storage Indication	
Peak Flow (Qp)	=	29.69 (cfs)
Time to Peak (Tp)	=	722.00 (min)
Time Step	=	2.00 (min)
Hydrograph Number:14		
Name:	PostDev 100-yr Bypass	
Type:	Computed Flood	
Peak Flow (Qp)	=	5.16 (cfs)
Time to Peak (Tp)	=	728.00 (min)
Time Step	=	2.00 (min)

RICKMOND ENGINEERING, INC.

1643 C Merrimac Trail
 WILLIAMSBURG, VIRGINIA 23185
 229-1776
 875-1785

JOB 02104

SHEET NO. _____ OF _____

CALCULATED BY KWJ DATE 7/31/02

CHECKED BY _____ DATE _____

SCALE _____

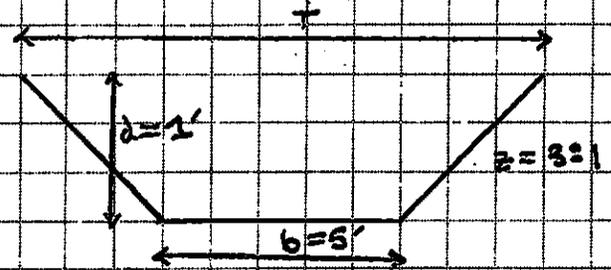
TRAPEZOIDAL-DITCH DESIGN

Outfall Channel

Q = 17.93 cfs (10-year)
S = 0.18%
L = 180 ft.

T = 11 ft.
 d = 1 ft.

*21.5 is
 combined
 Q10 for design*



$$R = \frac{bd + zd^2}{b + 2d(z + 1)} = \frac{(5 \text{ ft})(1 \text{ ft}) + (3)(1 \text{ ft})^2}{(5 \text{ ft}) + 2(1 \text{ ft})(10)} = 0.71 \text{ ft}$$

n = 0.25 (rip rap)

$$A = bd + zd^2 = (5 \text{ ft})(1 \text{ ft}) + (3)(1 \text{ ft})^2 = 8.00 \text{ ft}^2$$

Q = 17.93 cfs d = 0.37' V = 8.00 fps

**USE VDOT CLASS II
 RIP RAP CHANNEL**

Sediment Basin Design

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

REVISED 8-13-02

Project LANDMARK AUTO PARTS

Basin # 1 Location JAMES CITY CO.

Total area draining to basin: 5.20 acres.

Basin Volume Design

Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{5.20} \text{ acres} = \underline{349} \text{ cu. yds.}$$

2. Available basin volume = 1228 cu. yds. at elevation 31.0. (From storage - elevation curve)

3. Excavate 1228 cu. yds. to obtain required volume*.

* Elevation corresponding to required volume = invert of the dewatering orifice.

4. Available volume before cleanout required.

$$33 \text{ cu. yds.} \times \underline{5.20} \text{ acres} = \underline{172} \text{ cu. yds.}$$

5. Elevation corresponding to cleanout level = 30.00.

(From Storage - Elevation Curve) *LEAVES 456 C.Y. AVAIL*

6. Distance from invert of the dewatering orifice to cleanout level = 1.0 ft.
(Min. = 1.0 ft.)

Dry Storage:

7. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

$$67 \text{ cu. yds.} \times \underline{5.20} \text{ acres} = \underline{350} \text{ cu. yds.}$$

8. Total available basin volume at crest of riser* = 1899 cu. yds. at elevation 32.24. (From Storage - Elevation Curve)

* Minimum = 134 cu. yds./acre of total drainage area.

9. Diameter of dewatering orifice = 3 in.
10. Diameter of flexible tubing = 5 in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 32.24
 Top of Dam = 36.0
 Design High Water = 32.29
 Upstream Toe of Dam = 27.0

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}} = \frac{L}{W_e} = \frac{230}{31.2} = 7.4$

$W_e = \frac{7175}{230} = 31.2$ If > 2 , baffles are not required X

If < 2 , baffles are required _____

Runoff

13. $Q_2 =$ _____ cfs (From Chapter 5)
14. $Q_{25} =$ 42.17 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2 =$ _____ cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25} =$ 42.17 cfs. (riser and barrel)

16. With emergency spillway:

Assumed available head (h) = _____ ft. (Using Q_2)

$h = \text{Crest of Emergency Spillway Elevation} - \text{Crest of Riser Elevation}$

Without emergency spillway:

Assumed available head (h) = _____ ft. (Using Q_{25})

$h = \text{Design High Water Elevation} - \text{Crest of Riser Elevation}$

17. Riser diameter (D_r) = DI-7 in. Actual head (h) = 0.24 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 300 ft.

Head (H) on barrel through embankment = _____ ft.

(From Plate 3.14-7).

19. Barrel diameter = 24 in.

(From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe]).

20. Trash rack and anti-vortex device

Diameter = N/A inches.

Height = N/A inches.

(From Table 3.14-D).

Emergency Spillway Design N/A

21. Required spillway capacity $Q_e = Q_{25} - Q_p =$ _____ cfs.

22. Bottom width (b) = _____ ft.; the slope of the exit channel (s) = _____ ft./foot; and the minimum length of the exit channel (x) = _____ ft.

(From Table 3.14-C).

Anti-Seep Collar Design *N/A*

23. Depth of water at principal spillway crest (Y) = ____ ft.
 Slope of upstream face of embankment (Z) = ____:1.
 Slope of principal spillway barrel (S_b) = ____ %
 Length of barrel in saturated zone (L_s) = ____ ft.
24. Number of collars required = ____ dimensions = ____
 (from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 36.0
 Design High Water = 32.29
 Emergency Spillway Crest = N/A
 Principal Spillway Crest = 32.12
 Dewatering Orifice Invert = 31.00
 Cleanout Elevation = 30.00
 Elevation of Upstream Toe of Dam
 or Excavated Bottom of "Wet Storage
 Area" (if excavation was performed) = 27.0

Sediment Basin Hydrographs

User Name: ddelano
Project: 02104 Landmark Pond Design
Scenario: Sediment Control

Date: 08-14-02
Time: 09:33:10

FLOOD HYDROGRAPH REPORT

Hydrograph Number: 2
Name: Routed 25-yr PostDev
Type: Reservoir: Storage Indication

[HYDROGRAPH INFORMATION]

Peak Flow (Qp) = 2.91 (cfs)
Time to Peak (Tp) = 752.00 (min)
Time of Base (Tb) = 2880.00 (min)
Volume = 0.99 (ac-ft)
Time Step = 2.00 (min)
Peak Elevation = 32.29 (ft)
Detention Time = NA

[RESERVOIR STRUCTURE INFORMATION]

Number = 1
Name = Sediment Basin
Storage Type = User-Defined Area
Maximum Storage = 88457.45 (cu ft)
Maximum Discharge = 31.83 (cfs)

[INFLOW HYDROGRAPH INFORMATION]

Number = 1
Name = PostDev 25-yr
Peak Flow (Qp) = 38.28 (cfs)
Time to Peak (Tp) = 718.00 (min)
Time of Base (Tb) = 1459.59 (min)
Volume = 1.82 (ac-ft)
Flow Multiplier = 1.00

[EQUATION]

$$0.5(I1+I2)dt + S1 - 0.5(O2)dt$$

Where:

I1 = Previous Inflow
I2 = Current Inflow
dt = Time increment
S1 = Previous Storage
S2 = Current Storage
O1 = Previous Outflow
O2 = Current Outflow

$$A = 0.5 (I1+I2) dt$$
$$B = S1 - 0.5 (O1) dt$$
$$C = S2 + 0.5 (O2) dt$$

Rickmond

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Project Number: 02104

Project Name: Landmark Auto

By: KMS Checked By: _____

Date: 8/14/02

Sheet Number: _____ of _____

Scale: _____

DESIGN SEDIMENT TRAP

Area = 2.3 acres

Initial Storage = 2.3 ac x 134 cyd/ac = 308 cyd

Dry Storage = 154 cyd

Wet Storage = 154 cyd

Calculate Wet Storage:

$$V_1 = 154 \text{ cyd} = 4158 \text{ cf}$$

$$D_1 = 4'$$

$$V_1 = .83 \times A_1 \times H'$$

$$4158 \text{ cf} = .83 \times A_1 \times 4'$$

$$A_1 = 1,223 \text{ sf} = 20' \times 61'$$

Calculate Dry Storage:

$$V_2 = 154 \text{ cyd} = 4158 \text{ cf}$$

$$D_2 = 3'$$

$$A_1 = 1,223 \text{ sf}$$

$$V_2 = \frac{A_1 + A_2}{2} \times D_2 \Rightarrow 4158 \text{ cf} = \frac{1,223 \text{ sf} + A_2}{2} \times 3'$$

$$A_2 = 1549 \text{ sf}$$

RICKMOND ENGINEERING, INC.

**1643 Merrimac Trail
Williamsburg, VA 23185
Phone: 757-229-1776
Fax: 757-229-4683**

**Vint Hill • P.O.Box 861647
Warrenton, VA 20187
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For
Environmental
Division

**Geotechnical Engineering Study
Landmark Auto Parts
1720 Endeavor Drive
James City County, Virginia**

Schnabel Project 02132060

*SP-51-02
JR059*

 ***chnabel***
Schnabel Engineering Associates, Inc.

August 16, 2002

Mr. Joseph Ritchie, Jr.
Ritchie-Curbow Construction Company, Inc.
739 Thimble Shoals Boulevard, Suite 304
Newport News, Virginia 23606

Subject: Project 02132060, Geotechnical Engineering Study, Landmark Auto Parts,
1720 Endeavor Drive, James City County, Virginia

Dear Mr. Ritchie:

We are pleased to submit two copies of our geotechnical engineering report for this project.

EXECUTIVE SUMMARY

Shallow spread footings have been evaluated and are recommended for support of the proposed building. A net allowable soil bearing pressure of 3,000 psf may be used to design footings. Footings should be supported on suitable natural soils and on compacted structural fill.

The subsurface exploration and laboratory testing indicate the highly plastic soils of Stratum A1 exhibit a high potential for moisture-related volume change (shrink/swell). These soils are anticipated at foundation grade over at least part of the building footprint. Accordingly, measures to limit changes in the moisture contents of foundation soils are provided in this report.

This executive summary is provided solely for purposes of overview. Any party that relies on this report must read the full report. This executive summary omits several details, any one of which could be very important to the proper application of the report.

INTRODUCTION

The scope of this study is as defined in our proposal P2132043 for this project dated July 22, 2002, except as modified by you, our client, in a memo dated July 24, 2002. Our services included subsurface exploration, field engineering, soil laboratory testing and development of geotechnical engineering recommendations. The objective of this study is to evaluate the subsurface conditions and to provide recommendations regarding the design of foundations and earthwork for this project.

SITE DESCRIPTION

The partially wooded site is located at the southern end of Endeavor Drive in the James River Commerce Center. The James River Commerce Center is located off U. S. Route 60 east of the Carter's Grove Historical Home in James City County, Virginia. Approximately 4.3 acres of the wooded 12.6 acre site is planned for development. Grades in the area proposed for development vary from about El 32 to El 38.

We obtained the site information from the topographic site plan dated April 24, 2002, prepared by Rickmond Engineering, Inc., and through our site visits.

PROPOSED CONSTRUCTION

Proposed for construction is a 51,400 sq ft, one-story office/warehouse facility with a finished floor elevation of El 39.0. Based on site plans prepared by Rickmond Engineering, Inc., up to 5 ft of fill can be anticipated to grade the area of the proposed southern building corner. An average of approximately 2 ft of fill is expected for the remainder of the building pad. ~~and up to about 10 ft of cut is expected to construct the proposed SMP facility.~~ A two lane, 24-ft wide entrance road approximately 300-ft long is planned from Endeavor Drive. Parking for 42 vehicles and truck loading areas are proposed for the south and eastern sides of the facility.

We understand that the building will be a pre-engineered structure. Wall and column loads will not exceed about 0.5kips/ft and 60 kips, respectively as provided by Gary Funaiock with G.G. Cornwell & Company.

SUBSURFACE CONDITIONS

Data Collection Techniques

Fishburne Drilling, Inc. of Chesapeake, Virginia drilled ten borings at this site under our observation. Specific observations, remarks, and logs for the borings, classification criteria and sampling protocols are included in Appendix A. Approximate boring locations are shown on Figure A1 in Appendix A. Soil samples will be retained up to 45 days beyond the issuance of this report, unless other disposition is requested.

Our geotechnical laboratory conducted tests on selected samples obtained in the test borings. This testing aided in the classification of soils encountered in the subsurface exploration and provided data for use in the development of foundation and earthwork recommendations. The natural moisture content values of selected soil samples are shown in the logs in Appendix A. The results of the remaining laboratory tests are presented in Appendix B.

Generalized Subsurface Stratigraphy

We have characterized the following generalized subsurface soil stratigraphy based on the boring data presented in Appendix A:

Topsoil: Between 0.3 and 0.8 of forest litter, rootmat, and topsoil were encountered in the borings performed for this project.

Stratum A1: All of the borings encountered the fine-grained portion of the Sedley Formation. Stratum A1 consisted of generally stiff to hard consistency LEAN CLAY (CL) and FAT CLAY (CH). Below a depth of 12 ft, Stratum A1 clay was typically soft to medium stiff consistency. Of the eight deeper borings performed in the proposed building area, four penetrated the Sedley formation at depths ranging from 9.5 to 13 ft, about El 28.5 to El 23.0.

Laboratory tests conducted on samples representing Stratum A1 indicate these soils exhibit a very high potential for moisture-related volume change (shrink/swell behavior).

A California Bearing Ratio (CBR) test was conducted on the bulk sample of sandy lean clay from this stratum classifying (CL)(A-7-6). A laboratory CBR value of 7.4 with a swell value of 0.4 percent was obtained for this soil type. Natural moisture content

values of Stratum A1 soils tested in our laboratory varied from 13.0 to 26.0 percent. The optimum moisture content for compaction of these soils is 17.9 percent.

Stratum A2: Interlayered within Stratum A1, several borings encountered the coarse-grained constituent of the Sedley Formation. Stratum A2 consisted of firm to compact density SILTY SAND (SM) and CLAYEY SAND (SC).

Stratum B: Underlying the Strata A1 and A2 soils of the Sedley Formation, we encountered very soft to soft consistency FAT CLAY (CH) belonging to the Yorktown Formation. The thickness of Stratum B exceeded the depth of the borings.

Ground Water

Water level readings obtained in the borings during and after completion are noted on the logs. We did not observe ground water during drilling of any of the borings. Following removal of the augers, borings caved dry at depths of 0.8 to 4.2 ft. We did not obtain long-term water level readings as the borings caved at shallow depths.

The ground water levels on the logs show our estimate of the hydrostatic water table at the time the borings were drilled. Fluctuations in the hydrostatic water table should be anticipated depending on variations in precipitation, surface runoff, pumping, evaporation, leaking utilities, stream levels and similar factors.

GEOTECHNICAL RECOMMENDATIONS

Our geotechnical engineering analysis was based on the information developed from our subsurface exploration and soil laboratory testing along with the project development plans, site plans and structural loading furnished to our office. Shallow spread footings are recommended for support of the proposed structure based on our analysis. Detailed recommendations are provided in the following sections of the report.

Earthwork and Grading

Subgrades to receive compacted structural fill for building or pavement support should be stripped of vegetation, topsoil and organic matter. Our subsurface exploration indicated topsoil to depths of 0.3 to 0.8 ft below the ground surface. Due to the wooded nature of the site, we recommend a topsoil stripping depth of 0.8 ft be considered for the site during the project planning.

Stripped subgrades should be proofrolled with a loaded dump truck to evaluate their suitability to support the compacted structural fill. Areas that exhibit excessive pumping, weaving, or rutting should be excavated and replaced with additional compacted structural fill. Final pavement subgrades should also be proofrolled to evaluate their suitability to support the pavement.

Compacted structural fill should consist of material classifying CH, CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D-2487. Non-organic, on-site soils are expected to meet this criterion. If off-site borrow soils are needed, they should classify SC, SM, SP, SW, GC, GM, GP or GW per ASTM D-2487.

We understand that the primary source for on-site fill material is the proposed stormwater management pond to be located southeast of the building pad. A Preliminary Geotechnical Engineering Study (00132124) to evaluate the pond material as potential borrow fill was completed by Schnabel Engineering in July, 2000. The proposed pond depth was estimated to be about 3 ft to 6 ft at the time of this preliminary study. Three hand auger probes were excavated in the proposed pond area to depths of 3.7 ft to 5 ft. Based on this study, the soils encountered were considered suitable for use as fill, however they were generally fine-grained soils. Usage of the non-organic portions of the excavated material will depend on the natural moisture content of soils encountered during excavation. At the writing of the aforementioned report, natural moisture content values of soils tested in our laboratory varied from about 12.2 to 22.6 percent. Therefore, the use of these soils may require scarifying and drying if the natural moisture content values for the excavated soils are too high to permit adequate compaction. Drying of these soils will likely result in some delay, and drying may not be possible during late fall, winter and early spring. We recommend that the earthwork be performed during the warmer, drier times of the year from about May to October.

Compacted structural fill should be placed in maximum 8-inch thick horizontal, loose lifts and should be compacted to at least 95 percent of maximum dry density per ASTM D-698, Standard Proctor.

Spread Footings

Shallow spread footings are considered suitable for support of the proposed structure. Footings should be supported on suitable natural soils of Strata A1 and A2, and on compacted structural fill. Footings may be designed for a net allowable soil bearing pressure of 3,000 psf. This bearing pressure provides a factor of safety of at least 3.0

against general shear failure. Minimum widths of 16 and 24 inches should be maintained for wall and column footings, respectively, for shear considerations.

Interior footing grades may be set at nominal depths below the floor slab. The laboratory testing performed on selected samples of Stratum A1 indicate that the high plasticity soils of this stratum exhibit a high potential for moisture-related volume change. Accordingly, we recommend perimeter footings be set a minimum depth of 3 ft below final exterior grade. This depth is also considered adequate for frost protection.

Settlements of shallow foundations supported on suitable natural soils and on properly placed compacted structural fill are not expected to exceed about 1/2 inch. Differential settlements between similarly loaded footings are not expected to exceed about half this value.

Footing concrete should be placed as soon as possible after excavation to limit the potential for moisture changes at foundation levels. Similarly, foundation walls should be backfilled as soon as possible to reduce the potential for infiltration of water into the soils beneath the footings. Backfill should be placed as compacted structural fill.

Final grades should allow positive drainage away from the structure, so that water does not accumulate around the foundation. In addition, gutters and downspouts should be provided to collect and convey roof water well away from the building. Trees should be removed from and should not be planted within 25 ft of the building.

We have evaluated the Seismic Site Coefficient (S) for this site according to BOCA 1610.3.1 (1999). We recommend an S value of 1.2 be used for seismic design at this site.

Floor Slabs

Floor slabs may be supported on suitable natural soils or on compacted structural fill. Floor slabs may be designed using a modulus of subgrade reaction, k, of 125 pci.

Floor slab subgrades should be recompacted immediately before placing moisture barrier materials to repair any disturbance that may occur due to construction operations. Footing and utility excavations should be backfilled with compacted structural fill since floors will be slab on grade. Compaction requirements are the same as described herein compacted structural fill.

A 4-inch crushed stone or washed gravel capillary moisture barrier should underlie floor slabs on grade. Moisture barrier material should consist of VDOT No. 57 crushed stone and should be compacted in place by at least two passes with suitable vibratory compaction equipment.

Pavements

Pavement subgrades should be prepared, and compacted structural fill for pavement support should be placed and compacted as previously described herein. Dense-graded aggregate placed as pavement base course should be compacted to at least 95 percent of maximum dry density per ASTM D-698, Standard Proctor. Dense-graded aggregate should be placed in maximum 8-inch thick loose lifts.

We recommend that reinforced concrete pavement be used in dumpster pad and dumpster approach pad areas. These pads may be designed based on a modulus of subgrade reaction value, k , of 125 pci.

Adequate control of surface drainage will be a very important consideration for the overall development related to the pavement design. The area surrounding pavements should be graded to direct surface water away from paved areas. Utility excavations within pavement areas should be backfilled with compacted structural fill.

CONSTRUCTION CONSIDERATIONS

Earthwork

The soils at this site primarily consist of moderately to highly plastic clays. These soils are moisture sensitive and will readily become disturbed by construction traffic on exposed surfaces of wet subgrades. We recommend avoiding wet weather site preparation and grading activities. If wet weather work is performed, the quantities of disturbed soils to be excavated can be expected to increase.

Traffic on stripped or undercut subgrades should be limited to reduce disturbance of underlying soils. Also, using lightweight, track-mounted dozer equipment for stripping will limit the disturbance of underlying soils, and may reduce the undercut volume needed. The Contractor should be responsible for reworking of subgrades and compacted structural fill that were initially considered suitable but were later disturbed by equipment and/or weather.

Site drainage should be provided to maintain subgrades free of water and to avoid saturation and disturbance of the subgrade soils before placing compacted structural fill, pavement base course or moisture barrier material. This will be important during all phases of the construction work. Weakened subgrade soils should be recompacted, or removed and replaced as recommended by the Geotechnical Engineer.

Subgrades and the upper portions of compacted structural fills below floor slabs, pavements or other soil-supported structures can be easily disturbed due to weather conditions and construction operations. Accordingly, disturbed areas should be recompacted before placing additional fill, moisture barrier or base course materials.

Spread Footings

Care should be exercised during excavation for spread footings so that as little disturbance as possible occurs at the foundation level. Loose or soft soils should be carefully cleaned from the bottom of the excavation before placing concrete. Actual footing subgrades should be observed during construction by the Geotechnical Engineer to evaluate whether subgrade soils are as recommended in this report.

Footing subgrades needing undercut should be concreted at the elevation of undercut or backfilled to the original design subgrade elevation with lean concrete. Open-graded crushed stone should not be used as backfill beneath footings as this will create a path for moisture to reach subgrade soils, resulting in an increased potential for shrink/swell related distress. Footing concrete should be placed immediately after excavation of the footing so that accumulation of water in the excavation or drying of foundation soils can be prevented.

The potential for variation of moisture content in foundation soils is probably greatest during construction. If the moisture content of foundation soils is either increased or decreased during construction, a moisture-related change in volume will likely occur as these soils return to their natural moisture content. Therefore, prompt placement of concrete, backfilling and grading will be very important for proper foundation performance.

Engineering Services During Construction

The engineering recommendations provided in this report are based on the information obtained from the subsurface exploration and laboratory testing. However, conditions on the site may vary between the discrete locations observed at the time of our subsurface

exploration. The nature and extent of variations between borings may not become evident until during construction.

To account for this variability, professional observation, monitoring and testing of actual subsurface conditions during construction should be provided as an extension of our engineering services. These services will also help in evaluating the Contractor's conformance with the plans and specifications. Because of our unique position to understand the intent of the geotechnical engineering recommendations, retaining us for these services will allow us to provide consistent service through the project construction.

General Specification Recommendations

An allowance should be established to account for possible additional costs that may be required to construct earthwork and foundations as recommended in this report. Additional costs may be incurred for various reasons including variation of soil between borings, greater than anticipated unsuitable soils, need for borrow fill material, wet on-site soils, obstructions, temporary dewatering, etc.

We recommend that the construction contract include unit prices for scarifying and drying wet and/or loose subgrade soils, and provide an allowance for this work. In addition, the construction contract should include an allowance for undercutting soft or loose, near-surface soils and replacement with compacted structural fill. Add/deduct unit prices should also be established in the contract so adjustments for the actual volume of undercut can be made.

The project specifications should indicate the Contractor's responsibility for providing adequate site drainage during construction. Inadequate drainage will most likely lead to disturbance of soils by construction traffic and increased volume of undercut.

This report may be made available to prospective bidders for informational purposes. We recommend that the project specifications contain the following statement:

"A geotechnical engineering report has been prepared for this project by Schnabel Engineering Associates. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed represent the Geotechnical Engineer's interpretation of the subsurface conditions, tests, and the results of analyses conducted. Should the data contained in this report not be adequate for the Contractor's purposes, the Contractor may make, before bidding, independent exploration, tests and analyses. This report may be examined by bidders

at the office of the Owner or copies may be obtained from the Owner at nominal charge."

The Boring logs included in Appendix A should be included in the contract documents.

LIMITATIONS

The analyses and recommendations submitted in this report are based on the information revealed by our exploration. An attempt has been made to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. It is intended for use concerning this specific project. Our recommendations are based on information on the site and proposed construction as described in this report. Substantial changes in loads, locations or grades should be brought to our attention so we can modify our recommendations as needed. We would appreciate an opportunity to review the plans and specifications as they pertain to the recommendations contained in this report and to submit our comments to you based on this review.

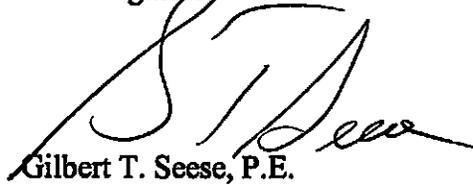
We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this agreement, or any report, opinion, document, or other instrument of service.

We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Very truly yours,
SCHNABEL ENGINEERING ASSOCIATES, INC.



Michael P. McGuire, E.I.T.
Staff Engineer



Gilbert T. Seese, P.E.
Senior Associate

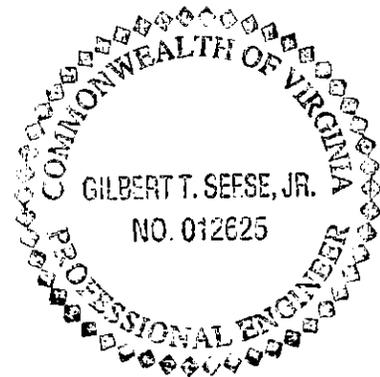
MPM:GTS:vw

Appendix A: Subsurface Exploration Data
Appendix B: Soil Laboratory Test Results

c: G.G. Cornwell and Company
Attn: Mr. Gary Funaiock

Caro, Monroe, & Liang Architects
Attn: Mr. Daniel Webb

Rickmond Engineering, Inc
Attn: Mr. Steven Stafford, P.E.



Appendix A

SUBSURFACE EXPLORATION DATA

**Subsurface Exploration Procedures
General Notes for Subsurface Exploration Logs
Identification of Soil
Boring Logs, B-1 through B-10
Location Plan, Figure A1**

SUBSURFACE EXPLORATION PROCEDURES

Boring Procedures

Drillers advanced the borings using hollow-stem augers. A plug device was used to block off the center opening in the hollow-stem auger to prevent cuttings from entering the augers during drilling. At the designated depth, drillers removed the plug and performed the Standard Penetration Test. Water or drilling fluid was not introduced into the boring using this procedure, unless indicated on individual logs. Water level data are indicated on the logs.

Standard Penetration Test Results

The numbers in the Sampling Data column of the boring logs represent Standard Penetration Test (SPT) results. Each number represents the blows needed to drive a 2-inch O.D., 1-3/8 inch I.D. split-spoon sampler 6 inches, using a 140-pound hammer falling 30 inches. The sampler is typically driven a total of 18 or 24 inches. The first 6 inches are considered a seating interval. The total of the number of blows for the second and third 6-inch intervals is the SPT "N value". The Standard Penetration Test is conducted according to ASTM D-1586.

Soil Classification Criteria

The group symbols on the logs represent the Unified Soil Classification System Group Symbols (ASTM D-2487) based on visual observation and limited laboratory testing of the samples. Criteria for visual identification of soil samples are included in this appendix. Some variation may be expected between samples visually classified and samples classified in the laboratory.

Pocket Penetrometer Results

The values following "PP=" in the sampling data column of the logs represent pocket penetrometer readings. Pocket penetrometer readings provide an estimate of the unconfined compressive strength of fine-grained soils.

Boring Locations and Elevations

Our personnel staked the borings by taping from building corner stakes provided by Rickmond Engineering. Approximate boring locations are shown in Figure A1. Ground surface elevations at the boring locations were scaled from the site plan by Rickmond Engineering, Inc. dated April 24, 2002. These locations and elevations should be considered no more accurate than the methods and plans used to obtain them.

GENERAL NOTES FOR SUBSURFACE EXPLORATION LOGS

1. Numbers in sampling data column next to Standard Penetration Test (SPT) symbols indicate blows required to drive a 2 inch O.D., 1-3/8 inch I.D. sampling spoon 6 inches using a 140 pound hammer falling 30 inches. The Standard Penetration Test (SPT) N value is the number of blows required to drive the sampler 12 inches, after a 6 inch seating interval. The Standard Penetration Test is performed in accordance with ASTM-1586.
2. Visual classification of soil is in accordance with terminology set forth in "Identification of Soil." The ASTM D-2487 group symbols (e.g. CL) shown in the classification column are based on visual observations.
3. Estimated ground water levels indicated by ▽; these levels are only estimates from available data and may vary with precipitation, porosity of the soil, site topography, etc.
4. Refusal at the surface of rock, boulder, or obstruction is defined as an SPT resistance of 100 blows for 2 inches or less of penetration.
5. The logs and related information depict subsurface conditions only at the specific locations and at the particular time when drilled or excavated. Soil conditions at other locations may differ from conditions occurring at these locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at the test boring, test pit and/or hand auger locations.
6. The stratification lines represent the approximate boundary between soil and rock types as obtained from the subsurface exploration. Some variation may also be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on these logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.
7. Key to symbols and abbreviations:

	5+10+1	- Standard Penetration Test
	24/18	- Length Pushed/Recovery (in inches)
	3T	- 2" or 3" Undisturbed Tube Sample
		Rock Core Sample
	NX	- Core Diameter Size
	REC	- Recovery %
	RQD	- RQD%
	W	- Water Content
	do	- Ditto
	WOW	- Water Observation Well
	PP	- Pocket Penetrometer Reading (tsf)
	FID	- Flame Ionization Detector Reading (ppm)
	PID	- Photoionization Detector Reading (ppm)
	GP	- Geostick Penetration Reading (inches)
	LL	- Liquid Limit
	PL	- Plastic Limit
	TPH	- Total Petroleum Hydrocarbons

SCHNABEL ENGINEERING ASSOCIATES, INC.

Consulting Geotechnical Engineers

IDENTIFICATION OF SOILS

I. DEFINITION OF SOIL GROUP NAMES (ASTM D-2487-83)

SYMBOL GROUP NAME

Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels – More than 50% of coarse fraction retained on No. 4 sieve Coarse, ¾" to 3" Fine, No. 4 to ¼"	Clean Gravels Less than 5% fines	GW	Well graded gravel
		Gravels with fines More than 12% fines	GP	Poorly graded gravel
			GM	Silty gravel
	Sands – 50% or more of coarse Fraction passes No. 4 sieve Coarse, No. 40 to No. 4 Medium, No. 40 to No. 10 Fine, No. 200 to No. 40	Clean Sands Less than 5% fines	GC	Clayey gravel
			SW	Well-graded sand
		Sands with fines More than 12% fines	SP	Poorly graded sand
SM	Silty sand			
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silt and Clays – Liquid Limit less than 50 Low to medium plasticity	Inorganic	SC	Clayey sand
			CL	Lean clay
		Organic	ML	Silt
			OL	Organic clay
	Silt and Clays – Liquid Limit 50 or more Medium to high plasticity	Inorganic	OH	Organic silt
			CH	Fat clay
		Organic	MH	Elastic silt
			OH	Organic clay
Highly Organic Soils	Primarily organic matter, dark in color and organic odor	PT	Peat	

II. DEFINITION OF MINOR SOIL COMPONENT PROPORTIONS

Adjective Form	Gravelly Sandy	30% or more coarse grained	Examples
"With"	With gravel	15% or more coarse grained	Gravelly lean clay
	With sand	5% to 12% fine grained	Fat clay with gravel
"Trace"	With silt	1% to 15% coarse grained	Poorly graded sand with silt
	With clay	1% to 5% fine grained	Silty sand, trace gravel
	Trace gravel		
	Trace sand		
	Trace clay		
	Trace silt		Poorly graded sand, trace clay

III. GLOSSARY OF MISCELLANEOUS TERMS

- SYMBOLS** Unified Soil Classification Symbols are shown above as group symbols. Dual symbols are used for borderline classifications.
- BOULDERS & COBBLES** Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inch size.
- DISINTEGRATED ROCK** Residual rock materials with a standard penetration resistance (SPT) between 60 blows per foot and refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.
- ROCK FRAGMENTS** Angular pieces of rock, distinguished from transported gravel, which have separated from original vein or strata and are present in a soil matrix.
- QUARTZ** A hard silica mineral often found in residual soils.
- IRONITE** Iron oxide deposited within a soil layer forming cemented deposits.
- CEMENTED SAND** Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate or other materials.
- MICA** A soft plate of silica mineral found in many rocks, and in residual or transported soil derived therefrom.
- ORGANIC MATERIALS** Topsoil Surface soils that support plant life and which contain considerable amounts of organic matter;
Organic Matter Soil containing organic colloids throughout its structure;
Lignite Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).
- FILL** Man-made deposit containing soil, rock and often foreign matter.
- PROBABLE FILL** Soils which contain no visually detected foreign matter but which are suspect with regard to origin.
- LENSES** 0 to ½ inch seam of minor soil component.
- LAYERS** ½ to 12 inch seam of minor soil component.
- POCKET** Discontinuous body of minor soil component.
- COLOR SHADES** Light to dark to indicate substantial difference in color.
- MOISTURE CONDITIONS** Wet, moist or dry to indicate visual appearance of specimen.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: E. Hester Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-45C (Track Mounted ATV) SEA Representative: T. Heinrich Dates Started: 7/30/02 Finished: 7/30/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 37.5± (feet)	Groundwater Observations																																										
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Date</th> <th>Time</th> <th>Depth</th> <th>Casing</th> <th>Caved</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Encountered</td> <td style="text-align: center;">7/30</td> <td style="text-align: center;">--</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">--</td> <td style="text-align: center;">--</td> </tr> <tr> <td style="text-align: center;">Completion</td> <td style="text-align: center;">7/30</td> <td style="text-align: center;">11:11</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">--</td> <td style="text-align: center;">--</td> </tr> <tr> <td style="text-align: center;">Casing Pulled</td> <td style="text-align: center;">7/30</td> <td style="text-align: center;">11:14</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">--</td> <td style="text-align: center;">3.9'</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Date	Time	Depth	Casing	Caved	Encountered	7/30	--	Dry	--	--	Completion	7/30	11:11	Dry	--	--	Casing Pulled	7/30	11:14	Dry	--	3.9'																		
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Completion	7/30	11:11	Dry	--	--																																						
Casing Pulled	7/30	11:14	Dry	--	3.9'																																						

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.6	Forest litter, rootmat and topsoil		36.9			3+5+6+6 SPT		
	Fat clay with sand, contains root fragments, moist - brown				5	6+20+15+18 SPT	PP>4.5tsf W=13.0%	SEDLEY FORMATION
	do, fine to coarse sandy, trace gravel, gray and orange brown					6+11+11+20 SPT	PP>4.5tsf	
	do, contains clayey sand pockets			A1		6+9+9+13 SPT	PP=4.5tsf	
	do, contains silty sand layers	CH			10	9+8+10+10 SPT		
	do, trace sand					3+2+5+4 SPT	PP=1.0tsf	
15.0	Boring Terminated at 15.0 ft		22.5		15			

TEST BORING LOG 02132060.GPJ SCHNABEL_GDT 8/18/02

Comments:
 1. Boring backfilled upon completion.



TEST BORING LOG
 Project: Landmark Auto Parts
 Endeavor Drive
 Williamsburg, Virginia

Boring Number: **B-2**
 Contract Number: 02132060
 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
 Chesapeake, Virginia
Boring Foreman: E. Hester
Drilling Method: 2-1/4" I.D. Hollow Stem Auger
Drilling Equipment: CME-45C (Track Mounted ATV)
SEA Representative: T. Heinrich
Dates Started: 7/30/02 **Finished:** 7/30/02
Location: See Location Plan, Figure A1
Ground Surface Elevation: 36.5± (feet)

Groundwater Observations						
	Date	Time	Depth	Casing	Caved	
Encountered	7/30	—	Dry	—	—	
Completion	7/30	12:05	Dry	—	—	
Casing Pulled	7/30	12:07	Dry	—	0.8'	

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.8	Forest litter, rootmat and topsoil		35.7			2+4+6+7 SPT	PP=4.5tsf	SEDLEY FORMATION
2.0	Lean clay with sand, contains root fragments, moist - brown	CL	34.5	A1		6+14+18+15 SPT	PP>4.5tsf	
	Fine to medium sandy fat clay, contains silty sand pockets, moist - orange brown and gray	CH			5	10+7+11+21 SPT	PP>4.5tsf	
6.0	Fine to coarse clayey sand, contains silty sand and fat clay pockets, moist - brown		30.5	A2		4+6+8+9 SPT		
		SC			10	7+5+6+9 SPT		
12.0	Fat clay, trace sand, contains mica, moist - gray and orange brown	CH	24.5	A1		2+2+4+5 SPT	PP=0.75tsf	
15.0	Boring Terminated at 15.0 ft		21.5		15			

TEST BORING LOG 02132060.GPJ SCHNABEL.GDT 8/16/02

- Comments:**
- Boring backfilled upon completion.
 - Boring offset 7 ft west due to trees.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: E. Hester Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-45C (Track Mounted ATV) SEA Representative: T. Heinrich Dates Started: 7/30/02 Finished: 7/30/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 37.0± (feet)	Groundwater Observations																																										
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	Date	Time	Depth	Casing	Caved																																						
Encountered	7/30	--	Dry	--	--																																						
Completion	7/30	11:36	Dry	--	--																																						
Casing Pulled	7/30	11:38	Dry	--	0.6'																																						

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DATA		TESTS	REMARKS
					DEPTH	DATA		
0.8	Forest litter, rootmat and topsoil		36.2			3+4+7+7 SPT	PP=3.75tsf	
	Fat clay with sand, contains root fragments, moist - brown	CH		A1		6+11+9+9 SPT	PP=4.5tsf	
4.0	do, fine to medium sandy, gray and orange brown		33.0	A2	5	5+8+10+13 SPT		
6.0	Fine to coarse clayey sand, trace gravel, contains silty sand pockets, moist - brown and orange brown	SC				5+6+10+11 SPT	PP=2.25tsf	SEDLEY FORMATION
	Fine to medium sandy fat clay, contains clayey sand layers, moist - gray and orange brown	CH	31.0	A1	10	11+6+6+13 SPT	PP=1.0tsf	
13.0	Fat clay, trace sand, contains mica, moist - gray	CH	24.0	B		2+2+2+2 SPT	PP=1.0tsf	YORKTOWN FORMATION
15.0	Boring Terminated at 15.0 ft		22.0		15			

TEST BORING LOG 02132060.GPJ SCHNABEL.GDT 8/16/02

Comments:
 1. Boring backfilled upon completion.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: E. Hester Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-45C (Track Mounted ATV) SEA Representative: T. Heinrich Dates Started: 7/30/02 Finished: 7/30/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 37.0± (feet)	Groundwater Observations																																										
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	Date	Time	Depth	Casing	Caved																																						
Encountered	7/30	--	Dry	--	--																																						
Completion	7/30	10:47	Dry	--	--																																						
Casing Pulled	7/30	10:49	Dry	--	1.2'																																						

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.7	Forest litter, rootmat and topsoil		36.3			3+8+8+8 SPT		
2.0	Lean clay with sand, contains root fragments, moist - brown	CL	35.0			8+10+10+15 SPT	PP>4.5tsf	
	Fat clay with sand, moist - gray and orange brown	CH		A1		7+10+12+12 SPT	PP>4.5tsf	
6.0	Fine to coarse silty sand, trace gravel, moist - gray and orange brown	SM	31.0	A2		11+14+17+20 SPT		SEDLEY FORMATION
8.0	Fine to medium sandy fat clay, moist - gray and orange brown	CH	29.0	A1		4+5+6+5 SPT	PP=0.5tsf	
	do, trace sand					1+1+2+2 SPT	PP=1.0tsf	
15.0	Boring Terminated at 15.0 ft		22.0					

TEST BORING LOG 02132060.GPJ SCHNABEL.GDT 8/16/02

 Comments:
 1. Boring backfilled upon completion.

		Project: Landmark Auto Parts Endeavor Drive Williamsburg, Virginia			Boring Number: B-5 Contract Number: 02132060 Sheet: 1 of 1				
Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: E. Hester Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-45C (Track Mounted ATV) SEA Representative: T. Heinrich Dates Started: 7/30/02 Finished: 7/30/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 37.0± (feet)				Groundwater Observations					
				Date	Time	Depth	Casing	Caved	
				Encountered	7/30	--	Dry	--	--
				Completion	7/30	12:50	Dry	--	--
				Casing Pulled	7/30	12:52	Dry	--	0.8'
DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS	
					DEPTH	DATA			
0.7	Forest litter, rootmat and topsoil		36.3			4+6+9+13 SPT	PP>4.5tsf	SEDLEY FORMATION	
	Fat clay with sand, contains root fragments and lean clay pockets, moist - gray and brown	CH		A1		9+11+12+16 SPT	PP>4.5tsf W=21.2%		
	do, gray, orange brown and red brown				5	5+9+9+12 SPT	PP>4.5tsf		
6.0	Fine to coarse clayey sand, trace gravel, moist - brown and gray		31.0			3+5+7+8 SPT		YORKTOWN FORMATION	
	do, contains fat clay pockets	SC		A2		6+6+7+10 SPT			
12.0	Fat clay, trace sand, contains shell fragments, moist - gray and brown		25.0			1+1+2+2 SPT	PP=1.0tsf		
15.0	Boring Terminated at 15.0 ft		22.0						

TEST BORING LOG 02132060.GPJ SCHNABEL.GDT 8/16/02

Comments:
 1. Boring backfilled upon completion.

Boring Contractor: Fishburne Drilling, Inc.
Chesapeake, Virginia
Boring Foreman: E. Hester
Drilling Method: 2-1/4" I.D. Hollow Stem Auger
Drilling Equipment: CME-45C (Track Mounted ATV)
SEA Representative: T. Heinrich
Dates Started: 7/30/02 **Finished:** 7/30/02
Location: See Location Plan, Figure A1
Ground Surface Elevation: 38.0± (feet)

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
Encountered	7/30	--	Dry	--	--
Completion	7/30	2:25	Dry	--	--
Casing Pulled	7/30	2:28	Dry	--	4.1'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.5	Forest litter, rootmat and topsoil		37.5			4+3+4+6 SPT	PP=4.25tsf	SEDLEY FORMATION
	Fat clay with sand, contains root fragments, moist - brown					10+11+19+12 SPT	PP=4.25tsf	
	do, fine to medium sandy, contains clayey sand pockets	CH		A1	5	8+7+10+11 SPT	PP>4.5tsf	
	do, with sand, contains silty sand layers					3+5+10+9 SPT	PP=2.0tsf	
	do, trace sand					7+3+5+6 SPT	PP=1.25tsf	
9.5	Fat clay, trace sand, moist - gray and brown	CH	28.5	B	10	1+1+3+3 SPT	PP=1.5tsf	YORKTOWN FORMATION
15.0	Boring Terminated at 15.0 ft		23.0		15			

TEST BORING LOG 02132060.GPJ SCHNABEL.GDT 8/18/02

Comments:
1. Boring backfilled upon completion.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: E. Hester Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-45C (Track Mounted ATV) SEA Representative: T. Heinrich Dates Started: 7/30/02 Finished: 7/30/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 37.0± (feet)	Groundwater Observations																																										
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	Date	Time	Depth	Casing	Caved																																						
Encountered	7/30	--	Dry	--	--																																						
Completion	7/30	1:57	Dry	--	--																																						
Casing Pulled	7/30	2:00	Dry	--	2.6'																																						

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.7	Forest litter, rootmat and topsoil		36.3			1+6+6+9 SPT	PP>4.5tsf	SEDLEY FORMATION
2.0	Lean clay with sand, contains root fragments, moist - brown	CL	35.0			7+10+13+17 SPT	PP=4.5tsf	
	Fat clay with sand, contains root fragments and silty sand layers, moist - gray and brown			5		8+10+12+15 SPT		
	do, fine to medium sandy, contains clayey sand pockets				5	3+4+5+8 SPT	PP=2.5tsf	
	do, with sand, contains silty sand layers	CH			10	12+15+25+25 SPT	PP=2.0tsf	
12.0	Fat clay, trace sand, moist - gray and brown	CH	25.0	B		WOH+1+1+1 SPT	PP<0.25tsf	YORKTOWN FORMATION
15.0	Boring Terminated at 15.0 ft		22.0					

TEST BORING LOG 02132060.GPJ SCHNABEL_GDT 8/18/02

Comments:
 1. Boring backfilled upon completion.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: E. Hester Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-45C (Track Mounted ATV) SEA Representative: T. Heinrich Dates Started: 7/30/02 Finished: 7/30/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 35.0± (feet)	Groundwater Observations																																										
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Date</th> <th>Time</th> <th>Depth</th> <th>Casing</th> <th>Caved</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Encountered</td> <td style="text-align: center;">7/30</td> <td style="text-align: center;">--</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">---</td> <td style="text-align: center;">---</td> </tr> <tr> <td style="text-align: center;">Completion</td> <td style="text-align: center;">7/30</td> <td style="text-align: center;">1:16</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">---</td> <td style="text-align: center;">---</td> </tr> <tr> <td style="text-align: center;">Casing Pulled</td> <td style="text-align: center;">7/30</td> <td style="text-align: center;">1:18</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">---</td> <td style="text-align: center;">1.8'</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Date	Time	Depth	Casing	Caved	Encountered	7/30	--	Dry	---	---	Completion	7/30	1:16	Dry	---	---	Casing Pulled	7/30	1:18	Dry	---	1.8'																		
	Date	Time	Depth	Casing	Caved																																						
Encountered	7/30	--	Dry	---	---																																						
Completion	7/30	1:16	Dry	---	---																																						
Casing Pulled	7/30	1:18	Dry	---	1.8'																																						

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS	
					DEPTH	DATA			
0.5	Forest litter, rootmat and topsoil		34.5			3+5+9+16 SPT	PP>4.5tsf	SEDLEY FORMATION	
2.0	Lean clay with sand, contains root fragments, moist - brown	CL	33.0	A1		10+13+19+20 SPT	PP>4.5tsf W=26.0%		
	Fat clay with sand, moist - gray and orange brown				5	7+9+12+15 SPT	PP>4.5tsf		
	do, fine to coarse sand	CH							
6.0	Fine to medium clayey sand, moist - gray and orange brown	SC	29.0	A2		7+7+10+13 SPT			
8.0	Fat clay with sand, contains silty sand layers, moist - gray and orange brown		27.0			6+5+6+7 SPT	PP=1.0tsf		
		CH		A1	10				
12.0	Fat clay, trace sand, moist - gray		23.0			1+2+3+4 SPT	PP=1.0tsf		YORKTOWN FORMATION
		CH		B					
15.0	Boring Terminated at 15.0 ft		20.0		15				

TEST BORING LOG 02132060.GPJ_SCHNABEL_GDT 8/16/02

- Comments:**
1. Boring backfilled upon completion.
 2. Boring offset 13 ft west due to large trees.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: E. Hester Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-45C (Track Mounted ATV) SEA Representative: T. Heinrich Dates Started: 7/30/02 Finished: 7/30/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 37.0± (feet)	Groundwater Observations																																				
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	Date	Time	Depth	Casing	Caved																																
Encountered	7/30	--	Dry	--	--																																
Completion	7/30	1:32	Dry	--	--																																
Casing Pulled	7/30	1:33	Dry	--	4.2'																																

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.8	Forest litter, rootmat and topsoil		36.2			1+1+5+7 SPT		
2.0	Lean clay with sand, contains root fragments, moist - brown	CL	35.0	A1		9+7+12+13 SPT	PP>4.5tsf	SEDLEY FORMATION
4.0	Fat clay with sand, trace gravel, moist - gray and orange brown	CH	33.0			10+11+15+19 SPT		
6.0	Fine to medium sandy lean clay, moist - gray and orange brown	CL	31.0		5			
6.0	Boring Terminated at 6.0 ft							

Powr Depth 10'

TEST BORING LOG 02132060.GPJ SCHNABEL.GOT 8/18/02

Comments:
 1. Boring backfilled upon completion.

Boring Contractor: Fishburne Drilling, Inc. Chesapeake, Virginia Boring Foreman: S. Sequist Drilling Method: 2-1/4" I.D. Hollow Stem Auger Drilling Equipment: CME-550X (ATV) SEA Representative: T. Heinrich Dates Started: 7/29/02 Finished: 7/29/02 Location: See Location Plan, Figure A1 Ground Surface Elevation: 38.0± (feet)	Groundwater Observations																																										
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Date</th> <th>Time</th> <th>Depth</th> <th>Casing</th> <th>Caved</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Encountered</td> <td style="text-align: center;">7/29</td> <td style="text-align: center;">--</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">--</td> <td style="text-align: center;">--</td> </tr> <tr> <td style="text-align: center;">Completion</td> <td style="text-align: center;">7/29</td> <td style="text-align: center;">9:30</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">--</td> <td style="text-align: center;">--</td> </tr> <tr> <td style="text-align: center;">Casing Pulled</td> <td style="text-align: center;">7/29</td> <td style="text-align: center;">9:32</td> <td style="text-align: center;">Dry</td> <td style="text-align: center;">--</td> <td style="text-align: center;">3.3'</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Date	Time	Depth	Casing	Caved	Encountered	7/29	--	Dry	--	--	Completion	7/29	9:30	Dry	--	--	Casing Pulled	7/29	9:32	Dry	--	3.3'																		
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DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
0.3	Forest litter Fine to coarse sandy lean clay, contains root fragments, moist - brown do, fine to medium sandy	CL	37.7	A1	5	WOH+2+2+3 SPT 2+3+5+7 SPT 2+4+4+5 SPT	PP=2.75tsf PP=2.75tsf PP=2.25tsf	SEDLEY FORMATION
6.0	Boring Terminated at 6.0 ft		32.0					

TEST BORING LOG 02132060.GPJ_SCHNABEL.GDT 8/18/02

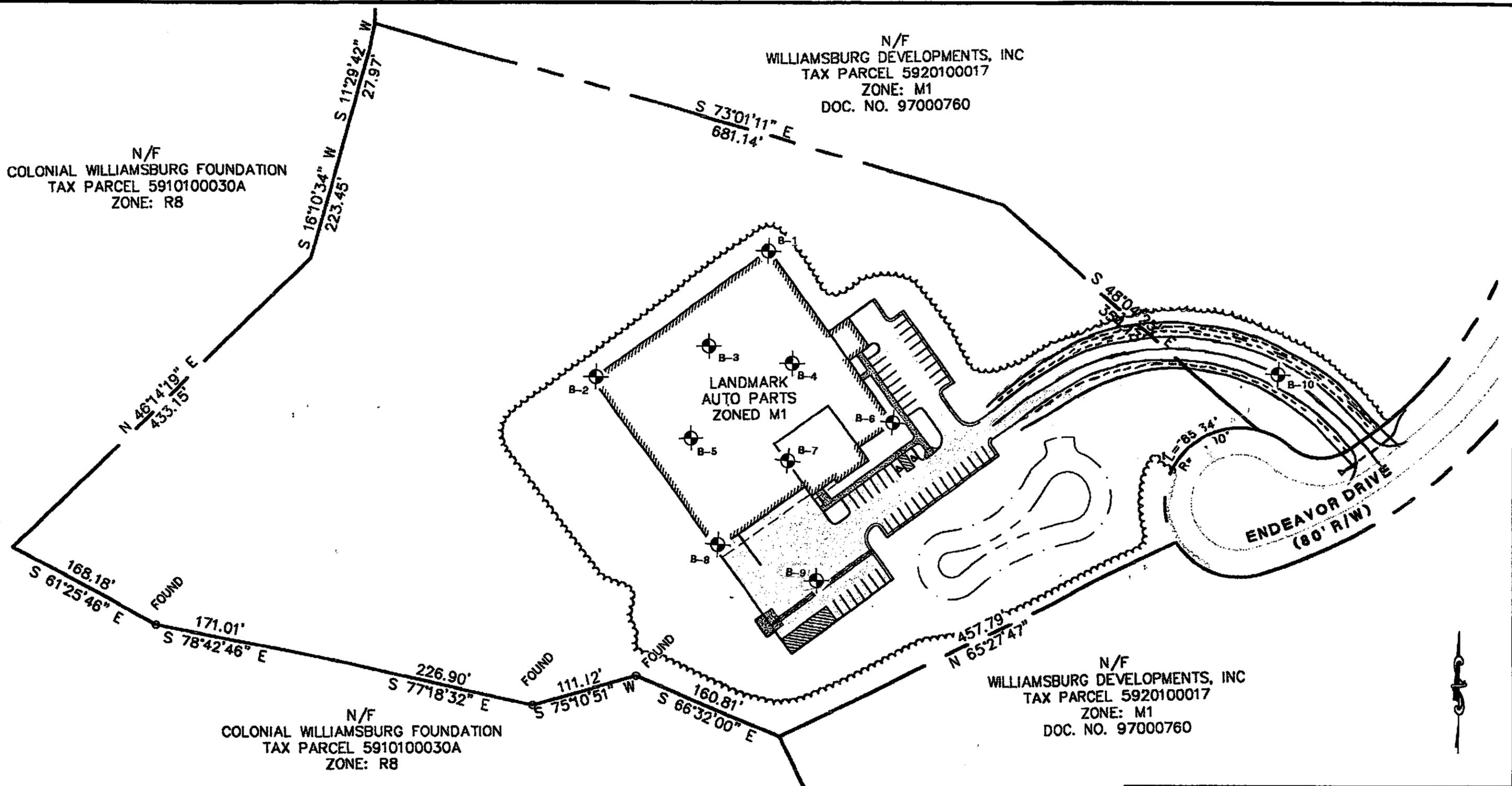
Comments:
 1. Boring backfilled upon completion.

N/F
 COLONIAL WILLIAMSBURG FOUNDATION
 TAX PARCEL 5910100030A
 ZONE: R8

N/F
 WILLIAMSBURG DEVELOPMENTS, INC
 TAX PARCEL 5920100017
 ZONE: M1
 DOC. NO. 97000760

N/F
 COLONIAL WILLIAMSBURG FOUNDATION
 TAX PARCEL 5910100030A
 ZONE: R8

N/F
 WILLIAMSBURG DEVELOPMENTS, INC
 TAX PARCEL 5920100017
 ZONE: M1
 DOC. NO. 97000760



LEGEND

APPROXIMATE TEST BORING LOCATION

Schnabel
 Schnabel Engineering Associates, Inc.

LANDMARK AUTO PARTS
 1720 ENDEAVOR DRIVE
 JAMES CITY COUNTY, VIRGINIA

LOCATION
 PLAN

APPROXIMATE SCALE	DATE
1"=100'	AUGUST 2002
DRAWN BY	CHECKED BY
DPC	MM/GS
CONTRACT NO.	FIGURE
02132060	A1
REVISED DATE	REVISED DATE

SOIL LABORATORY TESTING

Summary of Soil Laboratory Tests (1)

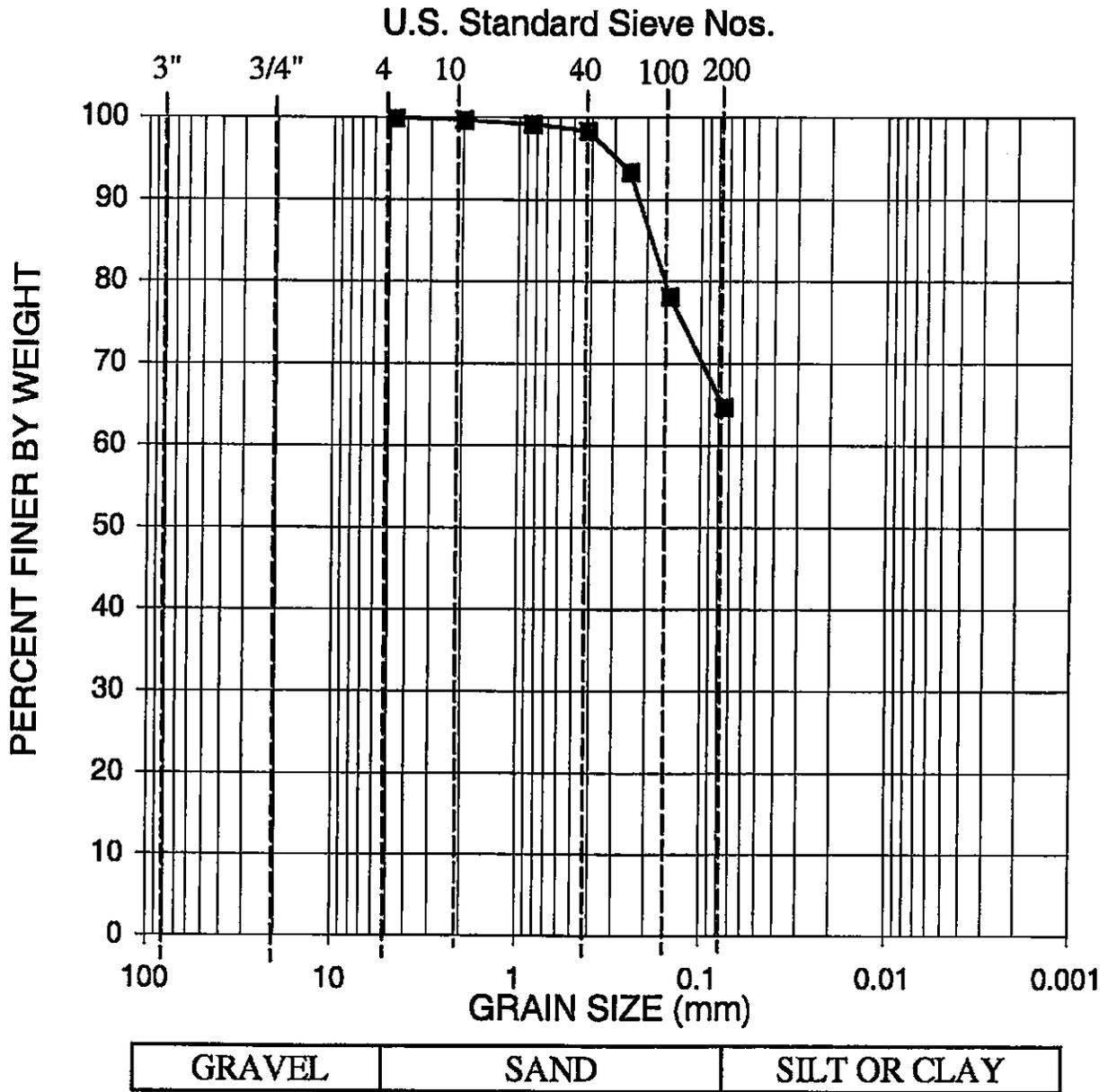
Gradation Test Curve (1)

Moisture Density Relationship (1)

SUMMARY OF SOIL LABORATORY TESTS

BORING	B-5	B-10		
DEPTH	2'-4	0'-5'		
SAMPLE TYPE	JAR	BULK		
STRATUM	A1	A1		
SAMPLE DESCRIPTION	FAT CLAY WITH SAND (CH), GRAY, BROWN AND RED BROWN	FINE TO COARSE SANDY LEAN CLAY (CL) (A-7-6), BROWN		
NATURAL MOISTURE CONTENT (%)	21.2	21.6		
NATURAL WET DENSITY (pcf)	--	--		
LIQUID LIMIT	74	42		
PLASTIC LIMIT	23	19		
PLASTICITY INDEX	51	23		
GRADATION DATA				
(% FINER THAN SIEVE)				
%#	--	100.0		
NO. 4	--	100.0		
NO. 40	99.4	98.4		
NO. 200	78.2	64.8		
MOISTURE DENSITY RELATION DATA (ASTM D-698)				
MAXIMUM DRY DENSITY (pcf)	--	107.1		
OPTIMUM MOISTURE CONTENT (%)	--	17.9		
CBR TEST DATA (VTM-8)				
BEFORE SOAK CBR	--	8.5		
AFTER SOAK CBR	--	7.4		
% SWELL	--	0.4		
COMPACTED SAMPLE DRY DENSITY (pcf)	--	108.6		
COMPACTED SAMPLE MOISTURE CONTENT (%)	--	17.3		
REMARKS		SEE GRADATION CURVE AND MOISTURE DENSITY RELATIONSHIP		

NOTES: 1. Soil tests in accordance with applicable ASTM, AASHTO and VTM Standards

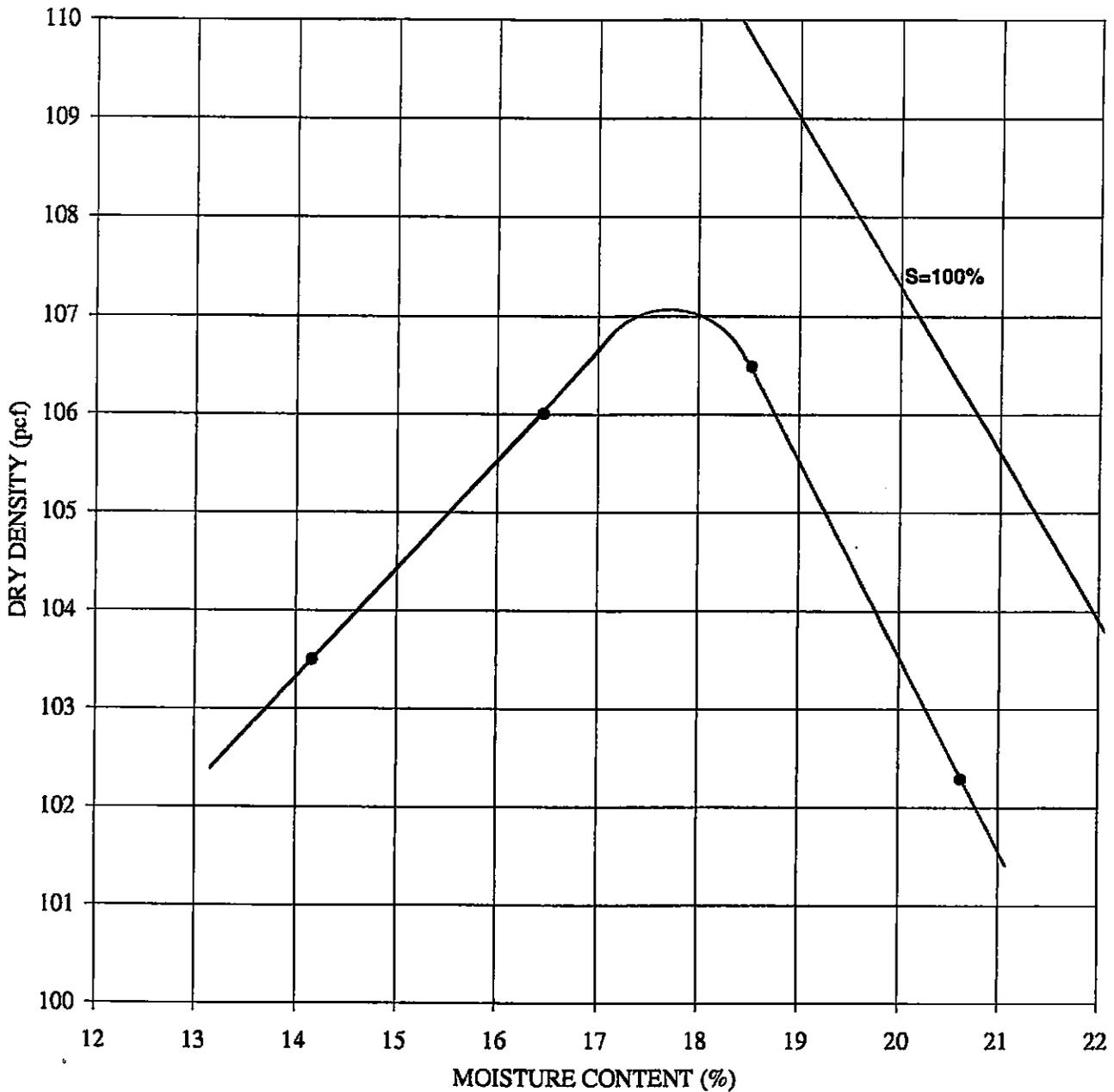


Key	Sample	Depth(ft.)	Sample Description	Class.	LL	PI
■	B-10	0'-5'	FINE TO COARSE SANDY LEAN CLAY, BROWN	CL, A-7-6	42	23

Schnabel
Schnabel Engineering Associates, Inc.
GRADATION CURVES

Project:
Landmark Auto Parts, James
City County, Virginia

Contract No. 02132060



Sample Description:

FINE TO COARSE SANDY LEAN CLAY, BROWN

Classification: CL, A-7-6

Sample Number: B-10

Sample Depth (Ft.): 0'-5'

Sample Source:

ON-SITE

Assumed Specific Gravity: 2.62

Liquid Limit (LL): 42

Plasticity Index (PI): 23

% Passing 3/4" Sieve: 100.0 **Max. Dry Density (pcf):** 107.1

% Passing #200 Sieve: 64.8 **Opt. Moist. Content (%):** 17.9



MOISTURE-DENSITY RELATION

Specification: VTM-1

Project: Landmark Auto Parts, James City County, Virginia

Contract No.: 02132060

SJT, WAC, JTB, Joe Ritchie Jr,
 Ken Jenkins, Hank Mullins
 For Meeting
 10/26/12

LandMark Auto Parts

1720 Endeavor PARCEL 10

SP 51-02 12.62⁶²⁸ contract; 5.3 ac Dist; Imp 2.754 ac

GPIN 5920100052

6.208 ac NOS to be dedicated in conserv easement for
 STW-compliance purposes

Type A2 wet pond (oversized)

BMP
 PREDEV DA 4.709 ac. CN 76 Tc 0.43 hr
 1 yr 3.61 cfs
 2 yr 5.81 cfs
 10 yr 13.98 cfs
 100 yr 27.36 cfs

BMP Worksheet 10.03 pts

7.208 ac.

5.465 @ 0.15 pts = 7.09 pts

0.743 @ 0.10 pts

Post Dev 5.81 ac. (2.754 ac imp.)
 CN 88 Tc 0.10 hr 6 min

1 yr 13.75 cfs (0.57 ac-ft SCPV)

2 yr 17.20 cfs

10 yr 33.55 cfs

100 yr 48.35 cfs

(36%) A-2 wp = 2.94

10.03

NOS accounts for ~70% of SW

Compliance

Bypass Flow

1.159 ac; CN=73, Tc=27 min

1 yr 0.70 cfs

2 1.19 cfs

10 3.12 cfs

100 5.16 cfs

WQV_R (2' per imp) = 19,994 CF

SCPV = 17,968 CF (0.41 ac-ft vs 0.57 ac-ft)

NP = 31.0

1/2 W.P. 9997 CF 0.2295 ac-ft

1/2 D.P. 9997 CF 0.2295 ac-ft

S/S @ NP EL 31 = 74510 CF

MAX Storage EL 34 = 55830 CF

Rated

1-YEAR 0.33 cfs

2-YEAR 1.86 cfs

10-YEAR 20.72 cfs

100-YEAR 29.69 cfs

SBV = WET 1228 CY
 DRY 1899 CY

Geotech Report (design) ✓ Yes
STAFF BMP Final inspect ✓ Yes

o Expedited review plan - Enterprise Zone

Richmond Aug 16 2002 Response to ENV DIV comm
MAY 2 2002, Comm # 24
NO3 easement being prepared.

ENV DIV

1ST comm MAY 2, 2002 Comm # 24

2ND comm Sept 16, 2002

SP approved 10/14/02 by ERP

Precon 12/02/02

Hallmark Enterprises LLC

Ritchie-Curbow Const Co. (Joe Ritchie) RLD

Hank Mullins HB Hankins RLD

ENV letter 10/3/12 \$10K need AB, field BMP items, NO3 plat

ENV letter 10/11/11 " " " "

ENV letter 11/24/10 " " " "

ENV letter 8/2/10 \$50 → \$10K reduced 11/17/04

Bond # 08265299 (11/11/02) Siltation Surety

in name of Ritchie-Curbow Const

Siltation Agreement

Siltation Agreement w/ Ritchie - Curshaw Const
Nov 12, 2002

LDP # 03-32 11/13/02 Released 10/21/04

I/m Agreement w/ Hallmark Enterprises 11/12/02
Instr # 020031321 c/o Joanna Ho, VP
Date Recorded: 12/27/02

AB submitted 12/13/04, never got CC - held

Post Const Cert Land Tech 10/27/11 (Jenkins)

AB Cert Land Tech 2/10/12 "undersized disclaimer" (Fetts)

JCC BMP Insp/Letter 10/30/08

- o Const cert comm (used)
- o AB comm
- o Const Related (not built right)

JC Moved Forward in good faith to

- o Approve SP, expedited w/o ded NOS
- o Issue LD w/o Ded NOS
- o Concur w/ issue of Ded NOS w/o ded MIS
- o Reduce siltation surety in 2004 50K \rightarrow 10K w/o NOS
- o Now asking to release surety

Two Main Issues

1. No ded NOS plat
2. BMP undersized

Current Owner:

Endeavor Assoc LLC, William W. Hanner
(former) Hallmark Enterprises LLC

Decision

1. Decided talk to current owners, Ritchie Team
2. If needed would involve County

County Options

1. Release & close with no further requirements.
(can't do.)
2. Enforce I/M agreement
3. Enforce through zoning ord. violation of approved SP.
4. Wait for new owner SP amendment or exp plan & hold SP approval or LDP
(not preferred)
5. Ritchie - LandTech tries to resolve with current owner

Scott Thomas

From: Michael Woolson
Sent: Friday, December 21, 2012 10:55 AM
To: 'William Hamner Jr.'
Cc: Scott Thomas; Joe Buchite
Subject: RE: Endeavor Associates deed
Attachments: 120026325 - James River Commerce Center Lot 10.pdf

Bill,

Here is a copy of the recorded easement.

Mike

Michael Woolson
Senior Watershed Planner
Engineering & Resource Protection



101-E Mounts Bay Road
Williamsburg, VA 23185
P: 757-253-6670
F: 757-259-4032
jamescitycountyva.gov

From: William Hamner Jr. [<mailto:bhamnerjr@hamnerdevco.com>]
Sent: Friday, November 30, 2012 9:17 AM
To: Michael Woolson
Subject: RE: Endeavor Associates deed

A PDF of the recordation would be must fine, Mr. Woolson. Thanks for all your help and I am glad we could get this all straightened out. I should have William Hamner, Sr. in the office on Tuesday of next week, so then I can get everything signed and over to you.

William W. Hamner, Jr.
President and Chief Operating Officer

HAMNER DEVELOPMENT COMPANY
Commercial, Industrial and Investment Properties Exclusively
11848 Rock Landing Drive
Suite 202
Newport News, VA 23606

Visit our website: www.hamnerdevco.com
757-873-1777
757-873-2479 (fax)

From: Michael Woolson [<mailto:Michael.Woolson@jamescitycountyva.gov>]
Sent: Friday, November 30, 2012 8:32 AM
To: 'William Hamner Jr.'
Subject: RE: Endeavor Associates deed

That would be great. Of course you can have a copy of the recordation for your files. Is a pdf okay or would you prefer a hard copy in the mail?

From: William Hamner Jr. [<mailto:bhamnerjr@hamnerdevco.com>]
Sent: Thursday, November 29, 2012 6:03 PM
To: Michael Woolson
Subject: RE: Endeavor Associates deed

Mike,

Thanks for this. I will get this executed on our side and notarized. Shall I just bring it over to your office when that is accomplished with the check? Then, you can get the docs fully executed and return one to us for our file?

Let me know, and have a great day.

William W. Hamner, Jr.
President and Chief Operating Officer

HAMNER DEVELOPMENT COMPANY
Commercial, Industrial and Investment Properties Exclusively
11848 Rock Landing Drive
Suite 202
Newport News, VA 23606

Visit our website: www.hamnerdevco.com
757-873-1777
757-873-2479 (fax)

From: Michael Woolson [<mailto:Michael.Woolson@jamescitycountyva.gov>]
Sent: Thursday, November 29, 2012 3:26 PM
To: 'bhamnerjr@hamnerdevco.com'
Subject: Endeavor Associates deed

Bill,

There is one correction. Please sign and submit the original plus a check for \$43 made payable to "Williamsburg-James City County Circuit Court". I already have the signed mylar and two paper copies. Once I get the original deed, I'll get it signed by the proper people here and record the easement. Thanks.

Mike

Michael Woolson
Senior Watershed Planner
Engineering & Resource Protection



101-E Mounts Bay Road
Williamsburg, VA 23185
P: 757-253-6670
F: 757-259-4032
jamescitycountyva.gov

120026325

**EXEMPT FROM RECORDATION TAX UNDER VIRGINIA CODE
SECTION 58.1-811(A) (3), AS AMENDED**

PIN 5920100052

DEED OF EASEMENT FOR NATURAL OPEN SPACE

THIS DEED OF EASEMENT, made this 30th day of November, 2012, by and between Endeavor Associates, L.L.C., a Virginia limited liability company, and its successors and assigns ("Grantor") and the County of James City, Virginia ("Grantee").

WHEREAS, the Grantor is the owner of certain property known as "Parcel 10, N/F Williamsburg Developments, Inc., 7.5000 Acres (Developable), 12.6280 Acres (Total)" on the plat of subdivision entitled "Subdivision of Property of Williamsburg Developments, Inc., Parcel 10, Being Part of the Locust Grove Tract, Situated in Roberts District, James City County, Virginia" made by LandMark Design Group, dated 12/27/00 and recorded in James City County Plat Book 80 at page 21, and being the same property shown on the survey entitled "ALTA/ASCM Survey Parcel 10 — 12.6280 Acres Being Part of the Locust Grove Tract" prepared by Patton Harris Rust & Associates, dated May 7, 2007 (the "Property"); and

WHEREAS, Grantee has adopted the Chesapeake Bay Preservation Ordinance, Chapter 23 of the James City County Code, as required by Chapter 21 of Title 10.1 of the Code of Virginia to protect the Chesapeake Bay and its tributaries from nonpoint source pollution within the Chesapeake Bay drainage area; and

WHEREAS, the Grantor wishes to preserve a portion of the Property as natural open space as part of Grantor's efforts to improve the quality of stormwater runoff from the Property.

NOW, THEREFORE, in recognition of the foregoing and in consideration of the sum of Ten Dollars (\$10.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, the Grantor does hereby grant and convey to Grantee an easement in perpetuity in gross, with the right in perpetuity to restrict the use as described below, of the portion of the Property described on Exhibit A attached hereto and made a part hereof (the "Easement Property").

Return to:
Adam R. Kinsman, Esq.
Deputy County Attorney
101-C Mounts Bay Road
Williamsburg, VA 23185
(757) 253-6832

146

The restrictions hereby imposed on the use of the Easement Property, the acts which the Grantor covenants to do or not to do, and the restrictions which the Grantee is hereby entitled to enforce, shall be as follows:

1. No building or structure shall be built or maintained on the Easement Property other than such building or structure approved by the County Watershed Planner, in writing;

2. The Easement Property shall be kept free and clear of any junk, trash, rubbish, or other unsightly or offensive material;

3. No new signs, billboards, outdoor advertising, road, or utility lines shall be placed on the property without the expressed written consent of the County Watershed Planner;

4. The Easement Property shall remain in its natural condition with respect to natural leaf litter or other ground-covering vegetation, understory vegetation or shrub layer, and tree canopy. The activities of Grantor within the Easement Property shall be limited to those which do not remove or damage any vegetation or disturb any soil. Such activities include selective trimming and pruning which will not alter the natural character of the Easement Property with the expressed written consent of the County Watershed Planner. Grantor may install walk trails or remove dead, diseased, poisonous, or invasive vegetation with the expressed written consent of the County Watershed Planner;

5. Grantee and its representatives may enter upon the Easement Property from time to time for inspection, to enforce the terms of this Easement, and to post a sign or marker identifying Grantee's interest in the Easement Property as natural open space; and

6. In the event of a violation of the Easement, the Grantee shall have the right to seek all appropriate legal and equitable relief, including but not limited to: reasonable attorney's fees and costs; the right to restore the Easement Property to its natural condition; and assess the cost of such restoration as a lien against the Easement Property.

Although this easement in gross will benefit the public in the ways cited above, nothing herein shall be construed to convey a right to the public of access to or use of the Easement Property, and the Grantor shall retain exclusive right to such access and use, subject only to the provisions herein recited.

Witness the following signatures and seals on the date first above written.

ENDEAVOR ASSOCIATES, L.L.C.

BY: W W Hamner
William W. Hamner, Manager (SEAL)

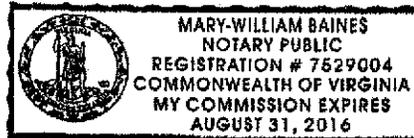
BY: William W. Hamner, Jr.
William W. Hamner, Jr., Manager (SEAL)

COMMONWEALTH OF VIRGINIA
CITY OF NEWPORT NEWS

I, M. Wm. Baines, a Notary Public of the above referenced jurisdiction, do hereby certify that William W. Hamner and William W. Hamner, Jr., Managers of Endeavor Associates, L.L.C., appeared before me and duly executed the aforesaid instrument on this 30th day of November, 2012. The persons are personally known to me, or I examined the following type of identification from of each of them: _____

M. Wm. Baines
Notary Public

My commission expires
8/31/12
SEAL/STAMP



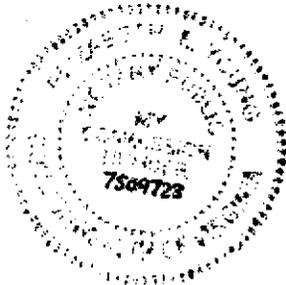
The form of this deed of easement is approved and, pursuant to Resolution of the Board of Supervisors of James City County, Virginia, duly executed on the 9th day of September, 2008, this conveyance is hereby accepted on behalf of said County.

Adam Kinsman
COUNTY ATTORNEY
DATE: 12-4-12

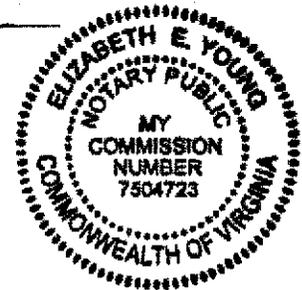
COMMONWEALTH OF VIRGINIA
JAMES CITY COUNTY

I, Elizabeth E. Young, a Notary Public of the above referenced jurisdiction, do hereby certify that Adam R. Kinsman Deputy County Attorney, appeared before me and duly executed the aforesaid instrument on this 4th day of December, 2012. The person is X personally known to me, or I examined the following type of identification:

My commission expires
June 30, 2015
SEAL/STAMP



Elizabeth E. Young
Notary Public



Prepared by:

William W. Harrison, Jr.
Williams Mullen
222 Central Park Avenue
Suite 1700
Virginia Beach, VA 23462
(757) 473-5387

EXHIBIT A
EASEMENT PROPERTY DESCRIPTION

That certain Conservation Easement for Natural Open Space, as shown on the Plat prepared by LandTech Resources, Inc.(attached), and consisting of 6.2089 Acres, which is a portion of Parcel 10 of James River Commerce Center.

VIRGINIA: CITY OF WILLIAMSBURG & COUNTY OF JAMES CITY
This document was admitted to record on 21 Dec 2012
at 9:50 AM/PM. The taxes imposed by Virginia Code
Section 58.1-801, 58.1-802 & 58.1-814 have been paid.

STATE TAX	LOCAL TAX	ADDITIONAL TAX
\$ <u> </u>	\$ <u> </u>	\$ <u> </u>

TESTE: BETSY B. WOOLRIDGE, CLERK

BY: Betsy B. Woolridge Clerk

19858657v.1

1 Large/Small Plat(s) Recorded
Parent # 120026325

PLAT ATTACHED

5086

FLAT SHOWING
CONSERVATION EASEMENT
PARCEL 10
JAMES RIVER COMMERCIAL CENTER

JAMES CITY COUNTY BERKELEY DISTRICT VIRGINIA
 DATE: 11-12-2012 SCALE: 1"=100' JOB # 12-023

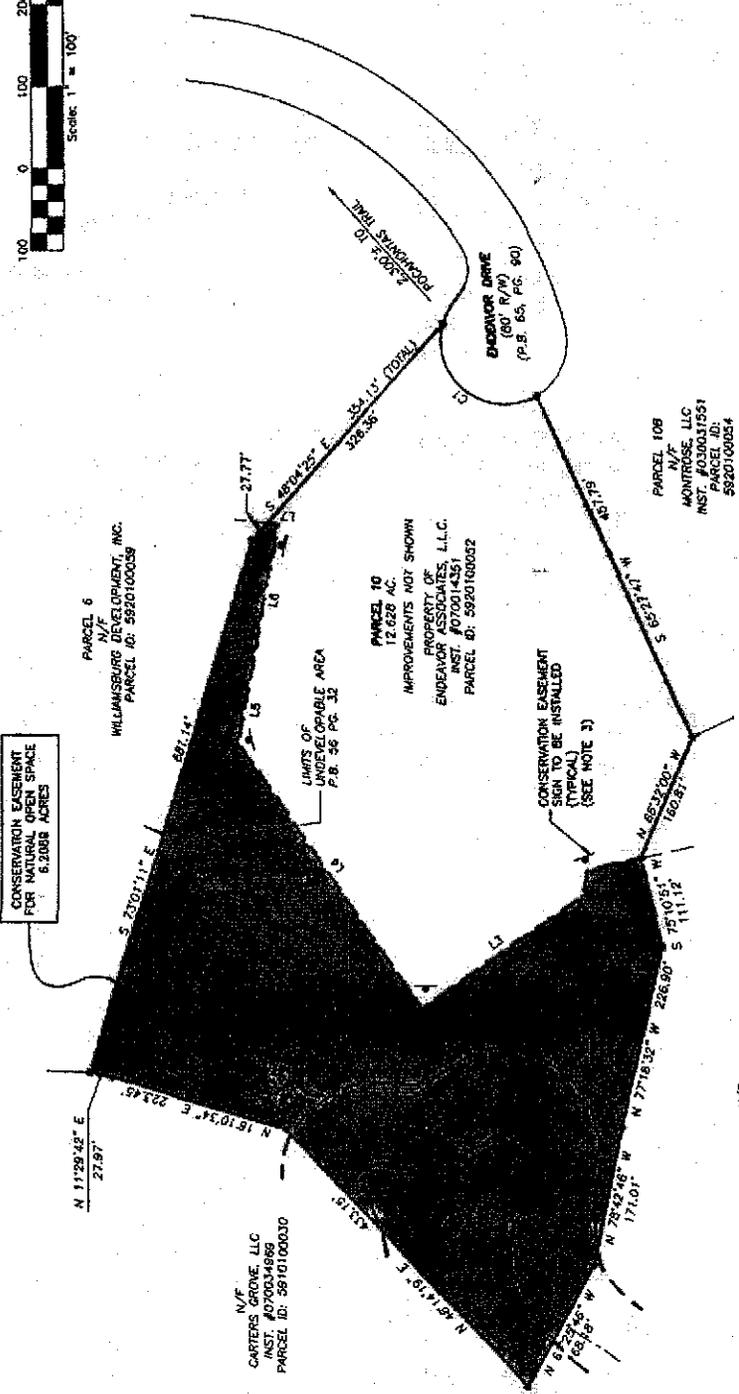


205 Bullfosta Boulevard, Suite 100, Williamsburg, Virginia 23186
 Phone: (757) 565-1677 Fax: (757) 565-0782
 web: landtechresources.com



SHEET 1 OF 1

- NOTES:**
1. WETLANDS AND LAND WITHIN RESOURCE PROTECTION AREAS SHALL REMAIN IN A NATURAL UNDISTURBED STATE EXCEPT FOR THOSE ACTIVITIES PERMITTED BY SECTION 23-7 (c) (1) OF THE JAMES CITY COUNTY CODE.
 2. NATURAL OPEN SPACE EASEMENT SHALL REMAIN IN A NATURAL UNDISTURBED STATE EXCEPT FOR THOSE ACTIVITIES REFERENCED IN THE DEED OF EASEMENT.
 3. CONSERVATION EASEMENT SIGNS SHOULD MEET REQUIREMENTS AND GUIDELINES AS ESTABLISHED BY JCC ENGINEERING AND RESOURCE PROTECTION DIVISION PPA, PPA BUFFER AND LIMITS OF WETLANDS SHOWN HEREON WERE TAKEN FROM APPROVED SITE PLAN.



STATE OF VIRGINIA, JAMES CITY COUNTY
 IN THE CLERK'S OFFICE OF THE CIRCUIT COURT FOR THE COUNTY OF JAMES CITY THIS DAY OF NOVEMBER 2012.
 THIS FLAT WAS PRESENTED AND ADMITTED TO RECORD AS THE LAW DIRECTS AT INSTRUMENT # _____
 TESTE

EASEMENT LINE TABLE

LINE	BEARING	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DIS. TO ANGLE
L1	N 12°18'42" W	65.62'	65.62'		
L2	N 77°19'42" W	32.84'	32.84'		
L3	N 35°10'51" W	239.25'	239.25'		
L4	N 54°49'58" E	597.69'	597.69'		
L5	N 76°25'45" E	75.62'	75.62'		
L6	S 78°47'39" E	184.95'	184.95'		
L7	N 02°58'51" E	13.16'	13.16'		

PROPERTY LINE CURVE TABLE

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DIS. TO ANGLE
C1	783.00'	185.14'	144.21'	S 37°10'13" W	1,356.0225'

N/F
 CARTERS GROVE, LLC
 INST. #070034969
 PARCEL ID: 59101000036

PARCEL 10B
 N/F
 MONROUSE, LLC
 INST. #070010051
 PARCEL ID: 5920100054

PARCEL 10
 12.628 AC.
 IMPROVEMENTS NOT SHOWN
 PROPERTY OF
 ENDEAVOR ASSOCIATES, L.L.C.
 INST. #070014351
 PARCEL ID: 59201000032

PARCEL 6
 N/F
 WILLIAMSBURG DEVELOPMENT, INC.
 PARCEL ID: 59201000059

N/F
 CARTERS GROVE, LLC
 INST. #070034969
 PARCEL ID: 59101000030

Pg. 6 of 6



OFFICIAL RECEIPT
WILLIAMSBURG/JAMES CITY COUNTY CIRCUIT
DEED RECEIPT

DATE: 12/21/12 TIME: 09:50:18 ACCOUNT: 830CLR120026325 RECEIPT: 12000041917
CASHIER: CHB REG: WD45 TYPE: DE-PL PAYMENT: FULL PAYMENT
INSTRUMENT : 120026325 BOOK: PAGE: RECORDED: 12/21/12 AT 09:50
GRANTOR: ENDEAVOR ASSOCIATES L L C EX: N LOC: CO
GRANTEE: JAMES CITY COUNTY OF EX: N PCT: 100%

AND ADDRESS :
RECEIVED OF : HAMNER DEVELOPMENT DATE OF DEED: 11/30/12
CHECK: \$43.00
DESCRIPTION 1: CONSERVATION EASEMENT PARCEL 10 JAMES RIVER PAGES: 6 OP 1
2: COMMERCE CENTER NAMES: 0
CONSIDERATION: .00 A/VAL: .00 MAP: PIN:
301 DEEDS 28.00 145 VSLF 3.00
106 TECHNOLOGY TRST FND 10.00 035 VOF FEE 1.00
442 TRANSFERS TO 113/31 1.00
TENDERED : 43.00
AMOUNT PAID: 43.00
CHANGE AMT : .00

CLERK OF COURT: BETSY B. WOOLRIDGE

PAYOR'S COPY
RECEIPT COPY 1 OF 2

Scott Thomas

From: Michael Woolson
Sent: Friday, December 21, 2012 10:50 AM
To: 'Joey Ritchie'
Cc: Scott Thomas; Joe Buchite
Subject: RE: Landmark/Key Stone Auto Parts

Joey,

The easement for Lot 10 James River Commerce Center was recorded today. We are in the process of releasing the bonds and closing the project out.

Mike

Michael Woolson
Senior Watershed Planner
Engineering & Resource Protection



101-E Mounts Bay Road
Williamsburg, VA 23185
P: 757-253-6670
F: 757-259-4032
jamescitycountyva.gov

From: Scott Thomas
Sent: Friday, October 26, 2012 1:54 PM
To: 'Joey Ritchie'
Subject: RE: Landmark/Key Stone Auto Parts

Joey – thanks for talking with us today about the project. I believe your notes generally cover the discussions we had. If we make progress on the conservation easement plat and deed of easement, they must be reviewed by our office prior to recordation. Thanks.

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Please use: Scott.Thomas@jamescitycountyva.gov for all future correspondence*

Scott J. Thomas, P.E.
Director of Engineering and Resource Protection



101-E Mounts Bay Road
Williamsburg, VA 23185
P: 757-253-6639
F: 757-259-4032
jamescitycountyva.gov

From: Joey Ritchie [<mailto:JRitchie@ritchiecurbow.com>]
Sent: Friday, October 26, 2012 1:14 PM
To: Scott Thomas; kjenkins@landtechresources.com; bhamnerjr@hamnerdevco.com; hank@hbhankins.com
Subject: Landmark/Key Stone Auto Parts

Guys,
Here are the minutes of our meeting as I heard them. Please make corrections and return if there is an error.

October 26, 2012

Scott Thomas, PE
Director
Engineering & Resource Protection
101-E Mounts Bay Road
Williamsburg VA 23187

Re: Remaining Issues at Landmark Auto Parts /Keystone Auto Parts on 1720 Endeavor Dr., James City County VA

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6. The property was sold to the Hamners in approximately 2006.
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8. Ken Jenkins of Landtech resources offered to do the plat for the dedication for cost.
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10. Dedication of the open space will finalize the project. No further actions will be required once the open space is dedicated to James City County.

End of Meeting Minutes

Thanks,
Joey

Joseph C. Ritchie, Jr.
President



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Fax 757.873.0467
Email jritchie@ritchiecurbow.com

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Scott Thomas

From: Scott Thomas
Sent: Thursday, November 29, 2012 10:25 AM
To: Michael Woolson
Cc: Joe Buchite; Bill Cain; Barry Moses
Subject: FW: Endeavor Associates, Deed of Easment for Natural Open Spaces, James River Commerce Center (formerly LandMark Auto Parts)
Attachments: Scanned Deed of Easment for Natural Open Space.pdf; RE: Landmark/Key Stone Auto Parts

Mike – as discussed Bill Hamner called me about the deed of easement for the former LandMark Auto Parts site. We had been working with Ritchie Curbow Construction on this for surety still being held for the project. Last meeting was on October 22. It is my understanding that LandTech submitted the conservation easement plat to you and the deed of easement was still outstanding.

Please take a look at this unsigned version of the D.O.E and provide Bill direction as to what steps are needed to finish this up as far as getting final signatures and the recordation process. His contact information is below. Looks to me like straight up County standard template version. Thanks.

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From: William Hamner Jr. [<mailto:bhamnerjr@hamnerdevco.com>]
Sent: Thursday, November 29, 2012 9:03 AM
To: Scott Thomas
Subject: Endeavor Associates, Deed of Easment for Natural Open Spaces, James River Commerce Center

Mr. Thomas,

It was nice to speak with you. Attached, hereto, is the Deed of Easement we discussed. Please let me know what the next step will be.

William W. Hamner, Jr.
President and Chief Operating Officer

HAMNER DEVELOPMENT COMPANY
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Visit our website: www.hamnerdevco.com

757-873-1777

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From: Scott Thomas
Sent: Friday, October 26, 2012 4:21 PM
To: Joe Buchite; Michael Woolson; Bill Cain; Barry Moses
Subject: FW: Landmark/Key Stone Auto Parts

FYI

From: Joey Ritchie [<mailto:JRitchie@ritchiecurbow.com>]
Sent: Friday, October 26, 2012 1:57 PM
To: Scott Thomas
Subject: RE: Landmark/Key Stone Auto Parts

I spoke with Bill Hamner Jr. on the way back and he is in general agreement with the process we discussed. We'll keep in touch.

Joey

From: Scott Thomas [<mailto:Scott.Thomas@jamescitycountyva.gov>]
Sent: Friday, October 26, 2012 1:54 PM
To: Joey Ritchie
Subject: RE: Landmark/Key Stone Auto Parts

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**James City County Environmental Division
Stormwater Management / BMP Inspection Report
Detention and Retention Pond Facilities**

County BMP ID Code (if known): _____

Name of Facility: Landmark Auto Parts BMP No.: JR059 of _____ Date: _____

Location: 1720 Endeavor Drive

Name of Owner: _____

Name of Inspector: Amy Parker

Type of Facility: Wet Pond

Weather Conditions: cool/dry Type: Final Inspection County BMP Inspection Program Owner Inspection

If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

- O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.
- Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.
- Urgent - The item checked requires immediate attention to keep the BMP operational and to prevent damage to the facility.

Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes:				
Grass Height		✓		
Vegetation Condition		✓		* 1-3" trees & brush - need to cut
Tree Growth		✓		for final inspection, *
Erosion ?				
Trash & Debris ?				
Seepage ?		✓		animal burrows
Fencing or Benches				bench is present - unable to insp
Interior Landscaping/Planted Areas: <input type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input checked="" type="checkbox"/> Naturally Established Vegetation → see note below				
Vegetated Conditions				
Trash & Debris				
Floating Material				
Erosion				
Sediment				
Dead Plant				
Aesthetics				
Other				
Notes: <u>NO</u> - unknown if plantings were installed per plan due to growth.				

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: <input checked="" type="checkbox"/> Permanent Pool (Retention Basin) <input checked="" type="checkbox"/> Shallow Marsh (Detention Basin) <input type="checkbox"/> None, Dry (Detention Basin)				
Shoreline Erosion				
Algae		✓		
Trash & Debris		✓		
Sediment				
Aesthetics				
Other				
Inflows (Describe Types/Locations):				
Condition of Structure				
Erosion				
Trash and Debris				
Sediment			✓ 3	sediment covering (OP)
Outlet Protection			✓ 3	1/3 of pipe full of water Island of sediment
Other				
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):				
Condition of Structure				
Corrosion	✓			
Trash and Debris				
Sediment	✓			
Vegetation				
Other				
Principal Outlet Structure - Barrel, Conduit, etc. :				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris		✓		trees, trash, debris along (OP) adjacent to RPA
Erosion/Sediment				Erosion around N, S, W of structure
Outlet Protection		✓		1-3" trees in (OP)
Other				missing debris filter pg 9 of plan
Emergency Spillway (Overflow):				
Vegetation	✓			
Lining	→			(CD)?? along emerg. spillway channel
Erosion	✓			
Trash & Debris	✓			
Other		✓		Patchy areas w/ no vegetation
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding				see surrounding perimeter conditions
Animal Burrows			various areas perimeter →	burrows burrows @ head of pond
Graffiti	✓			
Other				
Surrounding Perimeter Conditions:				
Land Uses				
Vegetation	✓			
Trash & Debris	✓			
Aesthetics	✓			
Access /Maintenance Roads or Paths	✓			
Other				Dumpers - perfect for mosquito breeding
Remarks:				
* Rip Rap @ at inflow area side slope - not on plan ??				
Overall Environmental Division Internal Rating: <u>2.5</u>				
Signature: _____ Date: _____				
Title: _____				