CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY THAT THE FOLLOWING ELECTRONIC RECORDS ARE TRUE AND ACCURATE REPRODUCTIONS OF THE ORIGINAL RECORDS OF JAMES CITY COUNTY GENERAL SERVICES DEPARTMENT- STORMWATER DIVISION; WERE SCANNED IN THE REGULAR COURSE OF BUSINESS PURSUANT TO GUIDELINES ESTABLISHED BY THE LIBRARY OF VIRGINIA AND ARCHIVES; AND HAVE BEEN VERIFIED IN THE CUSTODY OF THE INDIVIDUAL LISTED BELOW.

BMP NUMBER: **WC012**

DATE VERIFIED: **January 27, 2017**

QUALITY ASSURANCE TECHNICIAN: **Natalie Prevette**

NM Prevette

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 12, 2010

TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services

FROM: Jo Anna Ripley, Stormwater

PO: 270712

RE: Files Approved for Scanning

General File ID or BMP ID: WC012

PIN: 1240100016F

Subdivision, Tract, Business or Owner Name (if known): Hankins Industrial Park

Property Description: Williamsburg Peanut Factory

Site Address: 8012 Hankins Industrial Park Road

(For internal use only) **Box** 22 **Drawer:** 9

Agreements: (in file as of scan date) **N** **Book or Doc#:** **Page:**

Comments

RITCHIE - CURBOW CONSTRUCTION CO., INC.
739 THIMBLE SHOALS BLVD. #304
NEWPORT NEWS, VIRGINIA 23606
757 ~~(804)~~ 873-0123
757-873-0467 FAX

DATE 4-16-97 | JOB NO. 483

ATTENTION

TO DARRELL COOK
JAMES CITY CO. ENVIRONMENTAL
WILLIAMSBURG VA 23187

RE: WILLIAMSBURG FOODS

WE ARE SENDING YOU ☐ ATTACHED ☐ UNDER SEPARATE COVER VIA _____ THE FOLLOWING ITEMS:

☐ SHOP DRAWINGS ☐ PRINTS ☐ COPY OF LETTER ☐ SAMPLES ☐ SPECIFICATIONS
☐ CHANGE ORDER ☒ PLANS ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			SITE PLAN, AS BUILT FOR WILLIAMSBURG FOODS.

APR 1997 RECEIVED CODE COMPLIANCE OFFICE

REASON FOR TRANSMITTAL CHECKED BELOW:

☐ FOR APPROVAL ☐ APPROVED AS SUBMITTED ☐ RESUBMIT _____ COPIES FOR APPROVAL
☒ FOR YOUR USE ☐ RETURNED FOR CORRECTIONS ☐ SUBMIT _____ COPIES FOR DISTRIBUTION
☒ AS REQUESTED ☐ FOR REVIEW AND COMMENT ☐ RETURN _____ CORRECTED PRINTS
☐ APPROVED AS NOTED ☐ _____

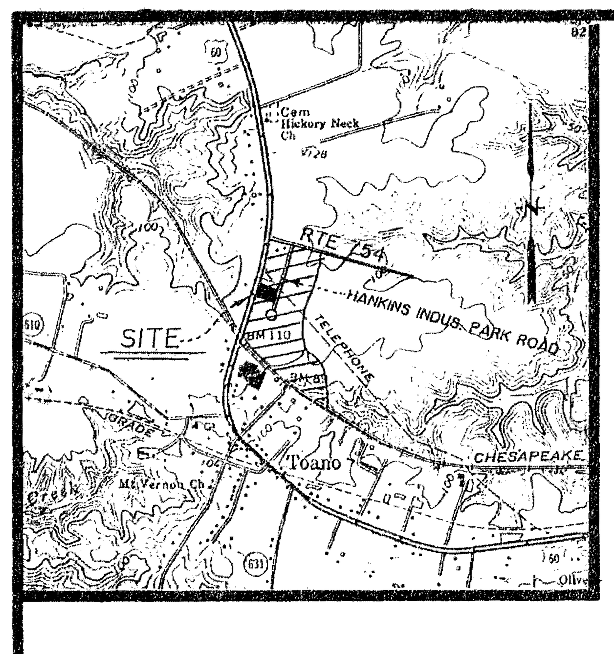
☐ **FOR BIDS DUE _____ 19 _____** ☐ **PRINTS RETURNED AFTER LOAN TO US**

REMARKS

PER REQUEST OF MR B. J. SOYNER OF WILLIAMSBURG FOODS, INC.

COPY TO _____ SIGNED: Joseph C Rithe Jr

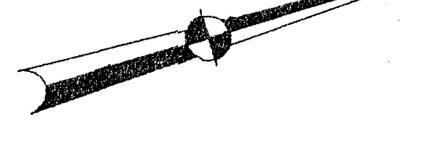
PLEASE NOTIFY US AT ONCE IF ENCLOSURES ARE NOT AS NOTED.

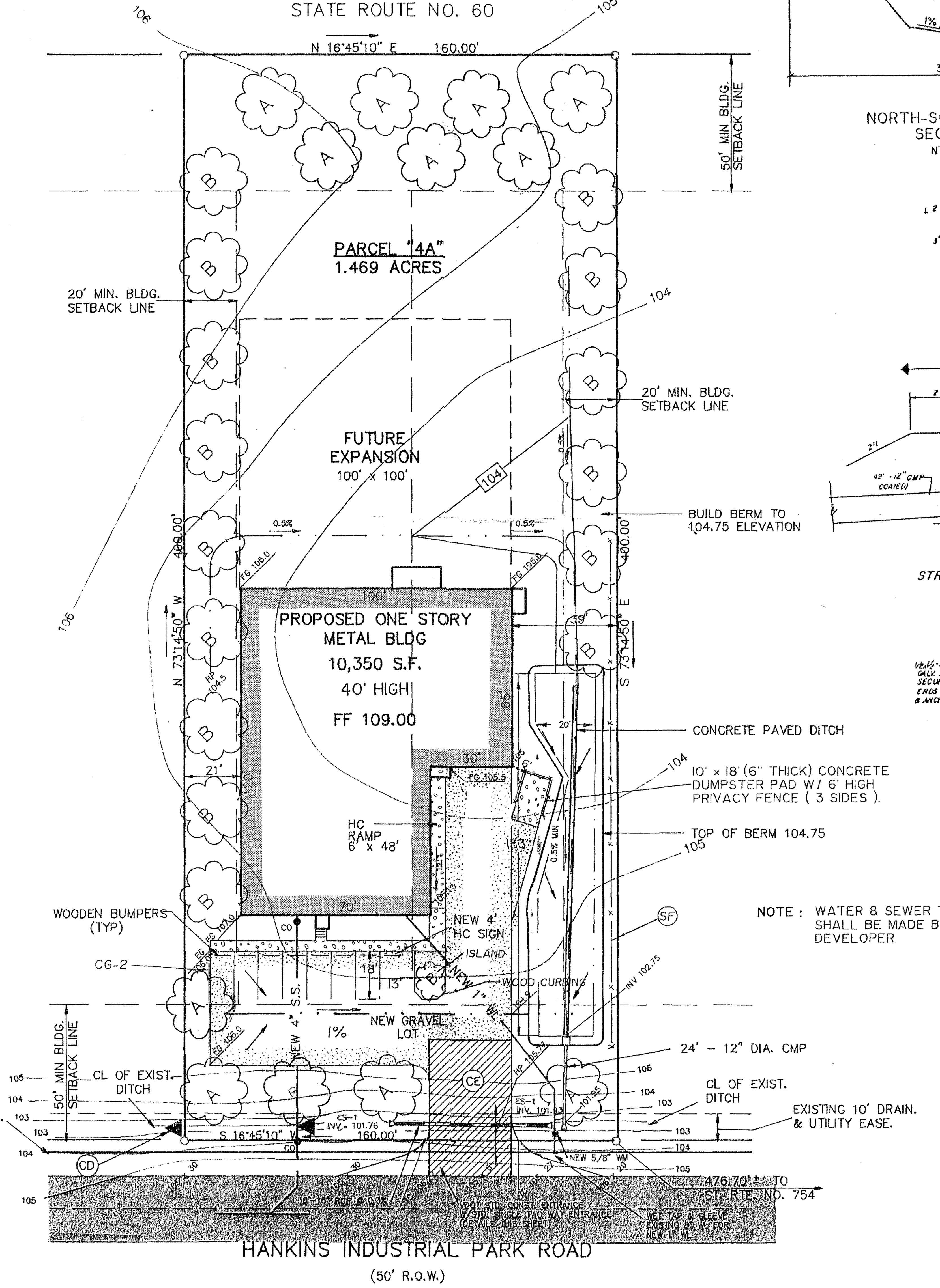


VICINITY MAP
SCALE: 1" = 2000'

NOTE: ALL NEW TREES SHALL MEET FOLLOWING HEIGHTS:
DECIDUOUS TREES 8 FT
EVERGREENS & FLOWERING TREES 6 FT

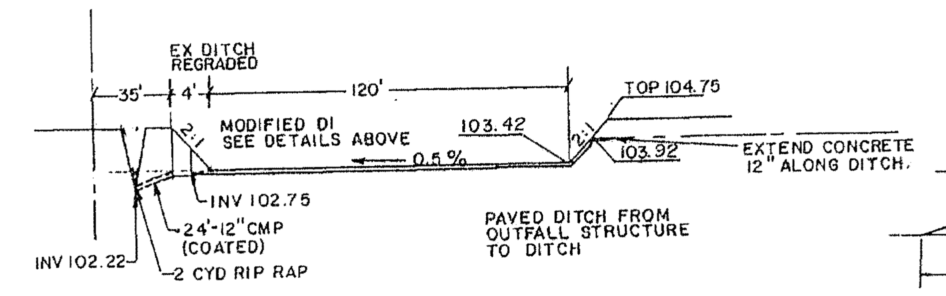
TREE LEGEND
A. OAK
B. MAPLE



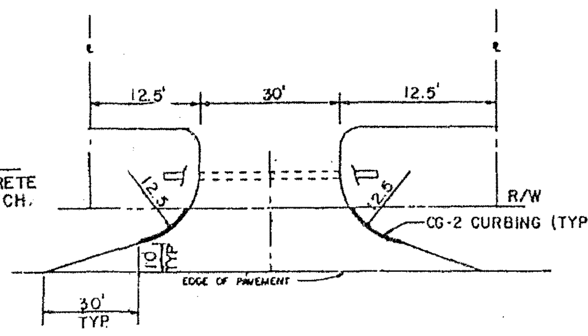


NOTE : WATER & SEWER TAPS SHALL BE MADE BY DEVELOPER.

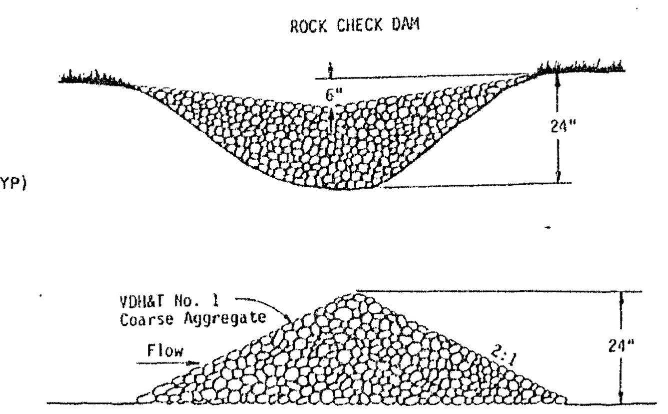
SITE PLAN
SCALE: 1" = 30'

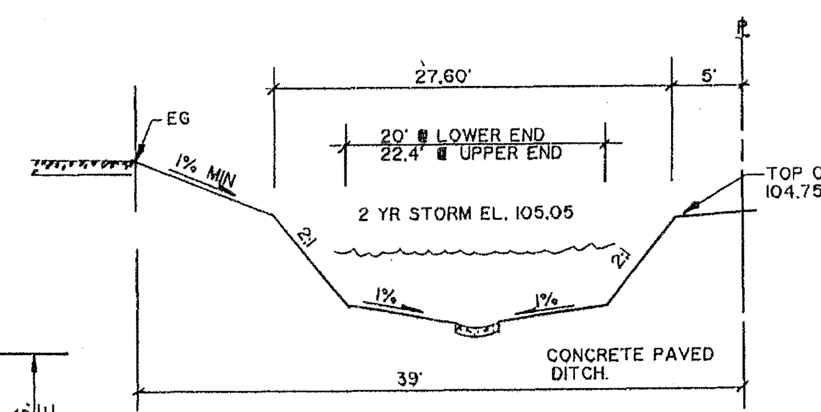


EAST-WEST CROSS SECTION
NTS

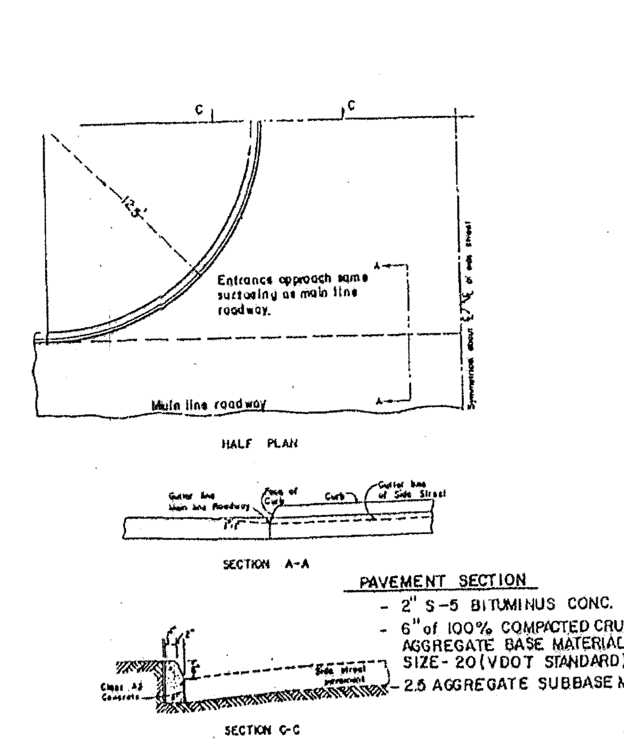


SINGLE TWO-WAY ENTRANCE

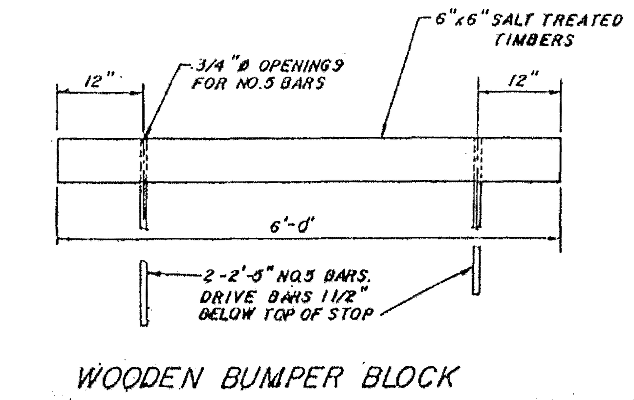




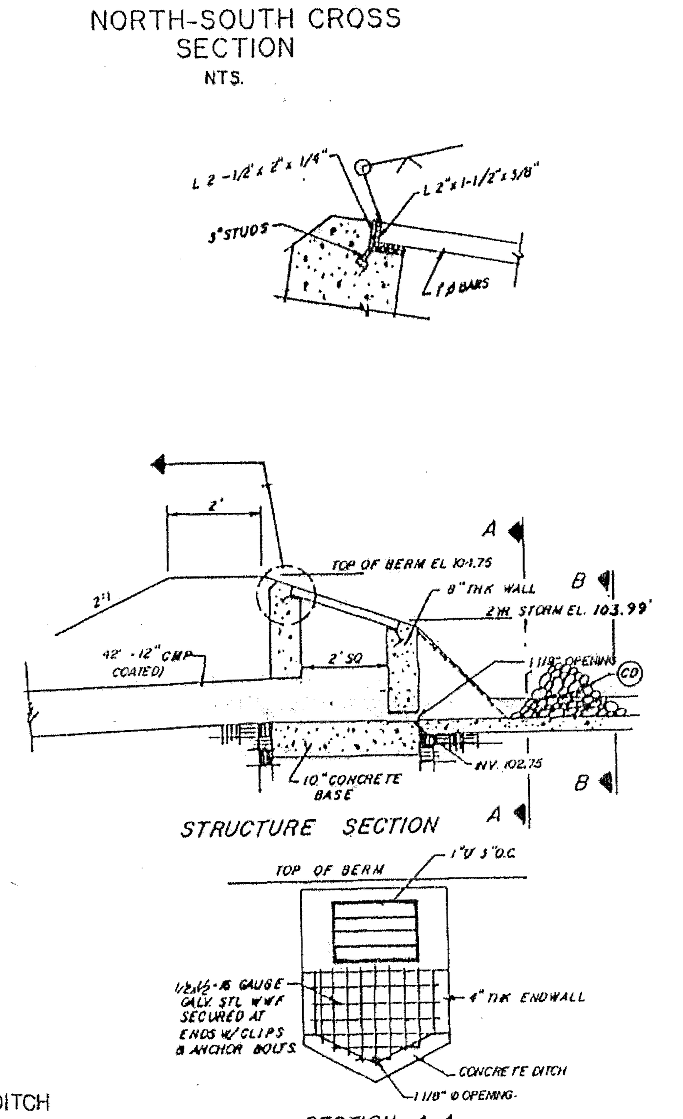
NORTH-SOUTH CROSS SECTION
NTS.



ENTRANCE SECTION

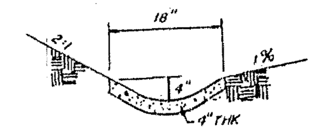


WOODEN BUMPER BLOCK

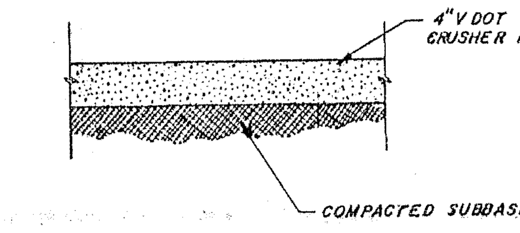


STRUCTURE SECTION

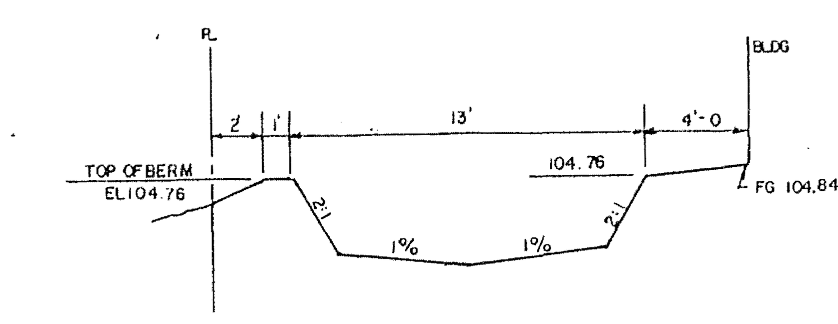
SECTION A-A



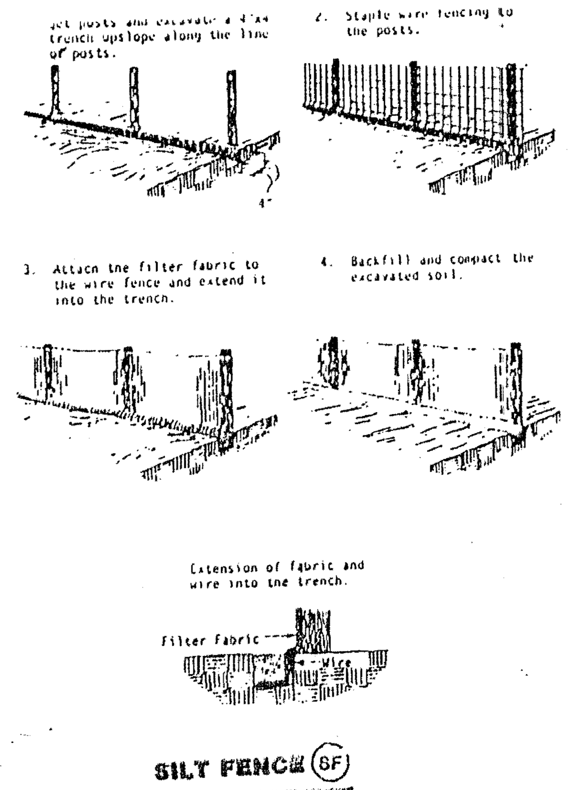
CONCRETE PAVED DITCH
B-B



GRAVEL LOT SECTION



DITCH SECTION



SILT FENCE (SF)

GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO CURRENT JAMES CITY COUNTY AND/OR VDOT STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE SPECIFIED.
2. CONTRACTOR SHALL SECURE THE LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND COMPLY WITH ALL COUNTY REQUIREMENTS FOR EROSION AND SEDIMENT CONTROL.
3. ALL CUTS, VEGETATION AND DELETERIOUS MATERIAL ENCOUNTERED SHALL BE REMOVED AND DISPOSED OF OFF-SITE.
4. SELECT MATERIAL REQUIRED FOR FILL AND BACKFILL UNDER PARKING LOT, FOOTINGS AND STRUCTURES SHALL BE PLACED IN LAYERS NOT TO EXCEED EIGHT INCHES (8") IN THICKNESS AND COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D-698.
5. ALL CONCRETE SHALL BE CLASS A-3 AIR ENTRAINED (3000 P.S.I.).
6. ALL GREEN AREA, WITHIN LIMITS OF CONSTRUCTION, TO BE TOPSOILED, FERTILIZED AND MULCHED.
7. CONTRACTOR SHALL OBTAIN AT HIS OWN EXPENSE, ANY PERMIT OR BOND IF REQUIRED BY ANY GOVERNMENT AGENCY.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION, PROTECTING AND RESOLVING ANY CONFLICTS WITH EXISTING UTILITIES AND SHALL REPAIR, AT HIS OWN EXPENSE, ALL UTILITIES TO BE RELOCATED OR DAMAGED BY CONSTRUCTION.
9. ANY ERRORS OR DISCREPANCIES SHALL BE REPORTED TO THE ARCHITECT OR THE SURVEYOR BEFORE PROCEEDING WITH THE WORK.
10. DEWATERING OR EXCAVATION, IF NEEDED, IS PART OF THIS CONTRACT.
11. BEFORE DIGGING CALL "MISS UTILITY" OF VIRGINIA 1-800-552-7001.
12. CONTRACTOR MUST OBTAIN ALL NESSARY BUILDING PERMITS PRIOR TO CONSTRUCTION.
13. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE SITE CONTRACTOR.
14. THE LAND DISTURBING PERMIT WHEN ISSUED WILL REQUIRE CONSTRUCTION OF THE SEDIMENT BASIN PRIOR TO ANY OTHER CONSTRUCTION ACTIVITIES ON THE REMAINDER OF THE PROJECT.
15. A SOILS TEST SHALL BE PREFORMED TO ENSURE SUITABLE SOIL FOR THE DETENTION BASIN.

THE PURPOSE OF THE EROSION CONTROL MEASURES SHOWN ON THESE PLANS SHALL BE TO PRECLUDE THE TRANSPORT OF ALL WATERBORNE SEDIMENTS RESULTING FROM CONSTRUCTION ACTIVITIES FROM ENTERING ONTO ADJACENT PROPERTIES OR STATE WATERS. IF FIELD INSPECTION REVEALS THE INADEQUECY OF THE PLAN TO CONFINE SEDIMENT TO THE PROJECT SITE, APPROPRIATE MODIFICATIONS WILL BE MADE TO CORRECT ANY PLAN DEFICIENCIES.

1. ALL EROSION & SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE "VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK". THE CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH ALL APPLICABLE MEASURES CONTAINED THEREIN WHICH MAY BE PERTINENT TO THIS PROJECT.
2. MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE "VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK". MAINTENANCE WILL INCLUDE THE REPAIR OF MEASURES DAMAGED BY ANY SUBCONTRACTOR INCLUDING THOSE OF THE PUBLIC UTILITY COMPANIES. AT THE PRE-CONSTRUCTION MEETING, THE CONTRACTOR WILL SUPPLY PUBLIC WORKS WITH THE NAME OF THE INDIVIDUAL WHO WILL BE RESPONSIBLE FOR ENSURING MAINTENANCE OF INSTALLED MEASURES ON A DAILY BASIS.
3. SEDIMENT CONTROL MEASURES MAY REQUIRE MINOR FIELD ADJUSTMENTS AT TIME OF CONSTRUCTION TO INSURE THEIR INTENDED PURPOSE IS ACCOMPLISHED. DEPARTMENT OF PUBLIC WORKS APPROVAL WILL BE REQUIRED FOR OTHER DEVIATIONS FROM THE APPROVED PLANS.
4. PERMANENT OR TEMPORARY SOIL STABILIZATION MUST BE APPLIED TO ALL DENUDED AREAS WITHIN 15 DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. SOIL STABILIZATION MUST ALSO BE APPLIED TO DENUDED AREAS WHICH MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 30 DAYS. SOIL STABILIZATION MEASURES INCLUDE VEGETATIVE ESTABLISHMENT, MULCHING AND THE EARLY APPLICATION OF GRAVEL BASE MATERIAL ON AREAS TO BE PAVED.
5. IF DISTURBED AREA STABILIZATION IS TO BE ACCOMPLISHED DURING THE MONTHS OF DECEMBER, JANUARY, OR FEBRUARY, STABILIZATION SHALL CONSIST OF MULCHING IN ACCORDANCE WITH SPECIFICATION 1.75. SEEDING WILL THEN TAKE PLACE AS SOON AS THE SEASON PERMITS.
6. THE TERM SEEDING, FINAL VEGETATIVE COVER OR STABLIZATION, ON THIS PLAN SHALL MEAN THE SUCCESSFUL GERMINATION AND ESTABLISHMENT OF A STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED CONTAINING THE SPECIFIED AMOUNTS OF SEED, LIME, AND FERTILIZER IN ACCORDANCE WITH SPECIFICATION 1.86, PERMANENT SEEDING. IRRIGATION SHALL BE REQUIRED AS NECESSARY TO ENSURE ESTABLISHMENT OF GRASS COVER.
7. TEMPORARY EROSION CONTROL MEASURES ARE NOT TO BE REMOVED UNTIL ALL DISTURBED AREAS ARE STABILIZED. AFTER STABILIZATION IS COMPLETE, ALL MEASURES SHALL BE REMOVED WITHIN 30 DAYS. TRAPPED SEDIMENT SHALL BE SPREAD AND SEEDED.
8. SILT FENCE SHALL BE PLACED AT THE TOE OF ALL STOCKPILES.
9. THE PERIMETER SILT FENCE AND ANY SEDIMENT BASINS OR TRAPS SHALL BE CONSTRUCTED AS THE FIRST STEP IN GRADING AND MUST BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.

OWNER/DEVELOPER

CHIP PENIK
PEANUT FACTORY OF WILLIAMSBURG
P. O. BOX GN
WILLIAMSBURG, VA 23187

NOTES:

1. ALL UTILITIES SHALL BE PLACED UNDERGROUND.
2. FUTURE EXPANSION SHALL OBTAIN SITE PLAN APPROVAL PRIOR TO CONSTRUCTION.
3. IDENTIFICATION SIGN SHALL BE LOCATED AT LEAST 5' FROM THE PROPERTY LINE AND NO LARGER THAT 32 SQ. FT. NOR OVER 20' IN HEIGHT.
4. EIGHT (8) PEOPLE ARE EXPECTED TO BE EMPLOYED. COUNTY ORDINANCE REQUIRES 1 PARKING SPACE FOR EVERY TWO (2) EMPLOYIES. EIGHT (8) SPACES ARE PROVIDED.
5. ALL CONSTRUCTION OR LAND DEVELOPMENT ACTIVITIES SHALL BE SUBJECT TO THE REQUIREMENTS OF THE CHESAPEAKE BAY PRESERVATION AREA DESIGNATION AND MANAGEMENT REGULATIONS (VR-173-02-01) AND ANY LOCAL ORDINANCES ADOPTED PURSUANT THERETO. THESE REGULATIONS AND ORDINANCES MAY PLACE ADDITIONAL REQUIREMENTS ON PROPERTY RECORDED AFTER SEPTEMBER 30, 1989, AND MAY LIMIT DEVELOPMENT OF PROPERTY. OWNERS SHOULD FAMILIARIZE THEMSELVES WITH THE REGULATIONS AND ORDINANCES AND ARE ENCOURAGED TO CONTACT THE JAMES CITY COUNTY DEPARTMENT OF COMMUNITY DEVELOPMENT FOR MORE INFORMATION.

STATISTICAL INFORMATION

ZONING	M-2
PARKING REQUIREMENTS	
USE CATEGORY	INDUSTRIAL (WAREHOUSE)
NO. SPACES REQUIRED	4
REG. SPACES PROVIDED	7
H.C. SPACES PROVIDED	1
TOTAL SPACES PROVIDED	8
OPEN SPACE DATA	
LOT SIZE	1.469 AC.
TOTAL GRAVEL AREA	.17 AC.
PERCENT GRAVEL	12%
PERCENT BUILDING	32%
OPEN SPACE AREA	.83 AC.
PERCENT OPEN AREA	56%
BUILDING DATA	
PROPOSED FLOOR AREA	10,350 SF
FUTURE EXPANSION FLOOR AREA	10,000 SF
TOTAL FLOOR AREA	20,350 SF

COUNTY OF JAMES CITY
Received
APP... ATE
Fire D...
Healt...
High...
Plan...
Pub...
Zonin...
JCSA...
Other
Other

SP-39-90

Rickmond Engineering, Inc.
Civil Engineering
Environmental Engineering
Land Development Planning
1643-C Merrimac Trail
Williamsburg VA 23185
(804)229-1776 or 875-1785

Designed By:	Drawn By:	Approved By:	Scale:	Date:	Job No.:
WTH	DPB	RCS	1"=30'	3-29-90	90124

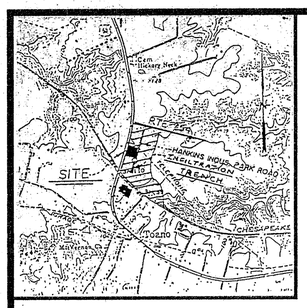
COMMONWEALTH OF VIRGINIA
RALPH C. SIMMONS
No.018289
PROFESSIONAL ENGINEER

No.	By	Revision	App.	Date
1.	WTH	REVISED PER COUNTY COMMENTS LTR. DTD. 5/29/90	RCS	6.8.1990

RECEIVED
JUN 1990
PLANNING DEPARTMENT

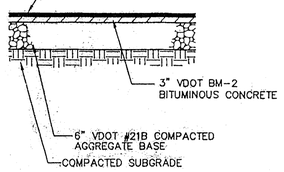
WILLIAMSBURG PEANUT FACTORY
JAMES CITY COUNTY VIRGINIA

Job Number	Sheet No.
90124	1 OF 1



VICINITY MAP

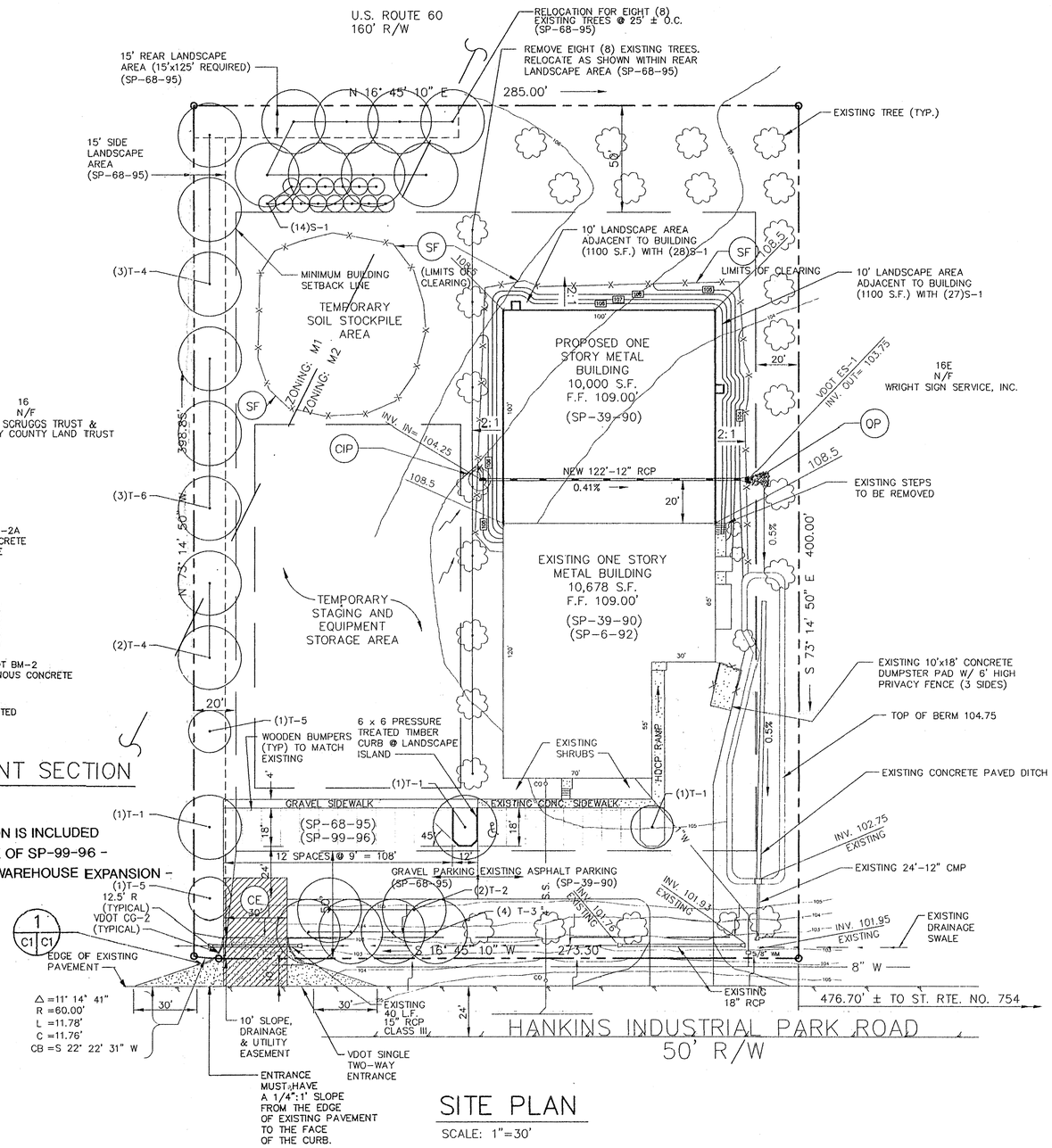
SCALE: 1"= 2000'



1 / C1 C1 TYPE I PAVEMENT SECTION

NOT TO SCALE

NOTE: TYPE I PAVEMENT SECTION IS INCLUDED IN THE SCOPE OF WORK OF SP-99-96 - WILLIAMSBURG FOODS WAREHOUSE EXPANSION - GRAVEL PARKING LOT.



SITE PLAN

SCALE: 1"=30'

NOTES:

1. ALL TOPOGRAPHICAL AND UTILITY INFORMATION TAKEN FROM SITE PLAN ENTITLED " WILLIAMSBURG PEANUT FACTORY, ADDENDUM TO SP-39-90" PREPARED BY RICKMOND ENGINEERING, INC., DATED JANUARY 31, 1992.
2. LOT LIES IN F.I.R.M. ZONE "X" ACCORDING TO COMMUNITY PANEL # 510201 0020 B, DATED FERUARY 6, 1991.
3. SIXTEEN (16) PEOPLE ARE EXPECTED TO BE EMPLOYED. COUNTY ORDINANCE REQUIRES 1 PARKING SPACE FOR EVERY TWO (2) EMPLOYEES. TWENTY (20) SPACES ARE PROVIDED.
4. OWNER: WILLIAMSBURG FOODS
   P.O. BOX GN
   WILLIAMSBURG, VA. 23187

   DEVELOPER: RITCHIE-CURBOW CONSTRUCTION COMPANY, INC.
   739 THIMBLE SHOALS BLVD.
   NEWPORT NEWS, VA. 23601
5. SITE PLAN APPROVAL FOR 10,350 S.F. OF ORIGINAL CONSTRUCTION AND 10,000 S.F. OF EXPANSION WAS RECEIVED UNDER CASE NO. SP-39-90 ON AUGUST 14, 1990. SITE PLAN APPROVAL FOR 328 S.F. OF ADDITIONAL CONSTRUCTION WAS RECEIVED UNDER CASE NO. SP-6-92 ON FEBRUARY 25, 1992. PRELIMINARY SITE PLAN APPROVAL TO CONSTRUCT THE GRAVEL PARKING LOT WAS RECEIVED UNDER CASE NO. SP-68-95 ON AUGUST 24, 1995.

STATISTICAL INFORMATION

ZONING	M-1 & M-2
TAX MAP #	12-4, LOT 16F
PARKING REQUIREMENTS	
USE CATEGORY	INDUSTRIAL (WAREHOUSE)
NO. SPACES REQUIRED	8
REG. SPACES PROVIDED	19
H.C. SPACES PROVIDED	1
TOTAL SPACES PROVIDED	20
OPEN SPACE DATA	
LOT SIZE	2.617 AC.
TOTAL PAVED AREA	.17 AC.
PERCENT PAVED	6%
TOTAL GRAVEL AREA	.14 AC.
PERCENT GRAVEL	5%
PERCENT BUILDING	18%
OPEN SPACE AREA	1.83 AC.
PERCENT OPEN AREA	70%
BUILDING DATA	
USE GROUP	S-2
CONSTRUCTION TYPE	2C
EXISTING FLOOR AREA	10,678 S.F.
PROPOSED FLOOR AREA	10,000 S.F.
TOTAL FLOOR AREA	20,678 S.F.
BLDG. HEIGHT (TOTAL)	22'-0"
NO. OF STORIES	1 STORY

GRAPHIC SCALES

0 15 30 60 90 1"= 30'

PLANT SCHEDULE - BUILDING LANDSCAPING

ABBR.	QTY.	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING
SHRUBS:					
S-1	55	JUNIPERUS HORIZONTALIS	BAR HARBOR JUNIPER	18"-24" CONT B & B	4' O.C.

PLANT SCHEDULE - ASPHALT PARKING LOT LANDSCAPING

ABBR.	QTY.	SCIENTIFIC NAME	COMMON NAME	SIZE
TREES:				
T-1	1	ACER RUBRUM	RED MAPLE	1 1/2-2" CAL B & B

SEE SP-93-02
103.4 BMP ELEV.

RECEIVED OCT 31 1996

REVISIONS

NO.	DATE	DESCRIPTION
1	9-25-96	REVISIONS PER JCC CODE COMPLIANCE COMMENTS (9-10-96) & VDOT COMMENTS (9-11-96)
2	10-16-96	REVISIONS PER VDOT COMMENTS (10-4-96)

ENGINEERS · ARCHITECTS · SURVEYORS
INTERIOR DESIGNERS · PLANNERS
P.O. BOX 3505 WILLIAMSBURG, VIRGINIA 23187 (804)253-0673 (804)874-5015

COMMONWEALTH OF VIRGINIA DANIEL I. DE YOUNG No. 2517 PROFESSIONAL ENGINEER CERTIFIED

SITE PLAN (SP-96-96)

WILLIAMSBURG FOODS
WAREHOUSE EXPANSION
JAMES CITY COUNTY, VIRGINIA

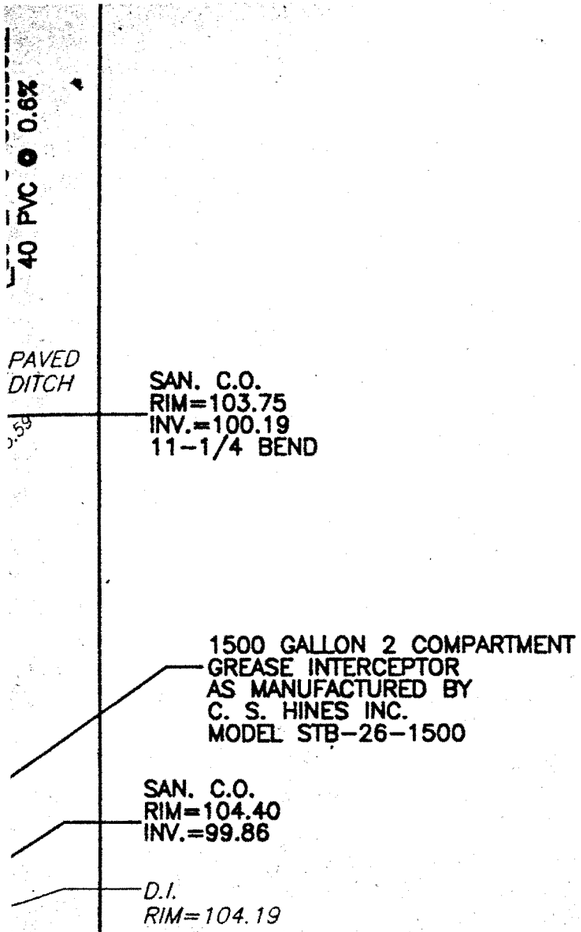
SCALE AS NOTED
DESIGNED TR/MEH
DRAWN JMM
CHECKED TR
DATE 8-23-96
1960550
COMMISSION NO.
SHEET C-1
1 OF 4

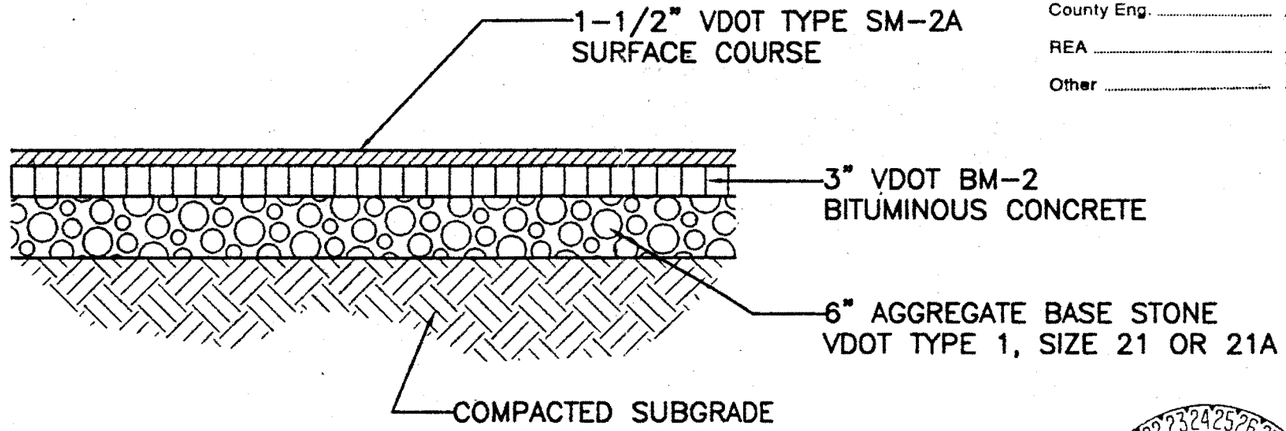
FILENAME: SP96SDCL.DWG
DATE: 9-26-96
PLOT SCALE: 1" = 30'

WC012_WILLIAMSBURG_PEANUT_FACTORY - 005

W Foods 483

Fire Dept	
Health Dept	
VDOT	
Planning	
Environ	
Zoning Adm.	
JCSA	
County Eng.	
REA	
Other	





PAVEMENT PATCH-SECTION

NOT TO SCALE

JUL 2002
RECEIVED
PLANNING DEPARTMENT

SP-093-02

WC012

WARNING – AS THE FIRST STEP IN CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND DETERMINING THE SIZE OF THE EXISTING WATER, SEWER, GAS, ELECTRICAL, TELEPHONE, STORM DRAINAGE AND LOCATING ALL OTHER UTILITIES WHICH COULD AFFECT THE PROPOSED CONSTRUCTION. IF CONDITIONS ARE DIFFERENT FROM THOSE SHOWN ON THE PLANS, NOTIFY THE ENGINEER IMMEDIATELY.

STOP

NOTIFY
MISS UTILITIES AT
1-800-552-7001
FOR LOCATION OF
EXISTING UTILITIES

20 10 0 20 40
scale feet

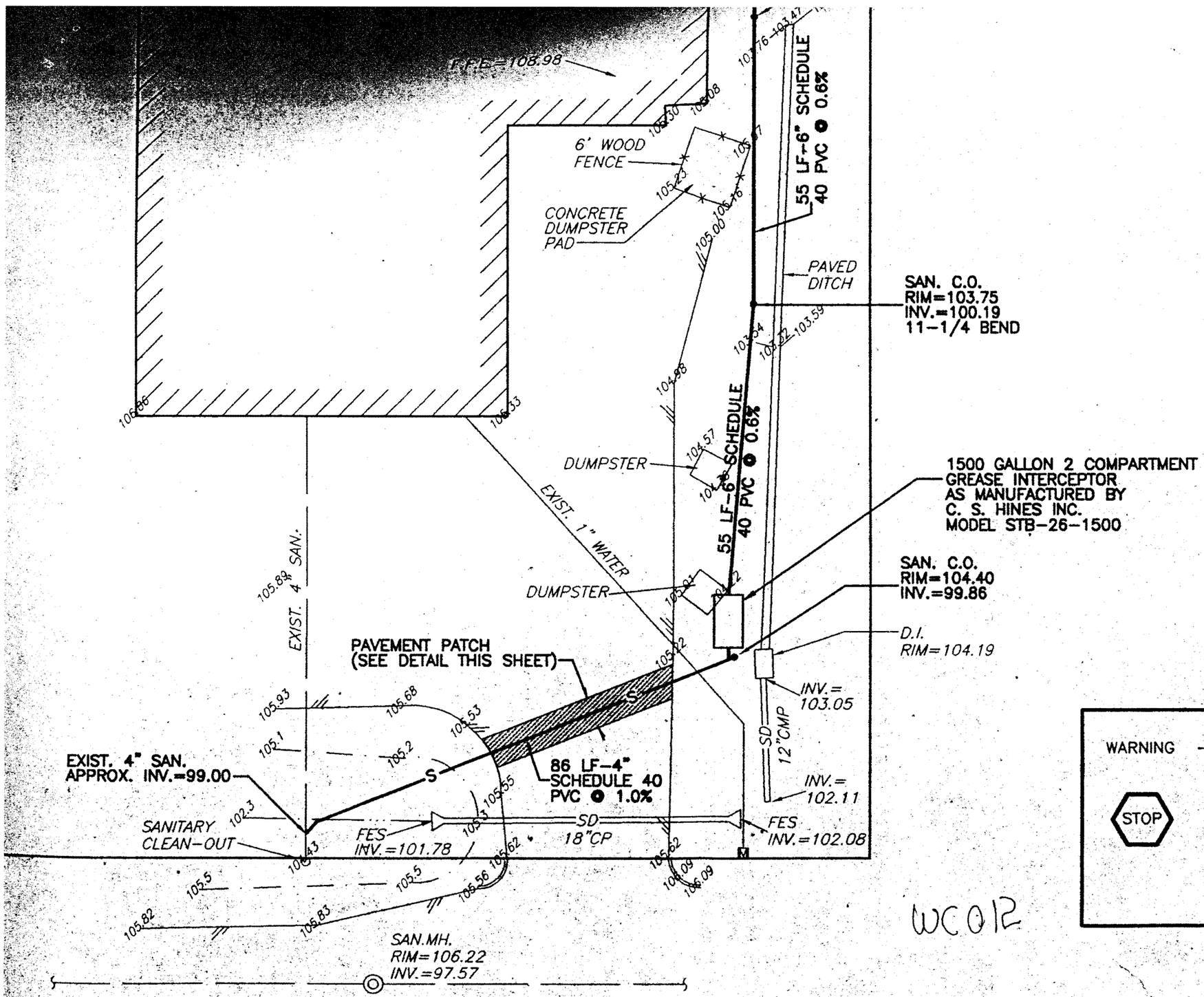
SEWER MODIFICATIONS
THE PEANUT SHOP OF WILLI
WILLIAMSBURG, VIJRGINIA
TAX MAP NO. (12-4) (01-0-0016-F)

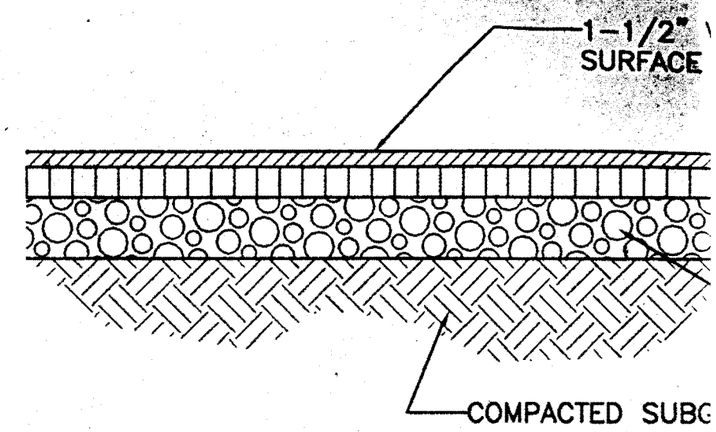
PROJ No:	2211.00.02
DATE:	07/18/02
SCALE:	1"=20'
DESIGN:	CRE
DRAWN:	SPR

SHEET NO.
1
1 OF 1

2211TOPO.DWG
2211.00.02

PROPOSED OIL/GREASE TRAP





PAVEMENT PATCH-SECTION

NOT TO SCALE

WC012

WARNING – AS THE FIRST STEP IN CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND DETERMINING THE SIZE OF THE EXISTING WATER, SEWER, GAS, ELECTRICAL, TELEPHONE, STORM DRAINAGE AND LOCATING ALL OTHER UTILITIES WHICH COULD AFFECT THE PROPOSED CONSTRUCTION. IF CONDITIONS ARE DIFFERENT FROM THOSE SHOWN ON THE PLANS, NOTIFY THE ENGINEER IMMEDIATELY.

STOP

U. S. ROUT
160' R/

RECORD MERIDIAN
PB 50 ; PG 82

N 16° 45' 10" E, 2

NOTE: SLOPE FROM COUNTY DRAINAGE MAP RICKMOND ENGINEERING JOB 92128 SHT. 1 (FILE SP-G-92)

SCALE: 1" = 50'

20'

EXIST & NEW AREA DRAIN TO CULVERT

BERM ALONG PROPRATY LINE

LOT LINE HEREBY EXTINGUISHED

20'

NEW PARCEL 4A
113,996 SQ. FT.
2.62 AC.

398.85'

400.00'

SLOPE 2.5% MAX.

UNIMPROVED

NEW 12" RCP S= 0.44%

104.25

103.75

NEW BLDG

EXIST BLDG.

RIDGE LINE

PARCEL 4
15.50 AC.

N 73° 14' 50" W

S 73° 14' 50" E

PARCEL 5

PARCEL 4A-1
1.15 AC.
TM (12-4)
(1-16G)

DENSE GRASS

PARCEL 4A
1.47 AC.
TM (12-4)
(1-16F)

EXISTING DETENTION BASIN

MIN. BLDG. SETBACK LINE

GRAVEL ASPHALT

GRASS

50'

342.8' TO PC OF RTE. 754

S 16° 45' 10" , 273.30'

10' SLOPE, DRAINAGE & UTILITY EASEMENT

HANKINS INDUSTRIAL PARK ROAD
50' R/W

Δ = 11° 14' 41"

JSTRIAL
'ORATION

JSTRIAL
'ORATION

WC012_WILLIAMSBURG_PEANUT_FACTORY - 008

NOTES: 1. PROPERTY SERVED BY PUBLIC WATER AND SEWER.

P.O. Box 3505
Williamsburg, Virginia 23187
(804) 253-0673
Fax (804) 253-2319

PROJECT Williamsburg Foods

DATE 8/6/96 COMM NO. 1960550

CAL TCR CKD PAGE # -

TITLE DRAINAGE CALCULATIONS

WILLIAMSBURG FOODS WAREHOUSE EXPANSION

SITE PLAN

DRAINAGE CALCULATIONS

BUILDING EXPANSION
WC012

P.O. Box 3505
Williamsburg, Virginia 23187
(804) 253-0673
Fax (804) 253-2319

PROJECT Williamsburg Foods Warehouse

DATE 8/6/96 COMM NO. 1960550

CAL TCR CKD _____ PAGE # 1

TITLE Drainage Calculations

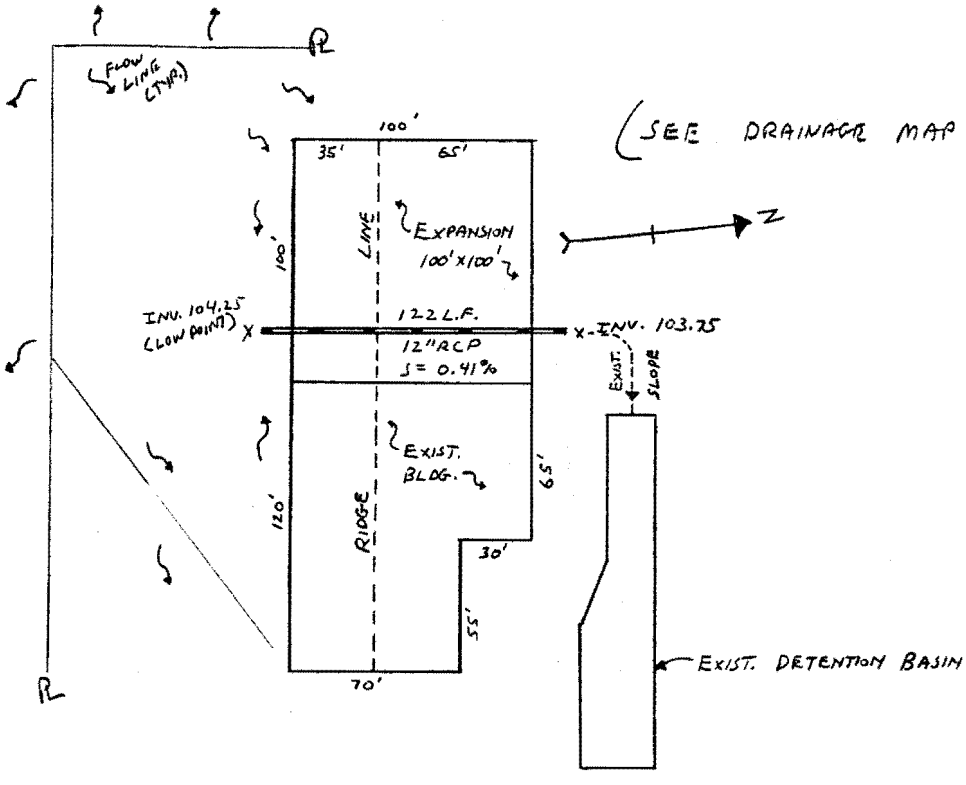
NOTE: 1. ORIGINAL SITE PLAN FOR WILLIAMSBURG PEANUT FACTORY RECEIVED FINAL APPROVAL ON 8/13/90 (CASE NO. SP-39-90). THIS INCLUDED 10,350 S.F. OF INITIAL CONSTRUCTION AND 10,000 S.F. OF EXPANSION.

2. THE SITE PLAN WAS AMMENDED IN 1992 TO ALLOW AN ADDITIONAL 328 S.F. OF FLOOR SPACE. FINAL APPROVAL WAS RECEIVED ON 2/25/92 (CASE NO. SP-6-92).

3. THIS SITE PLAN SUBMISSION IS FOR THE CONSTRUCTION OF THE 10,000 S.F. ADDITION TO THE WEST SIDE OF THE EXISTING WAREHOUSE.

4. DRAINAGE CALCULATIONS FOR SP-39-90 AND SP-6-92, MADE BY RICKMOND ENGINEERING, INC. ARE ATTATCHED.

5. DRAINAGE CALCULATIONS THAT FOLLOW ARE FOR CONVEYANCE OF RUNOFF FROM THE ROOF (SOUTH OF RIDGE) AND PORTION OF GRASS AREA SOUTH OF THE BUILDING TO THE EXISTING DETENTION BASIN NORTH OF THE BUILDING.



(SEE DRAINAGE MAP p. 3)

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Fax (804) 253-2319

PROJECT Williamsburg Foods Warehouse

DATE 8/6/96 COMM NO. 1960550

CAL TCR CKD PAGE # 2

TITLE Drainage Calculations

AREA TO INLET: ROOF $35' \times 220' \times \frac{1 \text{ ACRE}}{43{,}560 \text{ SF}} = 0.18$ Ac. (20%) C = 0.90 (AREA 2)

GRASS $30{,}725 \text{ SF} \times \frac{1 \text{ ACRE}}{43{,}560 \text{ SF}} = 0.71$ Ac (80%) C = 0.25 (AREA 1)

$\overline{CA} = (.20 \times .9 + .80 \times .25) \times .89 \text{ Ac} = .338$

LO = 220', SLOPE ≈ 2.5% ⇒ t_c = 19 MIN

∴ i_{2yr} = 3.5"/HR

i_{10yr} = 4.5"/HR

$q_{2yr} = .338 \times 3.5 = 1.18$ cfs

$q_{10yr} = .338 \times 4.5 = 1.52$ cfs

CAP. 12" RCP @ .003 = 2.1 cfs, V = 2.76 fps
" " " @ .005 = 2.71 cfs, V = 3.56 fps
} SEE ATTACHED

∴ 12" RCP @ .0041 → OK

12" PIPE AT 0.5% MAX. CAPACITY

```
     MANNING'S EQUATION                    Circ  Rec/Trap/Tria
                                            1          2            MAN> 1

  Units(0=ft, 1=m)=  <0>                      Area (sq ft)          =    0.76
  Depth (ft)      =  <.93>                 -> Velocity (ft/s)       =    3.56
-> Discharge (cfs) =  <2.71>  <---            Froude Number         =    0.51
  Manning's n     =  <.013>                   Critical Depth (ft)   =    0.71
  Slope(decimal)  =  <.005>                   Normal Depth (ft)     =    0.93/
  Diameter (in)   =  <12>                     Hydraulic Radius (ft)=     0.29
                                              Depth to Centroid(ft)=     0.44
  Enter '-' for unknown                       Top Width (ft)        =    0.51

  2 to output to file :: 1 to send to LP :: <CR> to display on screen ?
```

12" PIPE AT 0.3% MAX. CAP.

```
     MANNING'S EQUATION                    Circ  Rec/Trap/Tria
                                            1          2            MAN> 1

  Units(0=ft, 1=m)=  <0>                      Area (sq ft)          =    0.76
  Depth (ft)      =  <.93>                 -> Velocity (ft/s)       =    2.76
-> Discharge (cfs) =  <2.1>   <---            Froude Number         =    0.40
  Manning's n     =  <.013>                   Critical Depth (ft)   =    0.62
  Slope(decimal)  =  <.003>                   Normal Depth (ft)     =    0.93/
  Diameter (in)   =  <12>                     Hydraulic Radius (ft)=     0.29
                                              Depth to Centroid(ft)=     0.44
  Enter '-' for unknown                       Top Width (ft)        =    0.51

  2 to output to file :: 1 to send to LP :: <CR> to display on screen ?
```

WILLIAMSBURG PEANUT FACTORY
SITE PLAN

RUNOFF ANALYSIS

RICKMOND ENGINEERING INC.

REV. 6/8/90 WTH

PROJECT NO. 90124

RUNOFF ANALYSIS
WILLIAMSBURG PEANUT FACTORY
SITE PLAN

James City County, Virginia
May 1, 1990

INTRODUCTION

This runoff analysis report has been prepared in accordance with the James City County, James City Service Authority Design Manual for Runoff Analysis Reservoir Protection Overlay District (R.P.O.D.). This report is a supplement to the design documents for the referenced project which indicates the design details and locations of reservoir protection features.

DESCRIPTION

Engineered Building Structures of Virginia Site is located on a 1.47 acre site off of Hankins Industrial Park Road, in the Hankins Industrial Park in Toano, Virginia. The entire parcel is located in the R.P.O.D. and is currently zoned M-2.

The project consists of the erection of a 10,350 square foot warehouse, 10,000 square feet future expansion and 7,405 square feet of gravel parking area, sidewalk, and miscellaneous site improvements. Approximately 32% of the site will be developed. Clearing will be kept to a minimum.

At present the area drains to a low spot in the center of the property. After development, the area will drain northeasternly towards a ditch which runs along Hankins Industrial Park Road. The topography of the area consists of gentle slopes of 2 - 5%. The soils on the site are classified as Kempsville Emporia fine sand and Slagle fine sandy loam as indicated in the USDA Soil Conservation Service and VPI and SU. Permeability in these Slagle soils is moderate in the upper regions of the subsoil and moderately slower in the lower regions. The erosion hazard in these classification of soils is moderate.

RUNOFF CHARACTERISTICS

The method used for estimating peak runoff rates and volumes is the "Rational Method". The loading volumes for sediment and phosphorous were based on the rates tabulated in the Design Manual for Runoff Analysis.

RUNOFF AND POLLUTION CONTROL

A detention pond designed to hold the one inch of runoff from the impervious surfaces and the predeveloped runoff from the 2 year storm will be constructed on site. This pond will be used for temporary storage, infiltration, and settling of the runoff pollutants. A removal efficiency of 75% reduction for suspended soils (sediment) and phosphorous will be anticipated.

All erosion and sediment control measures will be employed during the construction of the detention pond. The control measures will be installed in accordance with the 1980 Virginia Erosion and Sediment Control Handbook and the James City County Code Compliance Department.

The runoff from the roof will drain into 4" black plastic pipes that lead to the detention pond.

RICKMOND ENGINEERING, INC.
1643 C Merrimac Trail
WILLIAMSBURG, VIRGINIA 23185
(804) 229-1776
(804) 875-1785

JOB 90124 - Lot 4A
SHEET NO. 1 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

Design of Detention Pond
Hankins Industrial Park
Lot 4A

A. Per SCS's Soil Survey of James City and York Counties and the City of Williamsburg Virginia "Soil in the area of the project is Kempsville - Emporia fine sand and slagle fine sandy loam.

B Runoff Determination - Rational Method

1.) Pre - Development

$Q = CAi$

$C = .25$

$A = 1.47$ Ac.

i: O.L. = 228

Slope = 1.6 %

$T_c = 22$ min.

$i_2 = 3.20$ in/hr plate 5-3

$Q = CAi = (.25)(1.47)(3.20) = 1.18$ cfs

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JOB 90124 - Lot 4A
SHEET NO. 2 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

2) Post Development

	C	A	CA
Gravel	.90	.17	.15
Rooftop	.90	.47	.42
grass	.25	.83	.21
		1.47	.78

$$c = \frac{CA}{A} = \frac{.78}{1.47} = .53$$

C = .53
A = 1.47 Ac

Overland: Length = 50'
Slope = 1.00%
Tc = 8.5 min
Tc = 13 min

Ditch: L = 280'
H = 1.75'
Tc = 4.5 min

i_2 = 4.1 in/hr

$$Q_2 = CAi = (.53)(1.47\ Ac.)(4.1) = 3.19 \text{ cfs}$$

$$Q_{10} = CAi = (.53)(1.47\ Ac.)(5.3) = 4.13 \text{ cfs}$$

Post development average takes into account future additional building.

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JOB 90124 - Lot 4A
SHEET NO. 3 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

c. Determination of Non-Point Pollution rates for sediment and phosphorus.

1.) Sediment

a) Pre-Development - Table 2-1, Idle land, Sandy loam

Annual loading rate = .01 tons/Ac/Yr.

Loading rate Lo+4A = .01(tons/Ac/Yr)(1.47 Ac) = .015 $\frac{tons}{Yr.}$

b) Post-Development - Table 2-1, Industry (Median Imper.) Sandy loam

Annual loading rate = .16 tons/Ac/Yr.

Loading rate Lo+4A = .16(tons/Ac/Yr.)(1.47 Ac) = .235 $\frac{tons}{Yr.}$

2.) Total Phosphate

a) Pre-Development - Table 2-2, Idle land, Sandy loam

Annual loading rate = 0.1 lbs/Ac/Yr

Loading rate Lo+4A = 0.1 lbs/Ac/Yr(1.47 Ac = .147 $\frac{lbs}{Yr}$

b) Post-Development - Table 2-2, Industry (Median Imper.) Sandy loam

Annual loading rate = 1.2 lbs/Ac/Yr

Loading rate Lo+4A = 1.2 lbs/Ac/Yr(1.47 Ac) = 1.764 $\frac{lbs}{Yr}$

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JOB 90124 - Lot 4A
SHEET NO. 4 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

D. Total impervious area

Area = .17 Ac (gravel) + .47 Ac (roof) = .64 Ac = 27,878.4 ft²

E. Total volume of water from 1" of runoff

$$V = \left(\frac{1\,in}{1/12\,ft}\right)\left(27{,}878.4\,ft^2\right) = 2323.2\,cf$$

Building and gravel lot = 44 % of total area

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JOB 90124 - Lot 4A
SHEET NO. 5 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

F. Determine Remaining volume of water to be retained

1) Allowable Discharge
Q pre = 1.18 cfs

2) Dev. Tc
Tc = 13 min

3) Peak Discharge
Qpost = 3.19

1	0.78	CA FOR DEVELOPED SITE				VII	130 =a	
2	13.00	TC DEV.					19 =b	
3	1.18	Q OUT					Richmond,Va.	
4	Q(in)	T(D)	i	R/O Vol	D/C Vol	Storage		
5	2.98	15	3.82	3266	1221	2044		4.06
6	2.60	20	3.33	3627	1398	2229		
7	2.30	25	2.95	3906	1575	2331		
8	2.07	30	2.65	4128	1752	2376		
9	1.88	35	2.41	4310	1929	2380*		
10	1.72	40	2.20	4460	2106	2354		
11	1.58	45	2.03	4587	2283	2303		
12	1.47	50	1.88	4695	2460	2235		
13	1.37	55	1.76	4789	2637	2152		
14	1.28	60	1.65	4871	2814	2057		
15	0.93	90	1.19	5205	3876	1329		
16	0.73	120	0.94	5395	4938	456		
17	0.60	150	0.77	5517	6000	-483		
18	0.51	180	0.65	5602	7062	-1460		
19	0.44	210	0.57	5666	8124	-2459		
20	0.39	240	0.50	5714	9186	-3472		

V = 2380 cf

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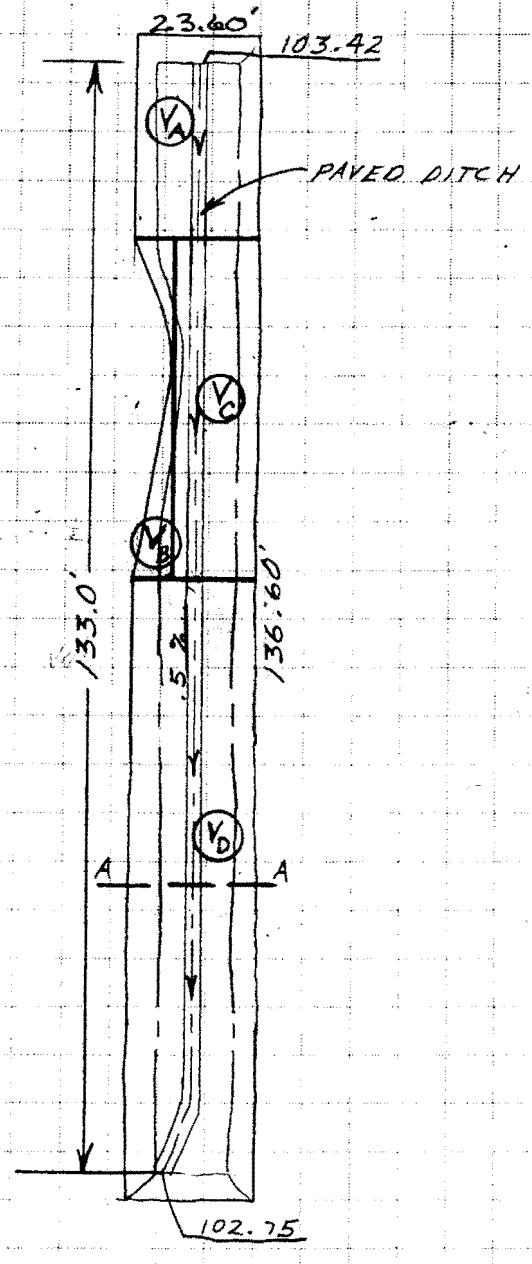
JOB 90124 - Lot 4A
SHEET NO. 6 OF 8
CALCULATED BY WTH DATE 4/24/90
CHECKED BY KJ DATE 4/25/90
SCALE



$$V_A = \frac{H}{4}(L_1 + L_2)(W_1 + W_2)$$

$$V_A = \frac{.9}{4}(23.8 + 22)(23.6 + 20) = 449 \text{ cf}$$

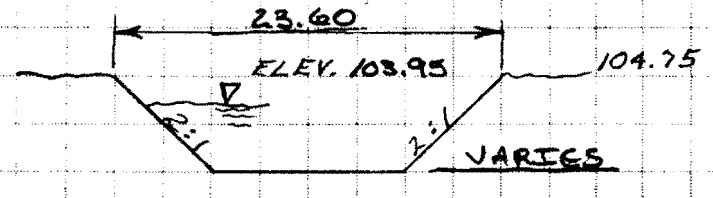
$$V_B = \frac{.9}{4}(32 + 32)(12.5 + 10.7) = 334 \text{ cf}$$

$$V_C = \frac{.9}{4}(64 + 64)(11.1 + 9.3) = 558 \text{ cf}$$

$$V_D = \frac{.9}{4}(52.8 + 51)(23.6 + 20) = 1018 \text{ cf}$$

TOTAL 2389 cf Total

$V_{A\ prev.}$ = 449 cf
Now - 449 cf



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JOB 90124 - Lot 4A
SHEET NO. 7 OF 8
CALCULATED BY WTH DATE 4/24/90
CHECKED BY KJ DATE 4/25/90
SCALE

* 1) Determine orifice diameter to release 1" of runoff over 24 hr:

$\forall = 2380$ cf

$Q_R = 24$ hr - release rate $= \frac{2380 \text{ cf}}{24 \text{ hr}} \Big| \frac{1 \text{ hr}}{3600 \text{ s}} = .0275$ cfs

H for storage of 2380 is .90' @ Elev 103.95

$h = (2/3)(H) = (2/3)(.90) = .60$

$Q = CA\sqrt{2gh}$

$.0275 = .62\,A\sqrt{2(32.2)(.60)}$

$.0275 = .62\,A\sqrt{38.64}$

$.0275 = 3.85\,A$

$A = .0071' = \pi r^2$

$r = .048' = .57''$ $\Longrightarrow$ use 1⅛" diameter orifice

* 1) Note: The 2yr storm (2380 cf) storage is slightly greater than the 1" of runoff (2323 cf) storage so we will release the 2yr storm over 24 hrs.

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JOB 90124
SHEET NO. 8 OF
CALCULATED BY KMJ DATE 4/25/90
CHECKED BY KJ DATE 4/25/90
SCALE

2) Determine Outlet Pipe to pass 10yr storm

$Q_{10} = 4.13 cfs$ $h = 1.52$

$Q = CA\sqrt{2gh}$

$4.13 = .62A\sqrt{2(32.2)(1.52)}$

$A = .6733$

$\pi r^2 = .6733$

$r = .46' = 5.56''$ Use 12" CMP

Williamsburg Peanut Factory

5 – 247 ft^3 rem

6 min. 0 rem.

Ditch = 1 cfs × 60 × 4 = 240 ft^3 2323

+24

10 min. – 2832 266 ft^3 → +

– 266

2566

Try SCS approach

– 1" runoff imp. surfaces –

82 = RCN

Runoff – from 3.5" = 1.77"

store 1" for 24 hrs.

leaves 0.77" to control

.77" × 1.47 ac = 4108 ft^3

release @ 1 cfs

$\frac{V_s}{V_r} \approx \frac{}{0.77"}$ $\frac{Q_o}{Q_i} = \frac{1.2}{3.2} \Rightarrow .375$

↳ .365 × .77 = .28" = 1500 ft^3 + 2323 = 3823 ft^3 total

Q_2 – V_s = 2430 ft^3 Q_{OUT} = 1.18 cfs

1" – V_s = 2323 ft^3 Q_{out} = 0.03 cfs

To control Q_2 – 0.03 cfs = 5510 ft^3

$Q_{weir} = CLH^{3/2} = 2.7 \times 2 \times H^{3/2} =$ .1" .17 cfs need 4590 ft^3

.3 .91 need 2880 ft^3

WATERSHED	WC	MAINTENANCE PLAN	No	CTRL STRUC DESC	DI Structure
BMP ID NO	012	SITE AREA acre	2.62	CTRL STRUC SIZE inches	
PLAN NO	SP-39-90	LAND USE	Limited Business	OTLT BARRL DESC	CMP
TAX PARCEL	(12-4)(1-16F)	old BMP TYP	Dry Detention	OTLT BARRL SIZE inch	12
PIN NO	12401000016F	JCC BMP CODE			
CONSTRUCTION DATE	6/8/1990	POINT VALUE	4	EMERG SPILLWAY	No
PROJECT NAME	Williamsburg Peanut Factory			DESIGN HW ELEV	104.7
FACILITY LOCATION	8012 Hankins Industrial Park			PERM POOL ELE	na
CITY-STATE	Toano, VA	SVC DRAIN AREA acres	1.47	2-YR OUTFLOW cfs	1.18
CURRENT OWNER	Williamsburg Foods, Inc.			10-YR OUTFLOW cfs	4.13
OWNER ADDRESS	PO Box GN			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Building & Parking Area		
CITY-STATE-ZIP CODE	Williamsburg, VA 23187	IMPERV AREA acres	0.64	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT of Frances Swamp		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	11/29/2001
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	0.64	INTERNAL RATING	3
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	Expanded SP-6-92 & 10,000 sf in 1996.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

Return to Menu

WC012_WILLIAMSBURG_PEANUT_FACTORY - 026

TRANSMITTAL SHEET

ENGINEERING & RESOURCE PROTECTION → STORMWATER

Project: SMITHFIELD SPECIALTY FOODS

County Plan No. SP-050-12

Assigned BMP No.: WC012

BMP Type: DRY SWALE

Information Enclosed:

- ☑ Record Drawings (Asbuilts)
- ☑ Construction Certification
- ☑ Computations
- ☐ Other :

Name: MIKE MASDESKI

Date: 1/23/13

Signature: [signature]

COUNTY OF JAMES CITY, VIRGINIA

COPY

DECLARATION OF COVENANTS
INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

Please type or print legibly in black ink. Covenantor(s) should submit this form to the JCC Engineering and Resource Protection Division, 101-E Mounts Bay Road, Williamsburg, VA 23185.

THIS DECLARATION OF COVENANTS, made this 28th. day of February, 2012, between THE SMITHFIELD PACKING COMPANY, INCORPORATED, and all successors in interest, ("COVENANTOR(S)"), owner(s) of the following property:

Parcel Identification Number(s): 1240100016F
Legal Description(s): Parcel 4A Hankins Industrial Park

Project or Subdivision Name: Smithfield Specialty Foods Group Building Addition
Document/Instrument No(s):
or Deed Book 488, Page No. 094,
and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

I (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, monitoring, 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.

Prepared by (Name, Address & Phone):
The Smithfield Packing Company, Inc.
111 Commerce St.
Smithfield, VA 23430
Attn: Law Department

Return to:
JCC Attorney's Office
101-C Mount's Bay Road
Williamsburg, VA 23185
(757) 253-6612

Instrument No. 120005712
Recorded On: March 14/2012

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) has executed this DECLARATION OF COVENANTS as of the date first above written.

COVENANTOR(S)
THE SMITHFIELD PACKING COMPANY, INC.

By: Len Nicholson
Signature

Len Nicholson, Chief Financial Officer
Print Name and Title

ACKNOWLEDGMENT

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Isle of Wight, to wit:

I hereby certify that on this 29th day of February, 2012, before the subscribed, a Notary Public for the Commonwealth of Virginia, personally appeared Len Nicholson and did acknowledge the foregoing instrument to be his/her Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 29th day of February, 2012.

[SEAL]

Lynn R. Mattox
Notary Public

Notary Registration Number: 338134

My Commission expires: 10-31-2015

Approved as to form:

Klankinsman
County Attorney

Drainage1_pre_doc
(Revised 5-11)

MEB
General Contractors

4016 Holland Boulevard · P.O. Box 6748
Chesapeake, Virginia 23323
Phone 757-487-5858 Fax 757-487-5089

LETTER OF TRANSMITTAL

DATE: 3/8/2012 JOB NO. 12.003

ATTN: Leanne Reidenbach
Luke Vinciguerra

RE: Smithfield Specialty Foods Addition
The Peanut Shop
8012 Hankins Industrial Park
Toano, VA 23168

TO: James City County
Code Compliance
101 E. Mounts Bay Road
Post Office Box 8784
Williamsburg, Virginia 23187

WE ARE SENDING YOU THE FOLLOWING ITEMS

- ☐ Shop Drawings
- ☐ Copy of Letter
- ☐ Prints
- ☐ Change Order
- ☐ Samples
- ☑ See Description Below
- ☐ Specifications

Copies	Date	Spec Section	Description	Comments
1	03/08/12		Smithfield SWM Agreement - Executed	

THESE ARE TRANSMITTED as checked below

- ☐ For Your Records
- ☐ For Your Use
- ☐ As Requested
- ☐ For Review and Comment
- ☐ For Bids Due
- ☐ Approved as Submitted
- ☐ Approved as Noted
- ☐ Returned for Corrections
- ☐ Prints Returned After Loan to Us
- ☑ As Requested
- ☐ Resubmit
- ☐ Submit
- ☐ Return

_____ copies for approval
_____ copies for distribution
_____ corrected prints

REMARKS

VIA

- ☐ UPS Ground
- ☐ U.S. Mail
- ☑ Hand Delivered
- ☐ Facsimile
- ☐ Pick Up
- ☐ Federal Express

SIGNED

Terri Harris, Administrative Assistant

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

Project Name: SMITHFIELD SPECIALTY FOODS GROUP
County Plan No. (List any amendments): SP-002-12
Stormwater Management Facility Type: DRY DETENTION SWALE
BMP Phase #: ☐ I ☐ II ☑ III

- ☑ Information Package Submittal Date: 9/19/12
- ☑ Completeness Check:
  - ☑ Record Drawing Date/By: 9/19/12 G. ZOBY
  - ☑ Construction Certification Date/By: 9/19/12 D. WILL
  - ☑ RD/CC Standard Forms (Ensure that all forms for the BMP type are included)
  - ☑ Insp/Maint Agreement # / Date: 120003712 / 2-28-12
  - ☑ BMP Maintenance Plan Location: ON ASBUILT DRAWINGS
  - ☐ Special Considerations: N/A
- ☑ Standard E&SC Notes on Approved Plan Requiring RD/CC or County comment in plan review
  Location (sheet #):
- ☑ **County BMP ID Code #:** UC012
- ☑ 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: 7/16/12 WAC
- ☑ Record Drawing (RD) Review Date: 7/16/12 WAC
- ☑ Construction Certification (CC) Review Date: 7/16/12 WAC
- ☑ Actions:
  - ☐ No comments.
  - ☑ Comments. Letter Forwarded. Date: 7/10/12
  - ☑ Record Drawing (RD)
  - ☑ Construction Certification (CC)
  - ☑ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other :
- ☑ Resubmittal (# and date): 8/3/12 ALL ADDRESSED AND COMPLETED WAC
- ☑ Re-inspection (if necessary): 8/3/12
- ☑ 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). N/A
- ☑ Add BMP to Municipal BMP list (if a County-owned facility) N/A
- ☑ Add BMP to PRIDE BMP ratings database. N/A

Final Sign-Off

Inspector: [signature] Date: 1/23/13

Chief Engineer: [signature] Date: 1/23/13

*** See separate checklist, if needed.

Stormwater Management/BMP Facilities
Record Drawing and Construction Certification Forms

(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.)

Environmental Division
SEP 20 2012
RECEIVED

Section 1 - Site Information:

Project Name: Smithfield Specialty Foods Group
Structure/BMP Name: Dry Detention Swale
Project Location: Toano, Virginia
BMP Location: Toano, Virginia
County Plan No.: SP-002-12

Project Type:
- ☐ Residential
- ☐ Business
- ☑ Commercial
- ☐ Office
- ☐ Institutional
- ☐ Industrial
- ☐ Public
- ☐ Roadway
- ☐ Other _____

Tax Map/Parcel No.: 1240100016F
BMP ID Code (if known): WC012
Zoning District: M1 Limited Business / Industrial
Land Use: _____
Site Area (sf or acres): 2.62 AC

Brief Description of Stormwater Management/BMP Facility: _____

Nearest Visible Landmark to SWM/BMP Facility: N/A

Nearest Vertical Ground Control (if known):

☑ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other

Station Number or Name: Toano 2
Datum or Reference Elevation: 108.14
Control Description: Standard disk set flush in concrete monument
Control Location from Subject Facility: _____

State Highway 168

Section 2 - Stormwater Management/BMP Facility Construction Information:

Pre-Construction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☑ Unknown
Approx. Construction Start Date for SWM/BMP Facility: April 2012
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☑ Unknown
Name of Site Work Contractor Who Constructed Facility: MEB General Contractors
Name of Professional Firm Who Routinely Monitored Construction: N/A
Date of Completion for SWM/BMP Facility: June 2012
Date of Record Drawing/Construction Certification Submittal: 8-15-2012

(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 Engineering and Resource Protection 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: Williamsburg Foods INC.
Mailing Address: 311 County St, Suite 201, Portsmouth, VA

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: MSA, P.C.
Mailing Address: 5033 Rouse Drive, Virginia Beach, VA 23462

Business Phone: (757) 490-9264
Fax: _____
Responsible Plan Preparer: Douglas Will
Title: Engineer
Plan Name: Site-Plan of Smithfield Specialty Foods Group
Firm's Project No. 11075
Plan Date: 4-3-12
Sheet No.'s Applicable to SWM/BMP Facility: C1.1 / C5.1 / C6.1 / C6.3 / _____

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management/BMP facility.)*

Firm Name: MEB General Contractors
Mailing Address: 4016 Holland Blvd. Chesapeake, VA 23323

Business Phone: (757) 487-5858

Fax: _____
Contact Person: Robert N. Croswell
Site Foreman/Supervisor: _____
Specialty Subcontractors and 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: MSA, P.C.
Mailing Address: 5033 Rouse Drive

Business Phone: (757) 490-9264
Fax: (757) 490-0634
Name: Gregory M. Zoby
Title: Land Surveyor
Signature:
Date: 9/19/2012

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 to the provisions of the approved design plan, specifications design, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
LAND SURVEYOR

(Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: MSA, P.C.
Mailing Address: 5033 Rouse Drive

Business Phone: (757) 490-9264
Fax: (757) 490-0634
Name: Douglas Will
Title: Engineer
Signature:
Date: 9/19/12

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 plan, specifications, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
DOUGLAS M. WILL
Lic. No. 028336
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer

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

☐ Pre-Construction Meeting - Provides an opportunity to review SWM/BMP facility construction, maintenance and operation plans and addresses 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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.)*

XX 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.

XX 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 Engineering and Resource Protection 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.

N/A 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.

N/A 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.

N/A 8. Elevation of the principal spillway crest or outlet crest of the structure.

N/A 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.

N/A 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.

N/A 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.**

N/A 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.

N/A 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.

N/A 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)

VIII. Group F - Extended Dry Detention *(Includes F-1 Timber Walls; and F-2 Dry Extended Detention with Forebay)*

XX F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

XX F2. Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.

N/A F3. Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)

N/A F4. Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.

N/A F5. A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging.

N/A F6. Principal spillway and outlet barrel provided consisting of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

N/A F7. Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.

N/A F8. Low flow orifice, if used, has a minimum diameter of three (3) inches or two (2) inches if internal orifice control was utilized and a small, cage type external trash rack.

N/A F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

N/A F10. Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.

N/A F11. Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.

XX F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

XX F13. Adequate, direct access provided to the facility. Access corridor to facility is at least ten (10) feet wide; slope is less than twenty (20) percent and appropriate stabilization provided for equipment and vehicle use. Access extends to forebay, standpipe and timber wall, as applicable.

N/A F14. No visual signs of undercutting of timber walls or clogging of the low orifice were present.

XX F15. No visual signs of erosion or channel degradation immediately downstream of facility.

XX F16. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

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.)

XX SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

XX SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.

XX SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).

XX SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.

XX SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XI. 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 Engineering and Resource Protection Division specific to the proposed SWM/BMP facility.

MSA, P.C.

Environmental Sciences · Planning · Surveying · Civil & Environmental Engineering · Landscape Architecture

5033 Rouse Drive , Virginia Beach, VA 23462-3708
(757) 490-9264 Office
(757) 490-0634 Fax

16416 Courthouse Road, Eastville, VA 23347
P.O. Box 246, Eastville, VA 23347
Office (757) 414-0234
Fax (757) 678-7882

To	Date	Project Number
James City County Environmental Division James City County Environmental Division 101-E Mounts Bay Road Williamsburg, VA 23187	08/15/2012	11075

Subject
The Peanut Shop

Environmental Division
AUG 21 2012
RECEIVED

We are sending you the following items:

Copies	Date	Description
1	08/15/2012	Response Letter
1	08/15/2012	Checklist
1	08/15/2012	As-Built Survey

- [ ] For your use
- [ ] As requested
- [x] For review & comment
- [ ] Approved as noted
- [ ] Other
- [ ] For recordation
- [ ] For signature
- [ ] For signature and notarization
- [ ] Response required
- [ ] Email
- [x] Mail
- [ ] Deliver
- [ ] Pickup
- [ ] Overnight
- [ ] Via Fax # 757-259-4032

Remarks

Copy To:
Robert Croswell - Mid-Eastern Builders Inc
File

By: Bill Sebring
Title: Survey CADD Technician
Office: Virginia Beach

MSA, P.C.
5033 Rouse Drive, Virginia Beach, VA 23462-3708
Office 757-490-9264 • Fax 757-490-0634
www.msaonline.com

Environmental Sciences • Planning • Surveying • Civil & Environmental Engineering • Landscape Architecture

Environmental Division
AUG 21 2012
RECEIVED

August 15, 2012

James City County, Virginia
Environmental Division
101 Mounts Bay Road
Williamsburg, VA

RE: As-Built of BMP of The Peanut Shop - Smithfield Specialty Foods Group Building Addition. (PIN# 1240100016F), Toano, Virginia.
County Plan No. SP-002-12
County BMP ID Code: WC012
MSA #11075

To Whom it May Concern:

Please find enclosed for review the As-Built Survey of BMP of Smithfield Specialty Foods Group, located in Toano, VA along the east side of Hankins Industrial Park Road (Route 1019).

Thank you for your review. Please feel free to contact me at (757) 490-9264 or email me at bill.sebring@msaonline.com, should you have any questions or concerns.

Sincerely,

Bill Sebring
Survey CADD Technician

CC Robert N. Croswell, MEB General Contractors
File

Environmental Division

AUG 21 2012

Stormwater Management/BMP Facilities
Record Drawing and Construction Certification Forms

RECEIVED

(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: Smithfield Specialty Foods Group
Structure/BMP Name: Dry Detention Swale
Project Location: Toano, Virginia
BMP Location: Toano, Virginia
County Plan No.: SP-002-12

Project Type:
- ☐ Residential
- ☑ Commercial
- ☐ Institutional
- ☐ Public
- ☐ Other
- ☐ Business
- ☐ Office
- ☐ Industrial
- ☐ Roadway

Tax Map/Parcel No.: 1240100016F
BMP ID Code (if known): WC012
Zoning District: M1 Limited Business / Industrial
Land Use:
Site Area (sf or acres): 2.62 AC

Brief Description of Stormwater Management/BMP Facility:

Nearest Visible Landmark to SWM/BMP Facility: N/A

Nearest Vertical Ground Control (if known):

☑ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other

Station Number or Name: Toano 2
Datum or Reference Elevation: 108.14
Control Description: Standard disk set flush in concrete monument
Control Location from Subject Facility:

State Highway 168

Section 2 - Stormwater Management/BMP Facility Construction Information:

Pre-Construction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☑ Unknown
Approx. Construction Start Date for SWM/BMP Facility: April 2012
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☑ Unknown
Name of Site Work Contractor Who Constructed Facility: MEB General Contractors
Name of Professional Firm Who Routinely Monitored Construction: N/A
Date of Completion for SWM/BMP Facility: June 2012
Date of Record Drawing/Construction Certification Submittal: 8-15-2012

(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 Engineering and Resource Protection 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: Williamsburg Foods INC.
Mailing Address: 311 County St, Suite 201, Portsmouth, VA

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: MSA, P.C.
Mailing Address: 5033 Rouse Drive, Virginia Beach, VA 23462

Business Phone: (757) 490-9264
Fax: _____
Responsible Plan Preparer: Douglas Will
Title: Engineer
Plan Name: Site-Plan of Smithfield Specialty Foods Group
Firm's Project No. 11075
Plan Date: 4-3-12
Sheet No.'s Applicable to SWM/BMP Facility: C1.1 / C5.1 / C6.1 / C6.3 / _____

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management/BMP facility.)*

Firm Name: MEB General Contractors
Mailing Address: 4016 Holland Blvd. Chesapeake, VA 23323

Business Phone: (757) 487-5858

Fax: _____
Contact Person: Robert N. Croswell
Site Foreman/Supervisor: _____
Specialty Subcontractors and 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: MSA, P.C.
Mailing Address: 5033 Rouse Drive

Business Phone: (757) 490-9264
Fax: (757) 490-0634
Name: Gregory M. Zoby
Title: Land Surveyor
Signature: [signature]
Date: August 15, 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 to the provisions of the approved design plan, specifications, design, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
LAND SURVEYOR

(Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: MSA, P.C.
Mailing Address: 5033 Rouse Drive

Business Phone: (757) 490-9264
Fax: (757) 490-0634
Name: Douglas Will
Title: Engineer
Signature: [signature]
Date: 8/15/12

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 plan, specifications, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
DOUGLAS M. WILL
Lic. No. 028336
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer

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

☐ Pre-Construction Meeting - Provides an opportunity to review SWM/BMP facility construction, maintenance and operation plans and addresses 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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 Engineering and Resource Protection 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.)*

XX 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.

XX 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 Engineering and Resource Protection 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.

N/A 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.

N/A 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.

N/A 8. Elevation of the principal spillway crest or outlet crest of the structure.

N/A 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.

N/A 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.

N/A 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.**

N/A 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.

N/A 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.

N/A 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)

VIII. Group F - Extended Dry Detention *(Includes F-1 Timber Walls; and F-2 Dry Extended Detention with Forebay)*

XX F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

XX F2. Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.

N/A F3. Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)

N/A F4. Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.

N/A F5. A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging.

N/A F6. Principal spillway and outlet barrel provided consisting of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

N/A F7. Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.

N/A F8. Low flow orifice, if used, has a minimum diameter of three (3) inches or two (2) inches if internal orifice control was utilized and a small, cage type external trash rack.

N/A F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

N/A F10. Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.

N/A F11. Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.

XX F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

XX F13. Adequate, direct access provided to the facility. Access corridor to facility is at least ten (10) feet wide; slope is less than twenty (20) percent and appropriate stabilization provided for equipment and vehicle use. Access extends to forebay, standpipe and timber wall, as applicable.

N/A F14. No visual signs of undercutting of timber walls or clogging of the low orifice were present.

XX F15. No visual signs of erosion or channel degradation immediately downstream of facility.

XX F16. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

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.)

XX SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

XX SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.

XX SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).

XX SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.

XX SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XI. 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 Engineering and Resource Protection Division specific to the proposed SWM/BMP facility.

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
TOANO, VIRGINIA

LEGEND

SYMBOL/ABREVIATION	DESCRIPTION
SSMH, STMH	MANHOLE
SCO	SANITARY CLEANOUT
WV	VALVE
WM	WATER METER
FH	FIRE HYDRANT
WELL	WELL
DI	DROP INLET
CI	CURB INLET
GM	GAS METER
PP	POWER POLE
LP	LIGHT POLE
LP	STREET LIGHT
CATV, TEL	PEDESTAL
	CURB AND GUTTER
X X	FENCE
	PROPERTY LINE
	BUILDINGS
ST	STORM SEWER
SS	SANITARY SEWER
	WATER
OHE UGE / OHT UGT	ELECTRIC & TELEPHONE LINE
	TRAFFIC BOX
	SIGN
	MAIL BOX
	TREE
	BUSH/HEDGE
	PAVEMENT
CONC	CONCRETE
	TEMPORARY BENCHMARK(TBM)
10.00	ELEVATIONS
100.00	PROPOSED GRADES
100.00	FIELD AS-BUILT GRADES
TC 10.00 9.50	TOP OF CURB ELEVATIONS
	WATER LINE TEE
	WATER LINE REDUCER
	WATER LINE PLUG
	VERTICAL BEND IN WATER LINE
BOV	BLOW OFF VALVE
	WATER VAULT
SS	SANITARY SEWER LATERAL
	SANITARY SEWER WYE
W	WATER SERVICE LINE
	HORIZONTAL BEND
SCO	PROPOSED SANITARY CLEANOUT

SHEET INDEX

COVER SHEET

AS-BUILT OF BMP

NOTES

1. THIS PROPERTY APPEARS TO FALL IN FLOOD ZONE 'X' AS SHOWN ON PANEL 51095C0045C OF THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF JAMES CITY COUNTY, VIRGINIA, DATED SEPTEMBER 28, 2007. FLOOD ZONE INFORMATION SHOWN HEREON IS NOT GUARANTEED AND WAS APPROXIMATELY SCALED FROM F.E.M.A. FLOOD MAPS. MSA, P.C., IS NOT A PARTY IN DETERMINING THE REQUIREMENTS FOR THE FLOOD INSURANCE ON THE PROPERTY SHOWN HEREON. FOR FURTHER INFORMATION AND TO CONFIRM THE FLOOD ZONE FOR THIS PROPERTY, CONTACT THE LOCAL COMMUNITY FLOOD OFFICIAL. FLOOD ZONE DETERMINATION IS BASED ON THE FLOOD INSURANCE RATE MAPS AND DOES NOT IMPLY THAT THIS PROPERTY WILL OR WILL NOT BE FREE FROM FLOODING OR DAMAGE.

2. ALL NEW SIGNS SHALL BE IN ACCORDANCE WITH ARTICLE II, DIVISION 3 OF THE JAMES CITY COUNTY ZONING ORDINANCE.

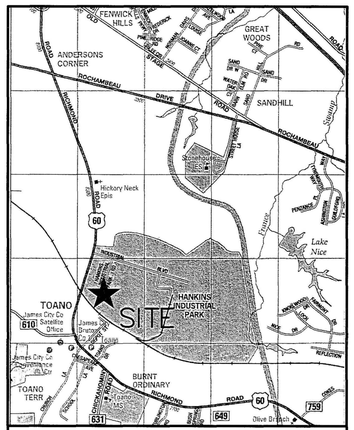
3. ELEVATIONS SHOWN HEREON BASED ON NGVD29 AND WERE ESTABLISHED FROM COUNTY OF JAMES CITY, VIRGINIA VERTICAL CONTROL STATION TOANO ELEVATION=108.14.

4. THIS AS-BUILT SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, GREGORY M. ZOBY, L.S. (LIC. NO. 2991) FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION; THAT THE ORIGINAL DATA WAS OBTAINED ON 6-18-12.

COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
6-18-2012
LAND SURVEYOR

SITE DATA

SITE ADDRESS:		8012 HANKINS INDUSTRIAL PARK ROAD TOANO, VA 23168
TAX MAP ID:		1240100016F
ZONING DISTRICT:		M1
COUNTY WATERSHED AREA:		WARE CREEK
HUC CODE:		Y062
SITE AREA:		2.62 AC
DISTURBED AREA:		1.03 AC
EXISTING IMPERVIOUS AREA:		0.92 AC
PROPOSED TOTAL IMPERVIOUS AREA:		1.36 AC = 52% OF SITE
PROPOSED USE:		CALL CENTER
EXISTING BUILDING AREA:		20,275 SF = 0.47 AC
EXISTING BUILDING HEIGHT:		22 FT
EXISTING BUILDING USE GROUP:		F-1
EXISTING BUILDING CONSTRUCTION TYPE:		2B
PROPOSED BUILDING ADDITION AREA:		6,146 SF = 0.14 AC
PROPOSED BUILDING ADDITION HEIGHT:		16 FT
PROPOSED BUILDING USE GROUP:		B
PROPOSED BUILDING CONSTRUCTION TYPE:		5B
MAXIMUM NUMBER OF EMPLOYEES:		
	EXISTING BUILDING:	20
	PROPOSED CALL CENTER BUILDING:	35
	TOTAL:	55
PARKING REQUIRED: (1 SPACE/2 EMPLOYEES)		28
PARKING PROVIDED:		56
	REGULAR SPACES:	53
	HANDICAP SPACES:	3
	TOTAL:	56
SEWER FLOW:		28
	VDH METHOD:	1.72 GPM (AVG) 4.30 GPM (PEAK) 825 GPD (AVG) 2,063 GPD (PEAK)
	RTS METHOD:	5.50 GPM (AVG) 13.76 GPM (PEAK) 2,642 GPD (AVG) 6,605 GPD (PEAK)
WATER DEMAND:		48 GPM (AVG) 120 GPM (PEAK)
FIRE FLOW DEMAND:		1000 GPM



LOCATION MAP
SCALE : 1"= 2,000'

COPYRIGHT ADC The Map People
Permitted Use No. 21001204

OWNER:	WILLIAMSBURG FOODS, INC 311 COUNTY ST SUITE 201 PORTSMOUTH, VA 23704
CIVIL ENGINEER:	MSA, P.C. 5033 ROUSE DRIVE VIRGINIA BEACH, VIRGINIA 23462 PHONE: (757) 490-9264
RESPONSIBLE LAND DISTURBER::	ATTN: ROBERT N. CROSWELL MEB GENERAL CONTRACTORS 4016 HOLLAND BLVD CHESAPEAKE, VIRGINIA 23323 PHONE: (757) 487-5858 www.mebgc.com

JCC# SP-002-12

BMP ID CODE: WC012

MSA, P.C.
Environmental Sciences • Planning • Surveying
Civil & Environmental Engineering • Landscape Architecture
5033 Rouse Drive, Virginia Beach, VA 23462
757-490-9264 (Ofc) 757-490-0634 (Fax)
www.msaonline.com
Offices in Hampton Roads & Virginia's Eastern Shore

RECORD DRAWING BASED ON INFORMATION AS SURVEYED JUNE 18, 2012 BY MSA, PC

PLAN STATUS

DATE	INITIAL	DESCRIPTION
7-10-12	WGS	1ST AS-BUILT SUBMITTAL
8-15-12	WGS	2ND AS-BUILT SUMITTAL

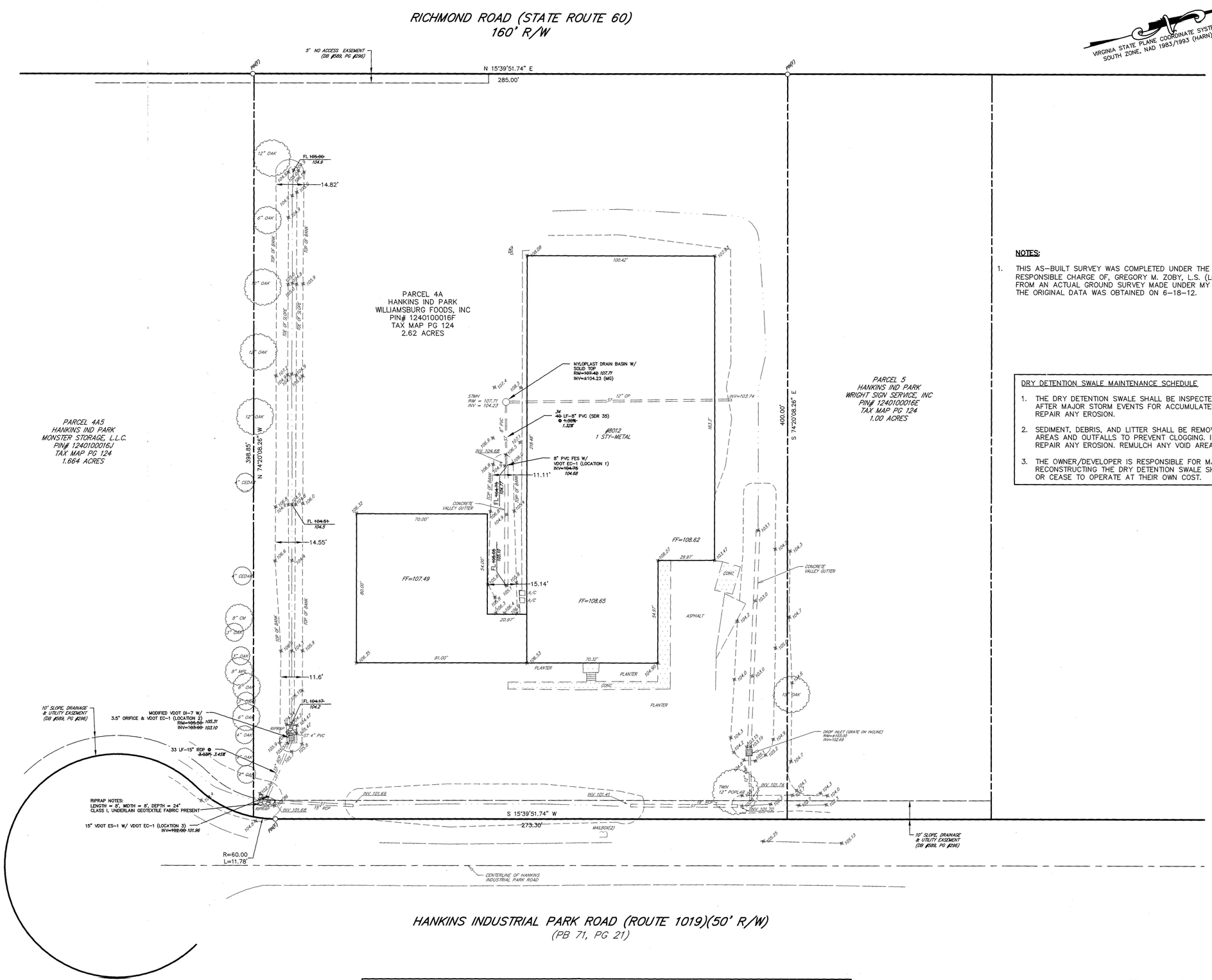
AUG 21 2012

SMITHFIELD SPECIALTY FOODS GROUP BUILDING ADDITION

1

1 of 2 Sheets

PROJ. NO.: 11075



NOTES:

1. THIS AS-BUILT SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, GREGORY M. ZOBY, L.S. (LIC. NO. 2991) FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION; THAT THE ORIGINAL DATA WAS OBTAINED ON 6-18-12.

DRY DETENTION SWALE MAINTENANCE SCHEDULE

1. THE DRY DETENTION SWALE SHALL BE INSPECTED MONTHLY AND AFTER MAJOR STORM EVENTS FOR ACCUMULATED SEDIMENT AND TO REPAIR ANY EROSION.
2. SEDIMENT, DEBRIS, AND LITTER SHALL BE REMOVED FROM THE BASIN AREAS AND OUTFALLS TO PREVENT CLOGGING. INSPECT FOR AND REPAIR ANY EROSION. REMULCH ANY VOID AREAS AS NEEDED.
3. THE OWNER/DEVELOPER IS RESPONSIBLE FOR MAINTENANCE AND RECONSTRUCTING THE DRY DETENTION SWALE SHOULD IT MALFUNCTION OR CEASE TO OPERATE AT THEIR OWN COST.

RECORD DRAWING BASED ON INFORMATION AS SURVEYED JUNE 18, 2012 BY MSA, PC

25 0 25 50
1 INCH = 25 FT

MSA, P.C.
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757-490-9264 (Ofc) 757-490-0634 (Fax)
www.msaonline.com

COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
6-18-2012
LAND SURVEYOR

DESIGNED	MSA
DRAWN	KEJ/ WGS
CHECKED	DMW/ JJV
APPROVED	DMW/ GMZ
DATE	8-2-12

REVISION DATE	REVISION	DESCRIPTION	FIELD AND DRAW. BY

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET 2
2 of 2 Sheets
SCALE: 1" = 25'
PROJ. NO.: 11075

MSA, P.C.
5033 Rouse Drive, Virginia Beach, VA 23462-3708
Office 757-490-9264 • Fax 757-490-0634
www.msaonline.com

Environmental Sciences • Planning • Surveying • Civil & Environmental Engineering • Landscape Architecture

Environmental Division

SEP 20 2012

RECEIVED

September 19, 2012

Attn: William Cain, P.E.

Engineering and Resource Protection
101-E Mounts Bay Road
Williamsburg, VA 23185

RE: As-Built of BMP of "The Peanut Shop" - Smithfield Specialty Foods Group Building Addition. (PIN# 1240100016F), Toano, Virginia.
County Plan No.: SP-002-12
County BMP ID Code: WC012
MSA #11075

Dear Mr. Cain:

In response to your comment letter dated June 18, 2012, MSA, P.C. offers the following acknowledgements:

Record Drawing & Construction Certification:

1.) Acknowledged –Construction Certification has been provided with the submittal.

Construction Certification:

2.) Acknowledged – See response #1.

Record Drawing:

3.) Acknowledged – All drainage items including concrete ditches, pipes, inlets, grates, swales, and check dams are shown with elevations, inverts, rims, and outfalls, and have been provided on the record drawing.

Construction – Related Items:

4.) Acknowledged – Contractor has been informed about the several areas along the northern side of the newly installed swale where scouring has occurred and the ensuing sediment plume has formed in the swale.

5.) Acknowledged – Updated BMP information has been provided on the record drawing.

Thank you for your review. Please feel free to contact me at bill.sebring@msaonline.com, or (757) 490-9264, should you have any questions or concerns.

Sincerely,

Bill Sebring
Survey CADD Technician

CC: MEB General Contractors – Robert N. Croswell
File

MSA, P.C.

Environmental Sciences · Planning · Surveying · Civil & Environmental Engineering · Landscape Architecture

5033 Rouse Drive , Virginia Beach, VA 23462-3708
(757) 490-9264 Office
(757) 490-0634 Fax

16416 Courthouse Road, Eastville, VA 23347
P.O. Box 246, Eastville, VA 23347
Office (757) 414-0234
Fax (757) 678-7882

To	Date	Project Number
William Cain James City County 101 Mounts Bay Road Williamsburg, Virginia 23187-8784	09/19/2012	11075

Subject
The Peanut Shop

Environmental Division

SEP 20 2012

We are sending you the following items:

Copies	Date	Description
1	09/19/2012	Response Letter
2	09/19/2012	As-Built Survey
1	09/19/2012	Checklist

RECEIVED

- [ ] For your use
- [ ] As requested
- [x] For review & comment
- [ ] Approved as noted
- [ ] Other
- [ ] For recordation
- [ ] For signature
- [ ] For signature and notarization
- [ ] Response required
- [ ] Email
- [ ] Mail
- [ ] Deliver
- [ ] Pickup
- [ ] Overnight
- [ ] Via Fax # 757-259-4032

Remarks

Copy To:
Robert Croswell - Mid-Eastern Builders Inc
File

By: Bill Sebring
Title: Survey CADD Technician
Office: Virginia Beach

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
TOANO, VIRGINIA

LEGEND

SYMBOL/ABREVIATION	DESCRIPTION
SSMH, STMH	MANHOLE
SCO	SANITARY CLEANOUT
WV	VALVE
WM	WATER METER
FH	FIRE HYDRANT
WELL	WELL
DI	DROP INLET
CI	CURB INLET
GM	GAS METER
PP	POWER POLE
LP	LIGHT POLE
LP	STREET LIGHT
CATV, TEL	PEDESTAL
	CURB AND GUTTER
X X	FENCE
	PROPERTY LINE
	BUILDINGS
ST	STORM SEWER
SS	SANITARY SEWER
	WATER
OHE UGE / OHT UGT	ELECTRIC & TELEPHONE LINE
	TRAFFIC BOX
	SIGN
	MAIL BOX
	TREE
	BUSH/HEDGE
	PAVEMENT
CONC	CONCRETE
	TEMPORARY BENCHMARK(TBM)
10.00	ELEVATIONS
100.00	PROPOSED GRADES
100.00	FIELD AS-BUILT GRADES
TC 10.00 / 9.50	TOP OF CURB ELEVATIONS
	WATER LINE TEE
	WATER LINE REDUCER
	WATER LINE PLUG
	VERTICAL BEND IN WATER LINE
BOV	BLOW OFF VALVE
	WATER VAULT
SS	SANITARY SEWER LATERAL
	SANITARY SEWER WYE
W	WATER SERVICE LINE
	HORIZONTAL BEND
SCO	PROPOSED SANITARY CLEANOUT

SHEET INDEX

1. COVER SHEET
2. AS-BUILT OF BMP

NOTES

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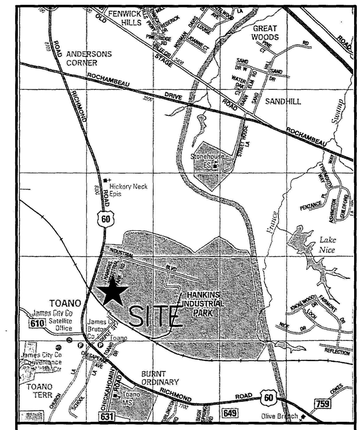
COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
PRELIMINARY
LAND SURVEYOR

SITE DATA

SITE ADDRESS:		8012 HANKINS INDUSTRIAL PARK ROAD TOANO, VA 23168
TAX MAP ID:		1240100016F
ZONING DISTRICT:		M1
COUNTY WATERSHED AREA:		WARE CREEK
HUC CODE:		Y062
SITE AREA:		2.62 AC
DISTURBED AREA:		1.03 AC
EXISTING IMPERVIOUS AREA:		0.92 AC
PROPOSED TOTAL IMPERVIOUS AREA:		1.36 AC = 52% OF SITE
PROPOSED USE:		CALL CENTER
EXISTING BUILDING AREA:		20,275 SF = 0.47 AC
EXISTING BUILDING HEIGHT:		22 FT
EXISTING BUILDING USE GROUP:		F-1
EXISTING BUILDING CONSTRUCTION TYPE:		2B
PROPOSED BUILDING ADDITION AREA:		6,146 SF = 0.14 AC
PROPOSED BUILDING ADDITION HEIGHT:		16 FT
PROPOSED BUILDING USE GROUP:		B
PROPOSED BUILDING CONSTRUCTION TYPE:		5B
MAXIMUM NUMBER OF EMPLOYEES:		
	EXISTING BUILDING:	20
	PROPOSED CALL CENTER BUILDING:	35
	TOTAL:	55
PARKING REQUIRED: (1 SPACE/2 EMPLOYEES)		28
PARKING PROVIDED:		56
	REGULAR SPACES:	53
	HANDICAP SPACES:	3
	TOTAL:	56
SEWER FLOW:		28
	VDH METHOD:	1.72 GPM (AVG)
		4.30 GPM (PEAK)
		825 GPD (AVG)
		2,063 GPD (PEAK)
	RTS METHOD:	5.50 GPM (AVG)
		13.76 GPM (PEAK)
		2,642 GPD (AVG)
		6,605 GPD (PEAK)
WATER DEMAND:		
		48 GPM (AVG)
		120 GPM (PEAK)
FIRE FLOW DEMAND:		1000 GPM



LOCATION MAP
SCALE : 1"= 2,000'

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Permitted Use No. 21001204

Environmental Division
SEP 20 2012
RECEIVED

OWNER: WILLIAMSBURG FOODS, INC
311 COUNTY ST SUITE 201
PORTSMOUTH, VA 23704

CIVIL ENGINEER: MSA, P.C.
5033 ROUSE DRIVE
VIRGINIA BEACH, VIRGINIA 23462
PHONE: (757) 490-9264

RESPONSIBLE LAND DISTURBER:: ATTN: ROBERT N. CROSWELL
MEB GENERAL CONTRACTORS
4016 HOLLAND BLVD
CHESAPEAKE, VIRGINIA 23323
PHONE: (757) 487-5858
www.mebgc.com

JCC# SP-002-12
BMP ID CODE: WC012

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RECORD DRAWING BASED ON INFORMATION AS SURVEYED JUNE 18, 2012 BY MSA, PC

PLAN STATUS

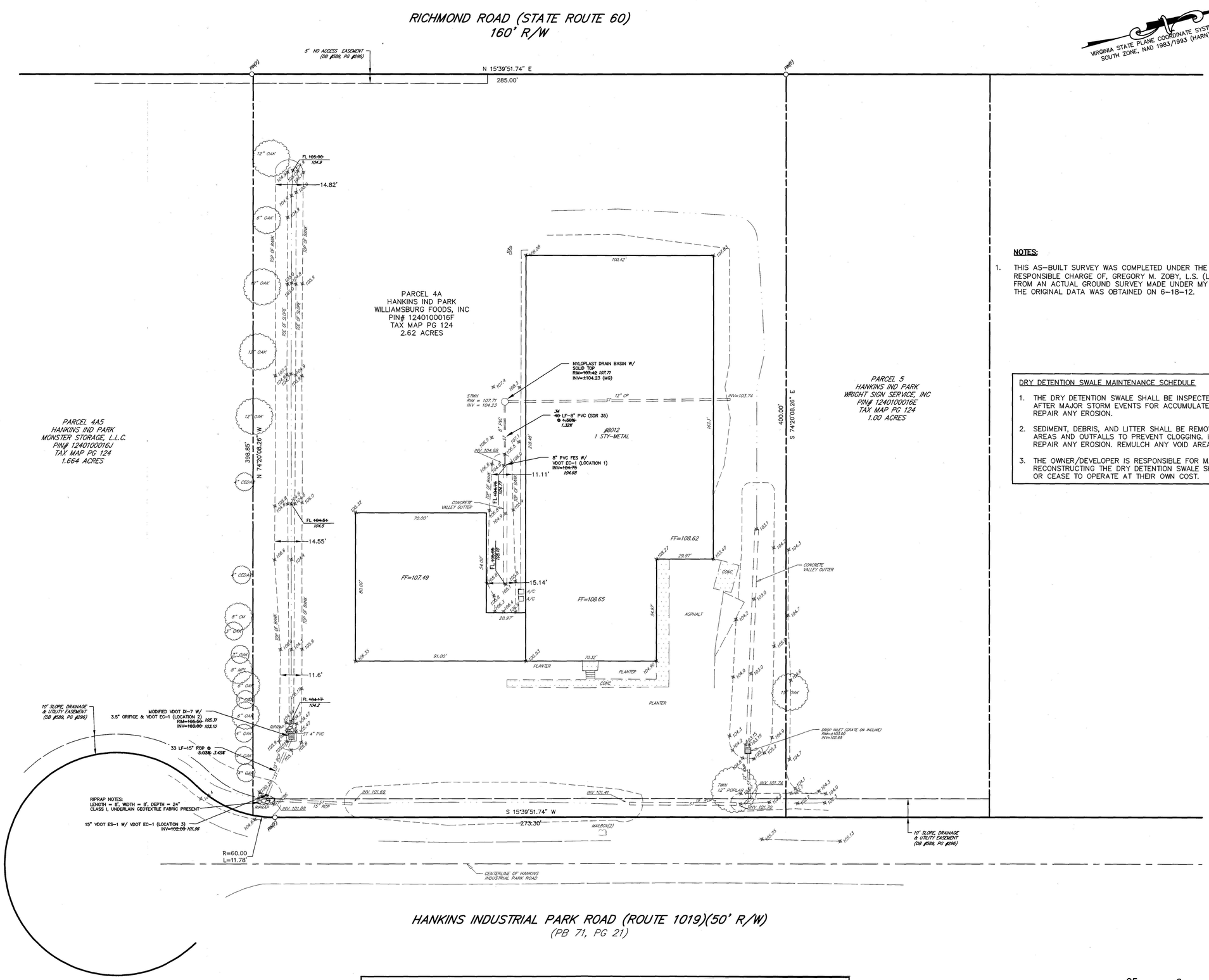
DATE	INITIAL	DESCRIPTION
7-10-12	WGS	1ST AS-BUILT SUBMITTAL
9-19-12	WGS	2ND AS-BUILT SUMITTAL

SMITHFIELD SPECIALTY FOODS GROUP BUILDING ADDITION

1

1 of 2 Sheets

PROJ. NO.: 11075



NOTES:

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DRY DETENTION SWALE MAINTENANCE SCHEDULE

1. THE DRY DETENTION SWALE SHALL BE INSPECTED MONTHLY AND AFTER MAJOR STORM EVENTS FOR ACCUMULATED SEDIMENT AND TO REPAIR ANY EROSION.
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RECORD DRAWING BASED ON INFORMATION AS SURVEYED JUNE 18, 2012 BY MSA, PC

25 0 25 50
1 INCH = 25 FT

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COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
PRELIMINARY
LAND SURVEYOR

DESIGNED	MSA
DRAWN	WGS
CHECKED	JJV
APPROVED	GMZ
DATE	8-2-12

REV. NO.	REV. INITIAL	DESCRIPTION	REVISION DATE

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET 2 of 2 Sheets
SCALE: 1" = 25'
PROJ. NO.: 11075

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
TOANO, VIRGINIA

LEGEND

SYMBOL/ABREVIATION	DESCRIPTION
SSMH, STMH	MANHOLE
SCO	SANITARY CLEANOUT
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COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
PRELIMINARY
AND SURVEY

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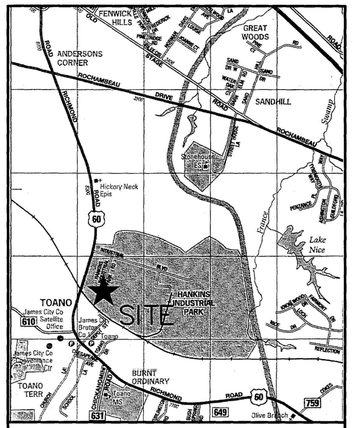

LOCATION MAP
SCALE : 1"= 2,000'

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Environmental Division
SEP 20 2012
RECEIVED

OWNER: WILLIAMSBURG FOODS, INC
311 COUNTY ST SUITE 201
PORTSMOUTH, VA 23704

CIVIL ENGINEER: MSA, P.C.
5033 ROUSE DRIVE
VIRGINIA BEACH, VIRGINIA 23462
PHONE: (757) 490-9264

RESPONSIBLE LAND DISTURBER:: ATTN: ROBERT N. CROSWELL
MEB GENERAL CONTRACTORS
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CHESAPEAKE, VIRGINIA 23323
PHONE: (757) 487-5858
www.mebgc.com

JCC# SP-002-12
BMP ID CODE: WC012

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RECORD DRAWING BASED ON INFORMATION AS SURVEYED JUNE 18, 2012 BY MSA, PC

PLAN STATUS

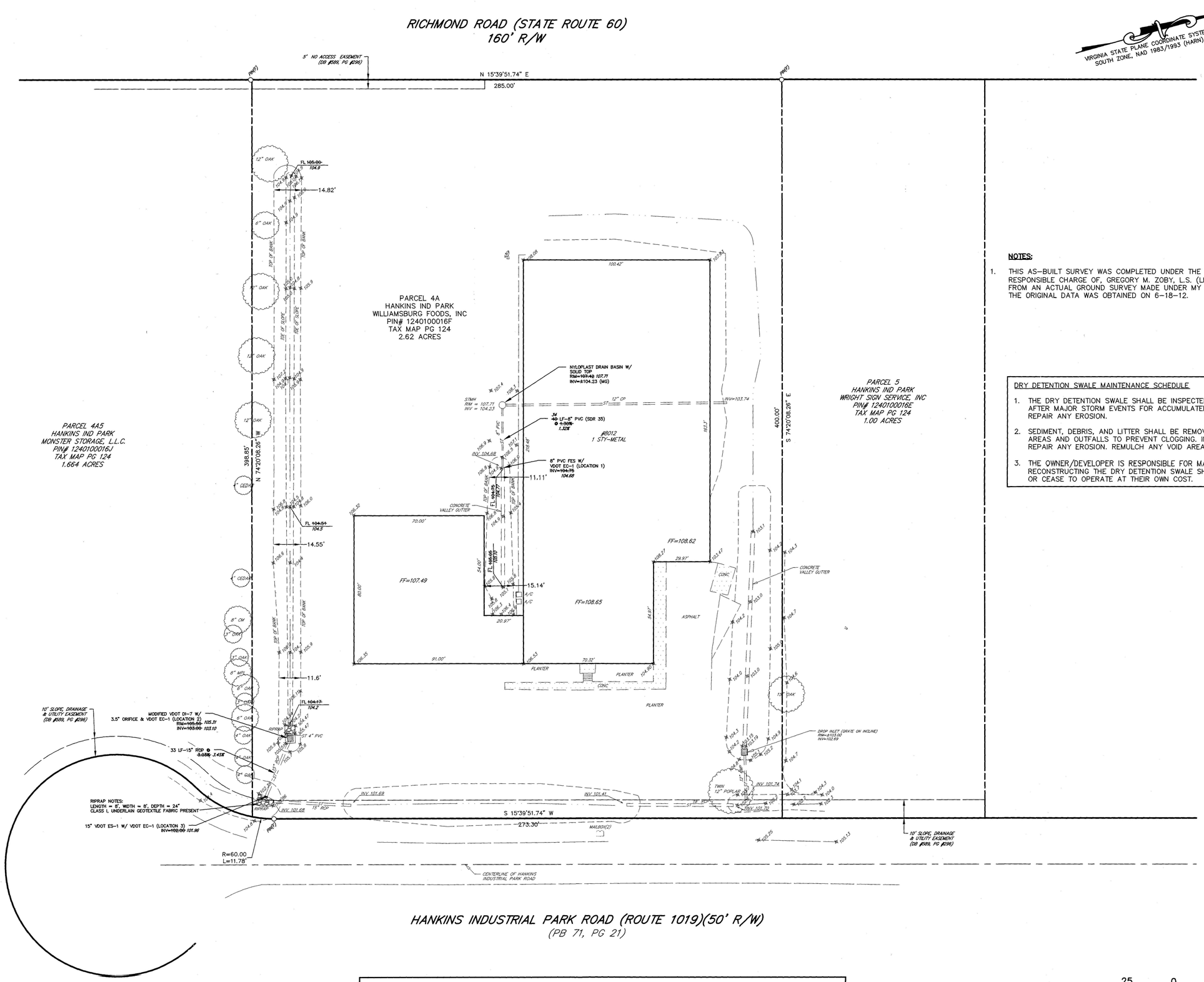
DATE	INITIAL	DESCRIPTION
7-10-12	WGS	1ST AS-BUILT SUBMITTAL
9-19-12	WGS	2ND AS-BUILT SUMITTAL

SMITHFIELD SPECIALTY FOODS GROUP BUILDING ADDITION

1

1 of 2 Sheets

PROJ. NO.: 11075



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1 INCH = 25 FT

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COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
PRELIMINARY
LAND SURVEYOR

DESIGNED	MSA
DRAWN	WGS
CHECKED	JJV
APPROVED	GMZ
DATE	8-2-12

REV. NO.	REV. BY	REVISION	DESCRIPTION	REVISION DATE

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET 2 of 2 Sheets
SCALE: 1" = 25'
PROJ. NO.: 11075

2ND
SUBMITTAL

MSA, P.C.
5033 Rouse Drive, Virginia Beach, VA 23462-3708
Office 757-490-9264 • Fax 757-490-0634
www.msaonline.com

Environmental Sciences • Planning • Surveying • Civil & Environmental Engineering • Landscape Architecture

August 2, 2012

Environmental Division

AUG 03 2012

RECEIVED

James City County, Virginia
Environmental Division
101 Mounts Bay Road
Williamsburg, VA

As-Built of BMP of The Peanut Shop - Smithfield Specialty Foods Group Building Addition. (PIN# 1240100016F), Toano, VA.
County Plan No. SP-002-12
County BMP ID Code: WC012
MSA #11075

To whom it May Concern:

Please find enclosed for review the As-Built Survey of BMP of Smithfield Specialty Foods Group, located in Toano, VA along the east side of Hankins Industrial Park Road (Route 1019).

As per comment letter dated June 18, 2012, from William Cain, P.E. stating a construction certificate is required, please see attached email from Terri Harris with MEB General Contractors for more information.

Also attached is the County comment letter to assist with the review.

Thank you for your review. Please feel free to contact me at bill.sebring@msaonline.com, or at phone# (757) 490-9264, should you have any questions or concerns.

Sincerely,

Bill Sebring
Survey CADD Technician

CC MEB General Contractors – Robert N. Croswell
File

MSA, P.C.

Environmental Sciences · Planning · Surveying · Civil & Environmental Engineering · Landscape Architecture

5033 Rouse Drive , Virginia Beach, VA 23462-3708
(757) 490-9264 Office
(757) 490-0634 Fax

16416 Courthouse Road, Eastville, VA 23347
P.O. Box 246, Eastville, VA 23347
Office (757) 414-0234
Fax (757) 678-7882

To	Date	Project Number
James City County, Virginia Environmental Division 101 Mounts Bay Rd, Williamsburg, VA 23187-8784	08/02/2012	11075

Subject
The Peanut Shop

We are sending you the following items:

Copies	Date	Description
1	08/02/2012	County Comment Letter
2	08/02/2012	As-built Surveys
1	08/12/2012	Letter

Environmental Division
AUG 03 2012
RECEIVED

- [ ] For your use
- [ ] As requested
- [x] For review & comment
- [ ] Approved as noted
- [ ] Other
- [ ] For recordation
- [ ] For signature
- [ ] For signature and notarization
- [ ] Response required
- [ ] Email
- [x] Mail
- [ ] Deliver
- [ ] Pickup
- [ ] Overnight
- [ ] Via Fax #

Remarks

Copy To:
Robert Croswell - Mid-Eastern Builders Inc
File

By: Bill Sebring
Title: Survey CADD Technician
Office: Virginia Beach

Bill Sebring <bill.sebring@msaonline.com>

The Peanut Shop - Smithfield Specialty Foods Group Building Addition

2 messages

Bill Sebring <bill.sebring@msaonline.com> Wed, Aug 1, 2012 at 9:37 AM
To: Terri Harris <tharris@mebgc.com>

Per comment letter dated June 18, 2012 for "The Peanut Shop - Smithfield Specialty Foods Group Building Addition", what is the update with the construction certificate the city/county is asking for?

Thanks,
Bill Sebring

--
Bill Sebring, Survey CADD Technician
MSA, P.C.
5033 Rouse Drive
Virginia Beach, VA 23462-3708
Environmental Sciences • Planning • Surveying
Civil & Environmental Engineering • Landscape Architecture

Office: 757.490.9264
Fax: 757.490.0634
bill.sebring@msaonline.com
http://www.msaonline.com

Virginia DMBE Certified Small Business Enterprise
SBA Certified Veteran Owned Small Business

Environmental Division
AUG 03 2012
RECEIVED

Terri Harris <tharris@mebgc.com> Wed, Aug 1, 2012 at 9:57 AM
To: Bill Sebring <bill.sebring@msaonline.com>

The "Certificate to Construct" is related to James City County Stormwater Facilities. We had completed that application back in March and have been told that the application is your certificate. So for now I think we are good. Fingers crossed.

Thank You,

Terri Harris

Administrative Assistant

MEB General Contractors

Chesapeake Office

757-487-5858 Direct Office

757-487-5089 Fax

www.mebgc.com

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error please notify tharris@mebgc.com.

From: Bill Sebring [mailto:bill.sebring@msaonline.com]
Sent: Wednesday, August 01, 2012 9:37 AM
To: Terri Harris
Subject: The Peanut Shop - Smithfield Specialty Foods Group Building Addition

[Quoted text hidden]

June 18, 1012

Environmental Division
AUG 03 2012
RECEIVED

Kris Jenkins
MSA, P.C.
5033 Rouse Drive
Virginia Beach, VA 23462

Re: The Peanut Shop – Smithfield Specialty Foods Group Building Addition
County Plan No. SP- 002-12
County BMP ID Code: WC012

Mr. Will,

The Engineering and Resource Protection Division has received a record drawing (as-built) for the stormwater management facility for the above referenced project. The record drawing is intended to provide as-built information for the stormwater conveyance system and dry swale situated on the southern portion of the site. Record Drawings (asbuilts) and construction certifications are required for the entirety of the stormwater conveyance and attenuation system which includes any stormwater management/BMP(s) and the associated conveyance system(s). Record drawings and construction certifications must meet established program requirements of both the county engineering and resource protection and stormwater divisions.

Based on our review of the project, record drawing submittal, and concurrent field inspection as performed on July 17, 2012, the following items must be addressed prior to the release of surety and for our division to proceed with the closing out of the project:

Record Drawing & Construction Certification:

1. In accordance with the Note # 21 on Sheet C6.1 of the approved plan set, record drawings (as-builts) and ***construction certifications*** are required for all stormwater management facilities and storm drainage conveyance systems. Record Drawings and Construction Certifications must meet established program requirements of both the County Engineering and Resource Protection and Stormwater Divisions. While a Record Drawing certification was provided to our office for review and approval, information related to a construction certification was not. Prior to project close out and release of the associated bonds and surety for this project, these criteria must be satisfied. Please ensure that appropriate information is provided with the next submittal of the record drawings.

Construction Certification:

2. Please provide a construction certification with the next submittal. This information certifies to the construction and installation of any and all stormwater piping, swales, basins, embankments, and any other stormwater conveyance channel or BMP and that all items were installed to the specification provided in the plan set.

Record Drawing:

3. While record drawing information was provided for the associated project, not all information has been included. Please ensure that with the next submittal, all drainage items including concrete ditches, pipes, inlets, grates, swales, and check dams are shown with elevations, inverts, rims, and outfalls. Please ensure that all items have been installed in accordance with the approved plans and are in a good condition to prevent additional comments from being generated with the next submittal of these record drawings.

Construction - Related Items:

4. There are several areas along the northern side of the newly installed swale where scouring has occurred and the ensuing sediment plume has formed in the swale. Prior to the release of the posted bonds for this project, the areas must be restored and stabilized. It may be necessary to incorporate a design change in these areas to prevent future erosion and the need for perpetual maintenance of these areas.

5. Be advised that construction was not completed at the time of site inspection for these record drawings and that an inspection of the site should be performed prior to resubmittal of this information to minimize the potential for additional comments to be generated with the resubmittal.

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.

Should you have any comments or questions regarding these comments, please contact me at your convenience at 757-253-6702 or via email at wacain@jamescitycountyva.gov.

Sincerely,

William Cain, P.E.
Chief Civil Engineer
Engineering and Resource Protection

cc: Williamsburg Foods, Inc. – via mail
MEB General Contractors- (email:tharris@mebgc.com)
File

\\jccdeptstore\dmo1\DMData\environmental\Projects\AsBuilts\Reviews\Final\SP0212.WC012.0

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
TOANO, VIRGINIA

LEGEND

SYMBOL/ABREVIATION	DESCRIPTION
SSMH, STMH	MANHOLE
SCO	SANITARY CLEANOUT
WV	VALVE
WM	WATER METER
FH	FIRE HYDRANT
WELL	WELL
DI	DROP INLET
CI	CURB INLET
GM	GAS METER
PP	POWER POLE
LP	LIGHT POLE
LP	STREET LIGHT
CATV, TEL	PEDESTAL
	CURB AND GUTTER
X X	FENCE
	PROPERTY LINE
	BUILDINGS
ST	STORM SEWER
SS	SANITARY SEWER
	WATER
OHE UGE / OHT UGT	ELECTRIC & TELEPHONE LINE
	TRAFFIC BOX
	SIGN
	MAIL BOX
	TREE
	BUSH/HEDGE
	PAVEMENT
CONC	CONCRETE
	TEMPORARY BENCHMARK(TBM)
10.00	ELEVATIONS
100.00	PROPOSED GRADES
100.00	FIELD AS-BUILT GRADES
TC 10.00 / 9.50	TOP OF CURB ELEVATIONS
	WATER LINE TEE
	WATER LINE REDUCER
	WATER LINE PLUG
	VERTICAL BEND IN WATER LINE
BOV	BLOW OFF VALVE
	WATER VAULT
SS	SANITARY SEWER LATERAL
	SANITARY SEWER WYE
W	WATER SERVICE LINE
	HORIZONTAL BEND
SCO	PROPOSED SANITARY CLEANOUT

SHEET INDEX

COVER SHEET

AS-BUILT OF BMP

NOTES

1. THIS PROFERTY APPEARS TO FALL IN FLOOD ZONE 'X' AS SHOWN ON PANEL 51095C0045C OF THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF JAMES CITY COUNTY, VIRGINIA, DATED SEPTEMBER 28, 2007. FLOOD ZONE INFORMATION SHOWN HEREON IS NOT GUARANTEED AND WAS APPROXIMATELY SCALED FROM F.E.M.A. FLOOD MAPS. MSA, P.C., IS NOT A PARTY IN DETERMINING THE REQUIREMENTS FOR THE FLOOD INSURANCE ON THE PROPERTY SHOWN HEREON. FOR FURTHER INFORMATION AND TO CONFIRM THE FLOOD ZONE FOR THIS PROPERTY, CONTACT THE LOCAL COMMUNITY FLOOD OFFICIAL. FLOOD ZONE DETERMINATION IS BASED ON THE FLOOD INSURANCE RATE MAPS AND DOES NOT IMPLY THAT THIS PROPERTY WILL OR WILL NOT BE FREE FROM FLOODING OR DAMAGE.

2. ALL NEW SIGNS SHALL BE IN ACCORDANCE WITH ARTICLE II, DIVISION 3 OF THE JAMES CITY COUNTY ZONING ORDINANCE.

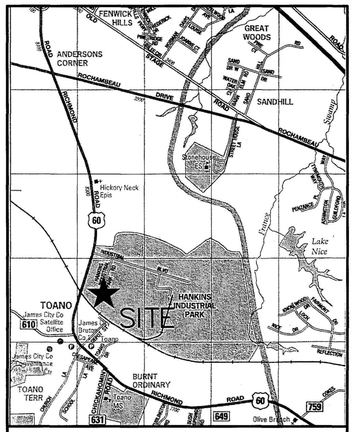
3. ELEVATIONS SHOWN HEREON BASED ON NGVD29 AND WERE ESTABLISHED FROM COUNTY OF JAMES CITY, VIRGINIA VERTICAL CONTROL STATION TOANO ELEVATION=108.14.

4. THIS AS-BUILT SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, GREGORY M. ZOBY, L.S. (LIC. NO. 2991) FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION; THAT THE ORIGINAL DATA WAS OBTAINED ON 6-18-12.

COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
LAND SURVEYOR

SITE DATA

SITE ADDRESS:	8012 HANKINS INDUSTRIAL PARK ROAD TOANO, VA 23168
TAX MAP ID:	1240100016F
ZONING DISTRICT:	M1
COUNTY WATERSHED AREA:	WARE CREEK
HUC CODE:	Y062
SITE AREA:	2.62 AC
DISTURBED AREA:	1.03 AC
EXISTING IMPERVIOUS AREA:	0.92 AC
PROPOSED TOTAL IMPERVIOUS AREA:	1.36 AC = 52% OF SITE
PROPOSED USE:	CALL CENTER
EXISTING BUILDING AREA:	20,275 SF = 0.47 AC
EXISTING BUILDING HEIGHT:	22 FT
EXISTING BUILDING USE GROUP:	F-1
EXISTING BUILDING CONSTRUCTION TYPE:	2B
PROPOSED BUILDING ADDITION AREA:	6,146 SF = 0.14 AC
PROPOSED BUILDING ADDITION HEIGHT:	16 FT
PROPOSED BUILDING USE GROUP:	B
PROPOSED BUILDING CONSTRUCTION TYPE:	5B
MAXIMUM NUMBER OF EMPLOYEES:	
EXISTING BUILDING:	20
PROPOSED CALL CENTER BUILDING:	35
TOTAL:	55
PARKING REQUIRED: (1 SPACE/2 EMPLOYEES)	28
PARKING PROVIDED:	56
REGULAR SPACES:	53
HANDICAP SPACES:	3
TOTAL:	56
SEWER FLOW:	28
VDH METHOD:	1.72 GPM (AVG)
	4.30 GPM (PEAK)
	825 GPD (AVG)
	2,063 GPD (PEAK)
RTS METHOD:	5.50 GPM (AVG)
	13.76 GPM (PEAK)
	2,642 GPD (AVG)
	6,605 GPD (PEAK)
WATER DEMAND:	48 GPM (AVG)
	120 GPM (PEAK)
FIRE FLOW DEMAND:	1000 GPM



LOCATION MAP
SCALE : 1"= 2,000'

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Environmental Division
AUG 03 2012
RECEIVED

OWNER: WILLIAMSBURG FOODS, INC
311 COUNTY ST SUITE 201
PORTSMOUTH, VA 23704

CIVIL ENGINEER: MSA, P.C.
5033 ROUSE DRIVE
VIRGINIA BEACH, VIRGINIA 23462
PHONE: (757) 490-9264

RESPONSIBLE LAND DISTURBER:: ATTN: ROBERT N. CROSWELL
MEB GENERAL CONTRACTORS
4016 HOLLAND BLVD
CHESAPEAKE, VIRGINIA 23323
PHONE: (757) 487-5858
www.mebgc.com

JCC# SP-002-12
BMP ID CODE: WC012

MSA, P.C.
Environmental Sciences • Planning • Surveying
Civil & Environmental Engineering • Landscape Architecture
5033 Rouse Drive, Virginia Beach, VA 23462
757-490-9264 (Ofc) 757-490-0634 (Fax)
www.msaonline.com
Offices in Hampton Roads & Virginia's Eastern Shore

RECORD DRAWING BASED ON INFORMATION AS SURVEYED JUNE 18, 2012 BY MSA, PC

PLAN STATUS

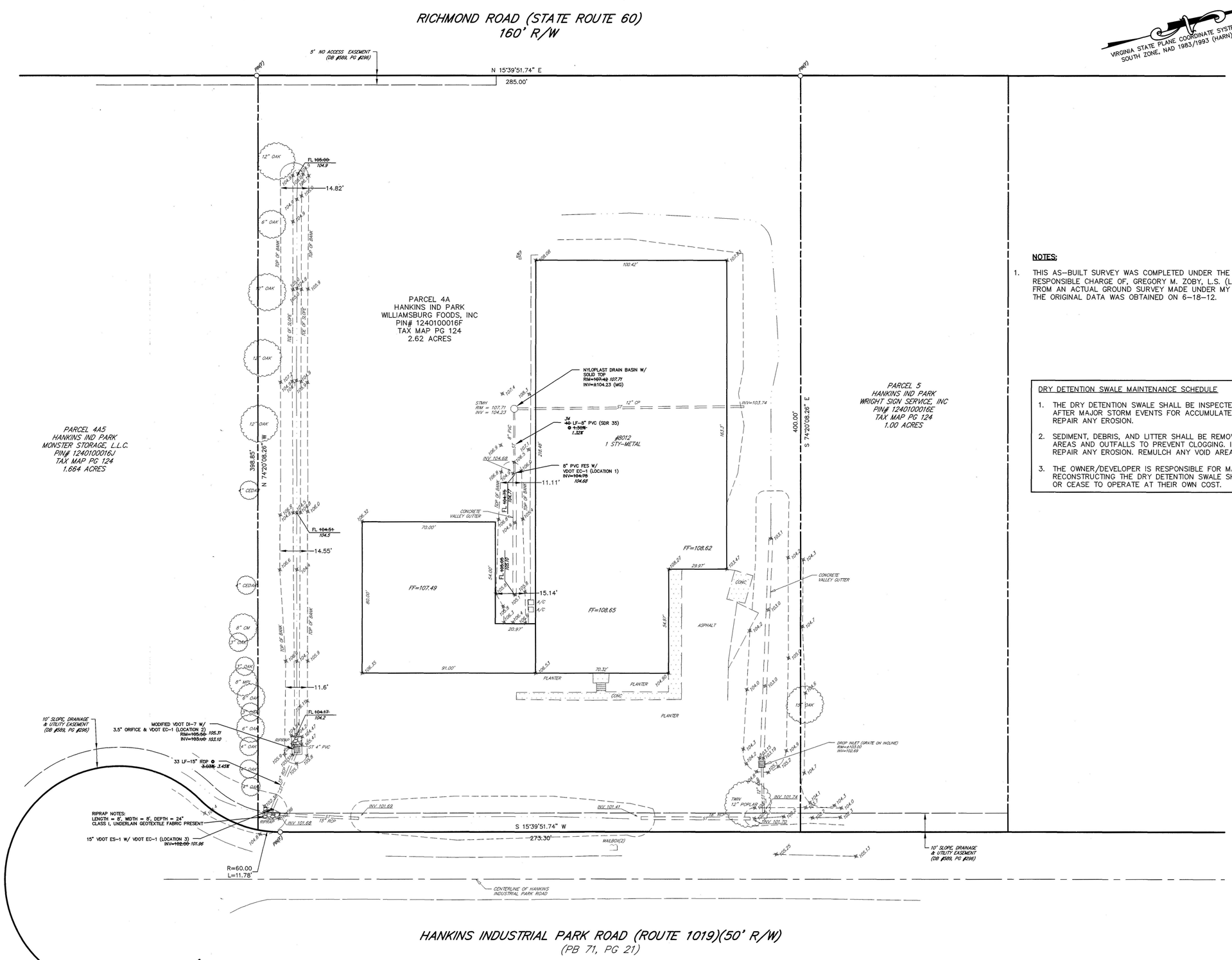
DATE	INITIAL	DESCRIPTION
7-10-12	WGS	1ST AS-BUILT SUBMITTAL
8-2-12	WGS	2ND AS-BUILT SUMITTAL

SMITHFIELD SPECIALTY FOODS GROUP BUILDING ADDITION

1

1 of 2 Sheets

PROJ. NO.: 11075



NOTES:

1. THIS AS-BUILT SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, GREGORY M. ZOBY, L.S. (LIC. NO. 2991) FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION; THAT THE ORIGINAL DATA WAS OBTAINED ON 6-18-12.

DRY DETENTION SWALE MAINTENANCE SCHEDULE

1. THE DRY DETENTION SWALE SHALL BE INSPECTED MONTHLY AND AFTER MAJOR STORM EVENTS FOR ACCUMULATED SEDIMENT AND TO REPAIR ANY EROSION.
2. SEDIMENT, DEBRIS, AND LITTER SHALL BE REMOVED FROM THE BASIN AREAS AND OUTFALLS TO PREVENT CLOGGING. INSPECT FOR AND REPAIR ANY EROSION. REMULCH ANY VOID AREAS AS NEEDED.
3. THE OWNER/DEVELOPER IS RESPONSIBLE FOR MAINTENANCE AND RECONSTRUCTING THE DRY DETENTION SWALE SHOULD IT MALFUNCTION OR CEASE TO OPERATE AT THEIR OWN COST.

RECORD DRAWING BASED ON INFORMATION AS SURVEYED JUNE 18, 2012 BY MSA, PC

25 0 25 50
1 INCH = 25 FT

MSA, P.C.
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www.msaonline.com

COMMONWEALTH OF VIRGINIA
GREGORY M. ZOBY
Lic. No. 2991
LAND SURVEYOR

DESIGNED	MSA
DRAWN	KEJ/ WGS
CHECKED	DMW/ JJV
APPROVED	DMW/ GMZ
DATE	8-2-12

REV. NO.	REV. BY	REVISION	DESCRIPTION	DATE

AS-BUILT OF BMP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET 2 of 2 Sheets
SCALE: 1" = 25'
PROJ. NO.: 11075

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JAN 2012
Planning Department
Environmental Division
JAN 23 2012
RECEIVED

DRAINAGE CALCULATIONS
FOR
SMITHFIELD SPECIALITY FOODS GROUP
TOANO, VA

January 17, 2012
MSA# 11075

Prepared by:

MSA, P.C.
5033 Rouse Drive
Virginia Beach, Virginia 23462
Telephone (757) 490-9264
Fax Number (757) 490-0634

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V. STORM SEWER PIPE ANALYSIS

VI. APPENDIX
- PRE-DEVELOPMENT DRAINAGE AREA MAP
- POST DEVELOPMENT DRAINAGE AREA MAP
- SOIL BORING DATA

I. DRAINAGE NARRATIVE

I. Drainage Narrative

The existing site currently contains the Smithfield Specialty Foods Group Building and associated asphalt and gravel parking lots. The project site is approximately 2.62 acres and is located on Hankins Industrial Park Road in Toano, Virginia. The proposed improvements will consist of the construction of a gravel parking lot and an approximately 6,146 SF building addition. The proposed construction will disturb approximately 1.03 acres. Majority of the existing site drains away from the existing building and into the existing on-site dry detention facility. The 12" outfall pipe from the facility ties directly into the existing roadside ditch. It is believed that the dry detention facility was previously installed to meet the Minimum Standard 19 (MS-19) of the ESC Regulations. The other remaining site drainage areas safely convey from the property.

There is an existing regional wet retention facility that serves majority of the existing industrial park, including the project site. This regional facility has been designed to provide both water quality and quantity management for future development within the industrial park. A recent site visit shows that the regional facility is functioning as designed and that there is adequate capacity to handle the additional impervious area associated with the on-site proposed improvements. The existing site currently consists of 0.92 acres of impervious area. The proposed improvements will increase the impervious area to 1.36 acres. Therefore, because the existing regional wet retention facility will provide the required stormwater management, then no additional on-site BMP is needed.

The MS-19 requirement is applicable to the proposed improvements on-site and it must be shown that the receiving channel (roadside ditch) is adequate in that it will not erode or be overtopped by runoff. To meet this requirement, the runoff generated by the 2-year storm must be analyzed for erodibility and the 10-year storm must be analyzed for capacity of the roadside ditch. In order to accurately model the runoff entering the roadside ditch for the 2- and 10-year storm events, all contributing drainage areas must be analyzed. Because of the difficulty in obtaining this information, an alternative option has been chosen to meet MS-19 requirements. This option will show that the on-site pre-development condition meets MS-19 and hence if the post-development condition is managed back to the pre-development conditions, then the requirements of MS-19 are met.

In order to analyze the pre-development condition for MS-19 requirements, the existing drainage pattern on-site has been divided into four (4) drainage areas, **DA #1, DA #2, DA #3 and DA #4** (see enclosed Existing Drainage Area Map). The runoff from DA #1 is diverted to a low point and conveyed through an existing 12" pipe, which runs underneath the existing building, and eventually outfalls into the existing dry detention facility. The runoff from DA #2 drains towards the existing dry detention facility. The runoff from DA #3 drains directly into the roadside ditches. The runoff from DA #4 drains into the existing ditch adjacent to State Route 60. The existing dry detention facility appears to be functioning adequately and is providing attenuation of at least the 2- and 10-year storm events. The following is a summary of the model results for the pre-development condition, which shows the total runoff rate leaving the site.

NODE DESCRIPTION	2-YR OUTFLOW	10-YR OUTFLOW
	(CFS)	(CFS)
EX. DRY DETENTION	2.41	2.79
EX. DA #3	1.23	1.59
EX. DA #4	0.17	0.23
TOTAL	**3.81**	**4.61**

Because the upstream drainage conditions are not known, the threshold of the 2-year storm erodibility and 10-year storm capacity of the existing roadside ditch cannot be analyzed. However, it can be stated that the current roadside ditch appears to be adequately handling the receiving velocities and runoff. Therefore, one can assume that the previously designed site conditions maximized these parameters and hence if the new proposed post-development rate does not exceed the pre-development rate then there will be no increase in ditch erosion or required capacity.

The second part of the analysis to meet MS-19 requirements is to manage the post-development runoff rate back to the pre-development conditions. In order to control the increased runoff from the proposed improvements, a dry detention swale with a control outlet structure has been provided to store runoff on-site and to allow for a slow release. The proposed drainage pattern on-site has been divided into four (4) drainage areas, **DA #1, DA #2, DA #3 and DA #4** (see enclosed Proposed Drainage Area Map). The runoff from DA #1 is directed into the proposed dry detention swale through sheet flow. The runoff from DA #2 drains towards the existing dry detention facility. The runoff from DA #3 drains directly into the roadside ditches. The runoff from DA #4 drains into the existing ditch adjacent to State Route 60. The existing dry detention facility will remain and continue to serve the site for attenuation of the 2- and 10-year storm events. The following is a summary of the model results for the post-development condition, which shows the total runoff rate leaving the site.

NODE DESCRIPTION	2-YR OUTFLOW	10-YR OUTFLOW
	(CFS)	(CFS)
PROP. DRY DETENTION	0.31	0.34
EX. DRY DETENTION	2.33	2.65
EX. DA #3	0.93	1.21
EX. DA #4	0.17	0.23
TOTAL	**3.74**	**4.42**

The proposed dry detention swale will provide the controlled release of runoff so that post-development conditions do not exceed pre-development conditions. Outlet protection has been provided on the outfall pipe from the swale. Therefore, because the post-development runoff rate has been managed back to the pre-development conditions, then the receiving roadside ditch is adequate in that it will not erode or be overtopped by runoff. The requirements of MS-19 have been met on-site.

The "Rational Method" was used to determine the peak storm water runoff rates shown above. The Hydraflow Hydrograph Model software was used to analyze the drainage areas and associated parameters. The runoff coefficients 'c' were compiled using the percentage of impervious versus pervious coverage.

II. SUMMARY OF CONDITIONS

Drainage Area Calculations

CALCULATIONS BY:	CVB
DATE:	1/10/2012
PROJECT:	Smithfield Speciality Foods Group Bldg Addition
PROJECT #	11075

Existing Conditions On-Site:

Total Areas:	Boundary Area =	113,996	SF =	2.62	AC
	Building =	20,275	SF =	0.47	AC
	Pavement/Conc =	19,842	SF =	0.46	AC
	Total Impervious =	*40,117*	SF =	*0.92*	AC

Existing Drainage Areas:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious	Pervious	Weighted C
1	Ex. Dry Detention	1.19	0.26	0.93	0.35
2	Ex. Dry Detention	0.92	0.46	0.46	0.55
3	Ex. Roadside Ditch	0.36	0.20	0.16	0.59
4	Ex. Rear Ditch	0.15	0.00	0.15	0.20
	Total	*2.62*	*0.92*	*1.70*	

Total Drainage Area to Existing Dry Detention:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious
1 & 2	-	2.11	0.72

Proposed Conditions On-Site:

Total Areas:	Boundary Area =	113,996	SF =	2.62	AC
	Building =	26,421	SF =	0.61	AC
	Pavement/Conc =	32,722	SF =	0.75	AC
	Total Impervious =	*59,143*	SF =	*1.36*	AC

Proposed Drainage Areas:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious	Pervious	Weighted C
1	Prop. Dry Detention	1.06	0.63	0.43	0.62
2	Ex. Dry Detention	1.10	0.59	0.51	0.58
3	Ex. Roadside Ditch	0.31	0.14	0.17	0.52
4	Ex. Rear Ditch	0.15	0.00	0.15	0.20
	Total	*2.62*	*1.36*	*1.26*	

Total Drainage Area to Proposed Dry Detention:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious
1	-	1.06	0.63

Total Drainage Area to Existing Dry Detention:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious
2	-	1.10	0.59

Hydrograph Summary Calculations

CALCULATIONS BY:	CVB
DATE:	1/10/2012
PROJECT:	Smithfield Speciality Foods Group Bldg Addition
PROJECT #	11075

Reference: Hydraflow Hydrograph Extension Model Summary Pages

Existing Conditions On-Site:

Existing Flows Leaving Site:

Node Description	Outflow 2-YR (cfs)	Outflow 10-YR (cfs)
EX. DRY DETENTION	2.41	2.79
EXISTING DA #3	1.23	1.59
EXISTING DA #4	0.17	0.23
Total Flow:	**3.81**	**4.61**

Proposed Conditions On-Site:

Proposed Flows Leaving Site:

Node Description	Outflow 2-YR (cfs)	Outflow 10-YR (cfs)
PROP. DRY DETENTION	0.31	0.34
EX. DRY DETENTION	2.33	2.65
EXISTING DA #3	0.93	1.21
EXISTING DA #4	0.17	0.23
Total Flow:	**3.74**	**4.42**

Summary:

Proposed Flow MUST be LESS than Existing Flow to meet stormwater requirements.

	Proposed Flow (cfs)		Existing Flow (cfs)	
2-Year Storm Event	3.74	<	3.81	**OK!**
10-Year Storm Event	4.42	<	4.61	**OK!**

IDF Curve

CALCULATIONS BY: CVB
DATE: 1/10/2012
PROJECT: Smithfield Speciality Foods Group Bldg Addition
PROJECT # 11075

Ref: VDOT Drainage Manual

2-Year Storm Event

Tc (min)	B	D	E	I (in/hr)
5	70.63	12.75	0.87	5.78
15	70.63	12.75	0.87	3.92
30	70.63	12.75	0.87	2.69
60	70.63	12.75	0.87	1.70

10-Year Storm Event

Tc (min)	B	D	E	I (in/hr)
5	55.61	10.00	0.74	7.50
15	55.61	10.00	0.74	5.14
30	55.61	10.00	0.74	3.63
60	55.61	10.00	0.74	2.40

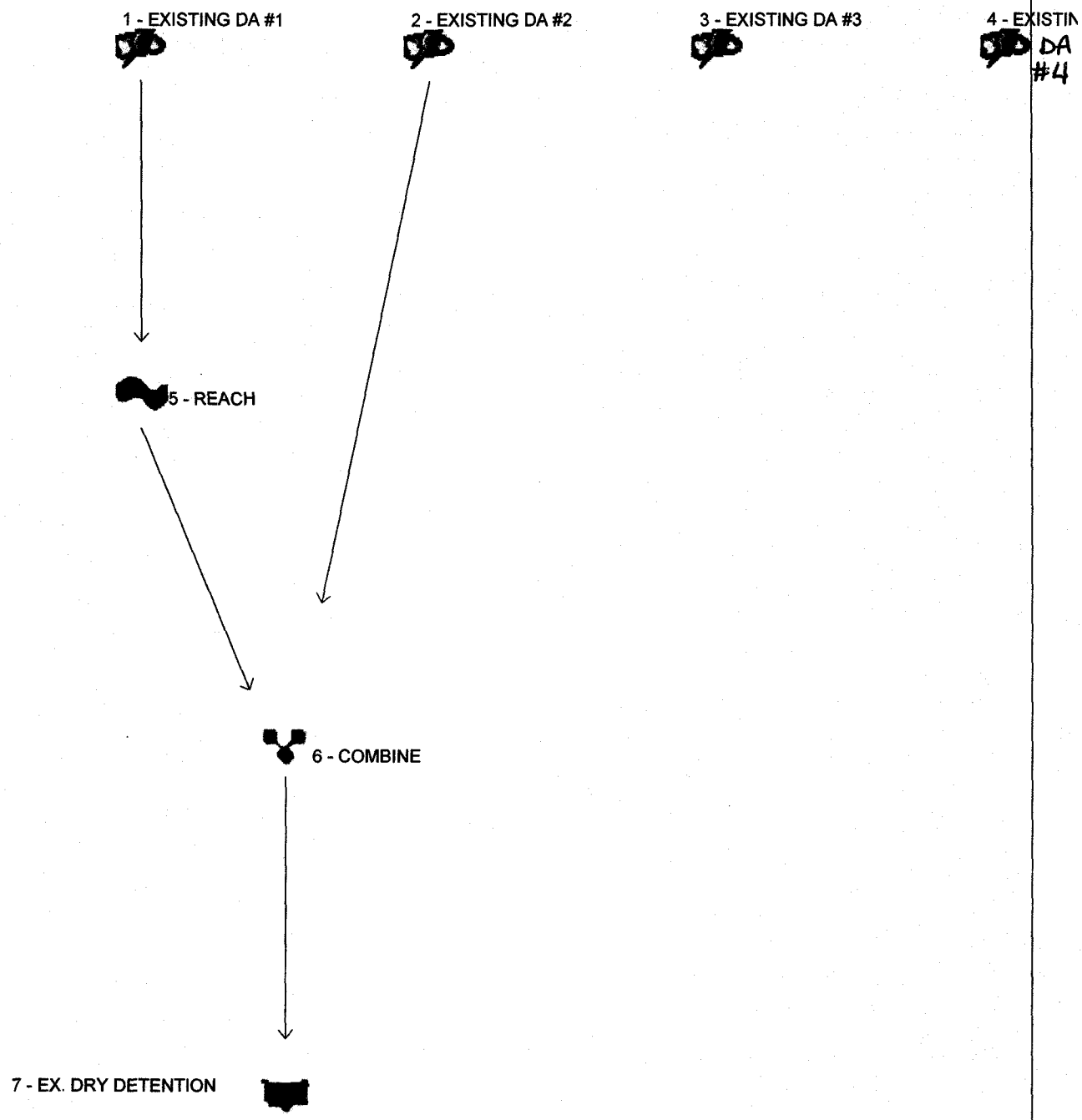
100-Year Storm Event

Tc (min)	B	D	E	I (in/hr)
5	36.77	5.25	0.56	9.99
15	36.77	5.25	0.56	6.82
30	36.77	5.25	0.56	5.00
60	36.77	5.25	0.56	3.54

III. EXISTING CONDITIONS HYDROGRAPH REPORT

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Legend

Hyd.	Origin	Description
1	Rational	EXISTING DA #1
2	Rational	EXISTING DA #2
3	Rational	EXISTING DA #3
4	Rational	EXISTING DA #4
5	Reach	REACH
6	Combine	COMBINE
7	Reservoir	EX. DRY DETENTION

Hydraflow Table of Contents

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Friday, Jan 13, 2012

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Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	------	------	1.682	------	------	2.206	------	------	------	EXISTING DA #1
2	Rational	------	------	2.662	------	------	3.458	------	------	------	EXISTING DA #2
3	Rational	------	------	1.227	------	------	1.592	------	------	------	EXISTING DA #3
4	Rational	------	------	0.173	------	------	0.225	------	------	------	EXISTING DA #4
5	Reach	1	------	1.645	------	------	2.187	------	------	------	REACH
6	Combine	2, 5	------	3.345	------	------	4.385	------	------	------	COMBINE
7	Reservoir	6	------	2.405	------	------	2.789	------	------	------	EX. DRY DETENTION

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.682	1	14	1,413	------	------	------	EXISTING DA #1
2	Rational	2.662	1	7	1,118	------	------	------	EXISTING DA #2
3	Rational	1.227	1	5	368	------	------	------	EXISTING DA #3
4	Rational	0.173	1	5	52	------	------	------	EXISTING DA #4
5	Reach	1.645	1	15	1,422	1	------	------	REACH
6	Combine	3.345	1	7	2,540	2, 5	------	------	COMBINE
7	Reservoir	2.405	1	11	2,540	6	103.59	376	EX. DRY DETENTION

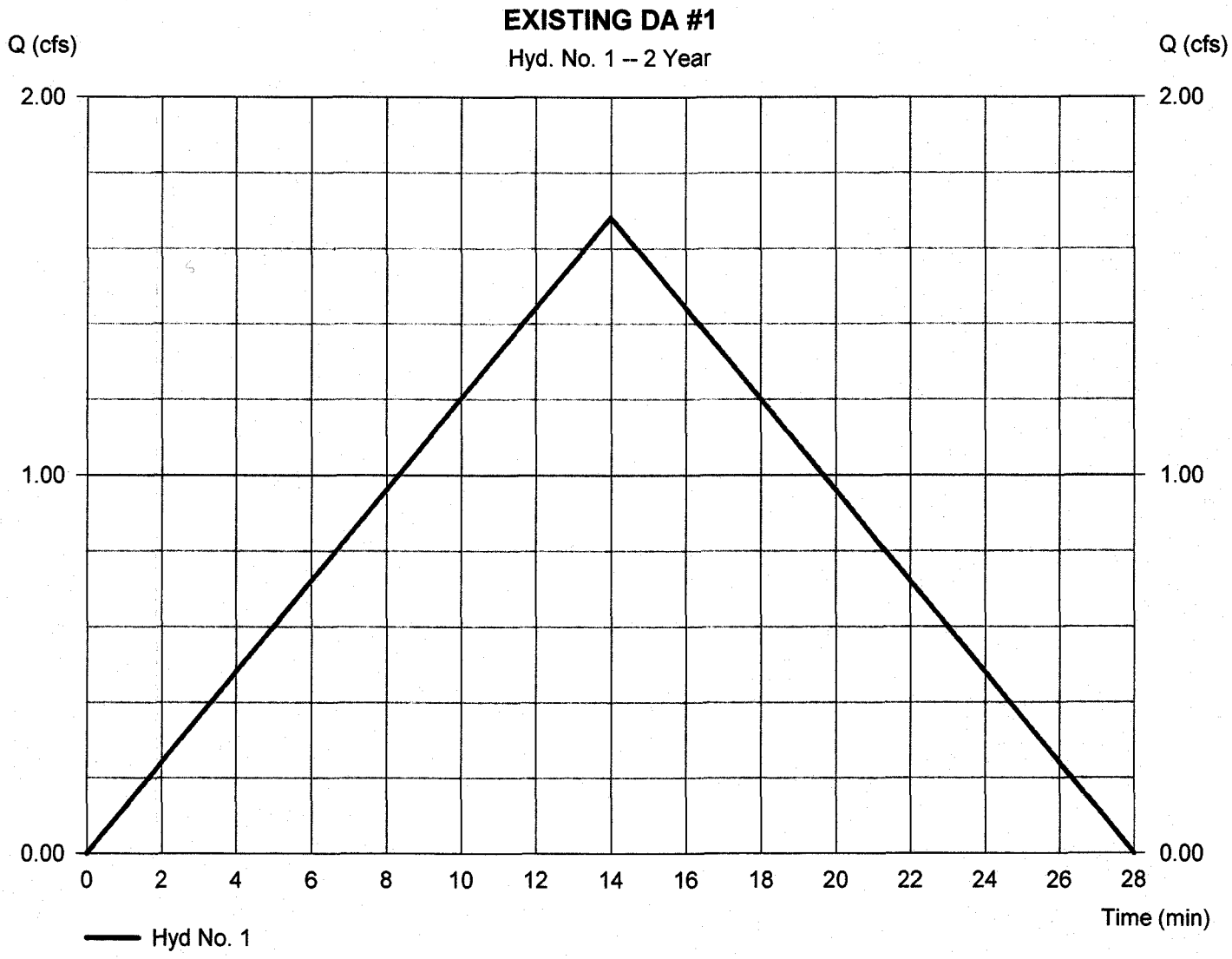
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 1

EXISTING DA #1

Hydrograph type	= Rational	Peak discharge	= 1.682 cfs
Storm frequency	= 2 yrs	Time to peak	= 14 min
Time interval	= 1 min	Hyd. volume	= 1,413 cuft
Drainage area	= 1.190 ac	Runoff coeff.	= 0.35
Intensity	= 4.039 in/hr	Tc by TR55	= 14.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 1

EXISTING DA #1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 95.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 13.06**	**+**	**0.00**	**+**	**0.00**	**=**	**13.06**
Shallow Concentrated Flow							
Flow length (ft)	= 106.00		0.00		0.00		
Watercourse slope (%)	= 2.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.28		0.00		0.00		
Travel Time (min)	**= 0.77**	**+**	**0.00**	**+**	**0.00**	**=**	**0.77**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 14.00 min

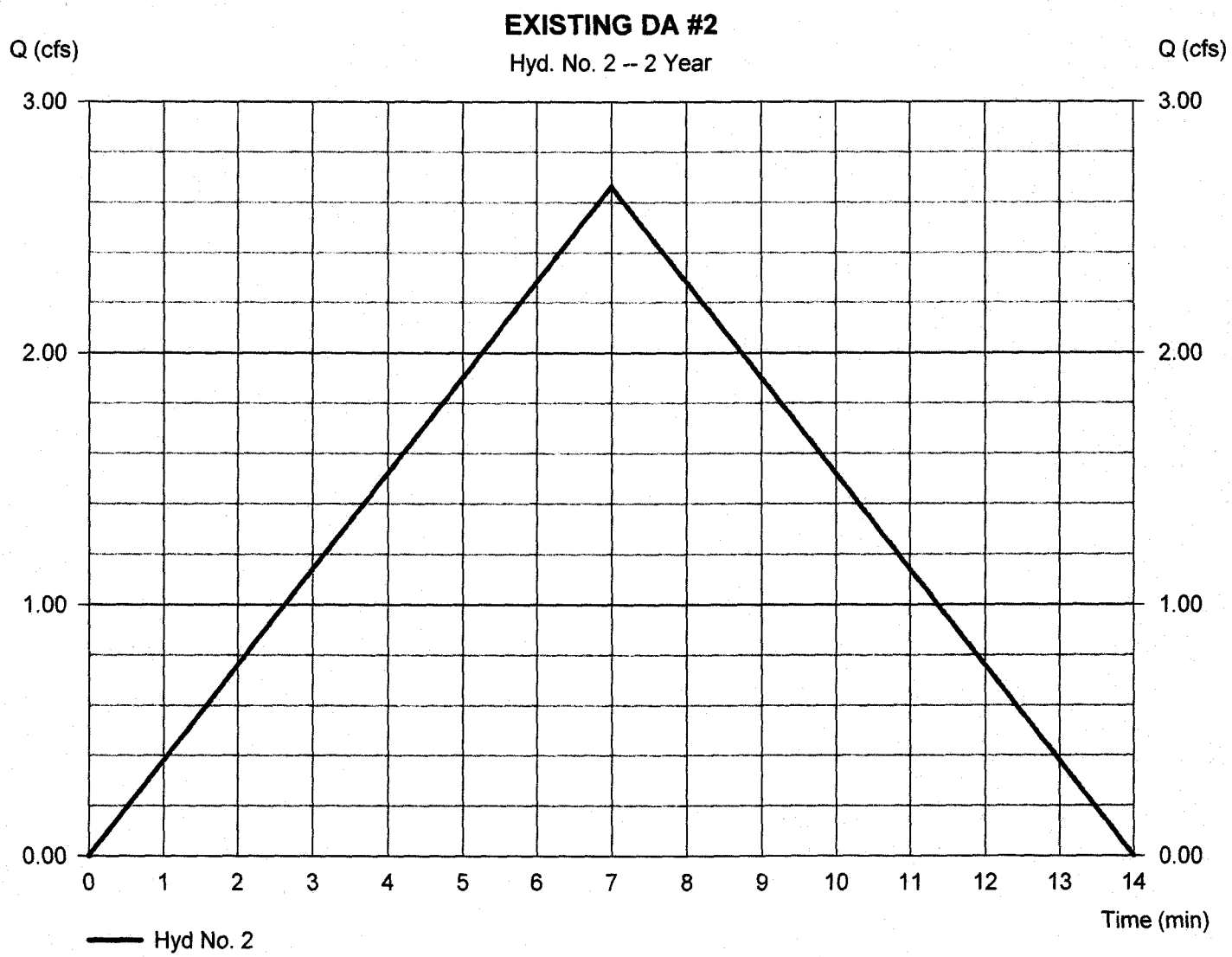
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

EXISTING DA #2

Hydrograph type	= Rational	Peak discharge	= 2.662 cfs
Storm frequency	= 2 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,118 cuft
Drainage area	= 0.920 ac	Runoff coeff.	= 0.55
Intensity	= 5.260 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hyd. No. 2

EXISTING DA #2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 31.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 5.33**	**+**	**0.00**	**+**	**0.00**	**=**	**5.33**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 13.00		0.00		0.00		
Wetted perimeter (ft)	= 27.00		0.00		0.00		
Channel slope (%)	= 0.50		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=2.15						
			0.00				
					0.00		
Flow length (ft)	({0})262.0		0.0		0.0		
Travel Time (min)	**= 2.03**	**+**	**0.00**	**+**	**0.00**	**=**	**2.03**

Total Travel Time, Tc ..... 7.00 min

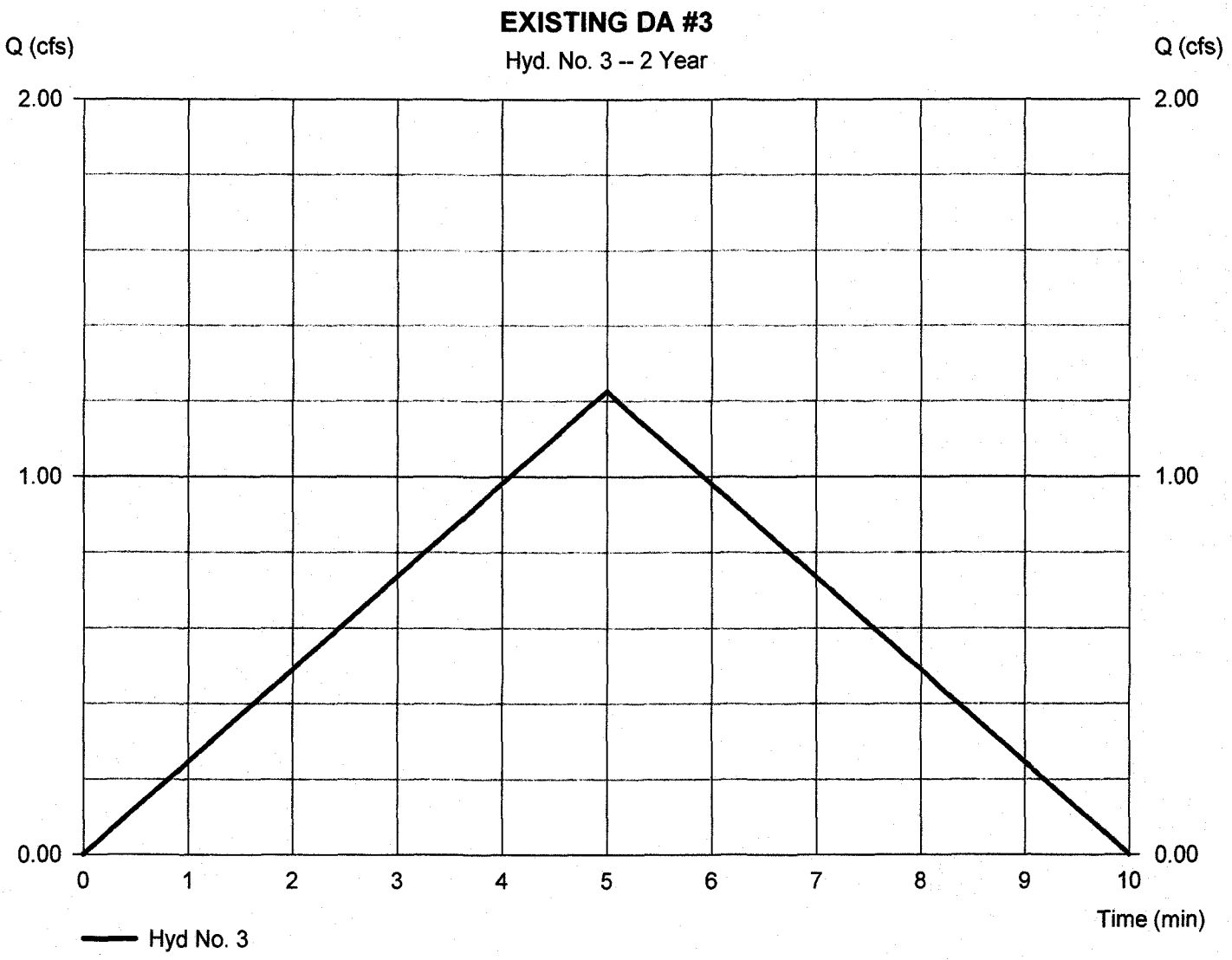
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

EXISTING DA #3

Hydrograph type	= Rational	Peak discharge	= 1.227 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 368 cuft
Drainage area	= 0.360 ac	Runoff coeff.	= 0.59
Intensity	= 5.775 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



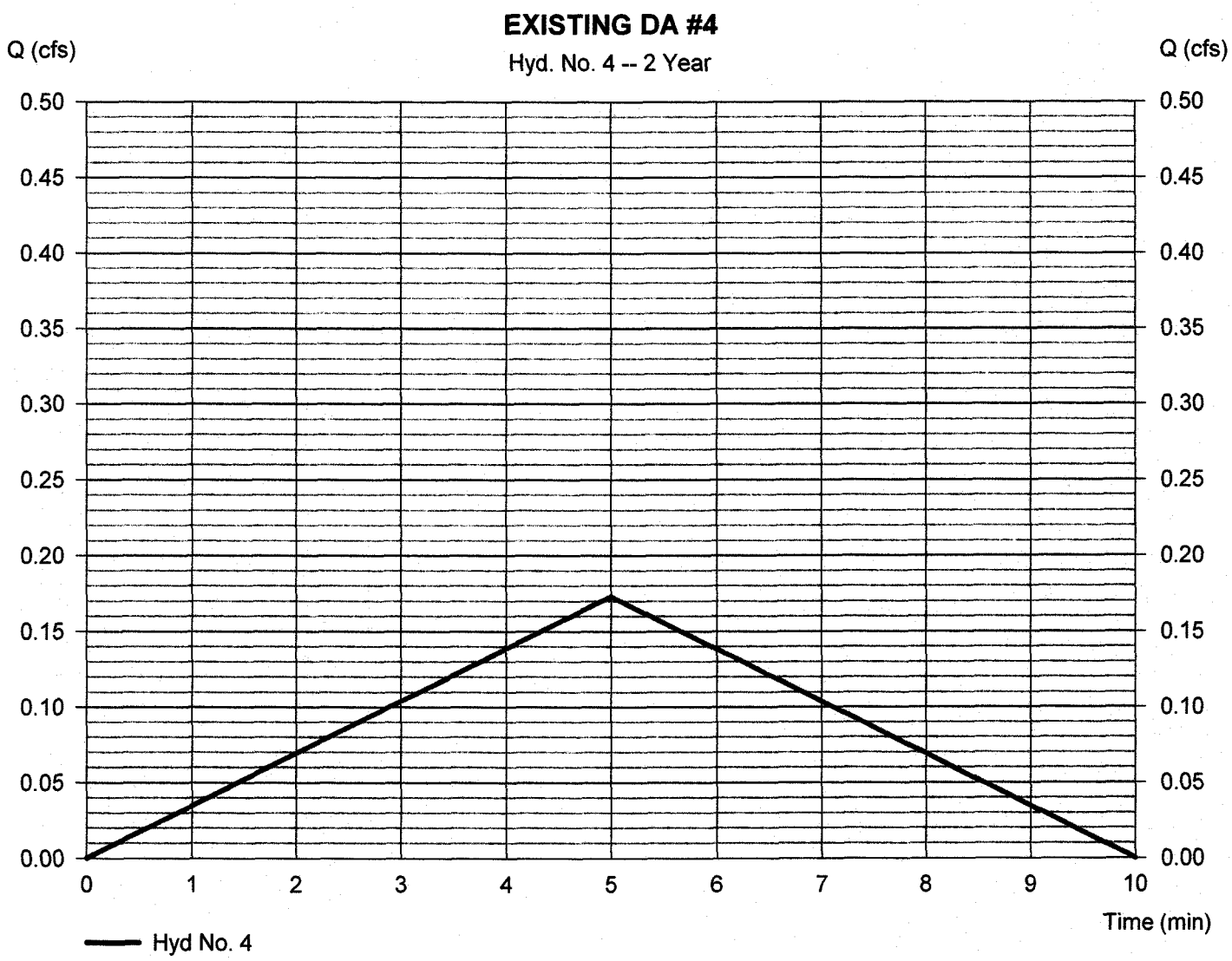
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

EXISTING DA #4

Hydrograph type	= Rational	Peak discharge	= 0.173 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 5.775 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 4

EXISTING DA #4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 25.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 2.58**	**+**	**0.00**	**+**	**0.00**	**=**	**2.58**
Shallow Concentrated Flow							
Flow length (ft)	= 152.00		0.00		0.00		
Watercourse slope (%)	= 0.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.14		0.00		0.00		
Travel Time (min)	**= 2.22**	**+**	**0.00**	**+**	**0.00**	**=**	**2.22**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 5.00 min

Hydrograph Report

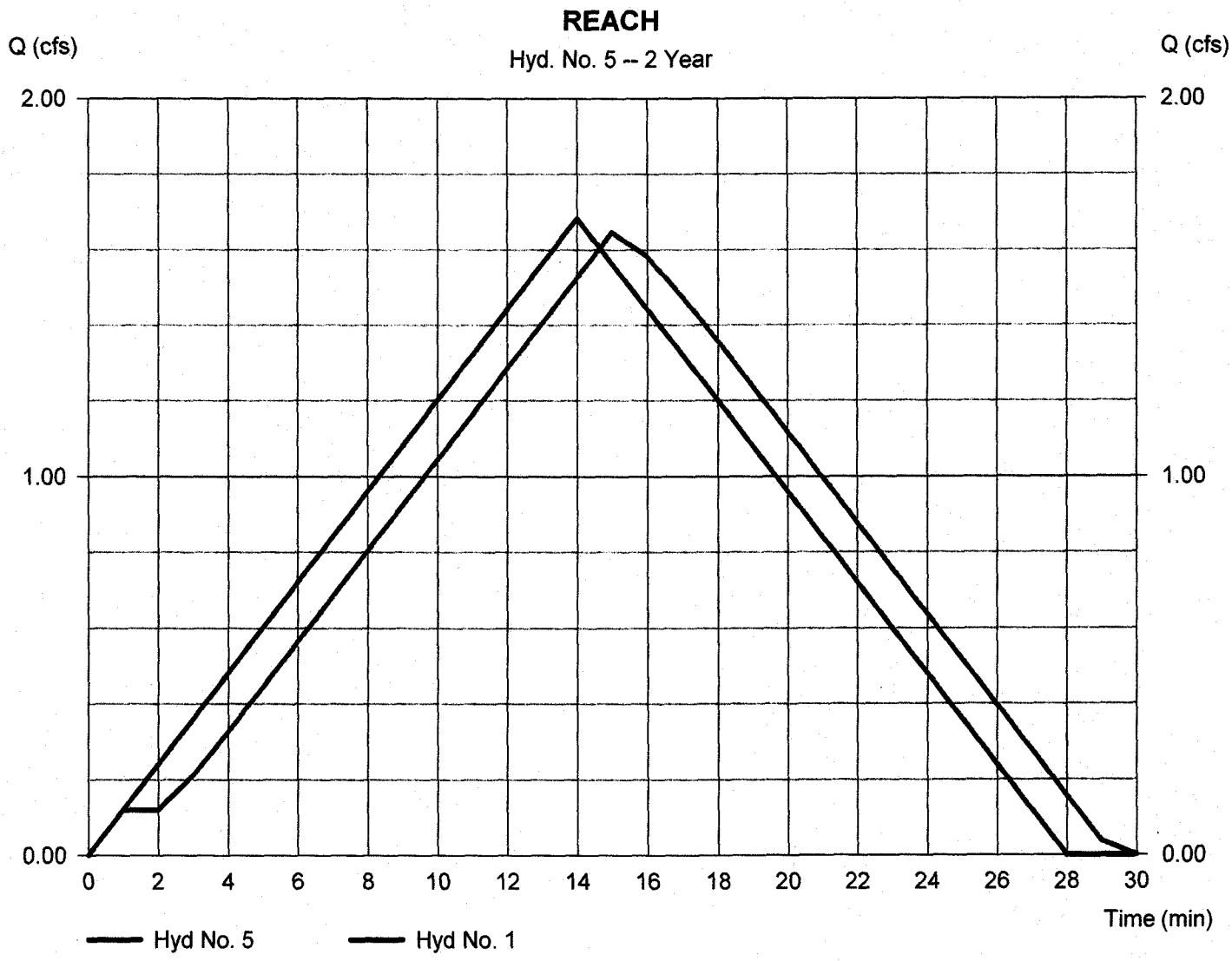
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

REACH

Hydrograph type	= Reach	Peak discharge	= 1.645 cfs
Storm frequency	= 2 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 1,422 cuft
Inflow hyd. No.	= 1 - EXISTING DA #1	Section type	= Circular
Reach length	= 130.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.013	Bottom width	= 1.0 ft
Side slope	= 0.0:1	Max. depth	= 0.0 ft
Rating curve x	= 3.960	Rating curve m	= 1.250
Ave. velocity	= 2.14 ft/s	Routing coeff.	= 0.7638

Modified Att-Kin routing method used.



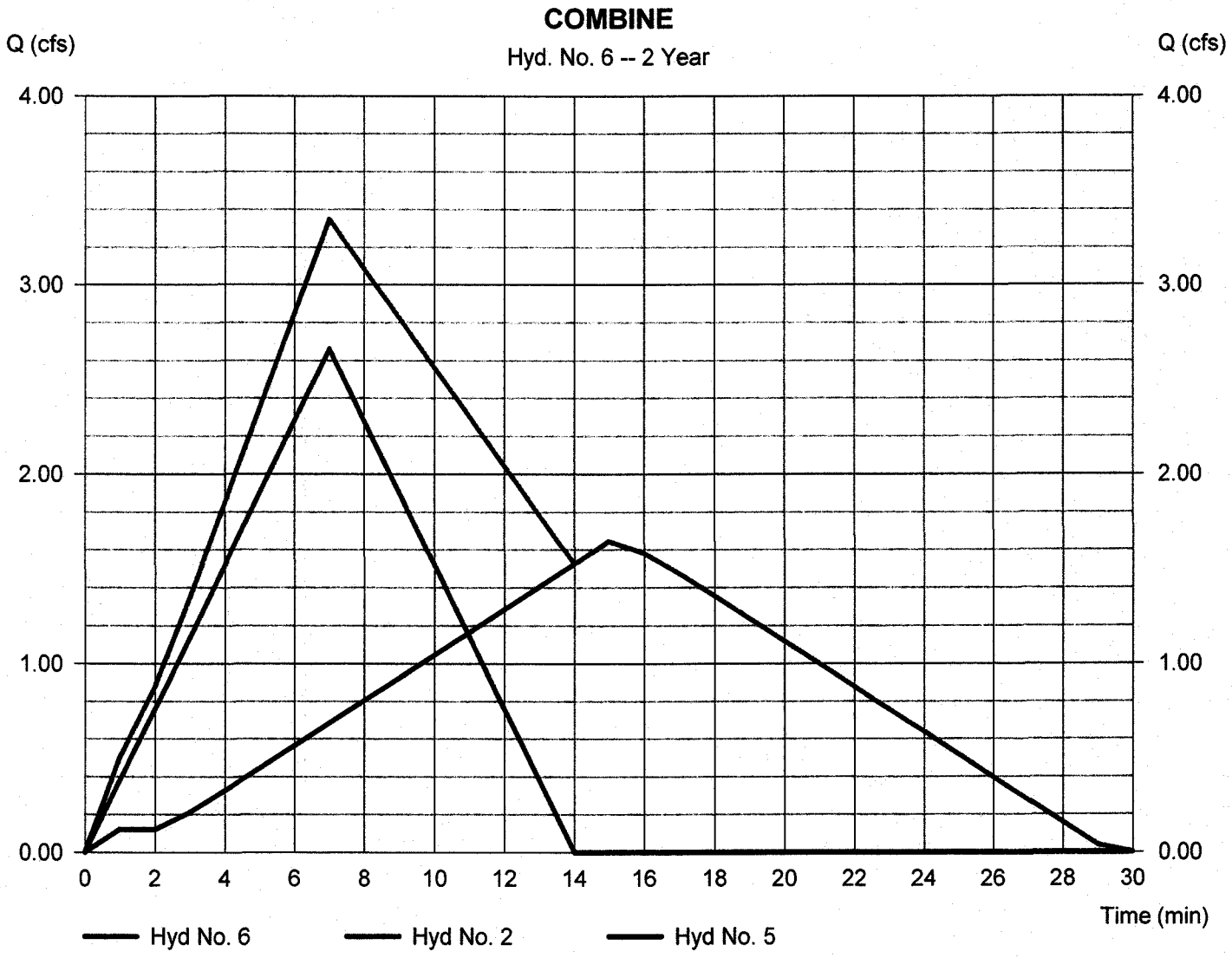
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 6

COMBINE

Hydrograph type	= Combine	Peak discharge	= 3.345 cfs
Storm frequency	= 2 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 2,540 cuft
Inflow hyds.	= 2, 5	Contrib. drain. area	= 0.920 ac



Hydrograph Report

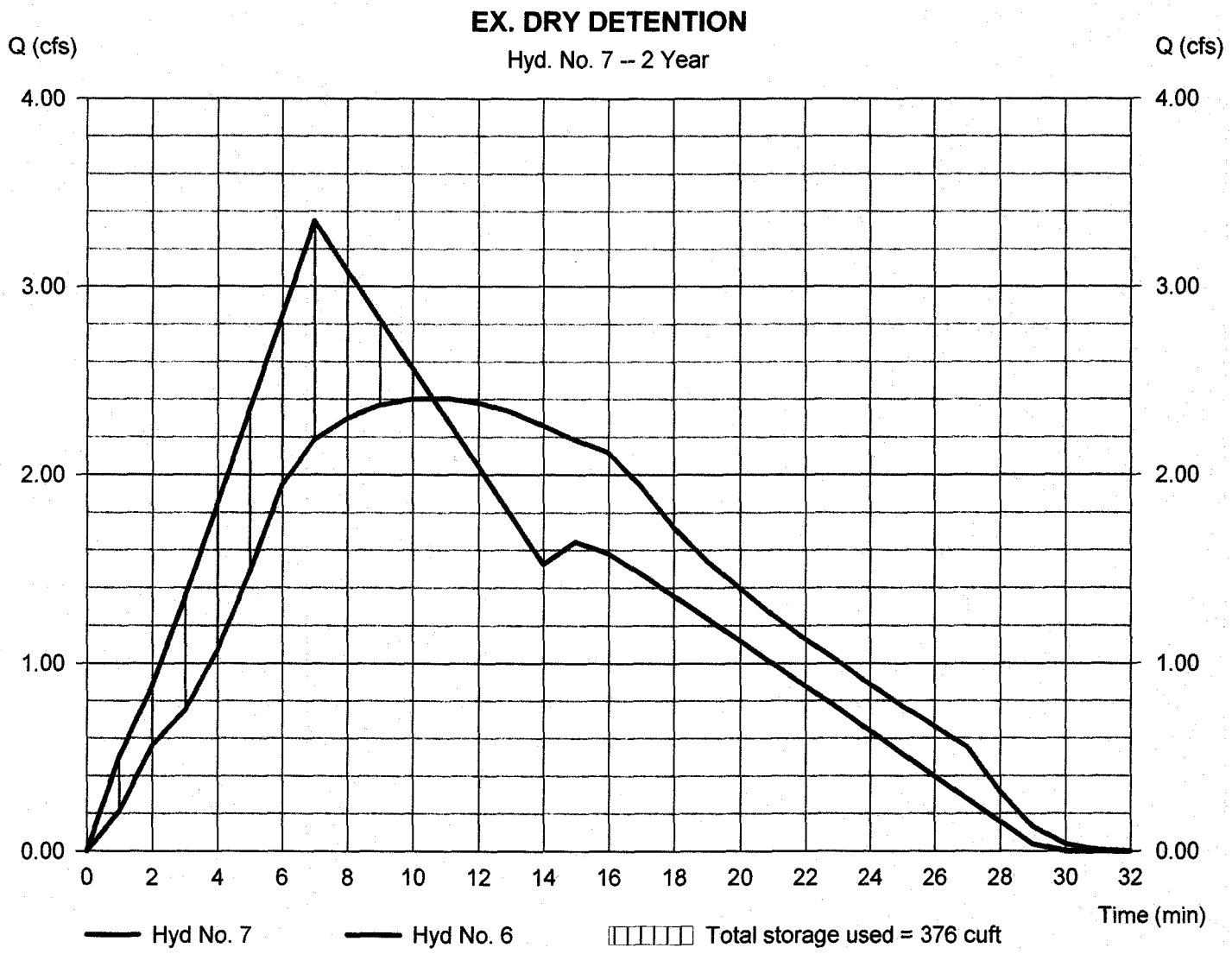
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 7

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.405 cfs
Storm frequency	= 2 yrs	Time to peak	= 11 min
Time interval	= 1 min	Hyd. volume	= 2,540 cuft
Inflow hyd. No.	= 6 - COMBINE	Max. Elevation	= 103.59 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 376 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Pond No. 1 - EXISTING DRY DETENTION

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 103.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	103.00	00	0	0
0.50	103.50	1,288	215	215
1.00	104.00	2,428	914	1,129

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 102.69	0.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 3.80	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	103.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.50	215	103.50	2.09 ic	---	---	---	---	---	---	---	---	---	2.095
1.00	1,129	104.00	3.40 ic	---	---	---	---	---	---	---	---	---	3.403

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	2.206	1	14	1,853	------	------	------	EXISTING DA #1
2	Rational	3.458	1	7	1,452	------	------	------	EXISTING DA #2
3	Rational	1.592	1	5	478	------	------	------	EXISTING DA #3
4	Rational	0.225	1	5	67	------	------	------	EXISTING DA #4
5	Reach	2.187	1	15	1,863	1	------	------	REACH
6	Combine	4.385	1	7	3,316	2, 5	------	------	COMBINE
7	Reservoir	2.789	1	12	3,316	6	103.74	643	EX. DRY DETENTION

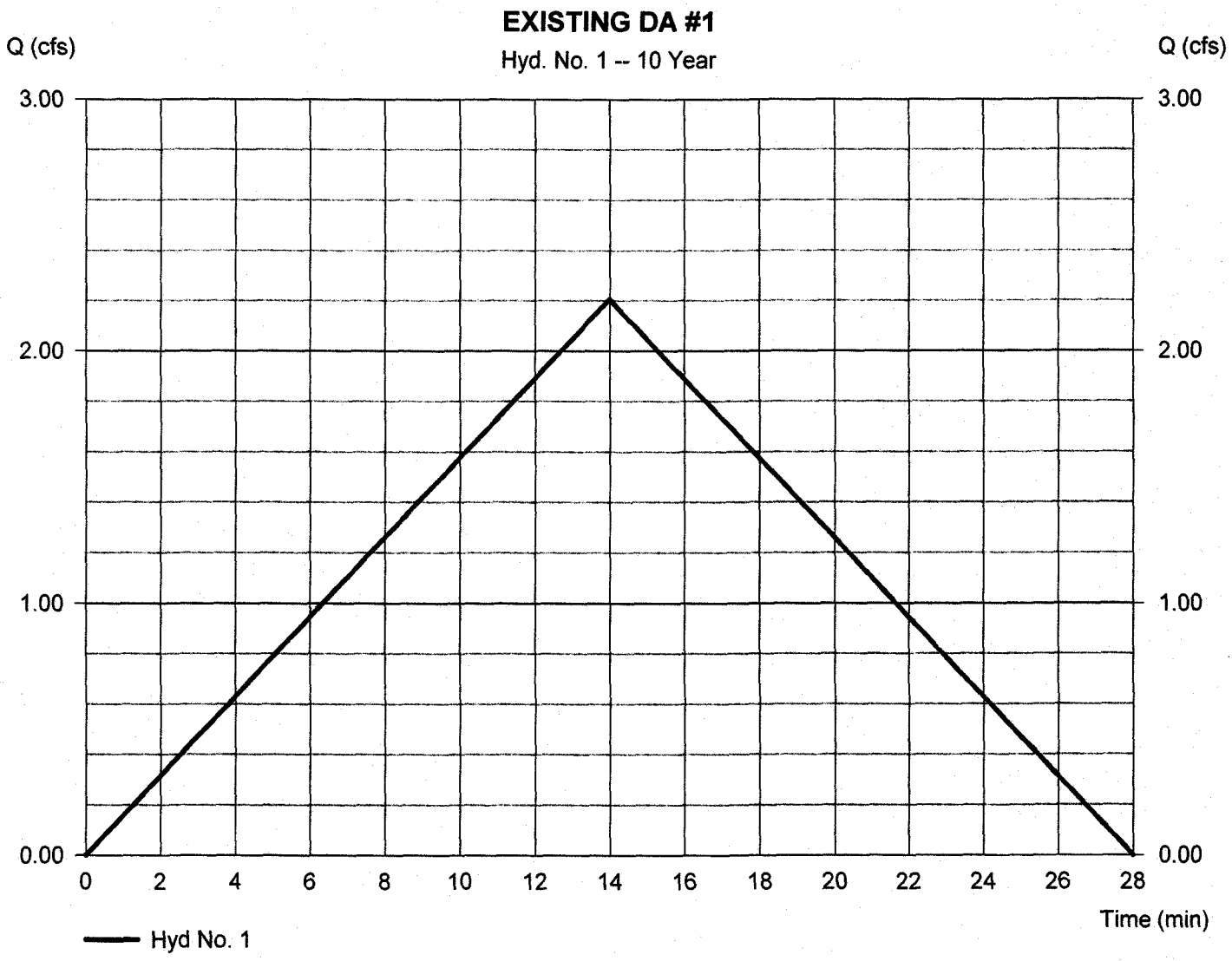
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 1

EXISTING DA #1

Hydrograph type	= Rational	Peak discharge	= 2.206 cfs
Storm frequency	= 10 yrs	Time to peak	= 14 min
Time interval	= 1 min	Hyd. volume	= 1,853 cuft
Drainage area	= 1.190 ac	Runoff coeff.	= 0.35
Intensity	= 5.296 in/hr	Tc by TR55	= 14.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



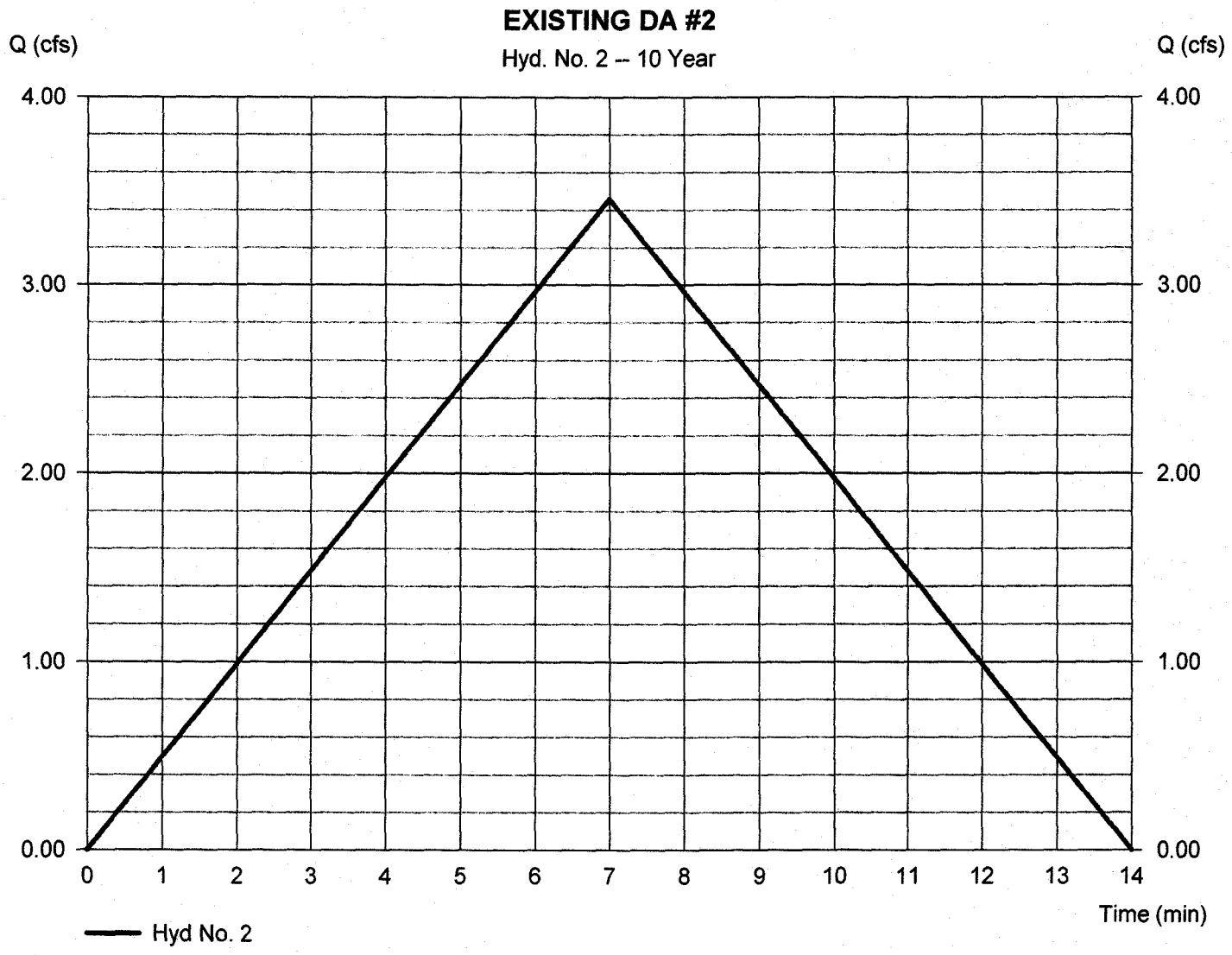
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

EXISTING DA #2

Hydrograph type	= Rational	Peak discharge	= 3.458 cfs
Storm frequency	= 10 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,452 cuft
Drainage area	= 0.920 ac	Runoff coeff.	= 0.55
Intensity	= 6.834 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



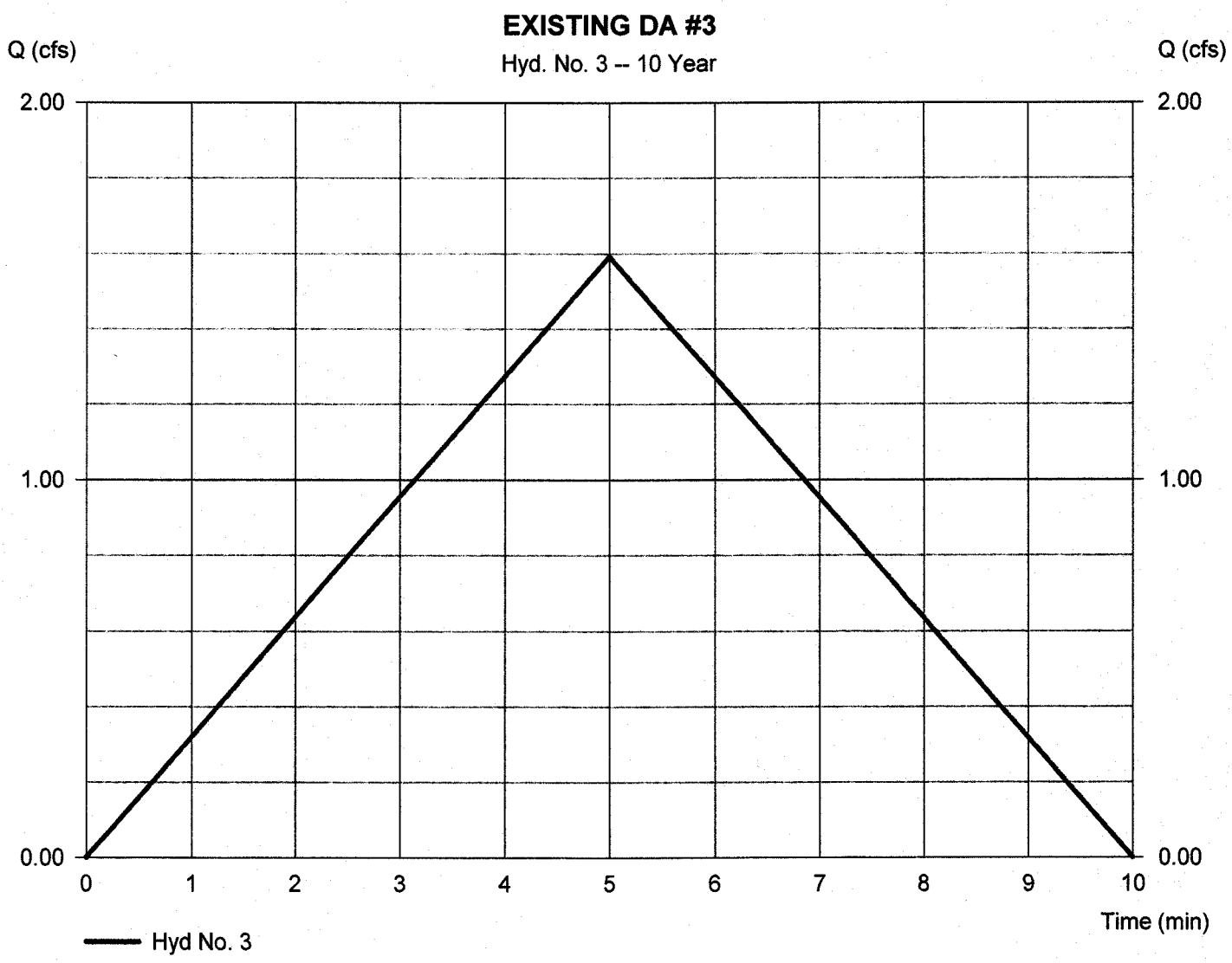
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

EXISTING DA #3

Hydrograph type	= Rational	Peak discharge	= 1.592 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 478 cuft
Drainage area	= 0.360 ac	Runoff coeff.	= 0.59
Intensity	= 7.496 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



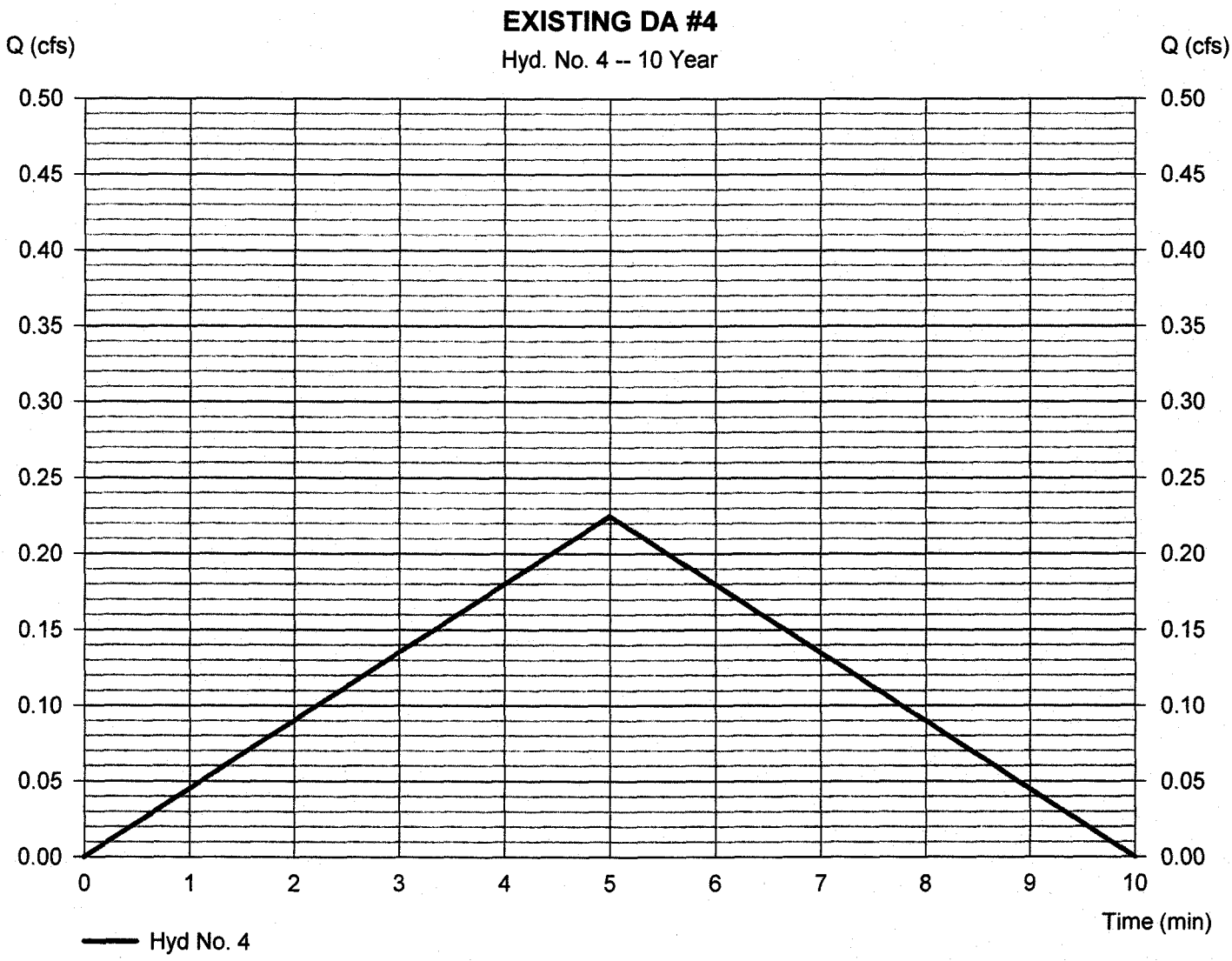
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

EXISTING DA #4

Hydrograph type	= Rational	Peak discharge	= 0.225 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 67 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 7.496 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

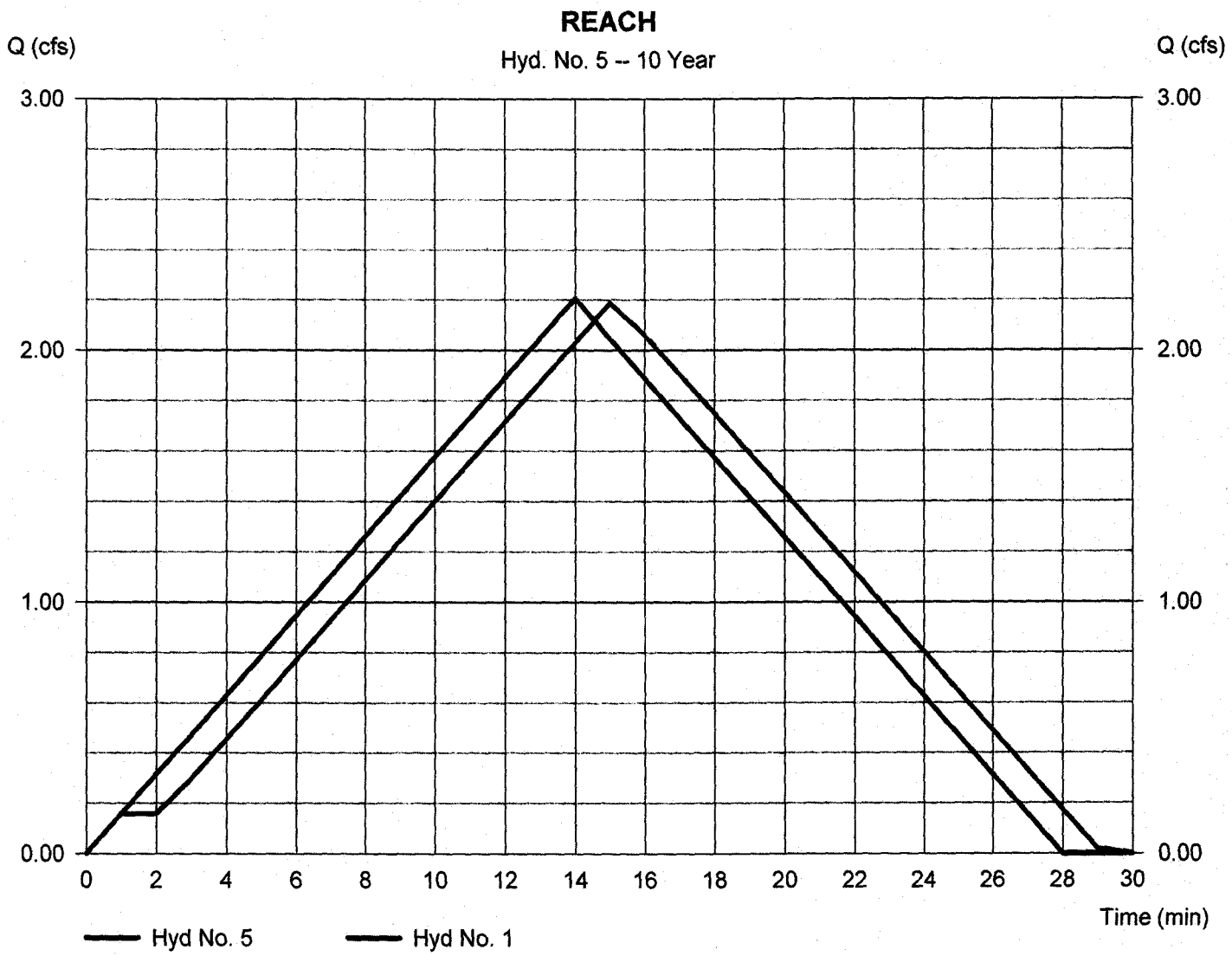
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

REACH

Hydrograph type	= Reach	Peak discharge	= 2.187 cfs
Storm frequency	= 10 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 1,863 cuft
Inflow hyd. No.	= 1 - EXISTING DA #1	Section type	= Circular
Reach length	= 130.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.013	Bottom width	= 1.0 ft
Side slope	= 0.0:1	Max. depth	= 0.0 ft
Rating curve x	= 3.960	Rating curve m	= 1.250
Ave. velocity	= 2.81 ft/s	Routing coeff.	= 0.8951

Modified Att-Kin routing method used.



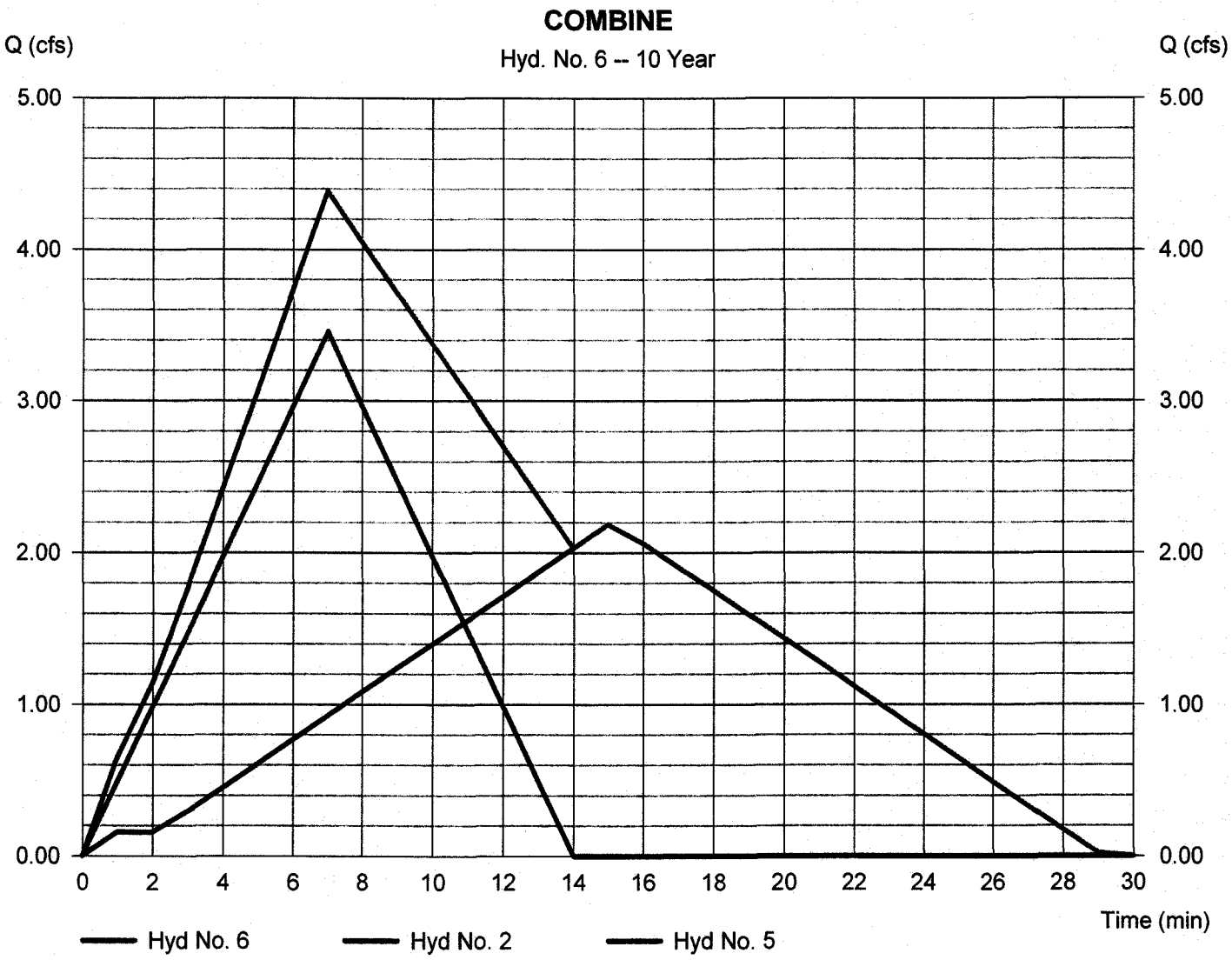
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 6

COMBINE

Hydrograph type	= Combine	Peak discharge	= 4.385 cfs
Storm frequency	= 10 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 3,316 cuft
Inflow hyds.	= 2, 5	Contrib. drain. area	= 0.920 ac



Hydrograph Report

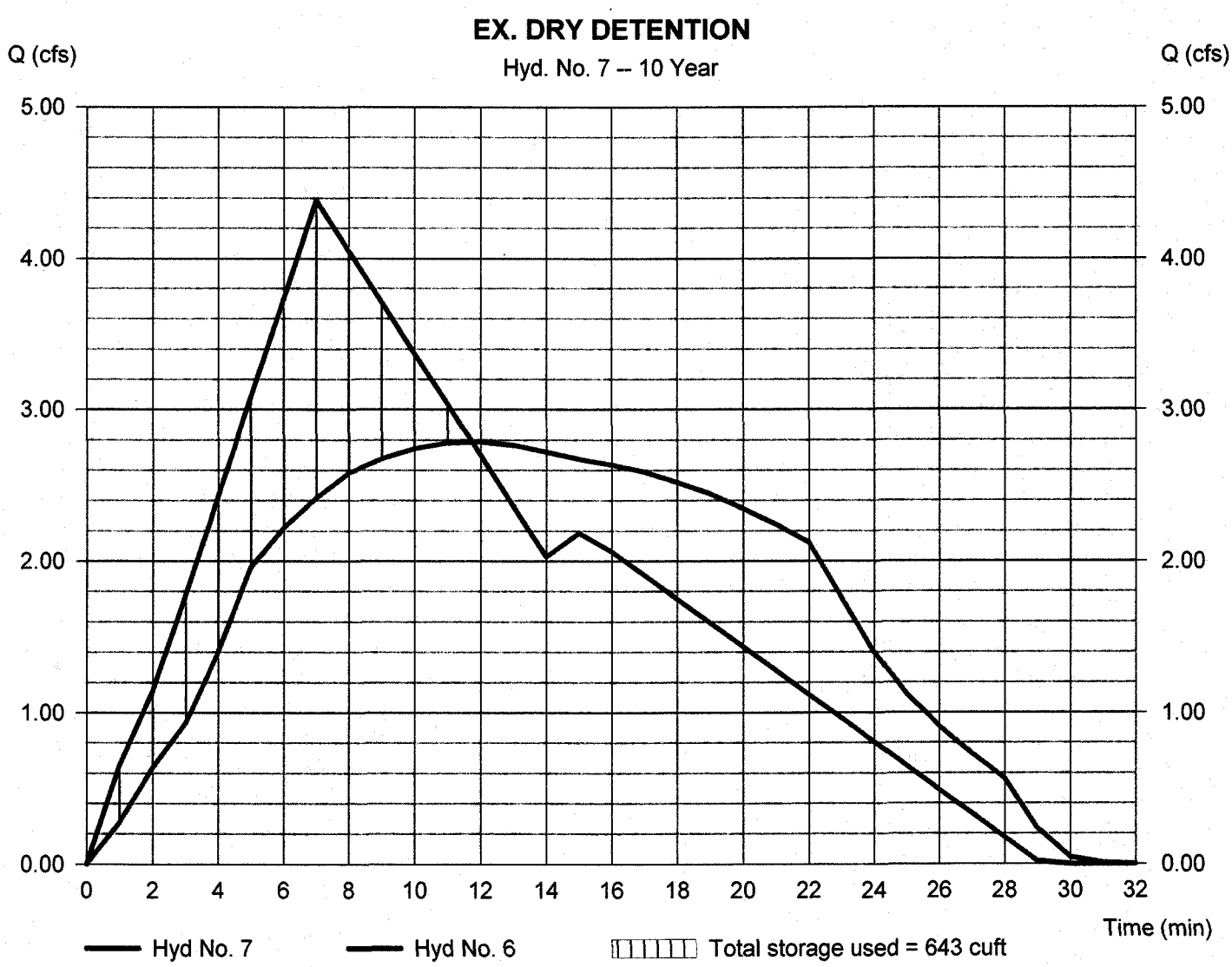
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 7

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.789 cfs
Storm frequency	= 10 yrs	Time to peak	= 12 min
Time interval	= 1 min	Hyd. volume	= 3,316 cuft
Inflow hyd. No.	= 6 - COMBINE	Max. Elevation	= 103.74 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 643 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	66.9152	12.4000	0.8577	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	55.5168	10.0000	0.7394	--------
25	0.0000	0.0000	0.0000	--------
50	0.0000	0.0000	0.0000	--------
100	36.9712	5.3000	0.5614	--------

File name: JAMES CITY IDF CURVE.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.77	4.65	3.91	3.39	3.00	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.50	6.06	5.14	4.49	4.01	3.63	3.33	3.08	2.87	2.69	2.54	2.40
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	9.98	7.99	6.82	6.03	5.45	5.00	4.64	4.35	4.10	3.89	3.70	3.54

Tc = time in minutes. Values may exceed 60.

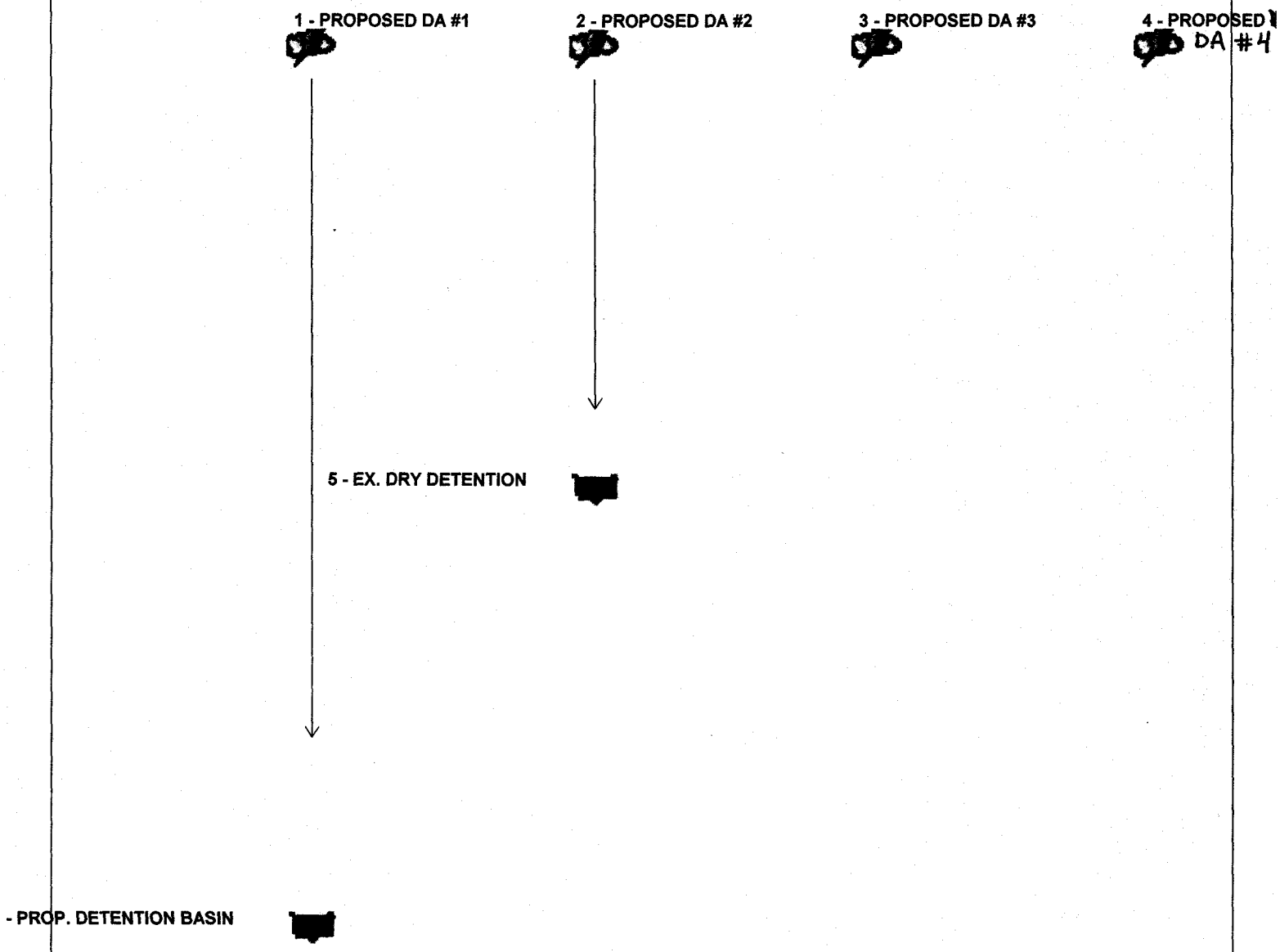
ɔcip. file name: I:\Projects\11075_Engineering\Calculations\Stormwater\JAMES CITY PRECIPITATION 24 HR.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.53	0.00	0.00	5.45	0.00	0.00	9.15
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

IV. PROPOSED CONDITIONS HYDROGRAPH REPORT

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Legend

Hyd.	Origin	Description
1	Rational	PROPOSED DA #1
2	Rational	PROPOSED DA #2
3	Rational	PROPOSED DA #3
4	Rational	PROPOSED DA #4
5	Reservoir	EX. DRY DETENTION
6	Reservoir	PROP. DETENTION BASIN

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Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	------	------	3.795	------	------	4.927	------	------	------	PROPOSED DA #1
2	Rational	------	------	3.356	------	------	4.360	------	------	------	PROPOSED DA #2
3	Rational	------	------	0.931	------	------	1.208	------	------	------	PROPOSED DA #3
4	Rational	------	------	0.173	------	------	0.225	------	------	------	PROPOSED DA #4
5	Reservoir	2	------	2.334	------	------	2.649	------	------	------	EX. DRY DETENTION
6	Reservoir	1	------	0.309	------	------	0.335	------	------	------	PROP. DETENTION BASIN

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	3.795	1	5	1,139	------	------	------	PROPOSED DA #1
2	Rational	3.356	1	7	1,409	------	------	------	PROPOSED DA #2
3	Rational	0.931	1	5	279	------	------	------	PROPOSED DA #3
4	Rational	0.173	1	5	52	------	------	------	PROPOSED DA #4
5	Reservoir	2.334	1	9	1,409	2	103.57	337	EX. DRY DETENTION
6	Reservoir	0.309	1	10	1,136	1	105.24	1,007	PROP. DETENTION BASIN

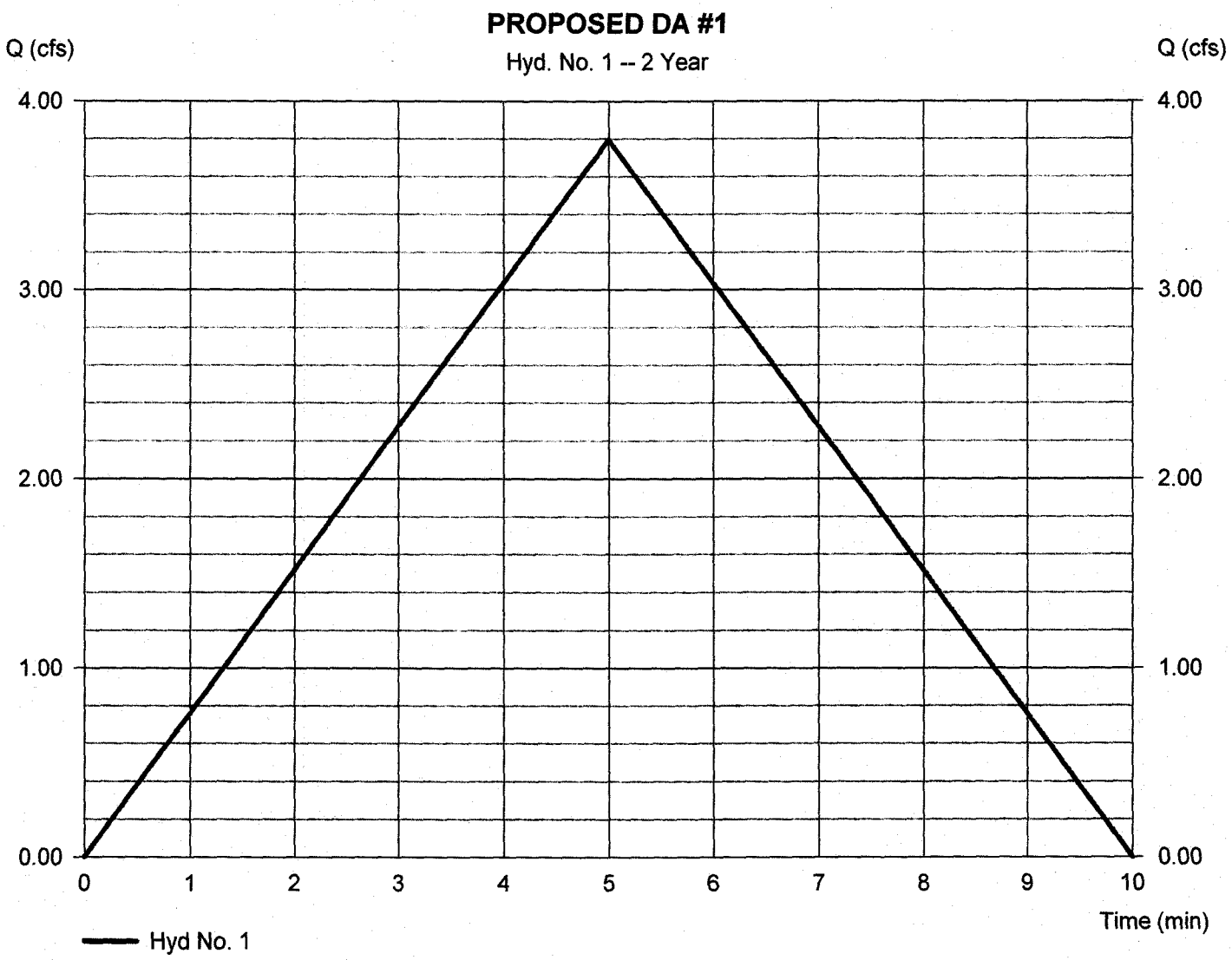
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 1

PROPOSED DA #1

Hydrograph type	= Rational	Peak discharge	= 3.795 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 1,139 cuft
Drainage area	= 1.060 ac	Runoff coeff.	= 0.62
Intensity	= 5.775 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



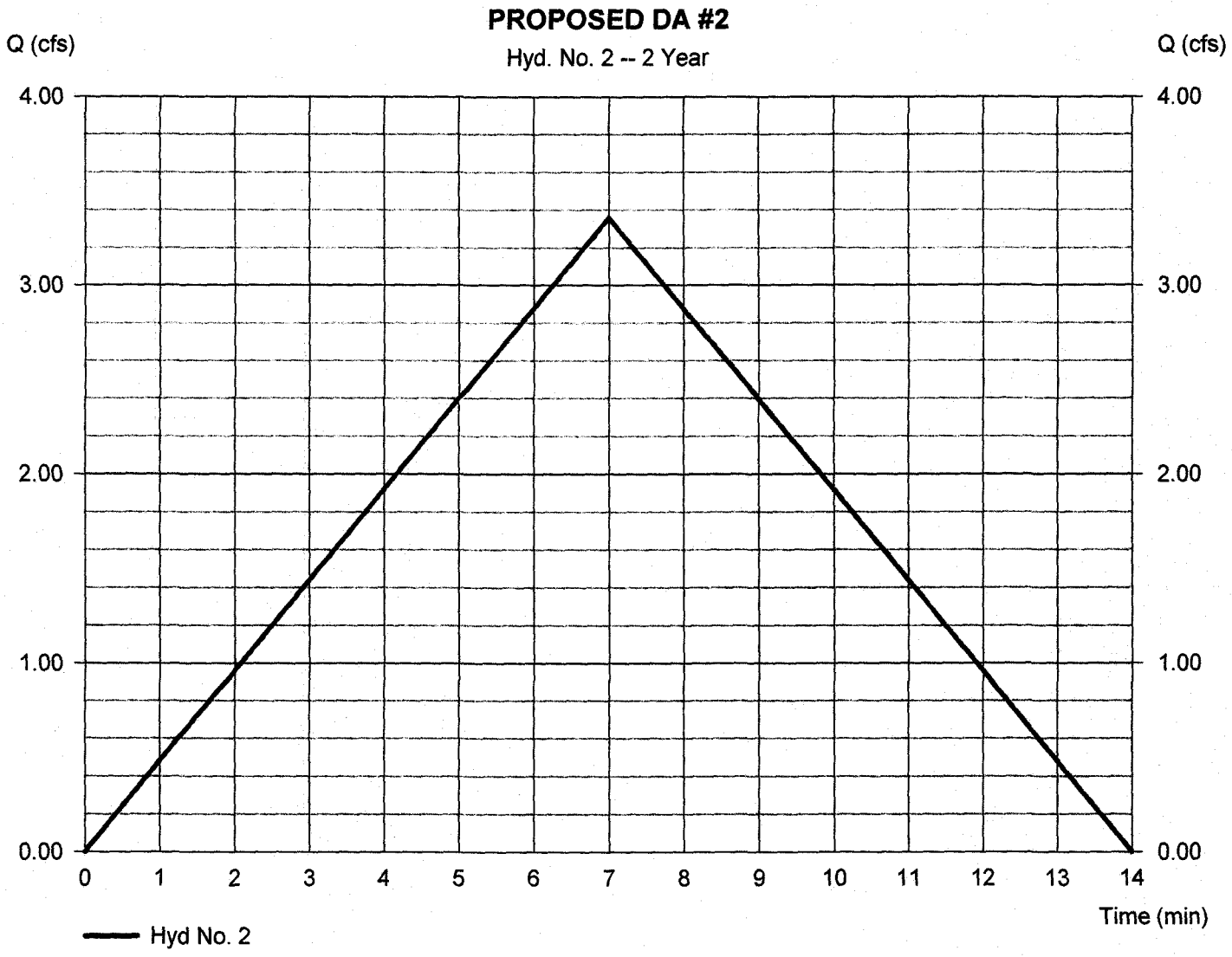
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

PROPOSED DA #2

Hydrograph type	= Rational	Peak discharge	= 3.356 cfs
Storm frequency	= 2 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,409 cuft
Drainage area	= 1.100 ac	Runoff coeff.	= 0.58
Intensity	= 5.260 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 2

PROPOSED DA #2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 31.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 5.33**	**+**	**0.00**	**+**	**0.00**	**=**	**5.33**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 13.00		0.00		0.00		
Wetted perimeter (ft)	= 27.00		0.00		0.00		
Channel slope (%)	= 0.50		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=2.15						
			0.00				
					0.00		
Flow length (ft)	({0})262.0		0.0		0.0		
Travel Time (min)	**= 2.03**	**+**	**0.00**	**+**	**0.00**	**=**	**2.03**

Total Travel Time, Tc ..... 7.00 min

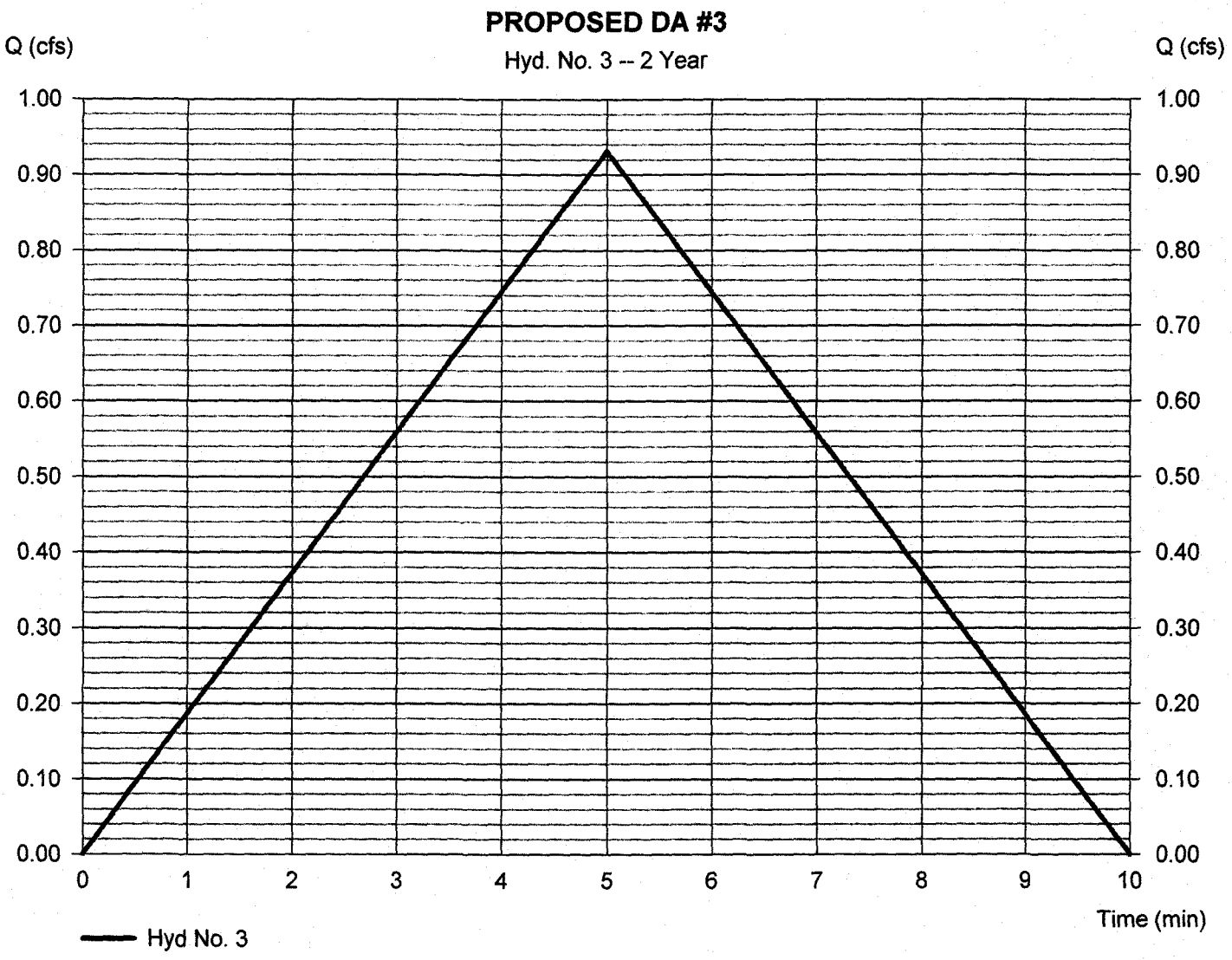
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

PROPOSED DA #3

Hydrograph type	= Rational	Peak discharge	= 0.931 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 279 cuft
Drainage area	= 0.310 ac	Runoff coeff.	= 0.52
Intensity	= 5.775 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



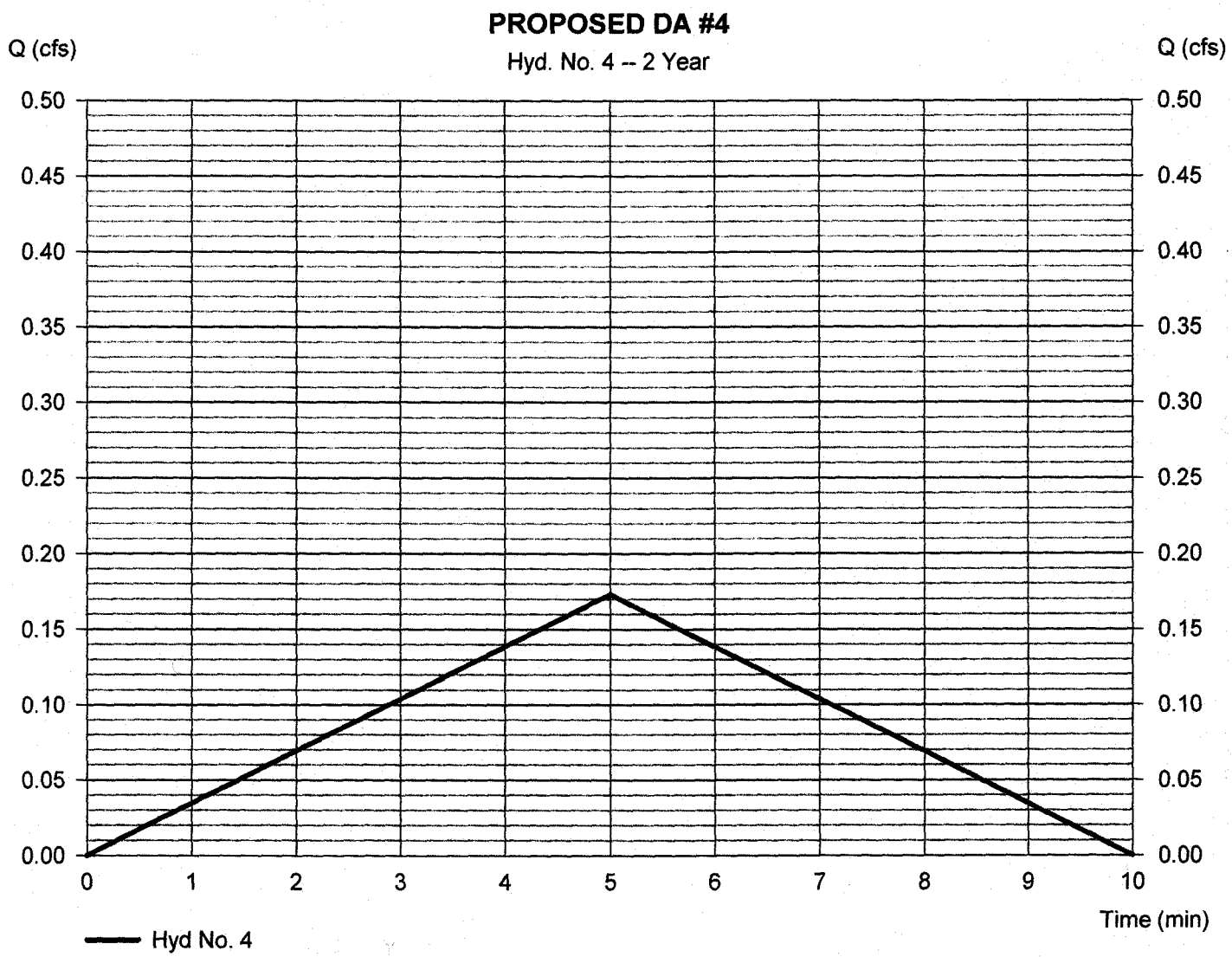
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

PROPOSED DA #4

Hydrograph type	= Rational	Peak discharge	= 0.173 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 5.775 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 4

PROPOSED DA #4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 25.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 2.58**	**+**	**0.00**	**+**	**0.00**	**=**	**2.58**
Shallow Concentrated Flow							
Flow length (ft)	= 152.00		0.00		0.00		
Watercourse slope (%)	= 0.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.14		0.00		0.00		
Travel Time (min)	**= 2.22**	**+**	**0.00**	**+**	**0.00**	**=**	**2.22**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 5.00 min

Hydrograph Report

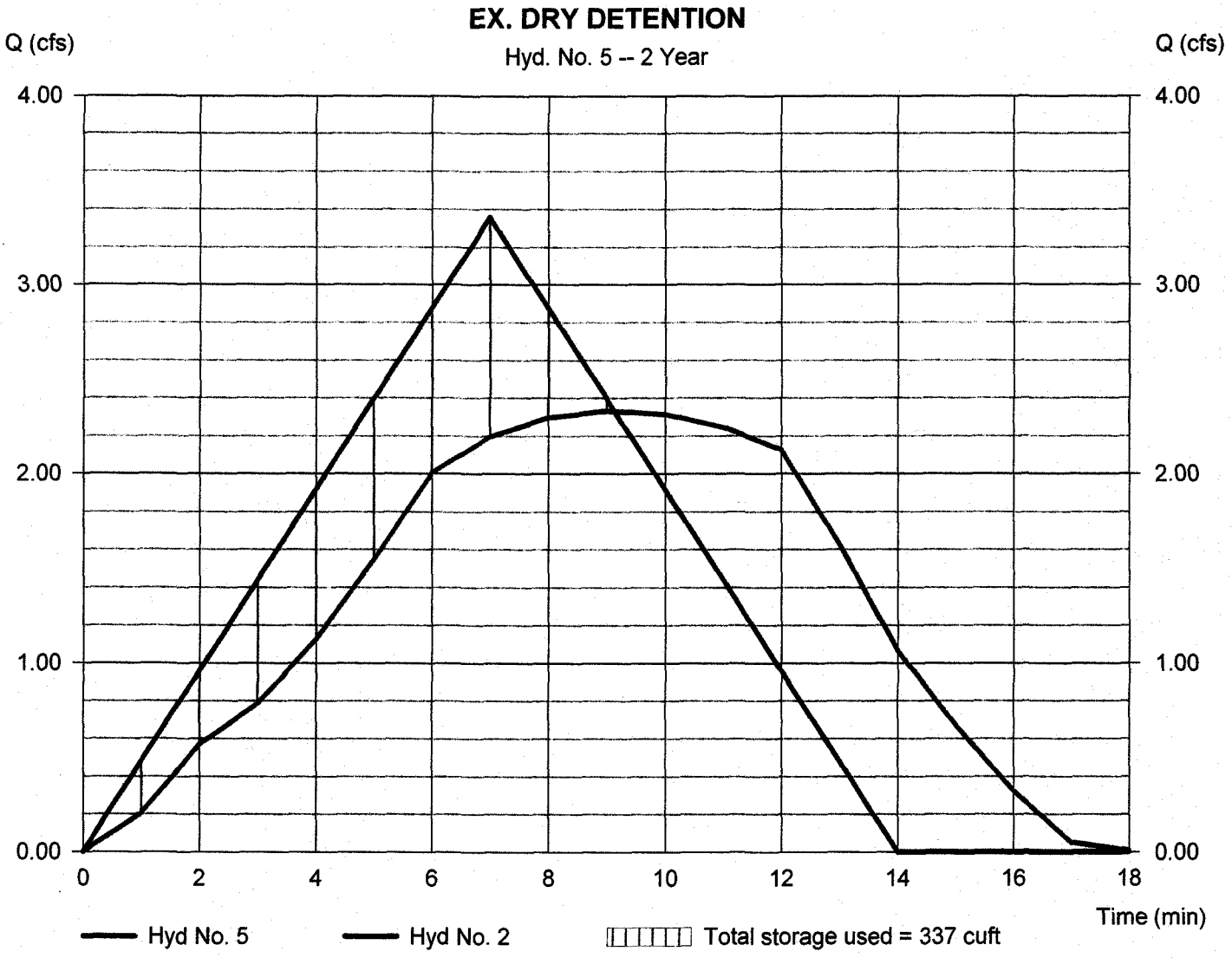
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.334 cfs
Storm frequency	= 2 yrs	Time to peak	= 9 min
Time interval	= 1 min	Hyd. volume	= 1,409 cuft
Inflow hyd. No.	= 2 - PROPOSED DA #2	Max. Elevation	= 103.57 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 337 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Pond No. 1 - EXISTING DRY DETENTION

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 103.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	103.00	00	0	0
0.50	103.50	1,288	215	215
1.00	104.00	2,428	914	1,129

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 102.69	0.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 3.80	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	103.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.50	215	103.50	2.09 ic	---	---	---	---	---	---	---	---	---	2.095
1.00	1,129	104.00	3.40 ic	---	---	---	---	---	---	---	---	---	3.403

Hydrograph Report

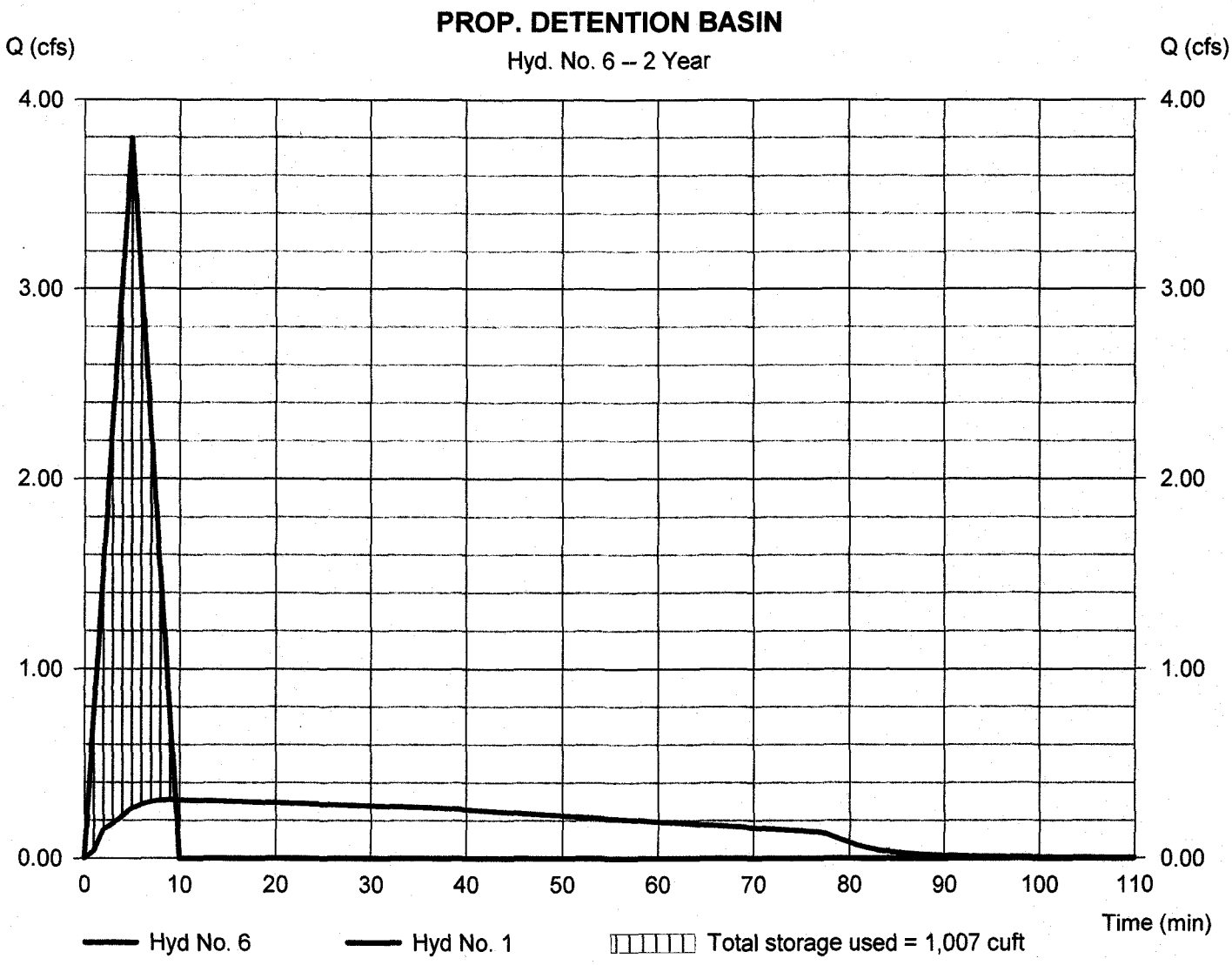
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 6

PROP. DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.309 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,136 cuft
Inflow hyd. No.	= 1 - PROPOSED DA #1	Max. Elevation	= 105.24 ft
Reservoir name	= PROPOSED DRY DETENTION	Max. Storage	= 1,007 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Pond No. 2 - PROPOSED DRY DETENTION

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 104.17 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	104.17	00	0	0
0.33	104.50	500	55	55
0.83	105.00	1,526	483	538
1.33	105.50	2,460	987	1,525
1.83	106.00	3,425	1,464	2,990

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.50	0.00	0.00
Span (in)	= 12.00	3.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 103.00	104.17	0.00	0.00
Length (ft)	= 32.00	1.00	0.00	0.00
Slope (%)	= 0.50	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.50	0.00	0.00	0.00
Crest El. (ft)	= 105.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	104.17	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.33	55	104.50	2.29 oc	0.14 ic	---	---	0.00	---	---	---	---	---	0.138
0.83	538	105.00	2.29 oc	0.27 ic	---	---	0.00	---	---	---	---	---	0.266
1.33	1,525	105.50	2.29 oc	0.35 ic	---	---	0.00	---	---	---	---	---	0.350
1.83	2,990	106.00	2.29 oc	0.42 ic	---	---	1.49 ic	---	---	---	---	---	1.903

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	4.927	1	5	1,478	-----	-----	-----	PROPOSED DA #1
2	Rational	4.360	1	7	1,831	-----	-----	-----	PROPOSED DA #2
3	Rational	1.208	1	5	363	-----	-----	-----	PROPOSED DA #3
4	Rational	0.225	1	5	67	-----	-----	-----	PROPOSED DA #4
5	Reservoir	2.649	1	10	1,831	2	103.68	539	EX. DRY DETENTION
6	Reservoir	0.335	1	10	1,476	1	105.41	1,334	PROP. DETENTION BASIN

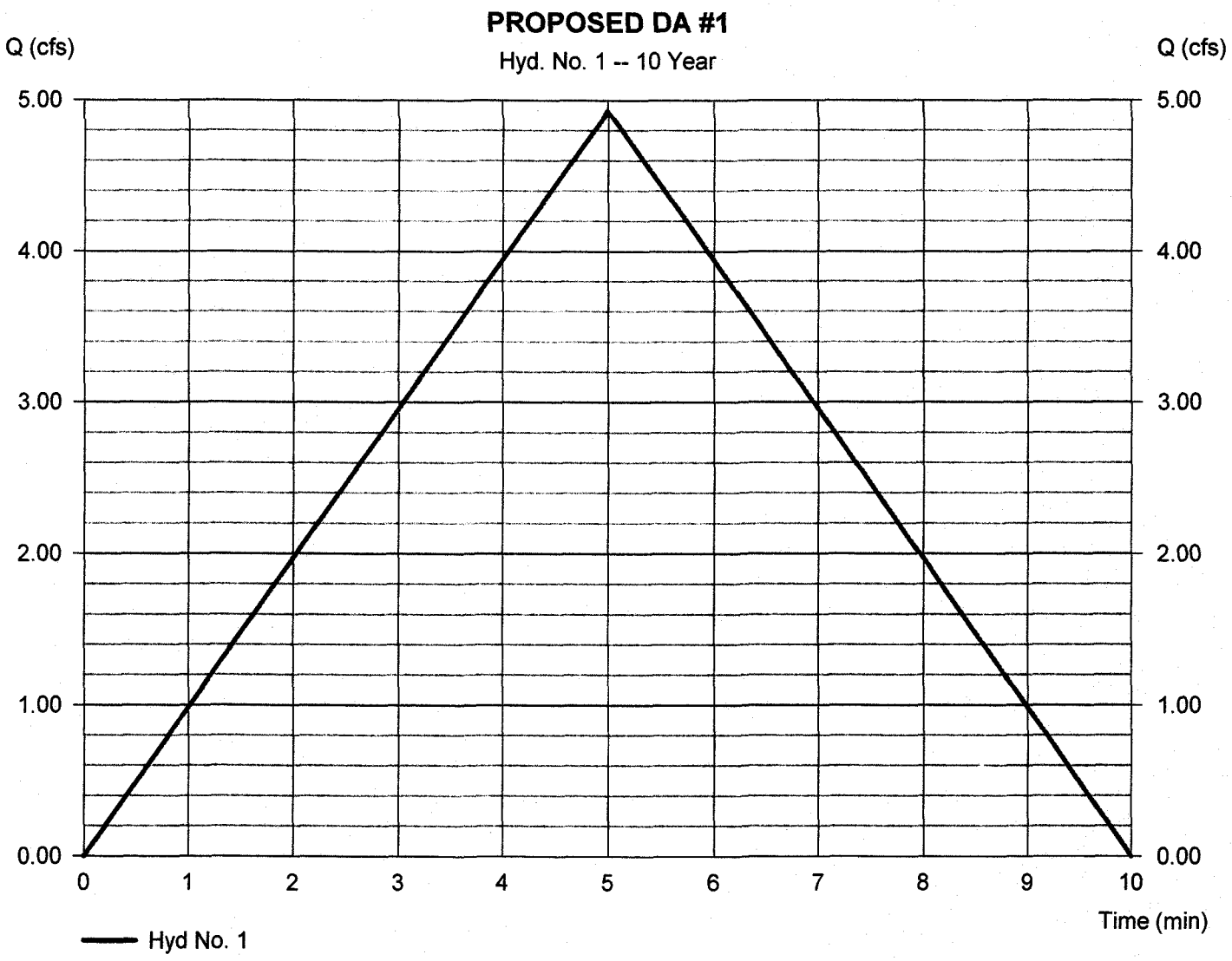
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 1

PROPOSED DA #1

Hydrograph type	= Rational	Peak discharge	= 4.927 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 1,478 cuft
Drainage area	= 1.060 ac	Runoff coeff.	= 0.62
Intensity	= 7.496 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



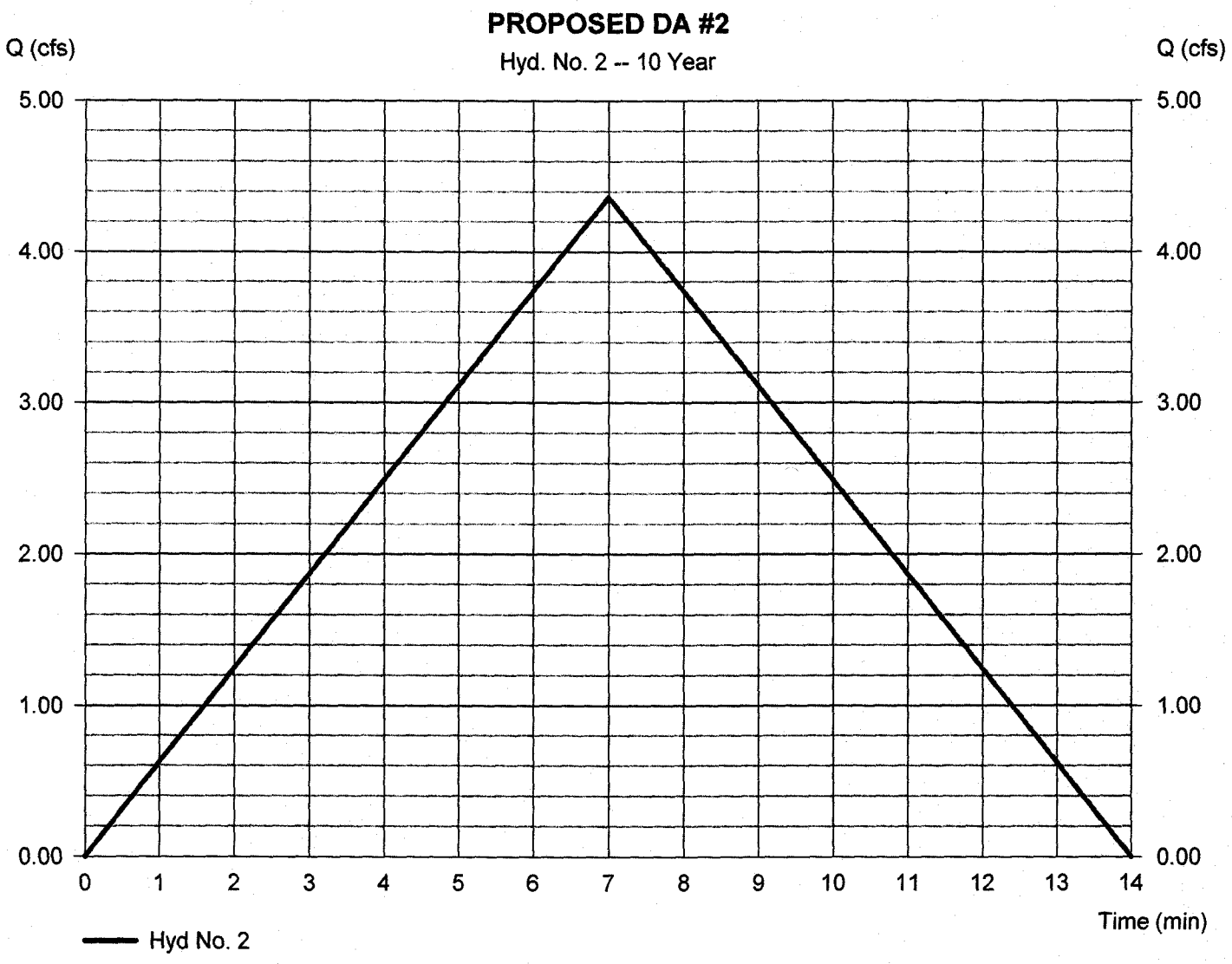
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

PROPOSED DA #2

Hydrograph type	= Rational	Peak discharge	= 4.360 cfs
Storm frequency	= 10 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,831 cuft
Drainage area	= 1.100 ac	Runoff coeff.	= 0.58
Intensity	= 6.834 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



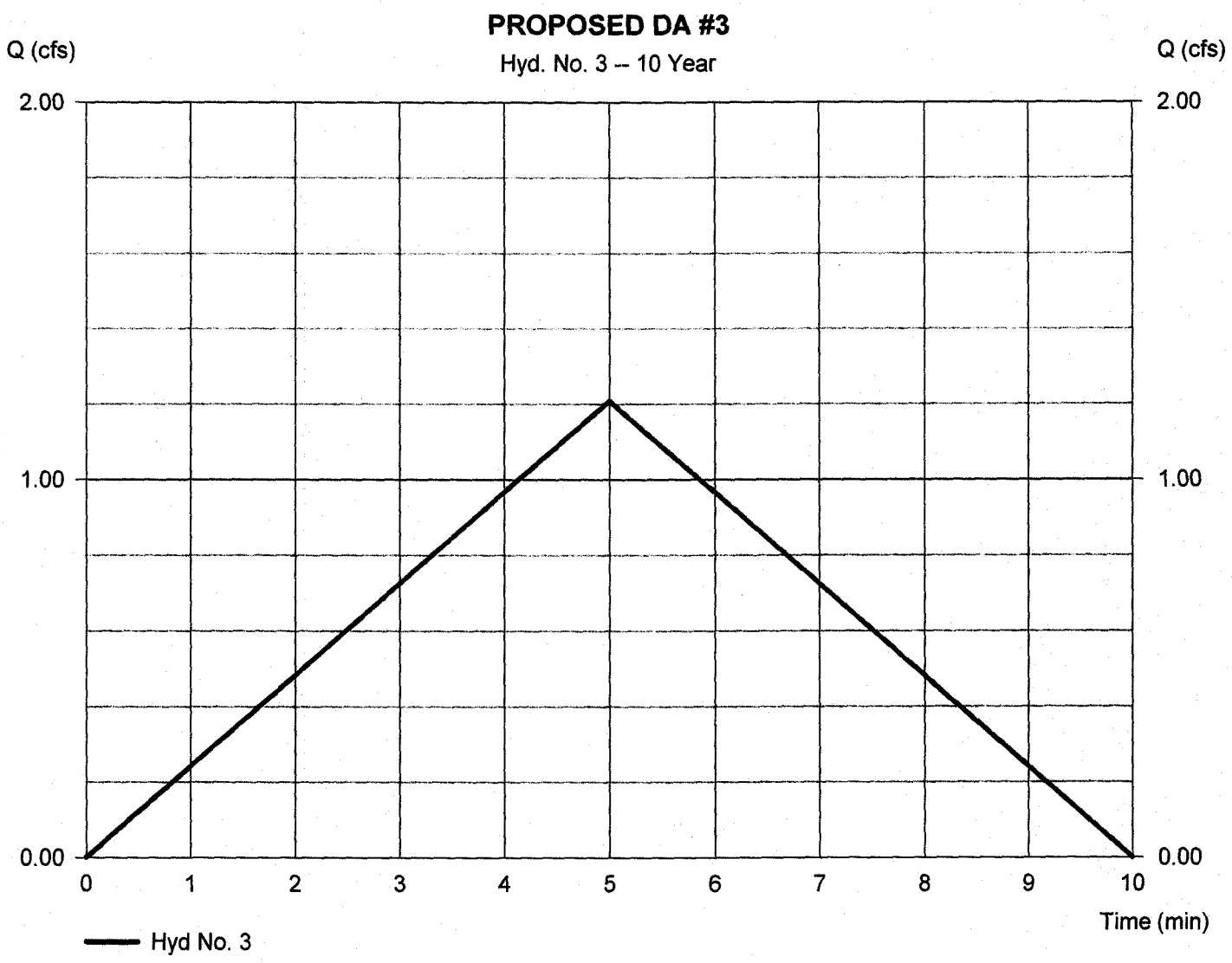
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

PROPOSED DA #3

Hydrograph type	= Rational	Peak discharge	= 1.208 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 363 cuft
Drainage area	= 0.310 ac	Runoff coeff.	= 0.52
Intensity	= 7.496 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



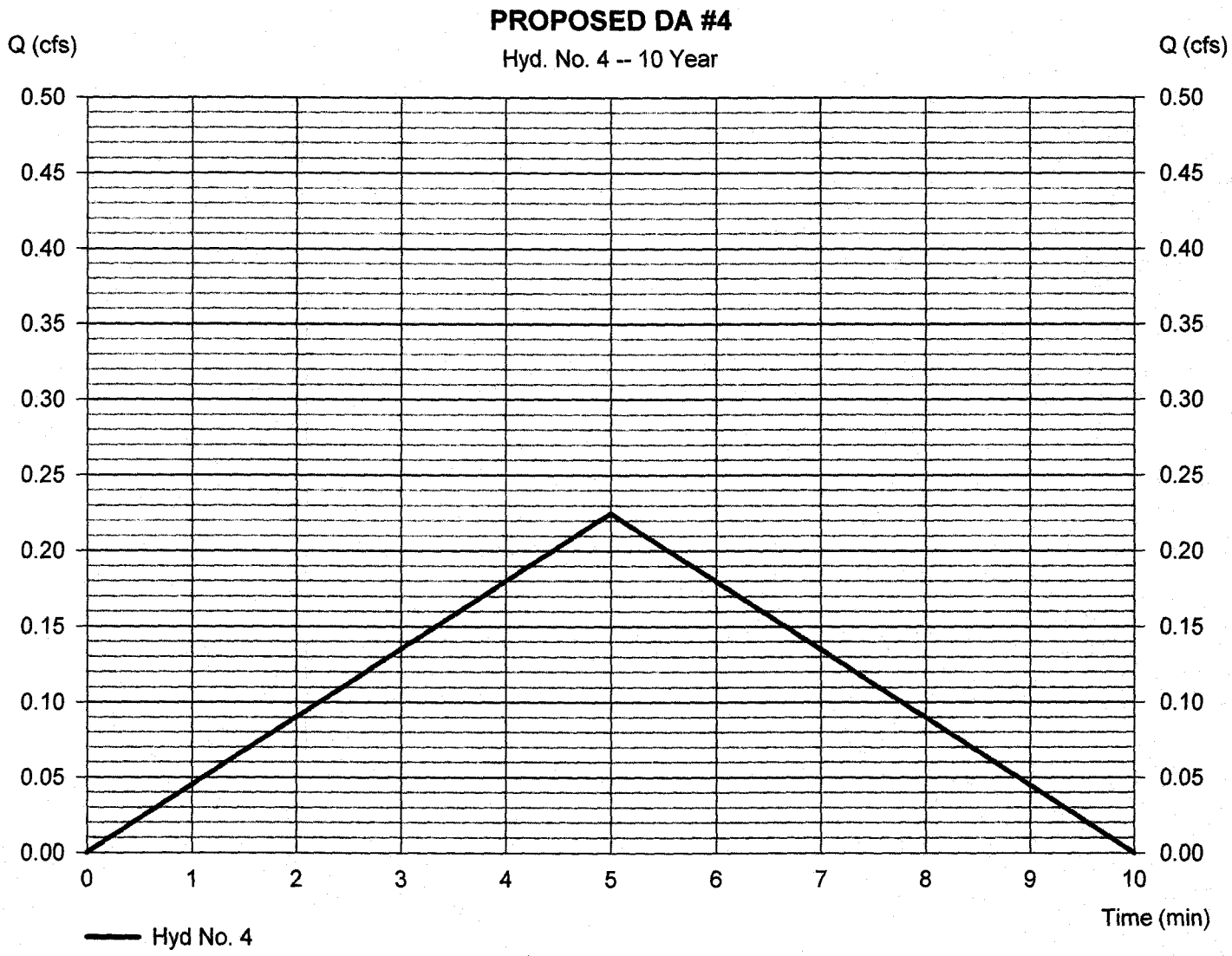
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

PROPOSED DA #4

Hydrograph type	= Rational	Peak discharge	= 0.225 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 67 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 7.496 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

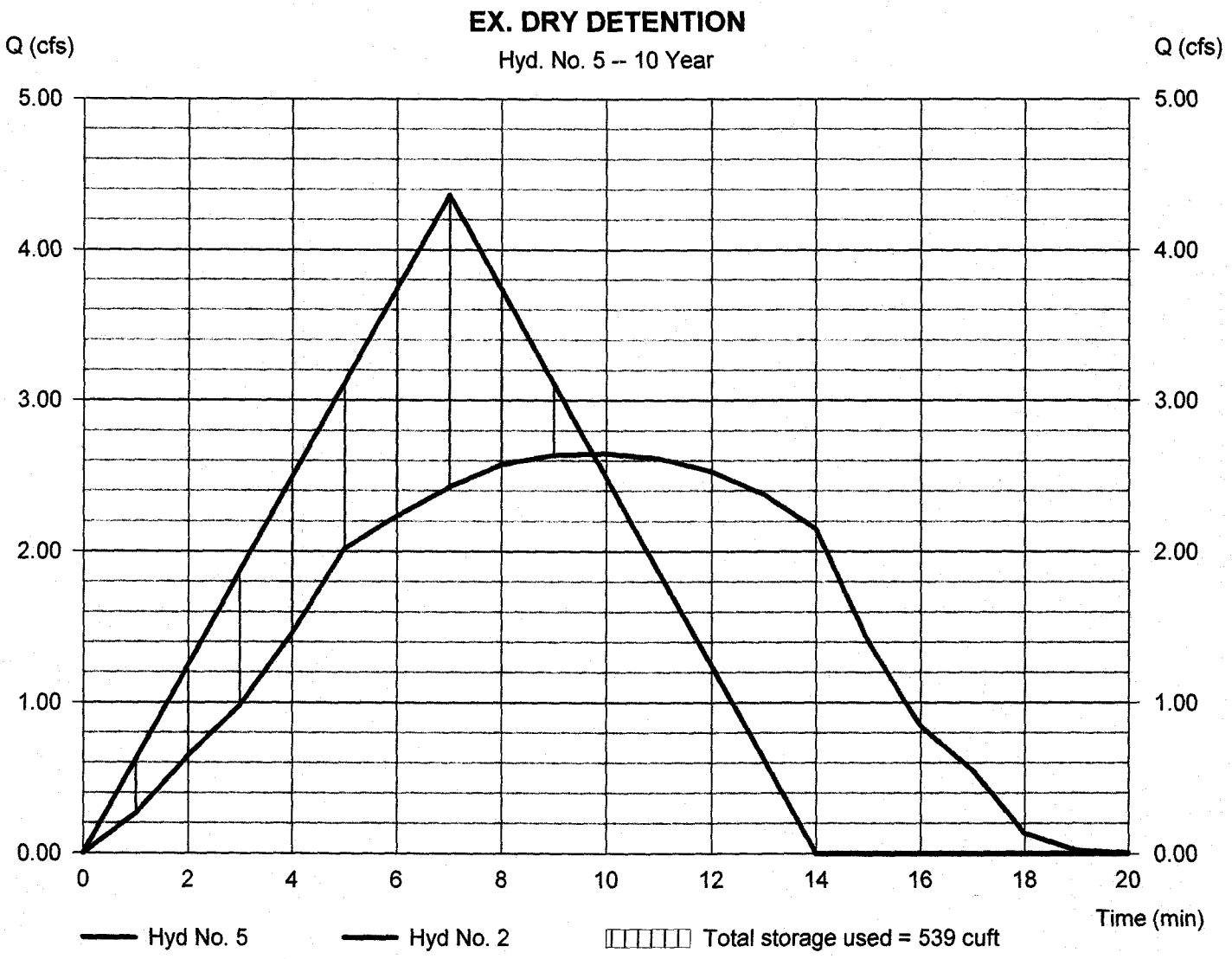
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.649 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,831 cuft
Inflow hyd. No.	= 2 - PROPOSED DA #2	Max. Elevation	= 103.68 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 539 cuft

Storage Indication method used.



Hydrograph Report

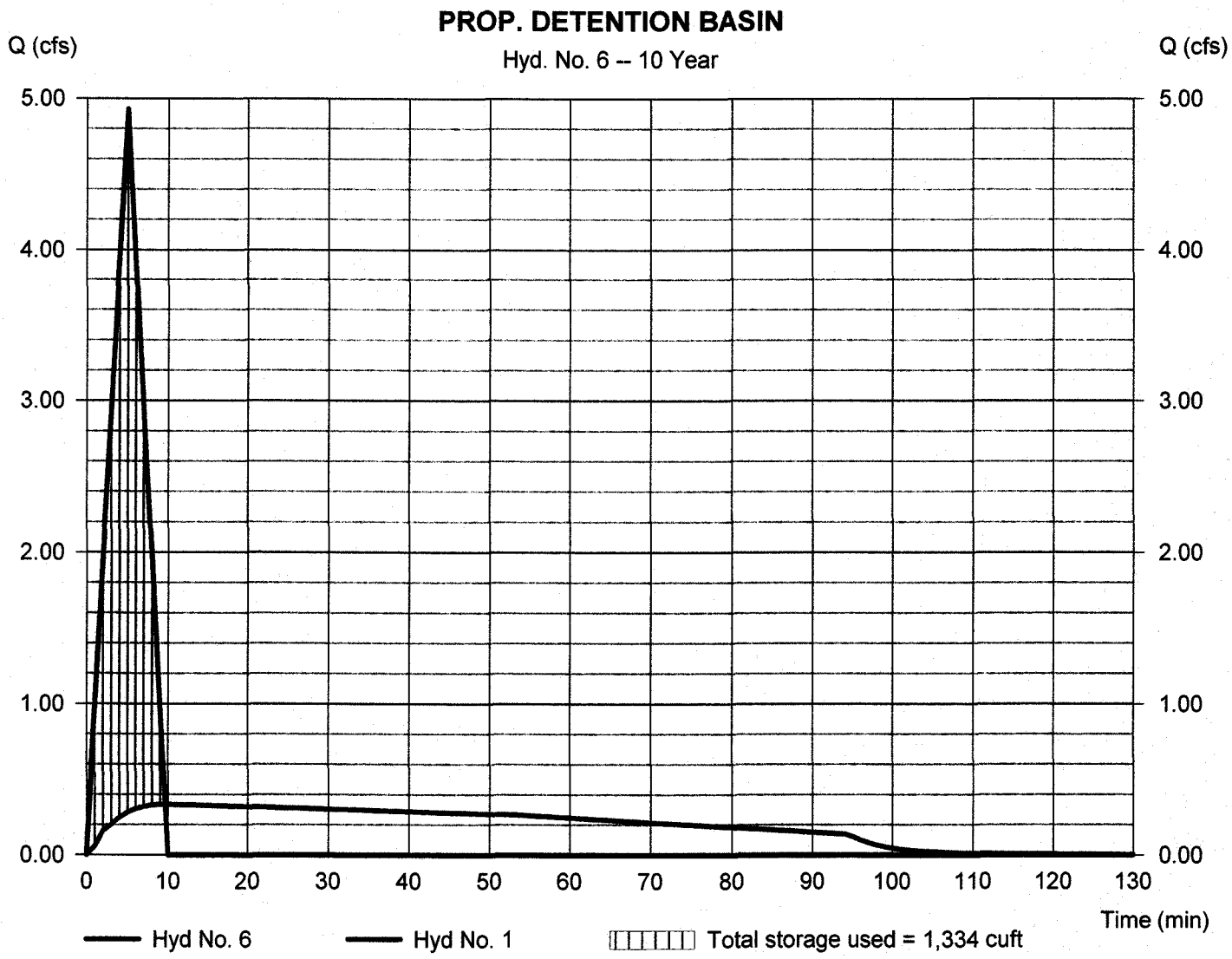
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 6

PROP. DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.335 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,476 cuft
Inflow hyd. No.	= 1 - PROPOSED DA #1	Max. Elevation	= 105.41 ft
Reservoir name	= PROPOSED DRY DETENTION	Max. Storage	= 1,334 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	66.9152	12.4000	0.8577	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	55.5168	10.0000	0.7394	--------
25	0.0000	0.0000	0.0000	--------
50	0.0000	0.0000	0.0000	--------
100	36.9712	5.3000	0.5614	--------

File name: JAMES CITY IDF CURVE.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.77	4.65	3.91	3.39	3.00	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.50	6.06	5.14	4.49	4.01	3.63	3.33	3.08	2.87	2.69	2.54	2.40
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	9.98	7.99	6.82	6.03	5.45	5.00	4.64	4.35	4.10	3.89	3.70	3.54

Tc = time in minutes. Values may exceed 60.

:cip. file name: I:\Projects\11075_Engineering\Calculations\Stormwater\JAMES CITY PRECIPITATION 24 HR.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.53	0.00	0.00	5.45	0.00	0.00	9.15
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

V. STORM SEWER PIPE ANALYSIS

Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Friday, Jan 13 2012

Proposed
Dry Detention Swale Outfall Pipe_Q 2-Year

Invert Elev Dn (ft)	= 102.00
Pipe Length (ft)	= 33.00
Slope (%)	= 3.03
Invert Elev Up (ft)	= 103.00
Rise (in)	= 12.0
Shape	= Cir
Span (in)	= 12.0
No. Barrels	= 1
n-Value	= 0.013
Inlet Edge	= 0
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.5

Embankment

Top Elevation (ft)	= 106.00
Top Width (ft)	= 30.00
Crest Width (ft)	= 0.00

Calculations

Qmin (cfs)	= 0.31
Qmax (cfs)	= 0.31
Tailwater Elev (ft)	= 0.00

Highlighted

Qtotal (cfs)	= 0.31
Qpipe (cfs)	= 0.31
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 2.24
Veloc Up (ft/s)	= 2.24
HGL Dn (ft)	= 102.23
HGL Up (ft)	= 103.23
Hw Elev (ft)	= 103.31
Hw/D (ft)	= 0.31
Flow Regime	= Inlet Control

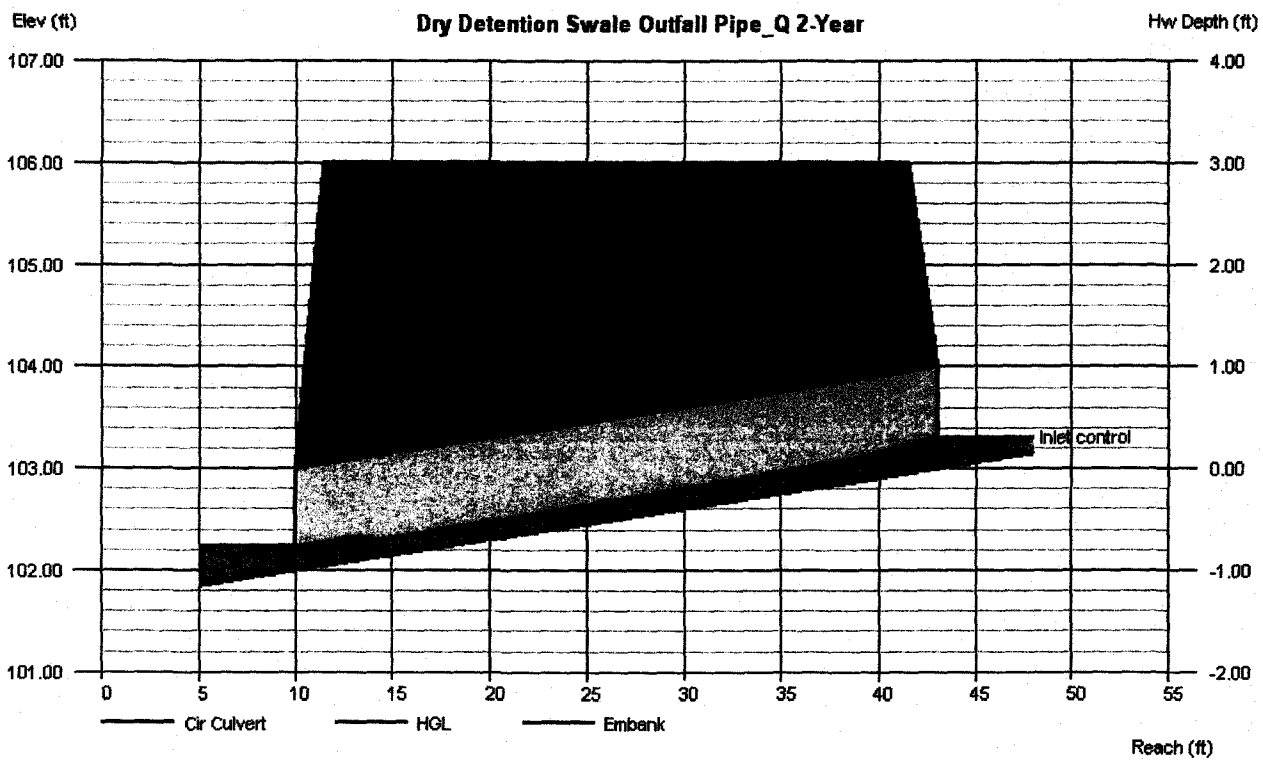


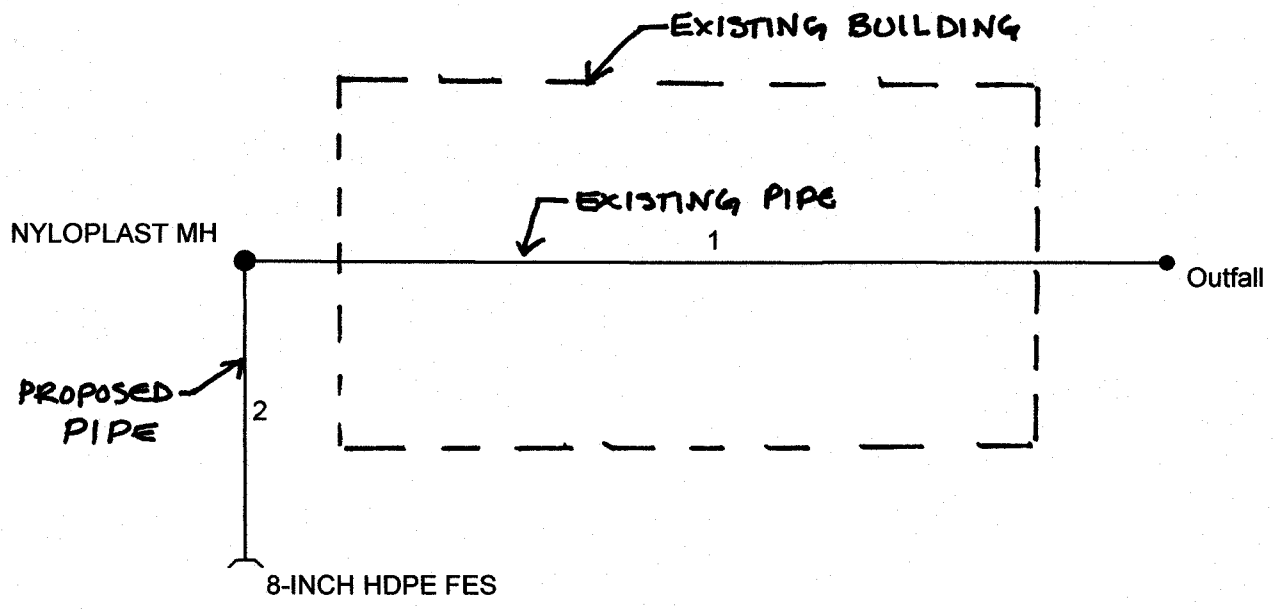
TABLE 5-22

PERMISSIBLE VELOCITIES FOR UNLINED EARTHEN CHANNELS

Soil Types	Permissible Velocity (ft./sec.)
Fine Sand (noncolloidal)	2.5
Sandy Loam (noncolloidal)	2.5
Silt Loam (noncolloidal)	3.0
Ordinary Firm Loam	3.5
Fine Gravel	5.0
Stiff Clay (very colloidal)	5.0
Graded, Loam to Cobbles (noncolloidal)	5.0
Graded, Silt to Cobbles (noncolloidal)	5.5
Alluvial Silts (noncolloidal)	3.5
Alluvial Silts (colloidal)	5.0
Coarse Gravel (noncolloidal)	6.0
Cobbles and Shingles	5.5
Shales and Hard Pans	6.0

Source: American Society of Civil Engineers

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Project File: Storm Sewer Under Building.stm	Number of lines: 2	Date: 1/13/2012

Storm Sewers v8.00

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	120.000	0.00	0.15	0.00	0.00	0.09	0.0	5.4	6.9	0.64	2.28	2.49	12	0.41	103.74	104.23	104.08	104.62	0.00	107.42	NYLOPLAST MH
2	1	40.000	0.15	0.15	0.62	0.09	0.09	5.0	5.0	7.0	0.65	1.79	2.81	8	1.30	104.23	104.75	104.70	105.13	107.42	105.50	8-INCH HDPE FES

Project File: Storm Sewer Under Building.stm | Number of lines: 2 | Run Date: 1/13/2012

NOTES:Intensity = 193.66 / (Inlet time + 23.60) ^ 0.99; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	12	0.64	103.74	104.08	0.34	0.23	2.72	0.12	104.19	0.525	120.000	104.23	104.62	0.39	0.28	2.26	0.08	104.70	0.313	0.419	0.503	1.00	0.08
2	8	0.65	104.23	104.70	0.47	0.26	2.47	0.09	104.79	0.239	40.000	104.75	105.13 j	0.38**	0.20	3.16	0.15	105.28	0.445	0.342	0.137	1.00	n/a

Project File: Storm Sewer Under Building.stm | Number of lines: 2 | Run Date: 1/13/2012

Notes: ; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

VI. APPENDIX

MSA, P.C.

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Offices in Virginia Beach & Belle Haven, VA

Project Information

Project Name	Smithfield Specialty Foods Expansion
Project Number	11075
Site Location	Smithfield, Virginia
Inspector	C. Hall
Project Manager	C. Hall
Date Sampled	1/9/2012
Method	Hand Auger

Elevation (FT AMSL)	
Ground Surface	107.5'
Seasonal High	> 10' bgs
Seasonal Low	N/A
Static Water	> 10' bgs

Boring No. HA-1

Seasonal low · Seasonal High · Current Depth

Depth (ft)	Lithology	Soil Description	K (ft./day)	Moisture	Matrix Color	Mottles	Notes
0–1		FINE SAND WITH SILT (SP-SM): Suspected fill material		Dry	10YR 4/3		
1–2					2.5Y 6/3		
2–3		FINE TO MEDIUM CLAYEY SAND (SC)			10YR 5/6		
3–4		FINE SAND AND SILT WITH CLAY (SC-SM)	~ 6		10YR 6/6		
4–5		FINE SANDY LEAN CLAY (CL)		Moist			
5–6		FAT CLAY (CH): With fine sand				10YR 6/2 and 10YR 5/6	
6–7		FINE CLAYEY SAND (SC)			10YR 6/2	10YR 6/4 and 10YR 5/6	
7–8		FINE SAND WITH CLAY (SP-SC)			10YR 5/4 and 10YR 6/2		
8–9		FINE SAND WITH SILT (SP-SM): Pockets of sandy (ML) and lenses of (SP)			10YR 6/6 and 10YR 6/2	10YR 5/6	
9–10					2.5Y 8/2	10YR 6/6	

CHARLES H. HALL
No. 1308
1-12-12
CERTIFIED PROFESSIONAL GEOLOGIST

Comments: SHWT = Seasonal High Water Table DTW = Depth to Water

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Project Information

Project Name	Smithfield Specialty Foods Expansion
Project Number	11075
Site Location	Smithfield, Virginia
Inspector	C. Hall
Project Manager	C. Hall
Date Sampled	1/9/2012
Method	Earthprobe

Elevation (FT AMSL)	
Ground Surface	107.2'
Seasonal High	> 10' bgs
Seasonal Low	N/A
Static Water	> 10' bgs

Boring No. EP-1

Seasonal low · Seasonal High · Current Depth

Depth (ft)	Lithology	Soil Description	K (ft./day)	Moisture	Matrix Color	Mottles	Notes
0–1.5		FINE SAND WITH SILT (SP-SM): Suspected fill material		Dry	10YR 4/3; 2.5Y 6/3		
1.5–3.5		FINE TO MEDIUM CLAYEY SAND (SC)			10YR 5/6		
3.5–4.5		FINE SAND AND SILT WITH CLAY (SC-SM)	6.9				
4.5–5.5		FINE SANDY LEAN CLAY (CL)		Moist			
5.5–6.5		FAT CLAY (CH): With fine sand			10YR 6/6	10YR 6/2 and 10YR 5/6	
6.5–7.5		FINE POORLY-GRADED SAND (SP): Trace silt			10YR 8/2		
7.5–8.5		FINE SAND WITH CLAY (SP-SC)			10YR 5/6, 10YR 6/6, 10YR 5/4 and 10YR 6/2	10YR 6/4 and 10YR 5/6	
8.5–9.5		FINE SAND WITH SILT (SP-SM): Pockets of sandy (CL) and lenses of (SP)				10YR 5/6	
9.5–12					2.5Y 8/2	10YR 6/6	

COMMONWEALTH OF VIRGINIA
CHARLES H. HALL
No. 1308
1-12-12
CERTIFIED PROFESSIONAL GEOLOGIST

Comments:

SHWT = Seasonal High Water Table DTW = Depth to Water

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Project Information

Project Name	Smithfield Specialty Foods Expansion
Project Number	11075
Site Location	Smithfield, Virginia
Inspector	C. Hall
Project Manager	C. Hall
Date Sampled	1/9/2012
Method	Earthprobe

Elevation (FT AMSL)	
Ground Surface	106.1'
Seasonal High	> 10' bgs
Seasonal Low	N/A
Static Water	> 10' bgs

Boring No. EP-2

Seasonal low · Seasonal High · Current Depth

Depth (ft)	Lithology	Soil Description	K (ft./day)	Moisture	Matrix Color	Mottles	Notes
0–3.3		FINE SAND WITH SILT (SP-SM): Suspected fill material		Dry	10YR 4/3; 2.5Y 6/3		
2–3.3		FINE TO MEDIUM CLAYEY SAND (SC)			10YR 5/6		
3.3–4.5		FINE SAND AND SILT WITH CLAY (SC-SM)	~ 6		10YR 6/6		
4.5–5.5		FINE SANDY LEAN CLAY (CL)		Moist			
5.5–6.5		FAT CLAY (CH): With fine sand				10YR 6/2 and 10YR 5/6	
6.5–7.5		FINE POORLY-GRADED SAND (SP): Trace silt					
7.5–8.5		FINE SAND WITH CLAY (SP-SC)			10YR 6/6, 10YR 5/4 and 10YR 6/2	10YR 6/4 and 10YR 5/6	
8.5–9.5		FINE SAND WITH SILT (SP-SM): Pockets of sandy (CL) and lenses of (SP)				10YR 5/6	
9.5–10.5					2.5Y 8/2	10YR 6/6	
10.5–12						10YR 6/6-6/8	

CHARLES H. HALL
No. 1003
1-12-12
PROFESSIONAL GEOLOGIST

Comments: SHWT = Seasonal High Water Table DTW = Depth to Water

STATE ROUTE 60
160' R/W

50' LANDSCAPE BUFFER

15' LANDSCAPE BUFFER

15' LANDSCAPE BUFFER

HA-1

EP-1

EP-2

PARCEL 445
HANKINS IND PARK
MONSTER STORAGE, L.L.C.
PIN# 1240100001J
TAX MAP PG 124
1.664 ACRES

PARCEL 5
HANKINS IND PARK
WRIGHT SIGN SERVICE, INC
PIN# 1240100001E
TAX MAP PG 124
1.00 ACRES

PROPOSED
BUILDING ADDITION
±6,145 SF

HANKINS INDUSTRIAL PARK ROAD
50' R/W

*** CAUTION ***
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1 INCH = 25 FT

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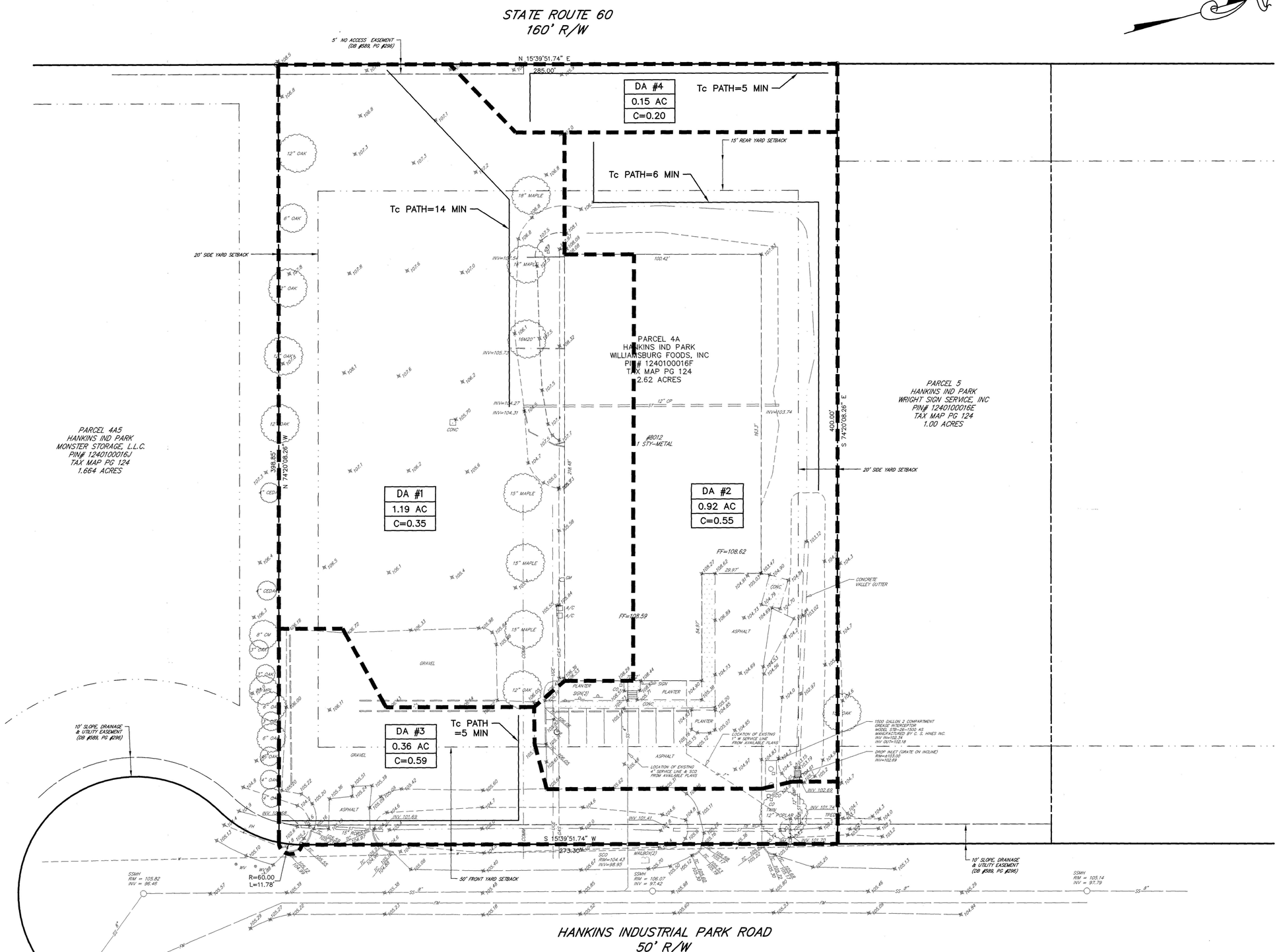
DRAWN KEJ
CHECKED DMW
APPROVED DMW
DATE 1/13/12

SOIL BORING MAP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET
8
- of 10 Sheets

SCALE: 1" = 25'

PROJ. NO.: 11075



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APPROVED	DMW
DATE	1/17/12

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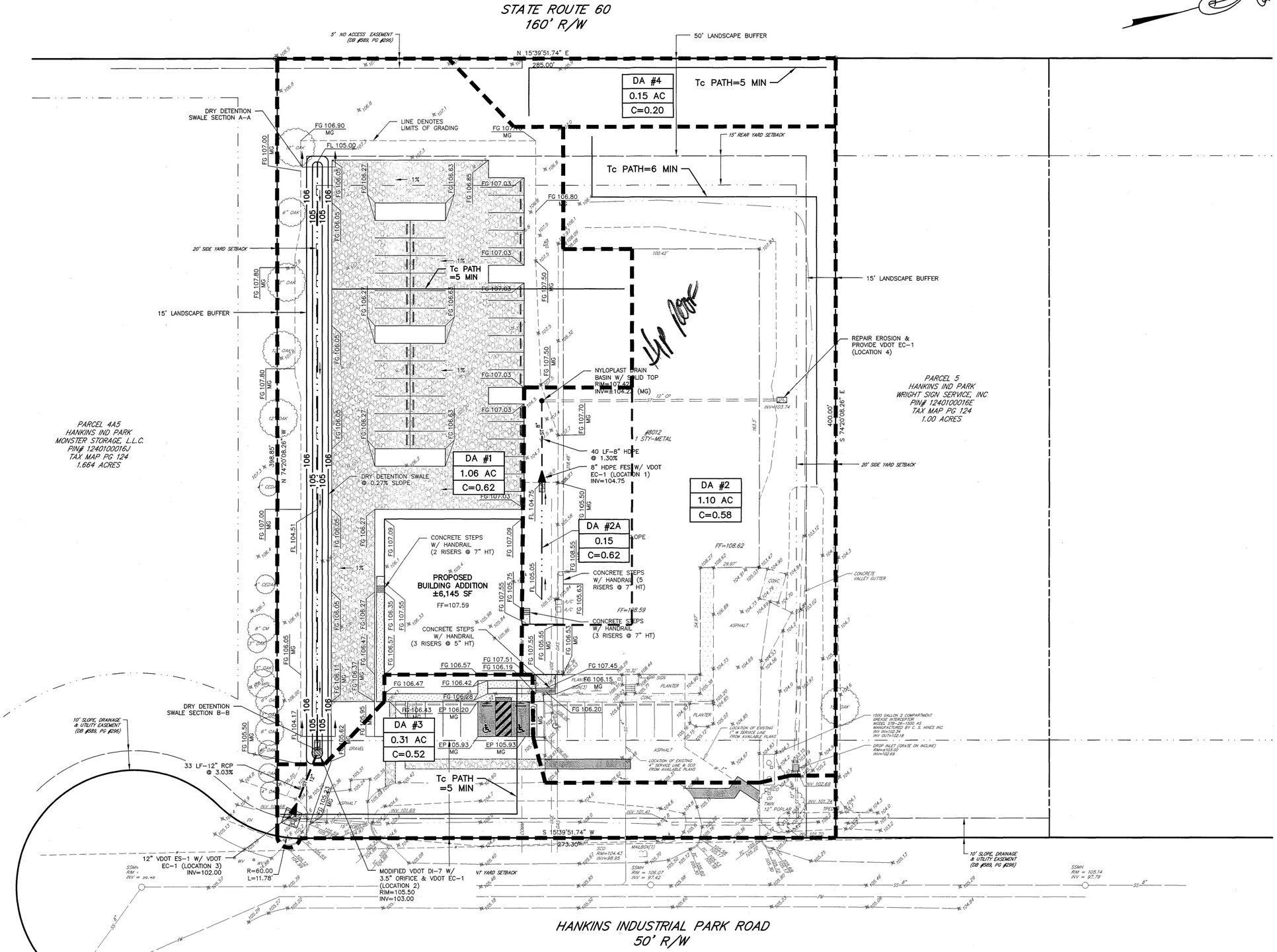
EXISTING DRAINAGE AREA MAP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET
DA1
– of 10 Sheets

SCALE: 1" = 25'

PROJ. NO.: 11075



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1 INCH = 25 FT

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CHECKED	DMW
APPROVED	DMW
DATE	1/17/12

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PROPOSED DRAINAGE AREA MAP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET
DA2
– of 10 Sheets

SCALE: 1" = 25'
PROJ. NO.: 11075

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

1 - ROADSIDE DITCH DA

Environmental Division
MAR 02 2012
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Legend

Hyd.	Origin	Description
1	Rational	ROADSIDE DITCH DA

Hydraflow Table of Contents

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Wednesday, Feb 29, 2012

Watershed Model Schematic 1

Hydrograph Return Period Recap 2

2 - Year

Summary Report 3

Hydrograph Reports 4

Hydrograph No. 1, Rational, ROADSIDE DITCH DA 4

TR-55 Tc Worksheet 5

10 - Year

Summary Report 6

Hydrograph Reports 7

Hydrograph No. 1, Rational, ROADSIDE DITCH DA 7

IDF Report 8

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	------	-------	4.745	-------	-------	6.708	-------	-------	9.913	ROADSIDE DITCH DA

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	4.745	1	61	17,368	-----	-----	-----	ROADSIDE DITCH DA

Hydrograph Report

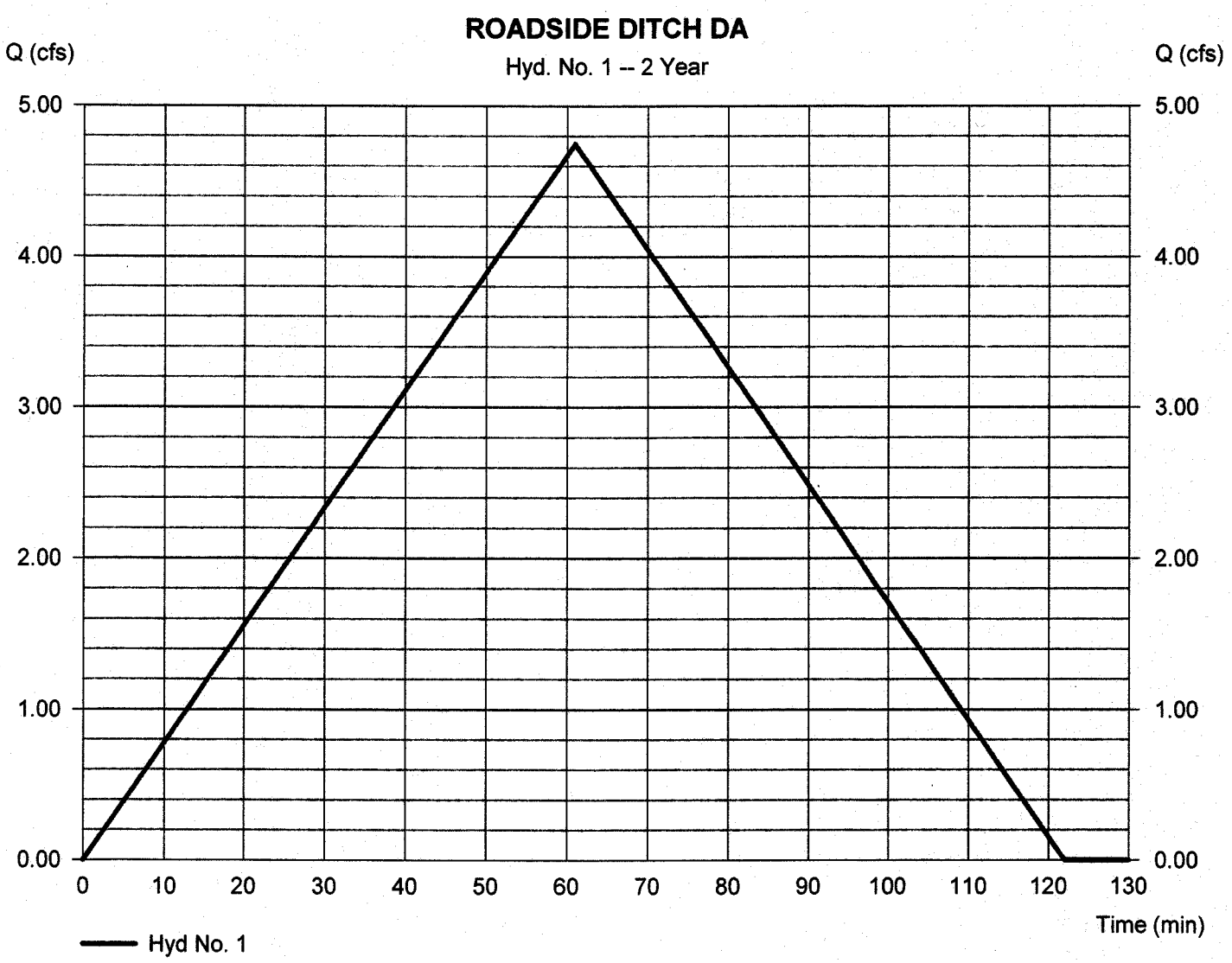
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Wednesday, Feb 29, 2012

Hyd. No. 1

ROADSIDE DITCH DA

Hydrograph type	= Rational	Peak discharge	= 4.745 cfs
Storm frequency	= 2 yrs	Time to peak	= 61 min
Time interval	= 1 min	Hyd. volume	= 17,368 cuft
Drainage area	= 6.140 ac	Runoff coeff.	= 0.46*
Intensity	= 1.680 in/hr	Tc by TR55	= 61.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(3.850 x 0.20) + (2.290 x 0.90)] / 6.140



TR55 Tc Worksheet

Hyd. No. 1

ROADSIDE DITCH DA

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 43.17**	**+**	**0.00**	**+**	**0.00**	**=**	**43.17**
Shallow Concentrated Flow							
Flow length (ft)	= 57.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.61		0.00		0.00		
Travel Time (min)	**= 0.59**	**+**	**0.00**	**+**	**0.00**	**=**	**0.59**
Channel Flow							
X sectional flow area (sqft)	= 27.30		0.00		0.00		
Wetted perimeter (ft)	= 22.40		0.00		0.00		
Channel slope (%)	= 0.01		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=0.57						
			0.00				
					0.00		
Flow length (ft)	({0})572.0		0.0		0.0		
Travel Time (min)	**= 16.81**	**+**	**0.00**	**+**	**0.00**	**=**	**16.81**

Total Travel Time, Tc ..... 61.00 min

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	6.708	1	61	24,551	------	------	------	ROADSIDE DITCH DA

Hydrograph Report

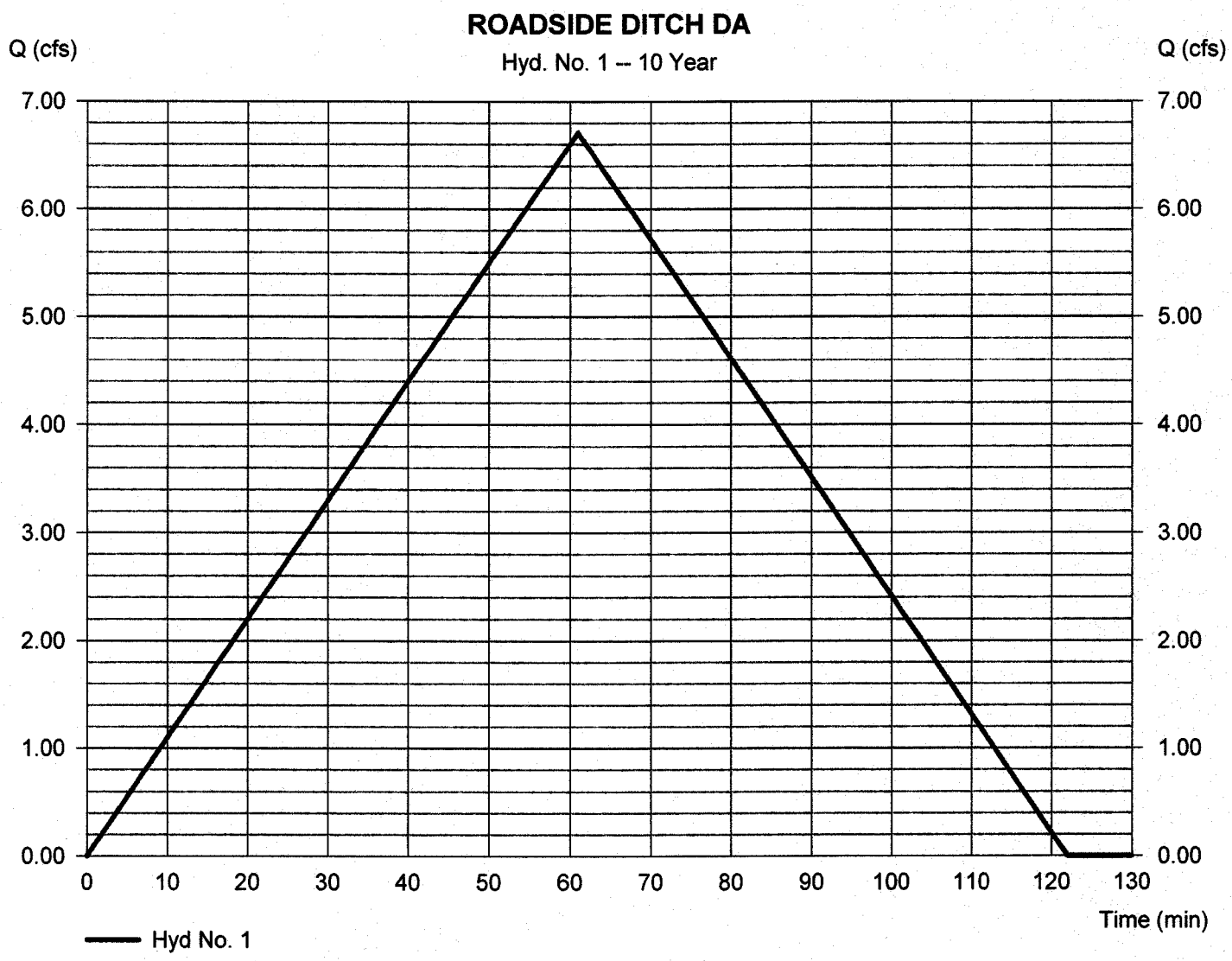
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Wednesday, Feb 29, 2012

Hyd. No. 1

ROADSIDE DITCH DA

Hydrograph type	= Rational	Peak discharge	= 6.708 cfs
Storm frequency	= 10 yrs	Time to peak	= 61 min
Time interval	= 1 min	Hyd. volume	= 24,551 cuft
Drainage area	= 6.140 ac	Runoff coeff.	= 0.46*
Intensity	= 2.375 in/hr	Tc by TR55	= 61.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(3.850 x 0.20) + (2.290 x 0.90)] / 6.140



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Wednesday, Feb 29, 2012

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	66.9152	12.4000	0.8577	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	55.5168	10.0000	0.7394	--------
25	0.0000	0.0000	0.0000	--------
50	0.0000	0.0000	0.0000	--------
100	36.9712	5.3000	0.5614	--------

File name: JAMES CITY IDF CURVE.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.77	4.65	3.91	3.39	3.00	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.50	6.06	5.14	4.49	4.01	3.63	3.33	3.08	2.87	2.69	2.54	2.40
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	9.98	7.99	6.82	6.03	5.45	5.00	4.64	4.35	4.10	3.89	3.70	3.54

Tc = time in minutes. Values may exceed 60.

ecip. file name: I:\Projects\11075_Engineering\Calculations\Stormwater\JAMES CITY PRECIPITATION 24 HR.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.53	0.00	0.00	5.45	0.00	0.00	9.15
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Wednesday, Feb 29 2012

Proposed Conditions_2 YR Storm - Roadside Ditch

Triangular

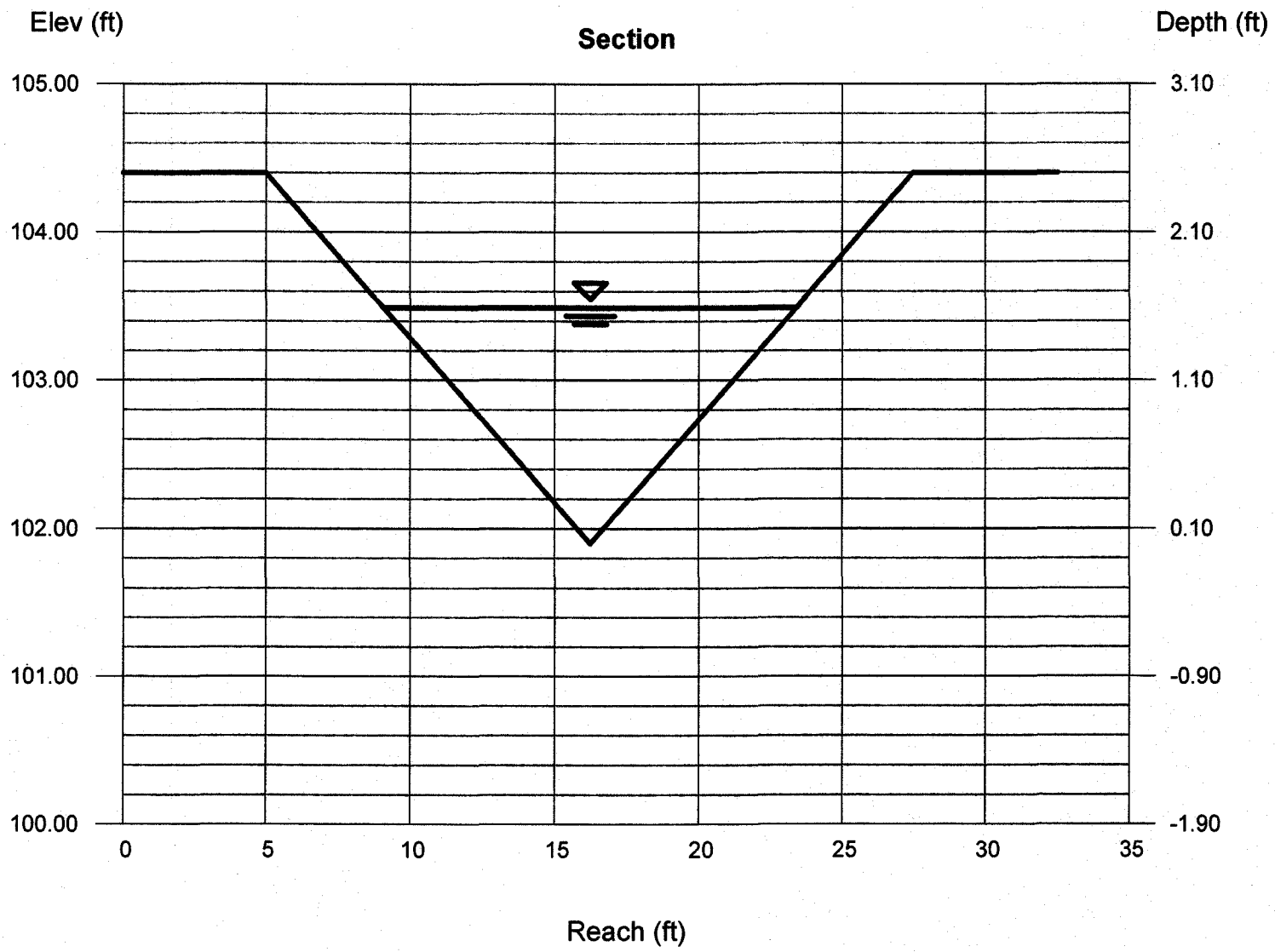
Side Slopes (z:1)	= 4.50, 4.50
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 101.90
Slope (%)	= 0.01
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.75

Highlighted

Depth (ft)	= 1.59
Q (cfs)	= 4.750
Area (sqft)	= 11.38
Velocity (ft/s)	= 0.42
Wetted Perim (ft)	= 14.66
Crit Depth, Yc (ft)	= 0.59
Top Width (ft)	= 14.31
EGL (ft)	= 1.59



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Wednesday, Feb 29 2012

Proposed Conditions_10 YR Storm - Roadside Ditch

Triangular

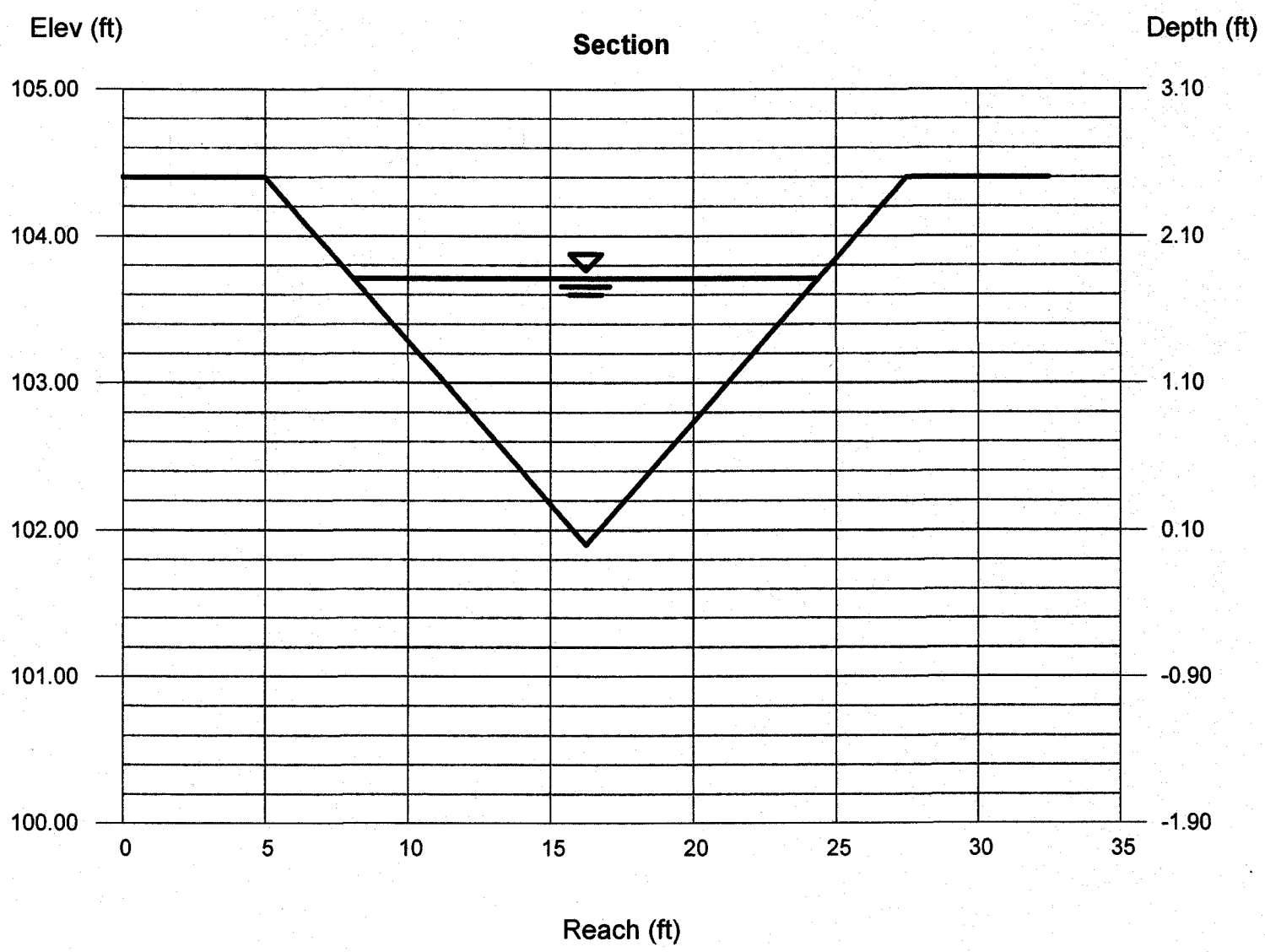
Side Slopes (z:1)	= 4.50, 4.50
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 101.90
Slope (%)	= 0.01
N-Value	= 0.030

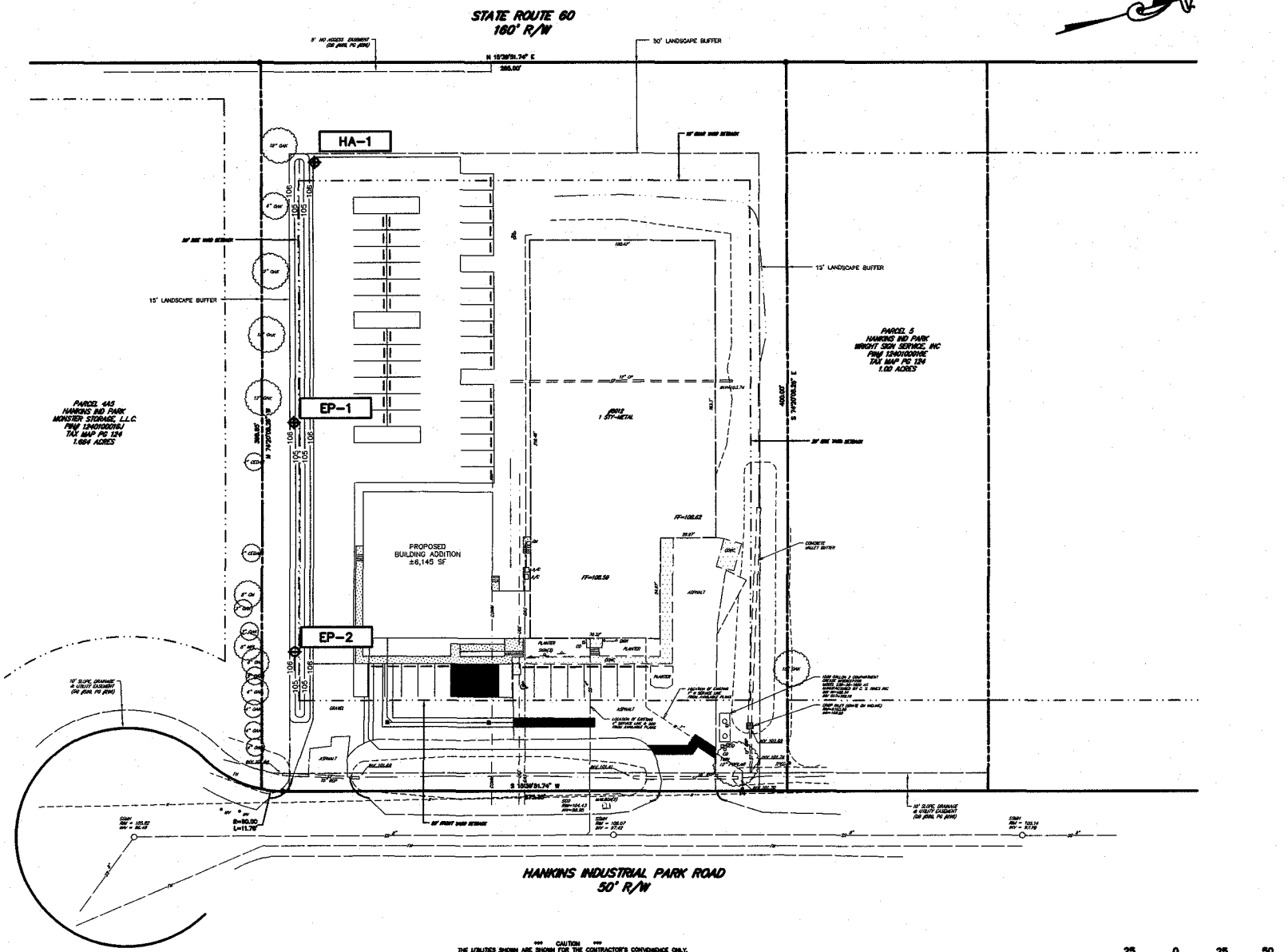
Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.71

Highlighted

Depth (ft)	= 1.81
Q (cfs)	= 6.710
Area (sqft)	= 14.74
Velocity (ft/s)	= 0.46
Wetted Perim (ft)	= 16.69
Crit Depth, Yc (ft)	= 0.68
Top Width (ft)	= 16.29
EGL (ft)	= 1.81





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25 0 25 50
1 INCH = 25 FT

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DRAWN	KGJ
CHECKED	DMW
APPROVED	DMW
DATE	1/13/12

SOIL BORING MAP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET
8
– of 10 Sheets
SCALE: 1" = 25'
PROJ. NO.: 11075

50 0 50 100

1 INCH = 50 FT

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CHECKED	DMW
APPROVED	DMW
DATE	2/28/12

REV	REVISION	DESCRIPTION	DATE

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ROADSIDE DITCH DRAINAGE AREA MAP
OF
SMITHFIELD SPECIALTY FOODS GROUP
BUILDING ADDITION
8012 HANKINS INDUSTRIAL PARK ROAD
TOANO VIRGINIA

SHEET
DA3
– of 11 Sheets

SCALE: 1" = 50'

PROJ. NO.: 11075

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- SOIL BORING DATA

I. DRAINAGE NARRATIVE

I. Drainage Narrative

The existing site currently contains the Smithfield Specialty Foods Group Building and associated asphalt and gravel parking lots. The project site is approximately 2.62 acres and is located on Hankins Industrial Park Road in Toano, Virginia. The proposed improvements will consist of the construction of a gravel parking lot and an approximately 6,146 SF building addition. The proposed construction will disturb approximately 1.03 acres. Majority of the existing site drains away from the existing building and into the existing on-site dry detention facility. The 12" outfall pipe from the facility ties directly into the existing roadside ditch. It is believed that the dry detention facility was previously installed to meet the Minimum Standard 19 (MS-19) of the ESC Regulations. The other remaining site drainage areas safely convey from the property.

There is an existing regional wet retention facility that serves majority of the existing industrial park, including the project site. This regional facility has been designed to provide both water quality and quantity management for future development within the industrial park. A recent site visit shows that the regional facility is functioning as designed and that there is adequate capacity to handle the additional impervious area associated with the on-site proposed improvements. The existing site currently consists of 0.92 acres of impervious area. The proposed improvements will increase the impervious area to 1.36 acres. Therefore, because the existing regional wet retention facility will provide the required stormwater management, then no additional on-site BMP is needed.

The MS-19 requirement is applicable to the proposed improvements on-site and it must be shown that the receiving channel (roadside ditch) is adequate in that it will not erode or be overtopped by runoff. To meet this requirement, the runoff generated by the 2-year storm must be analyzed for erodibility and the 10-year storm must be analyzed for capacity of the roadside ditch. In order to accurately model the runoff entering the roadside ditch for the 2- and 10-year storm events, all contributing drainage areas must be analyzed. Because of the difficulty in obtaining this information, an alternative option has been chosen to meet MS-19 requirements. This option will show that the on-site pre-development condition meets MS-19 and hence if the post-development condition is managed back to the pre-development conditions, then the requirements of MS-19 are met.

In order to analyze the pre-development condition for MS-19 requirements, the existing drainage pattern on-site has been divided into four (4) drainage areas, **DA #1, DA #2, DA #3 and DA #4** (see enclosed Existing Drainage Area Map). The runoff from DA #1 is diverted to a low point and conveyed through an existing 12" pipe, which runs underneath the existing building, and eventually outfalls into the existing dry detention facility. The runoff from DA #2 drains towards the existing dry detention facility. The runoff from DA #3 drains directly into the roadside ditches. The runoff from DA #4 drains into the existing ditch adjacent to State Route 60. The existing dry detention facility appears to be functioning adequately and is providing attenuation of at least the 2- and 10-year storm events. The following is a summary of the model results for the pre-development condition, which shows the total runoff rate leaving the site.

NODE DESCRIPTION	2-YR OUTFLOW	10-YR OUTFLOW
	(CFS)	(CFS)
EX. DRY DETENTION	2.41	2.79
EX. DA #3	1.23	1.59
EX. DA #4	0.17	0.23
TOTAL	**3.81**	**4.61**

Because the upstream drainage conditions are not known, the threshold of the 2-year storm erodibility and 10-year storm capacity of the existing roadside ditch cannot be analyzed. However, it can be stated that the current roadside ditch appears to be adequately handling the receiving velocities and runoff. Therefore, one can assume that the previously designed site conditions maximized these parameters and hence if the new proposed post-development rate does not exceed the pre-development rate then there will be no increase in ditch erosion or required capacity.

The second part of the analysis to meet MS-19 requirements is to manage the post-development runoff rate back to the pre-development conditions. In order to control the increased runoff from the proposed improvements, a dry detention swale with a control outlet structure has been provided to store runoff on-site and to allow for a slow release. The proposed drainage pattern on-site has been divided into four (4) drainage areas, **DA #1, DA #2, DA #3 and DA #4** (see enclosed Proposed Drainage Area Map). The runoff from DA #1 is directed into the proposed dry detention swale through sheet flow. The runoff from DA #2 drains towards the existing dry detention facility. The runoff from DA #3 drains directly into the roadside ditches. The runoff from DA #4 drains into the existing ditch adjacent to State Route 60. The existing dry detention facility will remain and continue to serve the site for attenuation of the 2- and 10-year storm events. The following is a summary of the model results for the post-development condition, which shows the total runoff rate leaving the site.

NODE DESCRIPTION	2-YR OUTFLOW	10-YR OUTFLOW
	(CFS)	(CFS)
PROP. DRY DETENTION	0.31	0.34
EX. DRY DETENTION	2.33	2.65
EX. DA #3	0.93	1.21
EX. DA #4	0.17	0.23
TOTAL	**3.74**	**4.42**

The proposed dry detention swale will provide the controlled release of runoff so that post-development conditions do not exceed pre-development conditions. Outlet protection has been provided on the outfall pipe from the swale. Therefore, because the post-development runoff rate has been managed back to the pre-development conditions, then the receiving roadside ditch is adequate in that it will not erode or be overtopped by runoff. The requirements of MS-19 have been met on-site.

The "Rational Method" was used to determine the peak storm water runoff rates shown above. The Hydraflow Hydrograph Model software was used to analyze the drainage areas and associated parameters. The runoff coefficients 'c' were compiled using the percentage of impervious versus pervious coverage.

II. SUMMARY OF CONDITIONS

Drainage Area Calculations

CALCULATIONS BY:	CVB
DATE:	1/10/2012
PROJECT:	Smithfield Speciality Foods Group Bldg Addition
PROJECT #	11075

Existing Conditions On-Site:

Total Areas:	Boundary Area =	113,996	SF =	2.62	AC
	Building =	20,275	SF =	0.47	AC
	Pavement/Conc =	19,842	SF =	0.46	AC
	Total Impervious =	*40,117*	SF =	*0.92*	AC

NOMAP FOR 2/8/11 REV.

Existing Drainage Areas:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious	Pervious	Weighted C
1	Ex. Dry Detention	1.19	0.26	0.93	0.35
2	Ex. Dry Detention	0.92	0.46	0.46	0.55
3	Ex. Roadside Ditch	0.36	0.20	0.16	0.59
4	Ex. Rear Ditch	0.15	0.00	0.15	0.20
	Total	*2.62*	*0.92*	*1.70*	

Total Drainage Area to Existing Dry Detention:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious
1 & 2	-	2.11	0.72

Proposed Conditions On-Site:

Total Areas:	Boundary Area =	113,996	SF =	2.62	AC
	Building =	26,421	SF =	0.61	AC
	Pavement/Conc =	32,722	SF =	0.75	AC
	Total Impervious =	*59,143*	SF =	*1.36*	AC

Proposed Drainage Areas:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious	Pervious	Weighted C
1	Prop. Dry Detention	1.06	0.63	0.43	0.62
2	Ex. Dry Detention	1.10	0.59	0.51	0.58
3	Ex. Roadside Ditch	0.31	0.14	0.17	0.52
4	Ex. Rear Ditch	0.15	0.00	0.15	0.20
	Total	*2.62*	*1.36*	*1.26*	

THIS DOESN'T DRAIN TO BASIN!

Total Drainage Area to Proposed Dry Detention:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious
1	-	1.06	0.63

Total Drainage Area to Existing Dry Detention:

DA No.	Drainage Structure	DA Area (acres)	Areas (acres) Impervious
2	-	1.10	0.59

Hydrograph Summary Calculations

CALCULATIONS BY:	CVB
DATE:	1/10/2012
PROJECT:	Smithfield Speciality Foods Group Bldg Addition
PROJECT #	11075

Reference: Hydraflow Hydrograph Extension Model Summary Pages

Existing Conditions On-Site:

Existing Flows Leaving Site:

Node Description	Outflow 2-YR (cfs)	Outflow 10-YR (cfs)
EX. DRY DETENTION	2.41	2.79
EXISTING DA #3	1.23	1.59
EXISTING DA #4	0.17	0.23
Total Flow:	**3.81**	**4.61**

Proposed Conditions On-Site:

Proposed Flows Leaving Site:

Node Description	Outflow 2-YR (cfs)	Outflow 10-YR (cfs)
PROP. DRY DETENTION	0.31	0.34
EX. DRY DETENTION	2.33	2.65
EXISTING DA #3	0.93	1.21
EXISTING DA #4	0.17	0.23
Total Flow:	**3.74**	**4.42**

Summary:

Proposed Flow MUST be LESS than Existing Flow to meet stormwater requirements.

	Proposed Flow (cfs)		Existing Flow (cfs)	
2-Year Storm Event	3.74	<	3.81	**OK!**
10-Year Storm Event	4.42	<	4.61	**OK!**

IDF Curve

CALCULATIONS BY:	CVB
DATE:	1/10/2012
PROJECT:	Smithfield Speciality Foods Group Bldg Addition
PROJECT #	11075

Ref: VDOT Drainage Manual

2-Year Storm Event

Tc (min)	B	D	E	I (in/hr)
5	70.63	12.75	0.87	5.78
15	70.63	12.75	0.87	3.92
30	70.63	12.75	0.87	2.69
60	70.63	12.75	0.87	1.70

10-Year Storm Event

Tc (min)	B	D	E	I (in/hr)
5	55.61	10.00	0.74	7.50
15	55.61	10.00	0.74	5.14
30	55.61	10.00	0.74	3.63
60	55.61	10.00	0.74	2.40

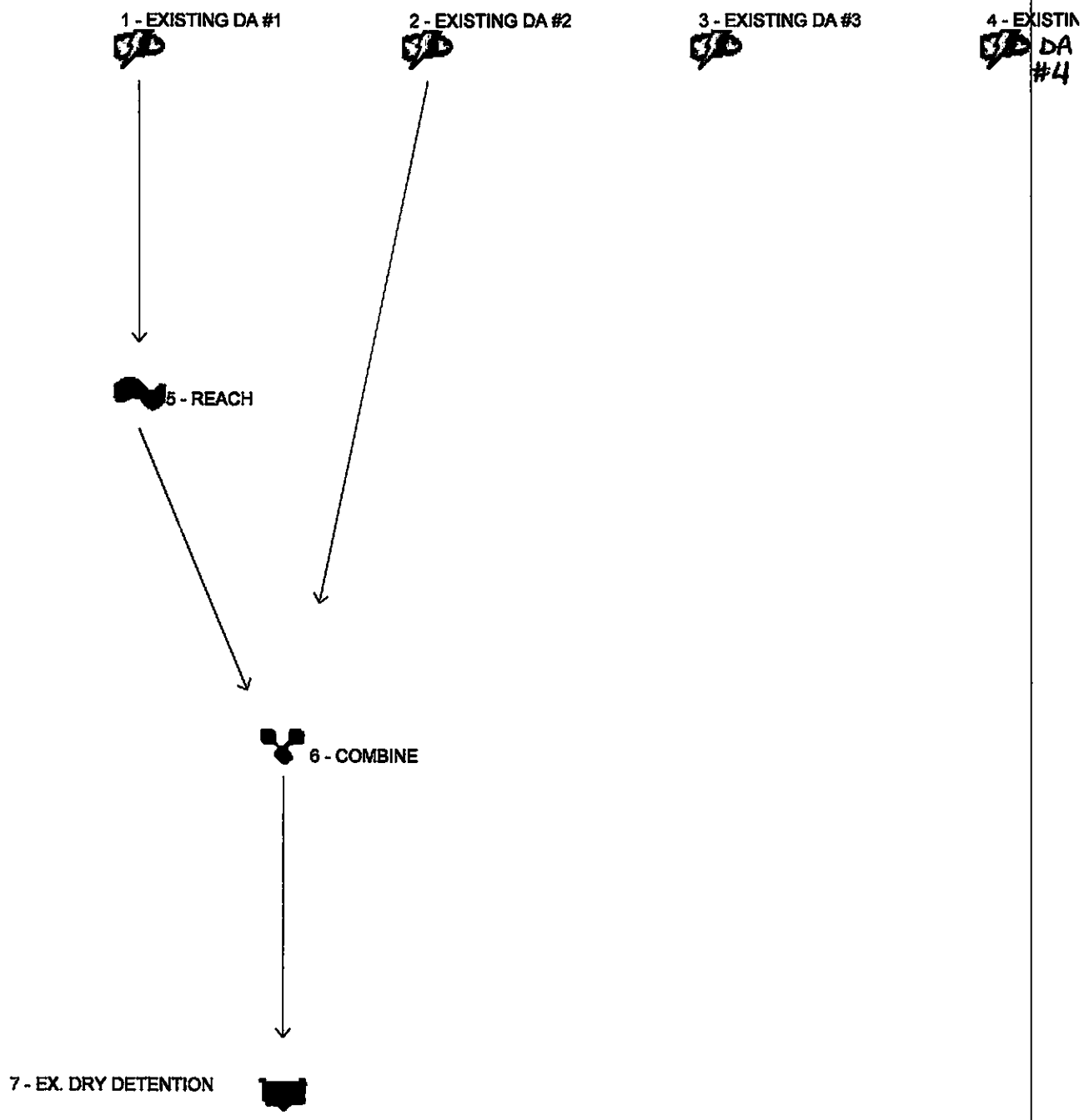
100-Year Storm Event

Tc (min)	B	D	E	I (in/hr)
5	36.77	5.25	0.56	9.99
15	36.77	5.25	0.56	6.82
30	36.77	5.25	0.56	5.00
60	36.77	5.25	0.56	3.54

III. EXISTING CONDITIONS HYDROGRAPH REPORT

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Legend

Hyd.	Origin	Description
1	Rational	EXISTING DA #1
2	Rational	EXISTING DA #2
3	Rational	EXISTING DA #3
4	Rational	EXISTING DA #4
5	Reach	REACH
6	Combine	COMBINE
7	Reservoir	EX. DRY DETENTION

Hydraflow Table of Contents

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Friday, Jan 13, 2012

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Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	—	—	1.682	—	—	2.206	—	—	—	EXISTING DA #1
2	Rational	—	—	2.662	—	—	3.458	—	—	—	EXISTING DA #2
3	Rational	—	—	1.227	—	—	1.592	—	—	—	EXISTING DA #3
4	Rational	—	—	0.173	—	—	0.225	—	—	—	EXISTING DA #4
5	Reach	1	—	1.645	—	—	2.187	—	—	—	REACH
6	Combine	2, 5	—	3.345	—	—	4.385	—	—	—	COMBINE
7	Reservoir	6	—	2.405	—	—	2.789	—	—	—	EX. DRY DETENTION

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.682	1	14	1,413	---	---	---	EXISTING DA #1
2	Rational	2.662	1	7	1,118	---	---	---	EXISTING DA #2
3	Rational	1.227	1	5	368	---	---	---	EXISTING DA #3
4	Rational	0.173	1	5	52	---	---	---	EXISTING DA #4
5	Reach	1.645	1	15	1,422	1	---	---	REACH
6	Combine	3.345	1	7	2,540	2, 5	---	---	COMBINE
7	Reservoir	2.405	1	11	2,540	6	103.59	376	EX. DRY DETENTION

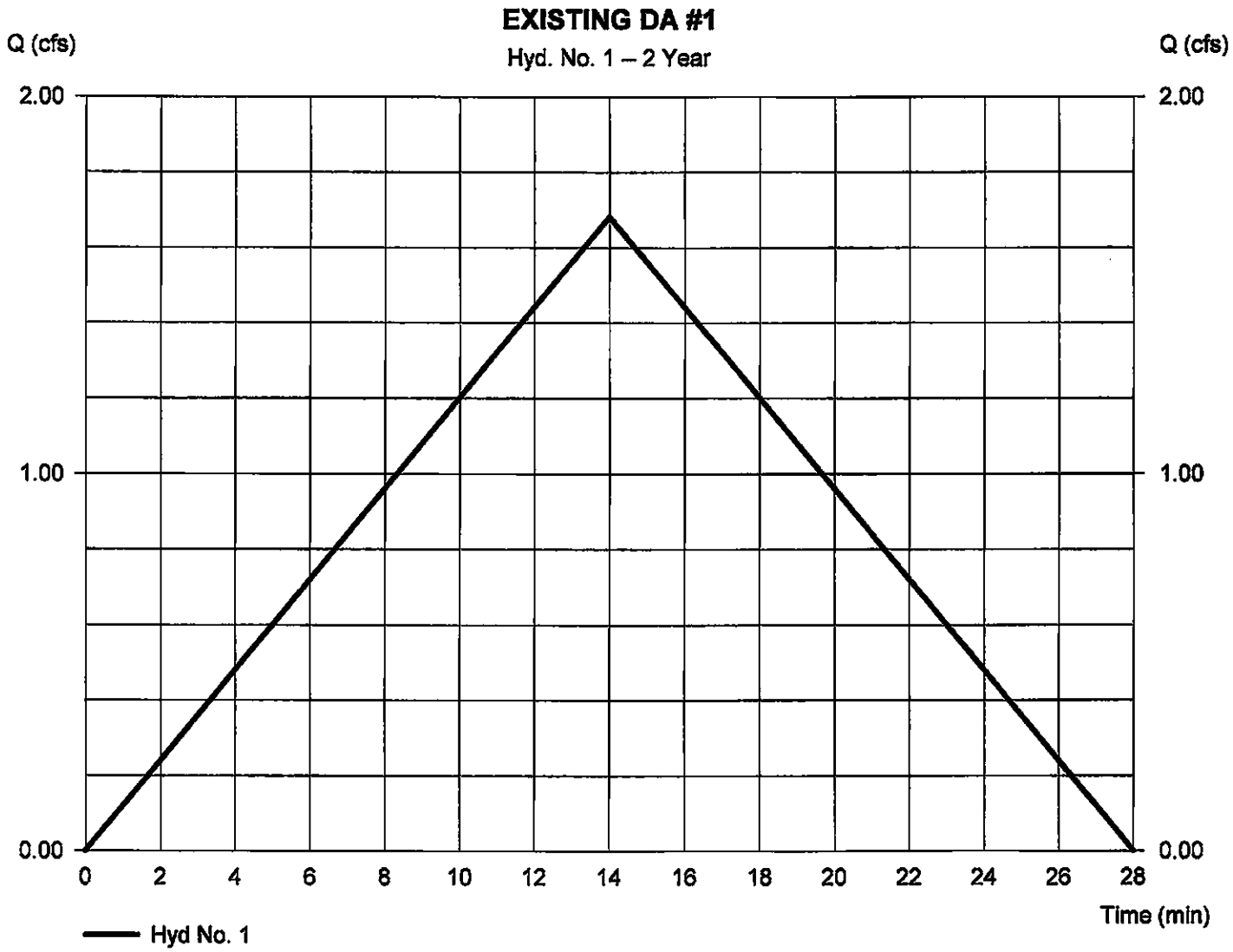
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Friday, Jan 13, 2012

Hyd. No. 1

EXISTING DA #1

Hydrograph type	= Rational	Peak discharge	= 1.682 cfs
Storm frequency	= 2 yrs	Time to peak	= 14 min
Time interval	= 1 min	Hyd. volume	= 1,413 cuft
Drainage area	= 1.190 ac	Runoff coeff.	= 0.35
Intensity	= 4.039 in/hr	Tc by TR55	= 14.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hyd. No. 1

EXISTING DA #1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 95.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 13.06**	**+**	**0.00**	**+**	**0.00**	**=**	**13.06**
Shallow Concentrated Flow							
Flow length (ft)	= 106.00		0.00		0.00		
Watercourse slope (%)	= 2.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.28		0.00		0.00		
Travel Time (min)	**= 0.77**	**+**	**0.00**	**+**	**0.00**	**=**	**0.77**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 14.00 min

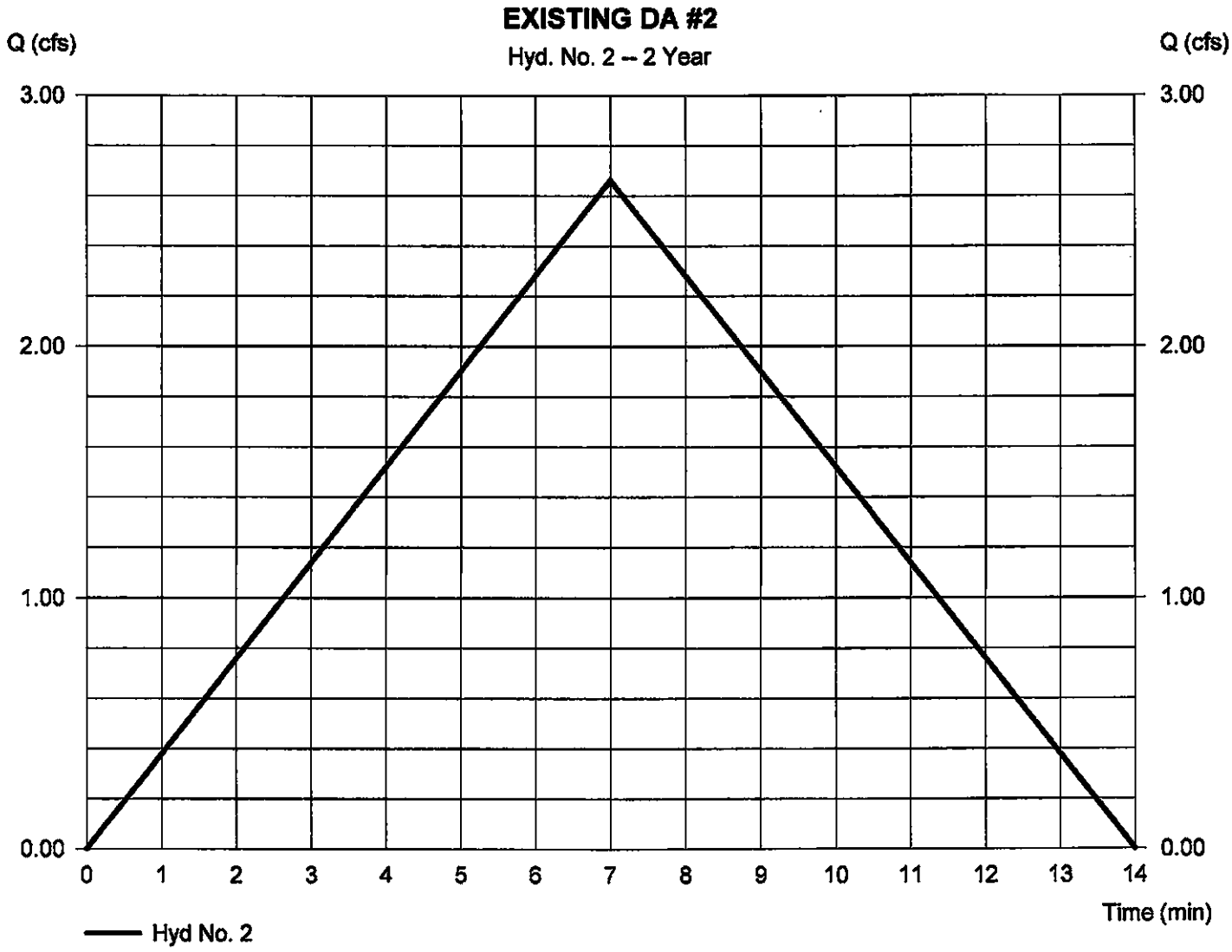
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

EXISTING DA #2

Hydrograph type	= Rational	Peak discharge	= 2.662 cfs
Storm frequency	= 2 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,118 cuft
Drainage area	= 0.920 ac	Runoff coeff.	= 0.55
Intensity	= 5.260 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hyd. No. 2

EXISTING DA #2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 31.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 5.33**	**+**	**0.00**	**+**	**0.00**	**=**	**5.33**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 13.00		0.00		0.00		
Wetted perimeter (ft)	= 27.00		0.00		0.00		
Channel slope (%)	= 0.50		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=2.15						
			0.00				
					0.00		
Flow length (ft)	({0})262.0		0.0		0.0		
Travel Time (min)	**= 2.03**	**+**	**0.00**	**+**	**0.00**	**=**	**2.03**

Total Travel Time, Tc ..... 7.00 min

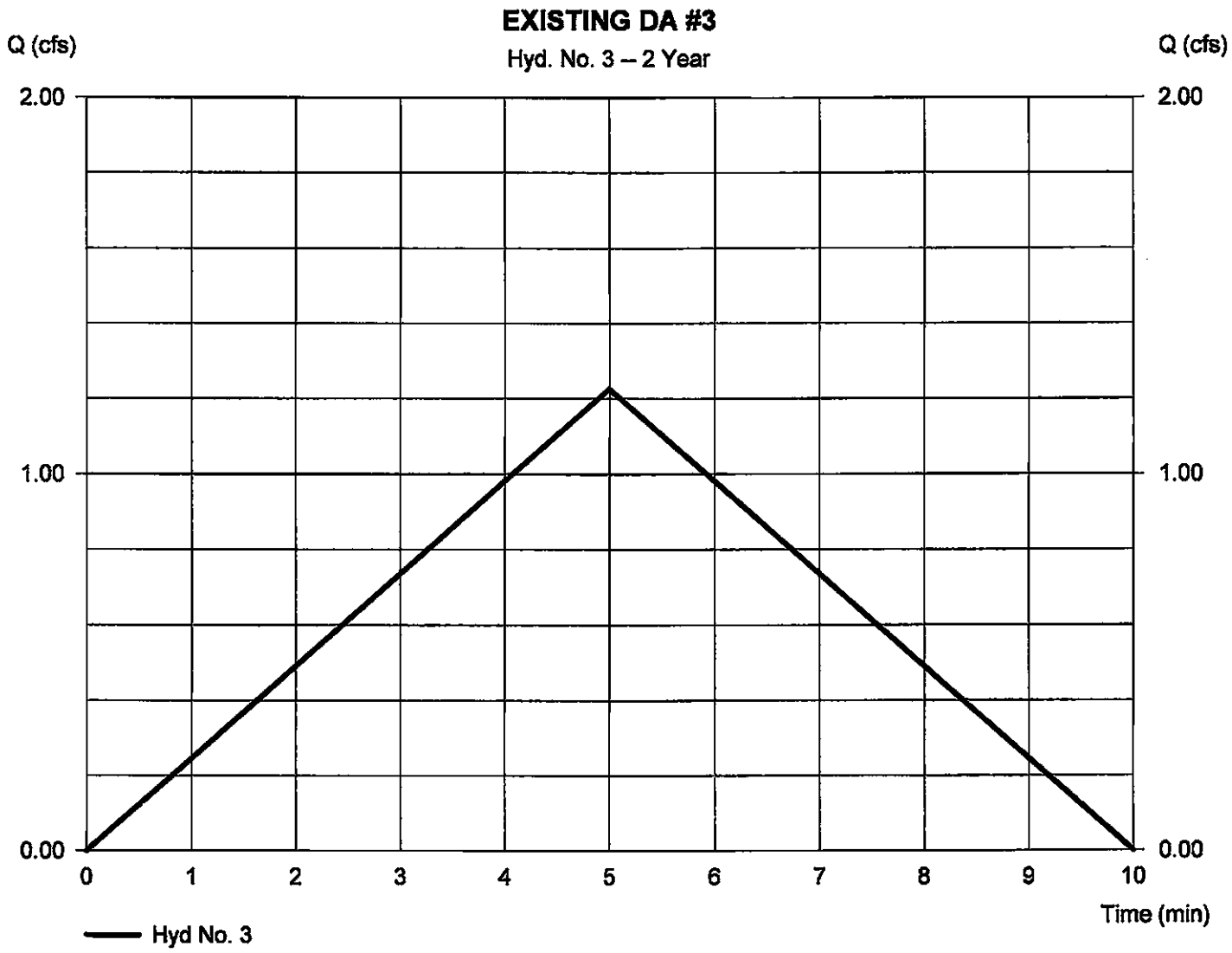
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

EXISTING DA #3

Hydrograph type	= Rational	Peak discharge	= 1.227 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 368 cuft
Drainage area	= 0.360 ac	Runoff coeff.	= 0.59
Intensity	= 5.775 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



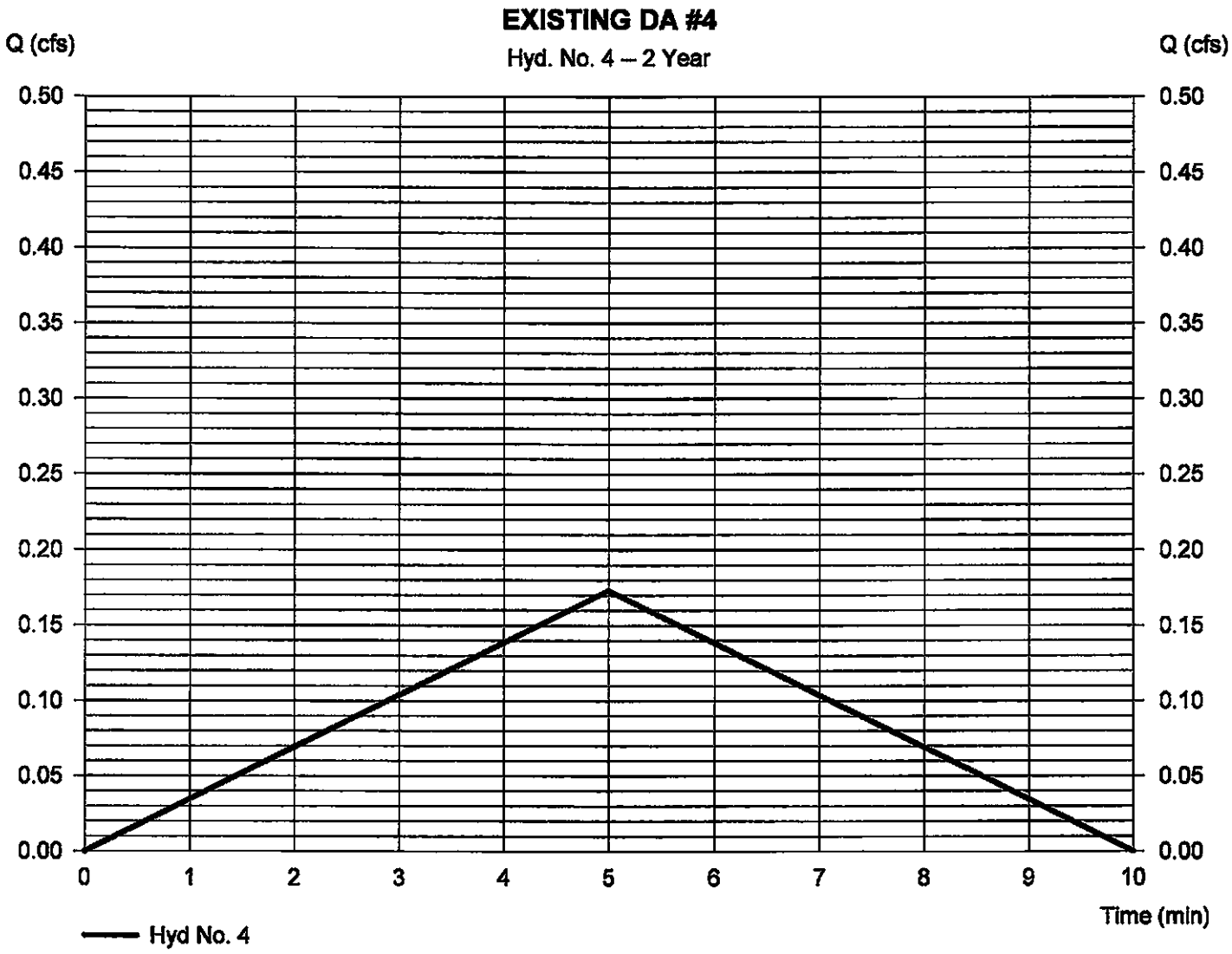
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

EXISTING DA #4

Hydrograph type	= Rational	Peak discharge	= 0.173 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 5.775 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hyd. No. 4

EXISTING DA #4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 25.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 2.58**	**+**	**0.00**	**+**	**0.00**	**=**	**2.58**
Shallow Concentrated Flow							
Flow length (ft)	= 152.00		0.00		0.00		
Watercourse slope (%)	= 0.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.14		0.00		0.00		
Travel Time (min)	**= 2.22**	**+**	**0.00**	**+**	**0.00**	**=**	**2.22**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 5.00 min

Hydrograph Report

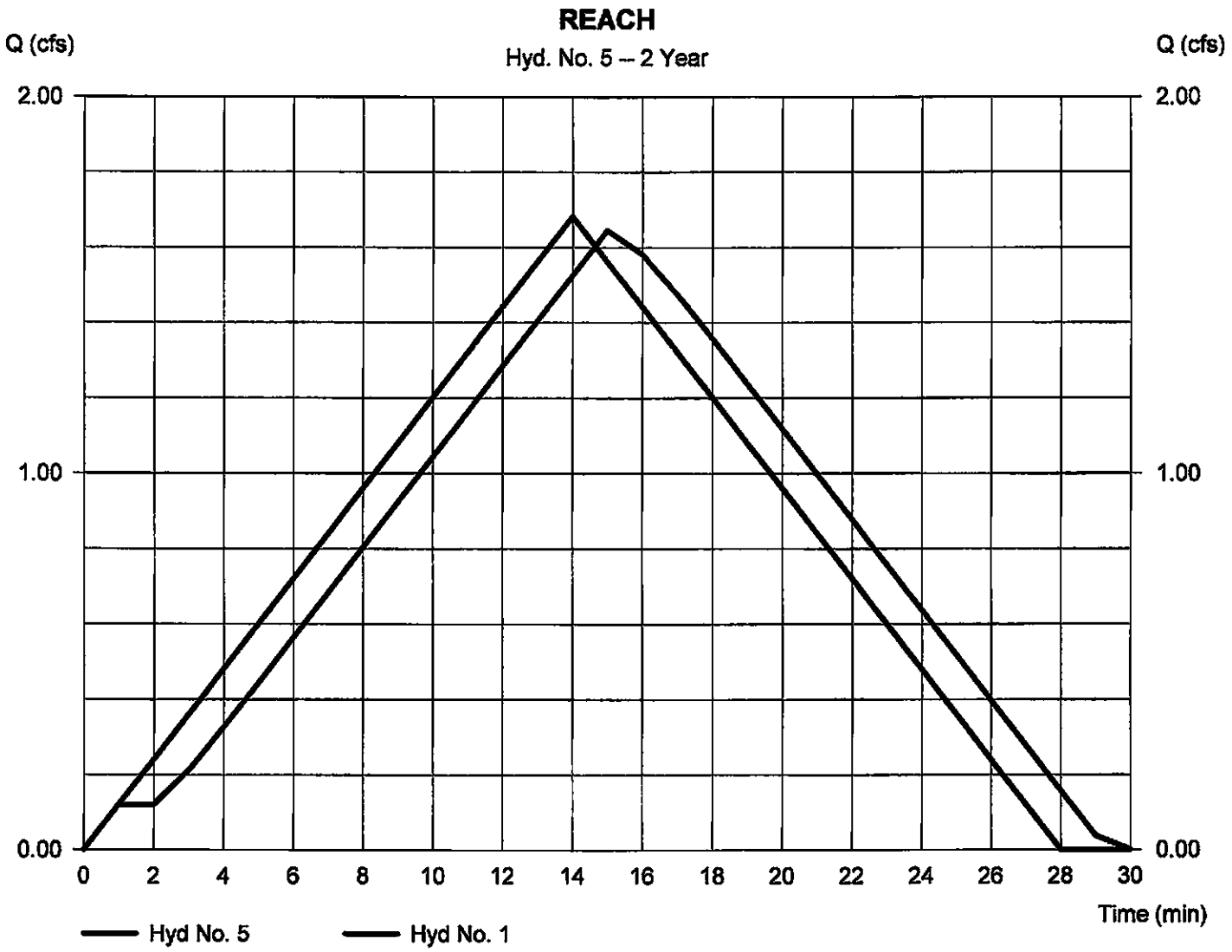
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

REACH

Hydrograph type	= Reach	Peak discharge	= 1.645 cfs
Storm frequency	= 2 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 1,422 cuft
Inflow hyd. No.	= 1 - EXISTING DA #1	Section type	= Circular
Reach length	= 130.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.013	Bottom width	= 1.0 ft
Side slope	= 0.0:1	Max. depth	= 0.0 ft
Rating curve x	= 3.960	Rating curve m	= 1.250
Ave. velocity	= 2.14 ft/s	Routing coeff.	= 0.7638

Modified Att-Kin routing method used.

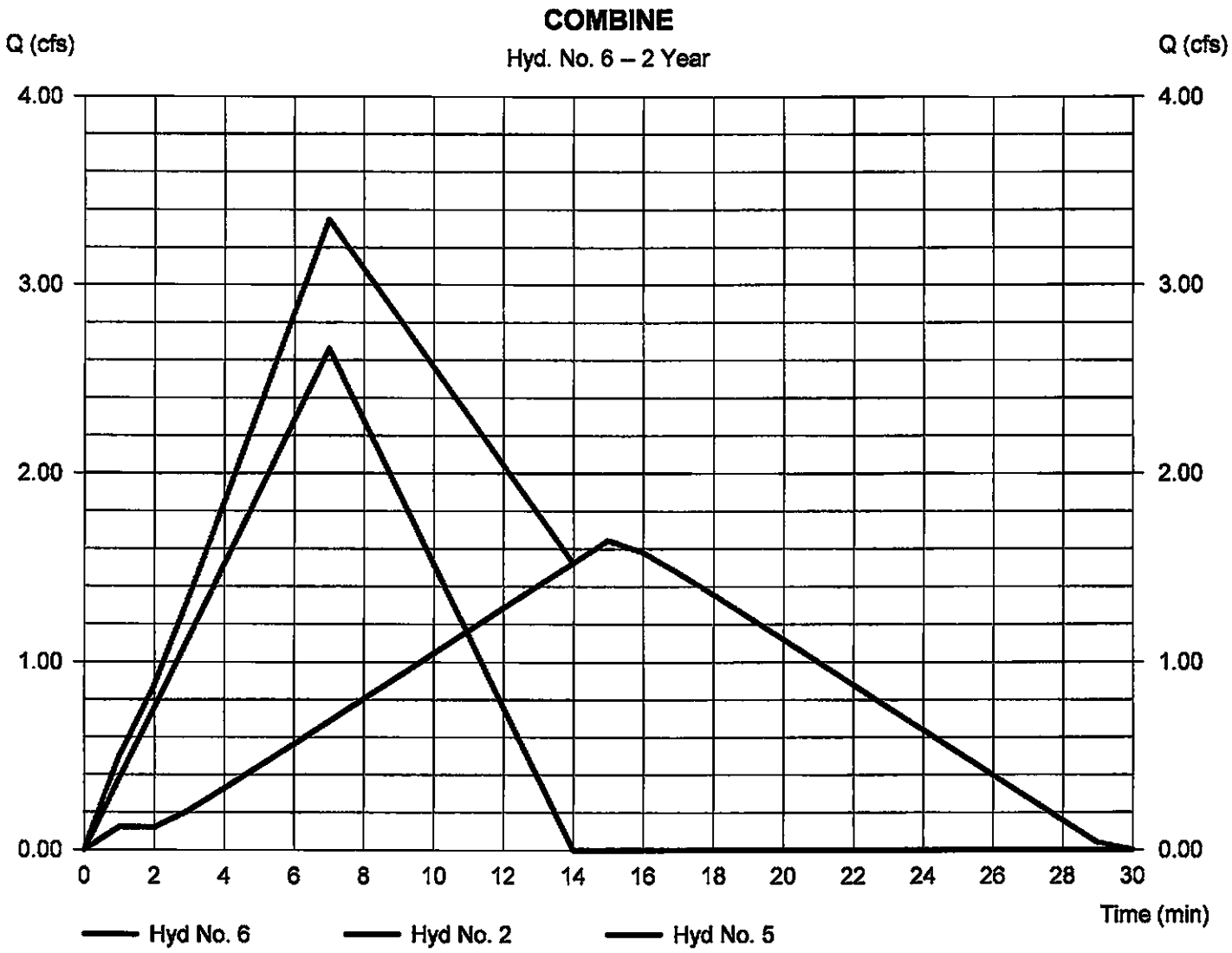


Hydrograph Report

Hyd. No. 6

COMBINE

Hydrograph type	= Combine	Peak discharge	= 3.345 cfs
Storm frequency	= 2 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 2,540 cuft
Inflow hyds.	= 2, 5	Contrib. drain. area	= 0.920 ac



Hydrograph Report

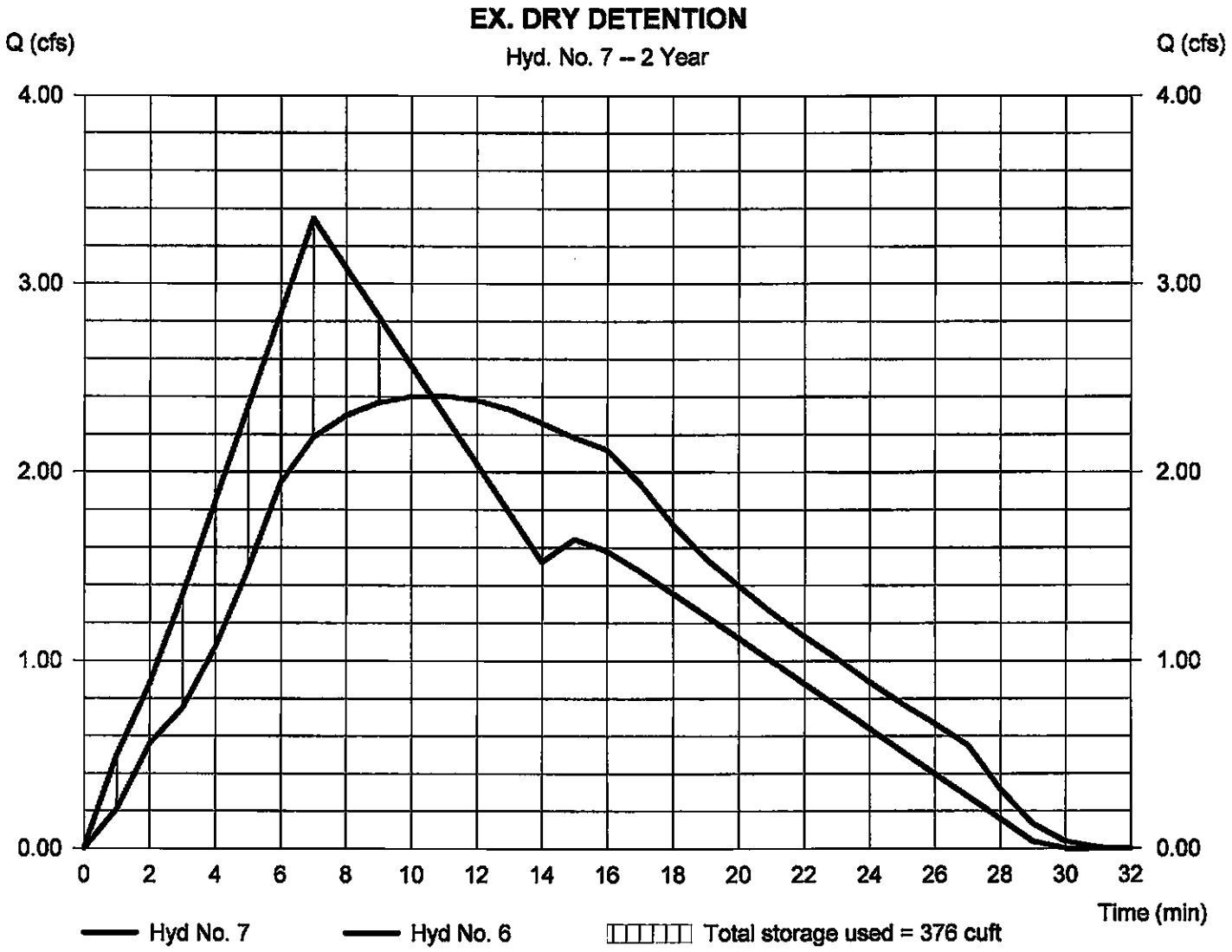
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 7

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.405 cfs
Storm frequency	= 2 yrs	Time to peak	= 11 min
Time interval	= 1 min	Hyd. volume	= 2,540 cuft
Inflow hyd. No.	= 6 - COMBINE	Max. Elevation	= 103.59 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 376 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Friday, Jan 13, 2012

Pond No. 1 - EXISTING DRY DETENTION

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 103.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	103.00	00	0	0
0.50	103.50	1,288	215	215
1.00	104.00	2,428	914	1,129

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 102.69	0.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 3.80	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	103.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.50	215	103.50	2.09 ic	---	---	---	---	---	---	---	---	---	2.095
1.00	1,129	104.00	3.40 ic	---	---	---	---	---	---	---	---	---	3.403

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	2.206	1	14	1,853	----	----	----	EXISTING DA #1
2	Rational	3.458	1	7	1,452	----	----	----	EXISTING DA #2
3	Rational	1.592	1	5	478	----	----	----	EXISTING DA #3
4	Rational	0.225	1	5	67	----	----	----	EXISTING DA #4
5	Reach	2.187	1	15	1,863	1	----	----	REACH
6	Combine	4.385	1	7	3,316	2, 5	----	----	COMBINE
7	Reservoir	2.789	1	12	3,316	6	103.74	643	EX. DRY DETENTION

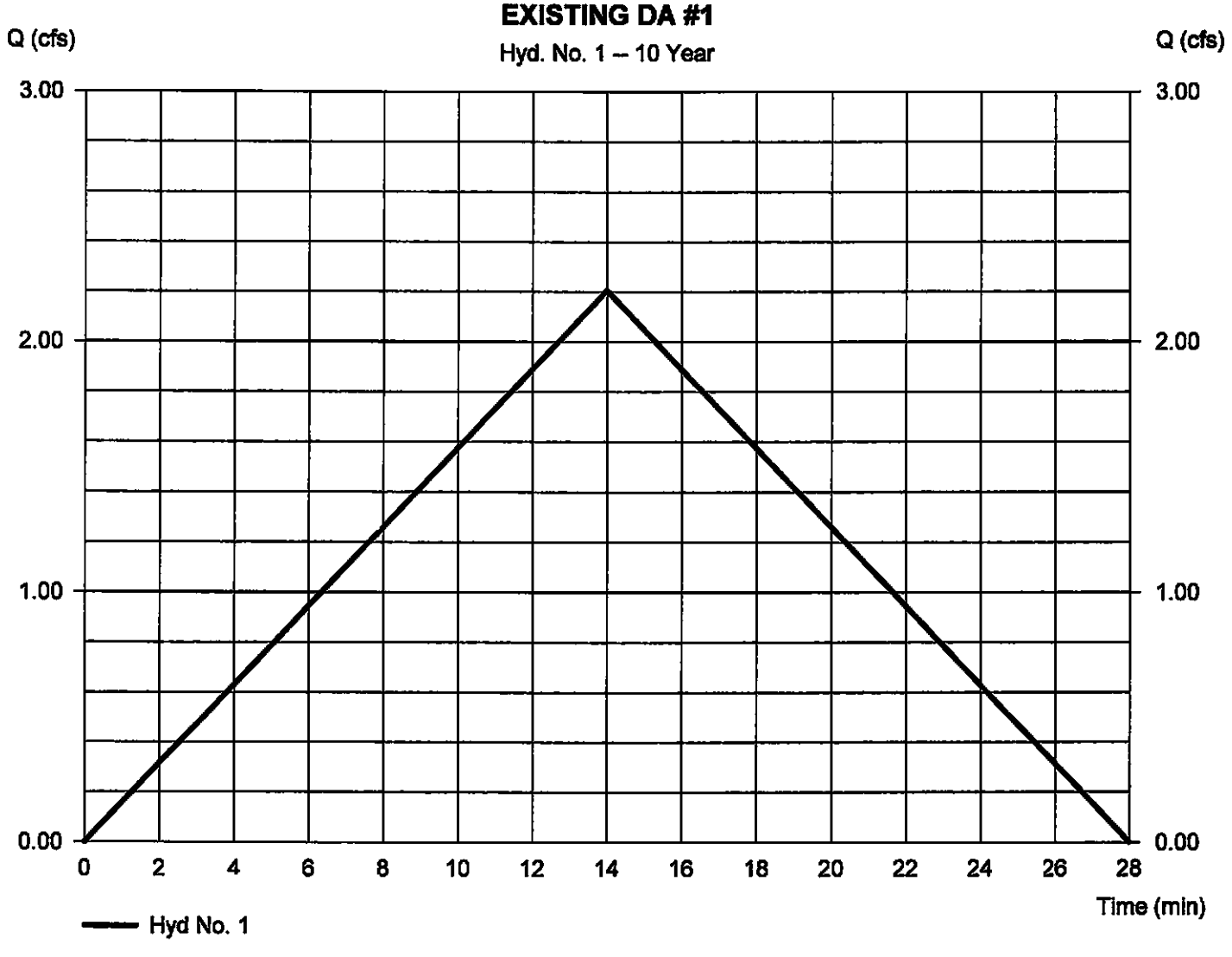
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 1

EXISTING DA #1

Hydrograph type	= Rational	Peak discharge	= 2.206 cfs
Storm frequency	= 10 yrs	Time to peak	= 14 min
Time interval	= 1 min	Hyd. volume	= 1,853 cuft
Drainage area	= 1.190 ac	Runoff coeff.	= 0.35
Intensity	= 5.296 in/hr	Tc by TR55	= 14.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



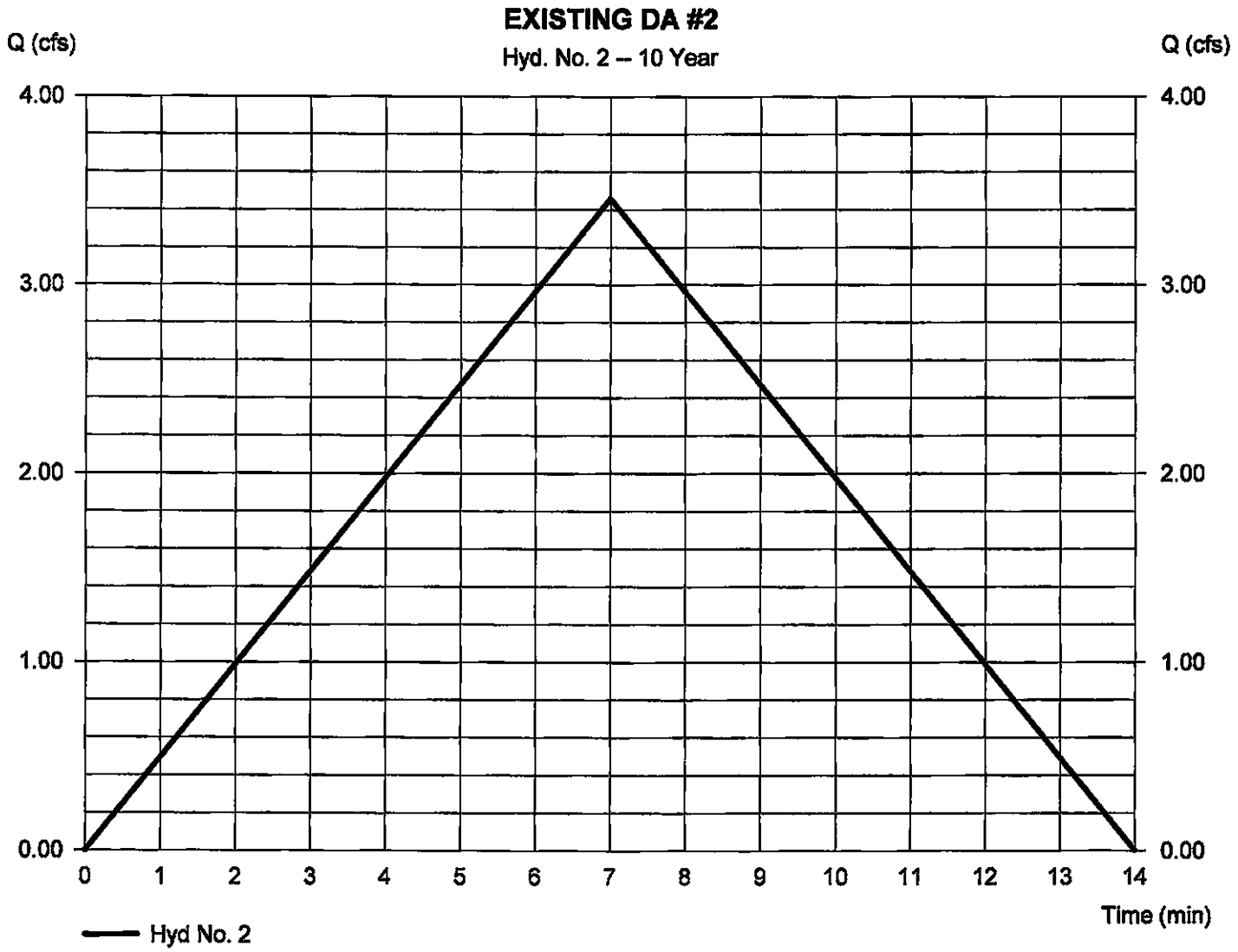
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

EXISTING DA #2

Hydrograph type	= Rational	Peak discharge	= 3.458 cfs
Storm frequency	= 10 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,452 cuft
Drainage area	= 0.920 ac	Runoff coeff.	= 0.55
Intensity	= 6.834 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



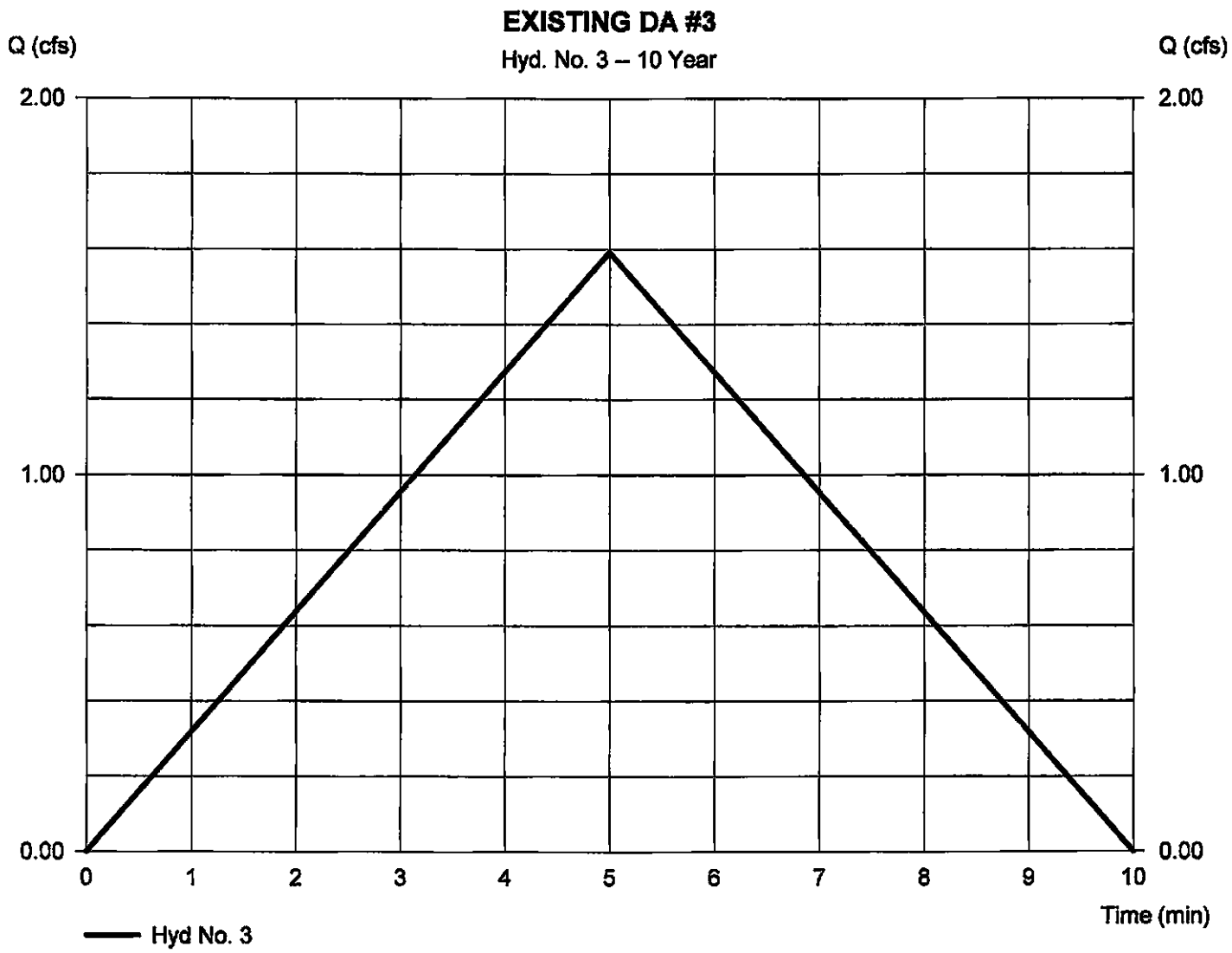
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

EXISTING DA #3

Hydrograph type	= Rational	Peak discharge	= 1.592 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 478 cuft
Drainage area	= 0.360 ac	Runoff coeff.	= 0.59
Intensity	= 7.496 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



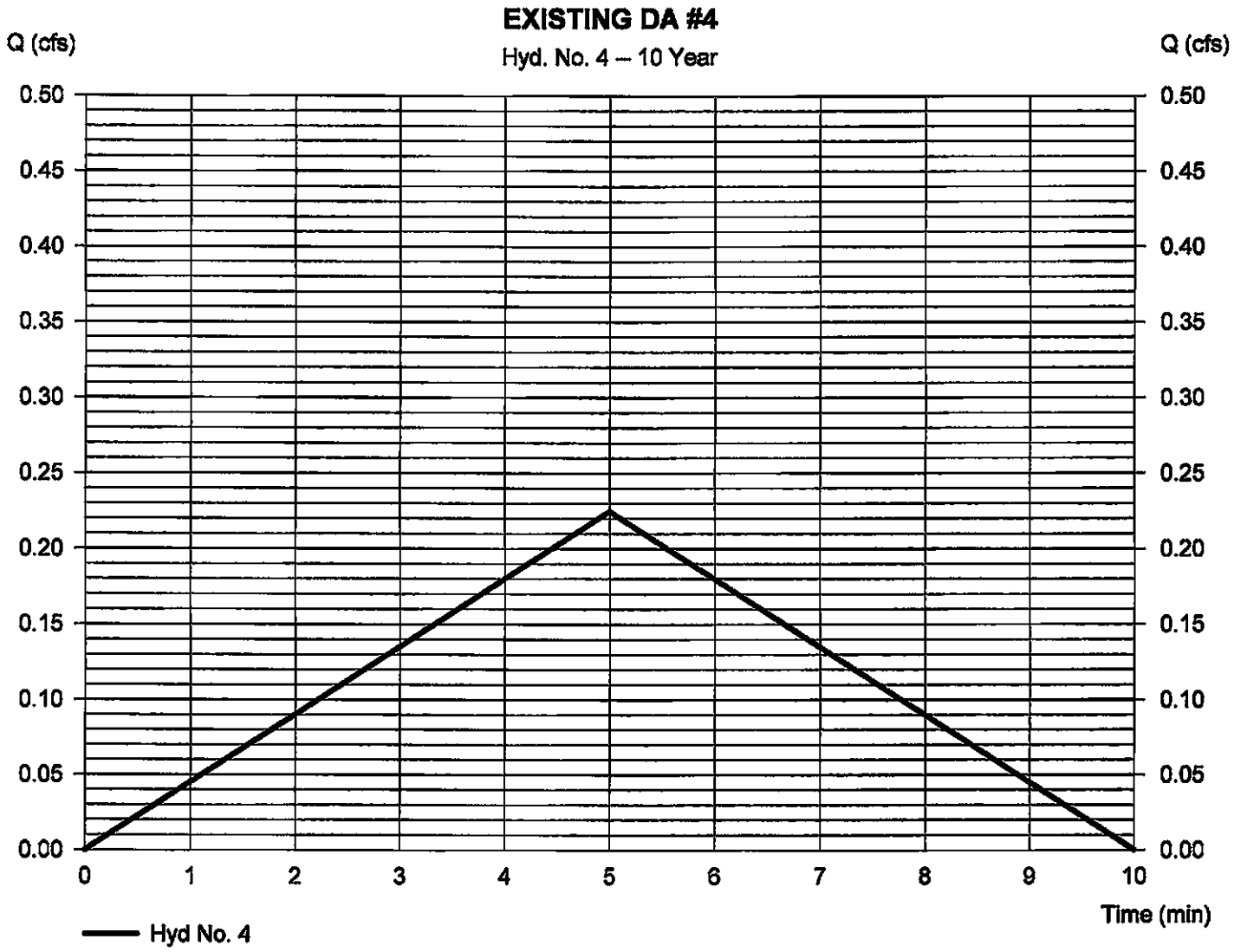
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

EXISTING DA #4

Hydrograph type	= Rational	Peak discharge	= 0.225 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 67 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 7.496 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

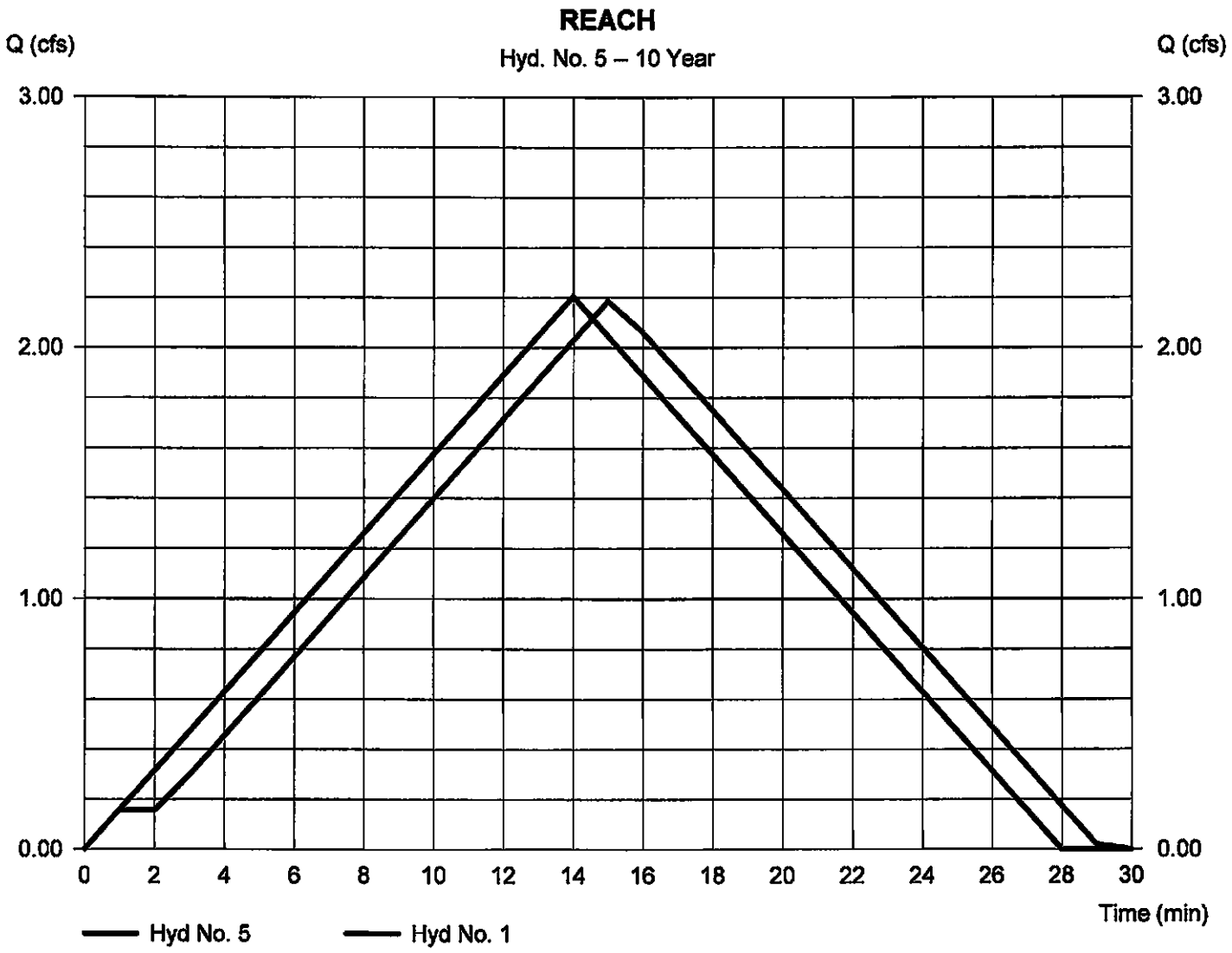
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

REACH

Hydrograph type	= Reach	Peak discharge	= 2.187 cfs
Storm frequency	= 10 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 1,863 cuft
Inflow hyd. No.	= 1 - EXISTING DA #1	Section type	= Circular
Reach length	= 130.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.013	Bottom width	= 1.0 ft
Side slope	= 0.0:1	Max. depth	= 0.0 ft
Rating curve x	= 3.960	Rating curve m	= 1.250
Ave. velocity	= 2.81 ft/s	Routing coeff.	= 0.8951

Modified Att-Kin routing method used.



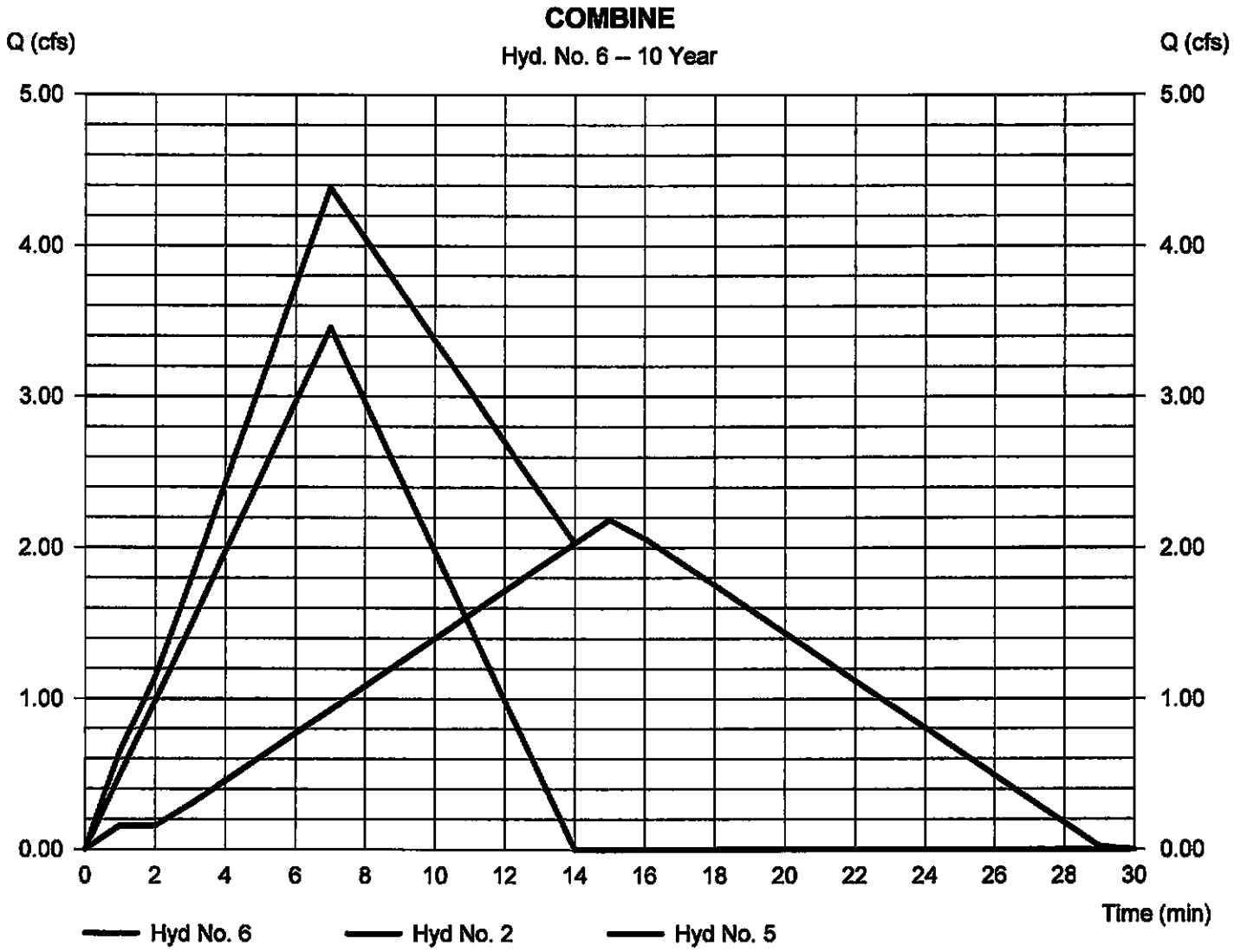
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 6

COMBINE

Hydrograph type	= Combine	Peak discharge	= 4.385 cfs
Storm frequency	= 10 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 3,316 cuft
Inflow hyds.	= 2, 5	Contrib. drain. area	= 0.920 ac



Hydrograph Report

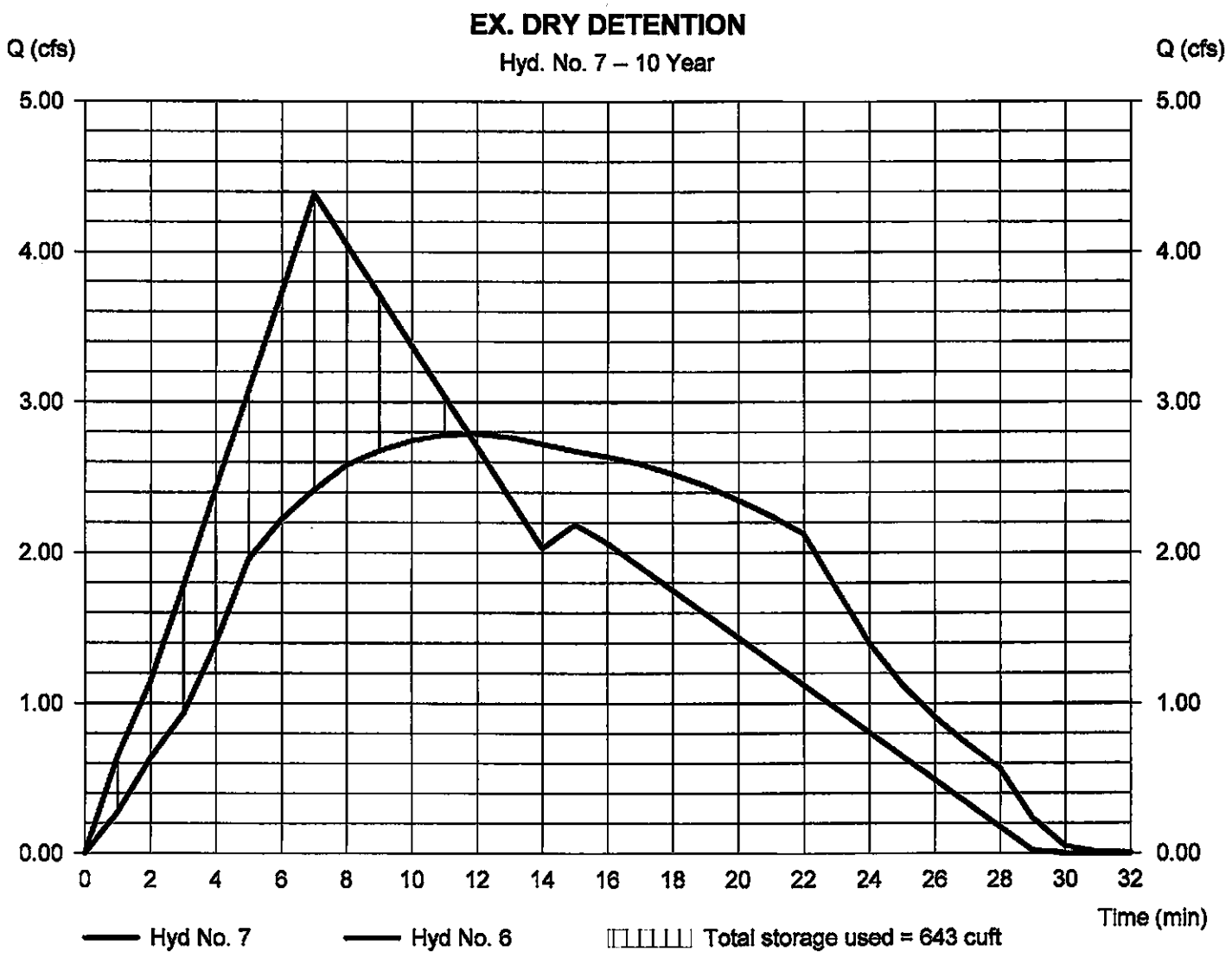
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 7

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.789 cfs
Storm frequency	= 10 yrs	Time to peak	= 12 min
Time interval	= 1 min	Hyd. volume	= 3,316 cuft
Inflow hyd. No.	= 6 - COMBINE	Max. Elevation	= 103.74 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 643 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	------
2	66.9152	12.4000	0.8577	------
3	0.0000	0.0000	0.0000	------
5	0.0000	0.0000	0.0000	------
10	55.5168	10.0000	0.7394	------
25	0.0000	0.0000	0.0000	------
50	0.0000	0.0000	0.0000	------
100	36.9712	5.3000	0.5614	------

File name: JAMES CITY IDF CURVE.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.77	4.65	3.91	3.39	3.00	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.50	6.06	5.14	4.49	4.01	3.63	3.33	3.08	2.87	2.69	2.54	2.40
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	9.98	7.99	6.82	6.03	5.45	5.00	4.64	4.35	4.10	3.89	3.70	3.54

Tc = time in minutes. Values may exceed 60.

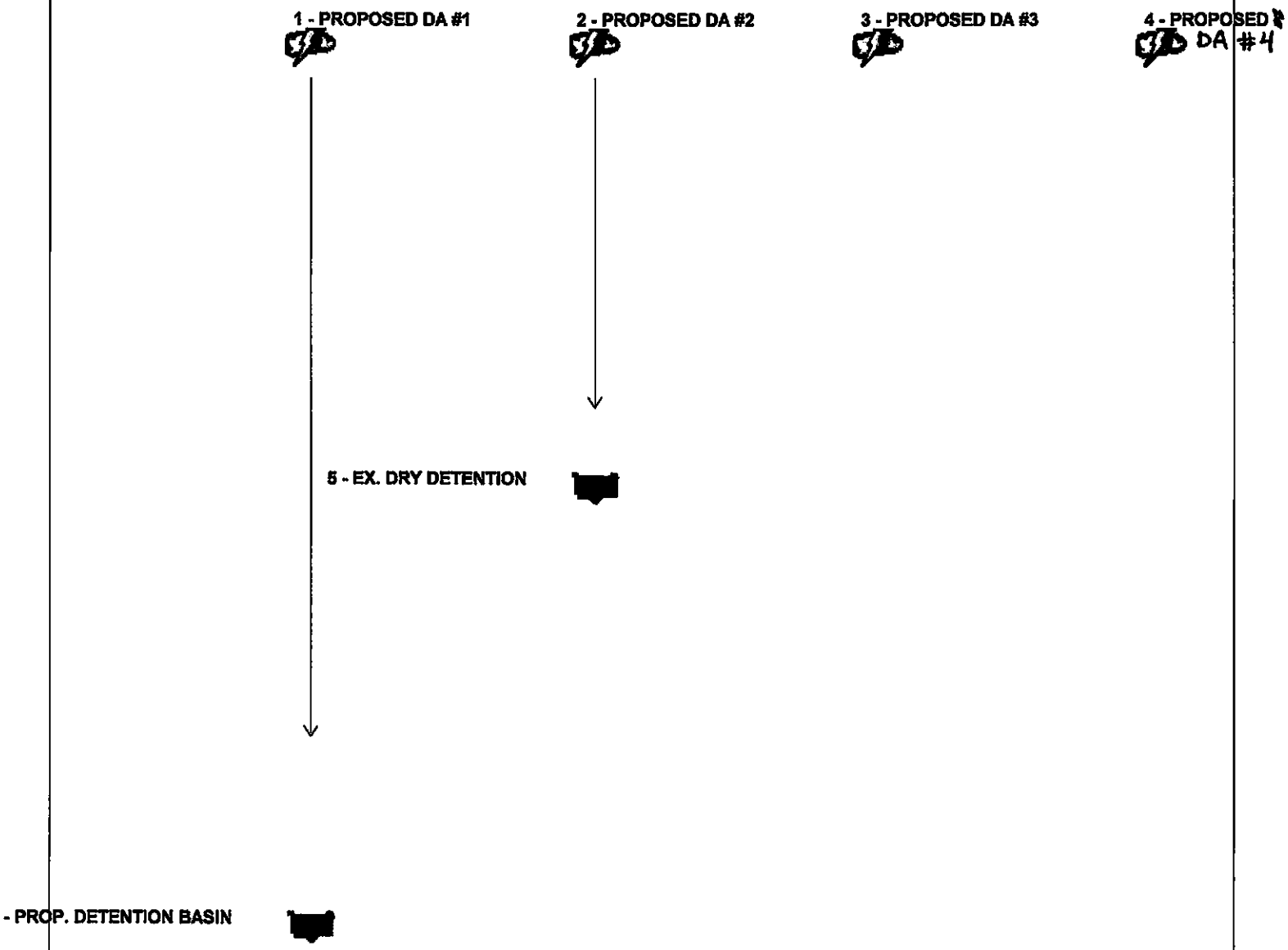
ıcip. file name: I:\Projects\11075_Engineering\Calculations\Stormwater\JAMES CITY PRECIPITATION 24 HR.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.53	0.00	0.00	5.45	0.00	0.00	9.15
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

IV. PROPOSED CONDITIONS HYDROGRAPH REPORT

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Legend

Hyd.	Origin	Description
1	Rational	PROPOSED DA #1
2	Rational	PROPOSED DA #2
3	Rational	PROPOSED DA #3
4	Rational	PROPOSED DA #4
5	Reservoir	EX. DRY DETENTION
6	Reservoir	PROP. DETENTION BASIN

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Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	----	----	3.795	----	----	4.927	----	----	----	PROPOSED DA #1
2	Rational	----	----	3.356	----	----	4.360	----	----	----	PROPOSED DA #2
3	Rational	----	----	0.931	----	----	1.208	----	----	----	PROPOSED DA #3
4	Rational	----	----	0.173	----	----	0.225	----	----	----	PROPOSED DA #4
5	Reservoir	2	----	2.334	----	----	2.649	----	----	----	EX. DRY DETENTION
6	Reservoir	1	----	0.309	----	----	0.335	----	----	----	PROP. DETENTION BASIN

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	3.795	1	5	1,139	----	----	----	PROPOSED DA #1
2	Rational	3.356	1	7	1,409	----	----	----	PROPOSED DA #2
3	Rational	0.931	1	5	279	----	----	----	PROPOSED DA #3
4	Rational	0.173	1	5	52	----	----	----	PROPOSED DA #4
5	Reservoir	2.334	1	9	1,409	2	103.57	337	EX. DRY DETENTION
6	Reservoir	0.309	1	10	1,136	1	105.24	1,007	PROP. DETENTION BASIN

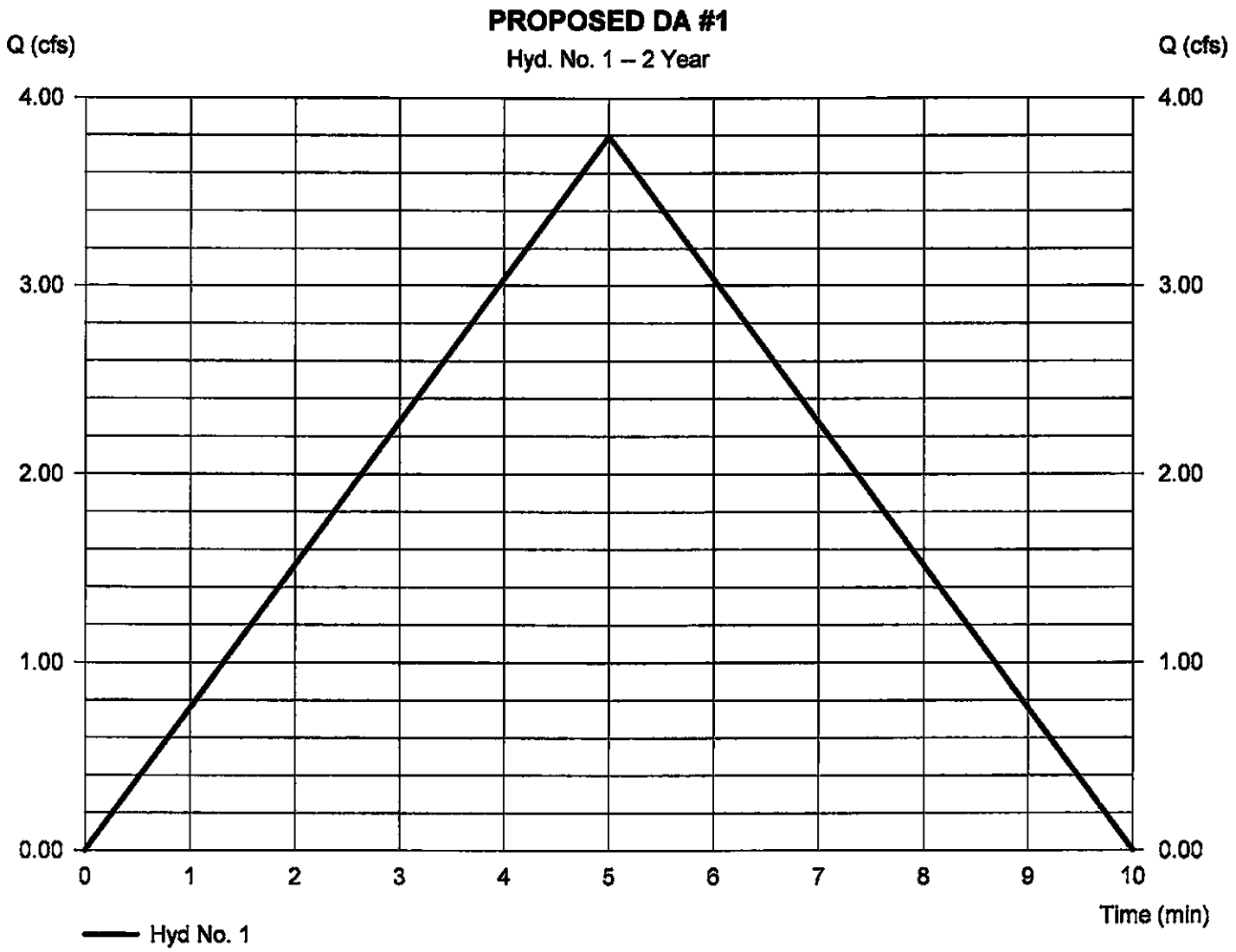
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 1

PROPOSED DA #1

Hydrograph type	= Rational	Peak discharge	= 3.795 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 1,139 cuft
Drainage area	= 1.060 ac	Runoff coeff.	= 0.62
Intensity	= 5.775 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



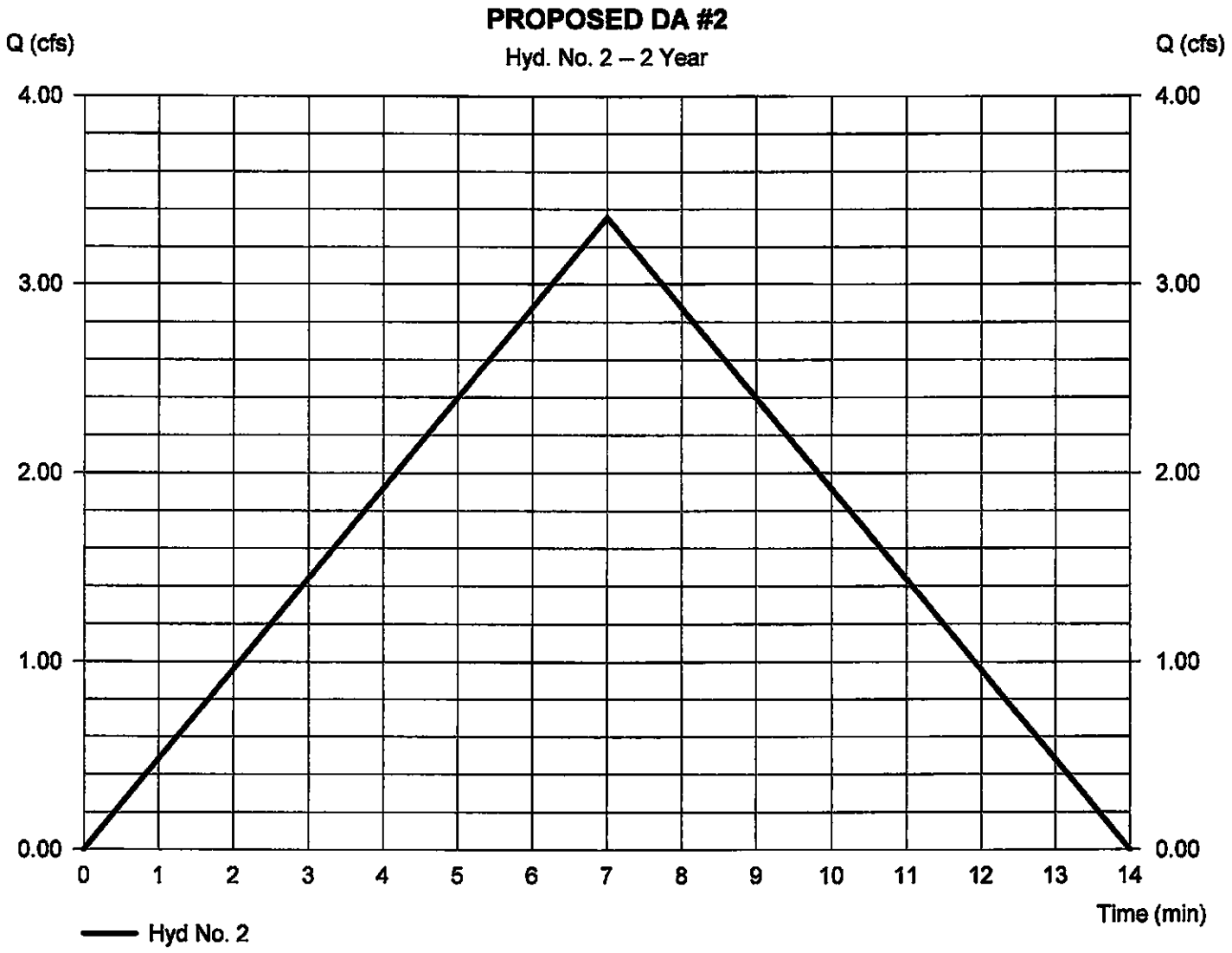
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

PROPOSED DA #2

Hydrograph type	= Rational	Peak discharge	= 3.356 cfs
Storm frequency	= 2 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,409 cuft
Drainage area	= 1.100 ac	Runoff coeff.	= 0.58
Intensity	= 5.260 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 2

PROPOSED DA #2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 31.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 5.33**	**+**	**0.00**	**+**	**0.00**	**=**	**5.33**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 13.00		0.00		0.00		
Wetted perimeter (ft)	= 27.00		0.00		0.00		
Channel slope (%)	= 0.50		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=2.15						
			0.00				
					0.00		
Flow length (ft)	({0})262.0		0.0		0.0		
Travel Time (min)	**= 2.03**	**+**	**0.00**	**+**	**0.00**	**=**	**2.03**

Total Travel Time, Tc ..... **7.00 min**

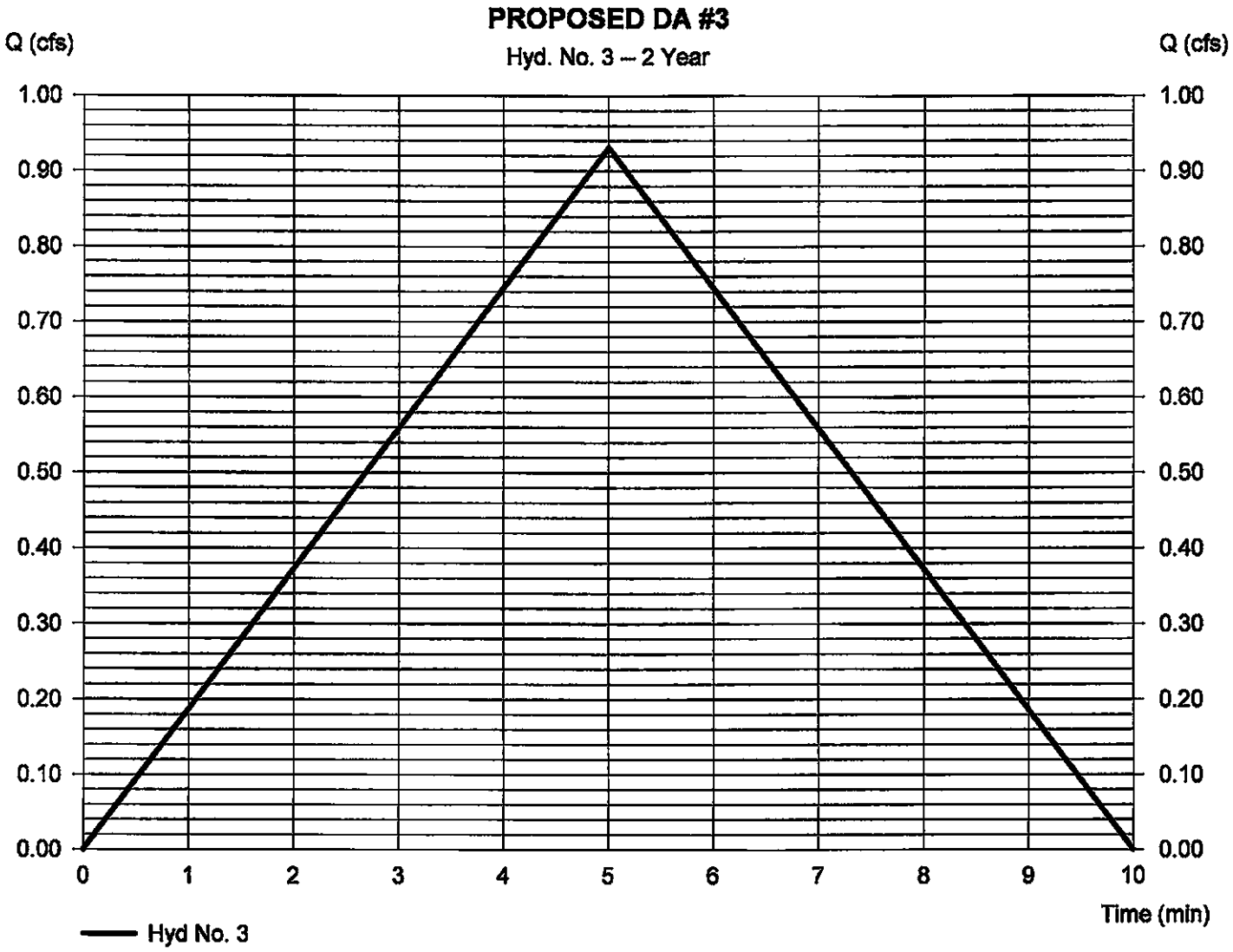
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

PROPOSED DA #3

Hydrograph type	= Rational	Peak discharge	= 0.931 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 279 cuft
Drainage area	= 0.310 ac	Runoff coeff.	= 0.52
Intensity	= 5.775 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



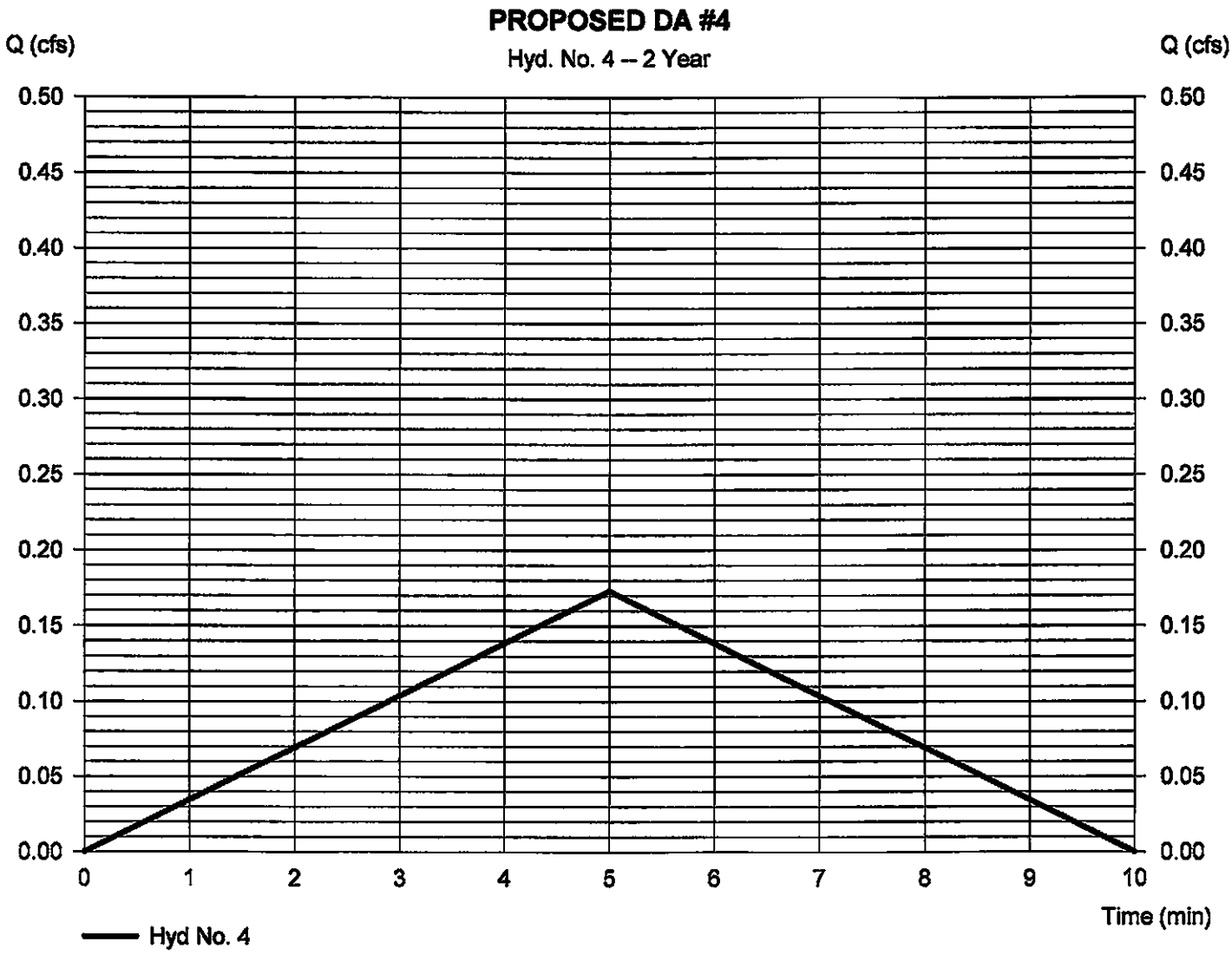
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

PROPOSED DA #4

Hydrograph type	= Rational	Peak discharge	= 0.173 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 5.775 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



TR55 Tc Worksheet

Hyd. No. 4

PROPOSED DA #4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 25.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.53		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 2.58**	**+**	**0.00**	**+**	**0.00**	**=**	**2.58**
Shallow Concentrated Flow							
Flow length (ft)	= 152.00		0.00		0.00		
Watercourse slope (%)	= 0.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.14		0.00		0.00		
Travel Time (min)	**= 2.22**	**+**	**0.00**	**+**	**0.00**	**=**	**2.22**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... **5.00 min**

Hydrograph Report

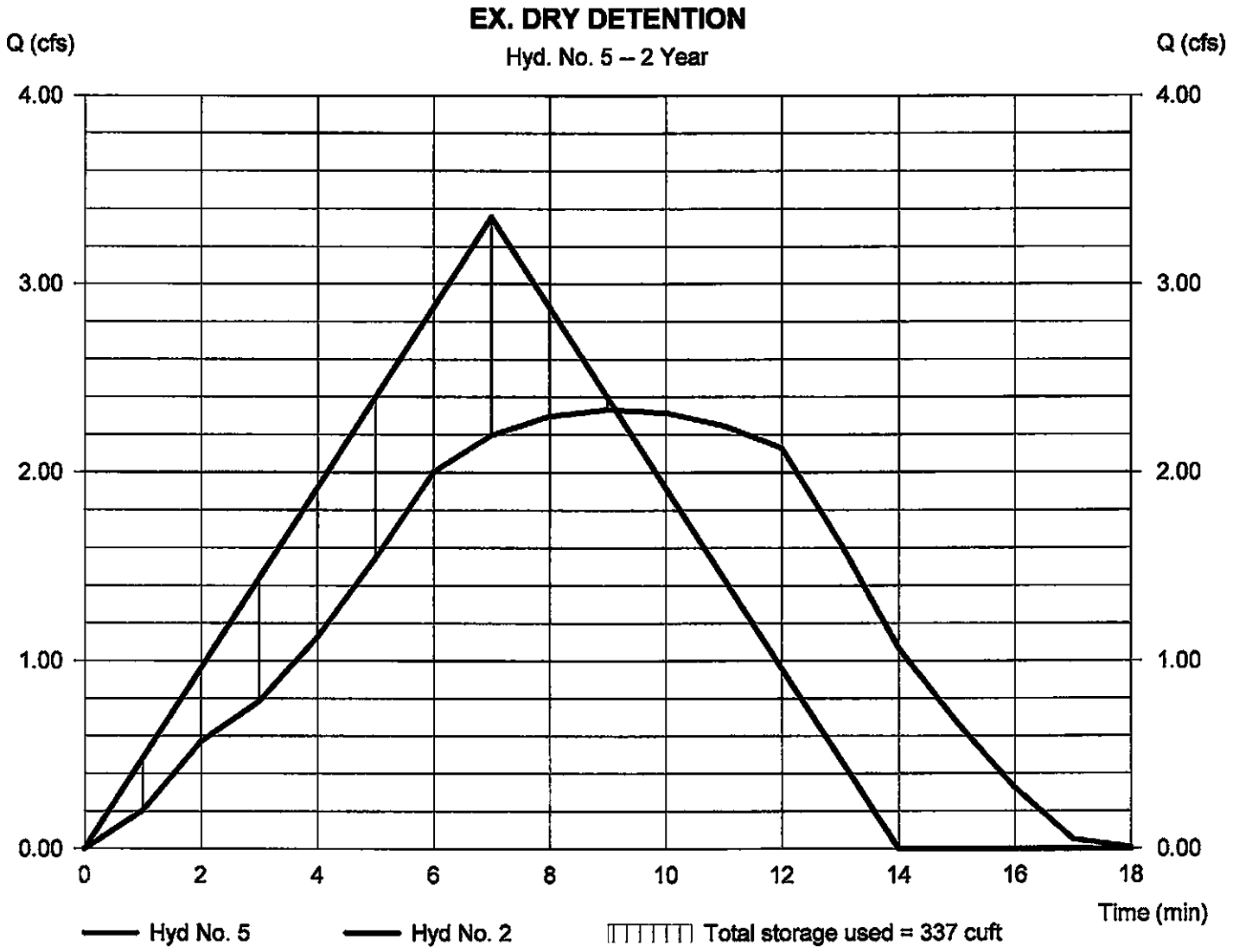
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.334 cfs
Storm frequency	= 2 yrs	Time to peak	= 9 min
Time interval	= 1 min	Hyd. volume	= 1,409 cuft
Inflow hyd. No.	= 2 - PROPOSED DA #2	Max. Elevation	= 103.57 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 337 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Friday, Jan 13, 2012

Pond No. 1 - EXISTING DRY DETENTION

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 103.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	103.00	00	0	0
0.50	103.50	1,288	215	215
1.00	104.00	2,428	914	1,129

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 102.69	0.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 3.80	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	103.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.50	215	103.50	2.09 ic	---	---	---	---	---	---	---	---	---	2.095
1.00	1,129	104.00	3.40 ic	---	---	---	---	---	---	---	---	---	3.403

Hydrograph Report

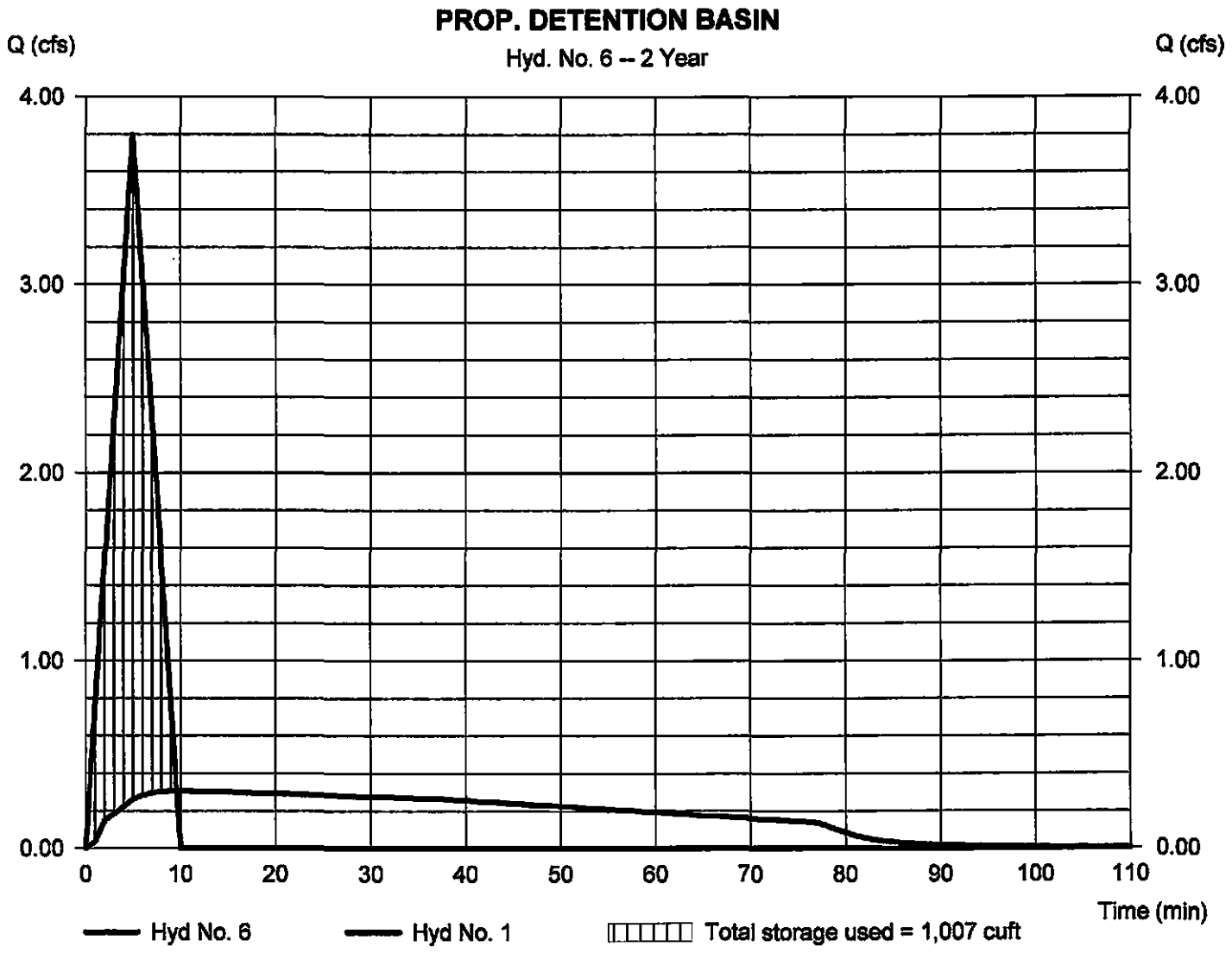
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 6

PROP. DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.309 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,136 cuft
Inflow hyd. No.	= 1 - PROPOSED DA #1	Max. Elevation	= 105.24 ft
Reservoir name	= PROPOSED DRY DETENTION	Max. Storage	= 1,007 cuft

Storage Indication method used.



Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Pond No. 2 - PROPOSED DRY DETENTION

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 104.17 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	104.17	00	0	0
0.33	104.50	500	55	55
0.83	105.00	1,526	483	538
1.33	105.50	2,460	987	1,525
1.83	106.00	3,425	1,464	2,990

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.50	0.00	0.00
Span (in)	= 12.00	3.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 103.00	104.17	0.00	0.00
Length (ft)	= 32.00	1.00	0.00	0.00
Slope (%)	= 0.50	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.50	0.00	0.00	0.00
Crest El. (ft)	= 105.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	104.17	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.33	55	104.50	2.29 oc	0.14 ic	---	---	0.00	---	---	---	---	---	0.138
0.83	538	105.00	2.29 oc	0.27 ic	---	---	0.00	---	---	---	---	---	0.266
1.33	1,525	105.50	2.29 oc	0.35 ic	---	---	0.00	---	---	---	---	---	0.350
1.83	2,990	106.00	2.29 oc	0.42 ic	---	---	1.49 ic	---	---	---	---	---	1.903

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	4.927	1	5	1,478	----	----	----	PROPOSED DA #1
2	Rational	4.360	1	7	1,831	----	----	----	PROPOSED DA #2
3	Rational	1.208	1	5	363	----	----	----	PROPOSED DA #3
4	Rational	0.225	1	5	67	----	----	----	PROPOSED DA #4
5	Reservoir	2.649	1	10	1,831	2	103.68	539	EX. DRY DETENTION
6	Reservoir	0.335	1	10	1,476	1	105.41	1,334	PROP. DETENTION BASIN

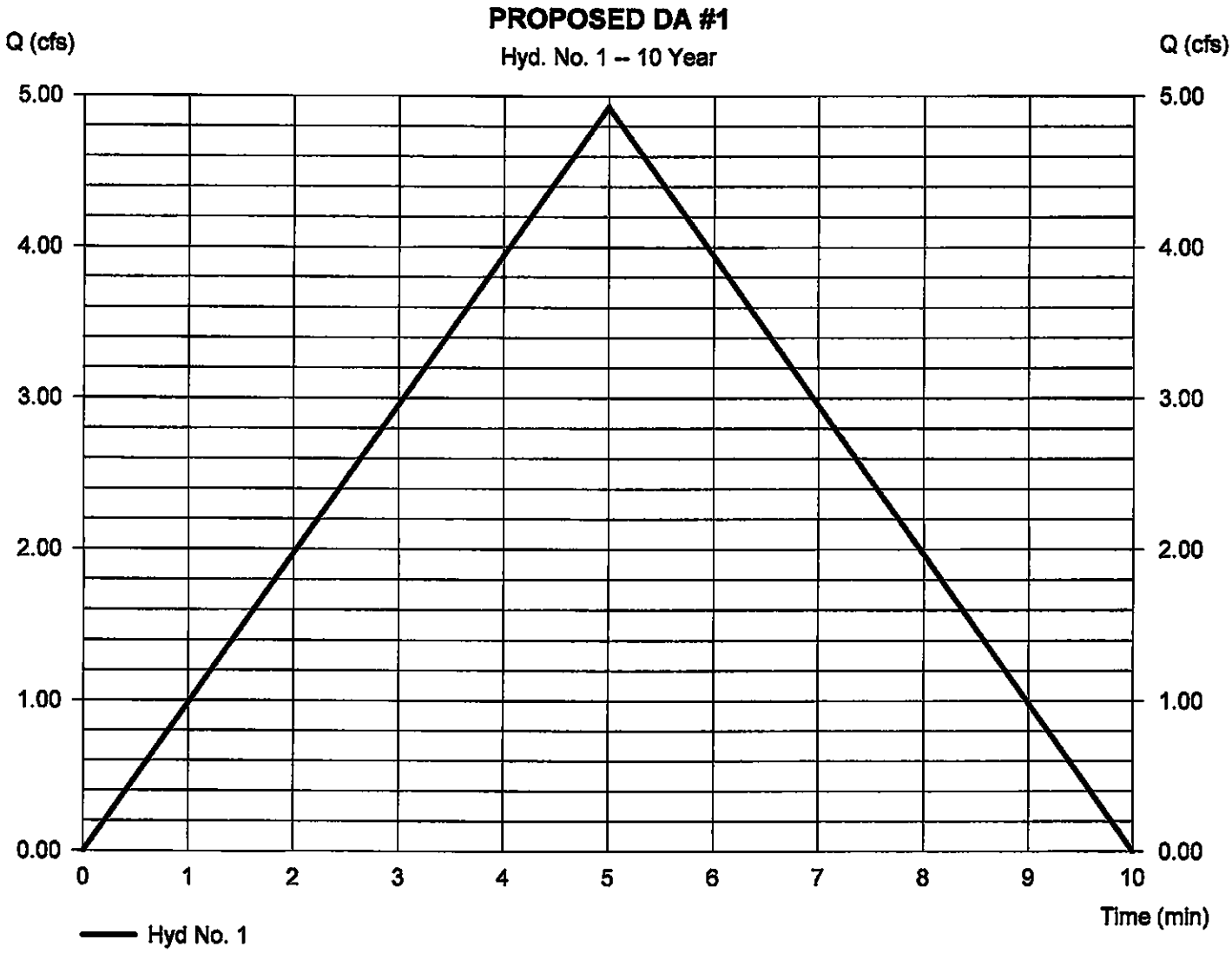
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 1

PROPOSED DA #1

Hydrograph type	= Rational	Peak discharge	= 4.927 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 1,478 cuft
Drainage area	= 1.060 ac	Runoff coeff.	= 0.62
Intensity	= 7.496 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



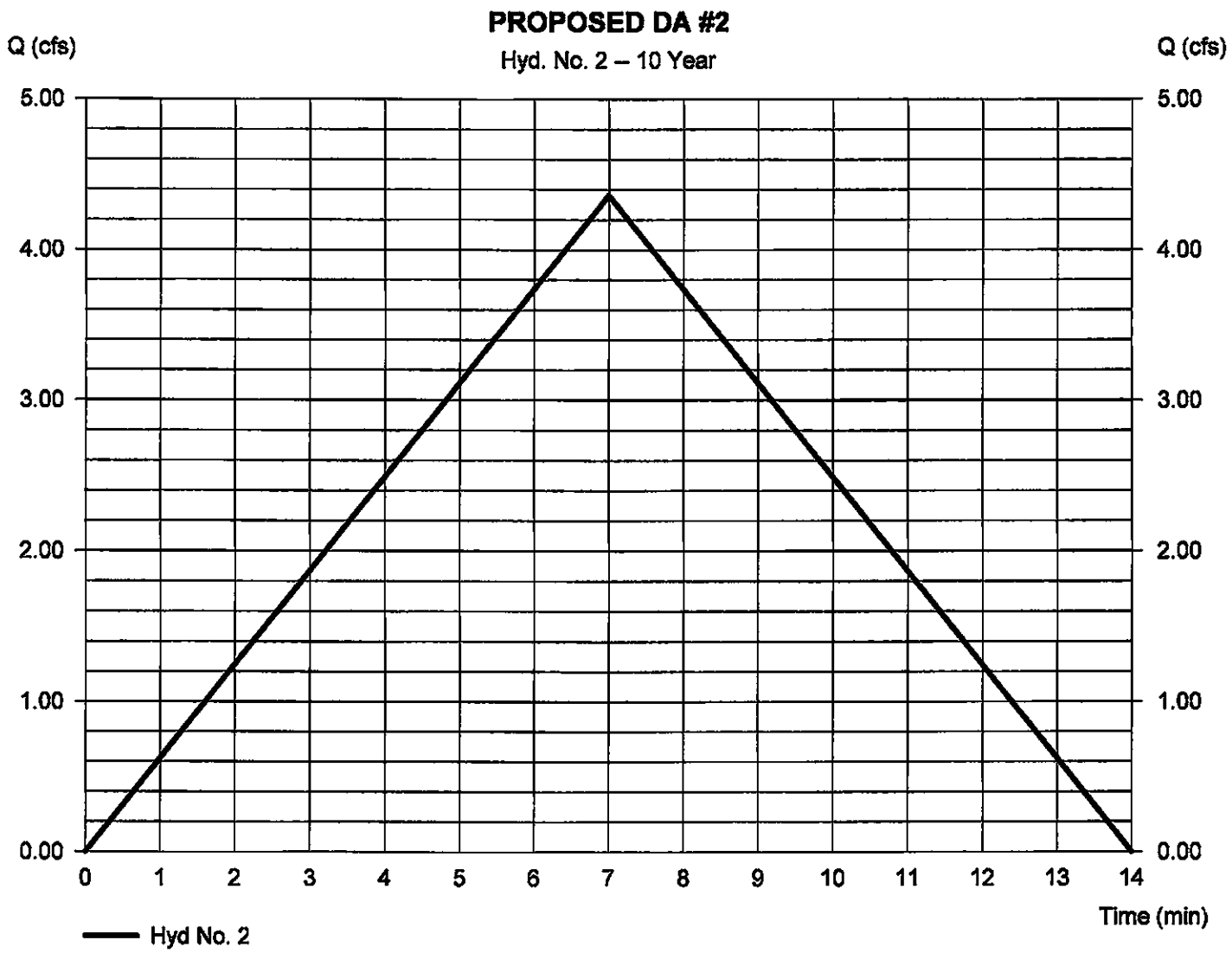
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 2

PROPOSED DA #2

Hydrograph type	= Rational	Peak discharge	= 4.360 cfs
Storm frequency	= 10 yrs	Time to peak	= 7 min
Time interval	= 1 min	Hyd. volume	= 1,831 cuft
Drainage area	= 1.100 ac	Runoff coeff.	= 0.58
Intensity	= 6.834 in/hr	Tc by TR55	= 7.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



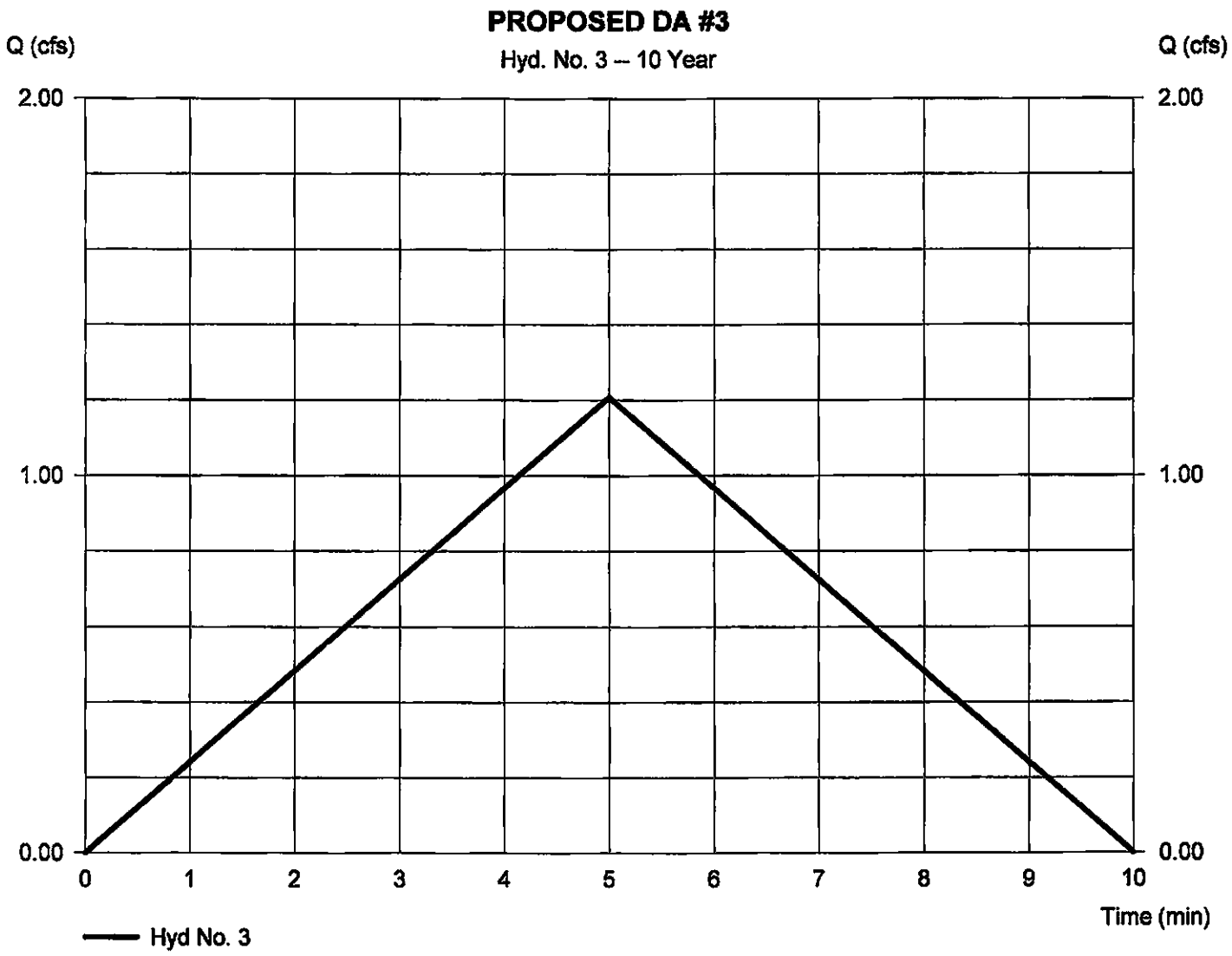
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 3

PROPOSED DA #3

Hydrograph type	= Rational	Peak discharge	= 1.208 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 363 cuft
Drainage area	= 0.310 ac	Runoff coeff.	= 0.52
Intensity	= 7.496 in/hr	Tc by User	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



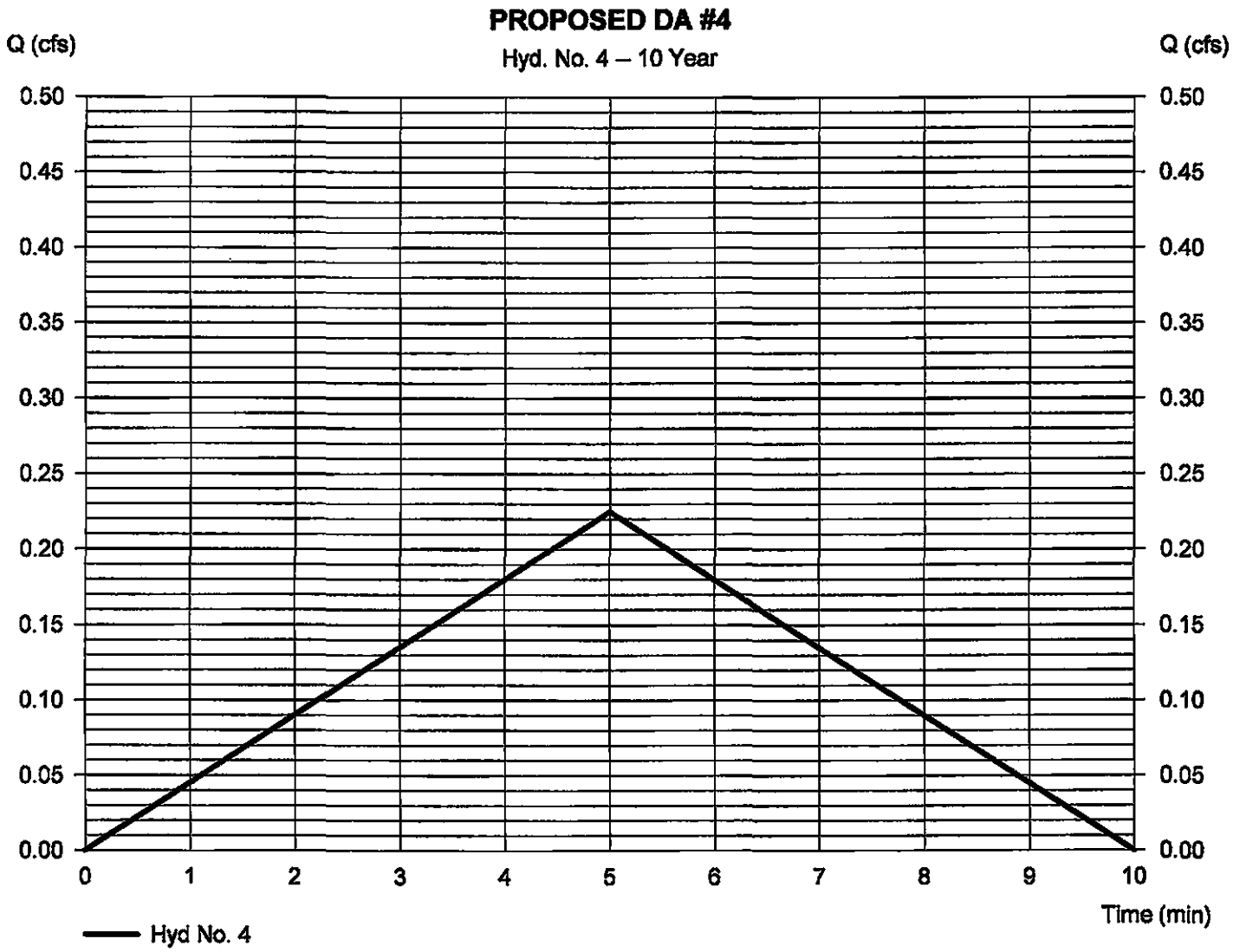
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 4

PROPOSED DA #4

Hydrograph type	= Rational	Peak discharge	= 0.225 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 67 cuft
Drainage area	= 0.150 ac	Runoff coeff.	= 0.2
Intensity	= 7.496 in/hr	Tc by TR55	= 5.00 min
IDF Curve	= JAMES CITY IDF CURVE.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

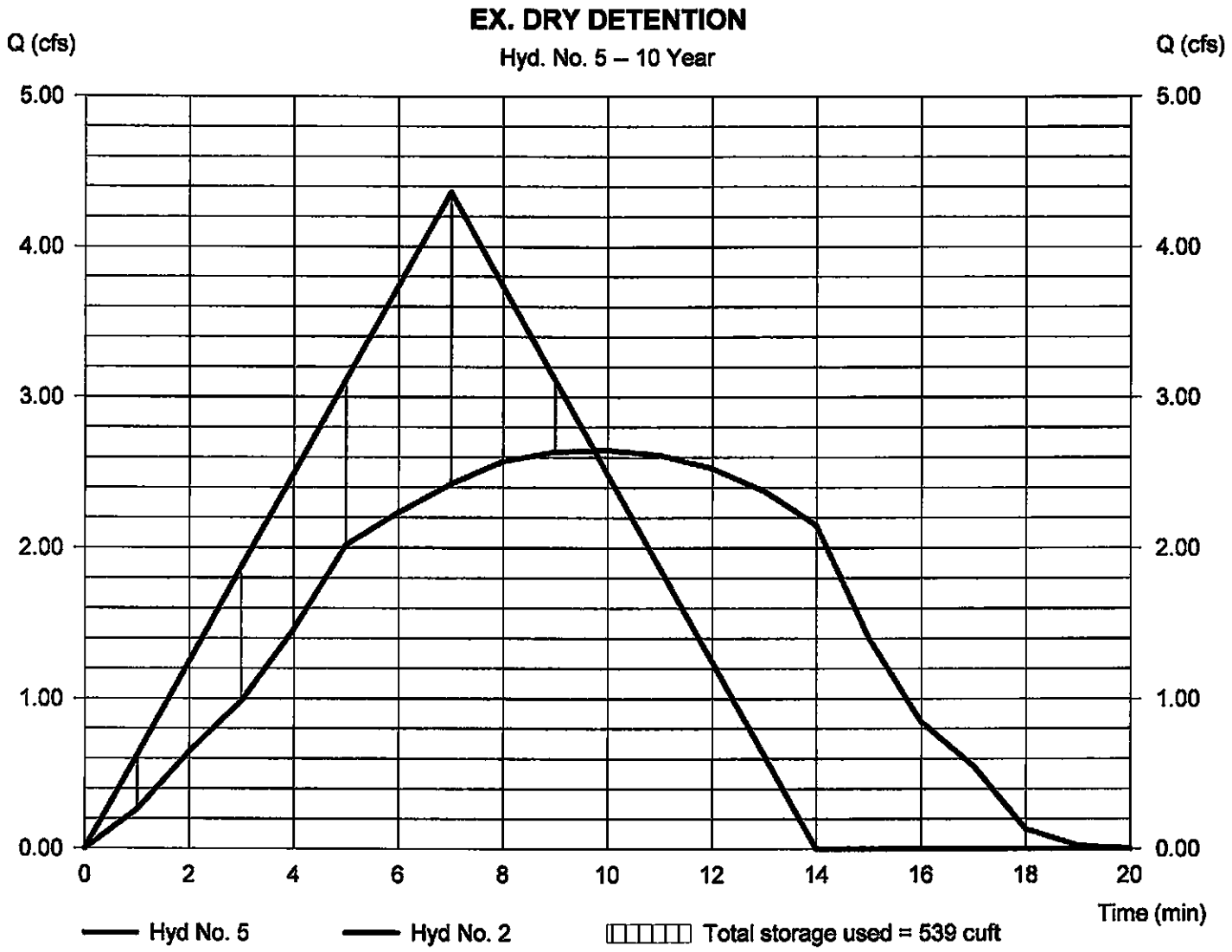
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 5

EX. DRY DETENTION

Hydrograph type	= Reservoir	Peak discharge	= 2.649 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,831 cuft
Inflow hyd. No.	= 2 - PROPOSED DA #2	Max. Elevation	= 103.68 ft
Reservoir name	= EXISTING DRY DETENTION	Max. Storage	= 539 cuft

Storage Indication method used.



Hydrograph Report

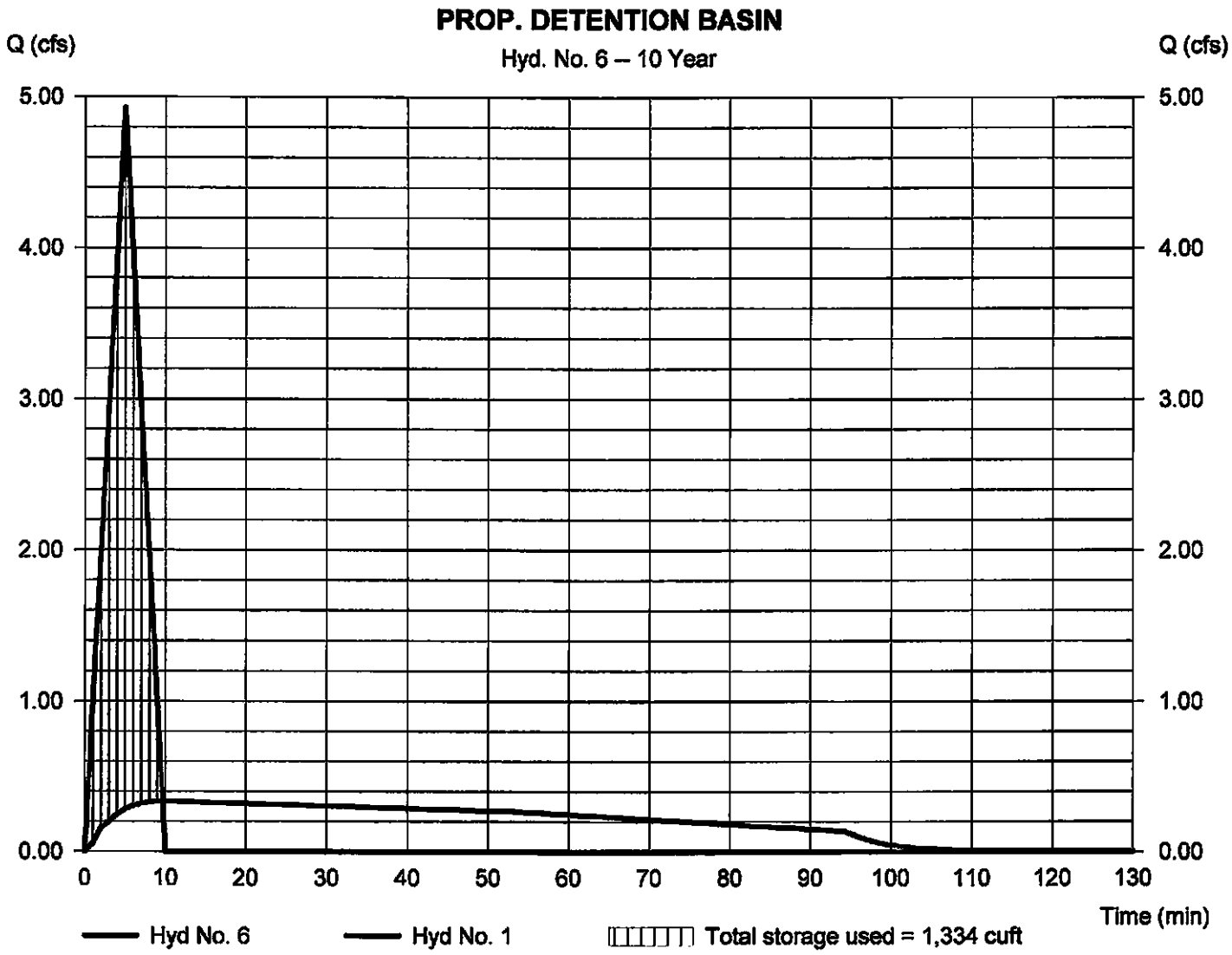
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Hyd. No. 6

PROP. DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.335 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,476 cuft
Inflow hyd. No.	= 1 - PROPOSED DA #1	Max. Elevation	= 105.41 ft
Reservoir name	= PROPOSED DRY DETENTION	Max. Storage	= 1,334 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 13, 2012

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	------
2	66.9152	12.4000	0.8577	------
3	0.0000	0.0000	0.0000	------
5	0.0000	0.0000	0.0000	------
10	55.5168	10.0000	0.7394	------
25	0.0000	0.0000	0.0000	------
50	0.0000	0.0000	0.0000	------
100	36.9712	5.3000	0.5614	------

File name: JAMES CITY IDF CURVE.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.77	4.65	3.91	3.39	3.00	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.50	6.06	5.14	4.49	4.01	3.63	3.33	3.08	2.87	2.69	2.54	2.40
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	9.98	7.99	6.82	6.03	5.45	5.00	4.64	4.36	4.10	3.89	3.70	3.54

Tc = time in minutes. Values may exceed 60.

ɜcip. file name: I:\Projects\11075_Engineering\Calculations\Stormwater\JAMES CITY PRECIPITATION 24 HR.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.53	0.00	0.00	5.45	0.00	0.00	9.15
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

V. STORM SEWER PIPE ANALYSIS

Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Friday, Jan 13 2012

Proposed
Dry Detention Swale Outfall Pipe_Q 2-Year

Invert Elev Dn (ft)	= 102.00
Pipe Length (ft)	= 33.00
Slope (%)	= 3.03
Invert Elev Up (ft)	= 103.00
Rise (in)	= 12.0
Shape	= Cir
Span (in)	= 12.0
No. Barrels	= 1
n-Value	= 0.013
Inlet Edge	= 0
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.5

Embankment

Top Elevation (ft)	= 106.00
Top Width (ft)	= 30.00
Crest Width (ft)	= 0.00

Calculations

Qmin (cfs)	= 0.31
Qmax (cfs)	= 0.31
Tailwater Elev (ft)	= 0.00

Highlighted

Qtotal (cfs)	= 0.31
Qpipe (cfs)	= 0.31
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 2.24
Veloc Up (ft/s)	= 2.24
HGL Dn (ft)	= 102.23
HGL Up (ft)	= 103.23
Hw Elev (ft)	= 103.31
Hw/D (ft)	= 0.31
Flow Regime	= Inlet Control

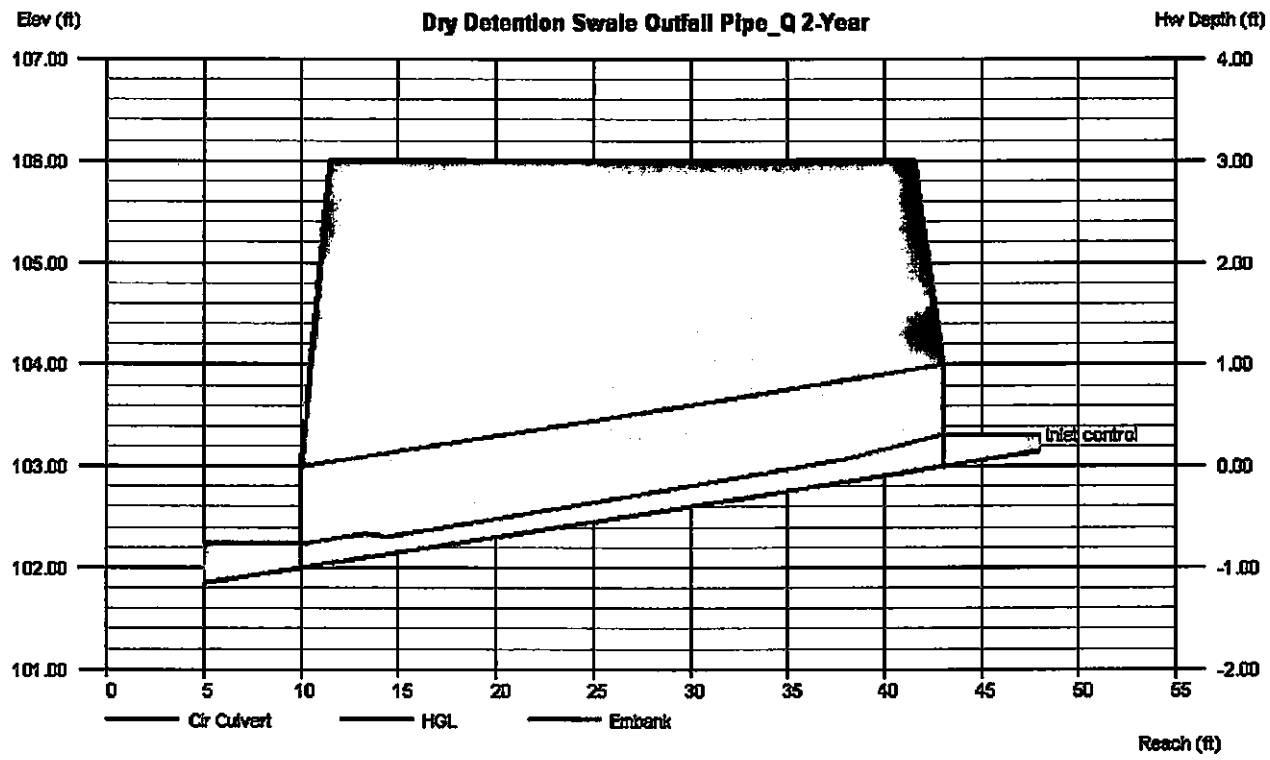


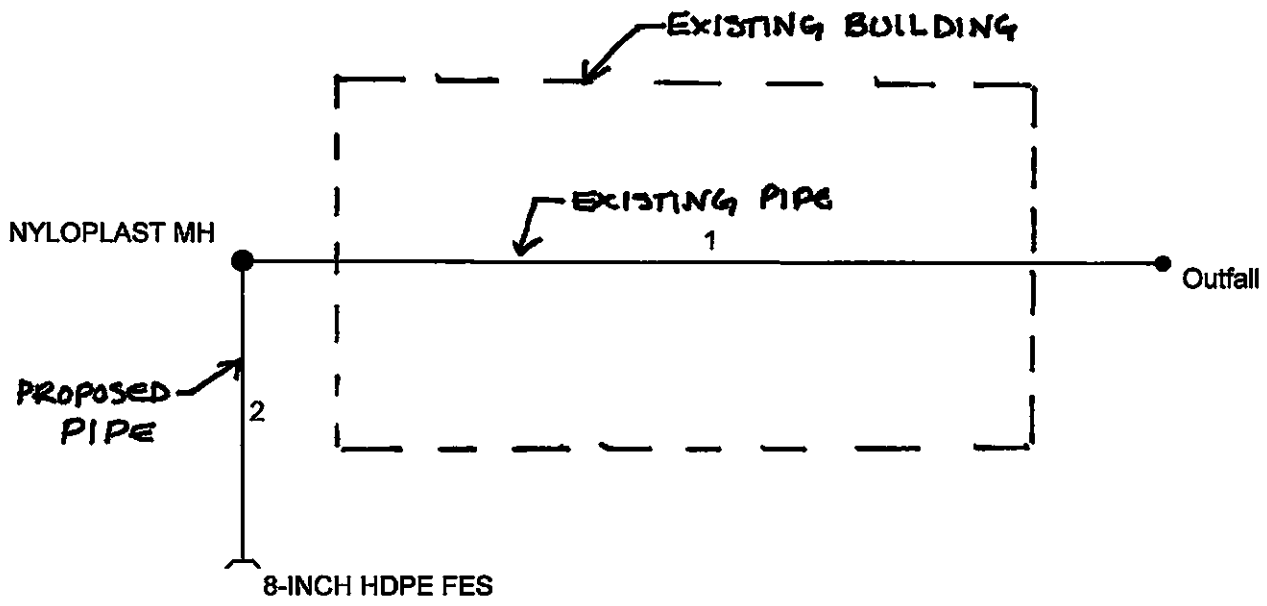
TABLE 5-22

PERMISSIBLE VELOCITIES FOR UNLINED EARTHEN CHANNELS

Soil Types	Permissible Velocity (ft./sec.)
Fine Sand (noncolloidal)	2.5
Sandy Loam (noncolloidal)	2.5
Silt Loam (noncolloidal)	3.0
Ordinary Firm Loam	3.5
Fine Gravel	5.0
Stiff Clay (very colloidal)	5.0
Graded, Loam to Cobbles (noncolloidal)	5.0
Graded, Silt to Cobbles (noncolloidal)	5.5
Alluvial Silts (noncolloidal)	3.5
Alluvial Silts (colloidal)	5.0
Coarse Gravel (noncolloidal)	6.0
Cobbles and Shingles	5.5
Shales and Hard Pans	6.0

Source: American Society of Civil Engineers

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Project File: Storm Sewer Under Building.stm	Number of lines: 2	Date: 1/13/2012

Storm Sewers v8.00

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	120.000	0.00	0.15	0.00	0.00	0.09	0.0	5.4	6.9	0.64	2.28	2.49	12	0.41	103.74	104.23	104.08	104.62	0.00	107.42	NYLOPLAST MH
2	1	40.000	0.15	0.15	0.62	0.09	0.09	5.0	5.0	7.0	0.65	1.79	2.81	8	1.30	104.23	104.75	104.70	105.13	107.42	105.50	8-INCH HDPE FES

Project File: Storm Sewer Under Building.stm | Number of lines: 2 | Run Date: 1/13/2012

NOTES:Intensity = 193.66 / (Inlet time + 23.60) ^ 0.99; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss*
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	12	0.64	103.74	104.08	0.34	0.23	2.72	0.12	104.19	0.525	120.000	104.23	104.62	0.39	0.28	2.26	0.08	104.70	0.313	0.419	0.503	1.00	0.08
2	8	0.65	104.23	104.70	0.47	0.26	2.47	0.09	104.79	0.239	40.000	104.75	105.13 j	0.38**	0.20	3.16	0.15	105.28	0.445	0.342	0.137	1.00	n/a

Project File: Storm Sewer Under Building.stm | Number of lines: 2 | Run Date: 1/13/2012

Notes: ; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

VI. APPENDIX

MSA, P.C.

Environmental Sciences · Geosciences · Planning
Surveying · Engineering · Landscape Architecture

5033 Rouse Drive, Virginia Beach, VA 23462
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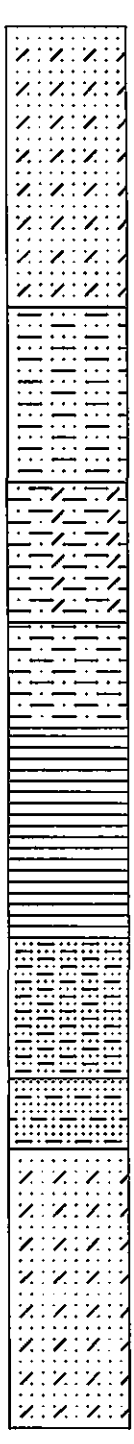
www.msaonline.com
Offices in Virginia Beach & Belle Haven, VA

Project Information

Project Name	Smithfield Specialty Foods Expansion
Project Number	11075
Site Location	Smithfield, Virginia
Inspector	C. Hall
Project Manager	C. Hall
Date Sampled	1/9/2012
Method	Hand Auger

Elevation (FT AMSL)	
Ground Surface	107.5'
Seasonal High	> 10' bgs
Seasonal Low	N/A
Static Water	> 10' bgs

Boring No. HA-1 — Seasonal low · Seasonal High · Current Depth



Depth (ft)	Lithology	Soil Description	K (ft./day)	Moisture	Matrix Color	Mottles	Notes
0–1		FINE SAND WITH SILT (SP-SM): Suspected fill material		Dry	10YR 4/3		
1–2					2.5Y 6/3		
2–3		FINE TO MEDIUM CLAYEY SAND (SC)			10YR 5/6		
3–4		FINE SAND AND SILT WITH CLAY (SC-SM)	~ 6		10YR 6/6		
4–5		FINE SANDY LEAN CLAY (CL)		Moist			
5–6		FAT CLAY (CH): With fine sand				10YR 6/2 and 10YR 5/6	
6–7		FINE CLAYEY SAND (SC)			10YR 6/2	10YR 6/4 and 10YR 5/6	
7–8		FINE SAND WITH CLAY (SP-SC)			10YR 5/4 and 10YR 6/2		
8–9		FINE SAND WITH SILT (SP-SM): Pockets of sandy (ML) and lenses of (SP)			10YR 6/6 and 10YR 6/2	10YR 5/6	
9–10					2.5Y 8/2	10YR 6/6	

CHARLES H. HALL
No. 1308
1-12-12
CERTIFIED PROFESSIONAL GEOLOGIST

Comments: SHWT = Seasonal High Water Table DTW = Depth to Water

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Project Information

Project Name	Smithfield Specialty Foods Expansion
Project Number	11075
Site Location	Smithfield, Virginia
Inspector	C. Hall
Project Manager	C. Hall
Date Sampled	1/9/2012
Method	Earthprobe

Elevation (FT AMSL)	
Ground Surface	107.2'
Seasonal High	> 10' bgs
Seasonal Low	N/A
Static Water	> 10' bgs

Boring No. EP-1 — Seasonal low · Seasonal High · Current Depth

Depth (ft)	Lithology	Soil Description	K (ft./day)	Moisture	Matrix Color	Mottles	Notes
0–1		FINE SAND WITH SILT (SP-SM): Suspected fill material		Dry	10YR 4/3		
1–2					2.5Y 6/3		
2–3		FINE TO MEDIUM CLAYEY SAND (SC)			10YR 5/6		
3–4		FINE SAND AND SILT WITH CLAY (SC-SM)	6.9				
4–5		FINE SANDY LEAN CLAY (CL)		Moist			
5–6		FAT CLAY (CH): With fine sand			10YR 6/6	10YR 6/2 and 10YR 5/6	
6–7		FINE POORLY-GRADED SAND (SP): Trace silt			10YR 8/2		
7–8		FINE SAND WITH CLAY (SP-SC)			10YR 5/6, 10YR 6/6, 10YR 5/4 and 10YR 6/2	10YR 6/4 and 10YR 5/6	
8–9		FINE SAND WITH SILT (SP-SM): Pockets of sandy (CL) and lenses of (SP)				10YR 5/6	
9–12					2.5Y 8/2	10YR 6/6	

COMMONWEALTH OF VIRGINIA
CHARLES H. HALL
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Comments: SHWT = Seasonal High Water Table DTW = Depth to Water

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Project Information

Project Name	Smithfield Specialty Foods Expansion
Project Number	11075
Site Location	Smithfield, Virginia
Inspector	C. Hall
Project Manager	C. Hall
Date Sampled	1/9/2012
Method	Earthprobe

Elevation (FT AMSL)	
Ground Surface	106.1'
Seasonal High	> 10' bgs
Seasonal Low	N/A
Static Water	> 10' bgs

Boring No. EP-2 — Seasonal low · Seasonal High · Current Depth

Depth (ft)	Lithology	Soil Description	K (ft./day)	Moisture	Matrix Color	Mottles	Notes
0–1		FINE SAND WITH SILT (SP-SM): Suspected fill material		Dry	10YR 4/3		
1–2					2.5Y 6/3		
2–3		FINE TO MEDIUM CLAYEY SAND (SC)			10YR 5/6		
3–4		FINE SAND AND SILT WITH CLAY (SC-SM)	~ 6		10YR 6/6		
4–5		FINE SANDY LEAN CLAY (CL)					
5–6		FAT CLAY (CH): With fine sand				10YR 6/2 and 10YR 5/6	
6–7		FINE POORLY-GRADED SAND (SP): Trace silt		Moist			
7–8		FINE SAND WITH CLAY (SP-SC)			10YR 6/6, 10YR 5/4 and 10YR 6/2	10YR 6/4 and 10YR 5/6	
8–9		FINE SAND WITH SILT (SP-SM): Pockets of sandy (CL) and lenses of (SP)				10YR 5/6	
9–10					2.5Y 8/2	10YR 6/6	
10–11						10YR 6/6-6/8	
11–12							

CHARLES H. HALL
No. 1308
1-12-12
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Comments: SHWT = Seasonal High Water Table DTW = Depth to Water

WILLIAMSBURG PEANUT FACTORY
SITE PLAN

RUNOFF ANALYSIS

RICKMOND
ENGINEERING
INC.

REV. 6/8/90 WTH
PROJECT NO. 90124

RUNOFF ANALYSIS
WILLIAMSBURG PEANUT FACTORY
SITE PLAN

James City County, Virginia
May 1, 1990

INTRODUCTION

This runoff analysis report has been prepared in accordance with the James City County, James City Service Authority Design Manual for Runoff Analysis Reservoir Protection Overlay District (R.P.O.D.). This report is a supplement to the design documents for the referenced project which indicates the design details and locations of reservoir protection features.

DESCRIPTION

Engineered Building Structures of Virginia Site is located on a 1.47 acre site off of Hankins Industrial Park Road, in the Hankins Industrial Park in Toano, Virginia. The entire parcel is located in the R.P.O.D. and is currently zoned M-2.

The project consists of the erection of a 10,350 square foot warehouse, 10,000 square feet future expansion and 7,405 square feet of gravel parking area, sidewalk, and miscellaneous site improvements. Approximately 32% of the site will be developed. Clearing will be kept to a minimum.

At present the area drains to a low spot in the center of the property. After development, the area will drain northeasternly towards a ditch which runs along Hankins Industrial Park Road. The topography of the area consists of gentle slopes of 2 - 5%. The soils on the site are classified as Kempsville Emporia fine sand and Slagle fine sandy loam as indicated in the USDA Soil Conservation Service and VPI and SU. Permeability in these Slagle soils is moderate in the upper regions of the subsoil and moderately slower in the lower regions. The erosion hazard in these classification of soils is moderate.

RUNOFF CHARACTERISTICS

The method used for estimating peak runoff rates and volumes is the "Rational Method". The loading volumes for sediment and phosphorous were based on the rates tabulated in the Design Manual for Runoff Analysis.

RUNOFF AND POLLUTION CONTROL

A detention pond designed to hold the one inch of runoff from the impervious surfaces and the predeveloped runoff from the 2 year storm will be constructed on site. This pond will be used for temporary storage, infiltration, and settling of the runoff pollutants. A removal efficiency of 75% reduction for suspended soils (sediment) and phosphorous will be anticipated.

All erosion and sediment control measures will be employed during the construction of the detention pond. The control measures will be installed in accordance with the 1980 Virginia Erosion and Sediment Control Handbook and the James City County Code Compliance Department.

The runoff from the roof will drain into 4" black plastic pipes that lead to the detention pond.

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(804) 875-1785

JOB 90124 - Lot 4A
SHEET NO. 1 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

Design of Detention Pond
Hankins Industrial Park
Lot 4A

A. Per SCS's Soil Survey of James City and York Counties and the City of Williamsburg Virginia "Soil in the area of the project is Kempsville - Emporia fine sand and Slagle fine sandy loam.

B Runoff Determination - Rational Method

1.) Pre - Development

Q = CAi

C = .25

A = 1.47 Ac.

i: O.L. = 228

Slope = 1.6 %

Tc = 22 min.

i_2 = 3.20 in/hr plate 5-3

Q = CAi = (.25)(1.47)(3.20) = 1.18 cfs

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JOB 90124 - Lot 4A
SHEET NO. 2 OF 8
CALCULATED BY WTH DATE
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SCALE

2) Post Development

	C	A	CA
Gravel	.90	.17	.15
Rooftop	.90	.47	.42
grass	.25	.83	.21
		1.47	.78

$$C = \frac{CA}{A} = \frac{.78}{1.47} = .53$$

C = .53
A = 1.47 Ac

Overland: Length = 50'
Slope = 1.00%
Tc = 8.5 min
Tc = 13 min

Ditch: L = 280'
H = 1.75'
Tc = 4.5 min

i_2 = 4.1 in/hr

$$Q_2 = CAi = (.53)(1.47\ Ac.)(4.1) = 3.19\ cfs$$

$$Q_{10} = CAi = (.53)(1.47\ Ac.)(5.3) = 4.13\ cfs$$

Post Development Average takes into account future additional building.

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JOB 90124 - Lot 4A
SHEET NO. 3 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

C. Determination of Non-Point Pollution rates for sediment and phosphorus.

1.) Sediment

a) Pre-Development - Table 2-1, Idle land, Sandy loam

Annual loading rate = .01 tons/Ac/Yr.

Loading rate Lot 4A = .01(tons/Ac/Yr.)(1.47 Ac) = .015 $\frac{tons}{Yr}$

b) Post-Development - Table 2-1, Industry (Median Imperv.) Sandy loam

Annual loading rate = .16 tons/Ac/Yr.

Loading rate Lot 4A = .16(tons/Ac/Yr.)(1.47 Ac) = .235 $\frac{tons}{Yr.}$

2.) Total Phosphate

a) Pre-Development - Table 2-2, Idle land, Sandy loam

Annual loading rate = 0.1 lbs/Ac/Yr

Loading rate Lot 4A = 0.1 lbs/Ac/Yr(1.47 Ac = .147 $\frac{lbs}{Yr}$

b) Post-Development - Table 2-2, Industry (Median Imperv.) Sandy loam

Annual loading rate = 1.2 lbs/Ac/Yr

Loading rate Lot 4A = 1.2 lbs/Ac/Yr(1.47 Ac) = 1.764 $\frac{lbs}{Yr}$

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JOB 90124 - Lot 4A
SHEET NO. 4 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

D. Total Impervious Area

Area = .17 Ac (gravel) + .47 Ac (roof) = .64 Ac = 27,878.4 ft²

E. Total volume of water from 1" of runoff

$$V = \left(\frac{1\,in}{1/12\,ft}\right)(27{,}878.4\ ft^2) = 2323.2\ cf$$

Building and gravel lot = 44 % of total area

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JOB 90 124 - Lot 4A
SHEET NO. 5 OF 8
CALCULATED BY WTH DATE
CHECKED BY KJ DATE 4/25/90
SCALE

F. Determine remaining volume of water to be retained

1) Allowable Discharge
Q pre = 1.18 cfs

2) Dev. Tc
Tc = 13 min

3) Peak Discharge
Qpost = 3.19

1	0.79	CA FOR DEVELOPED SITE				VII	130 =a
2	13.00	TC DEV.					19 =b
3	1.18	Q OUT					Richmond,Va.
4	Q(in)	T(D)	i	R/O Vol	D/C Vol	Storage	
5	2.98	15	3.82	3266	1221	2044	4.06
6	2.60	20	3.33	3627	1398	2229	
7	2.30	25	2.95	3906	1575	2331	
8	2.07	30	2.65	4128	1752	2376	
9	1.88	35	2.41	4310	1929	2380*	
10	1.72	40	2.20	4460	2106	2354	
11	1.58	45	2.03	4587	2283	2303	
12	1.47	50	1.88	4695	2460	2235	
13	1.37	55	1.76	4789	2637	2152	
14	1.28	60	1.65	4871	2814	2057	
15	0.93	90	1.19	5205	3876	1329	
16	0.73	120	0.94	5395	4938	456	
17	0.60	150	0.77	5517	6000	-483	
18	0.51	180	0.65	5602	7062	-1460	
19	0.44	210	0.57	5666	8124	-2459	
20	0.39	240	0.50	5714	9186	-3472	

V = 2380 cf

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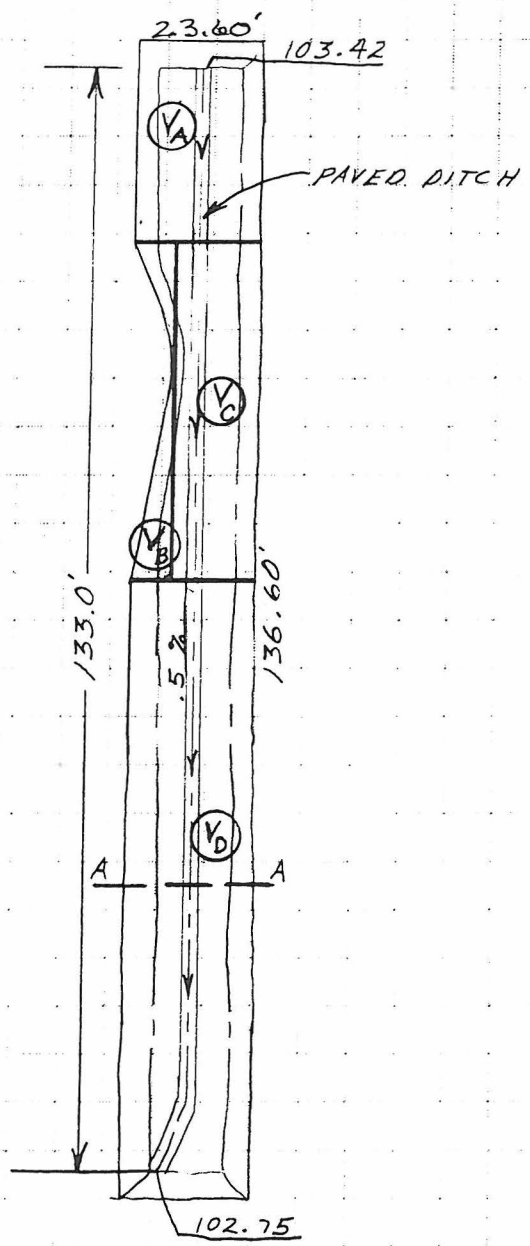
JOB 90124 - Lot 4A
SHEET NO. 6 OF 8
CALCULATED BY WTH DATE 4/24/90
CHECKED BY KJ DATE 4/25/90
SCALE



$$V_A = \frac{H}{4}(L_1 + L_2)(W_1 + W_2)$$

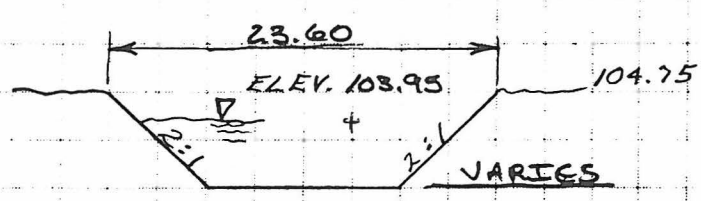
$$V_A = \frac{.9}{4}(23.8 + 22)(23.6 + 20) = 449 \text{ cf}$$

$$V_B = \frac{.9}{4}(32 + 32)(12.5 + 10.7) = 334 \text{ cf}$$

$$V_C = \frac{.9}{4}(64 + 64)(11.1 + 9.3) = 558 \text{ cf}$$

$$V_D = \frac{.9}{4}(52.8 + 51)(23.6 + 20) = 1018 \text{ cf}$$

TOTAL 2389 cf Total



103.95
.25
104.2

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JOB 90124 - Lot 4A
SHEET NO. 7 OF 8
CALCULATED BY WTH DATE 4/24/90
CHECKED BY KJ DATE 4/25/90
SCALE

* 1) Determine orifice diameter to release 1" of runoff over 24 hr:

$\forall = 2380$ cf

$Q_R = 24$ hr release rate $= \frac{2380 \text{ cf}}{24 \text{ hr}} \cdot \frac{1 \text{ hr}}{3600 \text{ s}} = .0275$ cfs

H for storage of 2380 is .90' @ Elev 103.95

$h = (2/3)(H) = (2/3)(.90) = .60$

$Q = CA\sqrt{2gh}$

$.0275 = .62 A \sqrt{2(32.2)(.60)}$

$.0275 = .62 A \sqrt{38.64}$

$.0275 = 3.85 A$

$A = .0071' = \pi r^2$

$r = .048' = .57''$ ⟹ use 1⅛" diameter orifice

* 1) Note: The 2yr storm (2380 cf) storage is slightly greater than the 1" of runoff (2323 cf) storage so we will release the 2yr storm over 24 hrs.

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JOB 90124
SHEET NO. 8 OF
CALCULATED BY KMJ DATE 4/25/90
CHECKED BY KJ DATE 4/25/90
SCALE

2) Determine outlet Pipe to pass 10yr storm

$Q_{10} = 4.13 cfs$ $h = 1.52$

$Q = CA\sqrt{2gh}$

$4.13 = .62A\sqrt{2(32.2)(1.52)}$

$A = .6733$

$\pi r^2 = .6733$

$r = .46' = 5.56''$ Use 12" CMP

Williamsburg Peanut Factory

5 – 247 ft^3 rem

6 min. 0 rem.

Disch = 1 cfs × 60 × 4 = 240 ft^3 2323

+24

10 min. – 2832 266 ft^3 → +

− 266

2566

Try SCS approach

– 1" runoff imp. surfaces –

82 = RCN

Runoff – from 3.5" = 1.77"

store 1" for 24 hrs.

have 0.77" to control

.77" × 1.47 ac = 4108 ft^3

release @ 1 cfs

$\frac{V_s}{V_r} \approx \frac{}{0.77"}$ $\frac{Q_o}{Q_i} = \frac{1.2}{3.2} \Rightarrow .375$

→ .365 × .77 = .28' = 1500 ft^3 + 2323 = 3823 ft^3 total

Q_2 – V_s = 2430 ft^3 Q_{OUT} = 1.18 cfs

1" – V_s = 2323 ft^3 Q_{out} = 0.03 cfs

To control Q_2 – 0.03 cfs = 5510 ft^3

$Q_{weir} = CLH^{3/2} = 2.7 \times 2 \times H^{3/2} =$ .1' .17 cfs need 4590 ft^3

.3 .91 need 2880 ft^3