COPY

COUNTY OF JAMES CITY, VIRGINIA

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 16th day of June, 2011, between TKC CL, LLC, and all successors in interest, ("COVENANTOR(S)"), owner(s) of the following property:

Parcel Identification Number(s): 2320100071
Legal Description(s): PARCEL 6A PORTION OF NORGE CENTER PARCEL 6

Project or Subdivision Name: Tractor Supply Company
Document/Instrument No(s): 110015101
or Deed Book _____, Page No. _____,
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):
V. Marc Bennett, Senior Project Mgr
AES Consulting Engineers
5248 Olde Town Rd. Suite 1
Williamsburg, VA 23188 757-253-0040

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

Instrument No. 110016620
Recorded on 8/3/2011

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

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

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

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

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

COVENANTOR(S)

Print Name Kenneth R. Beuley

Authorized Member / TKC CL, LLC
Title

ACKNOWLEDGMENT

State of North Carolina
~~COMMONWEALTH OF VIRGINIA~~
~~CITY~~/COUNTY OF Mecklenburg

I hereby certify that on this 16th day of June, 2011, before the subscribed, a Notary Public of the State of ~~Virginia,~~ North Carolina personally appeared Kenneth R. Beuley and did acknowledge the foregoing instrument to be his/her Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 16th day of June, 2011.

[SEAL]

Notary Public

WENDY FULTON NOTARY PUBLIC MECKLENBURG COUNTY, N.C.

Notary Registration Number: N/A

My Commission expires: 02/03/12

T for Supply

OFFICIAL RECEIPT
WILLIAMSBURG/JAMES CITY COUNTY CIRCUIT
DEED RECEIPT

DATE: 07/18/11 TIME: 15:16:31 ACCOUNT: 830CLR110015101 RECEIPT: 11000023555
CASHIER: CHB REG: WD45 TYPE: AF-PL PAYMENT: FULL PAYMENT
INSTRUMENT : 110015101 BOOK: PAGE: RECORDED: 07/18/11 AT 15:16
GRANTOR: NORGE CENTER INC EX: N LOC: CO
GRANTEE: NORGE CENTER INC EX: N PCT: 100%
AND ADDRESS : , .
RECEIVED OF : AES CONSULTING DATE OF DEED: 07/13/11
CHECK: $63.00
DESCRIPTION 1: PARCEL 6A PORTION OF NORGE CENTER PARCEL 6 PAGES: 1 OP 20
2: NAMES: 0
CONSIDERATION: .00 A/VAL: .00 MAP:
PIN:

301	DEEDS	41.50	145	VSLF	4.50
106	TECHNOLOGY TRST FND	15.00	442	TRANSFERS TO 113/31	2.00

TENDERED : 63.00
AMOUNT PAID: 63.00
CHANGE AMT : .00

CLERK OF COURT: BETSY B. WOOLRIDGE

PAYOR'S COPY
RECEIPT COPY 1 OF 2

ENGINEERING and RESOURCE PROTECTION – STORMWATER TRANSMITTAL

PROTECTING RESOURCES PRIDE IN DELICATE ENVIRONMENTS

James City County VIRGINIA Jamestown 1607

COUNTY PLAN NO: SP-17-11 (TRACTOR SUPPLY)

BMP ID CODE: YR018

WATERSHED: York River

- [x] **ENTIRE RECORD FILE**
- [ ] **ASBUILTS**
- [ ] **CONSTRUCTION CERTIFICATION**
- [ ] **COMPUTATIONS**
- [ ] **OTHER:** _____

RECEIVED ON MAY 18 '12 Stormwater Division

NAME: Mike Majoeski

SIGNATURE: Mike P. Mi

DATE: 5/17/12

Environmental Division

JAN 27 2012

RECEIVED

James City County, Virginia
Environmental Division

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.)

Section 1 – Site Information:

Project Name: TRACTOR SUPPLY COMPANY - NORGE
Structure/BMP Name: INFILTRATION BASIN
Project Location: NORGE CROSSING (SHOPPING CENTER), RICHMOND ROAD, NORGE
BMP Location: REAR OF SITE, ADJACENT TO REAR ACCESS ROAD
County Plan No.: SP - 0017 - 2011

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

Tax Map/Parcel No.: 2320100071G
BMP ID Code (if known): C2
Zoning District: B1 - GENERAL BUSINESS
Land Use: COMMERCIAL / RETAIL
Site Area (sf or acres): 3.45 ACRES

Brief Description of Stormwater Management/BMP Facility: LARGE INFILTRATION BASIN CREATED BY EXCAVATION WITH FOREBAY (ALSO CREATED BY EXCAVATION)

Nearest Visible Landmark to SWM/BMP Facility: NORGE LANE, 590 FEET TO SOUTHEAST

Nearest Vertical Ground Control (if known):
- ☑ JCC Geodetic Ground Control
- ☐ USGS
- ☐ Temporary
- ☐ Arbitrary
- ☐ Other

Station Number or Name: JCC MONUMENT #341
Datum or Reference Elevation: 107.08
Control Description:
Control Location from Subject Facility: 4030 FEET SOUTHEAST OF BMP SITE, IN KRISTAINSAN SUBDIVISION

Section 2 – Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☑ Yes ☐ No ☐ Unknown
Approx. Construction Start Date for SWM/BMP Facility: JUNE 2011
Facility Monitored by County Representative during Construction: ☑ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: TOANO CONTRACTORS
Name of Professional Firm Who Routinely Monitored Construction: AES CONSULTING ENGINEERS
Date of Completion for SWM/BMP Facility: NOVEMBER 2011
Date of Record Drawing/Construction Certification Submittal: JANUARY 17, 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 Environmental Division prior to final inspection, acceptance and bond or surety release.)

Section 3 – Owner / Designer / Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: TKC, CL, LLC
Mailing Address: 5935 CARNEGIE BLVD, SUITE 200
CHARLOTTE, NC 28209
Business Phone: 704-365-6000 Fax: 704-365-0733
Contact Person: KENNETH R. BEULEY 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: AES CONSULTING ENGINEERS
Mailing Address: 5248 OLDE TOWNE ROAD, SUITE 1
WILLIAMSBURG, VA 23188
Business Phone: 757-253-0040
Fax: 757-220-8994
Responsible Plan Preparer: V. MARC BENNETT
Title: SENIOR PROJECT MANAGER
Plan Name: TRACTOR SUPPLY COMPANY
Firm's Project No. W06753-06
Plan Date: FEBRUARY 17, 2011
Sheet No.'s Applicable to SWM/BMP Facility: R-05 / R-08 / ____ / ____ / ____

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

Name: TOANO CONTRACTORS
Mailing Address: 8589 RICHMOND ROAD
TOANO, VA 23168
Business Phone: 757-566-0097
Fax: 757-566-8874
Contact Person: CHRIS TAYLOR
Site Foreman/Supervisor: CHRIS TAYLOR
Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 – Professional Certifications:

Certifying Professionals: *(Note: A Registered Professional Engineer of 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: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Va 23188
Business Phone: 757-253-0040
Fax: 757-220-8994

Name: V. Marc Bennett
Title: Senior Project Manager

Signature: V. Marc Bennett
Date: 1/16/2012

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

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
Lic. No. 026628
1/16/2012
PROFESSIONAL ENGINEER

V. Marc Bennett (Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

Construction Certification

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Va 23188
Business Phone: 757-253-0040
Fax: 757-220-8994

Name: V. Marc Bennett
Title: Senior Project Manager

Signature: V. Marc Bennett
Date: 1/16/2012

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

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
Lic. No. 026628
1/16/2012
PROFESSIONAL ENGINEER

V. Marc Bennett (Seal)

Virginia Registered
Professional Engineer

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 plans 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.

N/A 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. (NO BERM, EXCAVATED CONSTRUCTION)

XX 4. T~~op width~~s, b~~erm wid~~ths 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 Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.

XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. ~~Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer~~. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.

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. (NO EMERGENCY SPILLWAY)

XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

XY	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.
X X	10.	Dimensions, locations and elevations of outlet orifices, weirs, ~~slots~~ and drains.
XY	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.**
XY	14.	Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
XY	15.	Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
XY	16.	Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
X X	17.	BMP in~~terior and~~ periphery landscaping zones conform with arrangements and requirements of the approved design plan.
XY	18.	Maintenance plan taken from approved design plan transposed onto record drawing set.
N/A	19.	Fencing location and type, if applicable to facility. (NO FENCING)
XY	20.	BMP vicinity properly cleaned of stockpiles and construction debris.
XY	21.	No visual signs of erosion or channel degradation immediately downstream of facility.
XY	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)*

V. Group C – Infiltration Practices *(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)*

XX C1. All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.

XX C2. Facility is not located on fill slopes or on natural ground in excess of six (6) percent.

XX C3. Pretreatment devices provided prior to entry into the infiltration facility. Acceptable pretreatment devices include sediment forebays, sediment basins, sediment traps, sump pits or inlets, grass channels, plunge pools or other acceptable measures.

XX C4. Three (3) or more of the following pretreatment devices provided to protect long term integrity of structure: grass channel, grass filter strip, bottom sand layer, upper filter fabric layer, use of washed bank run gravel aggregate.

XX C5. Sides of infiltration practice lined with filter fabric.

N/A C6. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction. (WAS USED FOR SEDIMENT TRAPPING, SEDIMENT REMOVED

XX C7. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

XX C8. Minimum one hundred (100) foot separation horizontally from any known water supply well and minimum one hundred (100) foot separation upslope from any building.

XX C9. Minimum twenty-five (25) foot separation down gradient from any structure.

XX C10. Stormwater outfalls provided for overflow associated with larger design storms.

XX C11. No visual signs of erosion or channel degradation immediately downstream of facility.

XX C12. Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.

XX C13. Observation well provided.

XX C14. Adequate, direct access provided to the facility for future maintenance, operation and inspection.

Environmental Division

JAN 27 2012

RECEIVED

James City County, Virginia
Environmental Division

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.)

Section 1 – Site Information:

Project Name: TRACTOR SUPPLY COMPANY – NORGE
Structure/BMP Name: INFILTRATION BASIN
Project Location: NORGE CROSSING (SHOPPING CENTER), RICHMOND ROAD, NORGE
BMP Location: REAR OF SITE, ADJACENT TO REAR ACCESS ROAD
County Plan No.: SP - 0017 - 2011

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

Tax Map/Parcel No.: 2320100071G
BMP ID Code (if known): C2
Zoning District: B1 – GENERAL BUSINESS
Land Use: COMMERCIAL / RETAIL
Site Area (sf or acres): 3.45 ACRES

Brief Description of Stormwater Management/BMP Facility: LARGE INFILTRATION BASIN CREATED BY EXCAVATION WITH FOREBAY (ALSO CREATED BY EXCAVATION)

Nearest Visible Landmark to SWM/BMP Facility: NORGE LANE, 590 FEET TO SOUTHEAST

Nearest Vertical Ground Control (if known):
- ☑ JCC Geodetic Ground Control
- ☐ USGS
- ☐ Temporary
- ☐ Arbitrary
- ☐ Other

Station Number or Name: JCC MONUMENT #341
Datum or Reference Elevation: 107.08
Control Description:
Control Location from Subject Facility: 4030 FEET SOUTHEAST OF BMP SITE, IN KRISTAINSAN SUBDIVISION

Section 2 – Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☑ Yes ☐ No ☐ Unknown
Approx. Construction Start Date for SWM/BMP Facility: JUNE 2011
Facility Monitored by County Representative during Construction: ☑ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: TOANO CONTRACTORS
Name of Professional Firm Who Routinely Monitored Construction: AES CONSULTING ENGINEERS
Date of Completion for SWM/BMP Facility: NOVEMBER 2011
Date of Record Drawing/Construction Certification Submittal: JANUARY 17, 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 Environmental Division prior to final inspection, acceptance and bond or surety release.)

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Name: TKC, CL, LLC
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CHARLOTTE, NC 28209
Business Phone: 704-365-6000 Fax: 704-365-0733
Contact Person: KENNETH R. BEULEY 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: AES CONSULTING ENGINEERS
Mailing Address: 5248 OLDE TOWNE ROAD, SUITE 1
WILLIAMSBURG, VA 23188
Business Phone: 757-253-0040
Fax: 757-220-8994
Responsible Plan Preparer: V. MARC BENNETT
Title: SENIOR PROJECT MANAGER
Plan Name: TRACTOR SUPPLY COMPANY
Firm's Project No. K06753-06
Plan Date: FEBRUARY 17, 2011
Sheet No.'s Applicable to SWM/BMP Facility: R-05 / R-08 / ____ / ____ / ____

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

Name: TOANO CONTRACTORS
Mailing Address: 8589 RICHMOND ROAD
TOANO, VA 23168
Business Phone: 757-566-0097
Fax: 757-566-8874
Contact Person: CHRIS TAYLOR
Site Foreman/Supervisor: CHRIS TAYLOR
Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 – Professional Certifications:

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Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road Suite 1
Williamsburg, VA 23188
Business Phone: 757-253-0040
Fax: 757-220-8994

Name: V. Marc Bennett
Title: Senior Project Manager

Signature: V. Marc Bennett
Date: 1/16/2012

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

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
Lic. No. 026628
1/16/2012
PROFESSIONAL ENGINEER

V. Marc Bennett (Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

Construction Certification

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road Suite 1
Williamsburg, VA 23188
Business Phone: 757-253-0040
Fax: 757-220-8994

Name: V. Marc Bennett
Title: Senior Project Manager

Signature: V. Marc Bennett
Date: 1/16/2012

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

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
Lic. No. 026628
1/16/2012
PROFESSIONAL ENGINEER

V. Marc Bennett (Seal)

Virginia Registered
Professional Engineer

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.)*

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XX 4. All plans 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.

N/A 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. (NO BERM, EXCAVATED CONSTRUCTION)

XX 4. ~~Top width~~s, ~~berm width~~s 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 Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.

XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. ~~Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer~~. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.

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. (NO EMERGENCY SPILLWAY)

XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

XX 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.

XX 10. Dimensions, locations and elevations of outlet orifices, weirs, ~~slots~~ and drains.

XX 11. Type and size of ~~anti-vortex~~ and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.

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.

XX 17. BMP in~~terior 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. (NO FENCING)

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)*

V. **Group C – Infiltration Practices** *(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)*

XX C1. All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.

XX C2. Facility is not located on fill slopes or on natural ground in excess of six (6) percent.

XX C3. Pretreatment devices provided prior to entry into the infiltration facility. Acceptable pretreatment devices include sediment forebays, sediment basins, sediment traps, sump pits or inlets, grass channels, plunge pools or other acceptable measures.

XX C4. Three (3) or more of the following pretreatment devices provided to protect long term integrity of structure: grass channel, grass filter strip, bottom sand layer, upper filter fabric layer, use of washed bank run gravel aggregate.

XX C5. Sides of infiltration practice lined with filter fabric.

N/A C6. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction. (WAS USED FOR SEDIMENT TRAPPING, SEDIMENT REMOVED

XX C7. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

XX C8. Minimum one hundred (100) foot separation horizontally from any known water supply well and minimum one hundred (100) foot separation upslope from any building.

XX C9. Minimum twenty-five (25) foot separation down gradient from any structure.

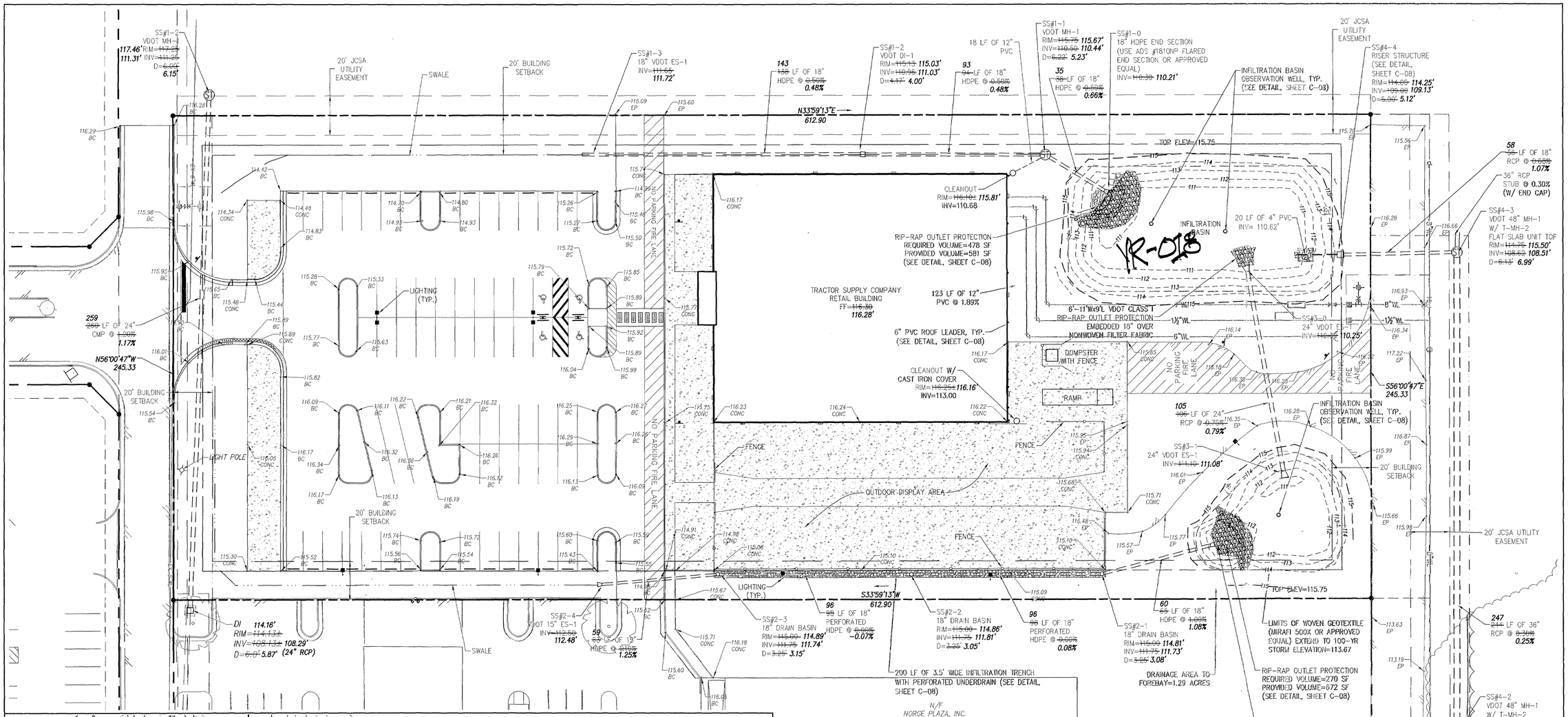
XX C10. Stormwater outfalls provided for overflow associated with larger design storms.

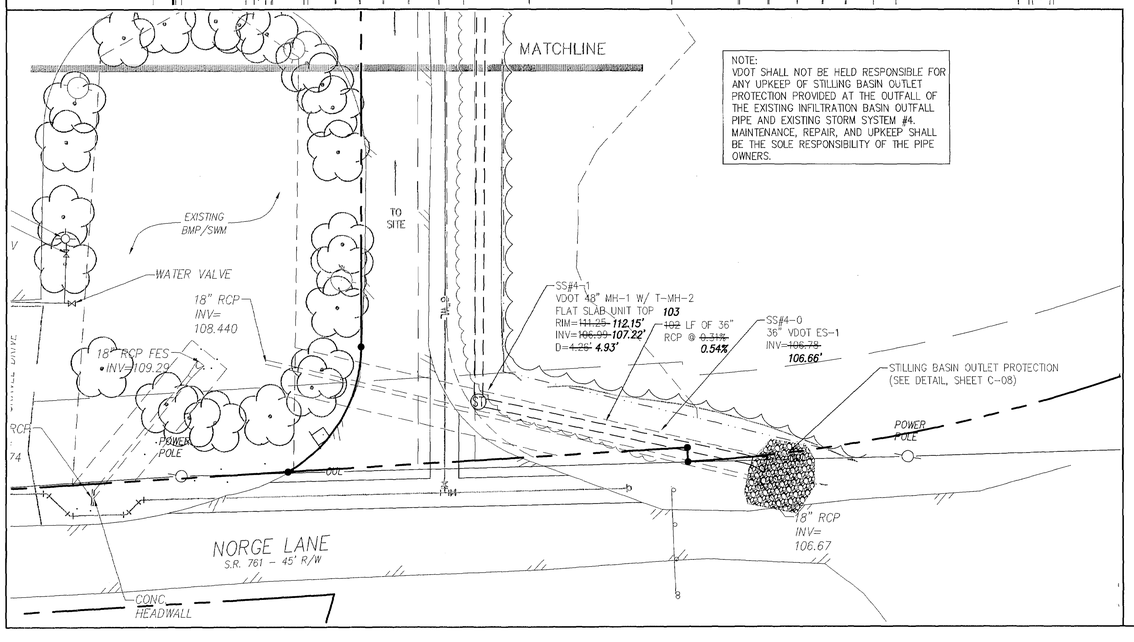
XX C11. No visual signs of erosion or channel degradation immediately downstream of facility.

XX C12. Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.

XX C13. Observation well provided.

XX C14. Adequate, direct access provided to the facility for future maintenance, operation and inspection.





NOTE:
VDOT SHALL NOT BE HELD RESPONSIBLE FOR ANY UPKEEP OF STILLING BASIN OUTLET PROTECTION PROVIDED AT THE OUTFALL OF THE EXISTING INFILTRATION BASIN OUTFALL PIPE AND EXISTING STORM SYSTEM #4. MAINTENANCE, REPAIR, AND UPKEEP SHALL BE THE SOLE RESPONSIBILITY OF THE PIPE OWNERS.

NOTE:
1. ALL 18" DRAIN BASINS TO BE NYLOPLAST 18" DRAIN BASINS (2818AG__X) W/ PEDESTRIAN H-10 RATED GRATES OR APPROVED EQUAL.
2. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING RECORD DRAWINGS AND CONSTRUCTION CERTIFICATION OF THE STORMWATER MANAGEMENT FACILITY AND STORM SEWER PRIOR TO RELEASE OF BOND. THESE DOCUMENTS SHALL BE SUBMITTED TO THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION BY THE GENERAL CONTRACTOR FOR REVIEW AND APPROVAL BEFORE RELEASE OF THE BONDING.

**EXCESS CUT SOIL STOCKPILE AND TOPSOI STOCKPILE AREA:
THERE SHALL BE NO MUD, SEDIMENT, MIXED SOIL (TOPSOIL AND FILL MATERIAL COMBINED), BROKEN PAVEMENT, WASTE CONCRETE, OR CONCRETE WASHOUT ALLOWED IN SOIL STOCKPILE AREAS.

GRAPHIC SCALE
25' 0' 25' 50'
SCALE: 1" = 25'

"THE STORM SEWER, SPOT SHOTS, DRAINAGE STRUCTURE LOCATIONS AND GRADES SHOWN ON THESE DRAWINGS, ARE ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF AND I CERTIFY THAT I, OR MY AGENT, HAVE MADE SUFFICIENT INSPECTION TO ENSURE THE ACCURACY OF THIS STATEMENT."

THOMAS C. SUBLETT DATE

COMMONWEALTH OF VIRGINIA
THOMAS C. SUBLETT
Lic. No. 1886
12/14/11
LAND SURVEYOR

Rev.	Date	Description	Reviewed by
3	12/14/11	RECORD DRAWINGS	JFS
2	5/4/11	REVISED PER COUNTY COMMENTS DATED 4/19/11	AES
1	4/6/11	REVISED PER COUNTY COMMENTS DATED 3/7/11	AES

Environmental Division
JAN 27 2012
RECEIVED

AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone: (757) 253-0040
Fax: (757) 220-8994
www.aesva.com
Hampton Roads | Central Virginia | Middle Peninsula

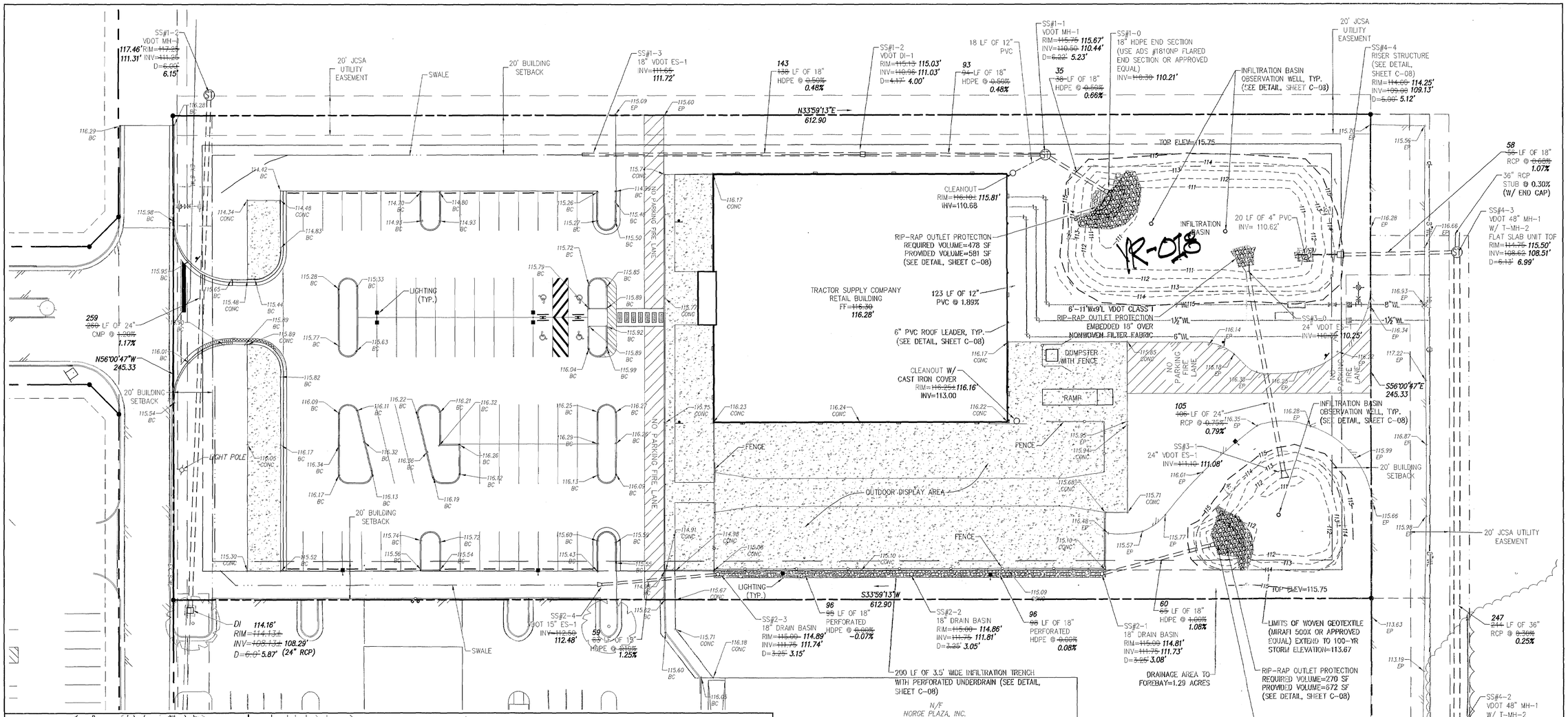
RECORD DRAWING
TRACTOR SUPPLY COMPANY
19,000 S.F. RETAIL
NORGE CENTER
STONEHOUSE B DISTRICT JAMES CITY COUNTY VIRGINIA

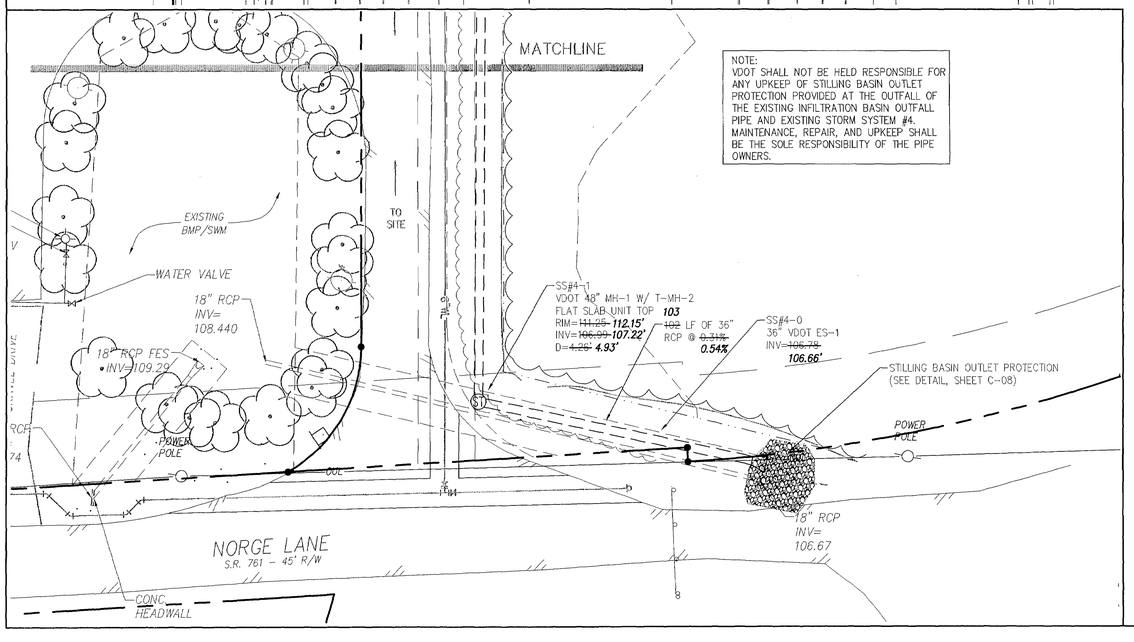
Project Contacts:	TCS/JFS
Project Number:	6753-06
Scale: 1"=25'	Date: 12/14/11

Sheet Title:
GRADING & DRAINAGE PLAN, FINAL EROSION CONTROL PLAN

Sheet Number
R-05

COUNTY PROJECT NO.: SP-0017-2011 RECORD DRAWING 12/14/11





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R-05

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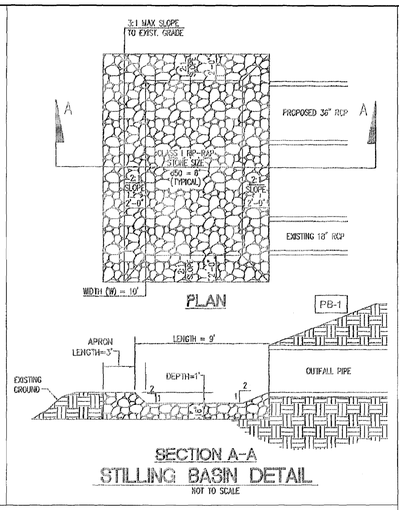
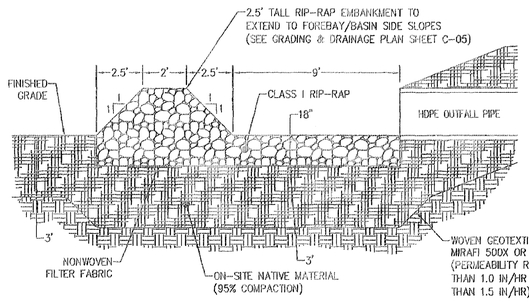


SECTION A-A

STILLING BASIN DETAIL

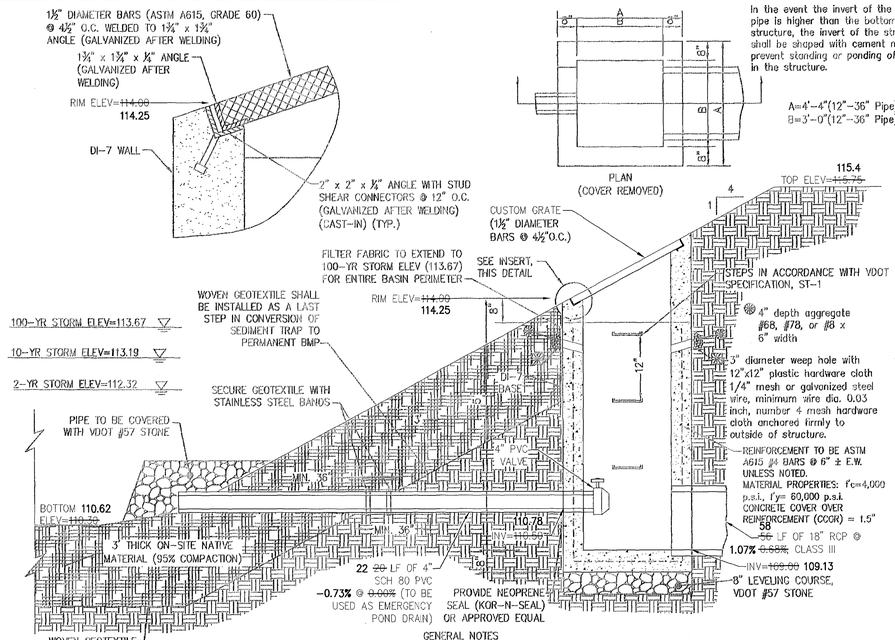
NOT TO SCALE



NOTE: THIS OUTLET PROTECTION DESIGN TO BE USED FOR STORM SYSTEM #1 AND #2 OUTFALLS ONLY.

STORM SYSTEMS #1 AND #2 OUTLET PROTECTION DETAIL

NOT TO SCALE



GENERAL NOTES

When specified on plans the invert is to be shaped in accordance with Std. IS-1.

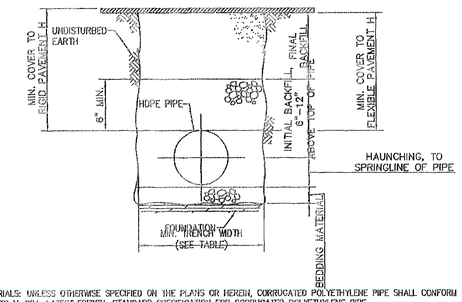
Reinforcing concrete footing may be pre cast or cast in place. Two lifting hooks of fabricators design to be provided in pre cast footing.

Safety Slabs are to be provided at 8' minimum and 12' maximum vertical intervals and are to be spaced so as not to conflict with openings for pipes as directed by the Engineer.

Concrete for Riser Structure to be Class A3.

RISER STRUCTURE DETAIL

N.T.S.



NOTES:

1. MATERIALS: UNLESS OTHERWISE SPECIFIED ON THE PLANS OR HEREIN, CORRUGATED POLYETHYLENE PIPE SHALL CONFORM TO AASHTO M-294, LATEST EDITION, STANDARD SPECIFICATION FOR CORRUGATED POLYETHYLENE PIPE.

   RESINS: CORRUGATED POLYETHYLENE PIPE SHALL BE MANUFACTURED FROM HIGH DENSITY POLYETHYLENE VIRGIN COMPOUNDS, AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM D-3350 FOR THE CELL CLASSIFICATION 335400C.

   COUPLING BANDS: EXCEPT AS OTHERWISE REQUIRED HEREIN, COUPLING BANDS AND OTHER HARDWARE FOR CORRUGATED POLYETHYLENE PIPE SHALL DEMONSTRATE THAT THEY MEET THE SOIL TIGHTNESS REQUIREMENTS OF AASHTO SECTION 26 "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES."

   COUPLING BANDS SHALL LAP EQUALLY ON EACH OF THE PIPES BEING CONNECTED TO FORM A TIGHTLY CLOSED JOINT AFTER INSTALLATION.
   THE CORRUGATIONS IN THE BAND SHALL INDEX THE CORRUGATIONS IN THE PIPE ENDS TO ENGAGE AT LEAST TWO FULL CORRUGATIONS FROM THE END OF EACH PIPE.
   WHEN INFILTRATION OR EXFILTRATION IS A CONCERN, THE COUPLING BANDS MAY BE REQUIRED TO HAVE GASKETS. THE GASKET MATERIAL SHALL BE CLOSED-CELL EXPANDED RUBBER OR NEOPRENE.
   OTHER COUPLINGS MAY BE BELL & SPIGOT AND CONFORM TO THE REQUIREMENTS OF AASHTO M294.

   DESIGNATION OF TYPE: THE PIPE SHALL BE THE FOLLOWING TYPE:
   TYPE S: THIS PIPE WILL HAVE A FULL CIRCULAR CROSS-SECTION, WITH AN OUTER CORRUGATED PIPE WALL AND A SMOOTH INNER LINER.

2. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL IN ACCORDANCE WITH ASTM D2321, LATEST EDITION. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING GEOTEXTILE MATERIAL.

3. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN ACCORDANCE WITH ASTM D2321, LATEST EDITION. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" FOR 4"-24"; 6" FOR 30"-60".

4. HAUNCHING AND INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

5. MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:

DIAMETER	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"

DIAMETER	MIN. TRENCH WIDTH
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"

DIAMETER	MIN. TRENCH WIDTH
42"	72"
48"	80"
54"	88"
60"	96"

THE TRENCH WIDTH MUST BE WIDE ENOUGH TO ACCOMMODATE COMPACTION EQUIPMENT.

6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS MEASURED FROM THE TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

	MINIMUM RECOMMENDED COVER	
	SURFACE LIVE LOADING CONDITION	
PIPE DIAM.	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD)*
12"-48"	12"	48"
54"-60"	24"	60"

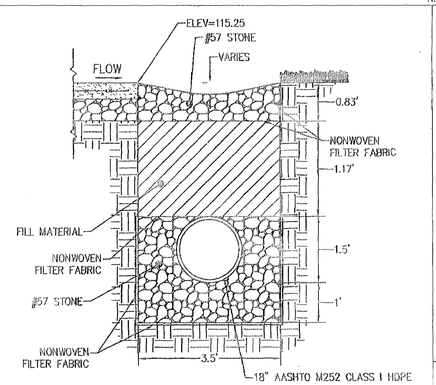
* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

7. CONNECTION TO CONCRETE STRUCTURES: CONNECTIONS SHALL MEET SPECIFICATIONS ASTM C923.

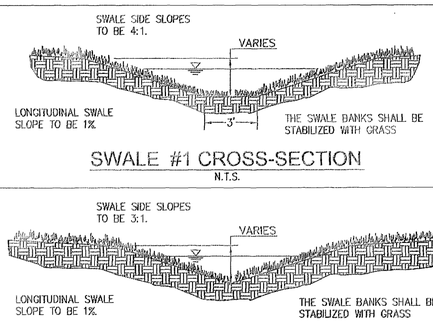
8. PERFORATED HDPE PIPE SHALL HAVE FIVE HOLES, ONE INCH IN DIAMETER EVENLY SPACED AND PLACED WITHIN AN ARC OF 130 DEGREES, THE CENTER HOLE BEING DIRECTLY OPPOSITE THE TOP MARKING. SPACING OF EACH SET OF FIVE HOLES SHALL BE AT 6 INCH INTERVALS ALONG THE TUBE. THE HOLES WILL BE DRILLED AND BE FREE OF ANY DEFECTS. THE PERFORATED PIPE SHALL BE INSTALLED SO THAT THE CENTER HOLE IS IN THE HORIZONTAL PLANE AND INTERFACES WITH THE GRADED GRAVEL.

HDPE PIPE INSTALLATION DETAIL

N.T.S.



INFILTRATION TRENCH CROSS SECTION

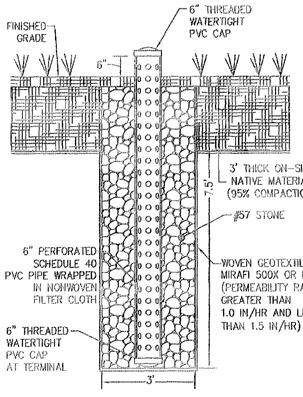


SWALE #1 CROSS-SECTION

N.T.S.

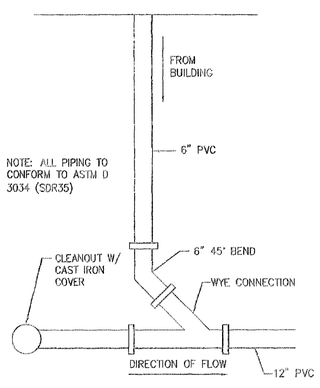
SWALE #2 CROSS-SECTION

N.T.S.



OBSERVATION WELL DETAIL (INFILTRATION BASIN)

N.T.S.



ROOF LEADER DETAIL

NOT TO SCALE

NOTE: WOVEN GEOTEXTILE SHALL NOT BE INSTALLED PRIOR TO CONVERSION OF SEDIMENT BASIN TO PERMANENT BMP.

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THOMAS C. SUBLETT 12/14/11
THOMAS C. SUBLETT DATE

COMMONWEALTH OF VIRGINIA
THOMAS C. SUBLETT
Lic. No. 1886
12/14/11
LAND SURVEYOR

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACILITY, SPILLWAY(S) AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE A YEAR. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY.

A DESIGNATED REPRESENTATIVE OF THE OWNER OF THE SITE WILL INSPECT THE SWM STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING MONDAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. WHERE STRUCTURES ARE TO BE MAINTAINED JOINTLY, ALLOCATION OF MAINTENANCE COSTS WILL BE IN ACCORDANCE WITH THE TERMS ESTABLISHED IN MAINTENANCE AGREEMENTS. KEYS TO LOCKED ACCESS POINTS, IF ANY, SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

WHEN THE BMP / INFILTRATION BASIN IS FIRST PLACED INTO SERVICE AND MADE FUNCTIONAL, ROUTINE MONTHLY INSPECTIONS, AND AFTER EVERY SIGNIFICANT STORM EVENT, THE BMP SHALL BE OBSERVED TO NOTE NORMAL FUNCTION AND THE INITIAL ACCUMULATION OF SEDIMENT FROM CONCLUDED CONSTRUCTION ACTIVITIES. THESE INSPECTIONS SHALL BE CONDUCTED FOR THE FIRST 6 MONTHS OF OPERATION.

INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. INSPECTION FOR THE ACCUMULATION OF SEDIMENT SHALL SPECIFICALLY BE PERFORMED AT EACH LOCATION OF THE BMP INFILTRATION STRUCTURE (WITHIN THE STRUCTURE). IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 4" ABOVE THE BOTTOM OF POND (i.e. CLEANOUT ELEVATION 105.3) OR BOTTOM OF THE STRUCTURE, REMOVAL IS REQUIRED. ONLY A RUBBER-WHEELED BACKHOE SHALL BE USED TO REMOVE SEDIMENT AND DEBRIS ACCUMULATED ON THE FLOOR OF THE BMP. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM AND OUTLET PIPE, AND BMP INFILTRATION STRUCTURE, OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.

2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT. TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING OR STABILIZED POND SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS.

5. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS OR SEDIMENT TO MAINTAIN THE INTEGRITY OF THE STRUCTURE, MAINTAIN PROPER PERFORMANCE, AND PROVIDE AN ATTRACTIVE APPEARANCE. INSPECT STRUCTURES ANNUALLY FOR DAMAGE OR NEEDED STRUCTURAL REPAIRS. INSPECT BMP INFILTRATION AREA FOR THE ACCUMULATION OF WATER. THIS MAY BE EVIDENCE OF POORLY DRAINING SOILS, OR CLOGGED GEOTEXTILE. INSPECT OBSERVATION WELLS ANNUAL FOR DEPTH OF SUBSURFACE WATER, IF ANY. EVIDENCE OF WATER HIGH WATER LEVELS IN THE OBSERVATION WELLS IS A SIGN OF POORLY DRAINING SUBSOIL, WHICH MAY REQUIRE CORRECTIVE ACTION.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, GRATE/ VISER(S), OUTLET BARREL, AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL/ RODENT BURROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

COUNTY PROJECT NO.: SP-0017-2011 RECORD DRAWING 12/14/11

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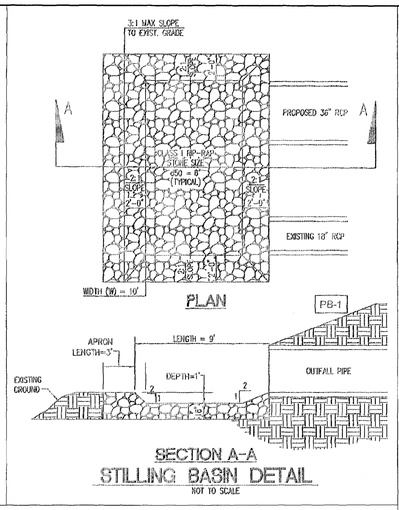
Project Number:	6753-06
Scale: 1"=25'	Date: 12/14/11

Sheet Title: STORMWATER MANAGEMENT NOTES & DETAILS

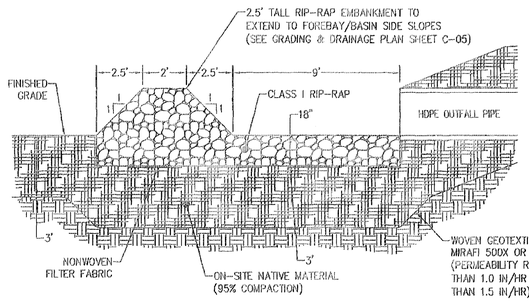
Sheet Number R-08



SECTION A-A

STILLING BASIN DETAIL

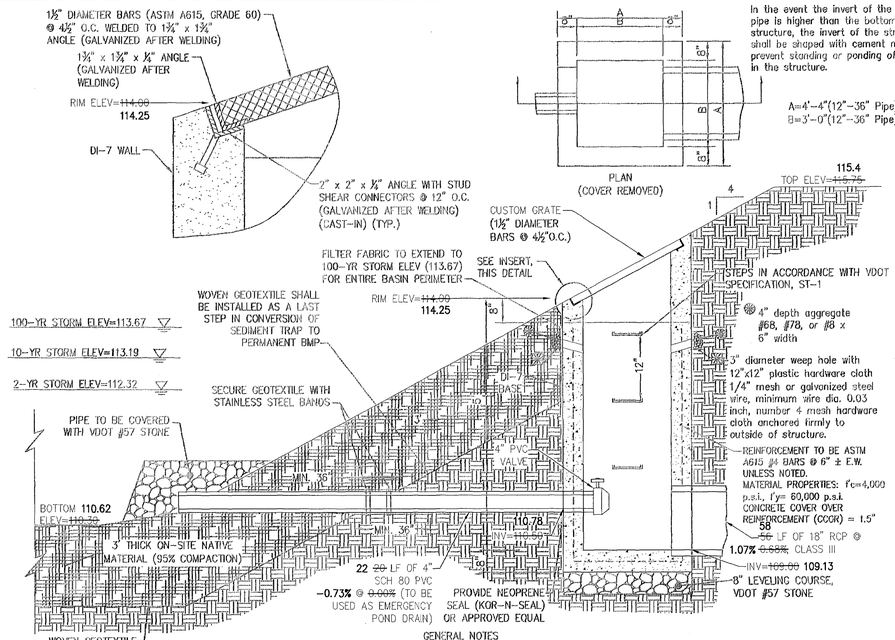
NOT TO SCALE



NOTE: THIS OUTLET PROTECTION DESIGN TO BE USED FOR STORM SYSTEM #1 AND #2 OUTFALLS ONLY.

STORM SYSTEMS #1 AND #2 OUTLET PROTECTION DETAIL

NOT TO SCALE



GENERAL NOTES

When specified on plans the invert is to be shaped in accordance with Std. IS-1.

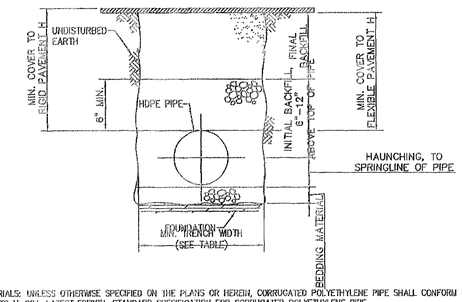
Reinforcing concrete footing may be pre cast or cast in place. Two lifting hooks of fabricators design to be provided in pre cast footing.

Safety Slabs are to be provided at 8' minimum and 12' maximum vertical intervals and are to be spaced so as not to conflict with openings for pipes as directed by the Engineer.

Concrete for Riser Structure to be Class A3.

RISER STRUCTURE DETAIL

N.T.S.



NOTES:

1. MATERIALS: UNLESS OTHERWISE SPECIFIED ON THE PLANS OR HEREIN, CORRUGATED POLYETHYLENE PIPE SHALL CONFORM TO AASHTO M-294, LATEST EDITION, STANDARD SPECIFICATION FOR CORRUGATED POLYETHYLENE PIPE.

   RESINS: CORRUGATED POLYETHYLENE PIPE SHALL BE MANUFACTURED FROM HIGH DENSITY POLYETHYLENE VIRGIN COMPOUNDS, AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM D-3350 FOR THE CELL CLASSIFICATION 335400C.

   COUPLING BANDS: EXCEPT AS OTHERWISE REQUIRED HEREIN, COUPLING BANDS AND OTHER HARDWARE FOR CORRUGATED POLYETHYLENE PIPE SHALL DEMONSTRATE THAT THEY MEET THE SOIL TIGHTNESS REQUIREMENTS OF AASHTO SECTION 26 "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES."

   COUPLING BANDS SHALL LAP EQUALLY ON EACH OF THE PIPES BEING CONNECTED TO FORM A TIGHTLY CLOSED JOINT AFTER INSTALLATION.
   THE CORRUGATIONS IN THE BAND SHALL INDEX THE CORRUGATIONS IN THE PIPE ENDS TO ENGAGE AT LEAST TWO FULL CORRUGATIONS FROM THE END OF EACH PIPE.
   WHEN INFILTRATION OR EXFILTRATION IS A CONCERN, THE COUPLING BANDS MAY BE REQUIRED TO HAVE GASKETS. THE GASKET MATERIAL SHALL BE CLOSED-CELL EXPANDED RUBBER OR NEOPRENE.
   OTHER COUPLINGS MAY BE BELL & SPIGOT AND CONFORM TO THE REQUIREMENTS OF AASHTO M294.

   DESIGNATION OF TYPE: THE PIPE SHALL BE THE FOLLOWING TYPE:
   TYPE S: THIS PIPE WILL HAVE A FULL CIRCULAR CROSS-SECTION, WITH AN OUTER CORRUGATED PIPE WALL AND A SMOOTH INNER LINER.

2. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL IN ACCORDANCE WITH ASTM D2321, LATEST EDITION. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING GEOTEXTILE MATERIAL.

3. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN ACCORDANCE WITH ASTM D2321, LATEST EDITION. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" FOR 4"-24"; 6" FOR 30"-60".

4. HAUNCHING AND INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

5. MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:

DIAMETER	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"

DIAMETER	MIN. TRENCH WIDTH
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"

DIAMETER	MIN. TRENCH WIDTH
42"	72"
48"	80"
54"	88"
60"	96"

THE TRENCH WIDTH MUST BE WIDE ENOUGH TO ACCOMMODATE COMPACTION EQUIPMENT.

6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS MEASURED FROM THE TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

	MINIMUM RECOMMENDED COVER	
	SURFACE LIVE LOADING CONDITION	
PIPE DIAM.	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD)*
12"-48"	12"	48"
54"-60"	24"	60"

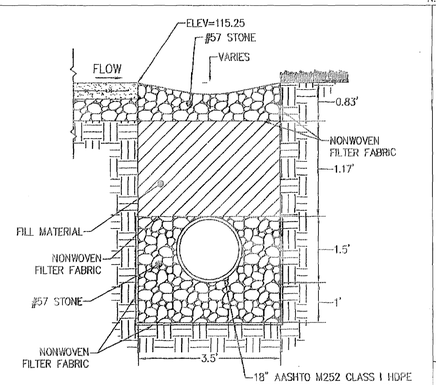
* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

7. CONNECTION TO CONCRETE STRUCTURES: CONNECTIONS SHALL MEET SPECIFICATIONS ASTM C923.

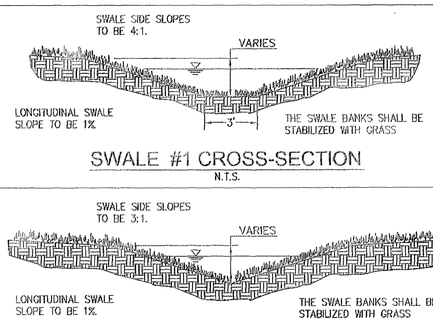
8. PERFORATED HDPE PIPE SHALL HAVE FIVE HOLES, ONE INCH IN DIAMETER EVENLY SPACED AND PLACED WITHIN AN ARC OF 130 DEGREES, THE CENTER HOLE BEING DIRECTLY OPPOSITE THE TOP MARKING. SPACING OF EACH SET OF FIVE HOLES SHALL BE AT 6 INCH INTERVALS ALONG THE TUBE. THE HOLES WILL BE DRILLED AND BE FREE OF ANY DEFECTS. THE PERFORATED PIPE SHALL BE INSTALLED SO THAT THE CENTER HOLE IS IN THE HORIZONTAL PLANE AND INTERFACES WITH THE GRADED GRAVEL.

HDPE PIPE INSTALLATION DETAIL

N.T.S.



INFILTRATION TRENCH CROSS SECTION

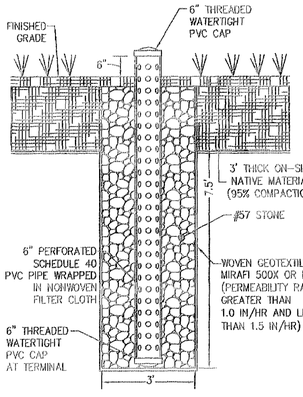


SWALE #1 CROSS-SECTION

N.T.S.

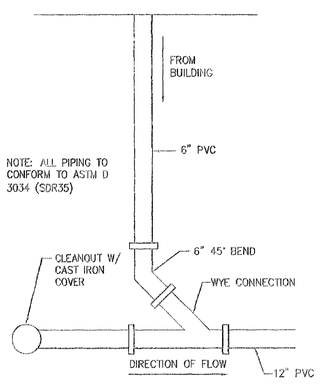
SWALE #2 CROSS-SECTION

N.T.S.



OBSERVATION WELL DETAIL (INFILTRATION BASIN)

N.T.S.



ROOF LEADER DETAIL

NOT TO SCALE

NOTE: WOVEN GEOTEXTILE SHALL NOT BE INSTALLED PRIOR TO CONVERSION OF SEDIMENT BASIN TO PERMANENT BMP.

"THE STORM SEWER, SPOT SHOTS, DRAINAGE STRUCTURE LOCATIONS AND GRADES SHOWN ON THESE DRAWINGS, ARE ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF AND I CERTIFY THAT I, OR MY AGENT, HAVE MADE SUFFICIENT INSPECTION TO ENSURE THE ACCURACY OF THIS STATEMENT."

THOMAS C. SUBLETT 12/14/11
THOMAS C. SUBLETT DATE

COMMONWEALTH OF VIRGINIA
THOMAS C. SUBLETT
Lic. No. 1886
12/14/11
LAND SURVEYOR

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACILITY, SPILLWAY(S) AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE A YEAR. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY.

A DESIGNATED REPRESENTATIVE OF THE OWNER OF THE SITE WILL INSPECT THE SWM STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING MONDAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. WHERE STRUCTURES ARE TO BE MAINTAINED JOINTLY, ALLOCATION OF MAINTENANCE COSTS WILL BE IN ACCORDANCE WITH THE TERMS ESTABLISHED IN MAINTENANCE AGREEMENTS. KEYS TO LOCKED ACCESS POINTS, IF ANY, SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

WHEN THE BMP / INFILTRATION BASIN IS FIRST PLACED INTO SERVICE AND MADE FUNCTIONAL, ROUTINE MONTHLY INSPECTIONS, AND AFTER EVERY SIGNIFICANT STORM EVENT, THE BMP SHALL BE OBSERVED TO NOTE NORMAL FUNCTION AND THE INITIAL ACCUMULATION OF SEDIMENT FROM CONCLUDED CONSTRUCTION ACTIVITIES. THESE INSPECTIONS SHALL BE CONDUCTED FOR THE FIRST 6 MONTHS OF OPERATION.

INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. INSPECTION FOR THE ACCUMULATION OF SEDIMENT SHALL SPECIFICALLY BE PERFORMED AT EACH LOCATION OF THE BMP INFILTRATION STRUCTURE (WITHIN THE STRUCTURE). IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 4" ABOVE THE BOTTOM OF POND (i.e. CLEANOUT ELEVATION 105.3) OR BOTTOM OF THE STRUCTURE, REMOVAL IS REQUIRED. ONLY A RUBBER-WHEELED BACKHOE SHALL BE USED TO REMOVE SEDIMENT AND DEBRIS ACCUMULATED ON THE FLOOR OF THE BMP. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM AND OUTLET PIPE, AND BMP INFILTRATION STRUCTURE, OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.

2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT. TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING OR STABILIZED POND SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS.

5. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS OR SEDIMENT TO MAINTAIN THE INTEGRITY OF THE STRUCTURE, MAINTAIN PROPER PERFORMANCE, AND PROVIDE AN ATTRACTIVE APPEARANCE. INSPECT STRUCTURES ANNUALLY FOR DAMAGE OR NEEDED STRUCTURAL REPAIRS. INSPECT BMP INFILTRATION AREA FOR THE ACCUMULATION OF WATER. THIS MAY BE EVIDENCE OF POORLY DRAINING SOILS, OR CLOGGED GEOTEXTILE. INSPECT OBSERVATION WELLS ANNUAL FOR DEPTH OF SUBSURFACE WATER, IF ANY. EVIDENCE OF WATER HIGH WATER LEVELS IN THE OBSERVATION WELLS IS A SIGN OF POORLY DRAINING SUBSOIL, WHICH MAY REQUIRE CORRECTIVE ACTION.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, GRATE/ VISER(S), OUTLET BARREL, AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL/ RODENT BURROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

COUNTY PROJECT NO.: SP-0017-2011 RECORD DRAWING 12/14/11

Rev.	Date	Description	Revised By
3	12/14/11	RECORD DRAWINGS	JFS
2	5/4/11	REVISED PER COUNTY COMMENTS DATED 4/19/11	AES
1	4/8/11	REVISED PER COUNTY COMMENTS DATED 3/7/11	AES

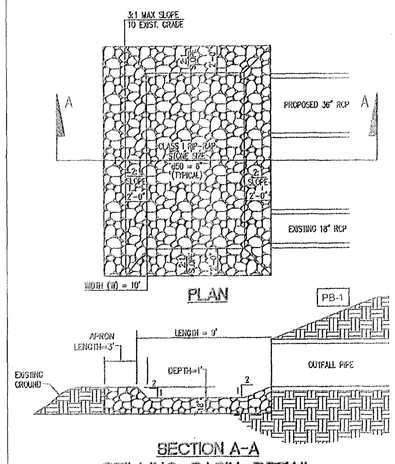
AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone: (757) 253-0040
Fax: (757) 220-8994
www.aesva.com
Hampton Roads | Central Virginia | Middle Peninsula

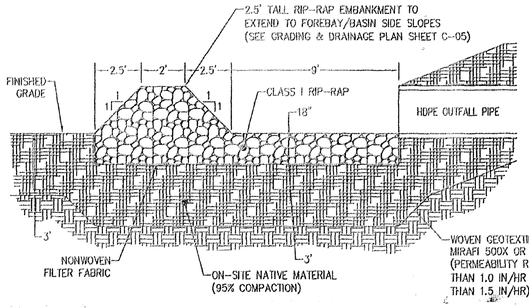
RECORD DRAWING
TRACTOR SUPPLY COMPANY
19,000 S.F. RETAIL
NORGE CENTER
STONEHOUSE B DISTRICT JAMES CITY COUNTY VIRGINIA

Project Contacts:	TCS/JFS
Project Number:	6753-06
Scale: 1"=25'	Date: 12/14/11

Sheet Title: STORMWATER MANAGEMENT NOTES & DETAILS

Sheet Number R-08





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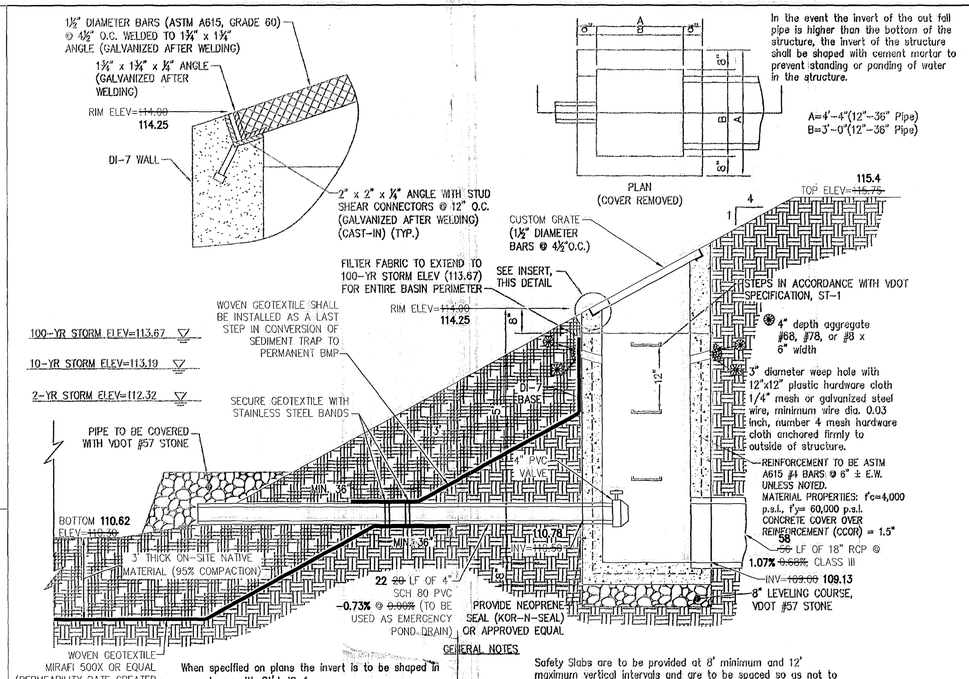
STORM SYSTEMS #1 AND #2 OUTLET PROTECTION DETAIL

NOT TO SCALE



GENERAL NOTES

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RISER STRUCTURE DETAIL

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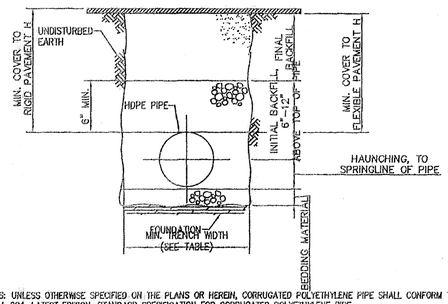

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5. MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:

DIAMETER	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"

DIAMETER	MIN. TRENCH WIDTH
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18"	39"
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30"	56"
36"	64"

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THE TRENCH WIDTH MUST BE WIDE ENOUGH TO ACCOMMODATE COMPACTION EQUIPMENT.

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	MINIMUM RECOMMENDED COVER	
	SURFACE LIVE LOADING CONDITION	
PIPE DIAM.	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD)*
12"-48"	12"	48"
54"-60"	24"	60"

* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

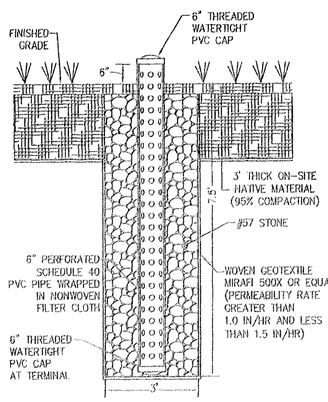
7. CONNECTION TO CONCRETE STRUCTURES: CONNECTIONS SHALL MEET SPECIFICATIONS ASTM C923.

8. PERFORATED HDPE PIPE SHALL HAVE FIVE HOLES, ONE INCH IN DIAMETER EVENLY SPACED AND PLACED WITHIN AN ARC OF 130 DEGREES, THE CENTER HOLE BEING DIRECTLY OPPOSITE THE TOP MARKING. SPACING OF EACH SET OF FIVE HOLES SHALL BE AT 6 INCH INTERVALS ALONG THE TUBE. THE HOLES WILL BE DRILLED AND BE FREE OF ANY DEFECTS. THE PERFORATED PIPE SHALL BE INSTALLED SO THAT THE CENTER HOLE IS IN THE HORIZONTAL PLANE AND INTERFACES WITH THE GRADED GRAVEL.

HDPE PIPE INSTALLATION DETAIL

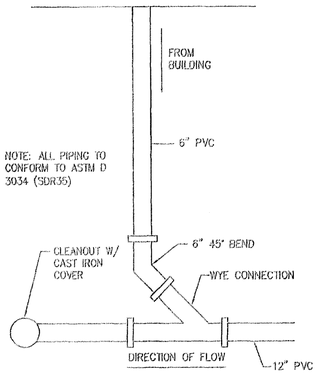
N.T.S.

Rev.	Date	Description	Revised By
5	3/22/12	REVISED RECORD DRAWINGS PER JCSA COMMENTS	LJA
4	2/20/12	REVISED RECORD DRAWINGS PER JCSA COMMENTS	JFS
3	12/14/11	RECORD DRAWINGS	JFS
2	5/4/11	REVISED PER COUNTY COMMENTS DATED 4/18/11	AES
1	4/8/11	REVISED PER COUNTY COMMENTS DATED 3/7/11	AES



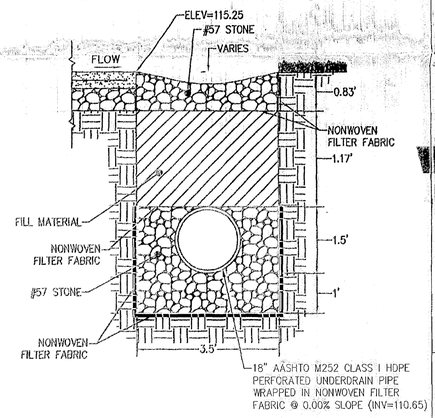
OBSERVATION WELL DETAIL (INFILTRATION BASIN)

N.T.S.

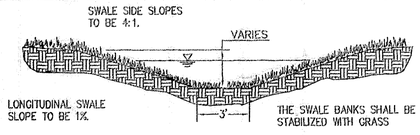


ROOF LEADER DETAIL

NOT TO SCALE

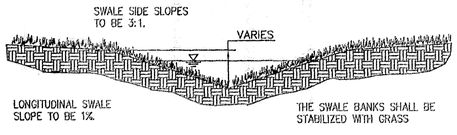


INFILTRATION TRENCH CROSS SECTION



SWALE #1 CROSS-SECTION

N.T.S.



SWALE #2 CROSS-SECTION

N.T.S.

NOTE: WOVEN GEOTEXTILE SHALL NOT BE INSTALLED PRIOR TO CONVERSION OF SEDIMENT BASIN TO PERMANENT BMP.

"THE STORM SEWER, SPOT SHOTS, DRAINAGE STRUCTURE LOCATIONS AND GRADES SHOWN ON THESE DRAWINGS, ARE ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF AND I CERTIFY THAT I, OR MY AGENT, HAVE MADE SUFFICIENT INSPECTION TO ENSURE THE ACCURACY OF THIS STATEMENT."

THOMAS C. SUBLETT — DATE 12/14/11

COMMONWEALTH OF VIRGINIA — THOMAS C. SUBLETT — Lic. No. 1886 — 12/14/11 — LAND SURVEYOR

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACILITY, SPILLWAY(S) AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE A YEAR. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY.

A DESIGNATED REPRESENTATIVE OF THE OWNER OF THE SITE WILL INSPECT THE STORM STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. WHERE STRUCTURES ARE TO BE MAINTAINED JOINTLY, ALLOCATION OF MAINTENANCE COSTS WILL BE IN ACCORDANCE WITH THE TERMS ESTABLISHED IN MAINTENANCE AGREEMENTS. KEYS TO LOCKED ACCESS POINTS, IF ANY, SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

WHEN THE BMP / INFILTRATION BASIN IS FIRST PLACED INTO SERVICE AND MADE FUNCTIONAL, ROUTINE MONTHLY INSPECTIONS, AND AFTER EVERY SIGNIFICANT STORM EVENT, THE BMP SHALL BE OBSERVED TO NOTE NORMAL FUNCTION AND THE INITIAL ACCUMULATION OF SEDIMENT FROM CONCLUDED CONSTRUCTION ACTIVITIES. THESE INSPECTIONS SHALL BE CONDUCTED FOR THE FIRST 6 MONTHS OF OPERATION.

INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. INSPECTION FOR THE ACCUMULATION OF SEDIMENT SHALL SPECIFICALLY BE PERFORMED AT EACH LOCATION OF THE BMP INFILTRATION STRUCTURE (WITHIN THE STRUCTURE). IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 4" ABOVE THE BOTTOM OF POND (i.e. CLEANOUT ELEVATION 109.3) OR BOTTOM OF THE STRUCTURE, REMOVAL IS REQUIRED. ONLY A RUBBER-WHEELED BACKHOE SHALL BE USED TO REMOVE SEDIMENT AND DEBRIS ACCUMULATED ON THE FLOOR OF THE BMP. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM AND OUTLET PIPE. AND BMP INFILTRATION STRUCTURE, OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.

2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST THRICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING ON STABILIZED POND SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 60% OF SOIL SURFACES, LIME FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 60% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS.

5. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS OR SEDIMENT TO MAINTAIN THE INTEGRITY OF THE STRUCTURE, MAINTAIN PROPER PERFORMANCE, AND PROVIDE AN ATTRACTIVE APPEARANCE. INSPECT STRUCTURES ANNUALLY FOR DAMAGE OR NEEDED STRUCTURAL REPAIRS. INSPECT BMP INFILTRATION AREA FOR THE ACCUMULATION OF WATER. THIS MAY BE EVIDENCE OF POORLY DRAINING SOILS, OR CLOGGED GEOTEXTILE. INSPECT OBSERVATION WELLS ANNUAL FOR DEPTH OF SUBSURFACE WATER, IF ANY. EVIDENCE OF WATER HIGH WATER LEVELS IN THE OBSERVATION WELLS IS A SIGN OF POORLY DRAINING SUBSOIL, WHICH MAY REQUIRE CORRECTIVE ACTION.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL, AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone: (757) 253-0040
Fax: (757) 253-1994
www.aesva.com
Hampton Roads | Central Virginia | Middle Peninsula

RECORD DRAWING
TRACTOR SUPPLY COMPANY
19,000 S.F. RETAIL
NORGE CENTER
STONEHOUSE B DISTRICT JAMES CITY COUNTY VIRGINIA

Project Contacts:	TCS/JFS
Project Number:	6753-06
Scale: 1"=25'	Date: 12/14/11

Sheet Title: STORMWATER MANAGEMENT NOTES & DETAILS

Sheet Number R-08

James City County
VIRGINIA
Jamestown 1607

Development Management
101-A Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784
P: 757-253-6671
F. 757-253-6822
devman@james-city.va.us

jamescitycountyva.gov

Building Safety and Permits
757-253-6620

Engineering and Resource Protection
757-253-6670

Planning
757-253-6685

Zoning Enforcement
757-253-6671

March 21, 2012

Mr. Marc Bennett
AES Consulting Engineers
5248 Olde Towne Road
Williamsburg, VA 23188

Re: Tractor Supply Company, Norge Center
SP-017-11
County BMP ID Code: YR-018

Dear Mr. Bennett:

The Engineering and Resource Protection Division has received a record drawing (as-built) and construction certification for the stormwater management facility and associated conveyance system components for the above referenced project. The record drawing provides as-built information for an infiltration basin situated in the northwestern corner of the site.

Based on our review of the project, record drawing submittal, and concurrent field inspection as performed on 3/21/12, 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:

Inspection Maintenance Agreement:

1. Based on a review of our active file and records for the project, our division issued comments under SP-017-11 dated 3/15/11 which required a Declaration of Covenants, Inspection/Maintenance agreement to be executed with the County for the BMP facility for this project. Based on a review of our records the Declaration of Covenants, Inspection/Maintenance Agreement is satisfactory.

Record Drawing & Construction Certification:

2. In accordance with the Note # 21 on Sheet C-07 of the approved plan, record drawings (as-builts) and construction certifications were required for the onsite stormwater management/BMP. The documents have been provided as required.

Construction Certification:

3. In accordance with the Note # 21 on Sheet C-07 of the approved plan, construction certification for the stormwater management/BMP facility is required. The construction certification has been provided and is satisfactory.

Record Drawing:

4. The record drawing set dated 12/14/11 is satisfactory. Please forward one reproducible and one blue/black line set of the record drawings to our office.

Construction - Related Items:

5. Remove silt fence present along the toe of embankment.

6. Erosion gullies present on the dam should be backfilled with compacted material, reseeded and mulched or matted for stabilization.

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

Please contact me at 757-253-6702 or the assigned Engineering and Resource Protection Division inspector, Mike Majdeski at 757-253-6839 should you have any comments or questions.

Sincerely,

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

cc: Marc Bennett, AES Consulting Engineer - via fax
Chris Taylor, Toano Construction- via fax
Michael Majdeski; JCC Senior Inspector - FYI

\\jccdeptstore\dmo1\DMData\environmental\Projects\AsBuilts\Reviews\Fina*SP01711.YR018*

COMPLETED 3/22/12 10:07 AM

JAMES CITY COUNTY - ENGINEERING & RESOURCE PROTECTION

Office Phone: 757-253-667 Fax Number: 757-259-4032

DATE SENT: 3/22/12

Name: MARC BENNETT

Firm or Company: AES CONSULTING ENGINEERS

Facsimile Number: (757) 220 8994

Number of Copies including this Transmittal: 3

From: MIKE MAJDESKI

James City County
PO Box 8784
Williamsburg VA 23187-8784

Comments

TRACTOR SUPPLY BMP REVIEW LETTER

If you do not receive all pages, call 757-253-6670 as soon as possible

DRAINAGE CALCULATIONS AND STORMWATER MANAGEMENT NARRATIVE

FOR

TRACTOR SUPPLY COMPANY

SITE:
TRACTOR SUPPLY COMPANY RETAIL BUILDING

Norge Center
James City County, Virginia

SUBMITTED TO:

James City County

Environmental Division
FEB 22 2011
RECEIVED

Prepared By:

AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188

February 17, 2011

AES Project No. W06753-06

6753-06_Drainage Calcs and Narrative

AES
CONSULTING ENGINEERS

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V STORMWATER MANAGEMENT AND WATER QUALITY

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APPENDICES

APPENDIX A STORM SYSTEM AND SWALE CALCULATIONS

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STORMWATER NARRATIVE

I PROJECT DESCRIPTION

This project will consist of a 19,000 square foot retail building with 70-space parking lot and outdoor display and retail areas. An access road will be extended to the site from the adjacent Farm Fresh property. The project site area is 3.45 acres.

II EXISTING SITE CONDITIONS

This site is currently consists of an agricultural field in production. Stormwater is currently conveyed via sheet flow to the northern corner of the property.

III SOILS

The project area consists of 20B - Kenansville Loamy Fine Sand, 31B – Suffolk Fine Sandy Loam, and 34B – Uchee Loamy Fine Sand, with slopes ranging from 0 to 6 percent.

From Geotechnical Report prepared by ECS:

"Surface cover encountered at the boring locations included approximately 6 to 10 inches of topsoil. Underlying the topsoil, we encountered FILL to depths of about 2 ft below existing surface grades at boring location B-14 located near the proposed entrance to the facility that consisted of Silty SAND (SM) that contained crushed stone. This FILL soil appears to be associated with the existing entrance road to the Norge Crossing shopping center."

"Underlying the Fill, we generally encountered two (2) distinct soil strata. Stratum I was encountered from the ground surface and below the topsoil and consisted of mixed and interbedded deposits of Silty SAND (SM), Poorly Graded SAND with Silt (SP-SM), and Clayey SAND (SC) and extended to depths of 11.5 feet to 16.5 feet below existing grades. Stratum II was encountered below Stratum I soils and consisted of Fat CLAY with Sand (CH) and was encountered to depths between 11.5 feet and 25 feet below existing grades."

IV CRITICAL EROSION AREAS

→ 25%

There are no areas of 15% slope impact on the project site.

V STORMWATER MANAGEMENT AND WATER QUALITY

The goal of the stormwater management design of this project is to provide the 10 BMP points as required by James City County and meet the Special Stormwater Criteria (SSC) for the site. These goals are achieved through the use of an infiltration basin with forebay, and the promotion of infiltration throughout the entire site.

In the parking lot in front of the Tractor Supply Company, stormwater will sheet flow away from a high point along the middle and into swales along the sides of the parking lot. These swales will have stormwater quality check dams to accumulate sediment and allow infiltration. These swales will transport stormwater along the perimeter of the project and towards the proposed storm systems. The storm system on the west side of the building flows directly into the Infiltration Basin. The storm system on the east side of the building (adjacent to the outdoor sales area) has 200 linear feet of perforated pipe to allow infiltration. These pipes run underneath an infiltration trench that will allow any debris in the runoff from the sales area to be collected before entering the storm system. The storm system eventually flows into a forebay before entering the Infiltration Basin.

Both the forebay and infiltration basin allow for infiltration. The infiltration basin has been designed with a rate of 4.5 in/hr, which assumes some clogging and degradation over time. Actual infiltration rates exceed the design rate as shown in the geotechnical report prepared for the site by ECS. Placed throughout the basin and in the forebay are infiltration structures. These structures are modified DI-7 structures that have perforations about the perimeter to allow runoff to enter underground, through a stone filter, and eventually to infiltrate into the subsurface soils.

The infiltration basin has been sized to contain runoff for all storm events up to the 100-year event with at least two feet of freeboard between the top of the basin and the water elevation. A modified DI-7 outlet structure has been provided in case back-to-back extreme storm events. This outlet structure leads to a 36" concrete pipe that outfalls next to the existing Farm Fresh infiltration basin outfall. A rip-rap stilling basin has been provided at this outfall.

VI RESULTS AND CONCLUSIONS

Based on a site area of 3.45 acres, the infiltration basin (which serves 3.58 acres) will provide 10.38 BMP points and satisfy the requirements of James City County. All storm systems, swales, and outlet protection has been designed based on Virginia or James City County requirements. The infiltration basin has been sized to provide water quality volume and channel protection volume.

Based on a disturbed area of 4.76 acres, the project site is designated SSC Class 3, meaning 3 unit measures of special stormwater criteria are required for the project. These requirements are met through the use of permanent check dams in the swales (SSCP #18), an infiltration trench (SSCP #16), and enhanced outlet protection measures at pipe outfalls (SSCP #20).

APPENDIX A

E & S, STORM SYSTEM AND SWALE CALCULATIONS

SEDIMENT TRAP DESIGN
TEMPORARY CULVERT DESIGN
STORM SYSTEM REPORTS
RIP-RAP OUTLET PROTECTION DESIGN
SWALE ADEQUACY CALCULATIONS

AES CONSULTING ENGINEERS

Project:	Tractor Supply Company
Project No.:	6753-06
Subject:	Sediment Trap Design
Date:	2/17/2011
Calculated By:	GVC

Drainage Area to Sediment Trap = 3.17 Acres

Required Wet Storage = 67 cy/acre * (Drainage Area) = 212 cubic yards, or 5,735 cubic feet

Required Dry Storage = 67 cy/acre * (Drainage Area) = 212 cubic yards, or 5,735 cubic feet

Determine Volume of Sediment Trap by Contour:

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
111	0	6157	0	0	0	0
112	1	7572	6864.5	254	6865	254
113	1	9089	8330.5	309	15195	563
114	1	10705	9897	367	25092	929
115	1	12422	11563.5	428	36656	1358
115.75	0.75	14100	9945.75	368	46601	1726
115.75	0		0	0	46601	1726

Length of Aggregate Outlet Weir = 6 ft./acre & (Drainage Area) = 19.02 feet

Elevation of Wet Storage Volume = 111.84

Elevation of Dry Storage Volume = 112.55

Elevation of accumulated sediment when sediment removed is required (1/2 wet storage volume) = 111.42

Top Width of Embankment (H_O = 0.7 ft.) = 2 feet

Note:
Sediment Trap designed based on layout of future infiltration basin. In its sediment trap design phase, it is designed to be large enough to store sediment based on wet and dry storage requirements. All accumulated sediment will be excavated when

Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Feb 17 2011

Temporary Culvert

Invert Elev Dn (ft)	=	111.00
Pipe Length (ft)	=	70.00
Slope (%)	=	3.57
Invert Elev Up (ft)	=	113.50
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.012
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

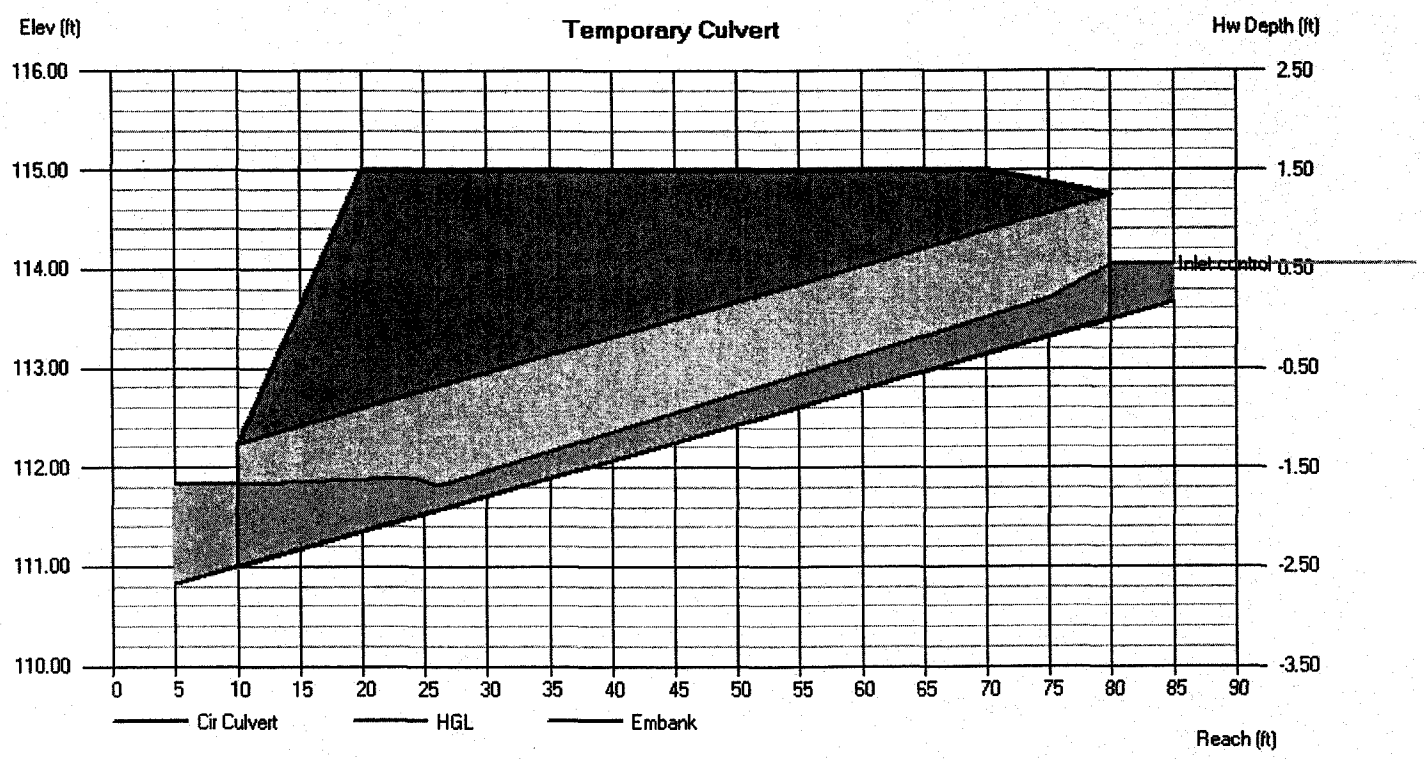
Top Elevation (ft)	=	115.00
Top Width (ft)	=	50.00
Crest Width (ft)	=	50.00

Calculations

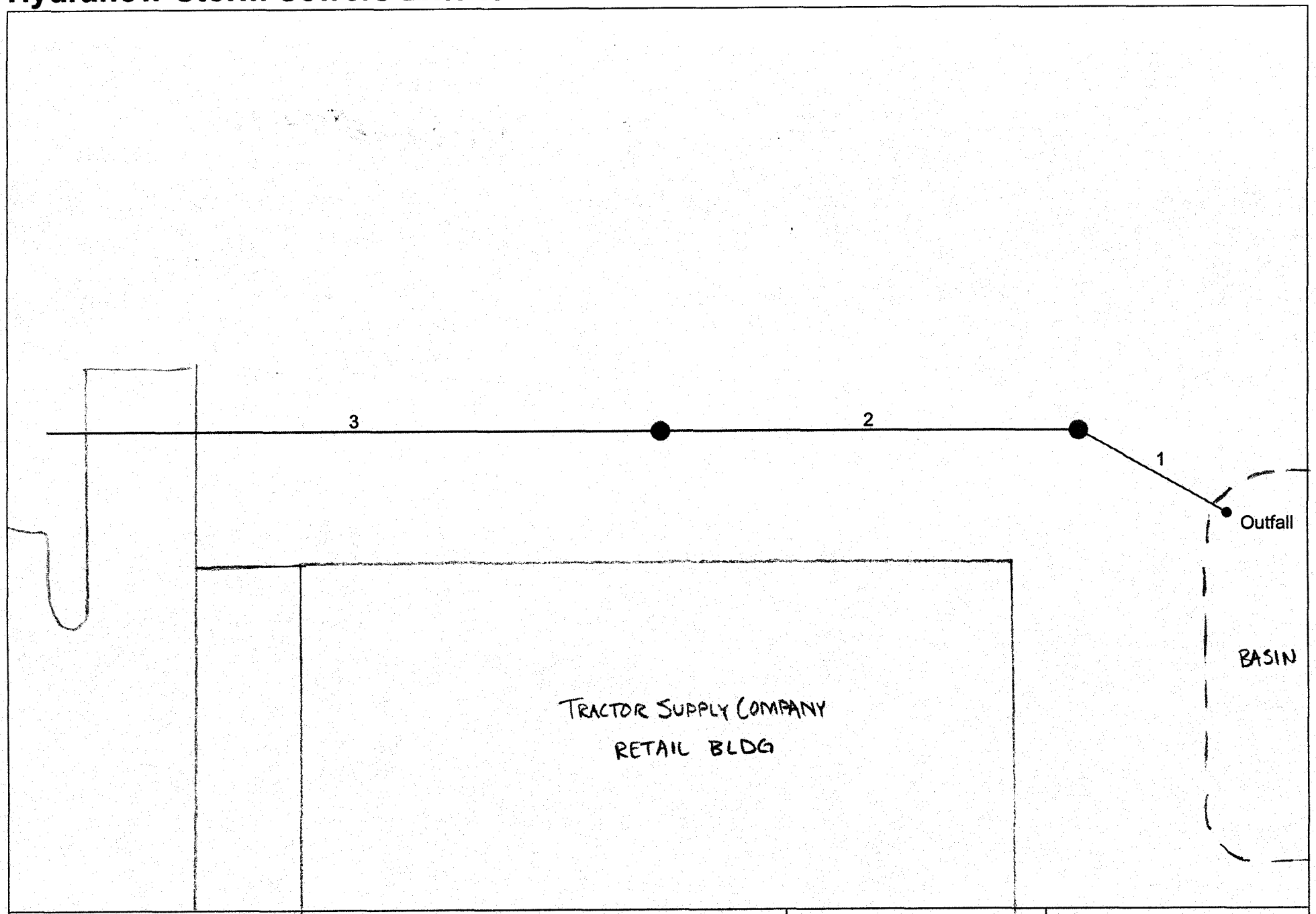
Qmin (cfs)	=	1.03
Qmax (cfs)	=	1.03
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.03
Qpipe (cfs)	=	1.03
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.20
Veloc Up (ft/s)	=	3.03
HGL Dn (ft)	=	111.83
HGL Up (ft)	=	113.90
Hw Elev (ft)	=	114.05
Hw/D (ft)	=	0.44
Flow Regime	=	Inlet Control

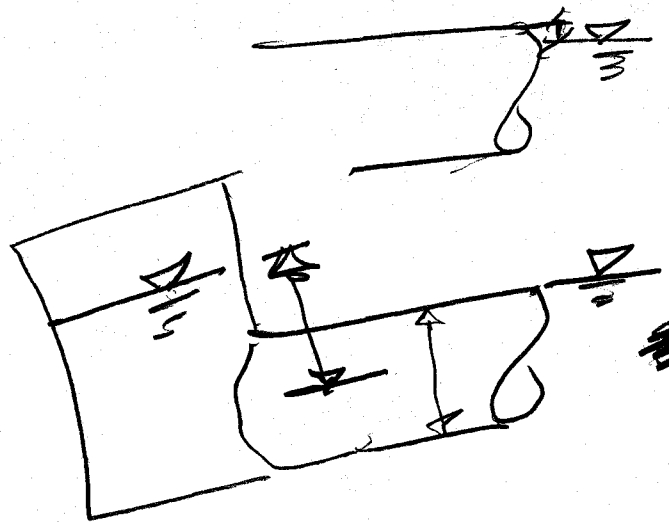


Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan



Project File: 6753-06_Storm System #1 Design.stm	Number of lines: 3	Date: 02-17-2011

Hydraflow Storm Sewers Extension v6.066



$$Q = \frac{k}{n} R^{2/3} S^{1/2} A$$

$$\boxed{\frac{V^2}{2g}} + \boxed{h_f} = \boxed{VA} = Q$$

CISX → $Q_{\Delta} \approx 0.1\ CFS$

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	38.000	0.00	1.25	0.00	0.00	1.03	0.0	6.0	7.2	7.36	9.01	5.55	18	0.74	109.25	109.53	110.32	110.57	109.00	115.25	1-1 TO 1-0
2	1	94.000	0.14	1.25	0.60	0.08	1.03	5.0	5.6	7.3	7.49	9.99	5.13	18	0.90	109.53	110.38	110.85	111.42	115.25	114.35	1-2 TO 1-1
3	2	138.000	1.11	1.11	0.85	0.94	0.94	5.0	5.0	7.5	7.07	10.07	5.47	18	0.92	110.38	111.65	111.42	112.67	114.35	111.65	1-3 TO 1-2

115.75 in plan

114.56 in plan

115.75 in plan

114.56

open Channel $\Rightarrow \boxed{\frac{k}{n} R^{2/3} S^{1/2} A} = Q$

$Q = VA$

$\frac{Q}{A} = V$

$\frac{P}{g} + \frac{V^2}{2g} + \boxed{h_f} + \Delta Z$

$\boxed{h_f = \frac{f L V^2}{2 D g}}$

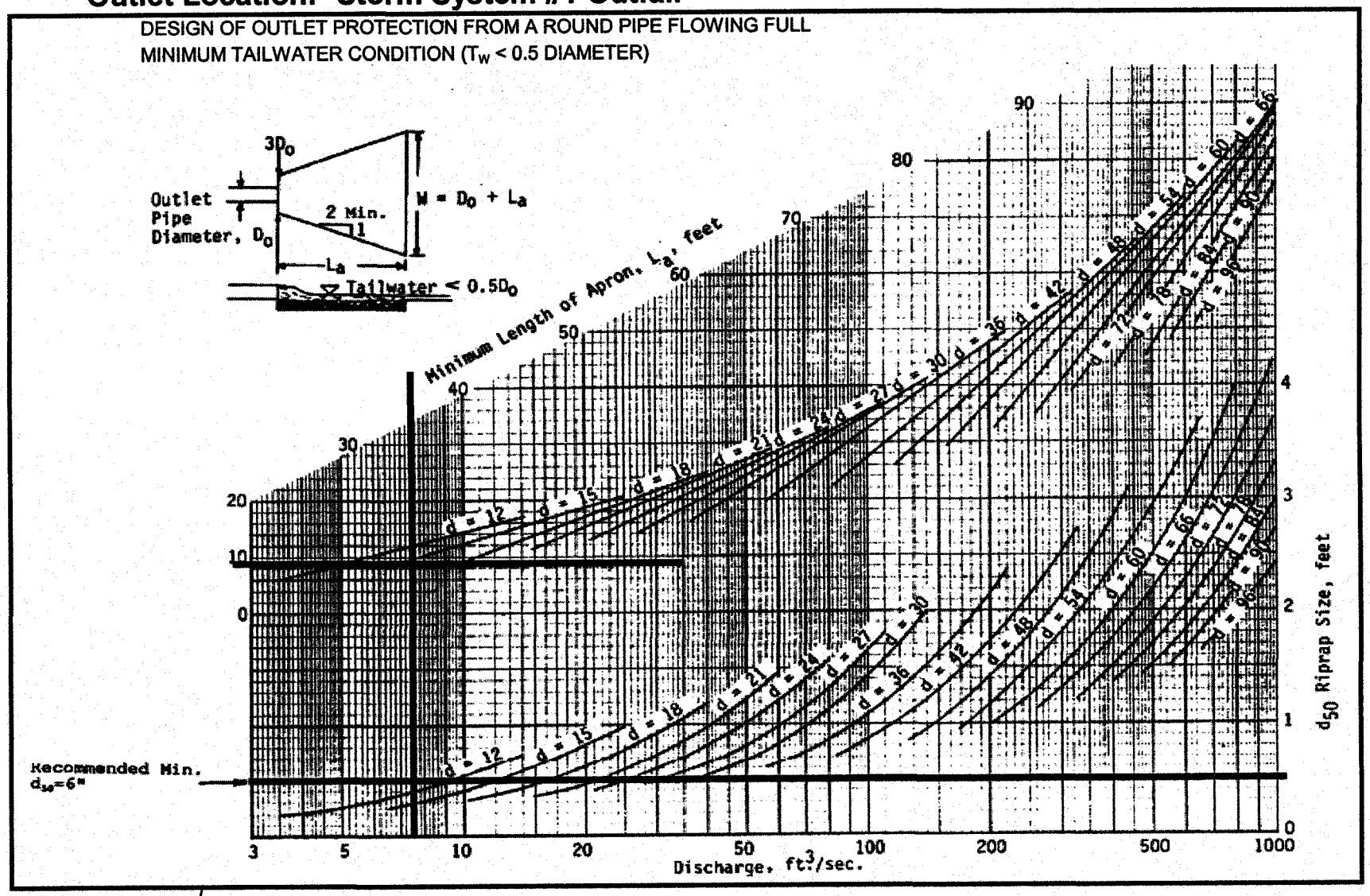
Project File: 6753-06_Storm System #1 Design.stm | Number of lines: 3 | Run Date: 02-17-2011

NOTES: Intensity = 55.61 / (Inlet time + 10.00) ^ 0.74; Return period = 10 Yrs. ; c = cir e = ellip b = box

AES CONSULTING ENGINEERS

Project:	Tractor Supply Company
Project No.:	6753-06
Subject:	Outlet Protection
Date:	2/17/2011
Calculated By:	GVC

Outlet Location: Storm System #1 Outfall



Q =	7.36	cfs	$3D_o$ =	4.5	ft	W =	11 ft	Depth = 1.5 ft
D_o =	18	in	L_a =	9	ft	d_{50} =	0.5 ft

Source: USDA-SCS 1992

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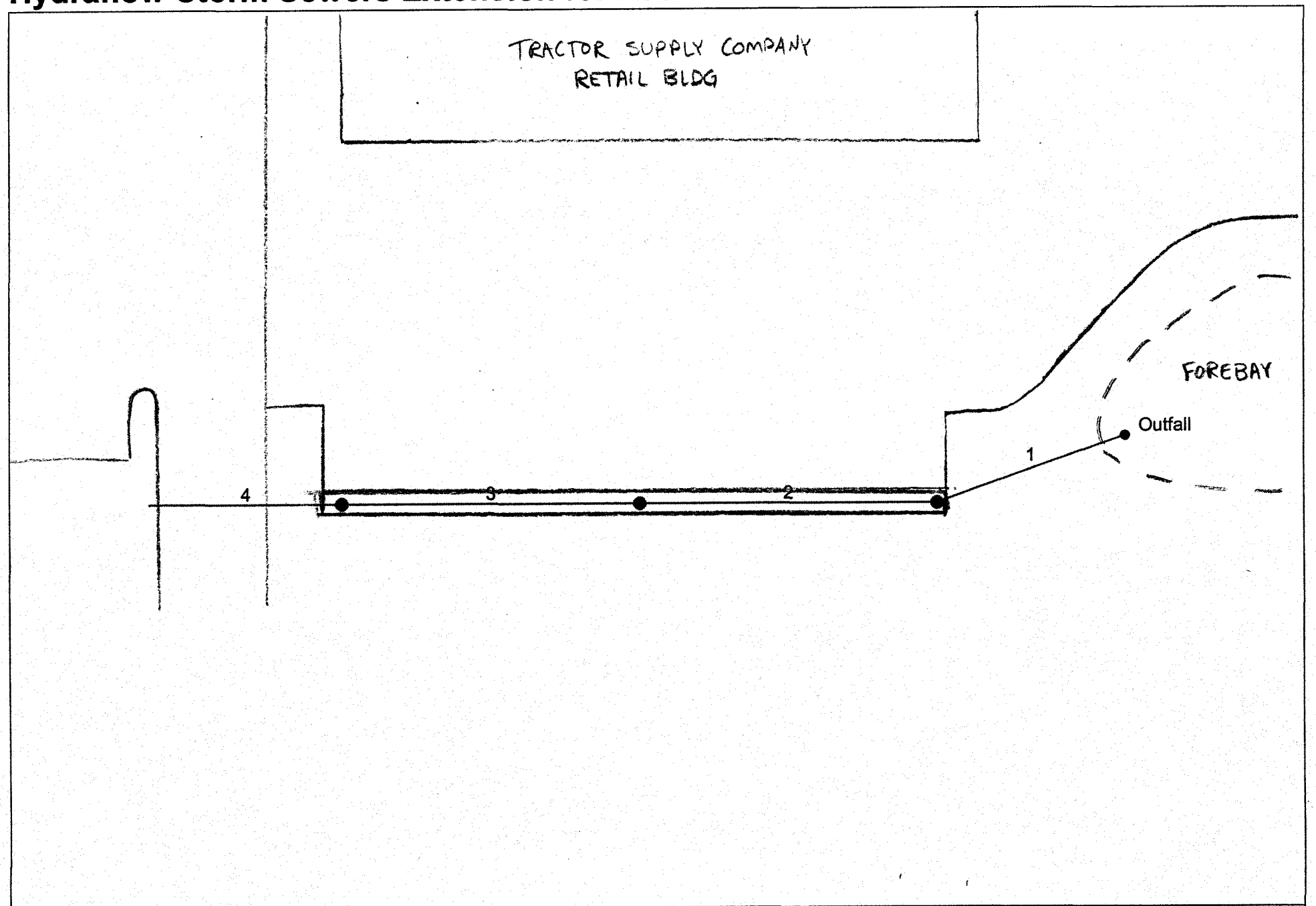
Plate 3.18-3

3.18

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan



Project File: 6753-06_Storm System #2 Design.stm	Number of lines: 4	Date: 02-17-2011

Hydraflow Storm Sewers Extension v6.066

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	65.000	0.06	0.87	0.90	0.05	0.78	5.0	6.7	6.9	5.43	10.50	4.97	18	1.00	110.00	110.65	110.89	111.54	110.00	115.00	2-1 TO 2-0
2	1	98.000	0.20	0.81	0.90	0.18	0.73	5.0	6.1	7.1	5.18	0.00	3.84	18	0.00	110.65	110.65	111.54	112.14	115.00	115.00	2-2 TO 2-1
3	2	98.000	0.14	0.61	0.90	0.13	0.55	5.0	5.4	7.3	4.03	0.00	2.28	18	0.00	110.65	110.65	112.21	112.35	115.00	115.00	2-3 TO 2-2
4	3	63.000	0.47	0.47	0.90	0.42	0.42	5.0	5.0	7.5	3.17	11.07	3.49	15	2.94	110.65	112.50	112.39	113.21	115.00	112.50	2-4 TO 2-3

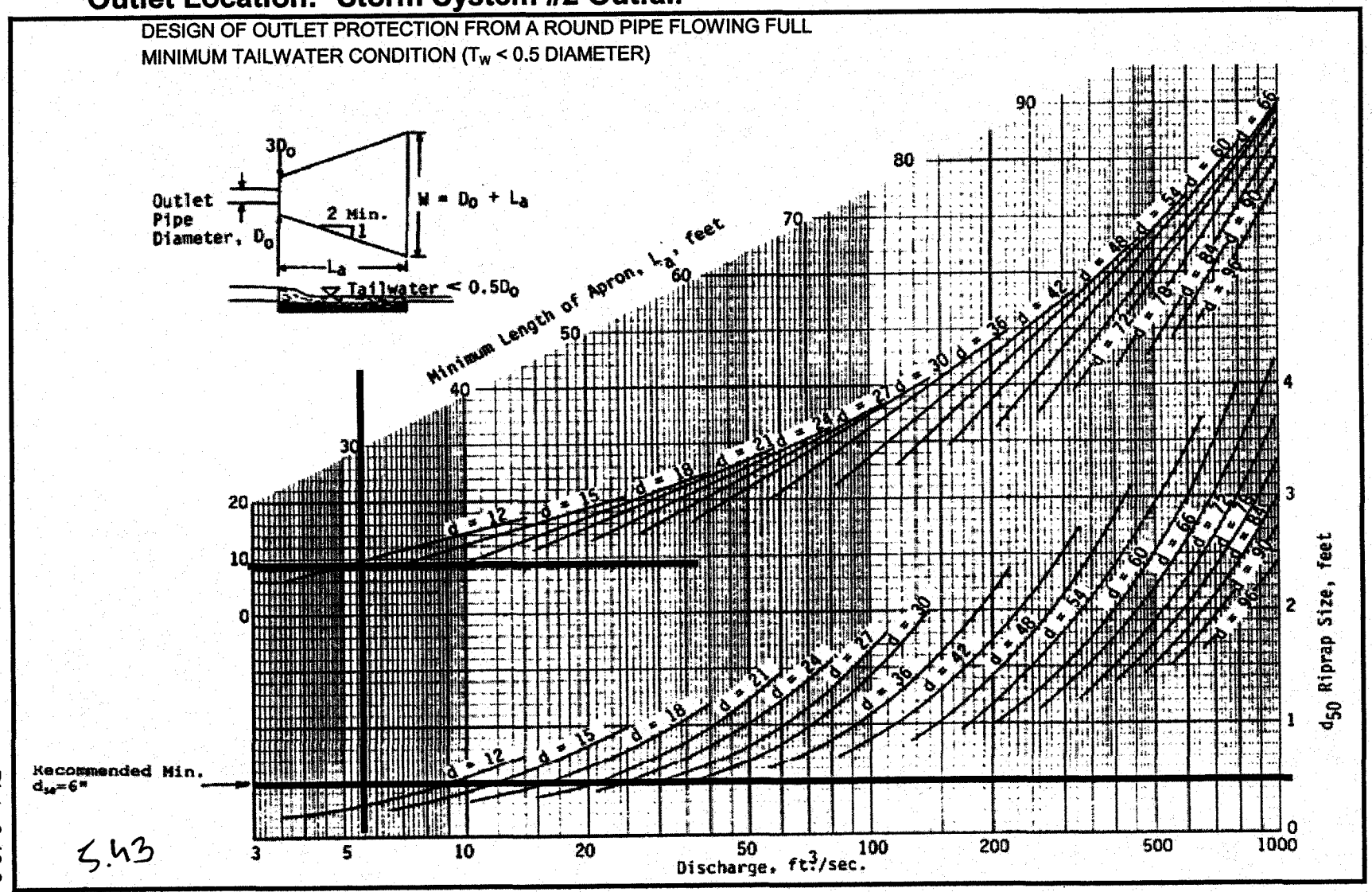
Project File: 6753-06_Storm System #2 Design.stm | Number of lines: 4 | Run Date: 02-17-2011

NOTES: Intensity = 55.61 / (Inlet time + 10.00) ^ 0.74; Return period = 10 Yrs. ; c = cir e = ellip b = box

Project:	Tractor Supply Company
Project No.:	6753-06
Subject:	Outlet Protection
Date:	2/17/2011
Calculated By:	GVC

AES CONSULTING ENGINEERS

Outlet Location: Storm System #2 Outfall



Source: USDA-SCS

Plate 3.18-3

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1992

3.18

Q =	5.41	cfs	$3D_0$ =	4.5	ft	W =	11	ft	Depth = 1.5 ft
D_0 =	18	in	L_a =	9	ft	d_{50} =	0.5	ft	

AES CONSULTING ENGINEERS

Project:	Tractor Supply Company
Project No.:	6753-06
Subject:	Channel Design
Date:	2/17/2011
Calculated By:	GVC

Design Point: **Swale #1**

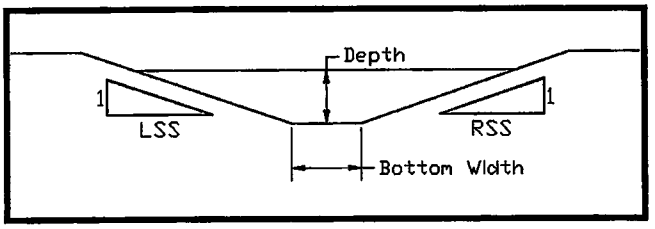
2 Year Storm - Velocity Check

Drainage Area	=	1.11	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **Tc=5 min**

Q = C I A (Peak Flow)

= 0.85 x 5.60 x 1.11

= 5.28 CFS



Channel Characteristics

Rt. Sideslope	=	4.00	:1
Lt. Sideslope	=	4.00	:1
Base Width	=	3.00	Ft.
Max. Depth	=	1.50	Ft.
Channel Slope	=	1.00	%
Mannings (n)	=	0.035	**Grass Swale**

Depth of Flow	=	0.50	Ft.	
Area	=	2.50	SF	Wetted Perimeter = 7.12 Ft.
Hydraulic Radius	=	0.35	Ft.	
Velocity (V)	=	2.11	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	5.27	CFS	(From Continuity Equation Q=AV)

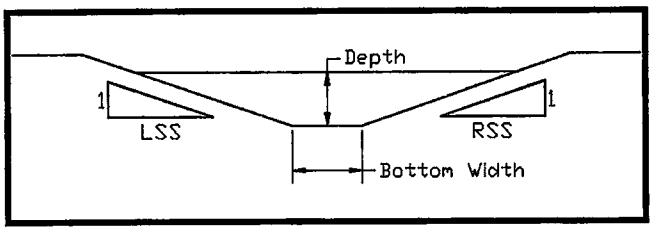
10 Year Storm - Capacity Check

Drainage Area	=	1.11	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **Tc=5 min**

Q = C I A (Peak Flow)

= 0.85 x 7.00 x 1.11

= 6.60 CFS



Channel Characteristics

Rt. Sideslope	=	4.00	:1
Lt. Sideslope	=	4.00	:1
Base Width	=	3.00	Ft.
Max. Depth	=	1.50	Ft.
Channel Slope	=	1.00	%
Mannings (n)	=	0.035	**Grass Swale**

Depth of Flow	=	0.56	Ft.	
Area	=	2.93	SF	Wetted Perimeter = 7.61 Ft.
Hydraulic Radius	=	0.38	Ft.	
Velocity (V)	=	2.25	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	6.58	CFS	(From Continuity Equation Q=AV)

AES CONSULTING ENGINEERS

Project:	Tractor Supply Company
Project No.:	6753-06
Subject:	Channel Design
Date:	2/17/2011
Calculated By:	GVC

Design Point: **Swale #2**

2 Year Storm - Velocity Check

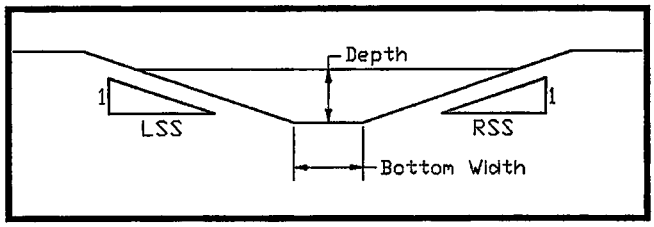
Drainage Area	=	0.47	Acres	(Area draining to Design Point)
C	=	0.90		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **Tc=5 min**

Q = C I A (Peak Flow)

= 0.90 x 5.60 x 0.47

= 2.37 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.50	Ft.
Channel Slope	=	1.00	%
Mannings (n)	=	0.035	**Grass Swale**

Depth of Flow	=	0.64	Ft.	
Area	=	1.23	SF	Wetted Perimeter = 4.05 Ft.
Hydraulic Radius	=	0.30	Ft.	
Velocity (V)	=	1.92	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	2.36	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

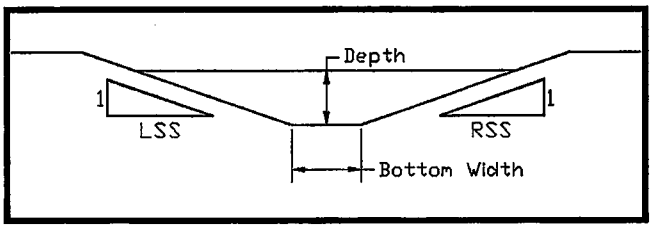
Drainage Area	=	0.47	Acres	(Area draining to Design Point)
C	=	0.90		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **Tc=5 min**

Q = C I A (Peak Flow)

= 0.90 x 7.00 x 0.47

= 2.96 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.50	Ft.
Channel Slope	=	1.00	%
Mannings (n)	=	0.035	**Grass Swale**

Depth of Flow	=	0.70	Ft.	
Area	=	1.45	SF	Wetted Perimeter = 4.40 Ft.
Hydraulic Radius	=	0.33	Ft.	
Velocity (V)	=	2.03	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	2.95	CFS	(From Continuity Equation Q=AV)

$f_d = 0.5f$ $\quad f_d = 4.5$ in/hr $\quad$ 4.5 in/hr

$d_{max} = f_d T_{max}$

$d_{max} = (4.5)(48)$

18'

$SA_{min} = \frac{V_{wq}}{18} = 475$

APPENDIX B

INFILTRATION BASIN CALCULATIONS

BMP POINT SYSTEM WORKSHEET
WATER QUALITY VOLUME REPORT
1-YR 24-HR DRAWDOWN CALCULATION
HYDROGRAPH REPORT
FOREBAY OUTFALL OUTLET PROTECTION DESIGN
RIP-RAP STILLING BASIN DESIGN

Storm Event (yr)	Forebay Elevation (ft)	Basin Elevation (ft)	Basin Outflow (cfs)
1	111.14	111.03	0
2	111.47	111.34	0
10	112.41	112.22	0
100	113.68	113.52	0

2/14/18

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM
Norge Center - Tractor Supply Company, AES PROJECT No. 6753-06
TOTAL AREA = 3.45 ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
Infiltration Basin	3.58	10	X	1.038	=	10.38
			X		=	
			X		=	
			X		=	
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				10.38

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
		(0.1 per 1%)	=	
		(0.15 per 1%)	=	
		TOTAL OPEN SPACE POINTS:		0.00

C. TOTAL WEIGHTED POINTS

10.38	+	0.00	=	10.38
Structural BMP Points		Natural Open Space Points		TOTAL

AES
CONSULTING ENGINEERS

Project:	Norge Center Parcel 6 (Preliminary)
Project No.:	W06753-06
Subject:	Water Quality Volume
Date:	2/17/2011
Calculated By:	GVC

BMP Type = **Infiltration Pond**

Water Quality Volume = 0.5 in. x **2.06** acres of impervious coverage

= (0.5 / 12) x (43,560 x **2.06**)

= **3739** CF

Total Storage Volume Required = **2** x Water Quality Volume

= **2** x **3739**

= **7477.8** CF

Min. Storage Volume Required = **2** x Water Quality Volume

= **2** x **3739**

= **7478** CF

Dry Storage Volume Provided = **43,317** CF Elevation = **114.0-Riser Elevation**

AES
CONSULTING ENGINEERS

Project:	Tractor Supply Company
Project No.:	W06753-06
Subject:	1 yr-24 hr Drawdown Calculation
	Kerplunk Method
Date:	28-Jan-11
Calculated By:	GVC

Channel Protection Volume:

Drainage Area	=	3.31	Acres
Runoff Curve No.	=	91	
1-Yr, 24-Hr Storm Volume	=	2.8	Inches

Direct Runoff (From TR55 Equations 2-3 & 2-4)

Q = 1.89 inches

Channel Protection Volume = DA x Q x 60% (Virginia Stormwater Managment Handbook section 5-6.2 - Method 2)

Vcp = 3.74 Ac-in = 13,593 cubic feet

Determine Volume of Pond by Contour (starting at invert of low flow orifice):

Elevation	Incremental Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)	Incremental Avg Head[1] (feet)	Incremental Avg Flow[1] (feet)	Incremental Drawdown Time[1] (hrs)
109.0	0.0	3,654	-	-	-	-			
110.0	1.0	4,844	4,249	157	4,249	157	0.50	0.07	17.41
111.0	1.0	6,157	5,501	204	9,750	361	1.50	0.13	12.22
112.0	1.0	7,573	6,865	254	16,615	615	2.28	0.16	6.86
113.0	1.0	9,089	8,331	309	24,946	924	0.00	0.00	0.00
114.0	1.0	10,705	9,897	367	34,843	1,290	0.00	0.00	0.00
115.0	1.0	12,422	11,564	428	46,406	1,719	0.00	0.00	0.00
115.8	0.8	14,000	9,908	367	56,314	2,086	0.00	0.00	0.00
	0.0		-	-	56,314	2,086	0.00	0.00	0.00
	0.0		-	-	56,314	2,086	0.00	0.00	0.00
		Total	56,314	2,086					36.48

[1] Incremental values computed from Channel Protection Volume Elevation

Elevation of Low Flow Orifice Invert	=	109.00	feet
Elevation of 1-yr, 24-hr Storage Volume	=	111.56	feet
Size of Orifice	=	2.00	inches
Total Average Drawdown Time	=	36.48	hrs

>24 HRS, OK

NOTE: THERE IS NO FLOW FROM THE FACILITY UP TO 100-YR STORM EVENTS.

Hydraflow Table of Contents

W06753-06 Pond.gpw

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Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	2.276	1	15	3,073	—	—	—	Pre Development - Basin
2	Mod. Rational	3.407	1	8	8,013	—	—	—	Post Development - Basin
3	Rational	1.282	1	15	1,731	—	—	—	Pre Development - Forebay
4	Mod. Rational	1.919	1	8	4,514	—	—	—	Post Development - Forebay
5	Reservoir(i)	0.000	1	24	0	4, 2	111.14	11,022	Pond Routing- Rational

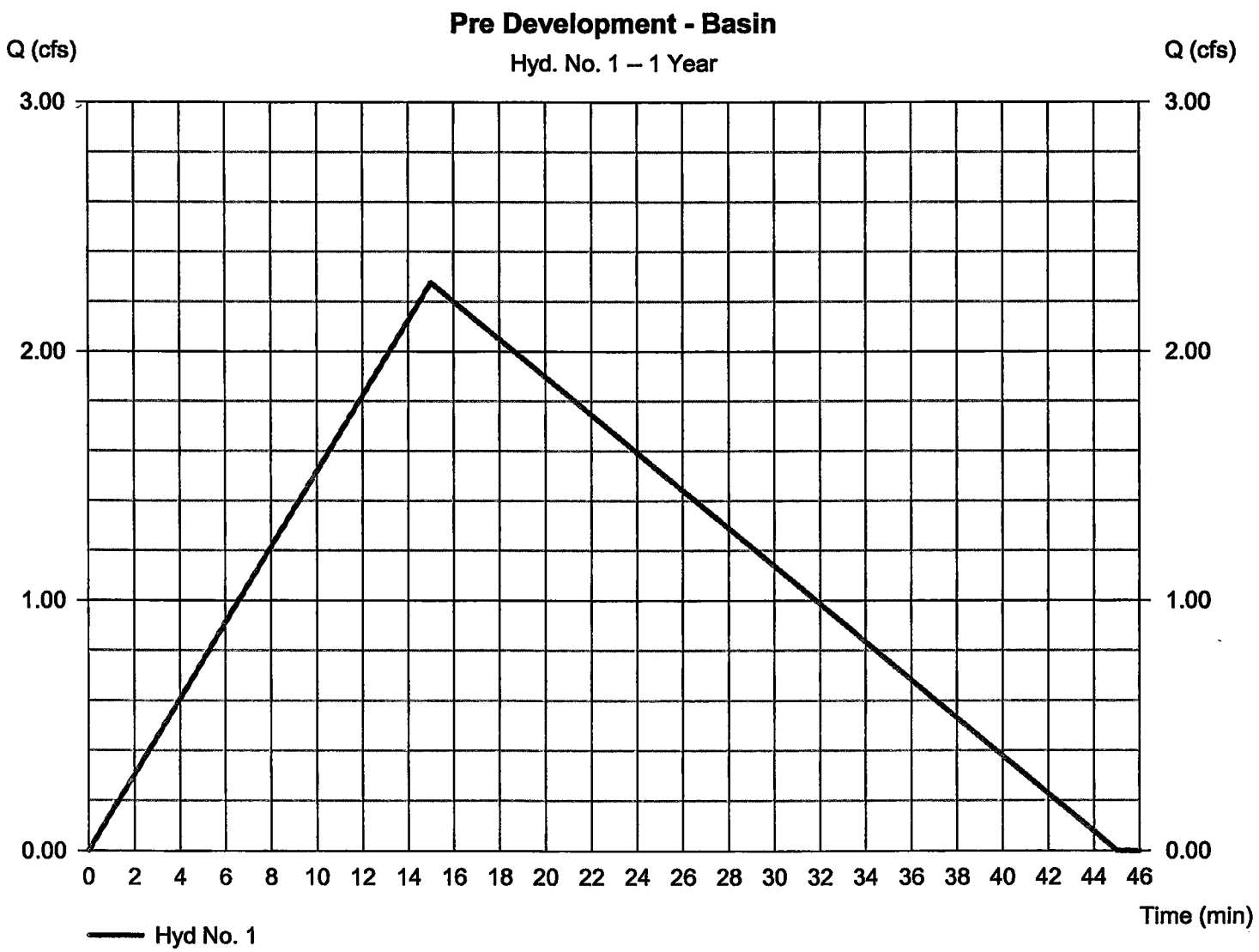
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 1

Pre Development - Basin

Hydrograph type	= Rational	Peak discharge	= 2.276 cfs
Storm frequency	= 1 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 3,073 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.3
Intensity	= 3.313 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



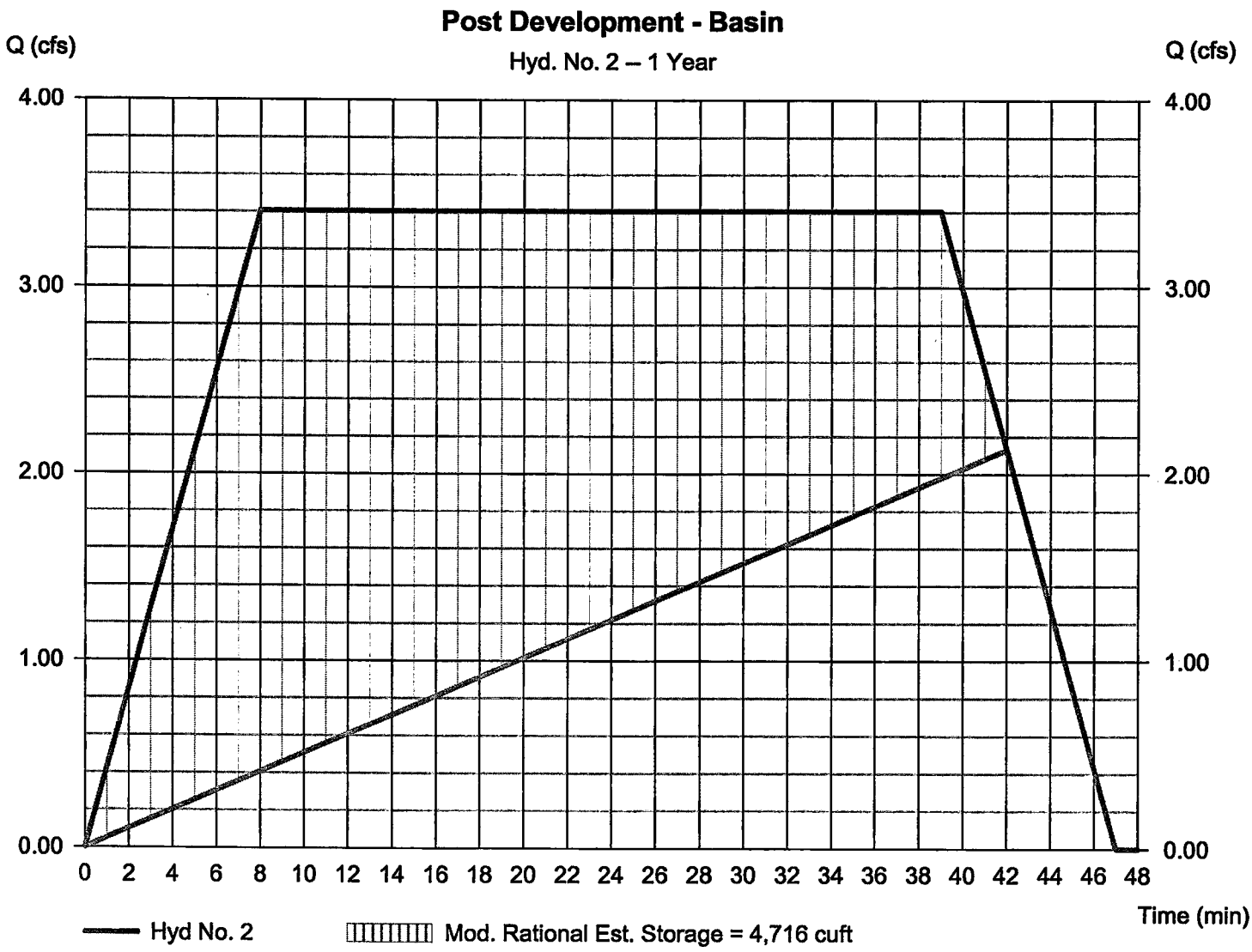
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 . Thursday, Feb 17, 2011

Hyd. No. 2

Post Development - Basin

Hydrograph type	= Mod. Rational	Peak discharge	= 3.407 cfs
Storm frequency	= 1 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 8,013 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.8
Intensity	= 1.860 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 4.9 x Tc
Target Q	= 2.280 cfs	Est. Req'd Storage	= 4,716 cuft



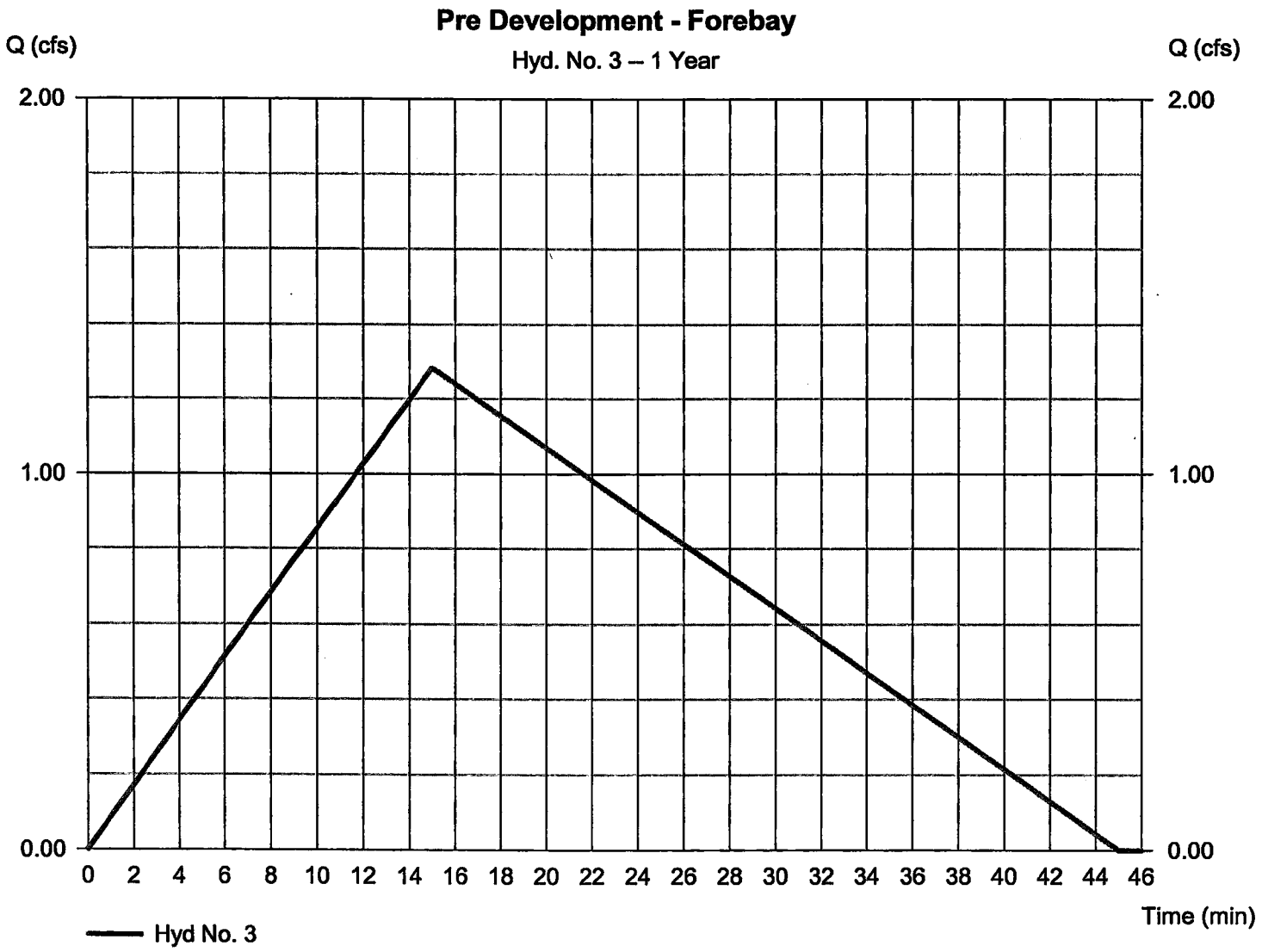
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 3

Pre Development - Forebay

Hydrograph type	= Rational	Peak discharge	= 1.282 cfs
Storm frequency	= 1 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 1,731 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.3
Intensity	= 3.313 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



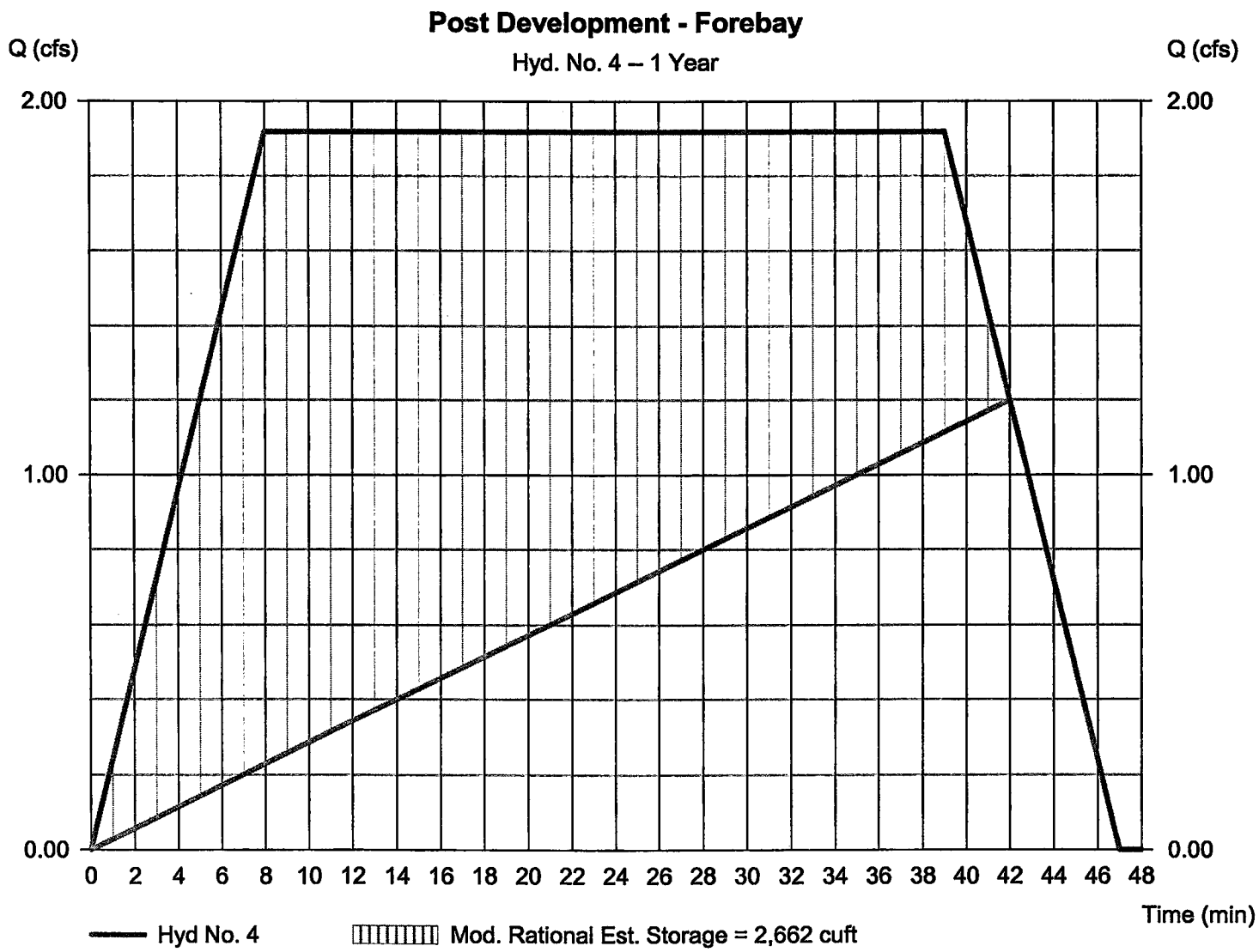
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 4

Post Development - Forebay

Hydrograph type	= Mod. Rational	Peak discharge	= 1.919 cfs
Storm frequency	= 1 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 4,514 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.8
Intensity	= 1.860 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 4.9 x Tc
Target Q	= 1.280 cfs	Est. Req'd Storage	= 2,662 cuft



Hydrograph Report

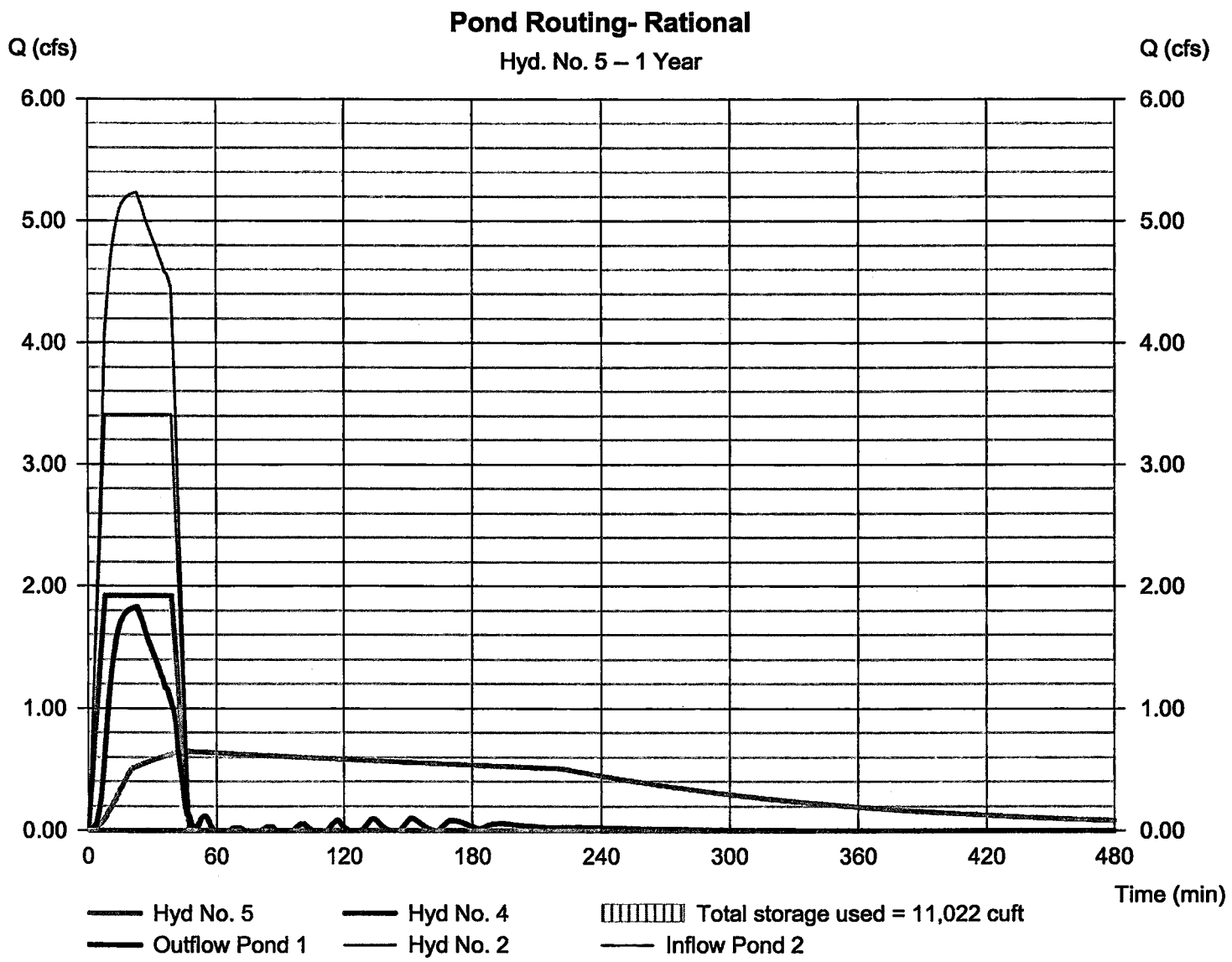
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 5

Pond Routing- Rational

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 24 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= Infiltration Pond
Inflow hyd.	= 4 - Post Development - Forebay	Other Inflow hyd.	= 2 - Post Develo
Max. Elevation	= 111.14 ft	Max. Elevation	= 111.03 ft
Max. Storage	= 1,101 cuft	Max. Storage	= 9,921 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Pond No. 1 - Forebay

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 110.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	110.00	858	0	0
1.00	111.00	1,414	1,124	1,124
2.00	112.00	2,070	1,731	2,856
3.00	113.00	2,827	2,438	5,294
4.00	114.00	3,685	3,246	8,540
5.00	115.00	4,642	4,154	12,694
5.75	115.75	5,500	3,798	16,493

Culvert / Orifice Structures

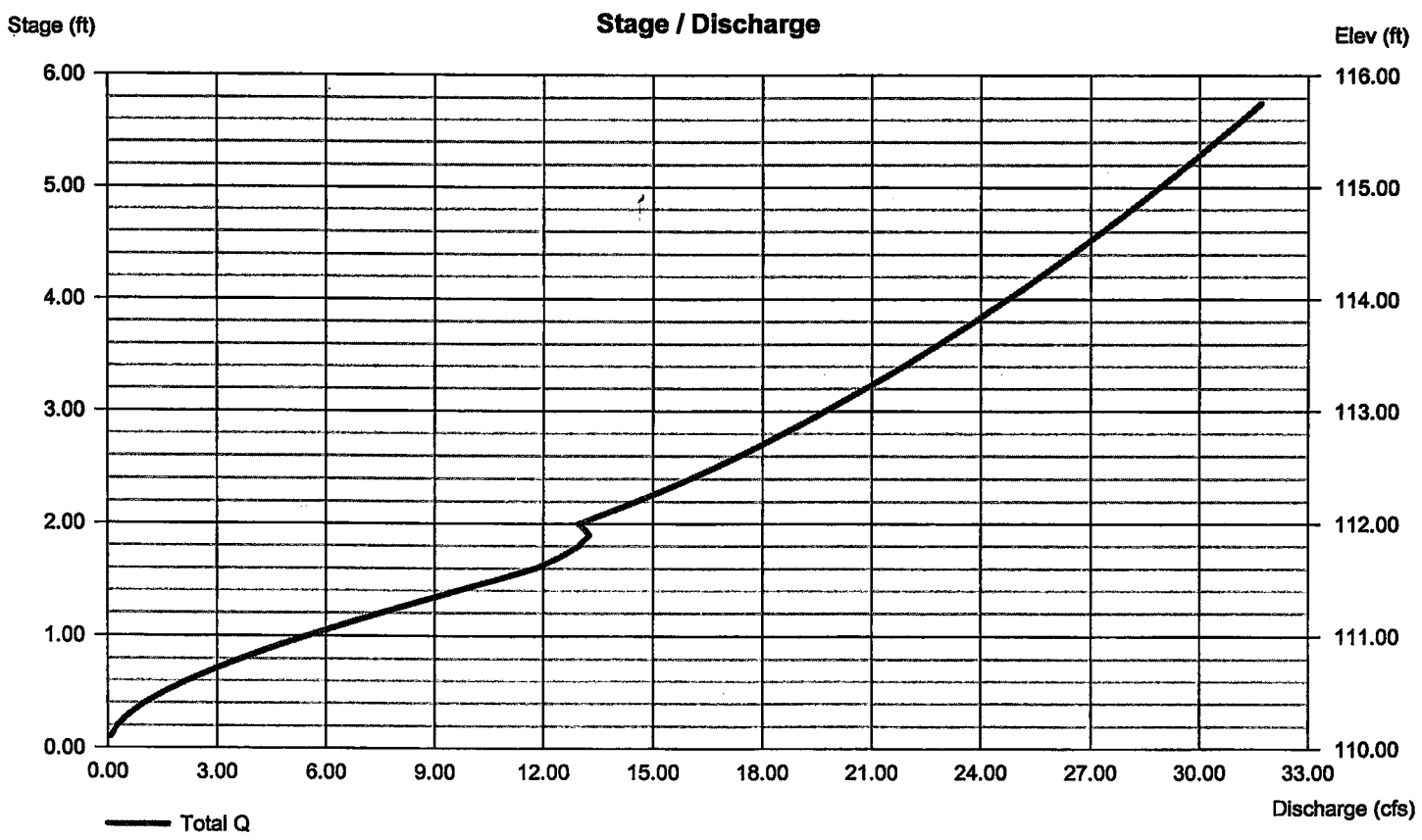
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 110.00	0.00	0.00	0.00
Length (ft)	= 118.00	0.00	0.00	0.00
Slope (%)	= 0.64	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	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	= No	No	No	No

Exfil.(in/hr) = 4.500 (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).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Pond No. 2 - Infiltration Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 109.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	109.00	3,654	0	0
1.00	110.00	4,844	4,235	4,235
2.00	111.00	6,157	5,487	9,721
3.00	112.00	7,573	6,852	16,574
4.00	113.00	9,089	8,319	24,892
5.00	114.00	10,705	9,885	34,777
6.00	115.00	12,422	11,552	46,329
6.75	115.75	14,000	9,901	56,230

Culvert / Orifice Structures

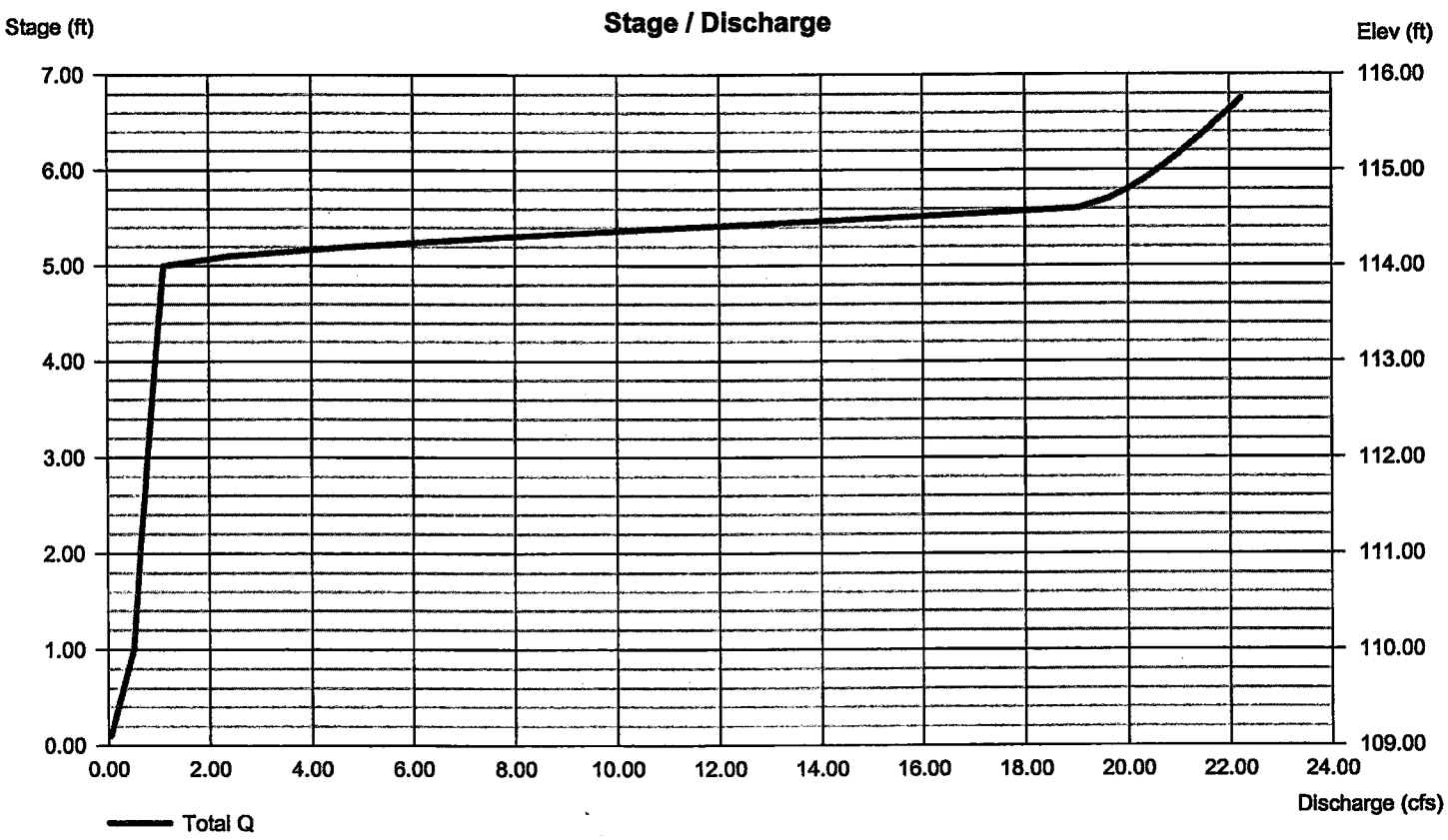
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 109.00	0.00	0.00	0.00
Length (ft)	= 56.00	0.00	0.00	0.00
Slope (%)	= 0.68	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	40.00	0.00	0.00
Crest El. (ft)	= 114.00	116.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 4.500 (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).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	2.693	1	15	3,636	—	—	—	Pre Development - Basin
2	Mod. Rational	4.163	1	8	9,790	—	—	—	Post Development - Basin
3	Rational	1.517	1	15	2,048	—	—	—	Pre Development - Forebay
4	Mod. Rational	2.345	1	8	5,515	—	—	—	Post Development - Forebay
5	Reservoir(i)	0.000	1	88	0	4, 2	111.47	13,616	Pond Routing- Rational

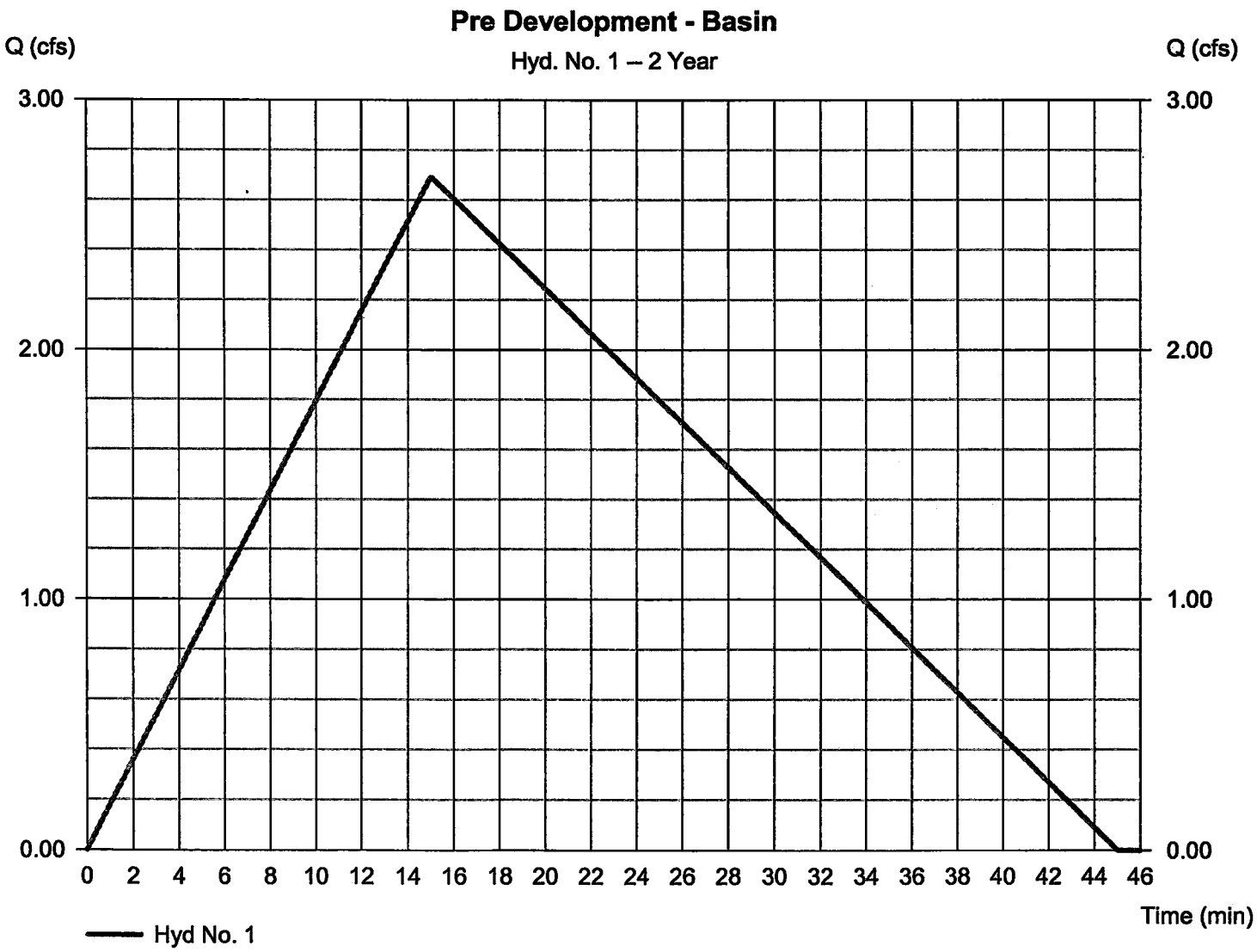
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 1

Pre Development - Basin

Hydrograph type	= Rational	Peak discharge	= 2.693 cfs
Storm frequency	= 2 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 3,636 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.3
Intensity	= 3.921 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



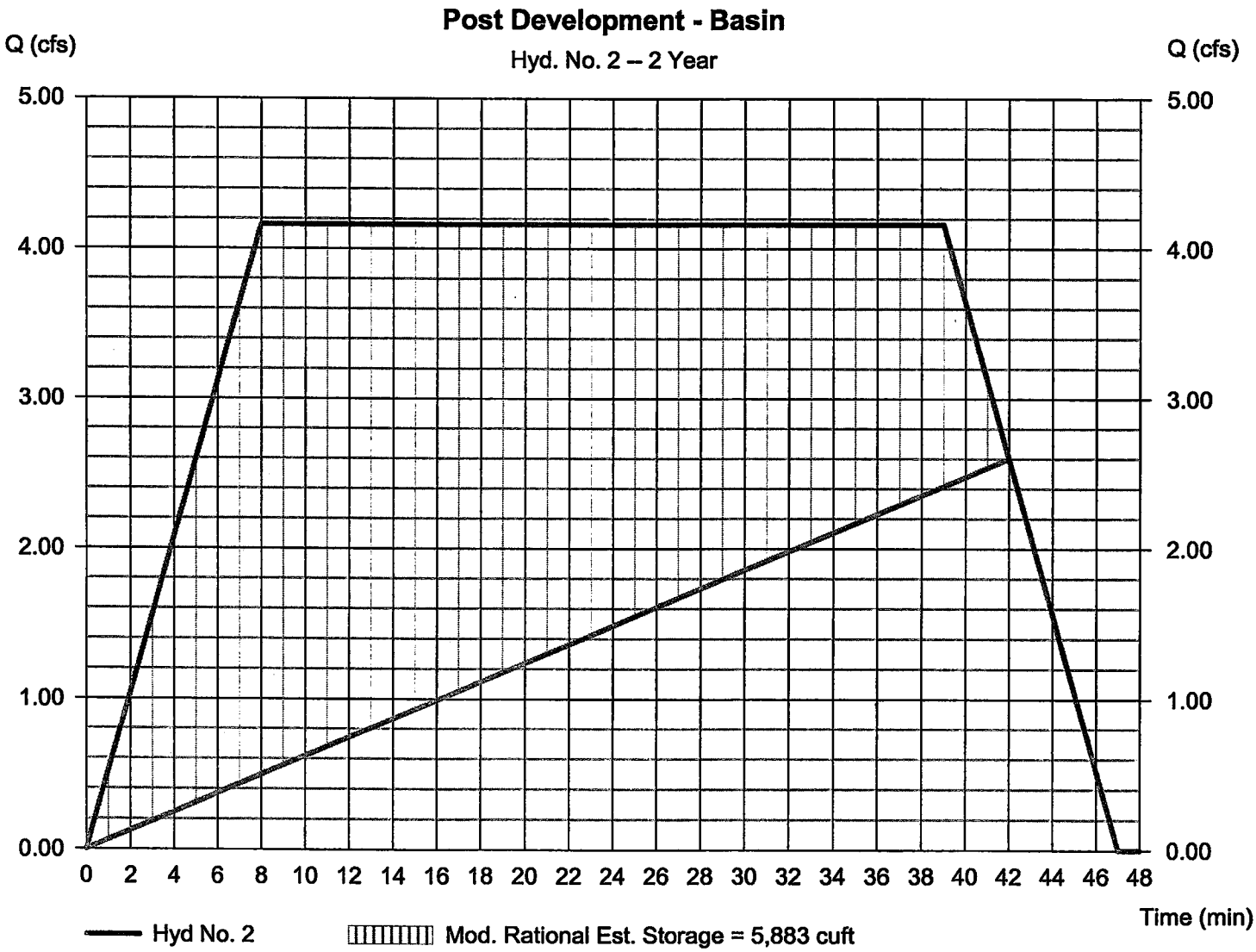
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 2

Post Development - Basin

Hydrograph type	= Mod. Rational	Peak discharge	= 4.163 cfs
Storm frequency	= 2 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 9,790 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.8
Intensity	= 2.272 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 4.9 x Tc
Target Q	= 2.690 cfs	Est. Req'd Storage	= 5,883 cuft



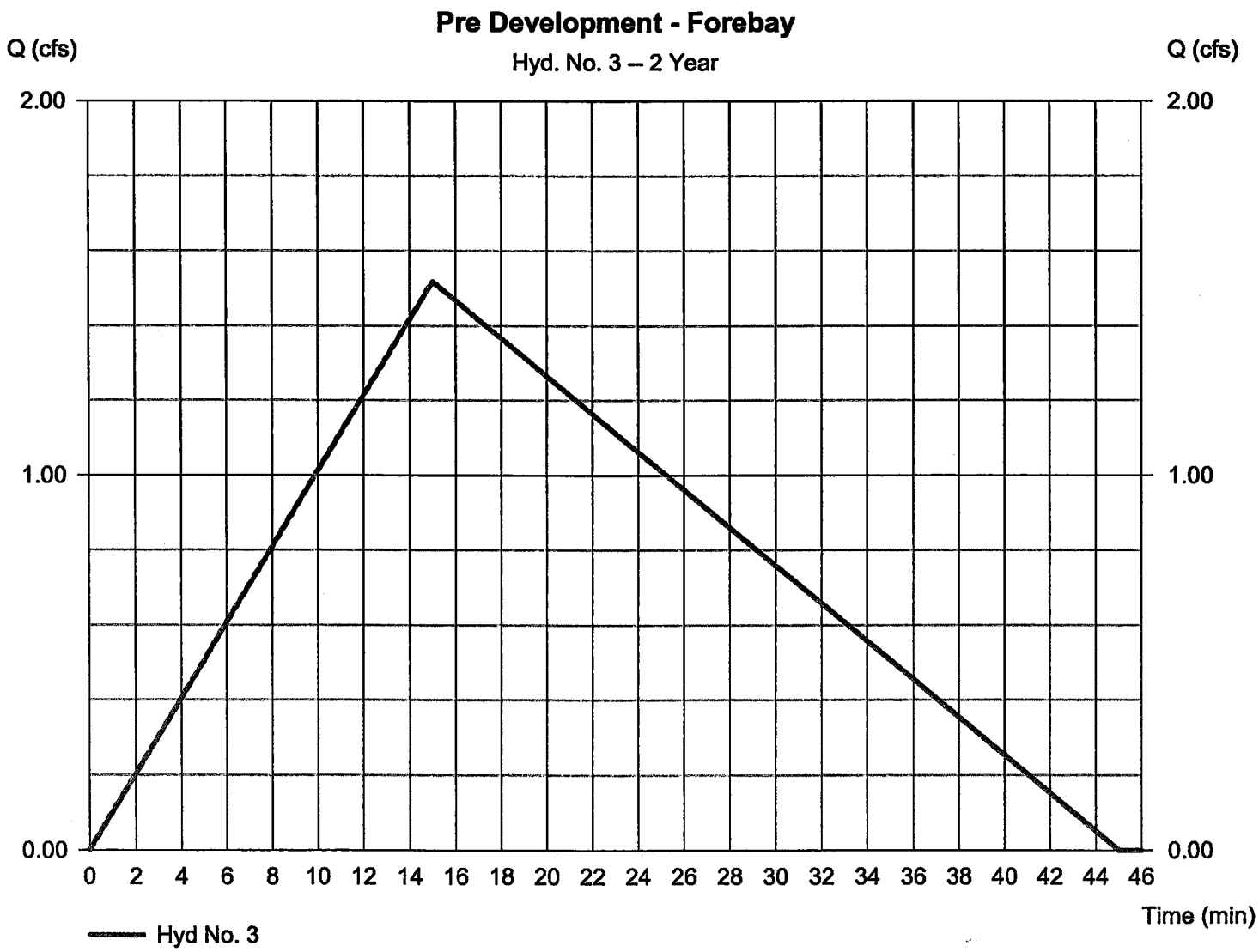
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 3

Pre Development - Forebay

Hydrograph type	= Rational	Peak discharge	= 1.517 cfs
Storm frequency	= 2 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 2,048 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.3
Intensity	= 3.921 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



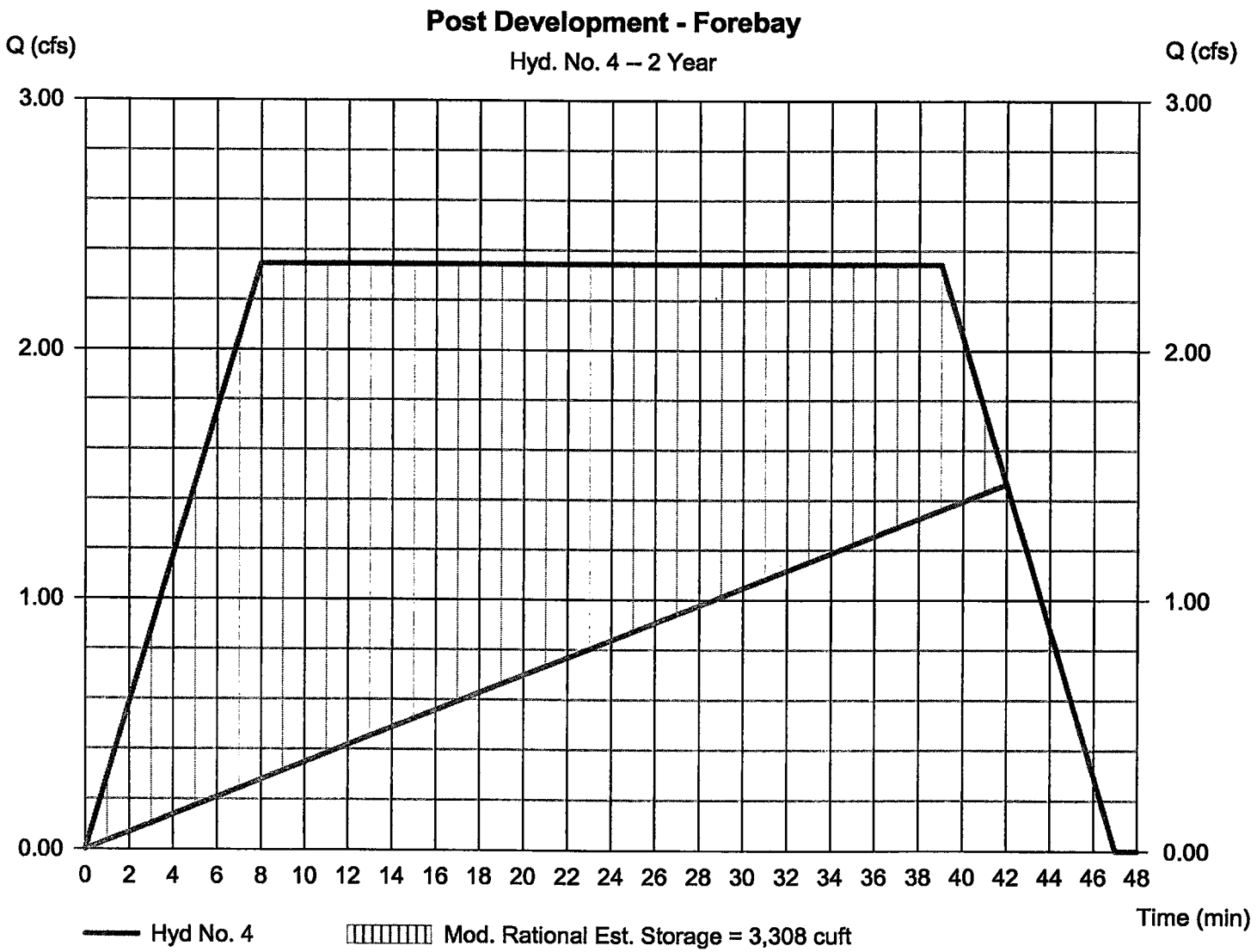
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 4

Post Development - Forebay

Hydrograph type	= Mod. Rational	Peak discharge	= 2.345 cfs
Storm frequency	= 2 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 5,515 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.8
Intensity	= 2.272 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 4.9 x Tc
Target Q	= 1.520 cfs	Est. Req'd Storage	= 3,308 cuft



Hydrograph Report

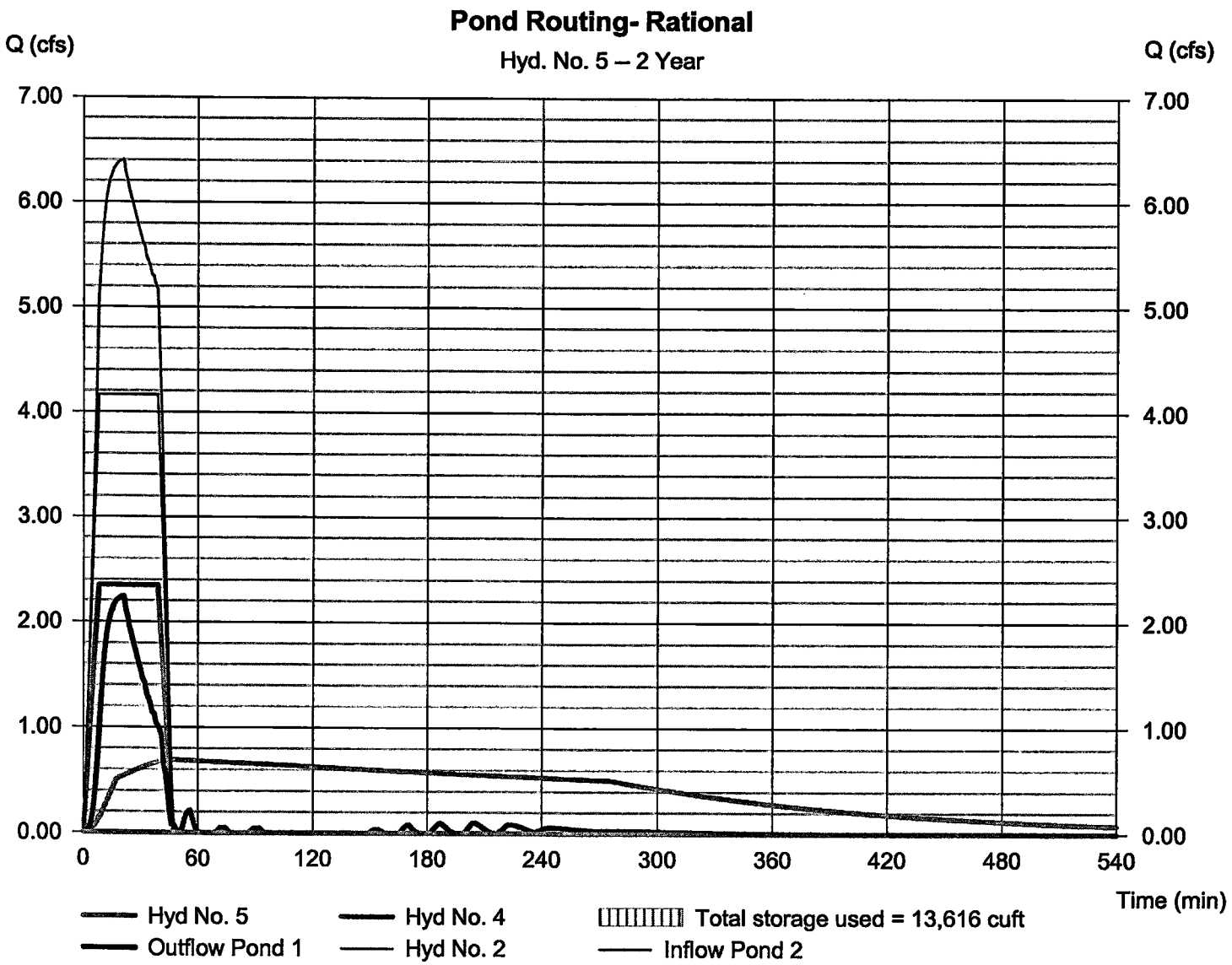
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 5

Pond Routing- Rational

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 88 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= Infiltration Pond
Inflow hyd.	= 4 - Post Development - Forebay	Other Inflow hyd.	= 2 - Post Develo
Max. Elevation	= 111.47 ft	Max. Elevation	= 111.34 ft
Max. Storage	= 1,598 cuft	Max. Storage	= 12,018 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	3.529	1	15	4,764	—	—	—	Pre Development - Basin
2	Mod. Rational	4.430	1	8	15,735	—	—	—	Post Development - Basin
3	Rational	1.988	1	15	2,684	—	—	—	Pre Development - Forebay
4	Mod. Rational	2.495	1	8	8,864	—	—	—	Post Development - Forebay
5	Reservoir(i)	0.000	1	166	0	4, 2	112.41	21,644	Pond Routing- Rational

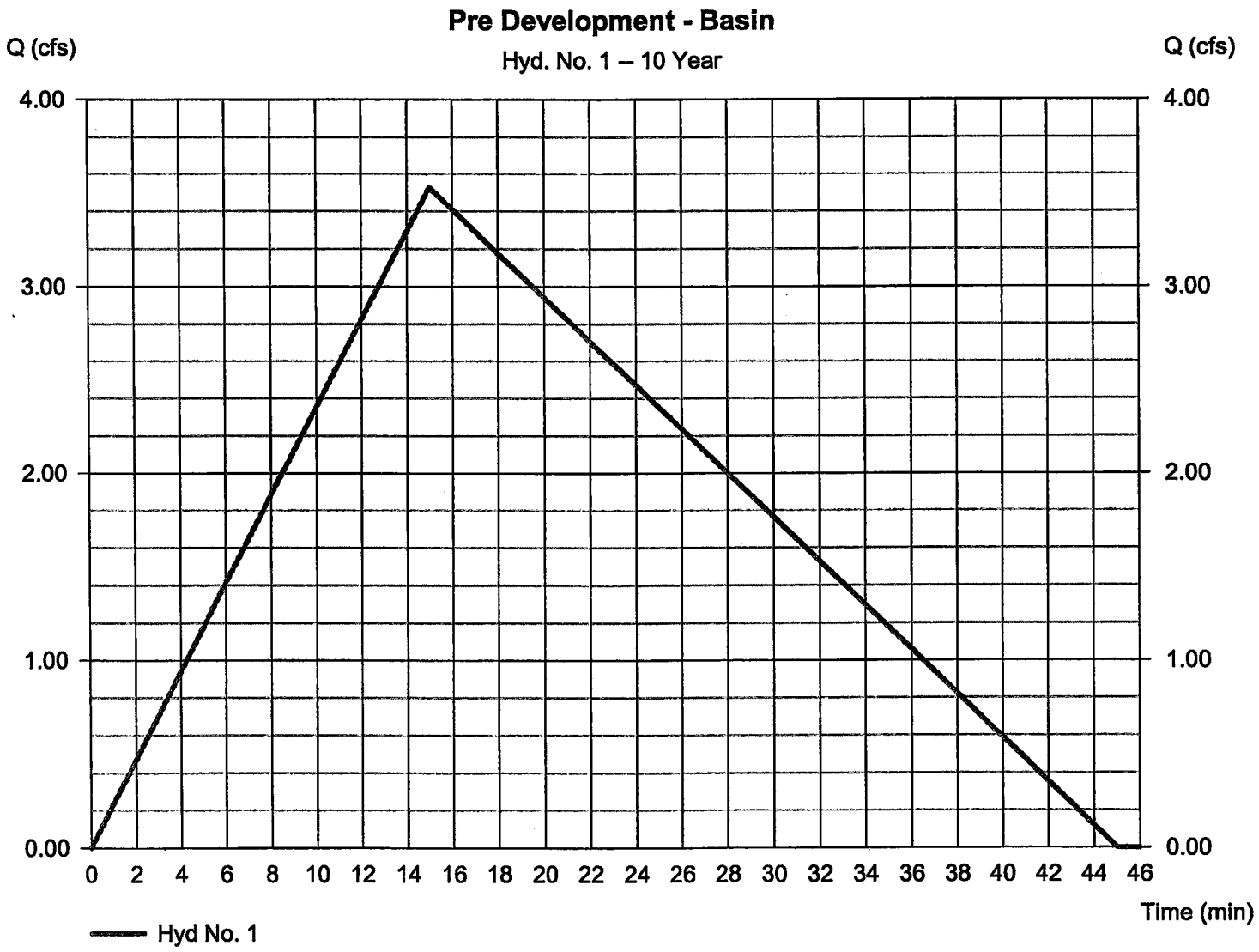
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 1

Pre Development - Basin

Hydrograph type	= Rational	Peak discharge	= 3.529 cfs
Storm frequency	= 10 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 4,764 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.3
Intensity	= 5.137 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



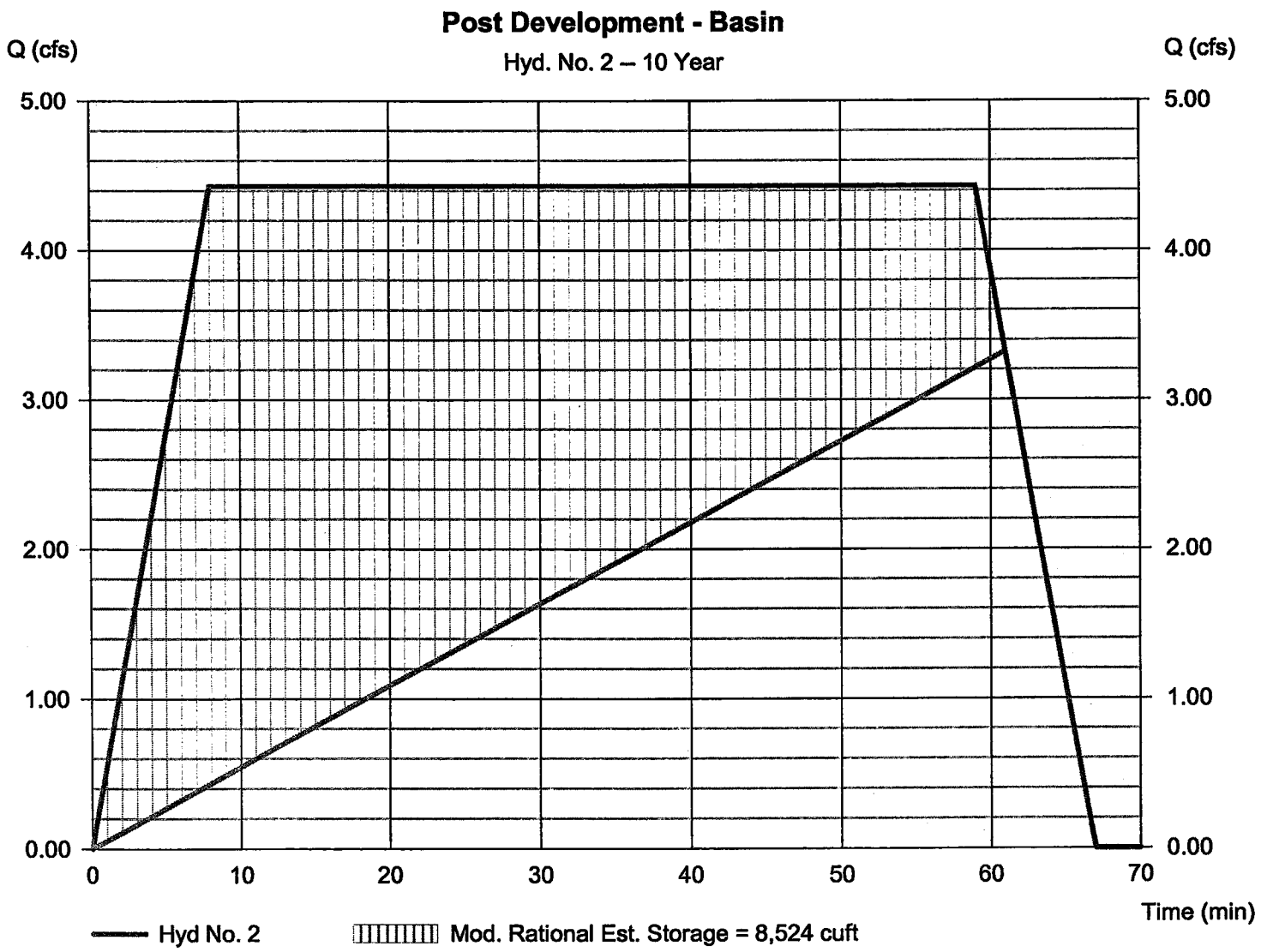
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 2

Post Development - Basin

Hydrograph type	= Mod. Rational	Peak discharge	= 4.430 cfs
Storm frequency	= 10 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 15,735 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.8
Intensity	= 2.418 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 7.4 x Tc
Target Q	= 3.530 cfs	Est. Req'd Storage	= 8,524 cuft



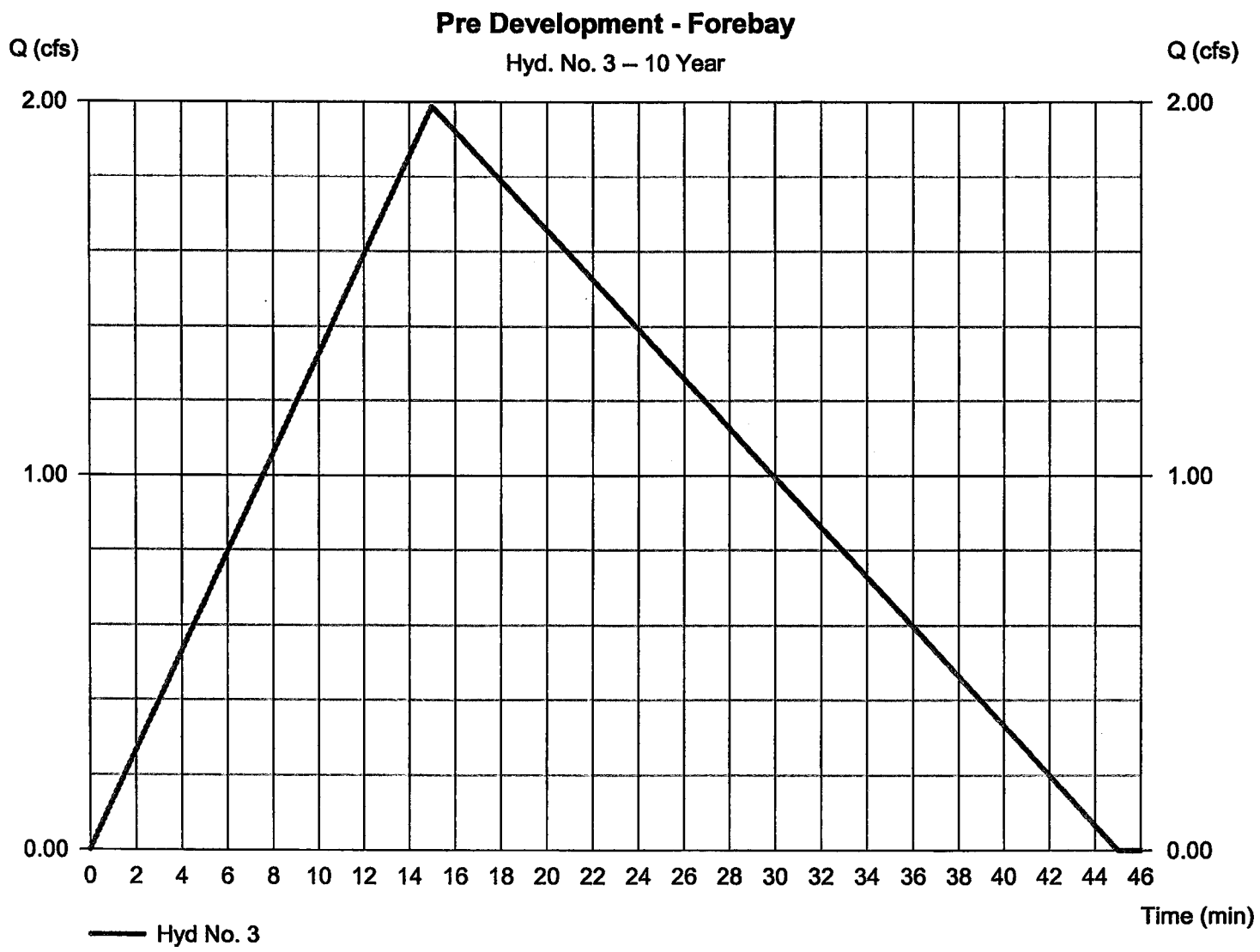
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 3

Pre Development - Forebay

Hydrograph type	= Rational	Peak discharge	= 1.988 cfs
Storm frequency	= 10 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 2,684 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.3
Intensity	= 5.137 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



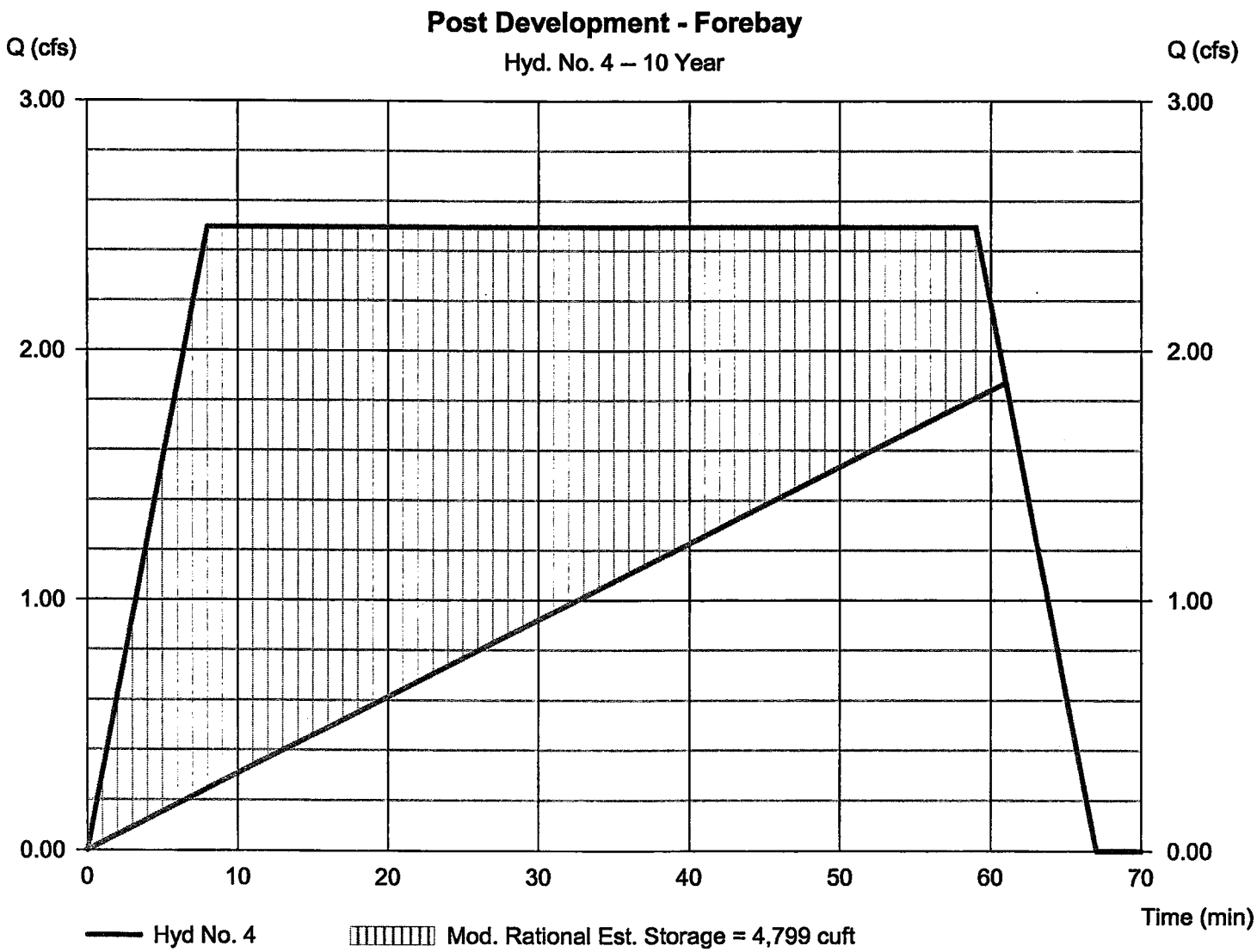
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 4

Post Development - Forebay

Hydrograph type	= Mod. Rational	Peak discharge	= 2.495 cfs
Storm frequency	= 10 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 8,864 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.8
Intensity	= 2.418 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 7.4 x Tc
Target Q	= 1.990 cfs	Est. Req'd Storage	= 4,799 cuft



Hydrograph Report

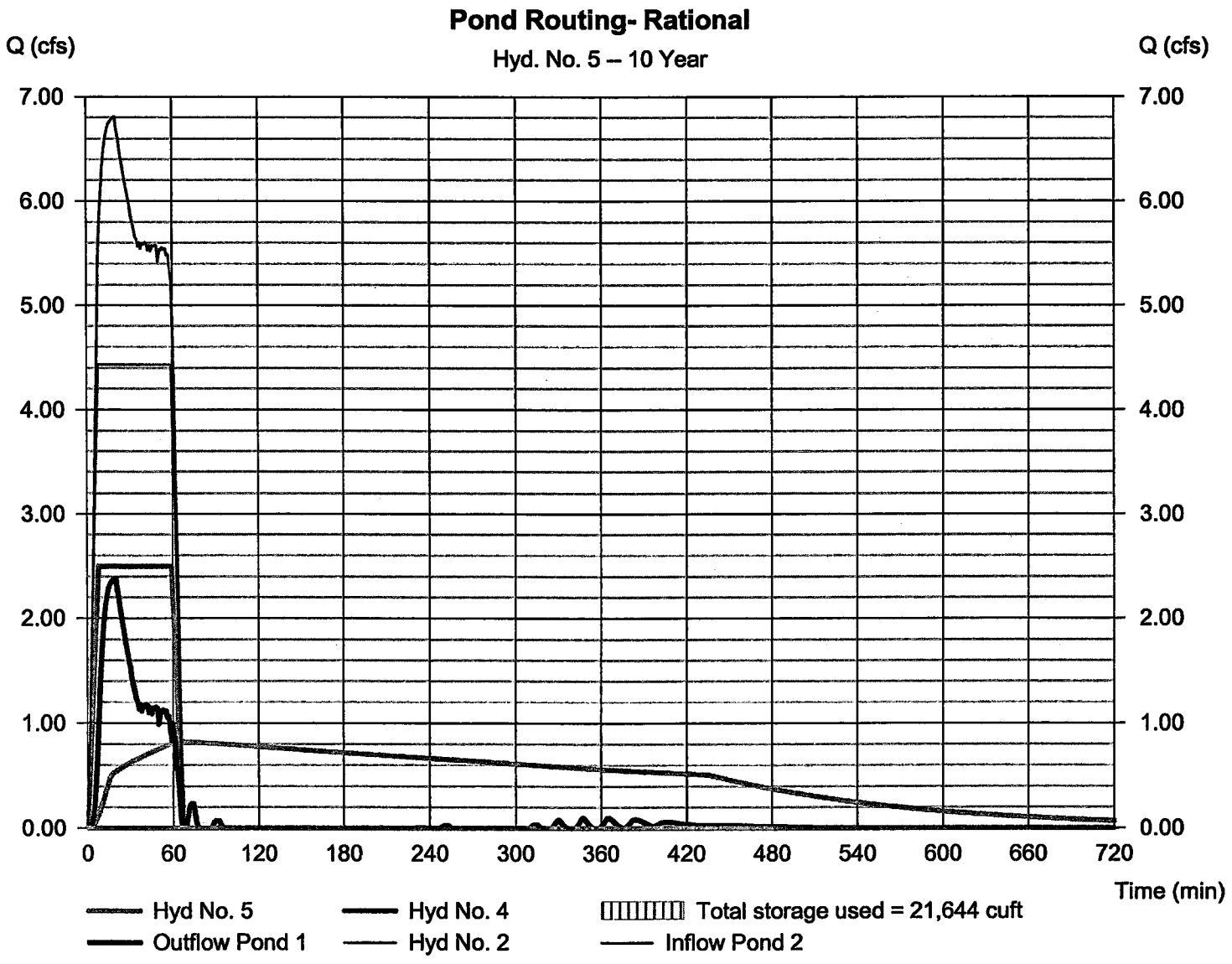
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 5

Pond Routing- Rational

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 166 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= Infiltration Pond
Inflow hyd.	= 4 - Post Development - Forebay	Other Inflow hyd.	= 2 - Post Develo
Max. Elevation	= 112.41 ft	Max. Elevation	= 112.22 ft
Max. Storage	= 3,224 cuft	Max. Storage	= 18,420 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	4.687	1	15	6,327	—	—	—	Pre Development - Basin
2	Mod. Rational	5.617	1	8	26,693	—	—	—	Post Development - Basin
3	Rational	2.640	1	15	3,564	—	—	—	Pre Development - Forebay
4	Mod. Rational	3.251	1	8	14,671	—	—	—	Post Development - Forebay
5	Reservoir(i)	0.000	1	393	0	4, 2	113.68	36,490	Pond Routing- Rational

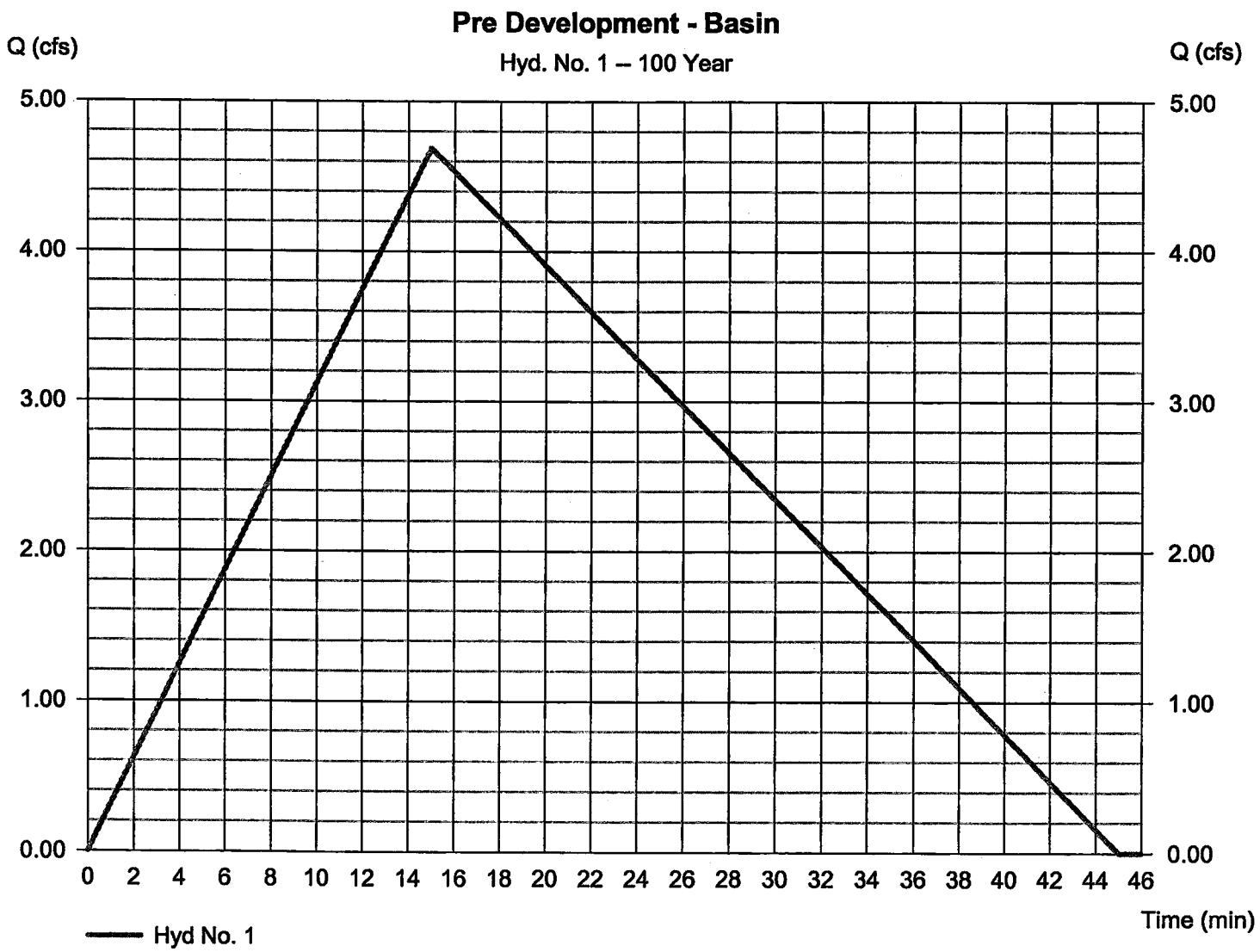
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 1

Pre Development - Basin

Hydrograph type	= Rational	Peak discharge	= 4.687 cfs
Storm frequency	= 100 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 6,327 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.3
Intensity	= 6.822 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



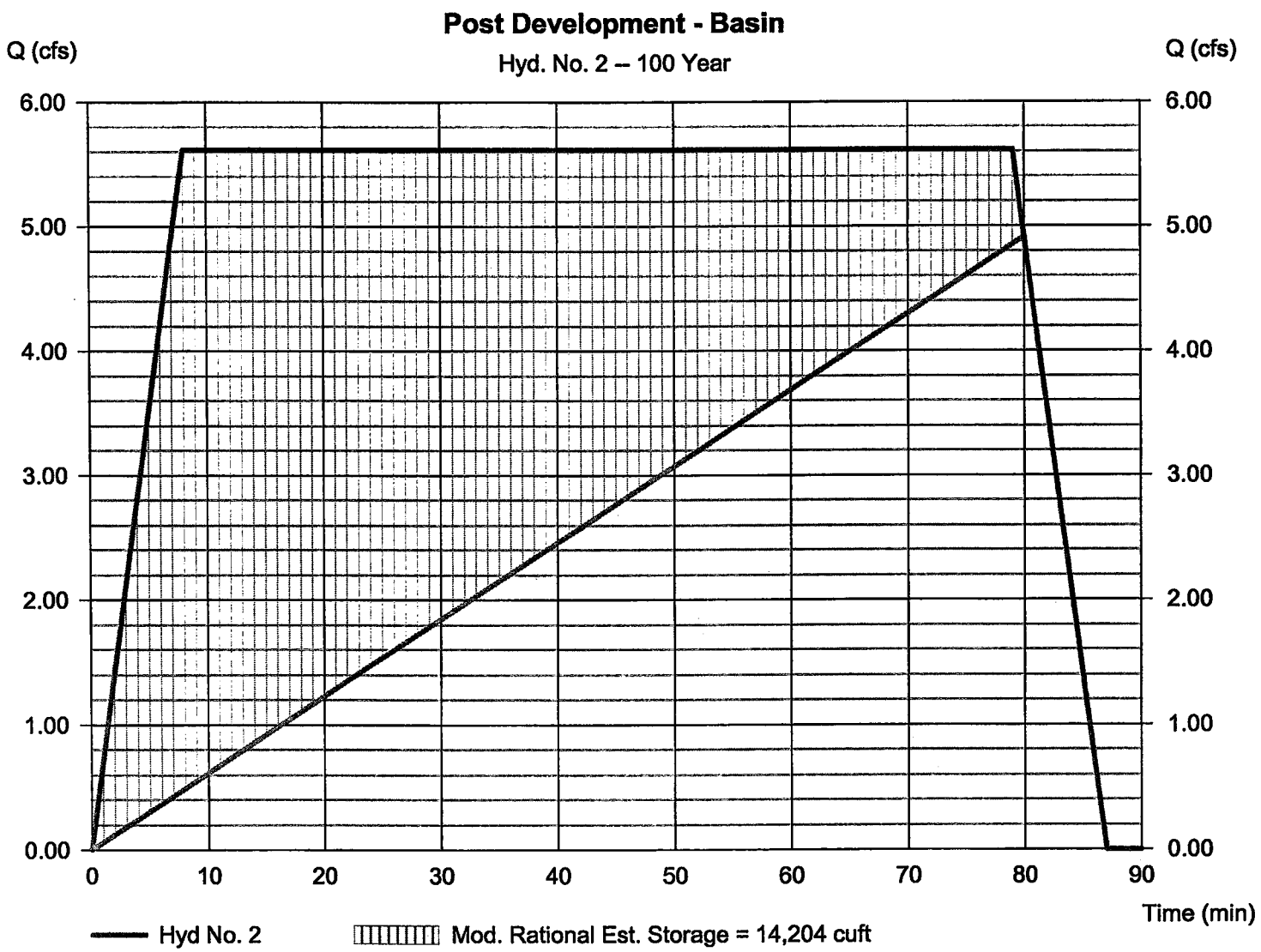
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 2

Post Development - Basin

Hydrograph type	= Mod. Rational	Peak discharge	= 5.617 cfs
Storm frequency	= 100 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 26,693 cuft
Drainage area	= 2.290 ac	Runoff coeff.	= 0.8
Intensity	= 3.066 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 9.9 x Tc
Target Q	= 4.690 cfs	Est. Req'd Storage	= 14,204 cuft



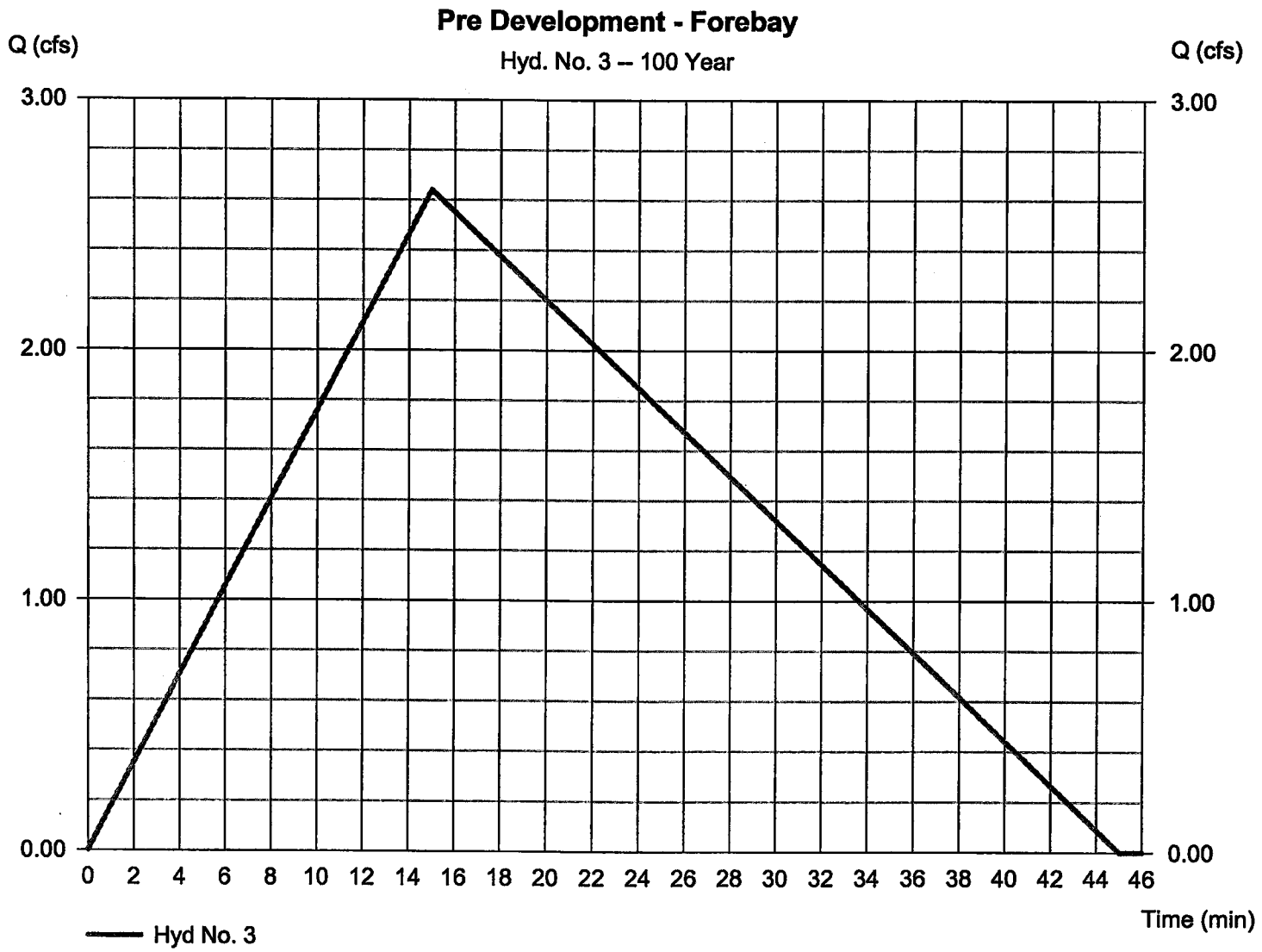
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 3

Pre Development - Forebay

Hydrograph type	= Rational	Peak discharge	= 2.640 cfs
Storm frequency	= 100 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 3,564 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.3
Intensity	= 6.822 in/hr	Tc by User	= 15.00 min
IDF Curve	= JamesCity-NW-14.IDF	Asc/Rec limb fact	= 1/2



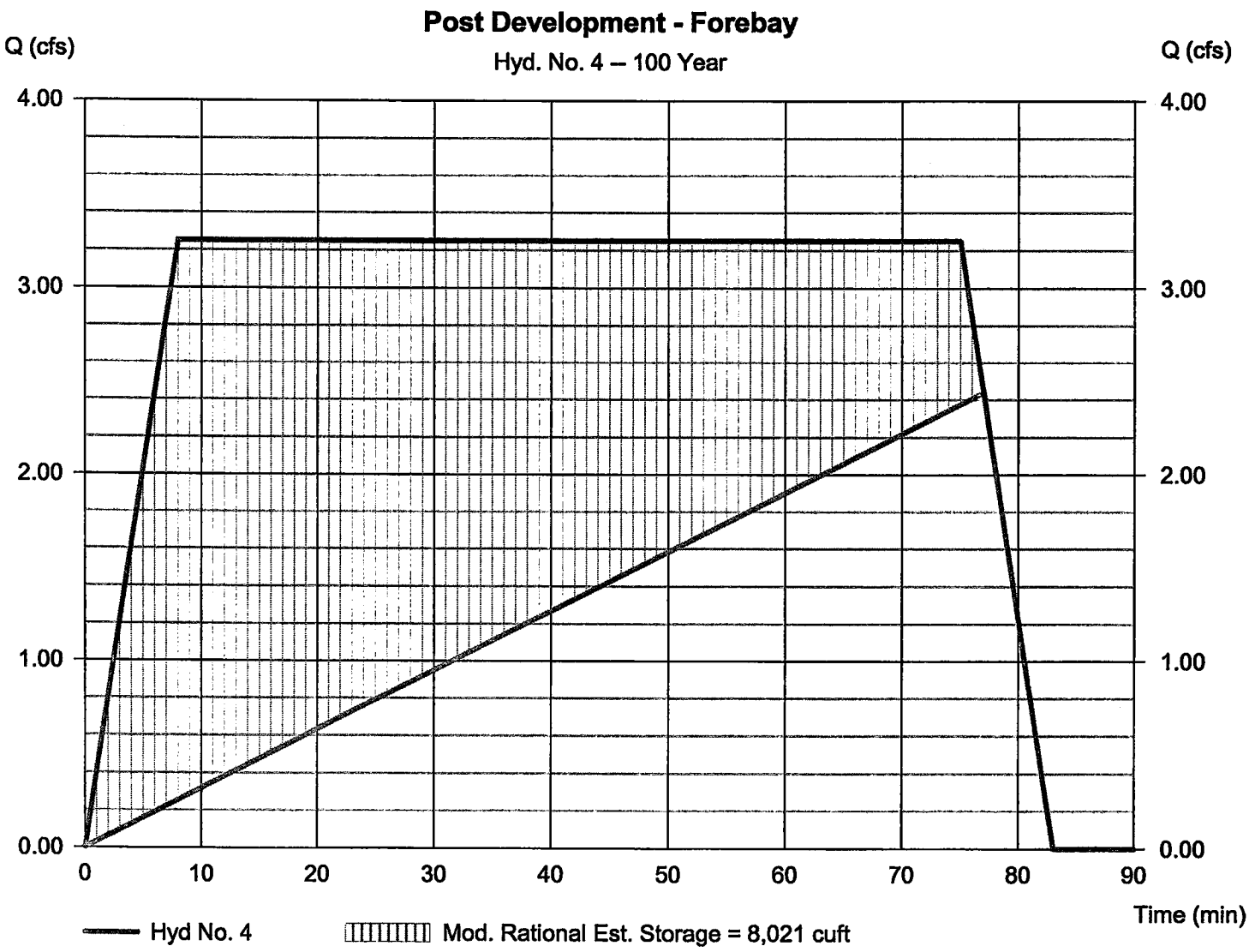
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 4

Post Development - Forebay

Hydrograph type	= Mod. Rational	Peak discharge	= 3.251 cfs
Storm frequency	= 100 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 14,671 cuft
Drainage area	= 1.290 ac	Runoff coeff.	= 0.8
Intensity	= 3.151 in/hr	Tc by User	= 8.00 min
IDF Curve	= JamesCity-NW-14.IDF	Storm duration	= 9.4 x Tc
Target Q	= 2.640 cfs	Est. Req'd Storage	= 8,021 cuft



Hydrograph Report

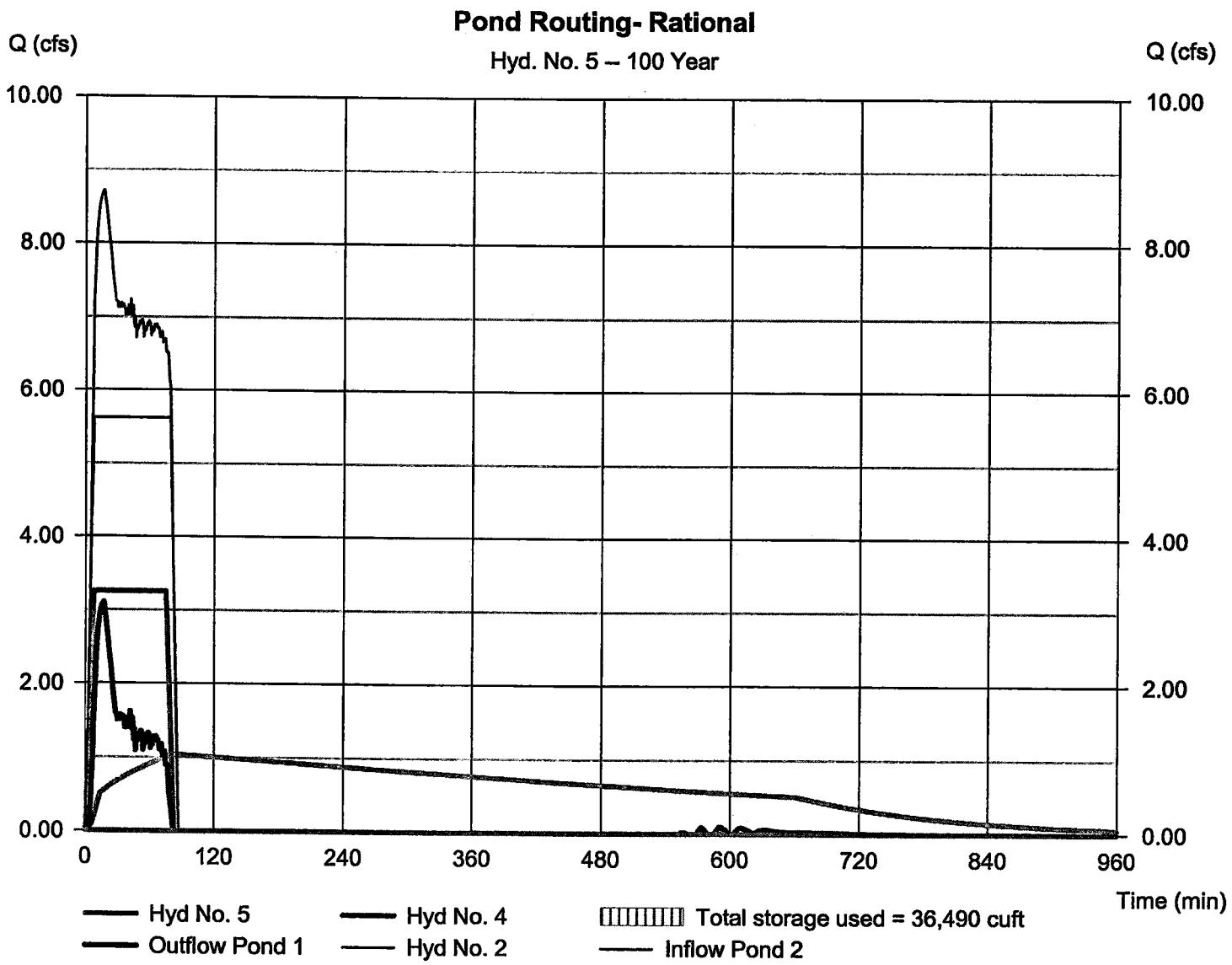
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Feb 17, 2011

Hyd. No. 5

Pond Routing- Rational

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 393 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= Infiltration Pond
Inflow hyd.	= 4 - Post Development - Forebay	Other Inflow hyd.	= 2 - Post Develo
Max. Elevation	= 113.68 ft	Max. Elevation	= 113.52 ft
Max. Storage	= 6,456 cuft	Max. Storage	= 30,034 cuft

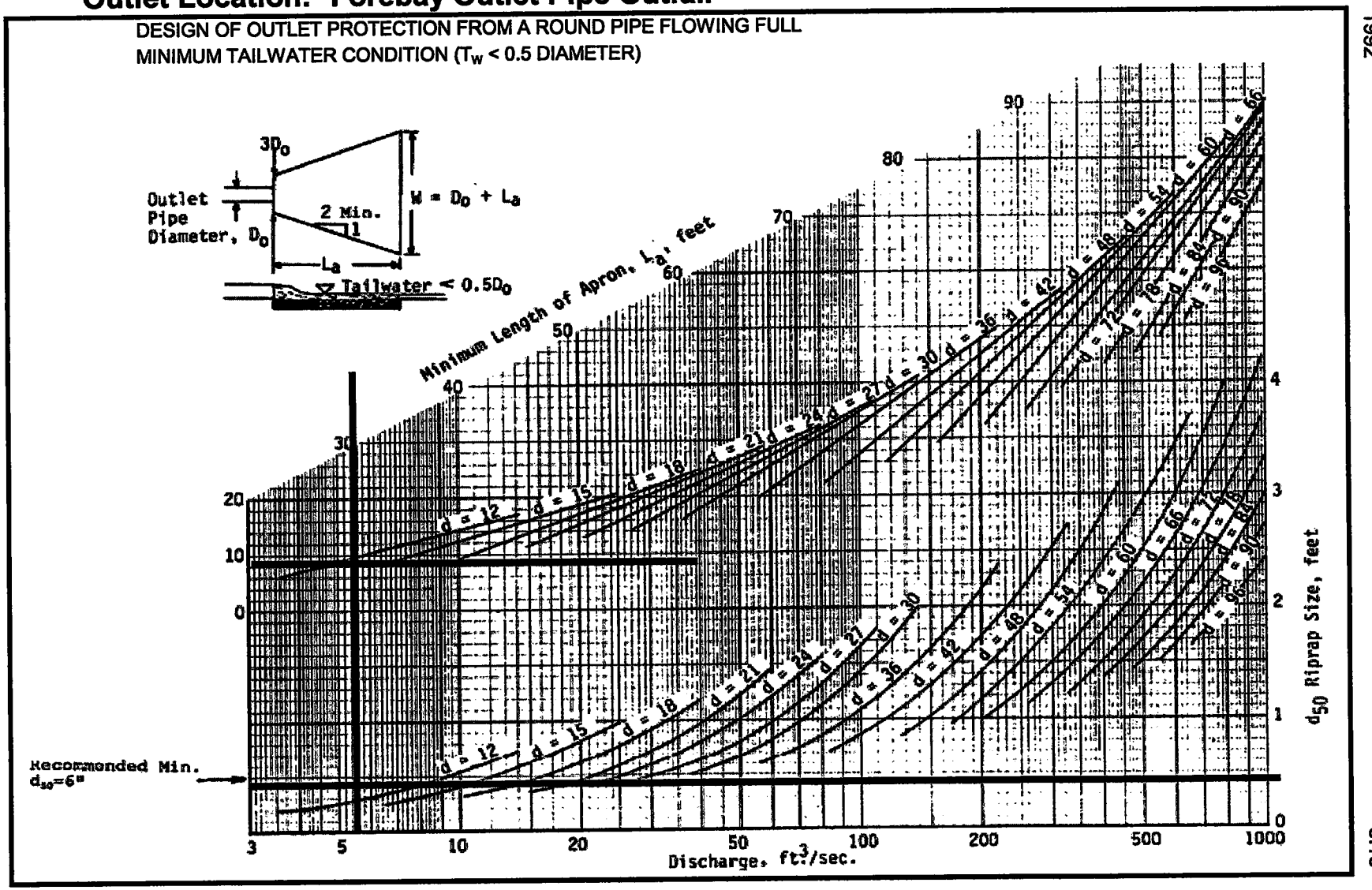
Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Project:	Tractor Supply Company
Project No.:	6753-06
Subject:	Outlet Protection
Date:	2/17/2011
Calculated By:	GVC

AES CONSULTING ENGINEERS

Outlet Location: Forebay Outlet Pipe Outfall



Q =	5.41	cfs	$3D_0$ =	6	ft	W =	11	ft	Depth = 1.5 ft
D_0 =	24	in ✓	L_a =	9	ft	d_{50} =	0.5	ft	

Source: USDA-SCS

1992

III - 164

Plate 3.18-3

3.18

AES CONSULTING ENGINEERS

Project:	Tractor Supply Company
Project No.:	6753-06
Subject:	Riprap Basin For Circular Culvert
Date:	2/17/2011
Calculated By:	GVC

Hydraulic Design of Energy Dissipators for Culverts and Channels
Hydraulic Engineering Circular No. 14, Third Edition
U.S. Department of Transportation Federal Highway Administration - July 2006

Outfall Description: **36" Pipe Outfall**

Pipe Diameter (D) or (W_o) = **3.00** FT.

Flow (Q) = **13.00** CFS (Based on Farm Fresh Infiltration Basin Max. Outfall)

Tailwater Depth (TW) = **1.00** FT.

Determine brink depth (y_o):

$$(K_u)\frac{Q}{D^{2.5}} = (1)\frac{13}{15.59} = 0.83$$

$$\frac{TW}{D} = \frac{1.00}{3.00} = 0.33$$

y_o / D = **0.35** From Figure 3.4

$$y_o = \underset{y_o/D}{0.35} \times \underset{D}{3.00} = 1.05 \text{ FT.}$$

Determine culvert outlet velocity (V_o):

$$\frac{TW}{y_o} = \frac{1.00}{1.05} = 0.952$$

A / D^2 = **0.2450** From Table B.2 where y_o / D = d / D

$$A = A/D^2 \times D^2 = 0.245 \times 9.00 = 2.21 \text{ SF}$$

$$V_o = Q \div A = 13.0 \div 2.21 = 5.9 \text{ FT/S}$$

Determine Froude number (Fr):

$$y_e = (A/2)^{1/2} = 1.05 \text{ FT.}$$

$$Fr = V_o / [(32.2)(y_e)]^{1/2} = 1.01$$

Try d_{50} / y_e = **0.20** d_{50} = **0.20** x **1.05** = **0.21** FT. or **2.5** IN.

Tailwater Parameter, C_o	Equation 10.2		
TW / y_e = **1.00** ÷ **1.05** = **0.95**			
$TW / y_e < 0.75$	C_o	=	1.4
$0.75 < TW / y_e < 1.0$	C_o	=	$4.0 (TW/y_e) - 1.6$
		=	4.0 (**0.95**) - 1.6 = **2.21**
$1.0 < TW / y_e$	C_o	=	2.4

h_s / y_e = 0.86 $(d_{50} / y_e)^{-0.55}$ (Fr) - C_o Equation 10.1

h_s / y_e = 0.86 (**0.20** $)^{-0.55}$ (**1.01**) - **1.40**

h_s / y_e = **0.7132**

h_s = **0.7132** x **1.05** = **0.75** FT.

Check

hs / d_{50} = **3.57** ≥ 2 OK

d_{50} / y_e = **0.20** ≥ 0.1 OK

Riprap Basin Size

Length of Dissipator Pool

L_s = 10 x h_s = **7.5** FT.

or L_s = 3 x W_o = **9.0** FT. Use Larger Value L_s = **9.0** FT.

Total Length

L_B = 15 x h_s = **11.2** FT.

or L_B = 4 x W_o = **12.0** FT. Use Larger Value L_B = **12.0** FT.

Width of Apron

W_B = W_o + 2 (L_B/3) = **11.0** FT.

Length of Apron

L_A = L_B - L_S

= **12.0** - **9.0** = **3.0** FT.

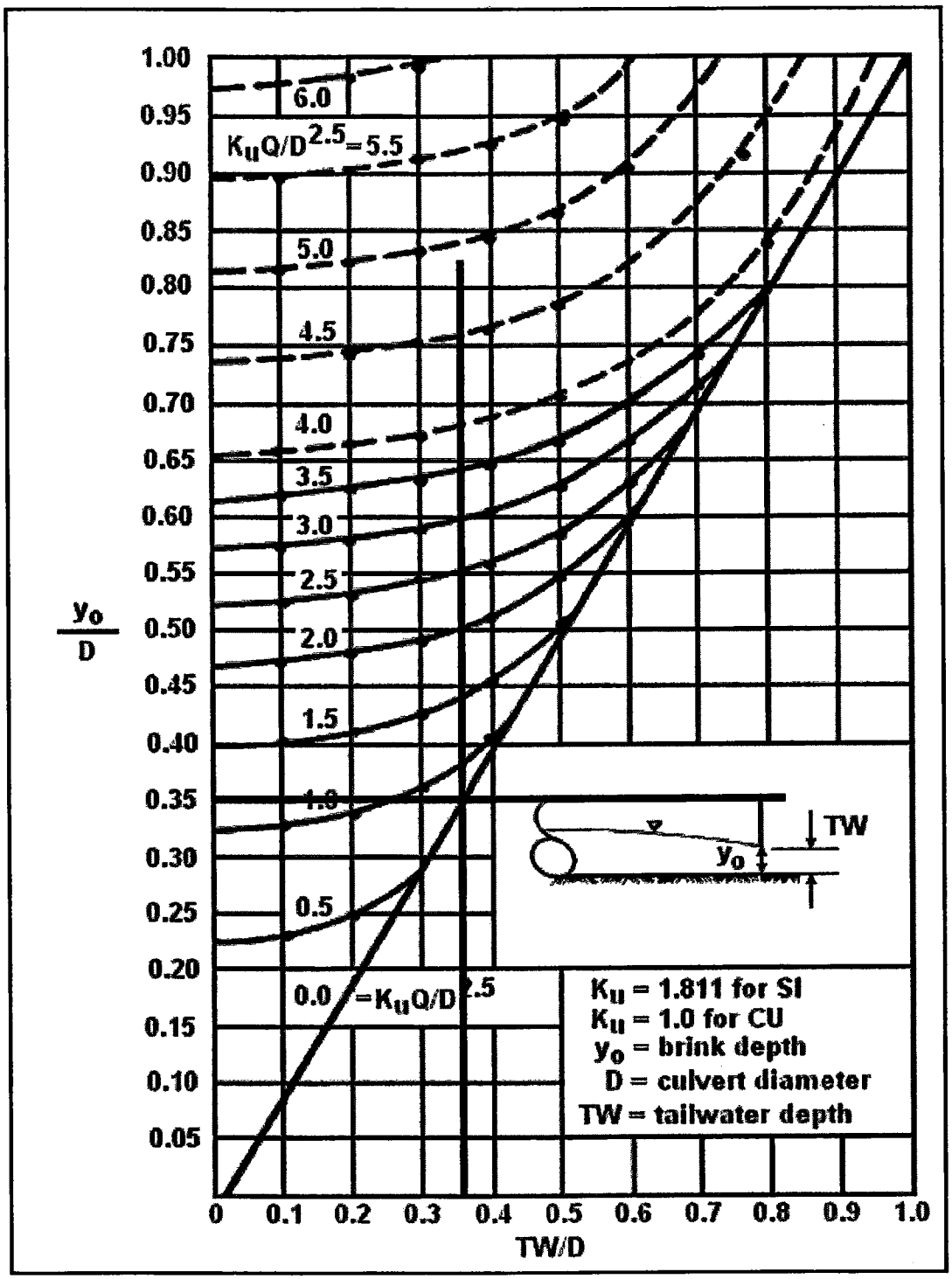


Figure 3.4. Dimensionless Rating Curves for the Outlets of Circular Culverts on Horizontal and Mild Slopes (Simons, 1970)

Table B.2. Uniform Flow in Circular Sections Flowing Partly Full

y/D	A/D^2	R/D	$\frac{(\alpha Qn)}{(D^{8/3} S^{1/2})}$	$\frac{(\alpha Qn)}{(y^{8/3} S^{1/2})}$	y/D	A/D^2	R/D	$\frac{(\alpha Qn)}{(D^{8/3} S^{1/2})}$	$\frac{(\alpha Qn)}{(y^{8/3} S^{1/2})}$
0.01	0.0013	0.0066	0.00007	15.04	0.51	0.4027	0.2531	0.239	1.442
0.02	0.0037	0.0132	0.00031	10.57	0.52	0.4127	0.2562	0.247	0.415
0.03	0.0069	0.0197	0.00074	8.56	0.53	0.4227	0.2592	0.255	1.388
0.04	0.0105	0.0262	0.00138	7.38	0.54	0.4327	0.2621	0.263	1.362
0.05	0.0147	0.0325	0.00222	6.55	0.55	0.4426	0.2649	0.271	1.336
0.06	0.0192	0.0389	0.00328	5.95	0.56	0.4526	0.2676	0.279	1.311
0.07	0.0294	0.0451	0.00455	5.47	0.57	0.1626	0.2703	0.287	1.286
0.08	0.0350	0.0513	0.00604	5.09	0.58	0.4724	0.2728	0.295	1.262
0.09	0.0378	0.0575	0.00775	4.76	0.59	0.4822	0.2753	0.303	1.238
0.10	0.0409	0.0635	0.0097	4.49	0.60	0.4920	0.2776	0.311	1.215
0.11	0.0470	0.0695	0.0118	4.25	0.61	0.5018	0.2799	0.319	1.192
0.12	0.0534	0.0755	0.0142	4.04	0.62	0.5115	0.2821	0.327	1.170
0.13	0.0600	0.0813	0.0167	3.86	0.63	0.5212	0.2842	0.335	1.148
0.14	0.0668	0.0871	0.0195	3.69	0.64	0.5308	0.2862	0.343	1.126
0.15	0.0739	0.0929	0.0225	3.54	0.65	0.5405	0.2988	0.350	1.105
0.16	0.0811	0.0985	0.0257	3.41	0.66	0.5499	0.2900	0.358	1.084
0.17	0.0885	0.1042	0.0291	3.28	0.67	0.5594	0.2917	0.366	1.064
0.18	0.0961	0.1097	0.0327	3.17	0.68	0.5687	0.2933	0.373	1.044
0.19	0.0139	0.1152	0.0365	3.06	0.69	0.5780	0.2948	0.380	1.024
0.20	0.1118	0.1206	0.0406	2.96	0.70	0.5872	0.2962	0.388	1.004
0.21	0.1199	0.1259	0.0448	2.87	0.71	0.5964	0.2975	0.395	0.985
0.22	0.1281	0.1312	0.0492	2.79	0.72	0.6054	0.2987	0.402	0.965
0.23	0.1365	0.1364	0.0537	2.71	0.73	0.6143	0.2998	0.409	0.947
0.24	0.1449	0.1416	0.0585	2.63	0.74	0.6231	0.3008	0.416	0.928
0.25	0.1535	0.1466	0.0634	2.56	0.75	0.6319	0.3042	0.422	0.910
0.26	0.1623	0.1516	0.0686	2.49	0.76	0.6405	0.3043	0.429	0.891
0.27	0.1711	0.1566	0.0739	2.42	0.77	0.6489	0.3043	0.435	0.873
0.28	0.1800	0.1614	0.0793	2.36	0.78	0.6573	0.3041	0.441	0.856
0.29	0.1890	0.1662	0.0849	2.30	0.79	0.6655	0.3039	0.447	0.838
0.30	0.1982	0.1709	0.0907	2.25	0.80	0.6736	0.3042	0.453	0.821
0.31	0.2074	0.1756	0.0966	2.20	0.81	0.6815	0.3043	0.458	0.804
0.32	0.2167	0.1802	0.1027	2.14	0.82	0.6893	0.3043	0.463	0.787
0.33	0.2260	0.1847	0.1089	2.09	0.83	0.6969	0.3041	0.468	0.770
0.34	0.2355	0.1891	0.1153	2.05	0.84	0.7043	0.3038	0.473	0.753
0.35	0.2450	0.1935	0.1218	2.00	0.85	0.7115	0.3033	0.453	0.736
0.36	0.2546	0.1978	0.1284	1.958	0.86	0.7186	0.3026	0.458	0.720
0.37	0.2642	0.2020	0.1351	1.915	0.87	0.7254	0.3018	0.485	0.703
0.38	0.2739	0.2062	0.1420	1.875	0.88	0.7320	0.3007	0.488	0.687
0.39	0.2836	0.2102	0.1490	1.835	0.89	0.7384	0.2995	0.491	0.670
0.40	0.2934	0.2142	0.1561	1.797	0.90	0.7445	0.2980	0.494	0.654
0.41	0.3032	0.2182	0.1633	1.760	0.91	0.7504	0.2963	0.496	0.637
0.42	0.3130	0.2220	0.1705	1.724	0.92	0.7560	0.2944	0.497	0.621
0.43	0.3229	0.2258	0.1779	1.689	0.93	0.7612	0.2921	0.498	0.604
0.44	0.3328	0.2295	0.1854	1.655	0.94	0.7662	0.2895	0.498	0.588
0.45	0.3428	0.2331	0.1929	1.622	0.95	0.7707	0.2865	0.498	0.571
0.46	0.3527	0.2366	0.201	1.590	0.96	0.7749	0.2829	0.496	0.553
0.47	0.3627	0.2401	0.208	1.559	0.97	0.7785	0.2787	0.494	0.535
0.48	0.3727	0.2435	0.216	1.530	0.98	0.7817	0.2735	0.489	0.517
0.49	0.3827	0.2468	0.224	1.500	0.99	0.7841	0.2666	0.483	0.496
0.50	0.3927	0.2500	0.232	1.471	1.00	0.7854	0.2500	0.463	0.463

y = depth of flow, m (ft)
D = diameter of pipe, m (ft)
A = area of flow, m^2 (ft^2)
R= hydraulic radius, m (ft)
Source: USBR (1974)

Q = discharge by Manning's Equation, m^3/s (ft^3/s)
n = Manning's coefficient
S = channel bottom and water surface slope
α = units conversion = 1.49 for SI, 1 for CU

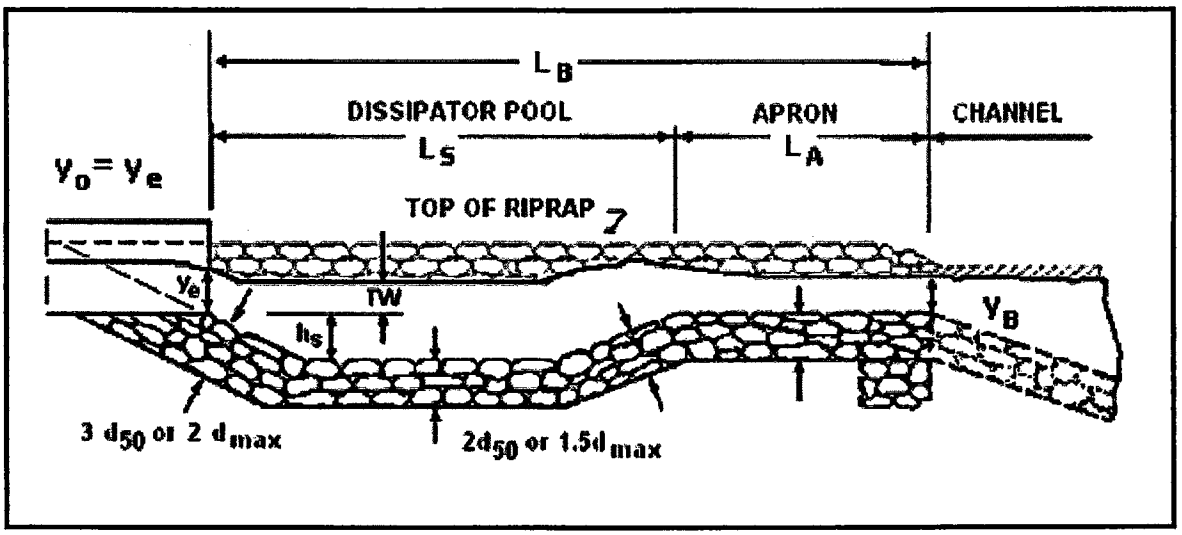


Figure 10.1. Profile of Riprap Basin

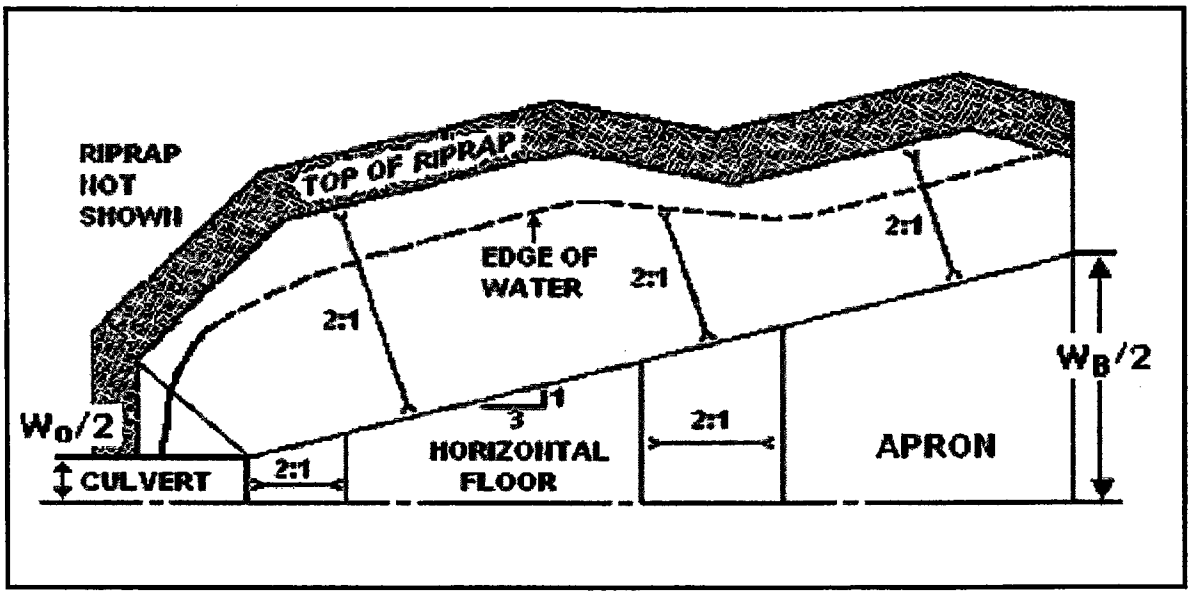


Figure 10.2. Half Plan of Riprap Basin

RECEIVED
FEB 2011
Planning Department

JCC Environmental Divsion

Stormwater Inspection Program

Project Name: TRACTOR SUPPLY

Location: NORGE PT 60/CROAKER RD

Project Number: SP-013-11

Project Start Date: JUNE 2011

Inspector(s): M. MASDEUS

BMP Number: [redacted] YR018

Infiltration/Bio-Retention Practice Construction Inspection Checklist

Key Questions		
Item	**X**	**Comments**
Type of facility (check all that apply)		
a. Infiltration - C1, C2, C3 or C4	X	TYPE C-2 INFIL BASIN
b. Filtration - D2, D3, D4, D5, or D6		
c. Bioretention - D1		
d. Extended detention (storage for Cpv)		
Facility Location		
a. Surface		
b. Underground		
Filtration Media		
a. No filtration media (e.g. dry well)		
b. Sand		
c. Bioretention soil		
d. Peat		
e. Other		
Hydraulic configuration		
a. On-line facility		
b. Off-line facility		
Type of pretreatment facility		Pretreatment must be provided
a. Sediment forebay (above ground)	X	
b. Sedimentation chamber		
c. Grass channel		
d. Grass filter strip		
e. Plunge pool		
f. Stone diaphragm		
g. Other		Type:

C. Excavation/Grading S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
Excavation and grading conform to plans	✓			**BENCHMARK INSPECTION** 8/25/11

D. Installation

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
Underground chambers or pipes installed	✓			BENCHMARK INSPECTION
Liner installed correctly, if applicable N/A				BENCHMARK INSPECTION
Filter bed composition, depth and	✓			BENCHMARK INSPECTION

Additional Comments:

Project Name: [illegible]
Location: [illegible] AT 60/[illegible]
Project Number: SP-017-11
Date of Inspection: ON-GOING
Inspector(s): M MASMOSM
Date: ON-GOING
Time:

Closed Storm Drain System Construction Inspection Checklist

Development Status (Active, Inactive, Complete): ACTIVE

Stage of Construction (Pre-Construction, Installation, etc): INSTALLATION

Key Questions Item	X	Comments
1. Type of closed pipe system	x	
a. Round	X	
b. Elliptical		
c. Other		
2. Type of pipe material		
a. Reinforced concrete pipe (RCP)	X	
b. HPDE	X	
c. Corrugated metal		
d. Other		

A. Pre-Construction S = Satisfactory U = Unsatisfactory N/A = Not Applicable Item	S	U	N/A	Comments
1. Pre-construction meeting	✓			7/16/11
a. Review of plan details, and sequence of construction	✓			↓
b. Review of required inspections, geo-tech reports, checklists & certificates	✓			↓

B. Site Preparation S = Satisfactory U = Unsatisfactory N/A = Not Applicable Item	S	U	N/A	Comments
1. Pipe and structures delivered and inspected prior to construction	✓			8/17/11
a. Inspect for material, diameter, dimensions and condition	✓			↓

C. Excavation/Grading S = Satisfactory U = Unsatisfactory N/A = Not Applicable Item	S	U	N/A	Comments
1. Excavation and grading conform to plans	✓			9/16/11
a. Trench bottom shaped to permit barrel of pipe to be in direct contact with soil or bedding	✓			↓
b. Areas excavated below established grade shall be backfilled with VDOT #25 or 26 aggregate (unless water is encountered - then #57 aggregate shall be used).	✓			↓

2. All earthwork shall be in conformance with VDOT Standard and Specification #303				

D. Installation

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Bedding per VDOT 302.03(a)2(b)	✓			8/22/11
a. Material shall be VDOT #25 or #26 aggregate or as specificied on the approved plans (unless water is encountered - then #57 aggregate shall be used).				
b. Shall be lightly compacted and shaped so pipe is in full contact with bedding				
c. Shall be shaped to accommodate the bell when bell and spigot pipe is used				
2. Placing Pipe per VDOT 302.03(a)2c	✓			8/22/11 / 9/16/11
a. Pipe shall be placed beginning at downstream end with bell or groove ends of rigid pipe facing upstream	✓			
b. Pipe shall be inspected before backfill is placed	✓			
3. Joining Pipe per VDOT 302.03(a)2(d)				
a. Rigid pipe sections shall have ends fully entered and inner surfaces flush and even				
b. Joints shall be sealed to form a leak-resistant joint				
c. Flexible pipe sections shall be firmly joined by approved coupling bands to form a leak-resistant joint	✓			9/16/11 - 9/21/11
d. When pipes enter structure, the inside of the pipe/structure joint shall be flush and fully mortared				
e. Lift holes in rigid pipe shall be plugged with a lift hole plug furnished by the manufacturer (302.03)				
4. Backfill shall be compacted in horizontal layers not more that six inches in thickness, loose measurement. VDOT 303.04(g)	✓			9/16/11 - 9/21/11
5. Compaction of backfill shall be in accordance with VTM-1 to the following densities:				
a. 95% beneath pavement, walks and road shoulders				
b. 90% in other unpaved areas	✓			Per ECS REPORTS - see Rec'd on CD
6. Testing and Inspection				
a. Each lift shall be tested for compaction on alternating sides of the pipe at intervals not to exceed 300 feet				
b. Pipe shall be inspected before any backfill is placed. (VDOT 302.03(a)2c)				

E. Final Inspection

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Pipes and structures shall be free of sediment and debris	✓			3/23/12
2. All inlet protection measures removed	✓			↓
3. All joints sealed	✓			
4. Outlet protection installed and operational	✓			
5. Configuration and dimensions of pipe system conforms with approved plans	✓			

G. Permit Approval and Documentation

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Construction certification submitted and	✓			3/22/12
2. As-built plans submitted and approved	✓			↓
3. Performance bond status				
a. Not released				
b. Partial release				
c. Full release				
4. Certificate of completion issued				N/A

Additional Comments:

Actions to be Taken:

		X	
1. No action necessary; continue routine			
2. Correct noted deficiencies			Correct by:
a.	1st notice		
b.	2nd notice		
3. Submit modifications to project plans			Submit by:

AES
CONSULTING ENGINEERS

Hampton Roads | Central Virginia | Middle Peninsula

5248 Olde Towne Road, Suite 1, Williamsburg, Virginia 23188
Phone (757) 253-0040 / Fax (757) 220-8994

aesva.com

Environmental Division
JAN 27 2012
RECEIVED

Letter of Transmittal

ATTN: **Michael Majdeski**

CO.: James City County ~~Planning~~ ERP

Address: 101-E Mouts Bay Road

Williamsburg, Virginia 23188

cc:

DATE	JOB NO.
January 26, 2012	W06~~1~~7-53-06

FROM: Marc Bennett

RE
Tractor Supply Company
Norge Center

WE ARE SENDING YOU THE FOLLOWING ITEMS: X Attached ☐ Under separate cover via

☐ Original(s) X Print(s) ☐ Plan(s) ☐ Specification(s) ☐ Change Order

☐ Copy of letter(s) ☐ Other:

COPIES	DATE	No. of Pages	DESCRIPTION
2	12/14/2011	2	BMP Record Drawings and record drawings of on-site storm sewer
2	-	Several	BMP Certification

THESE ARE TRANSMITTED as checked below:

☐ For your approval ☐ For your signature ☐ For review and comment

X For your use ☐ As you requested ☐ As requested by:

☐ Other:

REMARKS:
Hey, Michael. Hope to see you soon!
Record drawings have been completed for the BMP and on site storm sewer. Please use the attached in your field check. I have already advise Toano Contractors of a small rill on the side slope of the BMP.
Thank You!

VIA: ☒Hand Deliver ☐UPS Ground ☐UPS Next Day Air ☐USPS Mail ☐ Other:

If enclosures are not as noted, kindly notify us at once.

James City County Environmental Division
Stormwater Management / BMP Inspection Report
Infiltration Basin and Trench Facilities

County BMP ID Code (if known): YR-018

Name of Facility: TRACTOR SUPPLY INFILTRATION BMP No.: _____ Date: 3/23/12

Location: ADJACENT TO NORGE SHOPPING CENTER + RT 60

Name of Owner: TKC CL, LLC CHARLOTTE, NC.

Name of Inspector: M. MASDESKI

Type of Facility: INFIL BASIN C-2

Weather Conditions: SUNNY 75° Type: ☑ Final Inspection ☐ County BMP Inspection Program ☐ Owners Inspection

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

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

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

Facility Item	O.K.	Routine	Urgent	Comments
Accessibility:				
Roads	✓			
Parking Areas	✓			
Gates				N/A
Locks				N/A
Safety Fencing				N/A
Observation Wells/Areas:				
Trap Doors	✓			
Manhole Covers				N/A
Grates				N/A
Steps				N/A
Pretreatment Devices: ☐ Inlet ☐ Sump ☑ Forebay ☐ Other				
Sediment	✓			
Trash & Debris	✓			
Structure	✓			
Other				

Facility Item	O.K.	Routine	Urgent	Comments
Primary Storage/ Infiltration Area:				
Trash & Debris	✓			
Sediment	✓			
Ponding / Drawdown	✓			DRY AT TIME OF INSPECTION
Surface Aggregates				N/A
Aesthetics	✓			
Other				
Inlet Structure # 1 (Describe Location): SW CORNER				
Condition of Structure	✓			
Erosion	✓			
Trash and Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other				
Inlet Structure # 2 (Describe Location): NE CORNER				
Condition of Structure	✓			
Erosion	✓			
Trash and Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other				
Inlet Structure # 3 (Describe Location): N/A				
Condition of Structure				
Erosion				
Trash and Debris				
Sediment				
Aesthetics				
Other				
Outlets - Overflow or Bypass Control Structures (Describe Location): N CORNER				
Condition of Structure	✓			
Erosion	✓			
Trash and Debris	✓			
Sediment	✓			
Other				
Nuisance Type Conditions:				

Facility Item	O.K.	Routine	Urgent	Comments
Mosquito Breeding	✓			
Animals, Rodents	✓			
Graffiti	✓			
Other				
Perimeter (Contributing Drainage Area) Conditions: see below				
Stabilization	✓			
Vegetation Condition	✓			
Trash and Debris	✓			
Aesthetics	✓			
Other				

Remarks:

- Remove remaining E+S measures

Overall Environmental Division Internal Rating: 4/5

Signature: Min P. Min **Date:** 3/22/12

Title: Sr. Resource Inspector

SWMProg\BMP\CoInspProg\SubDetInfil.wpd

James City County Environmental Division
Stormwater Management/BMP Record Drawing & Construction Certification Review
Tracking Form

Project Name: TRACTOR SUPPLY - NORGE
County Plan No.: SP-017-11
Stormwater Management Facility: INFILTRATION BASINS - C3
BMP Phase #: ☐ I ☒ II ☑ III
✓ Information Package Received. Date/By: 1/27/12 - M. MAJESKI
✓ Completeness Check:
- ✓ Record Drawing Date/By: 1/16/12 - M. BENNETT
- ✓ Construction Certification Date/By: 1/16/12 - M. BENNETT
- ✓ RD/CC Standard Forms (Required for all BMPs after Feb 1st 2001Only)
- ✓ Insp/Maint Agreement # / Date: 11001J101 / 6/16/11
- ✓ BMP Maintenance Plan Location: ON ASBUILT DRAWINGS (COPIES INCLUDED)
- ✓ Other: GEO-TECHNICAL REPORTS (ON CD)

✓ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review
- ✓ Yes ☐ No Location: PLAN REVIEW COMMENTS + SITE PLAN NOTES

✓ Assign **County BMP ID Code #**: Code: YR018
✓ Preliminary Input/Log into Division's "As-Built Tracking Log"
✓ Add Location to GIS Map. Obtain basic site information (GPIN, Owner, Address, etc.)
✓ Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)
✓ Active Project File Review (correspondence, H&H, design computations, etc.).
✓ Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.).
✓ Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review).
✓ Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).
✓ Final Inspection (FI) Performed Date: MPM 3/23/12
✓ Record Drawing (RD) Review Date: WAC 3/22/12
✓ Construction Certification (CC) Review Date: WAC 3/22/12
✓ Actions:
- ☐ No comments.
- ✓ Comments. Letter Forwarded. Date: 3/23/12
- ✓ Record Drawing (RD) - OK
- ✓ Construction Certification (CC) - OK
- ✓ Construction-Related (CR) - OK
- ✓ Site Issues (SI) (SEE FIELD INSPECTION REPORT)
- ✓ Other : N/A

✓ Second Submission: N/A
✓ Reinspection (if necessary): 5/9/12 SITE ISSUES CORRECTED
✓ Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release.
✓ Complete "Surety Request Form".
✓ Check/Clean active file of any remaining material and finish "As-Built" file.
✓ Add to County BMP Inventory/Inspection schedule (Phase I, II or III).
✓ Copy Final Inspection Report into County BMP Inspection Program file.
✓ Obtain Digital Photographs of BMP and save into County BMP Inventory.
✓ Request mylar/reproducible from As-Built plan preparer. - LOCATED ON CD
✓ 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.

Final Sign-Off

Inspector: [signature] Date: 5/17/12
Chief Engineer: [signature] Date: 5/18/12

*** See separate checklist, if needed.