



TOWN COUNCIL WORK SESSION

Monday, September 25, 2017 @ **6:00pm**
Warren County Government Center

1. Bid Evaluation and Financing the new the Police Department – *Moseley Architects/Staff*
 2. Final Plat/Subdivision Plan Application for the extension of Progress Drive and subdivision for the Criminal Justice Academy – *Director of Planning/Zoning*
-

REGULAR TOWN COUNCIL MEETING

Monday, September 25, 2017 @ 7:00pm
Warren County Government Center

1. Pledge of Allegiance
2. Moment of Silence
3. Roll Call
4. Approval of the Regular Council Meeting minutes of September 11, 2017
5. Receipt of Petitions and/or Correspondence from the Public
6. Reports:
 - a. Report of special committees or Town officials and Town Manager.
 - * **Report from Director of Community Development/Tourism**
 - * **Report from EDA Executive Director Jennifer McDonald**
 - b. Requests and inquiries of Council members.
 - c. Report of the Mayor
 - d. Proposals for addition/deletion of items to the Agenda.
7. **CONSENT AGENDA ITEMS** – (ROLL CALL VOTE REQUIRED)
 - A. COUNCIL APPROVAL – None
8. **COUNCIL TO HEAR BAR APPEAL** - Economic Development Authority/Afton Inn
9. **PUBLIC HEARING** – Ordinance Amendment Pertaining to Flea Markets (*1st Reading*)
10. **COUNCIL APPROVAL** – Budget Amendment for Primary Extension Project - VDOT
11. **COUNCIL APPROVAL** – Budget Amendment for Risk Management Grant from VML
12. **COUNCIL APPROVAL** – Final Plat/Subdivision Plan Application for the extension of Progress Drive and subdivision for the Criminal Justice Academy
13. **COUNCIL APPROVAL** – Budget Amendment for Leach Run Parkway
14. **COUNCIL APPROVAL** - Bid for two (2) vehicles in Public Works
15. **PUBLIC HEARING** – Adoption of Property Maintenance Code and Establishment of a Rental Inspection District (*1st Reading*)

1



Town of Front Royal, Virginia Work Session Agenda Form

Date: 9/25/17

Agenda Item: Bid evaluation and financing of New Police Department

Summary: Discuss awarding the construction contract, financing, and funding of the new police department.

Council Discussion: Council is requested to discuss the future direction of the Town relating funding and financing the construction of the new police department.

Staff Evaluation: The most recent estimate provided by Mosely Architects to build the new police department is \$10,037,331, the contract for the clerk of the works totals \$173,400.00 and the remaining payments to Mosely Architects total \$116,526.88. The total estimated remaining cost for the project is \$10,327,257.88.

Beginning in FY2012, the Town raised the real estate tax rates allocating a portion of the \$0.02 per \$100 real estate tax increase to the New Police Department, Leach Run Parkway, & the West Main Connector Road at the time allowed \$75,000 to be allocated to each project.

In FY2015 an additional \$0.01 per \$100 of the real estate tax rate was allocated to the new Police Department, adding an additional \$112,500 in funding toward the project to bring the total allocation to \$187,500.

During FY2017 the real estate tax rate was increased \$0.005 per \$100 adding an additional \$55,000 toward the project to bring the total allocation from real estate taxes to \$242,500. Also in FY2017 there was \$100,000 added toward the allocation from not requiring the \$100,000 repayment of the Criser Road Trail making the total allocation for FY2017 the amount of \$342,500.

Currently, the remaining balance of encumbered funds from prior allocations & FY18 totals \$444,986.57.

On August 8, 2016 council approved a resolution to participate in the New Market Tax Credit Program which allowed \$9,000,000 for the construction of the new Police Department. The Warren County Economic Development Authority can allow up to \$12,000,000 for the Police Department if Town Council approves a revised resolution.

Budget/Funding: New Market Tax Credit Funding for the project - \$10,0000.00
Previously allocated funds - \$327,257.88

Legal Evaluation: Town Attorney will be available for questions

Staff Recommendations: Staff recommends for council to approve a revised resolution for the New Market Tax Credit Program, then award the construction bid to the lowest bidder, and for council to consider raising the real estate tax rate in small increments over a period of years to accommodate the additional revenue needed to repay the debt service that will begin as a result of the New Market Tax Credit Program.

Increasing the real estate tax incrementally over a period of years will help prevent a sudden high tax increase due to the end of the New Market Tax Credit Program. The additional funds could be set aside to then help decrease the amount of debt service required at the end of the New Market Tax Credit Program. Revenues and assessments change yearly, so it would be advisable to review revenues and adjust accordingly. Based on current rates/revenues/assessments a starting point may be to consider a \$0.005 per \$100 real estate tax rate increase each year to accommodate the debt service associated with the new Police Department Building.

An increase of \$0.005 per \$100 on a property assessed at \$200,000 would equate to an increase of \$10.00 annually.

Town Manager Recommendation: Town Manager will be available

Council Recommendation:

☐ Additional Work Session ☐ Regular Meeting ☐ No Action

Consensus Poll on Action: ____ (Aye) ____ (Nay)

TOWN OF FRONT ROYAL, VIRGINIA

Quotation Tabulation

Item: **POLICE DEPARTMENT HEADQUARTERS CONSTRUCTION**

Quotation **#24**

Date: **September 7, 2017**

Replied **4**

Vendor Quotation				
	LANTZ CONSTRUCTION COMPANY OF WINCHESTER	HOWARD SHOCKEY & SONS, INC.	DUSTIN CONSTRUCTION	KELLER BROTHERS, INC.
	WINCHESTER, VA	WINCHESTER, VA	IJAMSVILLE, MD	MOUNT AIRY, MD
QUANTITY	QUOTATION	QUOTATION	QUOTATION	QUOTATION
CONSTRUCTION FOR THE NEW POLICE DEPARTMENT HEADQUARTERS				
BASE BID	\$7,775,000.00	\$7,840,000.00	\$7,701,251.00	\$8,215,000.00
<u>UNIT PRICE ALLOWANCES:</u>				
500 CU.YD. - ADDITIONAL EARTHWORK TO IMPORT AND PLACE FILL	\$12,500.00 (\$25.00/CY)	\$15,818.00 (\$31.64/CY)	\$15,000.00 (\$30.00/CY)	\$27,500.00 (\$55.00/CY)
500 CU.YD. - REMOVAL AND OFF-SITE DISPOSAL OF UNCLASSIFIED SOIL	\$11,000.00 (\$22.00/CY)	\$11,600.00 (\$23.20/CY)	\$17,500.00 (\$35.00/CY)	\$15,000.00 (\$30.00/CY)
50 CY - ADDITIONAL SELECT BACKFILL	\$1,500.00 (\$30.00/CY)	\$1,584.00 (\$31.60/CY)	\$2,250.00 (\$45.00/CY)	\$4,750.00 (\$95.00/CY)
TOTAL QUOTATION	\$7,800,000.00	\$7,869,002.00	\$7,736,001.00	\$8,262,250.00

The above proposals verified to specifications and compliance with terms and conditions.

Purchasing Agent

**TOWN OF FRONT ROYAL
NEW POLICE HEADQUARTERS
CONSTRUCTION BUDGET ESTIMATE**

CONSTRUCT 2040 NEEDS

September 14, 2017

CONSTRUCTION COSTS

New Police Headquarters	15,751 SF @	\$280	\$4,402,854
Support Building	7,208 SF @	\$256	\$1,843,750
Site work	3.4 AC @	\$438,058	\$1,489,397
Construction Cost Subtotal			\$7,736,001

OTHER COSTS

Furniture Allowance	\$470,628
Geotechnical Study	\$10,102
Base Mapping Survey/Easement Plats	\$6,500
Architectural/Engineering Services	\$654,000
Testing and Inspections Allowance	\$78,000
Data/IT Infrastructure/Telephone Allowance	\$160,000
Fiber Line Extension/Connection Fees	\$47,100
Moving Expenses Allowance	\$20,000
Emergency Communications Consoles (3)	\$75,000
Property Acquisition Allowance	Not included
Permitting Fees	Not included
Utility Connection Fees	Not included
Legal Expenses	Not included
Financing Expenses	Not included
Other Costs Subtotal	\$1,521,330

Project Cost Subtotal **\$9,257,331**

Project Budget Contingency (10% of Construction Cost) \$780,000

TOTAL **\$10,037,331**

**TOWN OF FRONT ROYAL
NEW POLICE HEADQUARTERS
VALUE ENGINEERING BUDGET ESTIMATE**

CONSTRUCT 2040 NEEDS

September 14, 2017

CONSTRUCTION COSTS

New Police Headquarters	15,751 SF @	\$280	\$4,402,854
Support Building	7,208 SF @	\$256	\$1,843,750
Site work	3.4 AC @	\$438,058	\$1,489,397
Construction Cost Subtotal			\$7,736,001

OTHER COSTS

Furniture Allowance	\$470,628
Geotechnical Study	\$10,102
Base Mapping Survey/Easement Plats	\$6,500
Architectural/Engineering Services	\$654,000
Testing and Inspections Allowance	\$78,000
Data/IT Infrastructure/Telephone Allowance	\$160,000
Fiber Line Extension/Connection Fees	\$47,100
Moving Expenses Allowance	\$20,000
Emergency Communications Equipment Cost	\$75,000
Other Costs Subtotal	\$1,521,330

Project Cost Subtotal	\$9,257,331
------------------------------	--------------------

VE Items

Furniture Allowance	-\$48,000
Perimeter Wall to Fencing	-\$340,000
Eliminate Generator	-\$190,000
Other Costs Subtotal	-\$578,000

Project Cost Subtotal	\$8,679,331
------------------------------	--------------------

Project Budget Contingency (10% of Construction Cost)	\$780,000
---	-----------

TOTAL	\$9,459,331
--------------	--------------------

Estimated Expense & Revenues Associated with Buidling of Police Department Headquarters

	NEW MARKET TAX CREDIT PROGRAM		Full Debt Service on \$11 Million (3.25% for 20 Years)	R/E TAX REVENUE ALLOCATED TO POLICE DEPT HQ		
	Interest Only Paid on \$11 Million Minimum 7 Years	\$7.7 Million Loan (70% of \$11 Million) (3.25% for 20 Years)		R/E Tax Rate Per \$100	Possible R/E Tax Rate Increase	Estimated Police Dept HQ R/E Tax Allocation
FY2018	\$165,000		\$119,600	\$ 0.135		\$ 242,500
FY2019	\$165,000		\$750,675	\$ 0.140	\$ 0.005	\$ 292,500
FY2020	\$165,000		\$750,675	\$ 0.145	\$ 0.005	\$ 342,500
FY2021	\$165,000		\$750,675	\$ 0.150	\$ 0.005	\$ 392,500
FY2022	\$165,000		\$750,675	\$ 0.155	\$ 0.005	\$ 442,500
FY2023	\$165,000		\$750,675	\$ 0.160	\$ 0.005	\$ 492,500
FY2024	\$165,000		\$750,675	\$ 0.163	\$ 0.003	\$ 522,500
FY2025	\$165,000		\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2026	\$165,000	\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2027		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2028		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2029		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2030		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2031		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2032		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2033		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2034		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2035		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2036		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2037		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2038		\$525,950	\$750,675	\$ 0.163	\$ -	\$ 522,500
FY2039		\$525,950		\$ 0.163	\$ -	\$ 522,500
FY2040		\$525,950		\$ 0.163	\$ -	\$ 522,500
FY2041		\$525,950		\$ 0.163	\$ -	\$ 522,500
FY2042		\$525,950		\$ 0.163	\$ -	\$ 522,500
FY2043		\$525,950		\$ 0.163	\$ -	\$ 522,500
FY2044		\$525,950		\$ 0.163	\$ -	\$ 522,500
FY2045		\$525,950		\$ 0.163	\$ -	\$ 522,500
SUBTOTAL	\$1,485,000	\$10,519,000		\$ 0.163	\$ -	\$ 522,500
TOTAL INTEREST & DEBT EXP		\$12,004,000	\$15,133,100			

*All figures are based on current estimated expenses, revenues, & assessments all of which are subject to change
9/19/2017

2



Item No. 2

Town of Front Royal, Virginia Work Session Agenda Form

Date: September 25, 2017

Agenda Item: Subdivision Plan and Final Plats for Progress Drive Extension and subdivision for the Criminal Justice Academy

Summary: The Industrial Development Authority (Economic Development Authority) has submitted a Subdivision Plan and Final Plat for the extension of Progress Drive, intended to access the property for a future criminal justice academy, and other possible future development areas. In addition to the Subdivision Plan and Final Plat, the applications includes the required bond, stormwater maintenance agreement, and deed of restrictions that Town Council required in association with the past Special Exception application. Pursuant to Town Code 148-3 15.D.3, Town Council is required to review and approve the Subdivision Plan and Final Plat for Major Subdivisions within 60 days from review by the Planning Commission. The Planning Commission is scheduled to take action on the application at their meeting on September 20, 2017.

Council Discussion:

Staff Evaluation: Attachments

Budget/Funding: None

Legal Evaluation: Town Attorney will be available

Staff Recommendations: Recommends approval

Town Manager Recommendation: Recommends approval

Council Recommendation:

☐ Additional Work Session ☐ Regular Meeting ☐ No Action
Consensus Poll on Action: ____ (Aye) ____ (Nay)

Work Session

TOWN OF FRONT ROYAL
DEPARTMENT OF PLANNING & ZONING



STAFF REPORT FOR THE SEPTEMBER 20, 2017 PLANNING COMMISSION MEETING

Updated 09/19/17 for 09/25/17 Town Council Meeting

APPLICATION #:

FRSUB-000472-2017

APPLICANT:

Pennoni Associates Inc.

APPLICATION SUMMARY:

The subject application is the Subdivision Plan and Final Plats for the extension of Progress Drive and associated subdivision for the criminal justice academy. The applicant's submission includes the following documents: Attachment A - Final Plat; Attachment B - Subdivision Plan; Attachment C - Bond Estimate; Attachment D - Stormwater Maintenance Agreement; and Attachment E - Deed Restrictions.

GENERAL INFORMATION:

Site Address	No address currently.		
Zoning District	R-1, Residential District		
Overlay Districts	Historic Area – NO	Floodway - NO	Entrance Corridor – NO
Tax IDs	20A221-1B		
Location	The subject property is located at the end of Progress Drive and adjoins the property of Front Royal Limited Partnership.		
Existing Use	Vacant lot		
Proposed Use	Street Extension and Subdivision for a future Criminal Justice Training Academy (public facility)		





ADDITIONAL INFORMATION:

Preliminary Plan

The Preliminary Plan was approved conditionally by the Planning Commission on February 15, 2017. The Preliminary Plan was approved in conjunction with the site plan for the Criminal Justice Academy and a Special Exception to allow for the extension of Progress Drive.

Town Code, Chapter 148, Section 310, specifies that “(a) Preliminary Plan is required for all proposed major subdivisions. The Preliminary Plan review process includes review and approval of the subdivision design before submission of a Subdivision Plan and Final Plats.

Subdivision Plan and Final Plats

Town Code 148-315 of the Town Code requires major subdivisions to obtain approval of a subdivision plan and final plats within thirty-six (36) months of approval of the preliminary plan.

Unlike Preliminary Plans, Subdivision Plans and Final Plats require approval by Town Council. In addition, bonding is required.

For the Criminal Justice Academy project, a Stormwater Maintenance Agreement and Deed Restrictions (condition of Special Exception) are also required.

Review Comments

The Subdivision Plan has been revised to address the previous review comments identified on the Preliminary Plan. Furthermore, the applicant has executed the Deed Restrictions that were required by Town Council as part of the Special Exception for the road extension.

Conclusion

~~Town Staff recommends conditional approval. Before approval from Town Council, the applicant needs to submit the required performance bond and deed of dedication language for the right-of-way reservation that was required with the Special Exception approval. A signed version of the Stormwater Maintenance Agreement, with cash escrow surety, is also needed.~~

Updated September 19, 2017 for Town Council:

The Planning Commission is scheduled to act on this application at their meeting tomorrow evening, September 20, 2017. The applicant submitted the attached bond (Attachment F) today, September 19, 2017.

Unless the Planning Commission has new input at tomorrow's meeting, the application is ready for approval by Town Council,

conditional on the following:

- 1) The stormwater maintenance agreement (Attachment D) shall be signed and executed before any permits are issued for construction.**
- 2) The Deed of Dedication language shall be submitted by the applicant and reviewed by the Town Attorney and Director of Planning before recordation of the final plat (Attachment A).**

ATTACHMENTS:

Attachment A - Final Plat

Attachment B - Subdivision Plan

Attachment C - Bond Estimate (updated September 19, 2017 when applicant submitted the bond)

Attachment D - Stormwater Maintenance Agreement

Attachment E – Deed Restrictions

8



**Town of Front Royal, Virginia
Council Agenda Statement**

Page 1
Item No. 8

Meeting Date: September 25, 2017

Agenda Item: COUNCIL TO CONSIDER APPEAL OF THE ECONOMIC DEVELOPMENT AUTHORITY/AFTON INN REQUEST

Summary: Council is requested to consider an appeal from the Economic Development Authority regarding the demolition of the Afton Inn on Main Street. The EDA had applied to the BAR for demolition of the derelict structure, however that request was denied. The BAR rendered their decision on September 12th. The EDA filed an appeal on September 15th with the Clerk of Council to hear the matter at the next regular meeting of Town Council. Town Council discussed the appeal at the work session on September 18, 2017.

Budget/Funding: None

Attachments: Filing of Appeal and Town Code §175-94

Meetings: Work Session on September 18, 2017; Board of Architectural Review decision September 12, 2017.

Staff Recommendation: Approval ✓ Denial

Proposed Motions: (See next page)

Proposed Motions:

(1) (Approval) Finding that the Certificate of Appropriateness Application submitted by the Economic Development Authority for the demolition of 2 East Main Street, being the former Afton Inn property, together with the evidence and submissions submitted by the Economic Development Authority to Town Council, meets the intent and all appropriate purposes and objectives of the Town Code's Historic District Overlay Areas, and in particular, meets all appropriate guidelines and criteria for review as set forth in Town Code Section 175-91, and further finding that the appeal filed by the Economic Development Authority from the decision of the Board of Architectural Review rendered on September 12, 2017, denying said Application submitted by the Economic Development Authority, was timely and properly appealed in writing to Town Council, in accordance with Town Code Section 175-94.A., I move that Town Council grant the Economic Development Authority's Application for the demolition of 2 East Main Street, being the former Afton Inn property. **-OR-**

(2) (Denial) Finding that the Certificate of Appropriateness Application submitted by the Economic Development Authority for the demolition of 2 East Main Street, being the former Afton Inn property, together with the evidence and submissions submitted by the Economic Development Authority to Town Council, does not meet the intent and all appropriate purposes and objectives of the Town Code's Historic District Overlay Areas, and in particular, does not meet all appropriate guidelines and criteria for review as set forth in Town Code Section 175-91, I move that Town Council deny the Economic Development Authority's Application for the demolition of 2 East Main Street, being the former Afton Inn property.

*Note: Motions are the formal & final proposal of Council,
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved By:  _____



Board of
Directors

Greg Drescher,
Chairman

Bruce Drummond,
Vice Chairman

Bill Biggs,
Treasurer

Jim Eastham,
Director

Ron Llewellyn,
Director

Gray Blanton,
Director

Jennifer R.
McDonald,
Executive Director

September 15, 2017

Town Council of the Town of Front Royal, Virginia
c/o Jennifer Berry
Clerk of the Town Council of the Town of Front Royal
102 E. Main Street
Front Royal, VA 22630

Board of Architectural Review
Mrs. Angela Toler, Chairman
c/o Jeremy Camp
Town of Front Royal Planning Director
102 E. Main Street
Front Royal, VA 22630

Dear Town Council and Board of Architectural Review Members,

At the Board of Architectural Review meeting on Tuesday, September 12th, 2017, the Board voted to deny the application by the EDA for demolition of the former Afton Inn located at 2 E. Main Street in Front Royal.

In accordance with § 175-94(A) of the Town Code, the EDA wishes to appeal this decision to the Town Council. The EDA on behalf of MODE Partnership, LLC still feels the demolition to be the best way to turn the dilapidated property into a thriving economic engine for the Town of Front Royal and its citizens.

Please consider our request for the appeal. Thank you for your time and consideration.

Sincerely,

Greg Drescher
EDA Chairman

A. Any applicant aggrieved by a final decision of the Board of Architectural Review may appeal said decision to the Front Royal Town Council, provided that such appeal is filed, in writing, with the Town Clerk within ten (10) days after the final decision is rendered by the BAR. The Town Council will hear the matter at its next regularly scheduled meeting and will render its decision on the appeal at the following regularly scheduled meeting. The Council, in its discretion, may consider additional evidence and submissions during the period between meetings and at the second regularly scheduled meeting prior to rendering its decision.

B. Any applicant aggrieved by a final decision of the Board of Architectural Review following the decision rendered on appeal to the Front Royal Town Council, may appeal said decision to the Circuit Court of Warren County, Virginia, by filing a petition at law setting forth the alleged illegality of the BAR's action, provided that such petition is filed with the Circuit Court within thirty (30) days after the appealed decision of the Front Royal Town Council. The filing of said petition with the Circuit Court shall stay the decision of the BAR pending the outcome of the appeal, except that the filing of such petition shall not stay the decision of the BAR if such decision denies the right to raze or demolish an historic landmark, building or structure. The Circuit Court may reverse or modify the decision of the BAR, in whole or in part, if the Court finds, upon review, that the decision is arbitrary and constitutes an abuse of discretion. The Circuit Court may also affirm the decision of the BAR.

ADDENDUM

DEMOLITION REVIEW GUIDELINES

- 1) **Contribution to Historic District.** Is the building identified as a contributing structure? This is typically determined from the Front Royal Historic District records.

☐ **YES.** Continue.

☐ **NO.** The building is a candidate for demo. 

- 2) **Structural Integrity.** Does the building retain structural integrity? The following may be used to evaluate and determine if a building retains its structural integrity?

- A site visit by the BAR members to more closely inspect and evaluate the building.
- An unbiased report from a licensed structural engineer or licensed architect that addresses structural integrity.
- A report from the local building official.
- Testimony of expert witnesses at the public hearing at which the demolition request is being considered.

☐ **YES.** Continue.

☐ **NO.** The building is a candidate for demo. 

- 3) **Feasibility.** Upon review of the facts of the application, public testimony, and Town records, what factors limit renovation of the building instead of demolition, as determined by the BAR.

- ☐ Significantly higher costs than new construction.
- ☐ Poor Marketability, due to location or lack of usable space.
- ☐ Environmental Factors.
- ☐ Local, State, or Federal Regulations.
- ☐ The building is recognized as blighted.

☐ **1-2 box checked.**  The building is NOT a candidate for demo.

☐ **3 or more boxes checked.** Continue.

- 4) **Due Diligence.** Has the applicant given due diligence? Due diligence includes seeking renovation of the property for an extended period of time; allowing the relocation of the building (if offered by a 3rd party); and salvaging portions of the building.

☐ **YES.** The building is a candidate for demo. 

☐ **NO.**  The building is NOT a candidate for demo.

The Town of Front Royal Board of Architectural Review (BAR) shall give consideration of the following review factors when considering an application to demolish a building or structure. Each factor shall be considered in the order they are listed as outlined in the left hand column of this page.

- 1) Contribution to the Historic District
- 2) Structural Integrity
- 3) Feasibility
- 4) Due Diligence

REVIEW FACTORS

If the applicant successfully demonstrates that the building is a candidate for demolition, the Board of Architectural Review MAY consider the following:

- The BAR may require that the applicant conduct a reconnaissance or intensive-level survey in accordance with the Virginia Department of Historic Resource's Guidelines for Conducting Cultural Resource Surveys in Virginia.
- The applicant must conduct a Phase 1 archaeological study to document historic information that is important to the Town of Front Royal.
- The BAR may require that demolition application be reviewed concurrently with plans for new construction.
- Assurance that the demolition will be completed once started. A surety, such as a performance bond, from the contractor is a suitable method for assuring completion.
- Assurance that the completion of the demolition will occur in a reasonable amount of time.

DISCLAIMER: All required local, state, and federal permits or approvals are required separate from, and in addition to, the BAR's consideration of a Certificate of Appropriateness for demolition.

**BOARD OF ARCHITECTURAL REVIEW
TOWN OF FRONT ROYAL, VIRGINIA**

**PENDING APPROVAL
BY BOARD**

September 12, 2017

**Regular Meeting
Town Hall**

Present: Angela Toler, Chairman
Joan Harding, Vice Chairman
Gary Vaughan
Nancy LeHew
Michael Whitlow

Staff: Jeremy F. Camp, Planning Director/Zoning Administrator
Doug Napier, Town Attorney
Connie L. Potter, Sr. Administrative Assistant

Also present were members of the press and public.

The September 12, 2017 meeting of the Front Royal Board of Architectural Review was called to order by Chairman Toler at 7:00 p.m.

Mr. Vaughan moved, seconded by Vice Chairman Harding to approve the meeting minutes as written.

VOTE: Yes – Vaughan, LeHew, Whitlow, Harding, Toler

NEW BUSINESS

There were no items for new business.

OLD BUSINESS

- **FRCOA-000455-2017**, Afton Inn. A Certificate of Appropriateness Application submitted by the Economic Development Authority for the demolition of 2 E. Main Street, the Afton Inn.

Mr. Camp reminded the BAR that the motion is for an application for demolition and noted that a plan had not been submitted at this time. Staff's recommendation in the Staff Report was to approve the demolition contingent on two items.

- 1) Permits can only be issued once a plan has been reviewed and approved by the Board of Architectural Review, and
- 2) A development surety is put in place before demolition that is approved in form by the Town Attorney to guarantee demolition is completed once started.

Chairman Toler asked if BAR members had any additional comments that were not discussed in the work session that preceded the regular meeting.

Vice Chairman Harding noted that BAR members had concerns.

Vice Chairman Harding moved that the BAR does not approve. She then stopped and referred to the “Addendum” questions to be used when determining approval/denial of demolition applications.

Vice Chairman Harding withdrew the motion.

Demolition Review Guidelines:

- 1) Contribution to Historic District. Is the building identified as a contributing structure? This is typically determined from the Front Royal Historic District records.

Chairman Toler said that in the work session the BAR identified the building as a contributing structure and noted that it was one of the key structures that qualifies the Town to have a historic district.

- 2) Structural Integrity. Does the building retain structural integrity? The following may be used to evaluate and determine if a building retains its structural integrity?

BAR members agreed that it depended on who you ask. Chairman Toler said they could feasibly find someone who would say “yes, it does”. Vice Chairman Harding added that someone would say “it is salvageable”.

- 3) Feasibility. Upon review of the facts of the application, public testimony, and Town records, what factors limit renovation of the building instead of demolition, as determined by the BAR.

Significantly higher costs than new construction – The BAR has received conflicting cost information.

Poor Marketability, due to location or lack of usable space – Location is a prime factor to be retained.

Environmental Factors – The BAR has not received any information on environmental factors.

Local, State, or Federal Regulations – Sometimes things are precluded if federal funds are used. Vice Chairman Harding referred to some type of regulations that state you cannot tear down or alter if federal money had been used. Mr. Whitlow said that if you have received funds to renovate, for example a “plaqued” building, you are “stuck” to keep it. Vice Chairman Harding said the BAR is not 100% sure so this would be a question mark as well.

The building is recognized as blighted – At this point in time, yes.

- 4) Due Diligence. Has the applicant given due diligence? Due diligence includes seeking renovation of the property for an extended period; allowing the relocation of the building (if offered by a 3rd party); and salvaging portions of the building.

Chairman Harding stated that there has been such a “muddy” trail as to what has been done. If people knew that the EDA was not having success in marketing the property, and people who have said they wanted to renovate the building, but were not given permission. She believes this throws into question whether due diligence was in fact done. BAR members agreed they could not confirm “yes” due diligence was done.

Mr. Whitlow said in answering these questions, the BAR would not approve demolition of the structure. He felt there wasn’t enough information to make an intelligent decision. There has been a lot of interest from the Urban Development partners who have on their website, “Save the Afton Inn”. As far as marketing the building, Mr. Whitlow said he can only assume all the proper paperwork was made to gain some sort of status so that it could be marketed as a historic property. There must be some sort of paper trail and if the EDA has been to trade shows and marketed the Afton Inn, there would have to be some sort of proof. In his opinion, with all the new interest that is being shown in the building that the BAR take a different approach to possibly saving the building and if that doesn’t happen then let’s tear it down and build something that looks like the existing structure. Until the BAR has more information, he cannot make that decision and believes the application should be tabled.

Mr. Camp did not recommend tabling the application because the applicant can then just appeal that to Town Council.

Vice Chairman Harding moved, seconded by Ms. LeHew that the BAR, based on a number of factors that have been discussed in length, vote to decline to approve the demolition permit.

VOTE: Yes – Harding, Toler, LeHew, Whitlow, Vaughan

Mr. Vaughan moved, seconded by Mr. Whitlow to adjourn the meeting.

VOTE: Yes – Toler, Harding, Whitlow, Vaughan, LeHew

The meeting adjourned at 7:15 p.m.

Connie L. Potter
Sr. Administrative Assistant

9



Town of Front Royal, Virginia Council Agenda Statement

Page 1
Item No. 9

Meeting Date: September 25, 2017

Agenda Item: PUBLIC HEARING – Ordinance Amendment Pertaining to Flea Markets *(1st Read)*

Summary: Council is requested to affirm on its first reading to amend Town Code § 98-46; 175-3, 175-10.10; 175-44; 175-53.7.A.3; 175-63.C.3; 175-70.I.3 and 175-10.4.A that would allow flea markets to operate on Fridays with a Special Use Permit, subject to standards and review and potentially to have a Farmers Market; and, amendment to §98-46.B to change the license tax for flea markets from a per vendor tax of \$10.00 per year, or \$1.00 per day, to a flat license tax of \$500.00 per calendar year to be paid by the proprietor of the flea market, as presented.

Note: Council referred the request of the flea market to operate on Fridays, to the Planning Commission for further consideration and a recommendation on March 27, 2017. A Public Hearing was scheduled for July 24, 2017 but was postponed for staff to re-advertise the amendments together regarding opening on Fridays and the license fee. Another Public Hearing was scheduled for August 14, 2017 but died for lack of a second due to the amount of licensing fees being advertised at \$250.00 instead of \$500.00. Staff re-advertised for the higher fee.

Budget/Funding: None

Attachments: Proposed Ordinance, Letter of Request and Memo from Director of Planning/Zoning

Meetings: Work Sessions held March 20, July 3, July 17 and August 21, 2017. Referred to the Planning Commission by Town Council on March 27, 2017. Public Hearing scheduled and then cancelled on July 24, 2017. Public Hearing scheduled on August 14, 2017 but died for lack of a second due to licensing fee being advertised incorrectly.

Staff

Recommendation: Approval ☒ Denial ☐

Proposed Motion: I move that Council affirm on its first reading to amend Town Code § 98-46; 175-3, 175-10.10; 175-44; 175-53.7.A.3; 175-63.C.3; 175-70.I.3 and 175-10.4.A to allow flea markets to operate on Fridays with a Special Use Permit, subject to standards and review and potentially to have a Farmers Market. I further move that Council amend Town Code §98-46.B to change the license tax for flea markets from a per vendor tax of \$10.00 per year, or \$1.00 per day, to a flat license tax of \$500.00 per calendar year to be paid by the proprietor of the flea market, as presented.

ROLL CALL VOTE REQUIRED

*Note: Motions are the formal & final proposal of Council
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved By: JW



TOWN OF FRONT ROYAL
DEPARTMENT OF PLANNING & ZONING
Memorandum

To: Joe Waltz, Town Manager

From: Jeremy F. Camp, Planning & Zoning Director

Date: August 9, 2017

Re: Flea market regulations

Following a public hearing, the Planning Commission recommended adoption of the attached amendments to the Town Code during their meeting on June 21, 2017.

The amendments would allow the existing flea market (or future flea market operators) to apply for a Special Use Permit to operate on Fridays, in addition to Saturdays, Sundays and Holidays, as presently permitted in the Town Code. The draft also includes changes to the performance standards for flea markets.

It was stressed with Andrick's Flea Market that a Special Use Permit application would need to be applied for and approved before any changes to the existing flea market operation on Commerce Avenue. It was also discussed that during the Special Use Permit Application process the flea market would need to comply with the new requirements and performance standards in the Town Code.

No changes are necessary in regards to Farmer's Markets.

The request to amend the flea market regulations was initially requested by Andrick's Flea Market, followed by a referral to the Planning Commission by Town Council.

AN ORDINANCE TO AMEND FRONT ROYAL TOWN CODE §98-46 and §175-3, 175-10.10, 175-44, 175-53.7.A.3, 175-63.C.3, 175-70.I.3, and 175-10.4.A.PERTAINING TO FLEA MARKETS OPENING ON FRIDAYS & LICENSE FEES

WHEREAS, Town Council referred to the Planning Commission in March 2017 the request for Flea Markets to be open on Fridays; and,

WHEREAS, Town Council requested that Town Staff review the licensing fees for Flea Markets in June 2017; and,

NOW THEREFORE, BE IT ENACTED, by the Town Council of the Town of Front Royal, Virginia, that §98-46 and §175-3, 175-10.10, 175-44, 175-53.7.A.3, 175-63.C.3, 175-70.I.3, and 175-10.4.A. of the Front Royal Town Code are hereby amended as follows:

98-46 FLEA MARKETS

A. As used in this section, the following terms shall have the meanings indicated:

FLEA MARKET - An assembly of vendors, selling new or used goods in the open air or within temporary structures, who display and sell their wares on the lands of another for a consideration.

B. ~~Every vendor who is engaged in the sale or display of goods at a~~ **The proprietor of any** flea market shall be required to purchase a license and display the license in a prominent place visible to the public. For **every such** ~~license to sell or display antiques or used or second-hand goods at a flea market,~~ there shall be paid a license tax of ~~ten dollars (\$10.) per year or one dollar (\$1.) per day~~ **\$250.00 per calendar year**. Every vendor of new goods at the flea market shall be deemed a peddler or itinerant merchant and shall pay such license tax as is applicable to peddlers or itinerant merchants under the provisions of Section 98-61. Upon application to and approval by the Town Council, no license shall be required of a nonprofit organization that sells or displays goods at a flea market so long as the proceeds of sale are retained by the nonprofit organization and not shared with other persons, businesses or organizations. The following regulations shall govern the conduct of flea markets:

1. Goods and wares may be left on premises on Friday and Saturday nights only and on Sunday night if Monday is a holiday.
2. A night watchman may be allowed on weekends.
3. No overnight trailers are allowed.
4. The owner or lessee of the premises shall keep the flea market grounds clean and free of refuse and shall provide trash containers in sufficient numbers to serve the customers and vendors on the flea market site.
5. The owner or lessee of the premises shall rent no space to any flea market vendor, except those representing nonprofit organizations, unless the vendor first produces a valid and current license issued by the Town of Front Royal or a daily license permit for the sale and display of goods at a flea market.

175-3 DEFINITIONS

DOMESTIC PRODUCTS – Processed, cooked, dried or preserved foodstuffs and other agricultural products meant for human consumption, to include, but not limited to, jellies, pickles, herbs, smoked meats, baked goods, candies, canned foods, and other prepared edibles.

MANUFACTURED BUILDING – A building that is manufactured, typically in a factory, and is built in accordance with the United States Department of Housing and Urban Development Code, Manufactured Home Construction and Safety Standards, or other similar federal standards; and does not meet all local or state building code standards. Modular and pre-fabricated buildings that are manufactured and constructed in accordance with all local and state building code standards shall not be considered manufactured buildings.

MANUFACTURED HOME – A residential dwelling built in a factory in accordance with the United States Department of Housing and Urban Development code and, the federal Manufactured Home Construction and Safety Standards, or other similar federal standards; and does not meet all local or state building code standards. ~~A mobile home or home built from one (1) or more modular units are not considered manufactured homes.~~ Modular and pre-fabricated buildings that are manufactured and constructed in accordance with all local and state building code standards shall not be considered manufactured buildings.

FARM PRODUCTS – Ice, wood, charcoal, meats, milk, butter, eggs, poultry, game, vegetables, fruits or other family supplies of a perishable nature or farm products grown or produced by them and not purchased by them for sale.

FLEA MARKET - An assembly of vendors, selling new or used goods in the open air or within temporary structures, which display and sell their wares on the lands of another for a consideration.

FARMERS' MARKET – A collection of two (2) or more vendors, selling farm or domestic products, garden produce, or nursery products, ornamental or otherwise, which have been grown or produced by the vendor offering the same for sale, in an open-air setting or with temporary or partially enclosed structures.

175-10.10 STANDARDS (A-1)

B. **Farmers' Markets and Flea Markets.** Where flea markets are permitted by approval of a special use permit, the following standards shall be complied with, in addition to any conditions placed on the special use permit, and Section 98-46 of the Town Code.

1. Adequate water and sanitary facilities shall be provided if found necessary based on the size, frequency and duration of the market.
2. A minimum fifty (50) foot setback shall be maintained from all property lines, **excluding structures and uses in existence prior to July 1, 2001.**
3. No adverse effect on adjoining properties, including but not limited to excessive or untimely noise or lighting, overflow parking, or visual problems potentially affecting property values or marketability, is found.

4. No manufactured buildings shall be permitted.
5. All tables, facilities and structures shall be maintained in a well-kept and attractive manner.
6. ~~All temporary structures or facilities, including but not limited to canopy frames, except as provided in sub-section B.5. above, table extensions and display shelving, shall be removed during the hours that the market is not in operation.~~ Unless otherwise approved as part of a special use permit, all temporary structures or facilities shall be removed during the days that the market is not in operation.
7. Operation of ~~the market~~ a Flea Market shall be confined to Friday, Saturday, Sunday, and Holidays, unless other dates are specifically approved by the Town Council in conjunction with the Special Permit. The hours of operation shall be posted on the property.
8. ~~Open air markets shall only be conducted during the months of April through October. During the period from November 15 to March 15,~~ If a Flea Market or Farmers' Market elects to close during part of the year, or is required to close during part of the year by a condition of a special use permit, all tables and other temporary fixtures shall be removed within two (2) weeks of such closure. Such fixtures may be stored on the site, provided they are located within a completely enclosed building or otherwise screened from public view.
9. All Flea Markets and Farmers' Markets shall be swept clean, hosed down and/or picked clean daily. No food products or debris shall be permitted to remain upon the site overnight. All food products sold at the market must be displayed under sanitary conditions and sold in compliance with all requirements of the Virginia Department of Health or Virginia Department of Agriculture and Consumer Services.
10. Any expansion, including, but not limited to, new construction, an increase in the days of operation, or other significant changes to the use of the property, shall only be authorized with a special use permit.
11. Landscaping shall be provided where feasible and desirable for purposes of improvement aesthetics, screening, shade and the natural environment.
12. Fencing may be required for purposes of improvement aesthetics, screening or public safety.
13. The sale of live animals is prohibited.
14. The sale of new merchandise or serving of food, other than farm and domestic products, shall only be authorized if the vendor obtains an itinerant merchant or peddler license, in accordance with the Town Code regulations for such uses.
15. Farmers' Markets and Flea Markets on public property shall be classified as a public event.

175-44 PERFORMANCE STANDARDS (C-1)

F. Farmers' Markets & Flea Markets: Where farmer's markets are permitted under the provisions of this Chapter, the following standards shall be required:

1. Adequate water and sanitary facilities shall be provided if found necessary based on the size, frequency and duration of the market.
2. A minimum twenty-five (25) foot setback shall be maintained from all property lines, **excluding structures and uses in existence prior to July 1, 2001.**
3. No adverse effect on adjoining **properties**, including but not limited to excessive or untimely noise or lighting, overflow parking, or visual problems potentially affecting property values or marketability, is found.
4. All tables, facilities and structures shall be maintained in a well-kept and attractive manner.
5. ~~Any building and metal canopy frame associated with and attached or semi-detached from such building used for the storage or sale of goods and materials and as the market operator's office shall be constructed on a permanent foundation and meet appropriate building code regulations; provide that any such building and metal canopy frame in existence prior to July 1, 2001, shall not be required to be on a permanent foundation or meet building code regulations except as additions and enlargement are made thereon. No trailers or mobile home units shall be permitted.~~ **No manufactured buildings shall be permitted.**
6. ~~All temporary structures or facilities, including but not limited to canopy frames except as provided in sub-section (e) 5 above, table extensions and display shelving, shall be removed during the hours that the market is not in operation. Unless otherwise approved as part of a special use permit, all temporary structures or facilities shall be removed during the days that the market is not in operation.~~
7. Operation of ~~the market~~ **a Flea Market** shall be confined to **Friday**, Saturday, Sunday, and Holidays, unless other dates are specifically approved by the Town Council in conjunction with the Special Permit. The hours of operation shall be posted on the property.
8. ~~Open air markets shall only be conducted during the months of April through October. During the period from November 15 to March 15,~~ **If a Flea Market or Farmers' Market elects to close during part of the year, or is required to close during part of the year by a condition of a special use permit, all tables and other temporary fixtures shall be removed within two (2) weeks of such closure.** Such fixtures may be stored on the site, provided they are located within a completely enclosed building or otherwise screened from public view, in accordance with Section 175-44(A). ~~The provisions of this sub-section (h), shall not be applicable to any flea market in existence and operation as of July 1, 2001.~~

9. All Flea Markets and Farmers' Markets shall be swept clean, hosed down and/or picked clean daily. No food products or debris shall be permitted to remain upon the site overnight. All food products sold at the market must be displayed under sanitary conditions and sold in compliance with all requirements of the Virginia Department of Health or Virginia Department of Agriculture and Consumer Services.
10. Any expansion, including, but not limited to, new construction, an increase in the days of operation, or other significant changes to the use of the property, shall only be authorized with a special use permit.
11. Landscaping shall be provided where feasible and desirable for purposes of improvement aesthetics, screening, shade and the natural environment.
12. Fencing may be required for purposes of improvement aesthetics, screening or public safety.
13. The sale of live animals is prohibited.
14. The sale of new merchandise or serving of food, other than farm and domestic products, shall only be authorized if the vendor obtains an itinerant merchant or peddler license, in accordance with the Town Code regulations for such uses.
15. Farmers' Markets and Flea Markets on public property shall be classified as a public event.

175-53.7.A.3

~~h. Flea markets, subject to any conditions issued with special use permit, performance standards of the underlying zoning district, and requirements of Section 98-46 of the Town Code.~~

175-63.C.3

~~g. Flea markets, subject to any conditions issued with special use permit, performance standards of the underlying zoning district, and requirements of Section 98-46 of the Town Code.~~

175-70.I.3

~~h. Flea markets, subject to any conditions issued with special use permit, performance standards of the underlying zoning district, and requirements of Section 98-46 of the Town Code.~~

175-10.4.A.

COMMERCIAL:

Flea Markets and Farmers' Markets, subject to the standards of Section 175-10.10.B

This ordinance shall become effective upon passage.

APPROVED:

Hollis L. Tharpe, Mayor

ATTEST:

Jennifer E. Berry, Clerk of Council

THIS ORDINANCE was approved at the Regular Meeting of the Town of Front Royal, Virginia on its second reading, conducted _____ 2017, upon the following recorded vote:

Eugene R. Tewalt	Yes/No	Jacob L. Meza	Yes/No
William A. Sealock	Yes/No	Christopher S. Morrison	Yes/No
John P. Connolly	Yes/No	Gary Gillispie	Yes/No

A public hearing on the above was held on _____, 2017, having been advertised in the Northern Virginia Daily on _____ and _____, 2017.

Approved as to form and legality:

Douglas W. Napier, Town Attorney

Date: ____/____/____



Thalhimer
Thalhimer Center
11100 West Broad Street
Glen Allen, Virginia 23060
Tel +1 804 648 5881
Fax +1 804 697 3479
thalhimer.com
George C. Stuckey
Senior Vice President
Tel 1 804 697 3404
george.stuckey@thalhimer.com

June 5, 2017

Hollis L. Tharpe, Mayor
Town of Front Royal
Administration Building, 2nd Floor
102 E Main Street
Front Royal, VA 22630

Dear Mayor Tharpe,

This letter is to let you know that the Boisseau Family, who are the fee owners of the land where the flea market is located on Commerce, is very much in favor of the flea market having the opportunity to include Friday openings for their typical weekend. There are a number of conditions that determine when the flea market can be open, weather being one of them, so having Friday will be helpful and should bring more tourists into the Town of Front Royal.

Thank you and the Town Council for considering this. We look forward to hearing that the Town Council has passed this to go into effect

If you have any questions of the Landlord, please don't hesitate to contact me

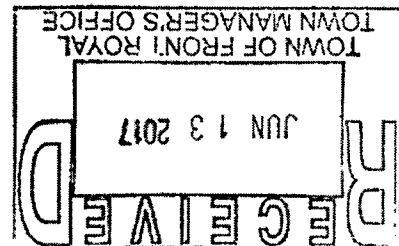
Sincerely,

George C. Stuckey
Agent for Boisseau Family

GCS.dsr

c Richard W. Boisseau, III
Linda Shade

J:\USER\georg2017\correspondence\Tharpe 06 05 177.doc



Linda Amrich-Shade 3/2/17

Amrich's front Royal Flea Market

would like to bring before
Council for Special Use Permit
for Farm & Market.

Zoning change for Friday operation.

Linda Amrich - Shade

10



**Town of Front Royal, Virginia
Council Agenda Statement**

Page 1
Item No. 10

Meeting Date: September 25, 2017

Agenda Item: COUNCIL APPROVAL – Budget Amendment Primary Extension Project –
Paving Commerce Avenue from South Street to Happy Creek Bridge - VDOT

Summary: Council is requested to approve a budget amendment to accept funds from the Virginia Department of Transportation (VDOT) to pave Route 522 South Commerce Avenue from South Street to the Happy Creek Bridge in the amount of \$196,880.00.

Budget/Funding: 4500-3410206 – Highway Maintenance Reimbursements - \$196,880.00
4500-47963 – Highway Maintenance VDOT Project Funding - \$196,880.00

Attachments: Standard Project Administration Agreement

Meetings: None

Staff

Recommendation: Approval ✓ Denial

Proposed Motion: I move that Council approve a budget amendment to accept funds from the Virginia Department of Transportation (VDOT) to pave Route 522 South Commerce Avenue from South Street to the Happy Creek Bridge in the amount of \$196,880.00.

ROLL CALL VOTE REQUIRED

*Note: Motions are the formal & final proposal of Council,
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved By: JW

STANDARD PROJECT ADMINISTRATION AGREEMENT
State-aid Projects

Project Number	UPC	Local Government
0522-112-172	111938	Town of Front Royal

THIS AGREEMENT, made and executed in triplicate this 30 day of August, 2017, by and between the Town of Front Royal, Virginia, hereinafter referred to as the LOCALITY and the Commonwealth of Virginia, Department of Transportation, hereinafter referred to as the DEPARTMENT.

WHEREAS, the LOCALITY has expressed its desire to administer the work described in Appendix A, and such work for each improvement shown is hereinafter referred to as the Project; and

WHEREAS, the funds shown in Appendix A have been allocated to finance the Project(s) and the funding currently allocated or proposed for the project(s) does not include Federal-aid Highway funds; and

WHEREAS, both parties have concurred in the LOCALITY's administration of the phase(s) of work for the respective Project(s) listed in Appendix A in accordance with applicable federal, state and local laws and regulations.

NOW THEREFORE, in consideration of the mutual premises contained herein, the parties hereto agree as follows:

1. The LOCALITY shall:
 - a. Be responsible for all activities necessary to complete the noted phase(s) of each Project shown in Appendix A, except for activities, decisions, and approvals which are the responsibility of the DEPARTMENT, as required by federal or state laws and regulations or as otherwise agreed to, in writing, between the parties.
 - b. Receive prior written authorization from the DEPARTMENT to proceed with the project.
 - c. Administer the project(s) in accordance with guidelines applicable to Locally Administered Projects as published by the DEPARTMENT.
 - d. Provide certification by a LOCALITY official of compliance with applicable laws and regulations on the **State Certification Form for State Funded Projects** or in another manner as prescribed by the DEPARTMENT.
 - e. Maintain accurate and complete records of each Project's development of all expenditures and make such information available for inspection or auditing by the DEPARTMENT. Records and documentation for items for which reimbursement will be requested shall be maintained for not less than three (3) years following acceptance of the final voucher on each Project.

- f. No more frequently than monthly, submit invoices with supporting documentation to the DEPARTMENT in the form prescribed by the DEPARTMENT. The supporting documentation shall include copies of related vendor invoices paid by the LOCALITY and also include an up-to-date project summary and schedule tracking payment requests and adjustments.
 - g. Reimburse the DEPARTMENT all Project expenses incurred by the DEPARTMENT if due to action or inaction solely by the LOCALITY the project becomes ineligible for state reimbursement, or in the event the reimbursement provisions of Section 33.2-348 or Section 33.2-331 of the Code of Virginia, 1950, as amended, or other applicable provisions of state law or regulations require such reimbursement.
 - h. On Projects that the LOCALITY is providing the required match to state funds, pay the DEPARTMENT the LOCALITY's match for eligible Project expenses incurred by the DEPARTMENT in the performance of activities set forth in paragraph 2.a.
 - i. Administer the Project in accordance with all applicable federal, state, and local laws and regulations. Failure to fulfill legal obligations associated with the project may result in forfeiture of state-aid reimbursements
 - j. If legal services other than that provided by staff counsel are required in connection with condemnation proceedings associated with the acquisition of Right-of-Way, the LOCALITY will consult the DEPARTMENT to obtain an attorney from the list of outside counsel approved by the Office of the Attorney General. Costs associated with outside counsel services shall be reimbursable expenses of the project.
 - k. For Projects on facilities not maintained by the DEPARTMENT, provide, or have others provide, maintenance of the Project upon completion, unless otherwise agreed to by the DEPARTMENT.
2. The DEPARTMENT shall:
- a. Perform any actions and provide any decisions and approvals which are the responsibility of the DEPARTMENT, as required by federal or state laws and regulations or as otherwise agreed to, in writing, between the parties.
 - b. Upon receipt of the LOCALITY's invoices pursuant to paragraph 1.f, reimburse the LOCALITY the cost of eligible Project expenses, as described in Appendix A. Such reimbursements shall be payable by the DEPARTMENT within 30 days of an acceptable submission by the LOCALITY.
 - c. If appropriate, submit invoices to the LOCALITY for the LOCALITY's share of eligible project expenses incurred by the DEPARTMENT in the performance of activities pursuant to paragraph 2.a.

- d. Audit the LOCALITY's Project records and documentation as may be required to verify LOCALITY compliance with applicable laws and regulations.
 - e. Make available to the LOCALITY guidelines to assist the parties in carrying out responsibilities under this Agreement.
- 3. Appendix A identifies the funding sources for the project, phases of work to be administered by the LOCALITY, and additional project-specific requirements agreed to by the parties. There may be additional elements that, once identified, shall be addressed by the parties hereto in writing, which may require an amendment to this Agreement.
 - 4. If designated by the DEPARTMENT, the LOCALITY is authorized to act as the DEPARTMENT's agent for the purpose of conducting survey work pursuant to Section 33.2-1011 of the Code of Virginia, 1950, as amended.
 - 5. Nothing in this Agreement shall obligate the parties hereto to expend or provide any funds in excess of funds agreed upon in this Agreement or as shall have been included in an annual or other lawful appropriation. In the event the cost of a Project is anticipated to exceed the allocation shown for such respective Project on Appendix A, both parties agree to cooperate in providing additional funding for the Project or to terminate the Project before its cost exceeds the allocated amount, however the DEPARTMENT and the LOCALITY shall not be obligated to provide additional funds beyond those appropriated pursuant to an annual or other lawful appropriation.
 - 6. Nothing in this agreement shall be construed as a waiver of the LOCALITY's or the Commonwealth of Virginia's sovereign immunity.
 - 7. The Parties mutually agree and acknowledge, in entering this Agreement, that the individuals acting on behalf of the Parties are acting within the scope of their official authority and the Parties agree that neither Party will bring a suit or assert a claim against any official, officer, or employee of either party, in their individual or personal capacity for a breach or violation of the terms of this Agreement or to otherwise enforce the terms and conditions of this Agreement. The foregoing notwithstanding, nothing in this subparagraph shall prevent the enforcement of the terms and conditions of this Agreement by or against either Party in a competent court of law.
 - 8. The Parties mutually agree that no provision of this Agreement shall create in the public, or in any person or entity other than parties, rights as a third party beneficiary hereunder, or authorize any person or entity, not a party hereto, to maintain any action for, without limitation, personal injury, property damage, breach of contract, or return of money, or property, deposit(s), cancellation or forfeiture of bonds, financial instruments, pursuant to the terms of this of this Agreement or otherwise. Notwithstanding any other provision of this Agreement to the contrary, unless otherwise provided, the Parties agree that the LOCALITY or the DEPARTMENT shall not be bound by any agreements between the either party and other persons or entities concerning any matter which is the subject of this Agreement, unless and until the LOCALITY or the DEPARTMENT has, in writing,

receive a true copy of such agreement(s) and has affirmatively agreed, in writing, to be bound by such Agreement.

9. This agreement may be terminated by either party upon 30 days advance written notice. Eligible Project expenses incurred through the date of termination shall be reimbursed in accordance with paragraphs 1.f, 1.g, and 2.b, subject to the limitations established in this Agreement and Appendix A. Upon termination and unless otherwise agreed to, the DEPARTMENT shall retain ownership of plans, specifications, and right of way for which state funds have been provided, unless all state funds provided for the Project have been reimbursed to the DEPARTMENT by the LOCALITY, in which case the LOCALITY will have ownership of the plans, specifications, and right of way.

THE LOCALITY and DEPARTMENT acknowledge and agree that this Agreement has been prepared jointly by the parties and shall be construed simply and in accordance with its fair meaning and not strictly for or against any party.

THE LOCALITY and the DEPARTMENT further agree that should Federal-aid Highway funds be added to the project, this agreement is no longer applicable and shall be terminated. The LOCALITY and the DEPARTMENT mutually agree that they shall then enter into a Standard Project Administration Agreement for Federal-aid Projects.

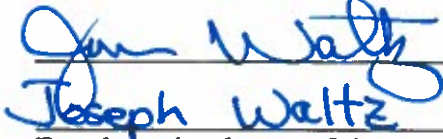
THIS AGREEMENT, when properly executed, shall be binding upon both parties, their successors, and assigns.

THIS AGREEMENT may be modified in writing by mutual agreement of both parties.

The remainder of this page is BLANK

IN WITNESS WHEREOF, each party hereto has caused this Agreement to be executed as of the day, month, and year first herein written.

TOWN OF FRONT ROYAL, VIRGINIA:



Joseph Waltz
Typed or printed name of signatory

Town Manager
Title

8/10/17
Date

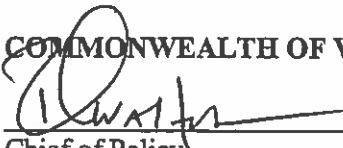


Signature of Witness

8/10/17
Date

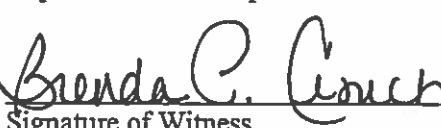
NOTE: The official signing for the LOCALITY must attach a certified copy of his or her authority to execute this agreement.

COMMONWEALTH OF VIRGINIA, DEPARTMENT OF TRANSPORTATION:



Chief of Policy
Commonwealth of Virginia
Department of Transportation

8/30/17
Date



Signature of Witness

8/30/2017
Date

Attachment
Appendix A (UPC 111938)

APPENDIX A

Project Number: 0522-112-172 UPC: 111938 Locality: Town of Front Royal

Project Location ZIP+4: 22630-4424	Locality DUNS# 050390749	Locality Address (incl ZIP+4): 102 E Main St. Front Royal, VA 22630-3337
---------------------------------------	--------------------------	---

Project Narrative

Scope: RTE 522 S Commerce Ave. Primary Extension Paving

From: South Street

To: Happy Creek Bridge Commerce Ave

Locality Project Manager Contact Info: Terry Lewis 540-635-7819

Department Project Coordinator Contact Info: Steven Damron 540-332-7389

Project Estimates

	Preliminary Engineering	Right of Way and Utilities	Construction	Total Estimated Cost
Estimated Locality Project Expenses	\$3,500	\$0	\$190,380	\$193,880
Estimated VDOT Project Expenses	\$1,500	\$0	\$1,500	\$3,000
Estimated Total Project Costs	\$5,000	\$0	\$191,880	\$196,880

Project Cost and Reimbursement

Phase	Estimated Project Costs	Funds type (Choose from drop down box)	Local % Participation for Funds Type	Local Share Amount	Maximum Reimbursement (Estimated Cost - Local Share)	Estimated Reimbursement to Locality (Max. Reimbursement - Est. VDOT Expenses)
Preliminary Engineering	\$5,000	State Funds	0%	\$0	\$5,000	
				\$0	\$0	
				\$0	\$0	
				\$0	\$0	
Total PE	\$5,000			\$0	\$5,000	
Right of Way & Utilities	\$0			\$0	\$0	
				\$0	\$0	
Total RW	\$0			\$0	\$0	
Construction	\$191,880	State Funds	0%	\$0	\$191,880	
				\$0	\$0	
Total CN	\$191,880			\$0	\$191,880	
Total Estimated Cost	\$196,880			\$0	\$196,880	\$193,880

Total Maximum Reimbursement by VDOT to Locality (Less Local Share)

\$196,880

Estimated Total Reimbursement by VDOT to Locality (Less Local Share and VDOT Expenses)

\$193,880

Project Financing

CTB Formula					Aggregate Allocations (A+B+C+D+E+F)
State Funds					
\$196,880					\$196,880

Program and project Specific Funding Requirements

- This project shall be administered in accordance with VDOT's Urban Manual
- This project shall be administered in accordance with VDOT's Locality Administered Projects Manual
- This project shall meet all applicable ADA requirements
- This is a limited funds project. The Locality shall be responsible for any additional funding in excess of \$196,880 (if applicable)
- The Locality will continue to operate and maintain the facility as constructed. Should the design features of the project be altered by the Locality subsequent to project completion without approval of the Department, the locality inherently agrees, by execution of this agreement, to make restitution, either physically or monetarily, as required by the Department.
- This project must be advertised within six months of award funding or be subject to deallocation.
- Total project allocations: \$196,880


Authorized Locality Official and Date
Joseph Walte
Typed or printed name of person signing

 8/16/17
Authorized VDOT Official
Recommendation and Date
Steven K. Damron
Typed or printed name of person signing
Version 8/19/11

RESOLUTION

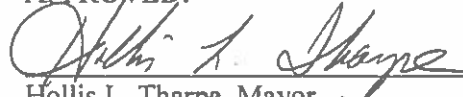
INTERIM TOWN MANAGER SIGNATURE AUTHORITY FOR VDOT

WHEREAS, Town Council approves various Virginia Department of Transportation (VDOT) Projects; and

WHEREAS, VDOT requests a Resolution by Town Council granting signature authority to the Interim Town Manager to execute agreements on various projects on the Town's behalf; and,

NOW, THEREFORE, IT BE RESOLVED by the Town Council of the Town of Front Royal to grant signature authority to the Interim Town Manager for various VDOT projects on the Town's behalf.

APPROVED:


Hollis L. Tharpe, Mayor

Attest:


Jennifer E. Berry, CMG, Clerk of Council

THIS RESOLUTION was approved at the Regular Meeting of the Town of Front Royal, Virginia, Town Council conducted on 3-27-, 2017 upon the following recorded vote:

William A. Sealock

Yes/No

Bébhinn C. Egger

Yes/No

Eugene R. Tewalt

Yes/No

Jacob L. Meza

Yes/No

John P. Connolly

Yes/No

Christopher S. Morrison Yes/No

Approved as to Form and Legality:


Douglas W. Napier, Town Attorney

Dated: 3-27-17

11



**Town of Front Royal, Virginia
Council Agenda Statement**

Page 1
Item No. 11

Meeting Date: September 25, 2017

Agenda Item: COUNCIL APPROVAL – Budget Amendment for Risk Management Grant

Summary: Council is requested to approve a budget amendment to accept funds from the Virginia Municipal League (VML) in the amount of \$3,429.00 for the purchase of a portable barrier (roll up fence) to be used as a barrier during events.

Budget/Funding: 1000-3310010 – General Fund Grant Proceeds
1202-47001 – Risk Management Equipment

Attachments: Letter from VML

Meetings: None

Staff

Recommendation: Approval ✓ Denial

Proposed Motion: I move that Council approve a budget amendment to accept funds from the Virginia Municipal League (VML) in the amount of \$3,429.00 for the purchase of a portable barrier (roll up fence) to be used during events.

ROLL CALL VOTE REQUIRED

*Note: Motions are the formal & final proposal of Council,
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved By: JW



August 25, 2017

Ms. Laura Scholtz
Risk Manager
Town of Front Royal
102 E. Main Street
Front Royal, VA 22630

Re: 2017-2018 Risk Management Grant
Date Receipts Due: 12/31/2017

VML #230

Qualifying Level: Tier III

<u>Pending Reimbursement</u>	<u>Application Received</u>	<u>Items Eligible for Reimbursement</u>
\$3,429.00	8/10/2017	Portable Barrier (Roll Up Fence)

Dear Ms. Scholtz:

This notice serves as confirmation of approval of your Risk Management Grant application. Please review the following requirements carefully:

- If you have not already done so, please submit proof of purchase consistent with the options offered in the Risk Management Grant FAQ document which can be referenced on our website at www.vmlins.org.
- Proof of purchase must arrive by December 31, 2017.

Please send receipts to safety@vmlins.org. Grant checks are processed approximately 30 days after receipts are received and are mailed to the attention of the grant applicant.

Please call me at 804-237-7319 or e-mail me at jcole@vmlins.org with questions. Thank you for allowing us to enhance your risk management program through grant funding.

Sincerely,

Jeffrey A. Cole
Director of Member Services

cc: Mr. Joseph Waltz, Town Manager
Mr. Pete Strickler

12



Town of Front Royal, Virginia 1 Page
Council Agenda Statement 12 Item No.

Meeting Date: September 25, 2017

Agenda Item: Subdivision Plan and Final Plats for Progress Drive Extension

Summary: The Industrial Development Authority (Economic Development Authority) has submitted a Subdivision Plan and Final Plat for the extension of Progress Drive, intended to access the property for a future criminal justice academy, and other possible future development areas. In addition to the Subdivision Plan and Final Plat, the applications includes the required bond, stormwater maintenance agreement, and deed of restrictions that Town Council required in association with the past Special Exception application. Pursuant to Town Code 148-315.D.3, Town Council is required to review and approve the Subdivision Plan and Final Plat for Major Subdivisions within 60 days from review by the Planning Commission. The Planning Commission is scheduled to take action on the application at their meeting on September 20, 2017.

Budget/Funding: None

Attachments: Below is a list of the various attachments:

- | | |
|---------------------------------|-------------------------------------|
| 1. Staff Report Attachment | 5. Attachment C2 – Bond |
| 2. Attachment A – Final Plat | 6. Attachment D – SWM Agreement |
| 3. Attachment B – Subdivision | 7. Attachment E – Deed Restrictions |
| 4. Attachment C – Bond Estimate | |

Meetings: Work Session scheduled for September 25, 2017

Staff Recommendation: Approval: ☒ (conditional) Denial: ☐

Proposed Motion: I move that Council conditionally approve the Subdivision Plan and Final Plats submitted by the Industrial Development Authority for the extension of Progress Drive, including acceptance of the required Performance Bond, Stormwater Management Facilities Maintenance Responsibility Agreement, and Declaration of Restrictions; subject to the following conditions:

- 1) The stormwater maintenance agreement (Attachment D) shall be signed and executed before any permits are issued for construction.
- 2) The Deed of Dedication for the Final Plat shall be submitted by the applicant and reviewed by the Town Attorney and Director of Planning before recordation to ensure the required right-of-way reservation is appropriately established.

*Note: Motions are the formal & final proposal of Council,
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved By: *JW*

TOWN OF FRONT ROYAL
DEPARTMENT OF PLANNING & ZONING



STAFF REPORT FOR THE SEPTEMBER 20, 2017 PLANNING COMMISSION MEETING

Updated 09/19/17 for 09/25/17 Town Council Meeting

APPLICATION #:

FRSUB-000472-2017

APPLICANT:

Pennoni Associates Inc.

APPLICATION SUMMARY:

The subject application is the Subdivision Plan and Final Plats for the extension of Progress Drive and associated subdivision for the criminal justice academy. The applicant's submission includes the following documents: Attachment A - Final Plat; Attachment B - Subdivision Plan; Attachment C - Bond Estimate; Attachment D - Stormwater Maintenance Agreement; and Attachment E - Deed Restrictions.

GENERAL INFORMATION:

Site Address	No address currently.		
Zoning District	R-1, Residential District		
Overlay Districts	Historic Area – NO	Floodway - NO	Entrance Corridor – NO
Tax IDs	20A221-1B		
Location	The subject property is located at the end of Progress Drive and adjoins the property of Front Royal Limited Partnership.		
Existing Use	Vacant lot		
Proposed Use	Street Extension and Subdivision for a future Criminal Justice Training Academy (public facility)		





ADDITIONAL INFORMATION:

Preliminary Plan

The Preliminary Plan was approved conditionally by the Planning Commission on February 15, 2017. The Preliminary Plan was approved in conjunction with the site plan for the Criminal Justice Academy and a Special Exception to allow for the extension of Progress Drive.

Town Code, Chapter 148, Section 310, specifies that “(a) Preliminary Plan is required for all proposed major subdivisions. The Preliminary Plan review process includes review and approval of the subdivision design before submission of a Subdivision Plan and Final Plats.

Subdivision Plan and Final Plats

Town Code 148-315 of the Town Code requires major subdivisions to obtain approval of a subdivision plan and final plats within thirty-six (36) months of approval of the preliminary plan.

Unlike Preliminary Plans, Subdivision Plans and Final Plats require approval by Town Council. In addition, bonding is required.

For the Criminal Justice Academy project, a Stormwater Maintenance Agreement and Deed Restrictions (condition of Special Exception) are also required.

Review Comments

The Subdivision Plan has been revised to address the previous review comments identified on the Preliminary Plan. Furthermore, the applicant has executed the Deed Restrictions that were required by Town Council as part of the Special Exception for the road extension.

Conclusion

~~Town Staff recommends conditional approval. Before approval from Town Council, the applicant needs to submit the required performance bond and deed of dedication language for the right-of-way reservation that was required with the Special Exception approval. A signed version of the Stormwater Maintenance Agreement, with cash escrow surety, is also needed.~~

Updated September 19, 2017 for Town Council:

The Planning Commission is scheduled to act on this application at their meeting tomorrow evening, September 20, 2017. The applicant submitted the attached bond (Attachment F) today, September 19, 2017.

Unless the Planning Commission has new input at tomorrow's meeting, the application is ready for approval by Town Council,

conditional on the following:

- 1) The stormwater maintenance agreement (Attachment D) shall be signed and executed before any permits are issued for construction.**
- 2) The Deed of Dedication language shall be submitted by the applicant and reviewed by the Town Attorney and Director of Planning before recordation of the final plat (Attachment A).**

ATTACHMENTS:

Attachment A - Final Plat

Attachment B - Subdivision Plan

Attachment C - Bond Estimate (updated September 19, 2017 when applicant submitted the bond)

Attachment D - Stormwater Maintenance Agreement

Attachment E – Deed Restrictions

APPROVED BY THE TOWN OF FRONT ROYAL
ALL TOWN TAXES HAVE BEEN PAID AND RELEASED.

FINANCE DIRECTOR _____ DATE _____
TOWN COUNCIL _____ DATE _____
PLANNING DIRECTOR _____ DATE _____

THIS PLAT WAS MADE WITH THE FREE CONSENT AND
DESIRE OF THE UNDERSIGNED OWNER.

BY [Signature]
INDUSTRIAL DEVELOPMENT AUTHORITY
ACKNOWLEDGED BEFORE ME
THIS 1 DAY OF Aug, 2017.
MY COMMISSION EXPIRES 2/20/18 #7360170
[Signature]
NOTARY

- DENOTES PIN SET.
- ⓂH DENOTES SANITARY SEWER MANHOLE.

NO TITLE REPORT FURNISHED TO THIS OFFICE.
SUBJECT TO ANY AND ALL EASEMENTS OF RECORD.

THIS PLAT IS SUBSTANTIALLY IN ACCORDANCE WITH THE
APPROVED PRELIMINARY PLAN.

PROPERTY ZONED R-1: MINIMUM LOT AREA 10,000 SQ. FT.
REQUIRED BUILDING SETBACK: FRONT 35' SIDE 25' TOTAL
WITH ONE SIDE NO LESS THAN 10 FEET, REAR 30'
AND

ZONED I-2: MINIMUM LOT AREA 20,000 SQ. FT.
REQUIRED BUILDING SETBACK: FRONT 25' SIDE 10'
REAR 0', CORNER SIDE 25'.

DERIVATION OF TO THE INDUSTRIAL DEVELOPMENT
AUTHORITY OF THE TOWN OF FRONT ROYAL AND
THE COUNTY OF WARREN, VIRGINIA
P.O. BOX 1245, FRONT ROYAL, VA. 22630
TEL:(540) 635-2182:
T.M. 20A22-1 PARCEL 1 PER D.B. 471 PAGE 748.
T.M. 20A22-1 PARCEL 1B PER D.B. 404 PAGE 121.
T.M. 20A22-1 PARCEL 2A1 PER INST. # 010002379.
AREAS A, B AND C ARE RESIDUAL AREAS PER
PER D.B. 342 PAGE 622.

PLAT REF: D.B. 342 PAGE 624, D.B. 471 PAGE 750,
D.B. 404 PAGE 123 AND SLIDE 189 A AND B.

PROPERTY SITUATED OUTSIDE THE LIMITS OF THE FEMA FLOOD ZONE.

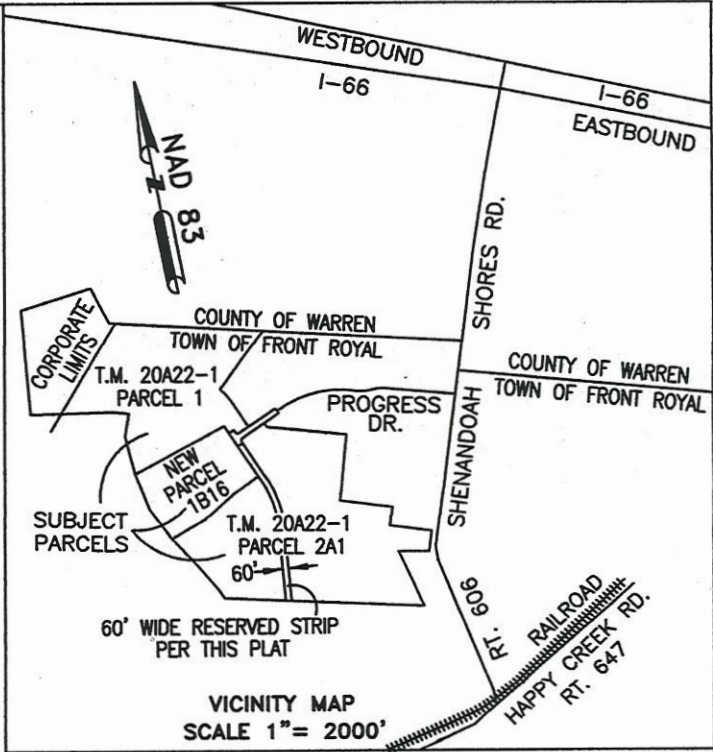
THIS IS TO CERTIFY THAT THE LAND SHOWN ON THIS PLAT IS ALL OR A PORTION OF LAND CONVEYED TO THE
INDUSTRIAL DEVELOPMENT AUTHORITY OF THE TOWN OF FRONT ROYAL AND THE COUNTY OF WARREN, VIRGINIA
PER DEED DATED JUNE 4, 1986 RECORDED IN DEED BOOK 342 PAGE 622, DEED DATED MAY 23, 1989
RECORDED IN DEED BOOK 404 PAGE 121, DEED DATED APRIL 30, 1992 RECORDED IN DEED BOOK 471 PAGE 748,
AND DEED DATED APRIL 12, 2001 RECORDED IN INSTRUMENT # 010002379 ALL OF RECORD IN THE WARREN
COUNTY CIRCUIT COURT CLERK'S OFFICE. I FURTHER CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY
KNOWLEDGE, INFORMATION AND BELIEF AND THAT MONUMENTATION WAS SET AS SHOWN.

[Signature]
JOSEPH G. BROGAN, JR. LIC. # 3209

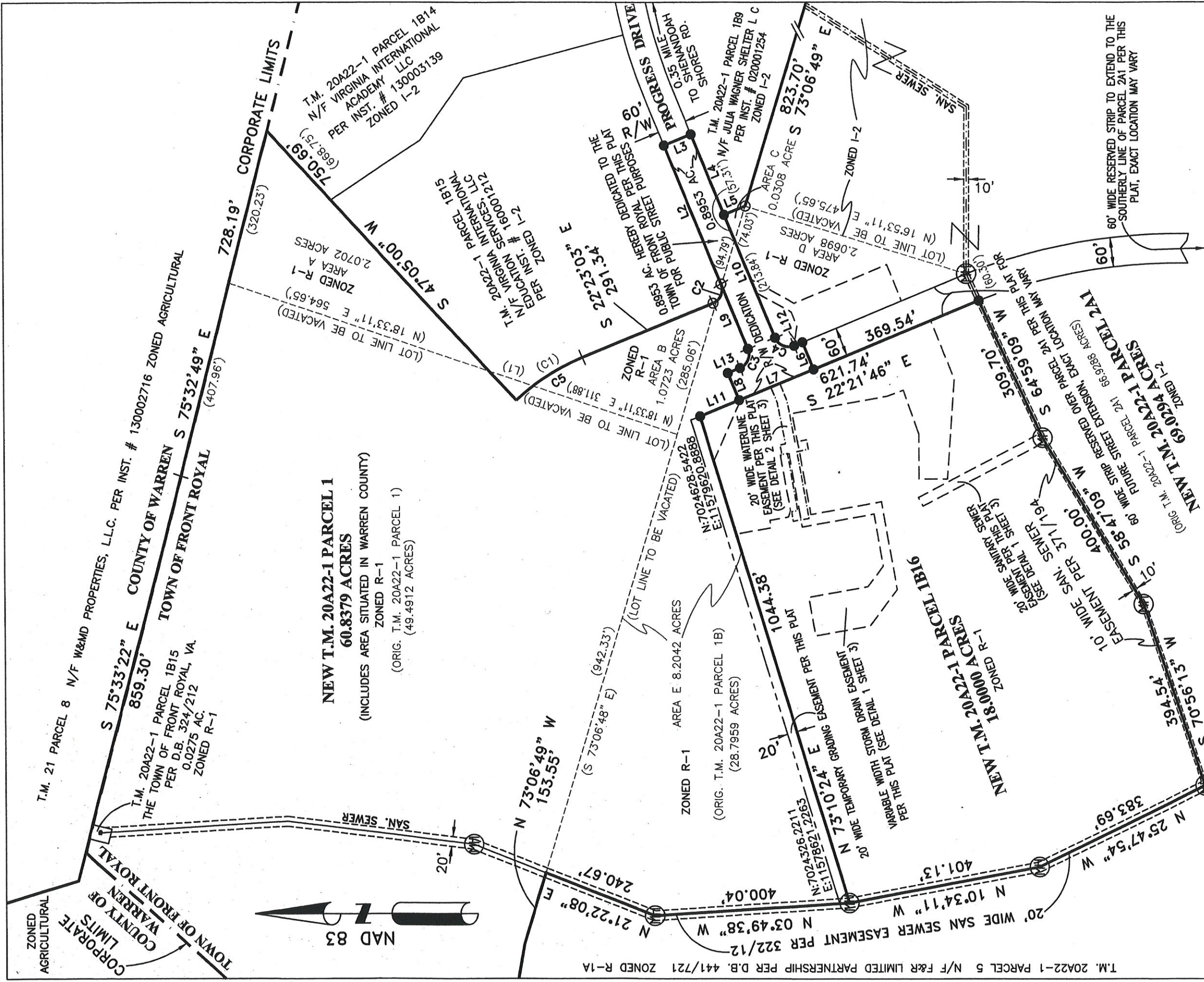
7/5/17
DATE

PLAT SHOWING 0.8953 AC. STREET DEDICATION,
DIVISION OF NEW T.M. 20A22-1 PARCEL 1B16
AND CONSOLIDATION OF VARIOUS PARCELS OF
THE LAND OF THE INDUSTRIAL DEVELOPMENT
AUTHORITY OF THE TOWN OF FRONT ROYAL
AND THE COUNTY OF WARREN, VIRGINIA
SHENANDOAH MAGISTERIAL DISTRICT
TOWN OF FRONT ROYAL
WARREN COUNTY, VA.

PREPARED BY:
BROGAN LAND SURVEYING, PLC
P.O. BOX 1578
FRONT ROYAL, VA. 22630-0034
TEL. & FAX (540) 635-5657
JULY 5, 2017



AREA TABULATION:	
ORIG. T.M. 20A22-1 PARCEL 1 PER DEED	49.4912 ACRES
AREA A	+2.0702 ACRES
AREA B	+1.0723 ACRES
AREA E RESID. AREA T.M. 20A22-1 PARCEL 1B	+8.2042 ACRES
NEW AREA T.M. 20A22-1 PARCEL 1	60.8378 ACRES
ORIG. T.M. 20A22-1 PARCEL 1B PER DEED	28.7959 ACRES
AREA D ADDED TO T.M. 20A22-1 PARCEL 2A1	-2.0698 ACRES
AREA E ADDED TO T.M. 20A22-1 PARCEL 1	-8.2042 ACRES
NEW 20A22-1 PARCEL 1B16	-18.0000 ACRES
AREA DEDICATED TO PROGRESS DRIVE	-0.5219 ACRES
RESIDUAL AREA	0.0000 ACRES
ORIG. T.M. 20A22-1 PARCEL 2A1 PER DEED	66.9288 ACRES
AREA C	+0.0308 ACRES
AREA D ADDED FROM T.M. 20A22-1 PARCEL 1	+2.0698 ACRES
NEW AREA T.M. 20A22-1 PARCEL 2A1	69.0294 ACRES
PROGRESS DRIVE RIGHT OF WAY DEDICATION:	
AREA ADDED FROM RESIDUAL AREA D.B. 342 PAGE 622.	0.3734 ACRES
AREA ADDED FROM RESIDUAL AREA T.M. 20A22-1 PARCEL 1B	+0.5219 ACRES
AREA DEDICATED TO PROGRESS DRIVE	0.8953 ACRES
ZONING TABULATION:	
AREA OF T.M. 20A22-1 PARCEL 1 ZONED R-1	60.8379 ACRES
AREA OF T.M. 20A22-1 PARCEL 1 ZONED I-2	0.0000 ACRES
AREA OF T.M. 20A22-1 PARCEL 1B16 ZONED R-1	18.0000 ACRES
AREA OF T.M. 20A22-1 PARCEL 1B16 ZONED I-2	0.0000 ACRES
AREA OF T.M. 20A22-1 PARCEL 2A1 ZONED R-1	2.0698 ACRES
AREA OF T.M. 20A22-1 PARCEL 2A1 ZONED I-2	+66.9596 ACRES
TOTAL	69.0294 ACRES



PLAT SHOWING 0.8953 AC. STREET DEDICATION,
DIVISION OF NEW T.M. 20A22-1 PARCEL 1B16
AND CONSOLIDATION OF VARIOUS PARCELS OF
THE LAND OF THE INDUSTRIAL DEVELOPMENT
AUTHORITY OF THE TOWN OF FRONT ROYAL
AND THE COUNTY OF WARREN, VIRGINIA

**TOWN OF FRONT ROYAL
WARREN COUNTY, VA.**

PREPARED BY:
BROGAN LAND SURVEYING, PLC
P.O. BOX 1578
FRONT ROYAL, VA. 22630-0034
TEL. & FAX (540) 635-5657
JULY 5, 2017



SHEET TWO OF THREE



STORM DRAIN EASEMENT

LINE	BEARING	DISTANCE
S1	S 22°21'46" E	422.89'
S2	S 67°36'09" W	128.58'
S3	N 85°48'32" W	205.63'
S4	N 00°00'07" W	58.68'
S5	N 89°59'53" E	91.43'
S6	N 70°39'39" E	95.36'
S7	N 19°20'21" W	36.57'
S8	N 10°07'12" W	199.15'
S9	S 79°34'03" W	210.75'
S10	S 10°07'12" E	148.00'
S11	S 79°52'48" W	182.94'
S12	N 53°01'47" W	94.20'
S13	N 10°07'12" W	113.70'
S14	N 79°52'48" E	80.45'
S15	S 10°07'12" E	123.88'
S16	S 53°01'47" E	52.98'
S17	N 79°52'48" E	108.55'
S18	N 10°07'12" W	150.00'
S19	N 79°52'48" E	152.73'
S20	N 10°07'12" W	18.00'
S21	S 79°52'48" W	115.00'
S22	N 72°37'31" W	14.14'
S23	N 10°07'12" W	38.51'
S24	S 79°52'48" W	15.48'
S25	N 10°07'12" W	72.91'
S26	N 73°10'24" E	156.11'
S27	S 66°03'58" E	138.33'
S28	S 22°21'46" E	90.74'
S29	S 28°51'08" W	101.14'
S30	S 22°21'46" E	206.75'
S31	S 67°38'14" W	80.00'
S32	N 22°21'46" W	240.05'
S33	S 81°37'06" E	40.80'
S34	N 67°38'14" E	30.61'
S35	N 28°51'08" E	81.27'
S36	N 67°36'56" E	29.81'

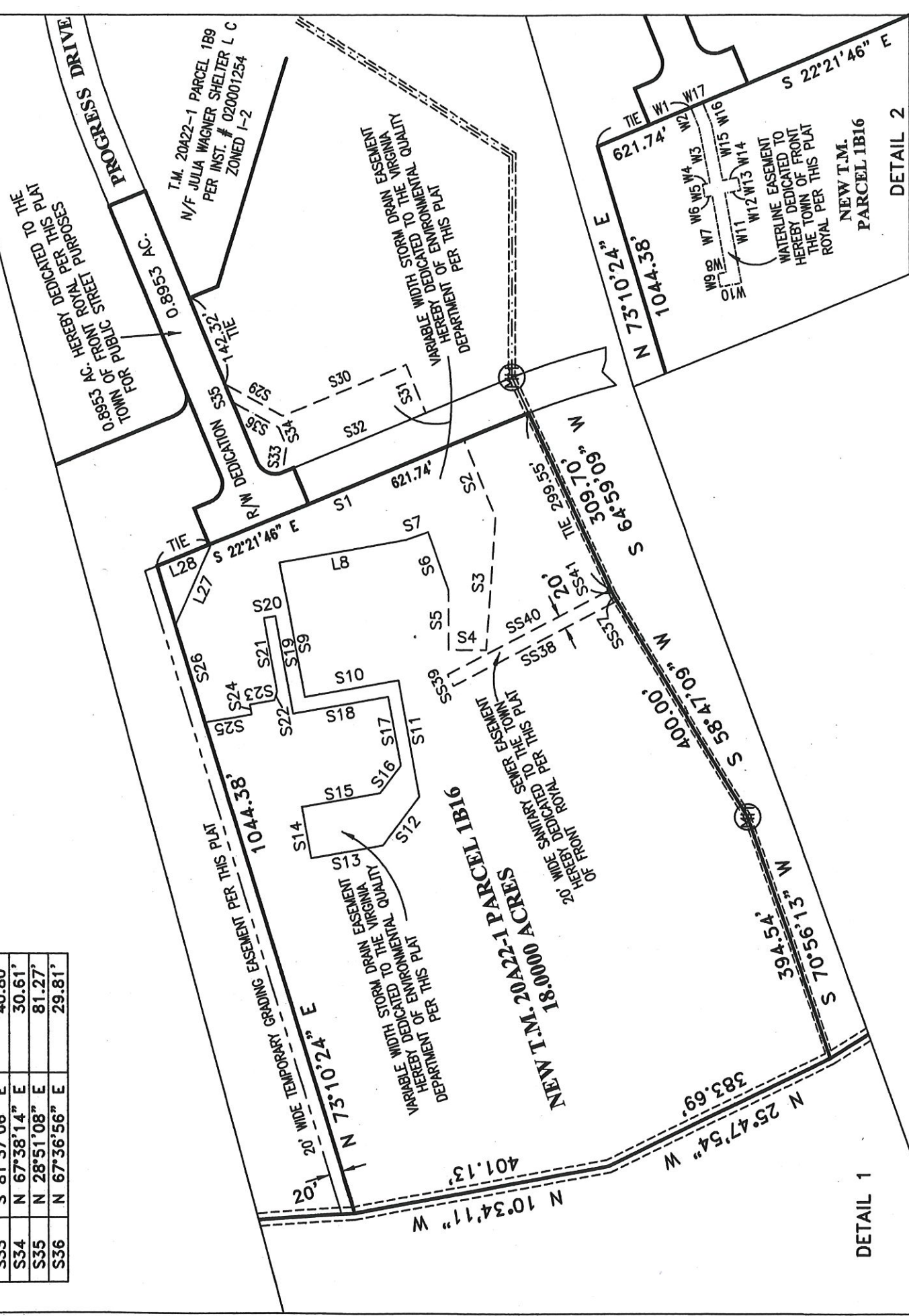
CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD LENGTH	CHORD BEARING
C1	455.00'	117.17'	14°45'19"	116.85'	S 29°45'43" E
C2	30.00'	47.13'	90°00'35"	42.43'	S 67°23'03" E
C3	30.00'	47.11'	89°58'43"	42.42'	N 67°22'25" W
C4	30.00'	47.14'	90°01'17"	42.43'	N 22°37'35" E
C5	455.00'	163.05'	20°31'56"	162.18'	S 32°39'01" E

WATERLINE EASEMENT

LINE	BEARING	DISTANCE
W1	S 22°21'46" E	66.16'
W2	S 67°36'57" W	34.33'
W3	S 78°53'12" W	86.09'
W4	N 11°06'48" W	11.63'
W5	S 78°53'12" W	20.00'
W6	S 11°06'48" E	11.47'
W7	S 79°49'35" W	118.85'
W8	N 10°07'22" W	12.73'
W9	S 79°52'38" W	20.00'
W10	S 10°07'22" E	32.75'
W11	N 79°49'35" E	139.20'
W12	S 11°06'48" E	24.01'
W13	N 78°53'12" E	20.00'
W14	N 11°06'48" W	23.85'
W15	N 78°53'12" E	88.06'
W16	N 67°36'57" E	36.30'
W17	N 22°21'46" W	20.00'

SANITARY SEWER EASEMENT

SS37	S 58°47'09" W	9.88'
SS38	N 27°31'14" W	285.37'
SS39	N 62°28'46" E	20.00'
SS40	S 27°31'14" E	285.18'
SS41	S 64°59'09" W	10.15'



DETAIL 1

PLAT SHOWING 0.8953 AC. STREET DEDICATION,
DIVISION OF NEW T.M. 20A22-1 PARCEL 1B16
AND CONSOLIDATION OF VARIOUS PARCELS OF
THE LAND OF THE INDUSTRIAL DEVELOPMENT
AUTHORITY OF THE TOWN OF FRONT ROYAL
AND THE COUNTY OF WARREN, VIRGINIA
SHENANDOAH MAGISTERIAL DISTRICT
TOWN OF FRONT ROYAL
WARREN COUNTY, VA.

PREPARED BY:
BROGAN LAND SURVEYING, PLC
P.O. BOX 1578
FRONT ROYAL, VA. 22630-0034
TEL. & FAX (540) 635-5657
JULY 5, 2017



SHEET THREE OF THREE



SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY FINAL PLAT

TOWN OF FRONT ROYAL, VIRGINIA

LOCAL UTILITIES

WATER/SEWER DISTRICT

TOWN OF FRONT ROYAL
DEPARTMENT OF PUBLIC WORKS
JIMMY HANNIGAN
P.O. BOX 1560
FRONT ROYAL, VA 22630
540-636-6338
540-636-8850 FAX

GAS SERVICE

WASHINGTON GAS
TIM HOOKMAN
350 HILLDALE LANE
540-868-7923
540-868-7930 FAX

COLUMBIA GAS

GERARD SCARBARRASI
34645 OLD VALLEY PIKE
STRASBURG, VA 22657
540-465-5152

ELECTRIC SERVICE

TOWN OF FRONT ROYAL, DEPT. OF ENERGY RESOURCES
DIRECTOR OF ENERGY SERVICES
JOE WALTZ
520A EAST 6TH STREET
FRONT ROYAL, VA 22630
540-635-3027
540-635-5497 FAX

TELEPHONE SERVICE

CENTURY LINK
450 REMOUNT ROAD
FRONT ROYAL, VA 22630
540-635-3197
800-816-2648 FAX

CABLE SERVICE

COMCAST
ART COLEMAN
195 RAINVILLE ROAD
WINCHESTER, VA 22602
540-504-0942

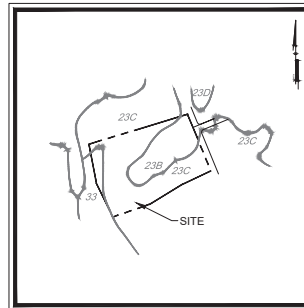
PREPARED FOR:
OWNER/DEVELOPER

FRONT ROYAL WARREN COUNTY ECONOMIC DEVELOPMENT AUTHORITY

400D KENDRICK LANE

P.O. BOX 445

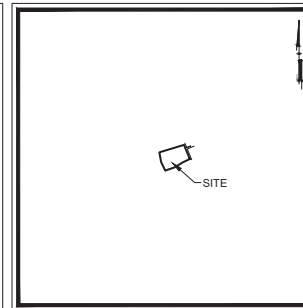
(540) 635-2182



SOILS MAP
Scale: 1" = 500'



LOCATION MAP
Scale: 1" = 2000'



USGS MAP
Scale: 1" = 2000'

Sheet Number	Sheet Title
C1	COVER DRAWING
C2	NOTES AND LEGENDS
C3	EXISTING CONDITIONS PLAN
C4	OVERALL SITE PLAN
C5	SITE PLAN
C6	GRADING PLAN
C7	PROGRESS DRIVE ROAD PROFILE
C8	UTILITIES PLAN
C9	WATER AND SANITARY SEWER PROFILES
C10	WATER AND SANITARY SEWER DETAILS
C11	STORM DRAIN PROFILES
C12	STORM DRAIN PROFILES
C13	BMP PLAN
C14	BIORETENTION PLANTING PLAN
C15	BIORETENTION DETAILS
C15.1	DRY SWALE DETAILS
C15.2	DRY SWALE DETAILS, DET. NOTES, & COMPS
C16	OUTFALL DIVIDES
C17	IMPERVIOUS AREA MAPS
C18	BMP & DETENTION DRAINAGE DIVIDES
C19	BMP COMPUTATIONS
C20	DETENTION COMPUTATIONS
C21	DETENTION COMPUTATIONS
C21.1	DETENTION COMPUTATIONS
C21.2	FLOOD PROTECTION OUTFALL ANALYSIS
C21.3	FLOOD PROTECTION OUTFALL ANALYSIS
C21.4	FLOOD PROTECTION OUTFALL ANALYSIS
C22	DETENTION FACILITY A 1-YR ROUTING
C23	DETENTION FACILITY A 2 & 10-YR ROUTINGS
C24	DETENTION FACILITY A 100-YR ROUTING
C25	DETENTION FACILITY B 1-YR ROUTING
C26	DETENTION FACILITY B 2 & 10-YR ROUTINGS
C27	DETENTION FACILITY B 100-YR ROUTING
C28	DETENTION FACILITY C 1-YR ROUTING
C29	DETENTION FACILITY C 2 & 10-YR ROUTINGS
C30	DETENTION FACILITY C 100-YR ROUTING
C30.1	DETENTION FACILITY D 1-YR ROUTING
C30.2	DETENTION FACILITY D 2 & 10-YR ROUTINGS
C30.3	DETENTION FACILITY D 100-YR ROUTING
C31	NYLOPLAST CONTROL STRUCTURE DETAILS
C32	EROSION AND SEDIMENT CONTROL PLAN PHASE I
C33	EROSION AND SEDIMENT CONTROL PLAN PHASE II
C34	EROSION AND SEDIMENT CONTROL DETAILS
C35	EROSION AND SEDIMENT CONTROL NARRATIVE
C36	LANDSCAPE PLAN
C37	LANDSCAPE DETAILS
C38	MISCELLANEOUS DETAILS
C39	MISCELLANEOUS DETAILS

APPROVING AUTHORITY

APPROVAL IS VALID FOR A PERIOD OF FIVE (5) YEARS

DIRECTOR OF PLANNING AND ZONING	DATE
DIRECTOR OF PUBLIC WORKS	DATE
DIRECTOR OF ENERGY SERVICES	DATE
DIRECTOR OF FINANCE	DATE
TOWN MANAGER	DATE

SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY

FRONT ROYAL WARREN COUNTY ECONOMIC
DEVELOPMENT AUTHORITY
FRONT ROYAL, VIRGINIA

COVER DRAWING

C1



CALL BEFORE YOU DIG
ALWAYS CALL 811 BEFORE YOU DIG IN VIRGINIA
CALL 1-800-552-7801
SECTION 56.2B-17 REQUIRES THREE WORKING DAYS
NOTICE TO UTILITIES BEFORE YOU EXCAVATE, DRILL OR
BLAST VIRGINIA UTILITY PROTECTION SERVICE, INC.
TICKET NUMBER(S)

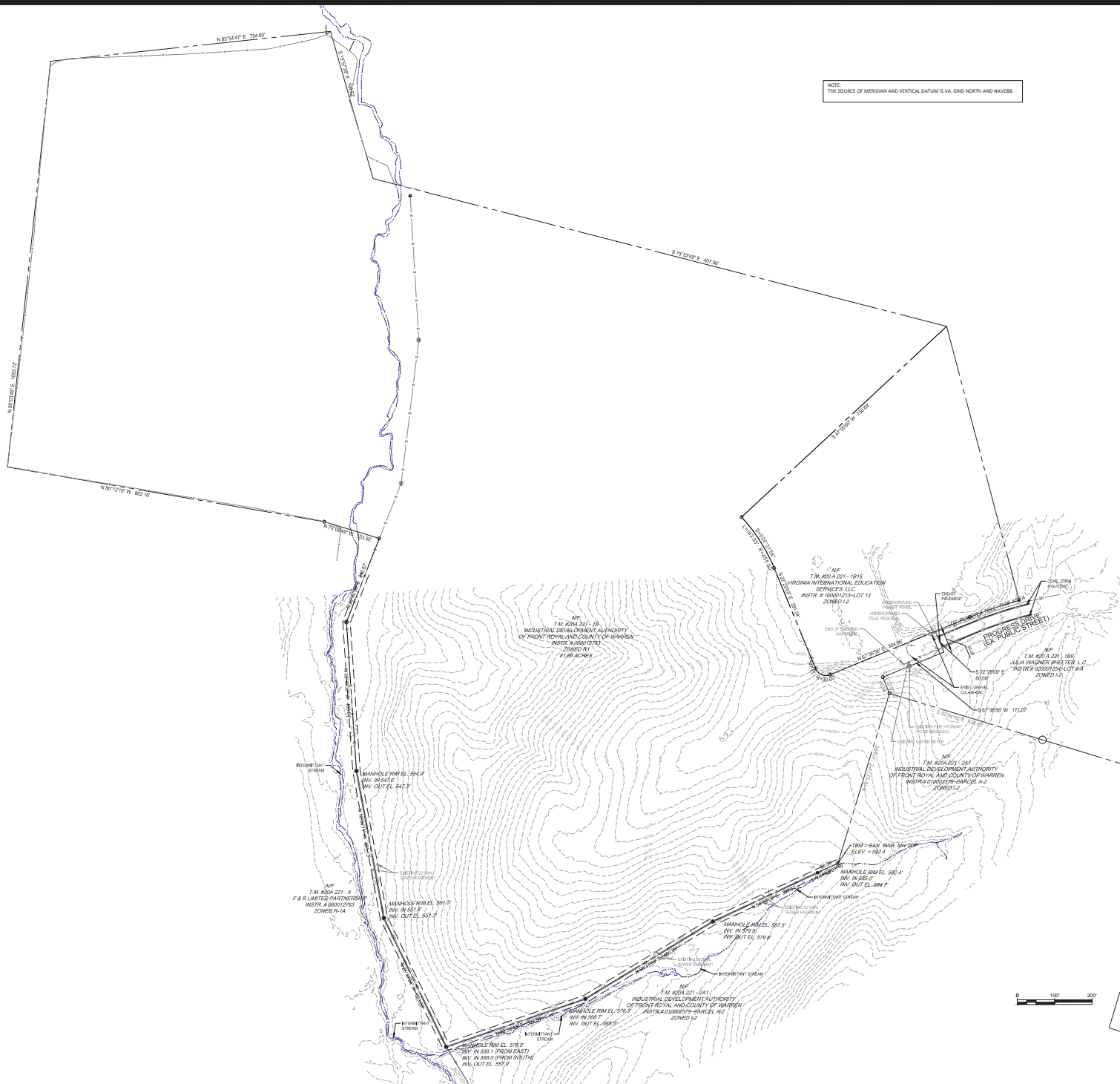
RESPONSIBLE LAND DISTURBER:
NAME: _____
CERTIFICATION #: _____
DATE: _____
THE RESPONSIBLE LAND DISTURBER
IS THAT PARTY RESPONSIBLE FOR
CARRYING OUT THE LAND DISTURBING
ACTIVITY AS SET FORTH IN THE PLANS.



PREPARED BY:

PENNONI ASSOCIATES INC.

117 East Piccadilly Street
Winchester, VA 22601
T 540.667.2139
F 540.665.0493



SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY

FRONT ROYAL WARREN COUNTY ECONOMIC
DEVELOPMENT AUTHORITY
FRONT ROYAL, VIRGINIA

PROJECT NO.	DATE
1000000000	JULY 20, 2014
DATE	DESCRIPTION
10/22/14	REV. PER GEO COMMENTS
3/26/15	REV. PER REG & COM
3/27/15	REV. PER REG COMMENTS
6/12/17	REV. PER AGENCY COMMENTS
7/26/17	REV. PER AGENCY COMMENTS

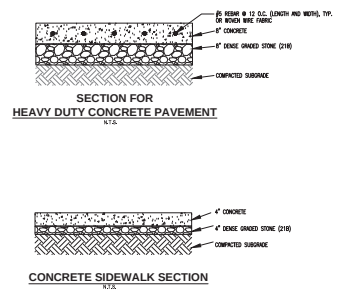
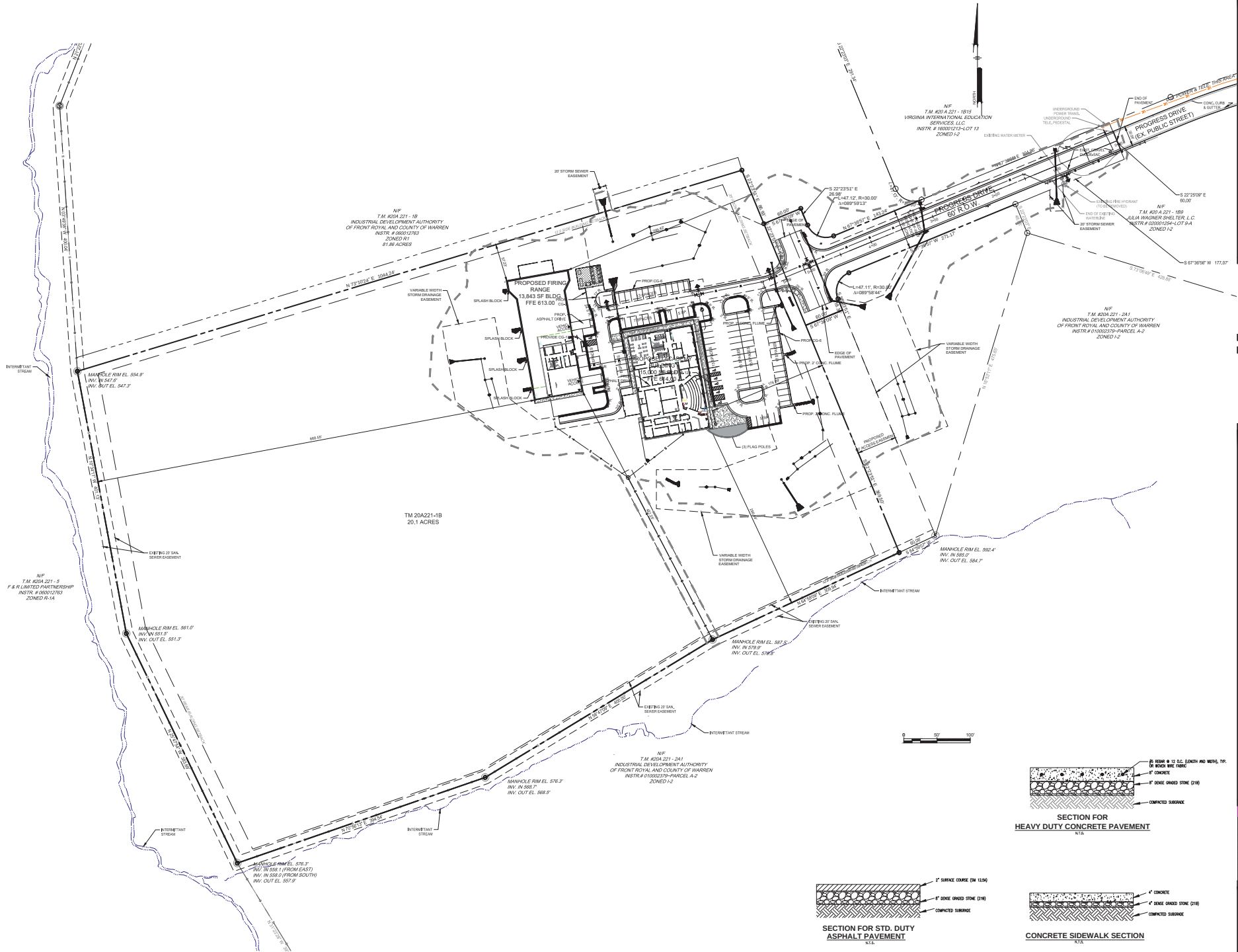
EXISTING
CONDITIONS
PLAN

C3



MOSELEYARCHITECTS

3000 NORFOLK STREET, RICHMOND, VA 23220
PHONE (804) 794-7555 FAX (804) 355-6690
T 10/22/2014 P 10/22/2014
MOSELEYARCHITECTS.COM



MOSELEYARCHITECTS

3300 NORFOLK STREET, RICHMOND, VA 23220
PHONE (804) 794-7555 FAX (804) 355-6590
T 804.794.7555 F 804.355.6590

SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY

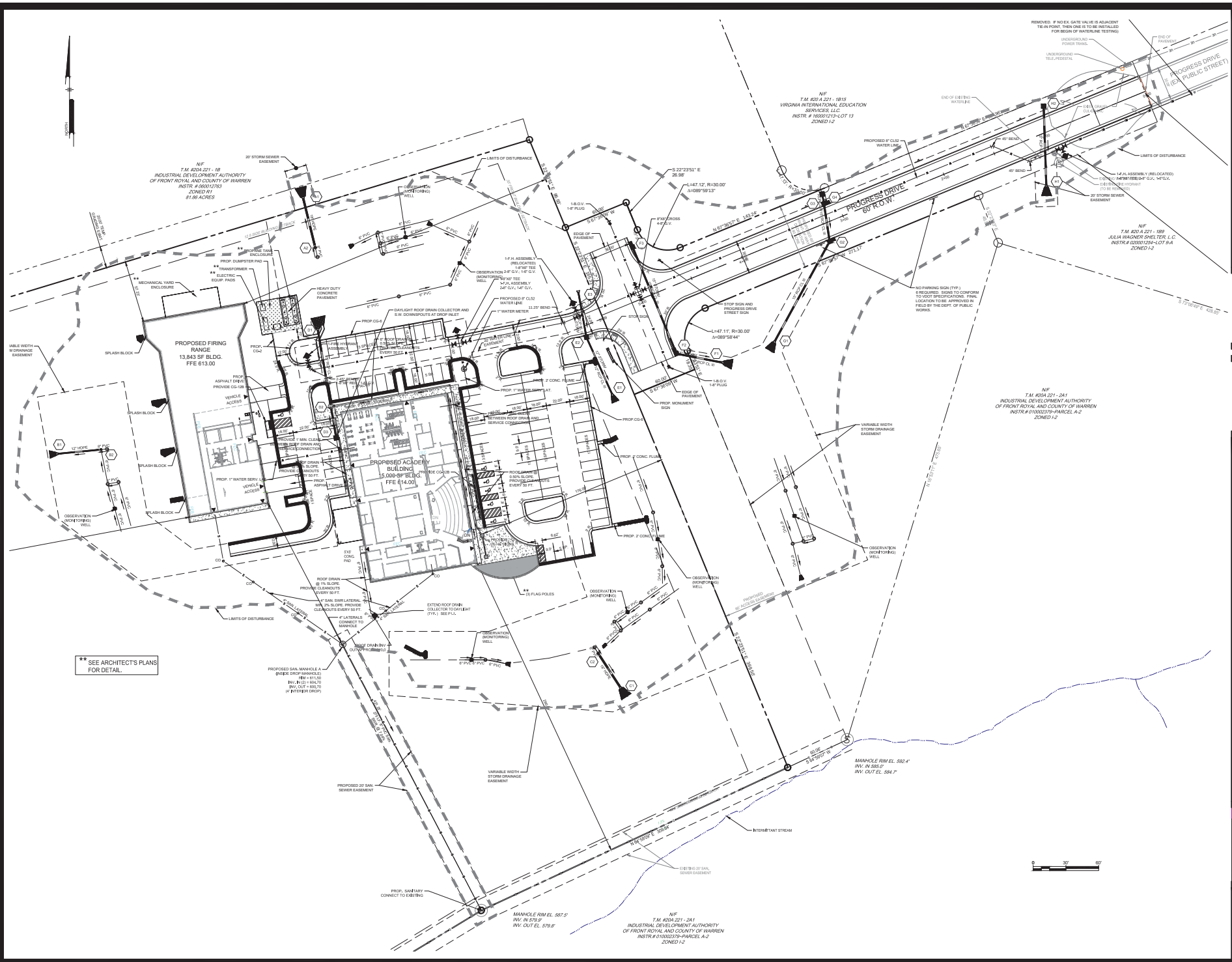
FRONT ROYAL WARREN COUNTY ECONOMIC DEVELOPMENT AUTHORITY
FRONT ROYAL, VIRGINIA

PROJECT NO: 160339
DATE: JULY 26, 2016
REVISIONS:

DATE	DESCRIPTION
1/22/16	REV. PER 120 COMMENTS
3/26/17	REV. PER 120 & 120A
5/17/17	REV. PER 120 COMMENTS
6/12/17	REV. PER 120 COMMENTS
7/25/17	REV. PER 120 COMMENTS
8/14/17	REV. PER 120 COMMENTS

OVERALL SITE PLAN

C4



MOSELEYARCHITECTS

3200 NORFOLK STREET, RICHMOND, VA 23220
PHONE (804) 794-7555 FAX (804) 355-6560
T 10/20/2015 P 10/20/2015

PROJECT NO: DATE: 10/20/15 JULY 26, 2016

DATE	REVISION
10/20/15	REV: ROOF DRAIN & V.I.
11/20/15	REV: PER RES COMMENTS
12/17/15	REV: PER RES & TOWN
01/27/16	REV: PER RES COMMENTS
07/07/16	REV: TOWN
08/17/16	REV: PER TOWN COMMENTS

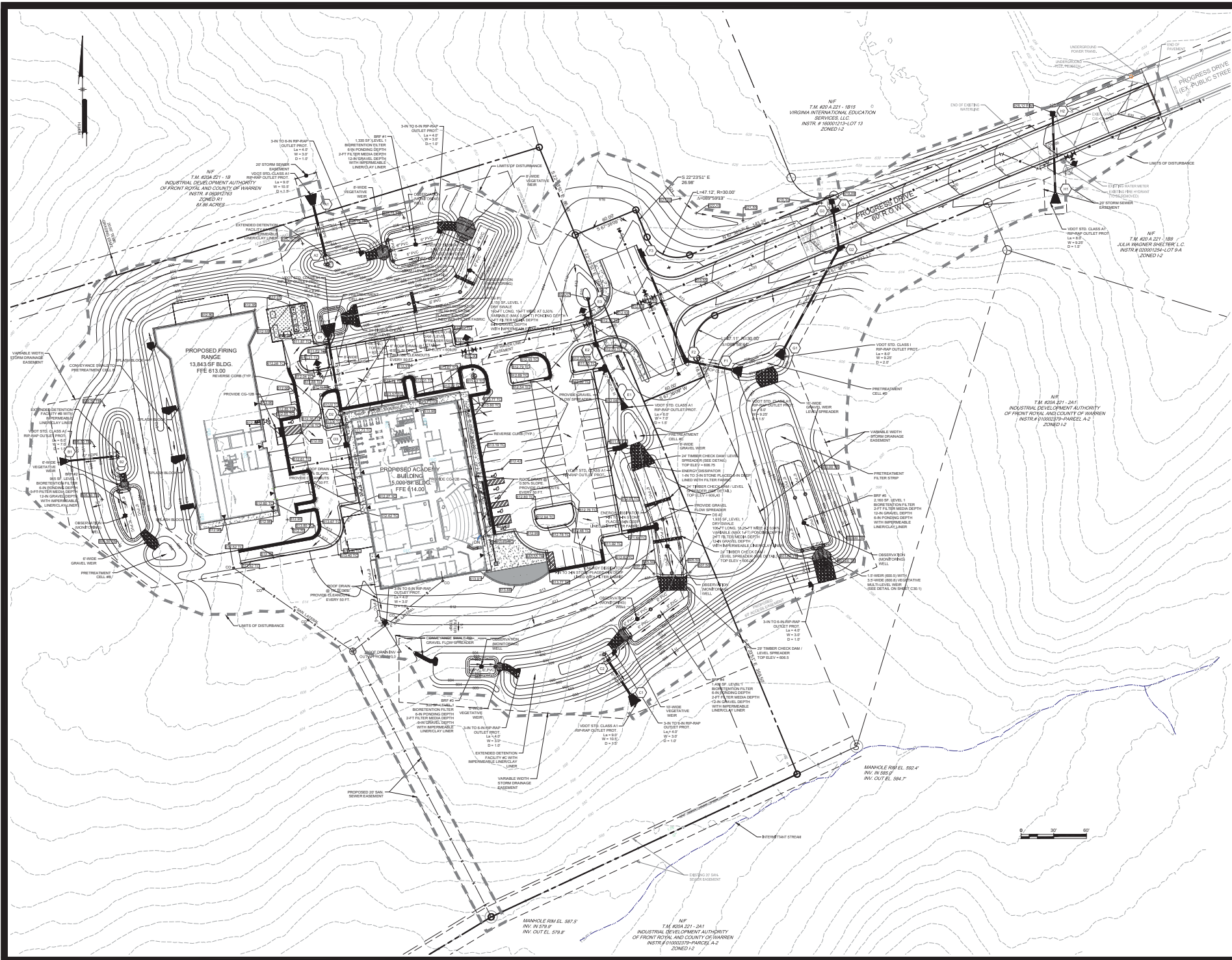
SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY

FRONT ROYAL WARREN COUNTY ECONOMIC DEVELOPMENT AUTHORITY

FRONT ROYAL, VIRGINIA

SITE PLAN

C5



MOSELEYARCHITECTS

3000 NORFOLK STREET, RICHMOND, VA 23290
PHONE (800) 794-7555 FAX (800) 355-6600
T 804.271.1818 F 804.271.1819

SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY

FRONT ROYAL WARREN COUNTY ECONOMIC
DEVELOPMENT AUTHORITY
FRONT ROYAL, VIRGINIA

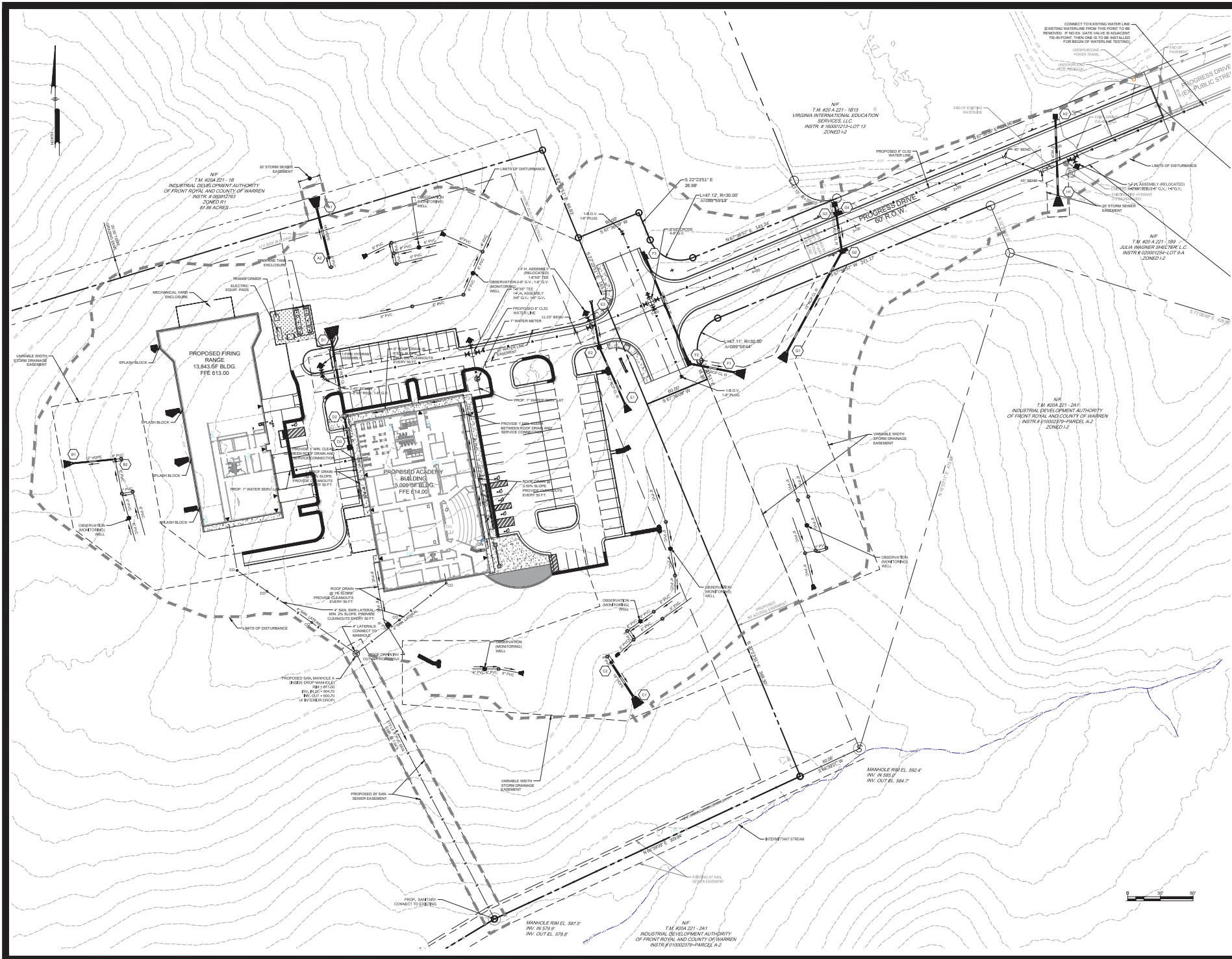
PROJECT NO: DATE: 160339 JULY 26, 2016

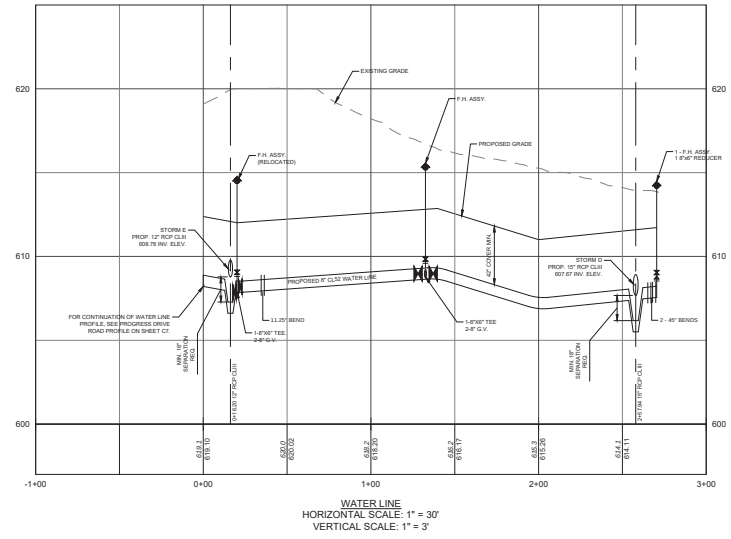
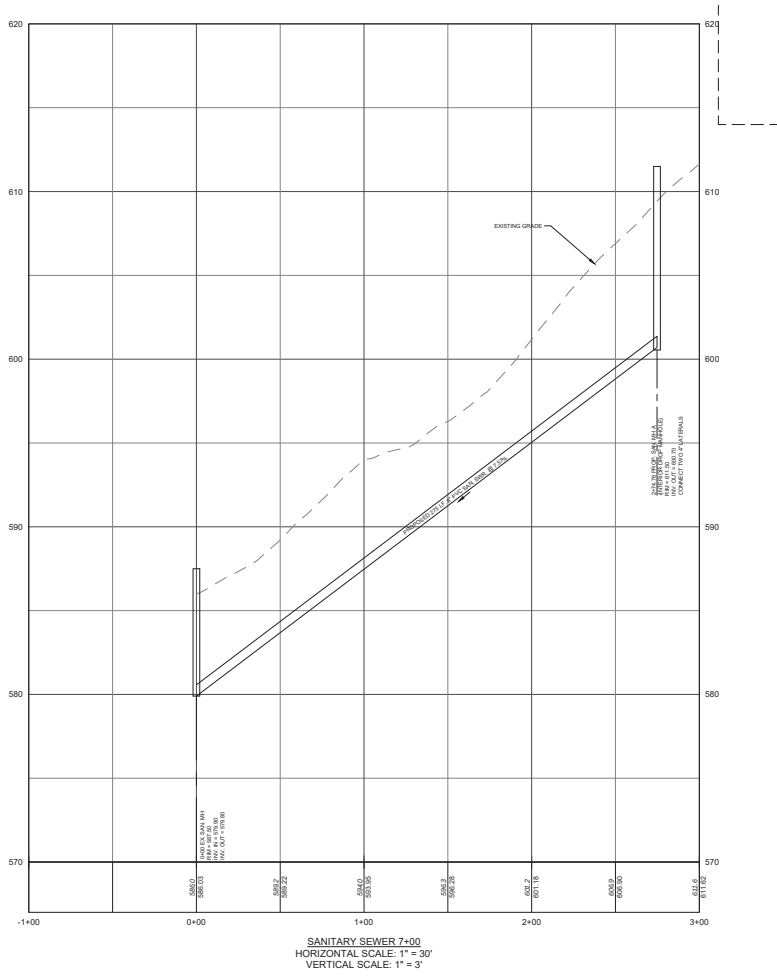
REVISIONS:

DATE	DESCRIPTION
7-26-16	REV. RCP DRAIN & V.L.
11-29-16	REV. RCP DRAIN COMMENTS
3-16-17	REV. PER DES & TOWN
6-17-17	REV. PER DES COMMENTS
6-27-17	REV. PER DES COMMENTS
7-17-17	REV. PER DES COMMENTS

GRADING
PLAN

C6





MOSELEYARCHITECTS

3300 NORFOLK STREET, RICHMOND, VA 23290
PHONE (804) 794-2555 FAX (804) 355-6690
T 1-800-271-1111 F 1-800-271-1111

SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY

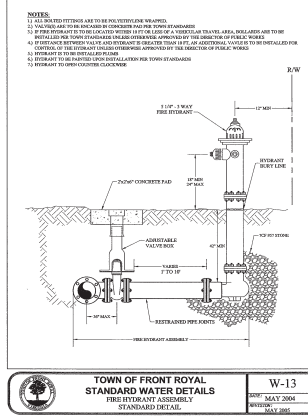
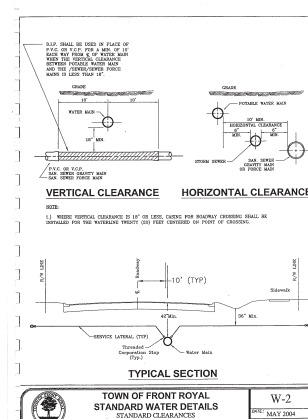
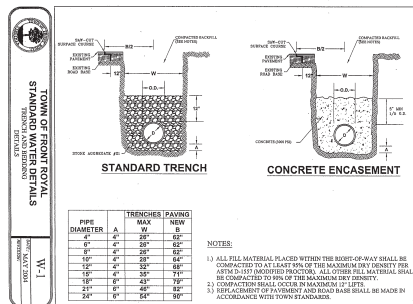
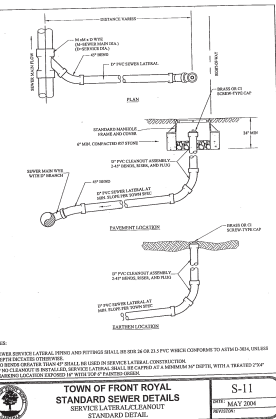
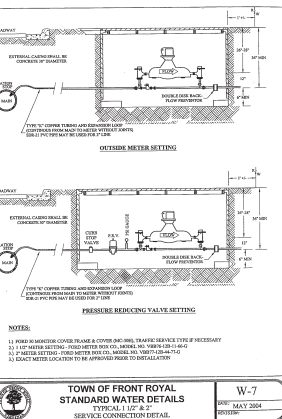
FRONT ROYAL WARREN COUNTY ECONOMIC DEVELOPMENT AUTHORITY

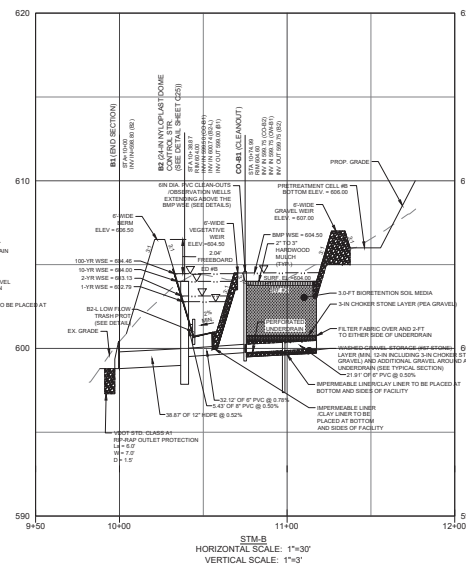
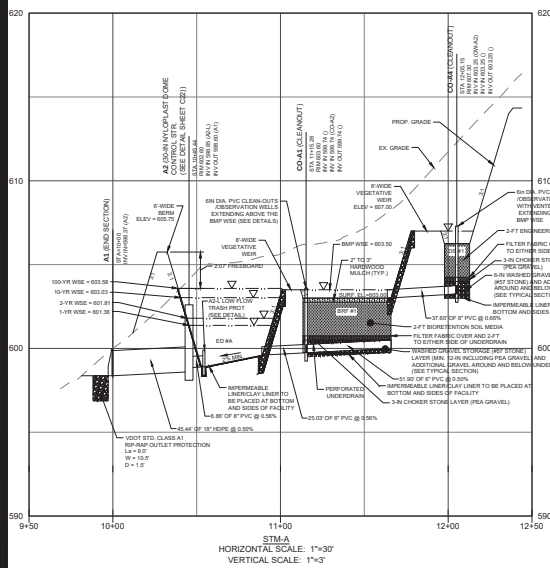
FRONT ROYAL, VIRGINIA

PROJECT NO:	160309	DATE:	JULY 26, 2016
DESCRIPTION:	REVISIONS		
DATE:	1/22/18	REVISION:	REV. PER GEO COMMENTS
DATE:	3/26/17	REVISION:	REV. PER GEO & CIVIL
DATE:	8/12/17	REVISION:	REV. PER GEO COMMENTS
DATE:	7/25/17	REVISION:	REV. PER GEO

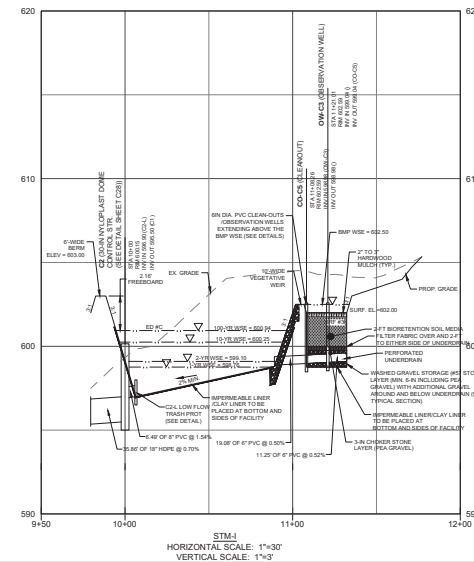
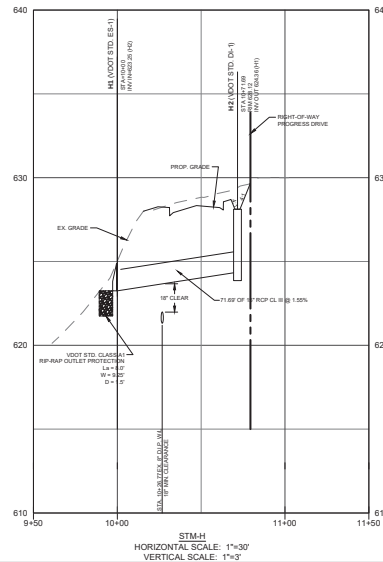
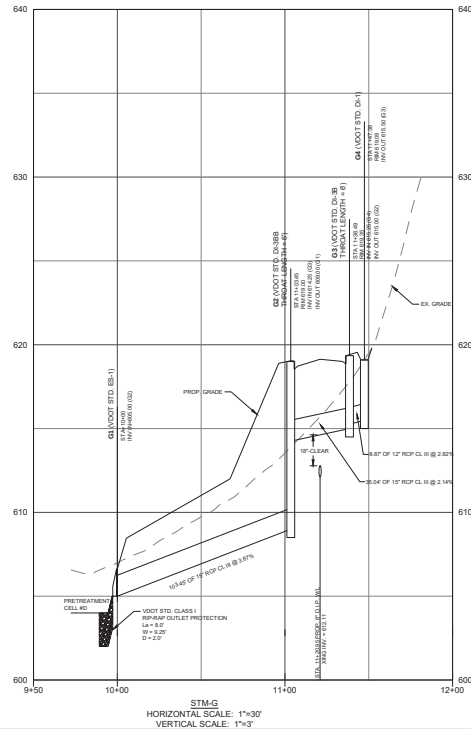
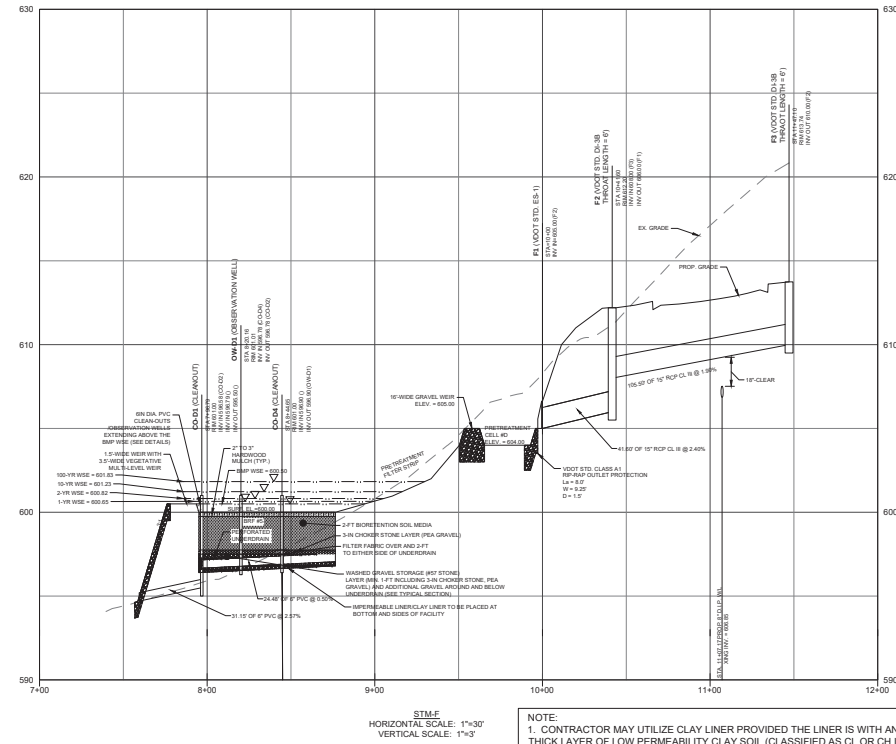
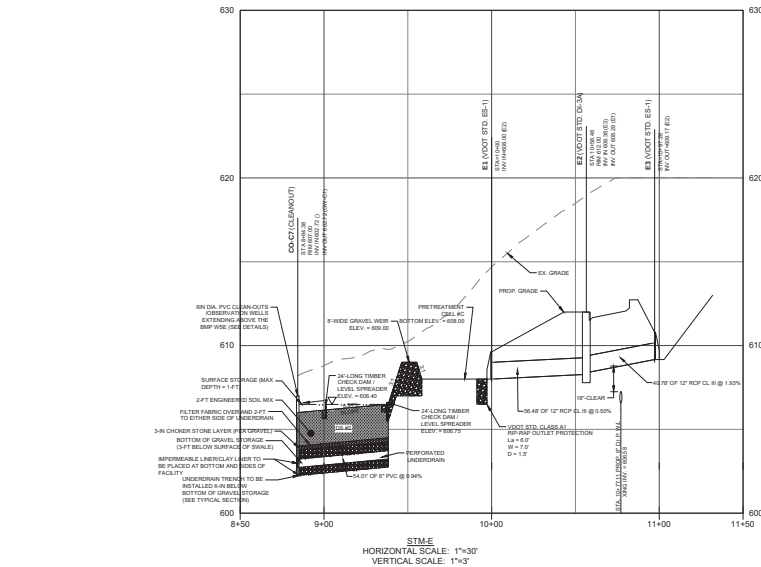
WATER AND SANITARY SEWER PROFILES

C9

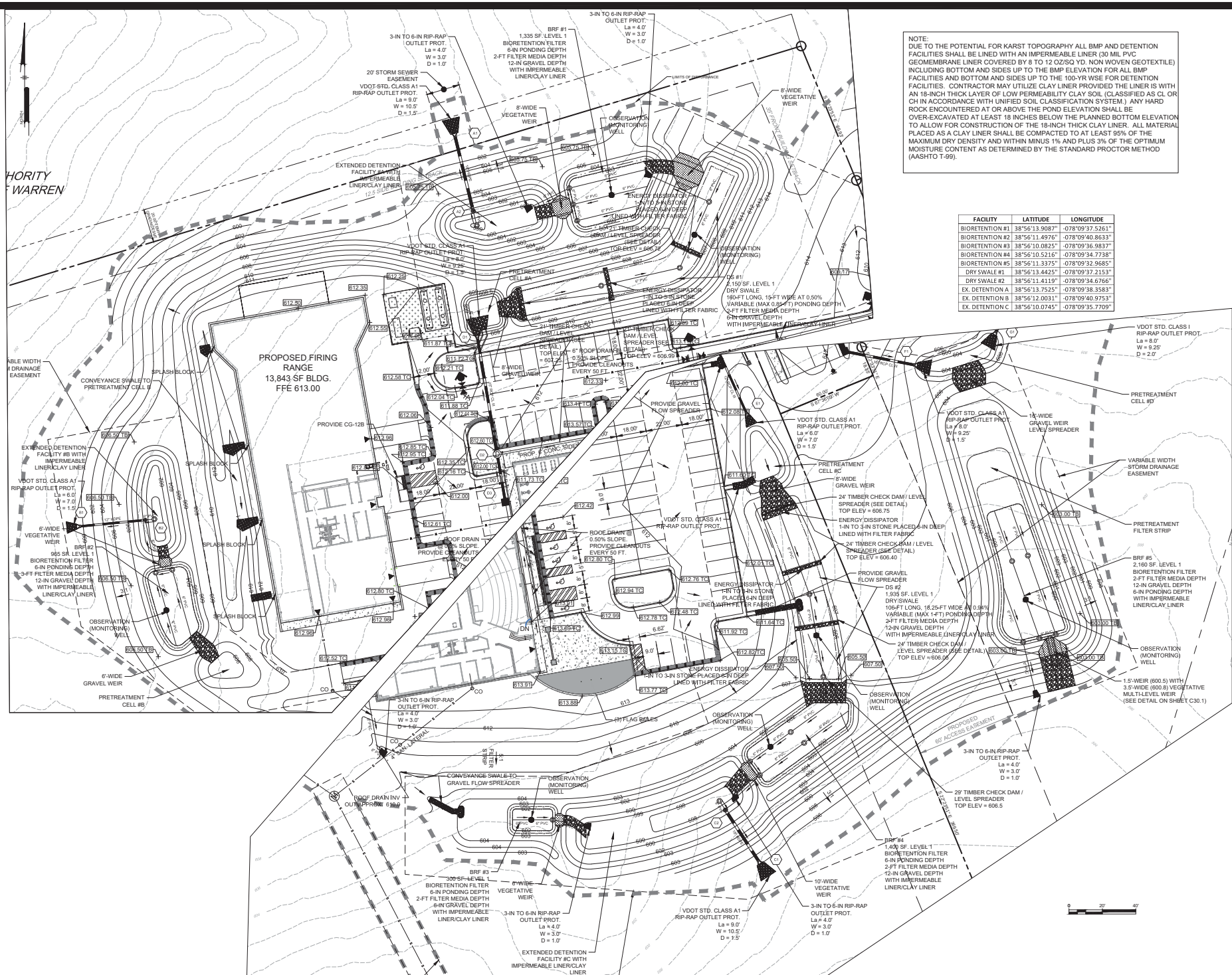




STORM SEWER DESIGN COMPUTATIONS																			
Flow Data		C & A										Results			Comments				
Station	Type	Structure	Design Area (Ac)	Round C & A	Round A & A	W Intersect C & A	W Intersect A & A	Q Intersect C & A	Q Intersect A & A	Minimum Q	Minimum "n"	Flow Vel (ft/s)	Flow Vel (ft/s)	Partial Vel (ft/s)	Length (ft)	Fall (ft)	Type	Lower	Top
0+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
0+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
1+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
2+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
3+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
4+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
5+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
6+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+60	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+70	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+80	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
7+90	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
8+00	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
8+10	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
8+20	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
8+30	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
8+40	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
8+50	Storm	Storm Sewer	0.13	0.00	0.12	0.12	0.00	0.77	0.67	0.69	0.019								
8+60																			



NOTE:
1. CONTRACTOR MAY UTILIZE CLAY LINER PROVIDED THE LINER IS WITH AN 8-INCH THICK LAYER OF LOW PERMEABILITY CLAY SOIL (CLASSIFIED AS CL OR CH IN THE SOIL CLASSIFICATION SYSTEM) OR AN EQUIVALENT MATERIAL. NO HARD ROCK ENCOUNTERED AT OR ABOVE THE POND ELEVATION SHALL BE OVER EXCAVATED AT LEAST 8 INCHES BELOW THE PLANNED BOTTOM ELEVATION TO ALLOW FOR CONSTRUCTION OF THE 8-INCH THICK CLAY LINER. ALL MATERIAL PLACED AS A CLAY LINER SHALL BE COMPACTED TO A MINIMUM OF 95% RELATIVE DENSITY AND WITHIN MINUS 1% AND PLUS 3% OF THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE STANDARD PROCTOR METHOD (ASTM D-99).



PROJECT NO:	04339	DATE:	JULY 26, 2014
DATE:	REVISION:	DESCRIPTION:	
11/22/14	REV. PER GEO COMMENTS		
06/07	REV. PER CIVIL COMMENTS		
04/17/15	REV. PER GEO COMMENTS		
01/22/17	REV. PER CIVIL COMMENTS		
07/01/17	REV. PER CIVIL COMMENTS		
07/01/17	REV. PER CIVIL COMMENTS		

BIO-RETENTION

SECTION 9: MAINTENANCE

9.1.MAINTENANCE AGREEMENTS

- THE VIRGINIA STORMWATER MANAGEMENT REGULATIONS (9VAC25-870-112) SPECIFY THE CIRCUMSTANCES UNDER WHICH A MAINTENANCE AGREEMENT MUST BE EXECUTED BETWEEN THE OWNER AND THE VSM AUTHORITY, AND SETS FORTH INSPECTION REQUIREMENTS, COMPLIANCE PROCEDURES IF MAINTENANCE IS NEGLECTED, NOTIFICATION OF THE LOCAL PROGRAM UPON TRANSFER OF OWNERSHIP, AND RIGHT-OF-ENTRY FOR LOCAL PROGRAM PERSONNEL.
- ALL BORETENTION PRACTICES MUST INCLUDE A LONG TERM MAINTENANCE AGREEMENTS CONSISTENT WITH THE PROVISIONS OF THE VSM REGULATIONS, AND MUST INCLUDE THE RECOMMENDED MAINTENANCE TASKS AND A COPY OF AN ANNUAL INSPECTION CHECKLIST.
- WHEN MICRO-SCALE BORETENTION PRACTICES ARE APPLIED ON PRIVATE RESIDENTIAL LOTS, HOMEOWNERS SHOULD BE EDUCATED REGARDING THEIR ROUTINE MAINTENANCE NEEDS BY BEING PROVIDED A SIMPLE DOCUMENT THAT EXPLAINS THEIR PURPOSE AND ROUTINE MAINTENANCE NEEDS.
- A DEED RESTRICTION, DRAINAGE EASEMENT OR OTHER MECHANISM ENFORCEABLE BY THE VSM AUTHORITY MUST BE IN PLACE TO HELP ENSURE THAT RAINGARDENS AND BIORETENTION FILTERS ARE MAINTAINED AND NOT CONVERTED OR DISTURBED, AS WELL AS TO PASS THE KNOWLEDGE ALONG TO ANY SUBSEQUENT OWNERS.
- THE MECHANISM SHOULD, IF POSSIBLE, GRANT AUTHORITY FOR THE VSM AUTHORITY TO ACCESS THE PROPERTY FOR INSPECTION OR CORRECTIVE ACTION.

9.1.FIRST YEAR MAINTENANCE OPERATIONS

- SUCCESSFUL ESTABLISHMENT OF BIORETENTION AREAS REQUIRES THAT THE FOLLOWING TASKS BE UNDERTAKEN IN THE FIRST YEAR FOLLOWING INSTALLATION:
- INITIAL INSPECTIONS.** FOR THE FIRST 6 MONTHS FOLLOWING CONSTRUCTION, THE SITE SHOULD BE INSPECTED AT LEAST TWICE AFTER STORM EVENTS THAT EXCEED 1/2 INCH OF RAINFALL.
- SPOT RESEEDING.** INSPECTORS SHOULD LOOK FOR BARE OR ERODING AREAS IN THE CONTRIBUTING DRAINAGE AREA OR AROUND THE BIORETENTION AREA, AND MAKE SURE THEY ARE IMMEDIATELY STABILIZED WITH GRASS COVER.
- FERTILIZATION.** ONE-TIME, SPOT FERTILIZATION MAY BE NEEDED FOR INITIAL PLANTINGS.
- WATERING.** WATERING IS NEEDED ONCE A WEEK DURING THE FIRST 2 MONTHS, AND THEN AS NEEDED DURING FIRST GROWING SEASON (APRIL-OCTOBER), DEPENDING ON RAINFALL.
- REMOVE AND REPLACE DEAD PLANTS.** SINCE UP TO 10% OF THE PLANT STOCK MAY DIE OFF IN THE FIRST YEAR, CONTRACTORS CONTRACTS SHOULD INCLUDE A CARE AND REPLACEMENT WARRANTY TO ENSURE THAT VEGETATION IS PROPERLY ESTABLISHED AND SURVIVES DURING THE FIRST GROWING SEASON FOLLOWING CONSTRUCTION. THE TYPICAL THRESHOLDS BELOW WHICH REPLACEMENT IS REQUIRED ARE 85% SURVIVAL OF PLANT MATERIAL AND 100% SURVIVAL OF TREES.

9.1.MAINTENANCE INSPECTIONS

- IT IS HIGHLY RECOMMENDED THAT A SPRING MAINTENANCE INSPECTION AND CLEANUP BE CONDUCTED AT EACH BIORETENTION AREA. THE FOLLOWING IS A LIST OF SOME OF THE KEY MAINTENANCE PROBLEMS TO LOOK FOR:
 - CHECK TO SEE IF 75% TO 90% COVER (MULCH PLUS VEGETATIVE COVER) HAS BEEN ACHIEVED IN THE BED, AND MEASURE THE DEPTH OF THE REMAINING MULCH.
 - CHECK FOR SEDIMENT BUILDUP AT CURB CUTS, GRAVEL DIAPHRAGMS OR PAVEMENT EDGES THAT PREVENTS FLOW FROM GETTING INTO THE BED, AND CHECK FOR OTHER SIGNS OF BYPASSING.
 - CHECK FOR ANY WINTER- OR SALT-KILLED VEGETATION, AND REPLACE IT WITH HARDIER SPECIES.
 - NOTE PRESENCE OF ACCUMULATED SAND, SEDIMENT AND TRASH IN THE PRE-TREATMENT CELL OR FILTER BEDS, AND REMOVE IT.
 - INSPECT BIORETENTION SIDE SLOPES AND GRASS FILTER STRIPS FOR EVIDENCE OF ANY RILL OR GULLY EROSION, AND REPAIR IT.
 - CHECK THE BIORETENTION BED FOR EVIDENCE OF MULCH FLOTATION, EXCESSIVE PONDING, DEAD PLANTS OR CONCENTRATED FLOWS, AND TAKE APPROPRIATE REMEDIAL ACTION.
 - CHECK INFLOW POINTS FOR CLOGGING, AND REMOVE ANY SEDIMENT.
 - LOOK FOR ANY BARE SOIL, OR SEDIMENT SOURCES IN THE CONTRIBUTING DRAINAGE AREA, AND STABILIZE THEM IMMEDIATELY.
 - CHECK FOR CLOGGED OR SLOW-DRAINING SOIL MEDIA, A CRUST FORMED ON THE TOP LAYER, INAPPROPRIATE SOIL MEDIA, OR OTHER CAUSES OF INSUFFICIENT FILTERING TIME, AND RESTORE PROPER FILTRATION CHARACTERISTICS.
- EXAMPLE MAINTENANCE INSPECTION CHECKLISTS FOR BIORETENTION AREAS CAN BE ACCESSED IN APPENDIX C OF CHAPTER 9 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (2010).

9.1.ROUTINE AND NON-ROUTINE MAINTENANCE TASKS

MAINTENANCE OF BIORETENTION AREAS SHOULD BE INTEGRATED INTO ROUTINE LANDSCAPE MAINTENANCE TASKS. IF LANDSCAPING CONTRACTORS WILL BE EXPECTED TO PERFORM MAINTENANCE TASKS, THEIR CONTRACTS SHOULD CONTAIN SPECIFICS ON UNIQUE BIORETENTION LANDSCAPING NEEDS, SUCH AS MAINTAINING ELEVATION DIFFERENCES NEEDED FOR PONDING, PROPER MULCHING, SEDIMENT AND TRASH REMOVAL, AND LIMITED USE OF FERTILIZERS AND PESTICIDES. A CUSTOMIZED MAINTENANCE SCHEDULE MUST BE PREPARED FOR EACH BIORETENTION FACILITY, SINCE THE MAINTENANCE TASKS WILL DIFFER DEPENDING ON THE SCALE OF BIORETENTION, THE LANDSCAPING TEMPLATE CHOSEN, AND THE TYPE OF SURFACE COVER. A GENERALIZED SUMMARY OF COMMON MAINTENANCE TASKS AND THEIR FREQUENCY IS PROVIDED IN TABLE 9.8.

- THE MOST COMMON NON-ROUTINE MAINTENANCE PROBLEM INVOLVES STANDING WATER. IF WATER REMAINS ON THE SURFACE FOR MORE THAN 48 HOURS AFTER A STORM, ADJUSTMENTS TO THE GRADING MAY BE NEEDED OR UNDERDRAIN REPAIRS MAY BE NEEDED. THE SURFACE OF THE FILTER BED SHOULD ALSO BE CHECKED FOR ACCUMULATED SEDIMENT OR A FINE CRUST THAT BUILDS UP AFTER THE FIRST SEVERAL STORM EVENTS. THERE ARE SEVERAL METHODS THAT CAN BE USED TO REHABILITATE THE FILTER (TRY THE EASIEST THINGS FIRST, AS LISTED BELOW):
- OPEN THE UNDERDRAIN OBSERVATION WELL OR CLEANOUT AND POUR IN WATER TO VERIFY THAT THE UNDERDRAINS ARE FUNCTIONING AND NOT CLOGGED OR OTHERWISE IN NEED OF REPAIR. THE PURPOSE OF THIS CHECK IS TO SEE IF THERE IS STANDING WATER ALL THE WAY DOWN THROUGH THE SOIL. IF THERE IS STANDING WATER ON TOP, BUT NOT IN THE UNDERDRAIN, THEN THERE IS A CLOGGED SOIL LAYER. IF THE UNDERDRAIN AND STAND PIPE INDICATES STANDING WATER, THEN THE UNDERDRAIN MUST BE CLOGGED AND WILL NEED TO BE SNAKED.
- REMOVE ACCUMULATED SEDIMENT AND TILL 2 TO 3 INCHES OF SAND INTO THE UPPER 5 TO 12 INCHES OF SOIL.
- INSTALL SAND WICKS FROM 3 INCHES BELOW THE SURFACE TO THE UNDERDRAIN LAYER. SAND WICKS CAN BE INSTALLED BY EXCAVATING OR AUGERING USING A TIRE AUGER (SMALLER TOOL) DOWN TO THE GRAVEL STORAGE ZONE TO CREATE VERTICAL COLUMNS WHICH ARE THEN FILLED WITH A CLEAN OPEN-GRADED COARSE SAND MATERIAL (COARSE SAND MIX SIMILAR TO THE GRADATION USED FOR THE SOIL MEDIA). A SUFFICIENT NUMBER OF WICK DRAINS OF SUFFICIENT DIMENSION SHOULD BE INSTALLED TO MEET THE DESIGN DEWATERING TIME FOR THE FACILITY.
- LAST RESORT - REMOVE AND REPLACE SOME OR ALL OF THE SOIL MEDIA.

NOTE:

DUE TO THE POTENTIAL FOR KARST TOPOGRAPHY ALL BMP AND DETENTION FACILITIES SHALL BE LINED WITH AN IMPERMEABLE LINER (30 MIL PVC GEOMEMBRANE LINED COVERED BY 8 TO 12 CDS) OR NON-WOVEN GEOTEXTILE INCLUDING BOTTOM AND SIDES UP TO THE BARF LAYER FOR ALL BMP FACILITIES AND BOTTOM AND SIDES UP TO THE 100-YR WVE FOR DETENTION FACILITIES. CONTRACTOR MAY UTILIZE CLAY LINER PROVIDED THE LINER IS WITH AN 18-INCH THICK LAYER OF LOW PERMEABILITY CLAY SOIL (CLASSIFIED AS CL OR CH IN ACCORDANCE WITH UNIFIED SOIL CLASSIFICATION SYSTEM.) ANY HARD ROCK ENCOUNTERED ABOVE THE POND ELEVATION SHALL BE OVER-EXCAVATED AT LEAST 18 INCHES BELOW THE PLANNED BOTTOM ELEVATION TO ALLOW FOR CONSTRUCTION OF THE 18-INCH THICK CLAY LINER. ALL MATERIAL PLACED AS A CLAY LINER SHALL BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AND WITHIN MINUS 1% AND PLUS 3% OF THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE STANDARD PROCTOR METHOD (ASHITO T-99).

EXTENDED DETENTION

SECTION 9: MAINTENANCE

9.1.MAINTENANCE AGREEMENTS

- THE VIRGINIA STORMWATER MANAGEMENT REGULATIONS (9VAC25-870-112) SPECIFY THE CIRCUMSTANCES UNDER WHICH A MAINTENANCE AGREEMENT MUST BE EXECUTED BETWEEN THE OWNER AND THE VSM AUTHORITY, AND SETS FORTH INSPECTION REQUIREMENTS, COMPLIANCE PROCEDURES IF MAINTENANCE IS NEGLECTED, NOTIFICATION OF THE LOCAL PROGRAM UPON TRANSFER OF OWNERSHIP, AND RIGHT-OF-ENTRY FOR LOCAL PROGRAM PERSONNEL.
- RESTRICTIVE COVENANTS OR OTHER MECHANISM ENFORCEABLE BY THE VSM AUTHORITY MUST BE IN PLACE TO HELP ENSURE THAT ED PONDS ARE MAINTAINED, AS WELL AS TO PASS THE KNOWLEDGE ALONG TO ANY SUBSEQUENT PROPERTY OWNERS.
- ACCESS TO ED PONDS SHOULD BE COVERED BY A DRAINAGE EASEMENT TO ALLOW ACCESS BY THE VSM AUTHORITY TO CONDUCT INSPECTIONS AND PERFORM MAINTENANCE WHEN NECESSARY.
- ALL ED PONDS MUST INCLUDE A LONG TERM MAINTENANCE AGREEMENTS CONSISTENT WITH THE PROVISIONS OF THE VSM REGULATIONS, AND MUST INCLUDE THE RECOMMENDED MAINTENANCE TASKS AND A COPY OF AN ANNUAL INSPECTION CHECKLIST.
- THE MAINTENANCE AGREEMENT SHOULD ALSO INCLUDE CONTACT INFORMATION FOR OWNERS TO GET LOCAL OR STATE ASSISTANCE TO SOLVE COMMON NUISANCE PROBLEMS, SUCH AS MOSQUITO CONTROL, GEESE, INVASIVE PLANTS, VEGETATIVE MANAGEMENT AND BEAVER REMOVAL.

9.1.MAINTENANCE INSPECTIONS

- MAINTENANCE OF ED PONDS IS DRIVEN BY ANNUAL INSPECTIONS THAT EVALUATE THE CONDITION AND PERFORMANCE OF THE POND, INCLUDING THE FOLLOWING:
- MEASURE SEDIMENT ACCUMULATION LEVELS IN FOREBAY.
- MONITOR THE GROWTH OF WETLANDS, TREES AND SHRUBS PLANTED. RECORD THE SPECIES AND THEIR APPROXIMATE COVERAGE, AND NOTE THE PRESENCE OF ANY INVASIVE PLANT SPECIES.
- INSPECT THE CONDITION OF STORMWATER INLETS TO THE POND FOR MATERIAL DAMAGE, EROSION OR UNDERCUTTING.
- INSPECT THE BANKS OF UPSTREAM AND DOWNSTREAM CHANNELS FOR EVIDENCE OF SLOUGHING, ANIMAL BURROWS, BOGgy AREAS, WOODY GROWTH, OR GULLY EROSION THAT MAY UNDERMINE EMBANKMENT INTEGRITY.
- INSPECT POND OUTFALL CHANNEL FOR EROSION, UNDERCUTTING, RIP-RAP DISPLACEMENT, WOODY GROWTH, ETC.
- INSPECT CONDITION OF PRINCIPAL SPILLWAY AND RISER FOR EVIDENCE OF SPALLING, JOINT FAILURE, LEAKAGE, CORROSION, ETC.
- INSPECT CONDITION OF ALL TRASH RACKS, REVERSE SLOPED PIPES OR FLASHBOARD RISERS FOR EVIDENCE OF CLOGGING, LEAKAGE, DEBRIS ACCUMULATION, ETC.
- INSPECT MAINTENANCE ACCESS TO INSURE IT IS FREE OF WOODY VEGETATION, AND CHECK TO SEE WHETHER VALVES, MANHOLES AND LOCKS CAN BE OPENED AND OPERATED.
- INSPECT INTERNAL AND EXTERNAL SIDE SLOPES OF THE POND FOR EVIDENCE OF SPARSE VEGETATIVE COVER, EROSION, OR SLUMPING, AND MAKE NEEDED REPAIRS IMMEDIATELY.

BASED ON INSPECTION RESULTS, SPECIFIC MAINTENANCE TASKS WILL BE TRIGGERED. EXAMPLE MAINTENANCE INSPECTION CHECKLISTS FOR ED PONDS CAN BE ACCESSED IN APPENDIX C OF CHAPTER 9 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (2010).

9.1.COMMON ONGOING MAINTENANCE TASKS

ED PONDS ARE PRONE TO CLOGGING AT THE ED LOW-FLOW ORIFICE. THIS COMPONENT OF THE PONDS PLUMBING SHOULD BE INSPECTED AT LEAST TWICE A YEAR, THE CONSTANTLY CHANGING WATER LEVELS IN ED PONDS MAKE IT DIFFICULT TO MOW OR MANAGE VEGETATIVE GROWTH. THE BOTTOM OF ED PONDS OFTEN BECOME SOGGY, AND WATER-LOVING TREES SUCH AS WILLOWS MAY TAKE OVER. THE MAINTENANCE PLAN SHOULD CLEARLY OUTLINE HOW THE POND AND ITS BUFFER WILL BE MANAGED OR HARVESTED IN THE FUTURE. PERIODIC MOWING OF THE STORMWATER BUFFER IS ONLY REQUIRED ALONG MAINTENANCE RIGHTS-OF-WAY AND THE EMBANKMENT. THE REMAINING BUFFER MAY BE MANAGED AS MEADOW (MOWING ONLY PERIODICALLY TO SUSTAIN HEALTHY GROWTH) OR FOREST.

THE MAINTENANCE PLAN SHOULD SCHEDULE A SHORELINE CLEANUP AT LEAST ONCE A YEAR TO REMOVE TRASH AND FLOATABLES THAT TEND TO ACCUMULATE IN THE FOREBAY, MICROPOOL, AND ON THE BOTTOM OF ED PONDS.

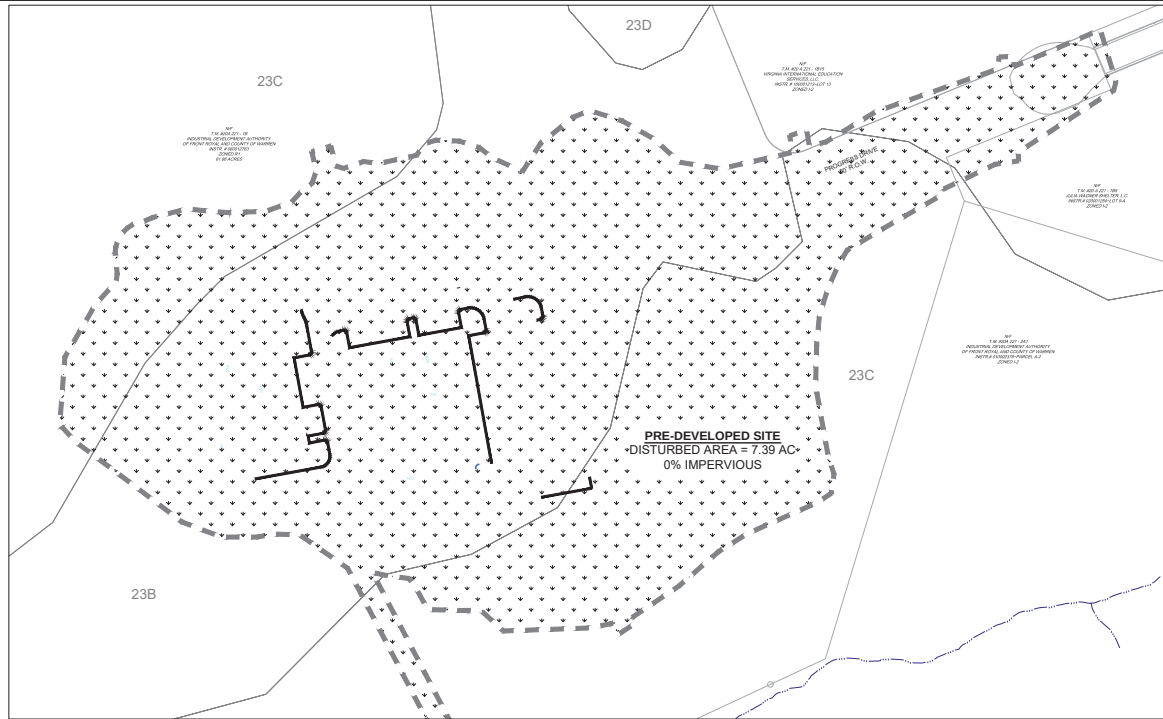
FREQUENT SEDIMENT REMOVAL FROM THE FOREBAY IS ESSENTIAL TO MAINTAIN THE FUNCTION AND PERFORMANCE OF AN ED POND. FOR PLANNING PURPOSES MAINTENANCE PLANS SHOULD ANTICIPATE CLEANOUTS EVERY 5 TO 7 YEARS, OR WHEN INSPECTIONS INDICATE THAT 50% OF THE FOREBAY CAPACITY HAS BEEN FILLED. ABSENT AN UPSTREAM EROSION CHANNEL OR OTHER SOURCE OF SEDIMENT, THE FREQUENCY OF SEDIMENT REMOVAL SHOULD DECREASE AS THE DRAINAGE AREA STABILIZES (AS NOTED ABOVE, THE DESIGNER SHOULD CHECK TO SEE WHETHER REMOVED SEDIMENTS CAN BE SPOILED (DEPOSITED) ON-SITE OR MUST BE HAULED AWAY. SEDIMENTS EXCAVATED FROM ED PONDS ARE TYPICALLY NOT CONSIDERED TOXIC OR HAZARDOUS, AND CAN BE SAFELY DISPOSED BY EITHER LAND APPLICATION OR LAND FILLING.

Water Calculations (2-75)

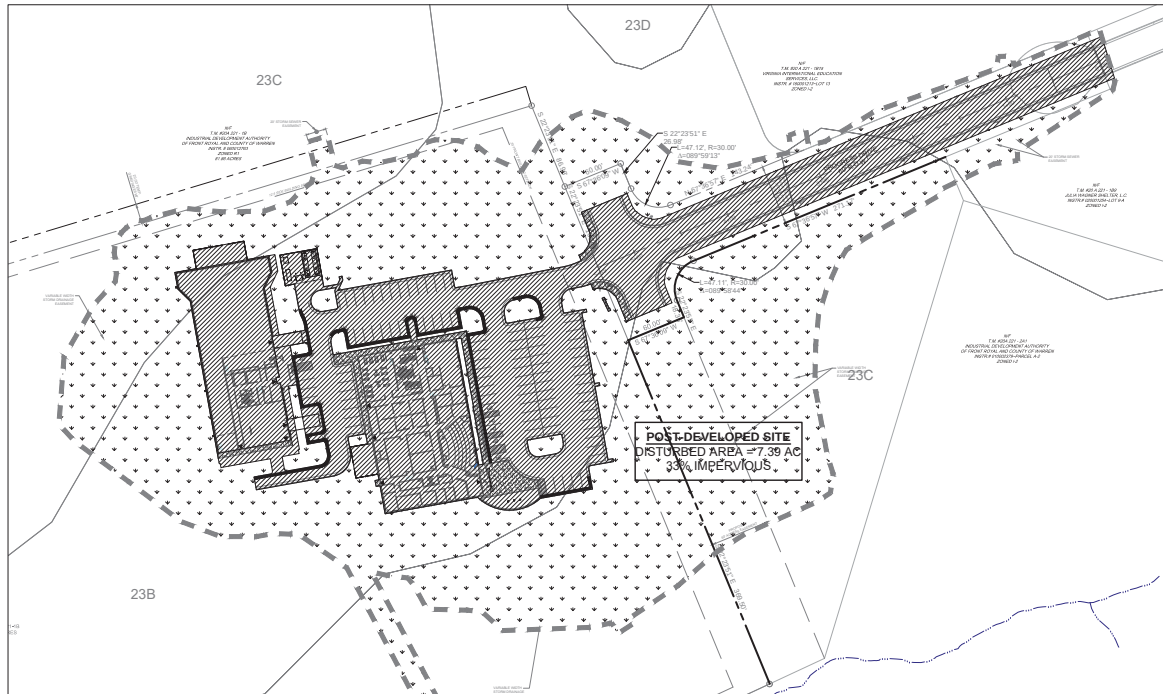
Q over Equation = C_uQ_u

C_u = 3.0

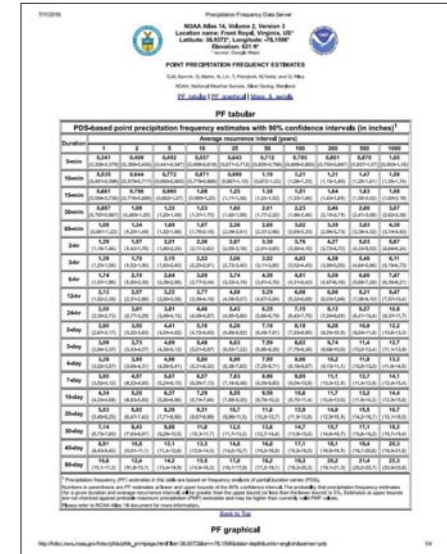
Water Location	Open Area (sq ft)	Clear	2 yr Intensity (in/hr)	2 yr Q (cfs)	10 yr Q (MGD)	Calculated Wet Length (ft)	Wet Length (ft)	Clear	2 yr Water Surface Elev. (ft)	2 yr Velocity (ft/sec)	Top of Embankment (ft)	Finalized Proposed (ft)
On Swale A1 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A2 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A3 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A4 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A5 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A6 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A7 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A8 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A9 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A10 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A11 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A12 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A13 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A14 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A15 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A16 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A17 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A18 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A19 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A20 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A21 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A22 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A23 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A24 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A25 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A26 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A27 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A28 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A29 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A30 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A31 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A32 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A33 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A34 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A35 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A36 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A37 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A38 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A39 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A40 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A41 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A42 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A43 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A44 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A45 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A46 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A47 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A48 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A49 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A50 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A51 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A52 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A53 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A54 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A55 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A56 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A57 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A58 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A59 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A60 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A61 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A62 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A63 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A64 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A65 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A66 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A67 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A68 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A69 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A70 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A71 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A72 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A73 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A74 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A75 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A76 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A77 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A78 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A79 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A80 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A81 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A82 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A83 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A84 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A85 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A86 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A87 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A88 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A89 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A90 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A91 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34	0.188	0.505	0.505	0.505	0.67	0.44	0.505
On Swale A92 (25 Facility 1)	1.10	0.72	5.35	4.57	0.34</							



EXISTING CONDITIONS IMPERVIOUS AREA MAP

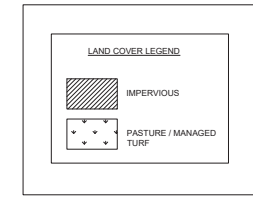


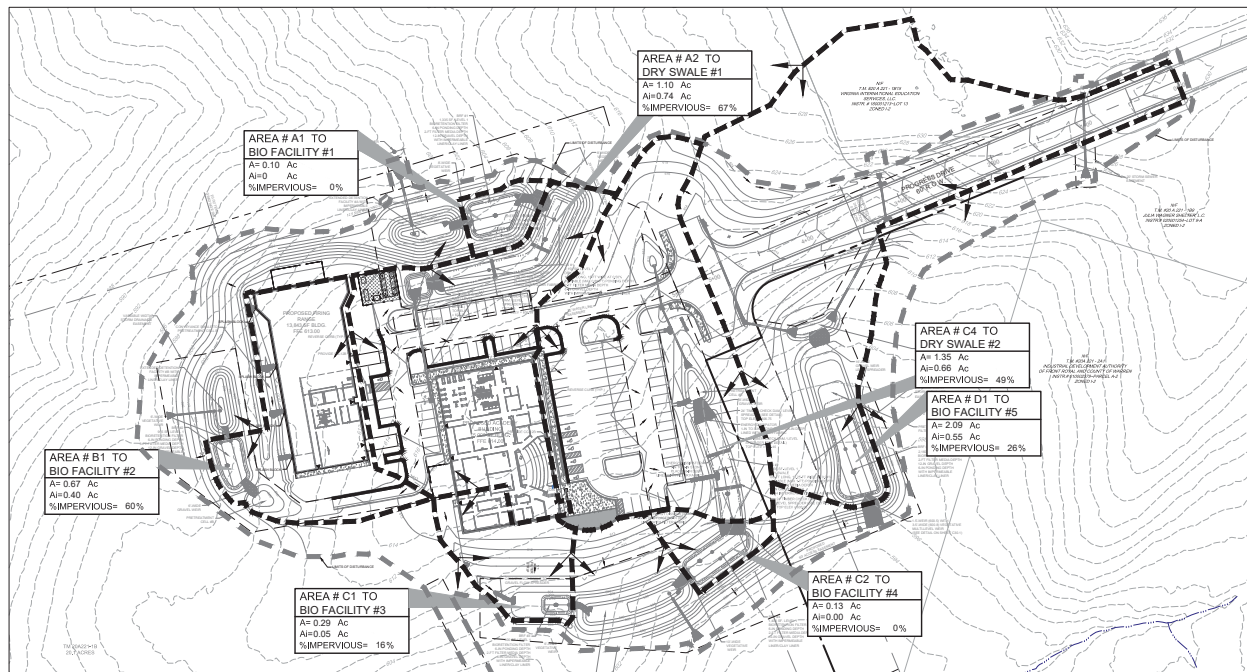
PROPOSED CONDITIONS IMPERVIOUS AREA MAP



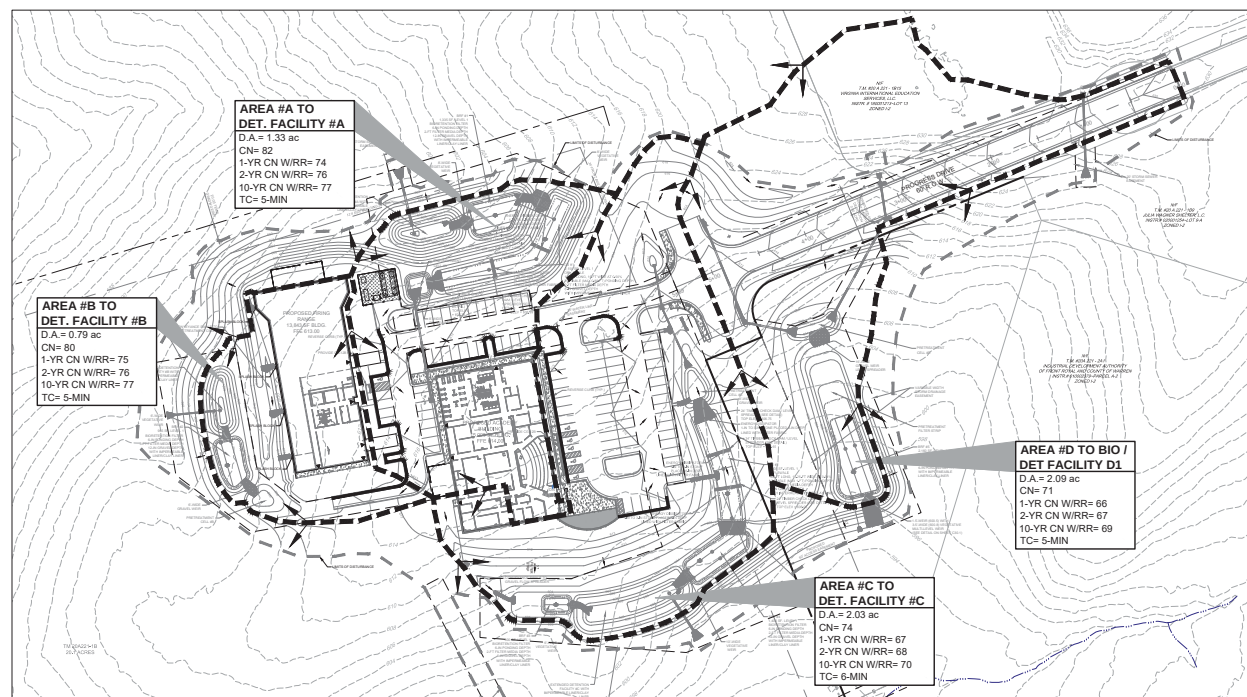
SOILS LEGEND		
MAP SYMBOL	SOIL NAME	HYDROLOGIC SOIL GROUP
23B	LODI SILT LOAM, 2 TO 7 PERCENT SLOPES	B
23C	LODI SILT LOAM, 7 TO 15 PERCENT SLOPES	B
23D	LODI SILT LOAM, 15 TO 25 PERCENT SLOPES	B

SOURCE: USDA NRCS SOIL SURVEY FOR WARREN COUNTY, VA.





BMP DRAINAGE DIVIDES



DETENTION DRAINAGE DIVIDES



OUTFALL-B STORMWATER MANAGEMENT DETENTION CALCULATIONS 2-YR & 10-YR STORM EVENTS

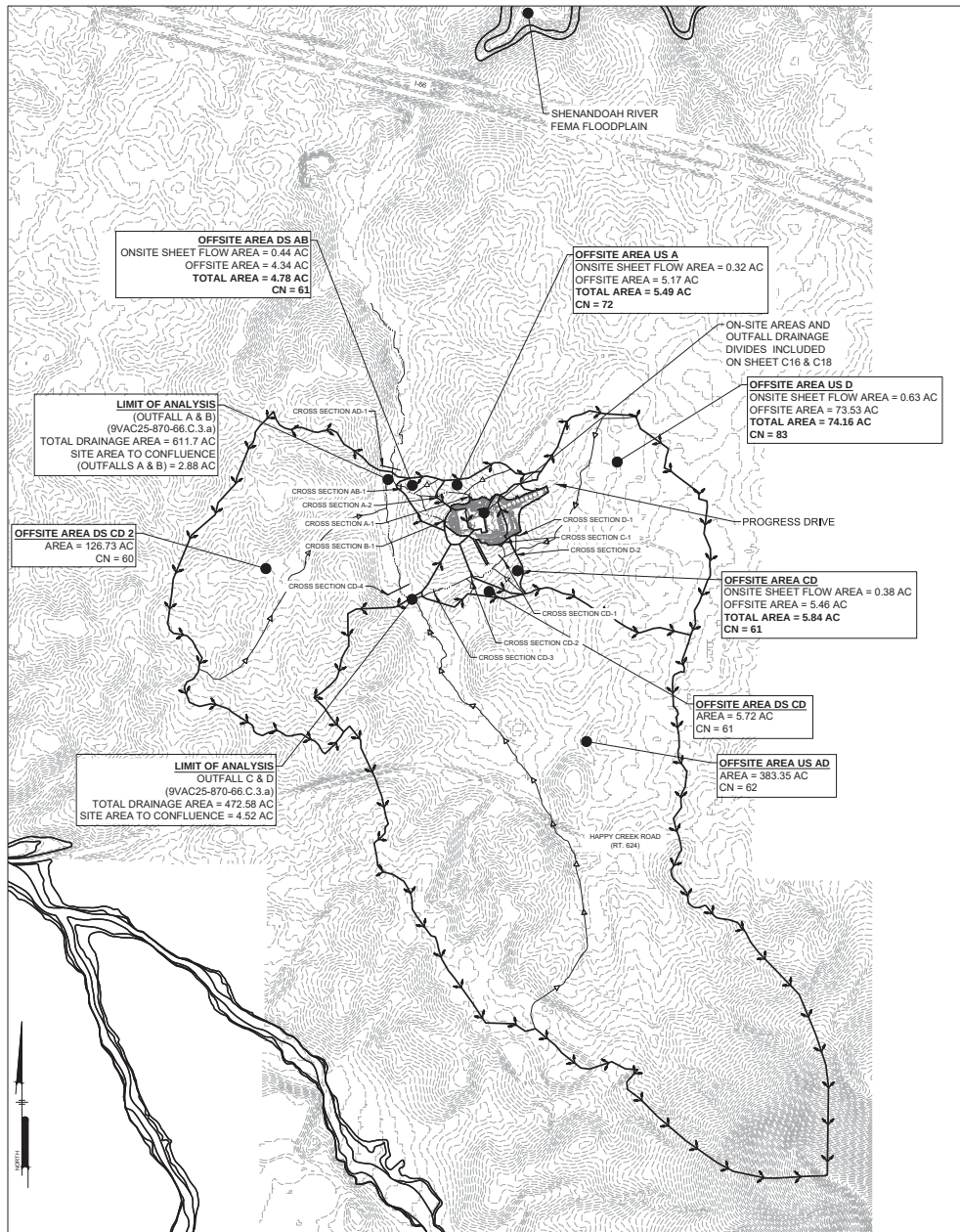
2-yr STORMWATER MANAGEMENT DETENTION COMPUTATIONS:

Outfall B						
Two-Year Storm Hydrology:						
		Forced Conditions	Pre Conditions	Post Conditions no RR	Post Conditions with RR	
Drainage Area (square miles)	Ac	1.44	1.44	1.31	1.31	
Runoff Curve Number	un	0.00251	0.00251	0.001915	0.001915	
Drainage Area (square miles)	ac	0.96	0.96	0.84	0.84	Time (hr) (p. 10/8) Spreadsheet
Potential Retention = 1000*(N - 10)	m	8.16	6.36	3.68	4.28	
Runoff Depth (in) (p. 10/8)	m	3.51	2.51	2.01	2.21	
Runoff Depth = (p. 2/25) (p. 8/85)	m	6.20	6.37	6.47	6.72	
Peak Flow TR-55 Calculation						
Initial Abstraction = 0.2" S		1.64	1.26	0.75	0.96	
Time of Concentration	hr	0.58	0.58	0.08	0.08	
Compute L _P =		5.544	5.425	0.243	0.280	
SCS peak discharge coeff. C _u (TR-55 Table F-1)		2.1768	2.2393	2.4921	2.4767	
SCS peak discharge coeff. C _u (TR-55 Table F-1)		-0.4509	-0.3842	-0.2506	-0.2207	
SCS peak discharge coeff. C _u (TR-55 Table F-1)		-0.0387	-0.0361	-0.0301	-0.0213	
Intermediate computation, log a =		2.371476	2.394181	2.508547	2.502136	
Unit peak discharge, q _p	cfs/in	203	547	1020	1028	
(Use T _c and t _{tp} with exhibit 4.4, or App F)						
Postdetention adjustment factor, F _p =		1.00	1.00	1.00	1.00	
(Use % area with table 4.2)						
Peak discharge, q _p	cfs	0.69	0.63	1.70	1.39	
(Where q _p = q _p Area ^{0.75})						
RV runoff volume, RV	ac-ft	0.62	0.64	0.88	0.87	
(RV = 53.33 "Q" A _d)		1.033	1.826	3.886	3.203	
2-yr Existing Storage Volume*	cf	1.826				
2-yr Proposed Volume Provided*	cf	3.203				
Estimated Storage TR-55 Calculation						
		Forced Conditions no Runoff Reduction	Pre Conditions no Runoff Reduction	Post Conditions no Runoff Reduction	Post Conditions with Runoff Reduction	
Peak inflow discharge, q _p	cfs	1.10	0.8	1.39	0.8	
Peak outflow discharge, q _p	cfs	0.45	0.45	0.45	0.45	
Compute q _{avg}		0.26	0.26	0.26	0.26	
V _{avg}		0.40	0.40	0.40	0.40	
(Use q _{avg} with figure 6-1, App F)						
RV Runoff volume, RV	ac-ft	0.62	0.64	0.88	0.87	
Estimated Required Storage volume, V _s	cf	0.62	0.64	0.88	0.87	
(V _s = RV - (V _s / RV))		1.535	1.535	1.545	1.545	
Two-Year Storm Hydrology Summary:						
		For Conditions	For Conditions no RR	For Conditions with RR		
Drainage Area	Ac	1.44	1.44	1.31		
Runoff Curve Number		0.01	0.01	0.01		
Runoff Depth = (p. 2/25) (p. 8/85)	m	0.37	0.37	0.27		
Runoff Volume	ac-ft	0.26	0.26	0.21		
Peak discharge	cfs	0.45	0.45	0.45		
Peak (Detention Adjusted) Peak Discharge	cfs	0.45	0.45	0.45		
Estimated Storage Volume Required	ac-ft	0.62	0.64	0.88		

Detention Facility Flow has been routed and releases at 0.39 cfs. 2-yr peak flow reduction has been achieved in this Detention Facility & Outfall B is releasing at a 2-yr flow rate which is less than existing conditions.

10-yr STORMWATER MANAGEMENT DETENTION COMPUTATIONS:

Outfall B							
Ten-Year Storm Hydrology:							
		Forced Conditions	Pre Conditions	Post Conditions	Post Conditions with RRs		
Drainage Area (square miles)	Ac	1.44	1.44	1.31	1.31		
Runoff Curve Number	un	0.00251	0.00251	0.00195	0.00195		
Runoff Depth = (P-0.25)/(P+0.85)	in	5.96	5.96	5.96	5.96	Notes (On per 1/10th Slope)	
Potential Retention = 1000*(C-10)	m	0.18	0.39	3.68	4.08		
Runoff Depth = 2.04*(C-10)	m	4.48	4.48	4.48	4.48		
Runoff Depth = (P-0.25)/(P+0.85)	m	6.72	6.06	1.68	1.72		
Peak Flow TR-55 Calculation							
Initial Abstraction = 0.2" S	in	1.64	1.26	0.76	0.82		
Time of Concentration	hr	0.58	0.58	0.08	0.08		
Compute L _P =		5.367	5.267	0.164	0.163		
SCS peak discharge coeff. C _u (TR-55 Table F-1)		2.4002	2.4777	2.5049	2.5169		
SCS peak discharge coeff. C _u (TR-55 Table F-1)		-0.8107	-0.6207	-0.4172	-0.4189		
SCS peak discharge coeff. C _u (TR-55 Table F-1)		-0.0778	-0.1107	-0.1419	-0.1429		
Intermediate computation, log a =		2.6402339	2.6570502	2.7187562	2.7187562		
Unit peak discharge, q _p	csm/ft	437	726	1043	1037		
(Use T _c and t _{tp} with exhibit 4.4, or App F)							
Postdetention adjustment factor, F _p = (Use % area with table 4.2)		1.00	1.00	1.00	1.00		
Peak discharge, q _p	cfs	0.71	0.73	2.78	2.41		
(Where q _p = q _p Area ^{0.75})							
RV Runoff volume, RV	ac-ft	0.68	0.72	0.78	0.78		
(RV = 53.33 "Q" A _d)		1.788	1.788	2.365	2.365		
10-yr Existing Storage Volume*	cf	1.788					
10-yr Proposed Volume Provided*	cf	1.788					
Estimated Storage TR-55 Calculation							
		Forced Conditions with RRs Reduction	Pre Conditions with RRs Reduction	Post Conditions with RRs Reduction			
Peak inflow discharge, q _p	cfs	2.75	2.75	2.75			
Peak outflow discharge, q _p	cfs	1.73	1.73	1.73			
Compute q _{avg}		0.66	0.66	0.66			
Use q _{avg} with Figure 6-1, App F)							
RV Runoff volume, RV	ac-ft	0.13	0.13	0.13			
Estimated Required Storage volume, V _s	cf	0.06	0.06	0.06			
(V _s = RV - (V _s / RV))		2.450	2.45	2.04			
Ten-Year Storm Hydrology Summary:							
		Pre Conditions	Post Conditions no RR	Post Conditions with RRs			
Drainage Area	Ac	1.44	1.44	1.31			
Runoff Curve Number	un	0.001	0.001	0.001			
Runoff Depth = (P-0.25)/(P+0.85)	in	6.06	6.06	6.06			
Runoff Volume	ac-ft	0.13	0.13	0.13			
Peak discharge	cfs	1.73	1.73	1.73			
Post Detention Adjusted Peak Discharge	cfs	1.73	1.73	1.73			
Estimated Storage Volume Required	ac-ft	0.06	0.06	0.06			



FLOOD PROTECTION
OUTFALL DRAINAGE DIVIDES

FLOOD PROTECTION NARRATIVE:

FLOOD PROTECTION WATER QUANTITY COMPLIANCE WAS EVALUATED FOR EACH SITE OUTFALL (9VAC25-870-66.C.1). FROM THE SITE TO THE LIMIT OF ANALYSIS (9VAC25-870-66.C.3). CROSS SECTIONS WERE EVALUATED AT EACH SITE OUTFALL AND AT SIGNIFICANT CONFLUENCES/CHANGES IN FLOW AREA DOWNSTREAM OF THE SITE.

DRAINAGE AREAS, RUNOFF CURVE NUMBER, AND TIME OF CONCENTRATIONS WERE EVALUATED FOR OFFSITE DRAINAGE AREAS THAT CONTRIBUTE TO THE OUTFALL DRAINAGE PATH. DRAINAGE AREA AND TIME OF CONCENTRATION DELINEATIONS WERE COMPLETED USING DETAILED TOPOGRAPHIC DATA DEVELOPED FROM LIDAR DATA. RUNOFF CURVE NUMBERS WERE COMPUTED USING NRCS SOIL DATA AND EXISTING LAND COVER. 10-YR FLOWS WERE EVALUATED IN HYDRAFLOW HYDROGRAPHS FOR SCS 24-HR EVENTS. A DRAINAGE AREA SUMMARY TABLE IS INCLUDED ON THIS SHEET.

CROSS SECTIONS WERE DEVELOPED FROM TOPOGRAPHIC DATA DEVELOPED FROM LIDAR DATA. CHANNEL LINING WAS ESTIMATED USING AERIAL IMAGERY. COMBINED FLOW DATA WAS INPUT TO CROSS SECTIONS IN BENTLEY FLOWMASTER. A TABLE OF RESULTS FOR THE CROSS SECTION ANALYSIS IS INCLUDED ON THIS SHEET.

THE ANALYSIS SHOWS THAT THE 10-YR FLOW IS CONVEYED THROUGH NATURAL CONVEYANCE CHANNELS FROM THE SITE TO THE LIMIT OF ANALYSIS SHOWN ON THIS SHEET. FLOW IS CONTAINED WITHIN THE DELINEATED CROSS SECTIONS. IN ADDITION THE SITE STORMWATER MANAGEMENT WAS DESIGNED TO RELEASE THE POST-DEVELOPMENT 10-YR 24-HR PEAK FLOW AT A RATE LESS THAN THE PRE-DEVELOPMENT 10-YR 24-HR PEAK FLOW RATE. THE ANALYSIS SATISFIES SECTION 9VAC25-870-66.C.1 TO THE LIMIT OF ANALYSIS (9VAC25-870-66.C.3.a) OF THE VSMP REGULATIONS.

SEE SHEETS C21.3 CROSS SECTION LOCATIONS. SEE SHEET C21.4 FOR HYDROGRAPH SUMMARY OUTPUT AND FLOWMASTER CROSS SECTION DATA.

OFFSITE DRAINAGE AREA SUMMARY					
OFFSITE OUTFALL ID	DRAINAGE AREA (AC)	RUNOFF CN	Tc (MIN)	10-YR PEAK FLOW (CFS)	
US A	5.49	72	15	13.11	
US AB	4.18	61	6	8.95	
US AD	383.35	62	48	238.47	
US D	74.16	83	19	231.48	
CD	5.84	61	9	9.25	
DS CD 2	5.72	61	10	9.06	
DS CD 2	126.73	60	24	108.39	
DS AD	168.60	64	38	143.62	

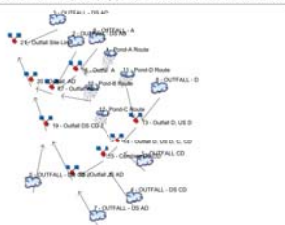
CROSS SECTION INPUT DATA					
CROSS SECTION	COVER (AERIAL IMAGERY)	MANNUIS (SOURCE: VDOT DRAINAGE MANUAL APPENDIX D-3)	DESCRIPTION	ELEVATION SOURCE	
XS A-1	GRASS FLOODPLAIN	0.035	HIGH GRASS	LEIAR DATA	
XS A-2	GRASS FLOODPLAIN	0.035	HIGH GRASS	LEIAR DATA	
XS B-1	GRASS FLOODPLAIN	0.035	HIGH GRASS	LEIAR DATA	
XS AB-1	GRASS FLOODPLAIN	0.035	HIGH GRASS	LEIAR DATA	
XS C-1	GRASS FLOODPLAIN	0.035	HIGH GRASS	LEIAR DATA	
XS D-1	GRASS FLOODPLAIN	0.035	HIGH GRASS	LEIAR DATA	
XS D-2	GRASS FLOODPLAIN	0.035	HIGH GRASS	LEIAR DATA	
XS CD-1	GRASS CHANNEL	0.035	HIGH GRASS	LEIAR DATA	
XS CD-2	GRASS CHANNEL	0.035	HIGH GRASS	LEIAR DATA	
XS CD-3	GRASS CHANNEL	0.035	HIGH GRASS	LEIAR DATA	
XS CD-4	NATURAL STREAM WITH LIGHT UNDERBUSH / GRASS FLOODPLAIN	0.057 (SS, SSF, S4S)	STREAM ON PLAIN (1 & 4) / HIGH GRASS	LEIAR DATA	
XS AD-1	NATURAL STREAM WITH LIGHT UNDERBUSH / GRASS FLOODPLAIN	0.057 (SS, SSF, S4S)	STREAM ON PLAIN (1 & 4) / HIGH GRASS	LEIAR DATA	

FlowMaster Output Table (10-YR, 24-HR, SCS Storm Event)															
Cross Section	Solve For	Friction Method	Roughness Coefficient	Channel Slope (ft/ft)	Water Surface Elevation (ft)	Flow Area (ft²)	Discharge (ft³/s)	Velocity (ft/s)	Hydraulic Radius (ft)	Top Width (ft)	Normal Depth (ft)	Critical Depth (ft)	Critical Slope (ft/ft)	Velocity (ft/s)	Specific Energy (ft)
XS A-1	Normal Depth	Manning Formula	0.035	0.07	584.42	2.24	0.38	0.55	0.10	10.03	0.10	0.21	0.03754	3.34	0.09
XS A-2	Normal Depth	Manning Formula	0.035	0.09	572.99	15.31	4.85	26.07	0.18	26.08	0.30	0.37	0.03917	3.18	0.13
XS B-1	Normal Depth	Manning Formula	0.035	0.09	582.55	1.64	0.58	0.52	0.10	5.51	0.17	0.21	0.03998	2.85	0.13
XS AB-1	Normal Depth	Manning Formula	0.035	0.06	544.56	23.96	5.31	19.80	0.28	19.88	0.36	0.40	0.02663	4.34	0.29
XS C-1	Normal Depth	Manning Formula	0.035	0.07	583.34	2.45	1.31	18.68	0.07	18.68	0.15	0.17	0.04189	1.88	0.05
XS D-1	Normal Depth	Manning Formula	0.035	0.03	584.09	5.88	2.95	37.01	0.08	37.00	0.11	0.10	0.04319	1.31	0.03
XS D-2	Normal Depth	Manning Formula	0.035	0.03	589.65	234.89	47.54	90.57	0.52	90.54	0.73	0.80	0.02144	4.84	0.38
XS CD-1	Normal Depth	Manning Formula	0.035	0.02	587.34	243.66	48.17	62.26	0.77	62.19	1.34	1.34	0.01943	5.06	0.40
XS CD-2	Normal Depth	Manning Formula	0.035	0.02	579.00	243.66	52.83	72.50	0.73	72.44	1.18	1.13	0.02000	4.61	0.33
XS CD-3	Normal Depth	Manning Formula	0.035	0.02	583.99	250.64	39.07	52.70	1.18	31.48	2.99	3.01	0.01745	6.41	0.64
XS CD-4	Normal Depth	Manning Formula	0.045	0.00	582.67	384.03	278.00	197.85	1.40	197.74	2.82	1.78	0.03427	1.31	0.03
XS AD-1	Normal Depth	Manning Formula	0.045	0.00	583.79	484.86	205.54	171.21	1.20	171.15	1.92	1.19	0.03144	2.38	0.09



HYDRAFLOW MODEL SCHEMATIC / HYDROGRAPH (10-YR) SUMMARY

Watershed Model Schematic



Legend

Sub. Drain	Description
1. SCS Runoff	OUTFALL CD
2. SCS Runoff	OUTFALL CD AD
3. SCS Runoff	OUTFALL CD AD
4. SCS Runoff	OUTFALL CD AD
5. SCS Runoff	OUTFALL CD AD
6. SCS Runoff	OUTFALL CD AD
7. SCS Runoff	OUTFALL CD AD
8. SCS Runoff	OUTFALL CD AD
9. SCS Runoff	OUTFALL CD AD
10. SCS Runoff	OUTFALL CD AD
11. SCS Runoff	OUTFALL CD AD
12. SCS Runoff	OUTFALL CD AD
13. SCS Runoff	OUTFALL CD AD
14. SCS Runoff	OUTFALL CD AD
15. SCS Runoff	OUTFALL CD AD
16. SCS Runoff	OUTFALL CD AD
17. SCS Runoff	OUTFALL CD AD
18. SCS Runoff	OUTFALL CD AD
19. SCS Runoff	OUTFALL CD AD
20. SCS Runoff	OUTFALL CD AD
21. SCS Runoff	OUTFALL CD AD

Project: Outfalls 10yr.gw Thursday, 06/12/2017

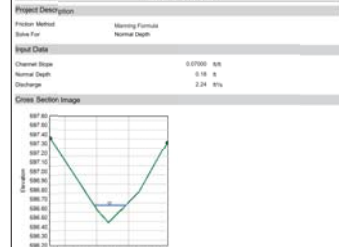
Hydrograph Summary Report

Hydrograph No.	Hydrograph Type	Peak Flow (cfs)	Time to Peak (hrs)	Peak Volume (cfs-hrs)	Subcatchment (sq ft)	Maximum Elevation (ft)	Total Storage (cu ft)	Hydrograph Description
1	SCS Runoff	8,250	1	720	22,408	---	---	OUTFALL CD
2	SCS Runoff	8,340	1	718	18,214	---	---	OUTFALL CD AD
3	SCS Runoff	142,402	1	758	780,389	---	---	OUTFALL CD AD
4	SCS Runoff	6,060	1	720	21,368	---	---	OUTFALL CD AD
5	SCS Runoff	108,38	1	758	459,211	---	---	OUTFALL CD AD
6	SCS Runoff	13,11	1	722	35,888	---	---	OUTFALL CD AD
7	SCS Runoff	238,47	1	745	1,347,883	---	---	OUTFALL CD AD
8	SCS Runoff	231,48	1	758	1,241,191	---	---	OUTFALL CD AD
9	Manual	2,340	1	724	10,784	---	---	OUTFALL CD AD
10	Manual	1,840	1	723	6,387	---	---	OUTFALL CD AD
11	Manual	3,880	1	723	13,330	---	---	OUTFALL CD AD
12	Manual	2,430	1	724	12,493	---	---	OUTFALL CD AD
13	Manual	226,36	1	758	788,484	---	---	OUTFALL CD AD
14	Manual	243,88	1	758	771,371	---	---	OUTFALL CD AD
15	Manual	470,41	1	754	760,317	---	---	OUTFALL CD AD
16	Manual	15,31	1	723	45,480	---	---	OUTFALL CD AD
17	Manual	23,36	1	723	71,785	---	---	OUTFALL CD AD
18	Manual	364,03	1	757	2,241,191	---	---	OUTFALL CD AD
19	Manual	485,80	1	726	2,480,168	---	---	OUTFALL CD AD
20	Manual	484,86	1	726	2,475,788	---	---	OUTFALL CD AD
21	Manual	588,07	1	730	3,037,788	---	---	OUTFALL CD AD

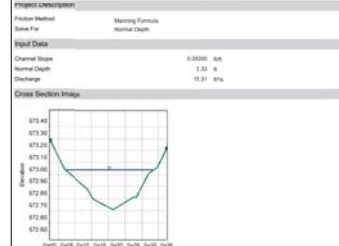
Outfalls 10yr.gw Return Period: 10 Year Thursday, 06/12/2017

FLOOD PROTECTION FLOWMASTER CROSS SECTION OUTPUT

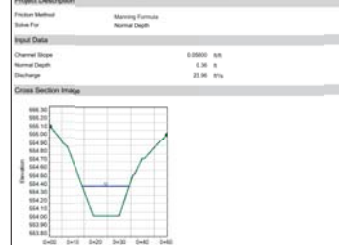
XS A-1 - 10-YR



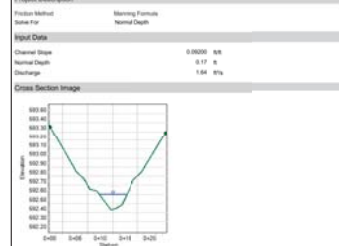
Cross Section for XS A-2



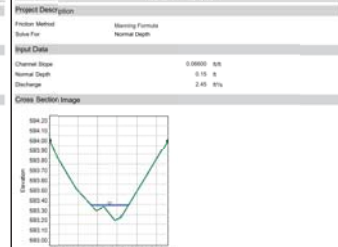
Cross Section for XS AB-1



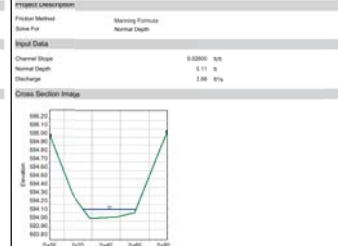
XS B-1 - 10-YR



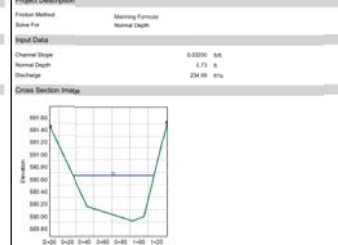
XS C-1 - 10-YR



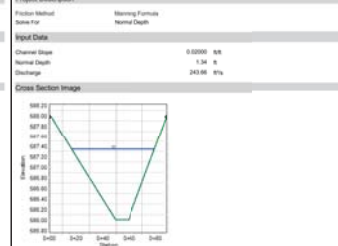
XS D-1 - 10-YR



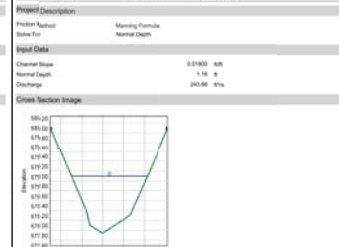
Cross Section for XS D-2



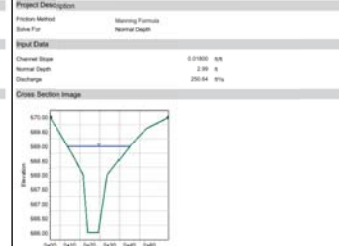
Cross Section for XS CD-1



Cross Section for XS CD-2



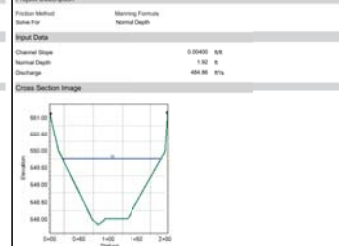
Cross Section for XS CD-3



Cross Section for XS CD-4



Cross Section for XS AD-1



Pond Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.0

Monday, 05/11/2017

Pond No. 1 - Pond-A

Continuity: 1.00 (Default) Initial loss: 0.00 (Default) Initial loss: 0.00 (Default) Beginning Elevation: 598.90 ft

Stage / Storage Table				
Stage (ft)	Elevation (ft)	Contour area (sqft)	Inlet Storage (cuft)	Total storage (cuft)
5.00	598.90	50	0	0
5.10	599.00	100	0	0
5.20	599.00	200	0	0
5.30	599.10	300	0	0
5.40	599.20	400	0	0
5.50	599.30	500	0	0
5.60	599.40	600	0	0
5.70	599.50	700	0	0
5.80	599.60	800	0	0
5.90	599.70	900	0	0
6.00	599.80	1,000	0	0
6.10	599.90	1,100	0	0
6.20	600.00	1,200	0	0
6.30	600.10	1,300	0	0
6.40	600.20	1,400	0	0
6.50	600.30	1,500	0	0
6.60	600.40	1,600	0	0
6.70	600.50	1,700	0	0
6.80	600.60	1,800	0	0
6.90	600.70	1,900	0	0
7.00	600.80	2,000	0	0
7.10	600.90	2,100	0	0
7.20	601.00	2,200	0	0
7.30	601.10	2,300	0	0
7.40	601.20	2,400	0	0
7.50	601.30	2,500	0	0
7.60	601.40	2,600	0	0
7.70	601.50	2,700	0	0
7.80	601.60	2,800	0	0
7.90	601.70	2,900	0	0
8.00	601.80	3,000	0	0
8.10	601.90	3,100	0	0
8.20	602.00	3,200	0	0
8.30	602.10	3,300	0	0
8.40	602.20	3,400	0	0
8.50	602.30	3,500	0	0
8.60	602.40	3,600	0	0
8.70	602.50	3,700	0	0
8.80	602.60	3,800	0	0
8.90	602.70	3,900	0	0
9.00	602.80	4,000	0	0
9.10	602.90	4,100	0	0
9.20	603.00	4,200	0	0
9.30	603.10	4,300	0	0
9.40	603.20	4,400	0	0
9.50	603.30	4,500	0	0
9.60	603.40	4,600	0	0
9.70	603.50	4,700	0	0
9.80	603.60	4,800	0	0
9.90	603.70	4,900	0	0
10.00	603.80	5,000	0	0
10.10	603.90	5,100	0	0
10.20	604.00	5,200	0	0
10.30	604.10	5,300	0	0
10.40	604.20	5,400	0	0
10.50	604.30	5,500	0	0
10.60	604.40	5,600	0	0
10.70	604.50	5,700	0	0
10.80	604.60	5,800	0	0
10.90	604.70	5,900	0	0
11.00	604.80	6,000	0	0
11.10	604.90	6,100	0	0
11.20	605.00	6,200	0	0
11.30	605.10	6,300	0	0
11.40	605.20	6,400	0	0
11.50	605.30	6,500	0	0
11.60	605.40	6,600	0	0
11.70	605.50	6,700	0	0
11.80	605.60	6,800	0	0
11.90	605.70	6,900	0	0
12.00	605.80	7,000	0	0
12.10	605.90	7,100	0	0
12.20	606.00	7,200	0	0
12.30	606.10	7,300	0	0
12.40	606.20	7,400	0	0
12.50	606.30	7,500	0	0
12.60	606.40	7,600	0	0
12.70	606.50	7,700	0	0
12.80	606.60	7,800	0	0
12.90	606.70	7,900	0	0
13.00	606.80	8,000	0	0
13.10	606.90	8,100	0	0
13.20	607.00	8,200	0	0
13.30	607.10	8,300	0	0
13.40	607.20	8,400	0	0
13.50	607.30	8,500	0	0
13.60	607.40	8,600	0	0
13.70	607.50	8,700	0	0
13.80	607.60	8,800	0	0
13.90	607.70	8,900	0	0
14.00	607.80	9,000	0	0
14.10	607.90	9,100	0	0
14.20	608.00	9,200	0	0
14.30	608.10	9,300	0	0
14.40	608.20	9,400	0	0
14.50	608.30	9,500	0	0
14.60	608.40	9,600	0	0
14.70	608.50	9,700	0	0
14.80	608.60	9,800	0	0
14.90	608.70	9,900	0	0
15.00	608.80	10,000	0	0
15.10	608.90	10,100	0	0
15.20	609.00	10,200	0	0
15.30	609.10	10,300	0	0
15.40	609.20	10,400	0	0
15.50	609.30	10,500	0	0
15.60	609.40	10,600	0	0
15.70	609.50	10,700	0	0
15.80	609.60	10,800	0	0
15.90	609.70	10,900	0	0
16.00	609.80	11,000	0	0
16.10	609.90	11,100	0	0
16.20	610.00	11,200	0	0
16.30	610.10	11,300	0	0
16.40	610.20	11,400	0	0
16.50	610.30	11,500	0	0
16.60	610.40	11,600	0	0
16.70	610.50	11,700	0	0
16.80	610.60	11,800	0	0
16.90	610.70	11,900	0	0
17.00	610.80	12,000	0	0
17.10	610.90	12,100	0	0
17.20	611.00	12,200	0	0
17.30	611.10	12,300	0	0
17.40	611.20	12,400	0	0
17.50	611.30	12,500	0	0
17.60	611.40	12,600	0	0
17.70	611.50	12,700	0	0
17.80	611.60	12,800	0	0
17.90	611.70	12,900	0	0
18.00	611.80	13,000	0	0
18.10	611.90	13,100	0	0
18.20	612.00	13,200	0	0
18.30	612.10	13,300	0	0
18.40	612.20	13,400	0	0
18.50	612.30	13,500	0	0
18.60	612.40	13,600	0	0
18.70	612.50	13,700	0	0
18.80	612.60	13,800	0	0
18.90	612.70	13,900	0	0
19.00	612.80	14,000	0	0
19.10	612.90	14,100	0	0
19.20	613.00	14,200	0	0
19.30	613.10	14,300	0	0
19.40	613.20	14,400	0	0
19.50	613.30	14,500	0	0
19.60	613.40	14,600	0	0
19.70	613.50	14,700	0	0
19.80	613.60	14,800	0	0
19.90	613.70	14,900	0	0
20.00	613.80	15,000	0	0
20.10	613.90	15,100	0	0
20.20	614.00	15,200	0	0
20.30	614.10	15,300	0	0
20.40	614.20	15,400	0	0
20.50	614.30	15,500	0	0
20.60	614.40	15,600	0	0
20.70	614.50	15,700	0	0
20.80	614.60	15,800	0	0
20.90	614.70	15,900	0	0
21.00	614.80	16,000	0	0
21.10	614.90	16,100	0	0
21.20	615.00	16,200	0	0
21.30	615.10	16,300	0	0
21.40	615.20	16,400	0	0
21.50	615.30	16,500	0	0
21.60	615.40	16,600	0	0
21.70	615.50	16,700	0	0
21.80	615.60	16,800	0	0
21.90	615.70	16,900	0	0
22.00	615.80	17,000	0	0
22.10	615.90	17,100	0	0
22.20	616.00	17,200	0	0
22.30	616.10	17,300	0	0
22.40	616.20	17,400	0	0
22.50	616.30	17,500	0	0
22.60	616.40	17,600	0	0
22.70	616.50	17,700	0	0
22.80	616.60	17,800	0	0
22.90	616.70	17,900	0	0
23.00	616.80	18,000	0	0
23.10	616.90	18,100	0	0
23.20	617.00	18,200	0	0
23.30	617.10	18,300	0	0
23.40	617.20	18,400	0	0
23.50	617.30	18,500	0	0
23.60	617.40	18,600	0	0
23.70	617.50	18,700	0	0
23.80	617.60	18,800	0	0
23.90	617.70	18,900	0	0
24.00	617.80	19,000	0	0
24.10	617.90	19,100	0	0
24.20	618.00	19,200	0	0
24.30	618.10	19,300	0	0
24.40	618.20	19,400	0	0
24.50	618.30	19,500	0	0
24.60	618.40	19,600	0	0
24.70	618.50	19,700	0	0
24.80	618.60	19,800	0	0
24.90	618.70	19,900	0	0
25.00	618.80	20,000	0	0
25.10	618.90	20,100	0	0
25.20	619.00	20,200	0	0
25.30	619.10	20,300	0	0
25.40	619.20	20,400	0	0
25.50	619.30	20,500	0	0
25.60	619.40	20,600	0	0
25.70	619.50	20,700	0	0
25.80	619.60	20,800	0	0
25.90	619.70	20,900	0	0
26.00	619.80	21,000	0	0
26.10	619.90	21,100	0	0
26.20	620.00	21,200	0	0
26.30	620.10	21,300	0	0
26.40	620.20	21,400	0	0
26.50	620.30	21,500	0	0
26.60	620.40	21,600	0	0
26.70	620.50	21,700	0	0
26.80	620.60	21,800	0	0
26.90	620.70	21,900	0	0
27.00	620.80	22,000	0	0
27.10	620.90	22,100	0	0
27.20	621.00	22,200	0	0
27.30	621.10	22,300	0	0
27.40	621.20	22,400	0	0
27.50	621.30	22,500	0	0
27.60	621.40	22,600	0	0
27.70	621.50	22,700	0	0
27.80	621.60	22,800	0	0
27.90	621.70	22,900	0	0
28.00	621.80	23,000	0	0
28.10	621.90	23,100	0	0
28.20	622.00	23,200	0	0
28.30	622.10	23,300	0	0
28.40	622.20	23,400	0	0
28.50	622.30	23,500	0	0
28.60	622.40	23,600	0	0
28.70	622.50	23,700	0	0
28.80	622.60	23,800	0	0
28.90	622.70	23,900	0	0
29.00	622.80	24,000	0	0
29.10	622.90	24,100	0	0
29.20	623.00	24,200	0	0
29.30	623.10	24,300	0	0
29.40	623.20	24,400	0	0
29.50	623.30	24,500	0	0
29.60	623.40	24,600	0	0
29.70	623.50	24,700	0	0
29.80	623.60	24,800	0	0
29.90	623.70	24,900	0	0
30.00	623.80	25,000	0	0
30.10	623.90	25,100	0	0
30.20	624.00	25,200	0	0
30.30	624.10	25,300	0	0
30.40	624.20	25,400	0	0
30.50	624.30	25,500	0	0
30.60	624.40	25,600	0	0
30.70	624.50	25,700	0	0
30.80	624.60	25,800	0	0

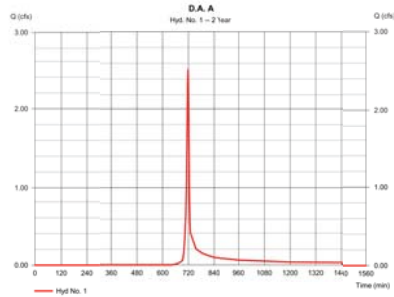
Hydrograph Report

Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 1
D.A. A

Hydrograph type	= SCS Runoff	Peak discharge	= 2.519 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 5,087 cuf
Drainage area	= 1.330 ac	Curve number	= 78
Basin slope	= 0.0 %	Hydraulic length	= 0.8
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

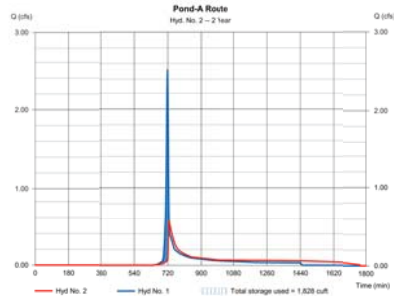
Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-A Route

Hydrograph type	= Reservoir	Peak discharge	= 0.561 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 5,087 cuf
Inflow hyd. No.	= 1-D.A. A	Max. Elevation	= 601.81 ft
Reservoir name	= Pond-A	Max. Storage	= 1,828 cuf

Storage Indication method used



Hydrograph Summary Report

Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph Type (Length)	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuf)	Reservoir Elevation (ft)	Total Storage Used (cuf)	Hydrograph Description
1	SCS Runoff	2.519	1	718	5,087	---	---	D.A. A
2	Reservoir	0.561	1	727	5,087	601.81	1,828	Pond-A Route

Det Facility A-2yr.gvw

Return Period: 2 Year

Thursday, 05/11/2017

Hydrograph Report

Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-A Route

Hydrograph type	= Reservoir	Peak discharge	= 0.561 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 5,087 cuf
Inflow hyd. No.	= 1-D.A. A	Reservoir name	= Pond-A
Max. Elevation	= 601.81 ft	Max. Storage	= 1,828 cuf

Storage Indication method used

Time (min)	Inflow cfs	Elevation ft	Chv A cfs	Chv B cfs	Chv C cfs	PFR cfs	Wv A cfs	Wv B cfs	Wv C cfs	Wv D cfs	Exfl cfs	Outflow cfs
674	0.025	599.02	0.490	0.014	---	---	---	---	---	---	---	0.014
675	0.026	599.02	0.490	0.014	---	---	---	---	---	---	---	0.014
676	0.029	599.03	0.490	0.014	---	---	---	---	---	---	---	0.014
677	0.029	599.03	0.490	0.015	---	---	---	---	---	---	---	0.015
678	0.031	599.04	0.490	0.015	---	---	---	---	---	---	---	0.015
679	0.032	599.04	0.490	0.015	---	---	---	---	---	---	---	0.015
680	0.034	599.05	0.490	0.016	---	---	---	---	---	---	---	0.016
681	0.036	599.06	0.490	0.016	---	---	---	---	---	---	---	0.016
682	0.037	599.06	0.490	0.017	---	---	---	---	---	---	---	0.017
683	0.039	599.07	0.490	0.017	---	---	---	---	---	---	---	0.017
684	0.041	599.08	0.490	0.017	---	---	---	---	---	---	---	0.017
685	0.044	599.09	0.490	0.018	---	---	---	---	---	---	---	0.018
686	0.045	599.10	0.490	0.018	---	---	---	---	---	---	---	0.018
687	0.047	599.11	0.490	0.019	---	---	---	---	---	---	---	0.019
688	0.049	599.12	0.490	0.019	---	---	---	---	---	---	---	0.019
689	0.051	599.13	0.490	0.020	---	---	---	---	---	---	---	0.020
690	0.053	599.14	0.490	0.020	---	---	---	---	---	---	---	0.020
691	0.056	599.15	0.490	0.021	---	---	---	---	---	---	---	0.021
692	0.059	599.17	0.490	0.021	---	---	---	---	---	---	---	0.021
693	0.066	599.19	0.490	0.022	---	---	---	---	---	---	---	0.022
694	0.071	599.21	0.490	0.022	---	---	---	---	---	---	---	0.022
695	0.082	599.25	0.490	0.023	---	---	---	---	---	---	---	0.023
696	0.111	599.29	0.490	0.024	---	---	---	---	---	---	---	0.024
697	0.135	599.29	0.490	0.025	---	---	---	---	---	---	---	0.025
698	0.163	599.30	0.490	0.027	---	---	---	---	---	---	---	0.027
699	0.195	599.30	0.490	0.028	---	---	---	---	---	---	---	0.028
700	0.231	599.40	0.490	0.030	---	---	---	---	---	---	---	0.030
701	0.272	599.53	0.490	0.032	---	---	---	---	---	---	---	0.032

Continuation next page...

Time (min)	Inflow cfs	Elevation ft	Chv A cfs	Chv B cfs	Chv C cfs	PFR cfs	Wv A cfs	Wv B cfs	Wv C cfs	Wv D cfs	Exfl cfs	Outflow cfs
702	0.316	599.61	0.490	0.034	---	---	---	---	---	---	---	0.034
703	0.360	599.67	0.490	0.035	---	---	---	---	---	---	---	0.035
704	0.419	599.75	0.490	0.037	---	---	---	---	---	---	---	0.037
705	0.478	599.75	0.490	0.039	---	---	---	---	---	---	---	0.039
706	0.544	599.82	0.490	0.039	---	---	---	---	---	---	---	0.039
707	0.621	599.89	0.490	0.041	---	---	---	---	---	---	---	0.041
708	0.714	599.96	0.490	0.043	---	---	---	---	---	---	---	0.043
709	0.829	600.05	0.490	0.044	---	---	---	---	---	---	---	0.044
710	0.971	600.13	0.490	0.045	---	---	---	---	---	---	---	0.045
711	1.139	600.22	0.490	0.047	---	---	---	---	---	---	---	0.047
712	1.333	600.32	0.490	0.049	---	---	---	---	---	---	---	0.049
713	1.559	600.41	0.490	0.051	---	---	---	---	---	---	---	0.051
714	1.799	600.50	0.490	0.053	---	---	---	---	---	---	---	0.053
715	2.071	600.70	0.490	0.056	---	---	---	---	---	---	---	0.056
716	2.299	600.94	0.490	0.059	---	---	---	---	---	---	---	0.059
717	2.462	601.09	0.490	0.061	---	---	---	---	---	---	---	0.061
718	2.519	601.23	0.490	0.063	---	---	---	---	---	---	---	0.063
719	2.426	601.36	0.490	0.064	---	---	---	---	---	---	---	0.064
720	2.241	601.49	0.490	0.066	0.031	---	---	---	---	---	---	0.097
721	1.967	601.60	0.490	0.067	0.130	---	---	---	---	---	---	0.197
722	1.640	601.61	0.490	0.066	0.258	---	---	---	---	---	---	0.326
723	1.266	601.70	0.490	0.063	0.345	---	---	---	---	---	---	0.424
724	1.009	601.75	0.539	0.059	0.426	---	---	---	---	---	---	0.426
725	0.777	601.80	0.553	0.070	0.474	---	---	---	---	---	---	0.544
726	0.618	601.81	0.570	0.070	0.491	---	---	---	---	---	---	0.561
727	0.507	601.81	0.570	0.070	0.491	---	---	---	---	---	---	0.561
728	0.440	601.80	0.580	0.070	0.482	---	---	---	---	---	---	0.551

Continuation next page...

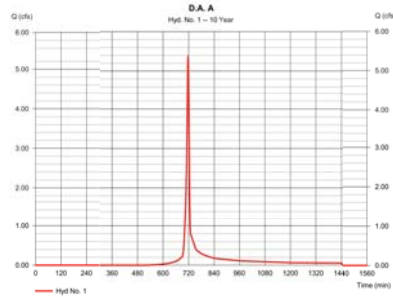
Hydrograph Report

Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 1
D.A. A

Hydrograph type	= SCS Runoff	Peak discharge	= 5.376 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 10,845 cuf
Drainage area	= 0.0 %	Curve number	= 77
Basin slope	= 0.0 %	Hydraulic length	= 0.8
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

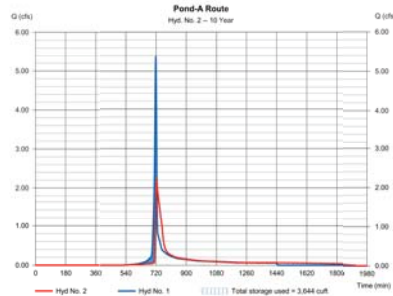
Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-A Route

Hydrograph type	= Reservoir	Peak discharge	= 2.236 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 10,845 cuf
Inflow hyd. No.	= 1-D.A. A	Max. Elevation	= 603.03 ft
Reservoir name	= Pond-A	Max. Storage	= 3,644 cuf

Storage Indication method used



Hydrograph Summary Report

Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph Type (Length)	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuf)	Reservoir Elevation (ft)	Total Storage Used (cuf)	Hydrograph Description
1	SCS Runoff	5.376	1	718	10,845	---	---	D.A. A
2	Reservoir	2.236	1	724	10,845	603.03	3,644	Pond-A Route

Det Facility A-10yr.gvw

Return Period: 10 Year

Thursday, 05/11/2017

Hydrograph Report

Hydrologic Hydrographs Extension for AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-A Route

Hydrograph type	= Reservoir	Peak discharge	= 2.236 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 10,845 cuf
Inflow hyd. No.	= 1-D.A. A	Reservoir name	= Pond-A
Max. Elevation	= 603.03 ft	Max. Storage	= 3,644 cuf

Storage Indication method used

Time (min)	Inflow cfs	Elevation ft	Chv A cfs	Chv B cfs	Chv C cfs	Wvfr cfs	Wv A cfs	Wv B cfs	Wv C cfs	Wv D cfs	Exfl cfs	Outflow cfs
698	0.572	600.28	0.490	0.048								0.048
699	0.667	600.33	0.490	0.049								0.049
700	0.771	600.39	0.490	0.050								0.050
701	0.882	600.46	0.490	0.051								0.051
702	0.998	600.54	0.490	0.052								0.052
703	1.121	600.62	0.490	0.054								0.054
704	1.251	600.72	0.490	0.055								0.055
705	1.389	600.83	0.490	0.057								0.057
706	1.537	600.96	0.490	0.058								0.058
707	1.708	601.06	0.490	0.060								0.060
708	1.912	601.16	0.490	0.062								0.062
709	2.163	601.27	0.490	0.063								0.063
710	2.465	601.39	0.490	0.065								0.065
711	2.818	601.54	0.490	0.067	0.071							0.138
712	3.216	601.69	0.490	0.069	0.272							0.341
713	3.656	601.85	0.665	0.070	0.586							0.656
714	4.140	602.02	0.996	0.071	0.902							0.973
715	4.657	602.15	1.165	0.072	1.083							1.155
716	5.071	602.29	1.348	0.073	1.296							1.299
717	5.338	602.44	1.506	0.074	1.413							1.409
718	5.278 ***	602.59	1.675	0.076	1.536							1.632
719	5.113	602.73	1.762	0.077	1.676							1.805
720	4.671	602.85	1.881	0.078	1.777							1.932
721	4.000	602.95	1.953	0.079	1.853							1.982
722	3.368	603.01	2.009	0.079	1.896	0.075						2.060
723	2.653	603.03	2.222	0.079	1.911	0.214						2.214
724	2.036	603.03 ***	2.244	0.079	1.913	0.245						2.245

Pond Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4 Monday, 05/11/2017

Pond No. 1 - Pond-A

Continuity: Allow defined rainfall rates. Continuity method used for volume calculation: Beginning Elevation = 588.36 ft

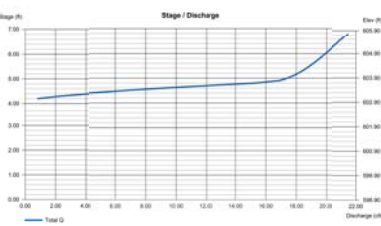
Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Inlet Storage (cuft)	Total storage (cuft)
5.00	588.36	0	0	0
5.10	589.36	40	1	1
5.20	590.36	80	1	1
5.30	591.36	120	1	1
5.40	592.36	160	1	1
5.50	593.36	200	1	1
5.60	594.36	240	1	1
5.70	595.36	280	1	1
5.80	596.36	320	1	1
5.90	597.36	360	1	1
6.00	598.36	400	1	1
6.10	599.36	440	1	1
6.20	600.36	480	1	1
6.30	601.36	520	1	1
6.40	602.36	560	1	1
6.50	603.36	600	1	1
6.60	604.36	640	1	1
6.70	605.36	680	1	1
6.80	606.36	720	1	1
6.90	607.36	760	1	1
7.00	608.36	800	1	1

Culvert / Orifice Structures

Row (in)	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]
Row (in)	= 18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Row (in)	= 18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0	0	0	0	0	0	0
Inlet E1 (ft)	= 588.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Length (ft)	= 45.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shape (ft)	= 5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
No. Inlets	= 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Surface	= 603.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Multi-Stage	= No	No	No	No	No	No	No	No	No	No

Note: Continuity method used for volume calculation: Beginning Elevation = 588.36 ft



Pond Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4 Monday, 05/11/2017

Pond No. 1 - Pond-A

Continuity: Allow defined rainfall rates. Continuity method used for volume calculation: Beginning Elevation = 588.36 ft

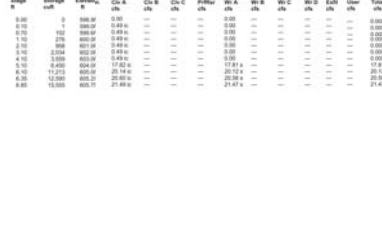
Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Inlet Storage (cuft)	Total storage (cuft)
5.00	588.36	0	0	0
5.10	589.36	40	1	1
5.20	590.36	80	1	1
5.30	591.36	120	1	1
5.40	592.36	160	1	1
5.50	593.36	200	1	1
5.60	594.36	240	1	1
5.70	595.36	280	1	1
5.80	596.36	320	1	1
5.90	597.36	360	1	1
6.00	598.36	400	1	1
6.10	599.36	440	1	1
6.20	600.36	480	1	1
6.30	601.36	520	1	1
6.40	602.36	560	1	1
6.50	603.36	600	1	1
6.60	604.36	640	1	1
6.70	605.36	680	1	1
6.80	606.36	720	1	1
6.90	607.36	760	1	1
7.00	608.36	800	1	1

Culvert / Orifice Structures

Row (in)	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]
Row (in)	= 18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Row (in)	= 18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0	0	0	0	0	0	0
Inlet E1 (ft)	= 588.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Length (ft)	= 45.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shape (ft)	= 5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
No. Inlets	= 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Surface	= 603.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Multi-Stage	= No	No	No	No	No	No	No	No	No	No

Note: Continuity method used for volume calculation: Beginning Elevation = 588.36 ft



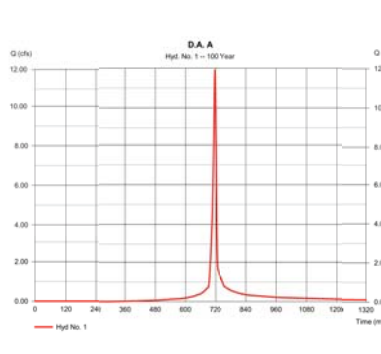
Hydrograph Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4 Thursday, 05/11/2017

Hyd. No. 1

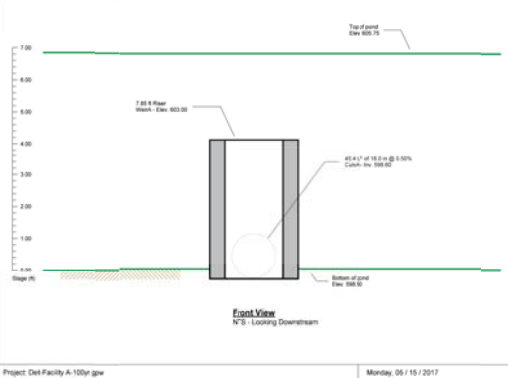
D.A.A.

Hydrograph type	= SCS Runoff	Peak discharge	= 11.91 cfs
Storm frequency	= 100 yrs	Time to peak	= 7.17 min
Time interval	= 1 min	Hyd. volume	= 25,177 cuft
Drainage area	= 1.330 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Distribution	= Type II	Shape factor	= 484
Storm duration	= 24 hrs		



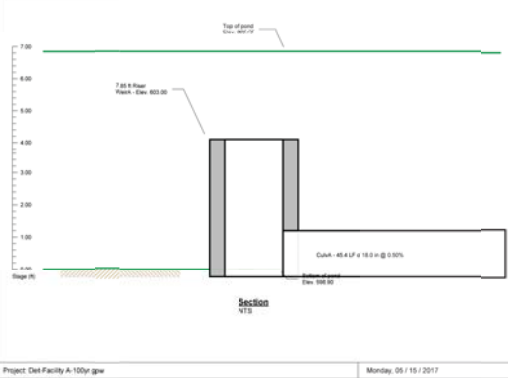
Pond No. 1 - Pond-A

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4



Pond No. 1 - Pond-A

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4



Hydrograph Report

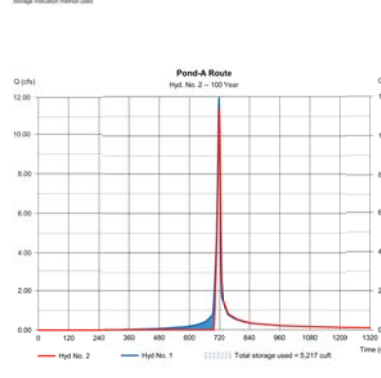
Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4 Thursday, 05/11/2017

Hyd. No. 2

Pond-A Route

Hydrograph type	= Reservoir	Peak discharge	= 11.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 7.19 min
Time interval	= 1 min	Hyd. volume	= 21,518 cuft
Inflow hyd. No.	= 1 - D.A.A.	Max. Elevation	= 603.58 ft
Reservoir name	= Pond-A	Max. Storage	= 5,217 cuft

Storage Induction method used



Hydrograph Summary Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4

Hyd. No.	Hydrograph type	Peak flow (cfs)	Time to peak (min)	Hyd. volume (cuft)	Inflow (cfs)	Maximum elevation (ft)	Total storage used (cuft)	Hydrograph Description
1	SCS Runoff	11.91	7.17	25,177	---	---	---	D.A.A.
2	Reservoir	11.38	7.19	21,518	1	603.58	5,217	Pond-A Route

Det Facility A-100yr gwe Return Period: 100 Year: Thursday, 05/11/2017

Hydrograph Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.4 Thursday, 05/11/2017

Hyd. No. 2

Pond-A Route

Hydrograph type	= Reservoir	Peak discharge	= 11.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 7.19 min
Time interval	= 1 min	Hyd. volume	= 21,518 cuft
Inflow hyd. No.	= 1 - D.A.A.	Reservoir name	= Pond-A
Max. Elevation	= 603.58 ft	Max. Storage	= 5,217 cuft

Storage Induction method used

Hydrograph Discharge Table													[Station] [Time]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Time	Inflow	Elevat	Chv A	Chv B	Chv C	PtR	W-A	W-B	W-C	W-D	W-E	W-F	W-G	W-H	W-I	W-J	W-K	W-L	W-M	W-N	W-O	W-P	W-Q	W-R	W-S	W-T	W-U	W-V	W-W	W-X	W-Y	W-Z	W-AA	W-AB	W-AC	W-AD	W-AE	W-AF	W-AG	W-AH	W-AI	W-AJ	W-AK	W-AL	W-AM	W-AN	W-AO	W-AP	W-AQ	W-AR	W-AS	W-AT	W-AU	W-AV	W-AW	W-AX	W-AY	W-AZ	W-BA	W-BB	W-BC	W-BD	W-BE	W-BF	W-BG	W-BH	W-BI	W-BJ	W-BK	W-BL	W-BM	W-BN	W-BO	W-BP	W-BQ	W-BR	W-BS	W-BT	W-BU	W-BV	W-BW	W-BX	W-BY	W-BZ	W-CA	W-CB	W-CC	W-CD	W-CE	W-CF	W-CG	W-CH	W-CI	W-CJ	W-CK	W-CL	W-CM	W-CN	W-CO	W-CP	W-CQ	W-CR	W-CS	W-CT	W-CU	W-CV	W-CW	W-CX	W-CY	W-CZ	W-DA	W-DB	W-DC	W-DD	W-DE	W-DF	W-DG	W-DH	W-DI	W-DJ	W-DK	W-DL	W-DM	W-DN	W-DO	W-DP	W-DQ	W-DR	W-DS	W-DT	W-DU	W-DV	W-DW	W-DX	W-DY	W-DZ	W-EA	W-EB	W-EC	W-ED	W-EE	W-EF	W-EG	W-EH	W-EI	W-EJ	W-EK	W-EL	W-EM	W-EN	W-EO	W-EP	W-EQ	W-ER	W-ES	W-ET	W-EU	W-EV	W-EW	W-EX	W-EY	W-EZ	W-FA	W-FB	W-FC	W-FD	W-FE	W-FF	W-FG	W-FH	W-FI	W-FJ	W-FK	W-FL	W-FM	W-FN	W-FO	W-FP	W-FQ	W-FR	W-FS	W-FT	W-FU	W-FV	W-FW	W-FX	W-FY	W-FZ	W-GA	W-GB	W-GC	W-GD	W-GE	W-GF	W-GG	W-GH	W-GI	W-GJ	W-GK	W-GL	W-GM	W-GN	W-GO	W-GP	W-GQ	W-GR	W-GS	W-GT	W-GU	W-GV	W-GW	W-GX	W-GY	W-GZ	W-HA	W-HB	W-HC	W-HD	W-HE	W-HF	W-HG	W-HH	W-HI	W-HJ	W-HK	W-HL	W-HM	W-HN	W-HO	W-HP	W-HQ	W-HR	W-HS	W-HT	W-HU	W-HV	W-HW	W-HX	W-HY	W-HZ	W-IA	W-IB	W-IC	W-ID	W-IE	W-IF	W-IG	W-IH	W-II	W-IJ	W-IK	W-IL	W-IM	W-IN	W-IO	W-IP	W-IQ	W-IR	W-IS	W-IT	W-IU	W-IV	W-IW	W-IX	W-IY	W-IZ	W-JA	W-JB	W-JC	W-JD	W-JE	W-JF	W-JG	W-JH	W-JI	W-JJ	W-JK	W-JL	W-JM	W-JN	W-JO	W-JP	W-JQ	W-JR	W-JS	W-JT	W-JU	W-JV	W-JW	W-JX	W-JY	W-JZ	W-KA	W-KB	W-KC	W-KD	W-KE	W-KF	W-KG	W-KH	W-KI	W-KJ	W-KL	W-KM	W-KN	W-KO	W-KP	W-KQ	W-KR	W-KS	W-KT	W-KU	W-KV	W-KW	W-KX	W-KY	W-KZ	W-LA	W-LB	W-LC	W-LD	W-LE	W-LF	W-LG	W-LH	W-LI	W-LJ	W-LK	W-LL	W-LM	W-LN	W-LO	W-LP	W-LQ	W-LR	W-LS	W-LT	W-LU	W-LV	W-LW	W-LX	W-LY	W-LZ	W-MA	W-MB	W-MC	W-MD	W-ME	W-MF	W-MG	W-MH	W-MI	W-MJ	W-MK	W-ML	W-MM	W-MN	W-MO	W-MP	W-MQ	W-MR	W-MS	W-MT	W-MU	W-MV	W-MW	W-MX	W-MY	W-MZ	W-NA	W-NB	W-NC	W-ND	W-NE	W-NF	W-NG	W-NH	W-NI	W-NJ	W-NK	W-NL	W-NM	W-NN	W-NO	W-NP	W-NQ	W-NR	W-NS	W-NT	W-NU	W-NV	W-NW	W-NX	W-NY	W-NZ	W-OA	W-OB	W-OC	W-OD	W-OE	W-OF	W-OG	W-OH	W-OI	W-OJ	W-OK	W-OL	W-OM	W-ON	W-OO	W-OP	W-OQ	W-OR	W-OS	W-OT	W-OU	W-OV	W-OW	W-OX	W-OY	W-OZ	W-PA	W-PB	W-PC	W-PD	W-PE	W-PF	W-PG	W-PH	W-PI	W-PJ	W-PK	W-PL	W-PM	W-PN	W-PO	W-PP	W-PQ	W-PR	W-PS	W-PT	W-PU	W-PV	W-PW	W-PX	W-PY	W-PZ	W-QA	W-QB	W-QC	W-QD	W-QE	W-QF	W-QG	W-QH	W-QI	W-QJ	W-QK	W-QL	W-QM	W-QN	W-QO	W-QP	W-QQ	W-QR	W-QS	W-QT	W-QU	W-QV	W-QW	W-QX	W-QY	W-QZ	W-RA	W-RB	W-RC	W-RD	W-RE	W-RF	W-RG	W-RH	W-RI	W-RJ	W-RK	W-RL	W-RM	W-RN	W-RO	W-RP	W-RQ	W-RR	W-RS	W-RT	W-RU	W-RV	W-RW	W-RX	W-RY	W-RZ	W-SA	W-SB	W-SC	W-SD	W-SE	W-SF	W-SG	W-SH	W-SI	W-SJ	W-SK	W-SL	W-SM	W-SN	W-SO	W-SP	W-SQ	W-SR	W-SS	W-ST	W-SU	W-SV	W-SW	W-SX	W-SY	W-SZ	W-TA	W-TB	W-TC	W-TD	W-TE	W-TF	W-TG	W-TH	W-TI	W-TJ	W-TK	W-TL	W-TM	W-TN	W-TO	W-TP	W-TQ	W-TR	W-TS	W-TT	W-TU	W-TV	W-TW	W-TX	W-TY	W-TZ	W-UA	W-UB	W-UC	W-UD	W-UE	W-UF	W-UG	W-UH	W-UI	W-UJ	W-UK	W-UL	W-UM	W-UN	W-UO	W-UP	W-UQ	W-UR	W-US	W-UT	W-UY	W-UZ	W-VA	W-VB	W-VC	W-VD	W-VE	W-VF	W-VG	W-VH	W-VI	W-VJ	W-VK	W-VL	W-VM	W-VN	W-VO	W-VP	W-VQ	W-VR	W-VS	W-VT	W-VU	W-VV	W-VW	W-VX	W-VY	W-VZ	W-WA	W-WB	W-WC	W-WD	W-WE	W-WF	W-WG	W-WH	W-WI	W-WJ	W-WK	W-WL	W-WM	W-WN	W-WO	W-WP	W-WQ	W-WR	W-WS	W-WT	W-WU	W-WV	W-WW	W-WX	W-WY	W-WZ	W-XA	W-XB	W-XC	W-XD	W-XE	W-XF	W-XG	W-XH	W-XI	W-XJ	W-XK	W-XL	W-XM	W-XN	W-XO	W-XP	W-XQ	W-XR	W-XS	W-XT	W-XU	W-XV	W-XW	W-XX	W-XY	W-XZ	W-YA	W-YB	W-YC	W-YD	W-YE	W-YF	W-YG	W-YH	W-YI	W-YJ	W-YK	W-YL	W-YM	W-YN	W-YO	W-YP	W-YQ	W-YR	W-YS	W-YT	W-YU	W-YV	W-YW	W-YX	W-YZ	W-ZA	W-ZB	W-ZC	W-ZD	W-ZE	W-ZF	W-ZG	W-ZH	W-ZI	W-ZJ	W-ZK	W-ZL	W-ZM	W-ZN	W-ZO	W-ZP	W-ZQ	W-ZR	W-ZS	W-ZT	W-ZU	W-ZV	W-ZW	W-ZX	W-ZY	W-ZZ
698	1.757	603.07	0.551				0.143																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							</																																																																																																																

4/26/2016 11:20:18 AM

Hydrograph Report

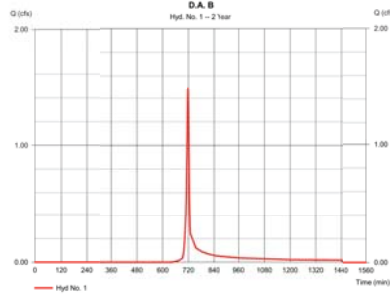
Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

Thursday, 05/11/2017

Hvd. No. 1

D.A. B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.498 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 3,022 cuft
Drainage area	= 0.790 ac	Curve number	= 76
Basin slope	= 0.0 %	Hydraulic length	= 0.8
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

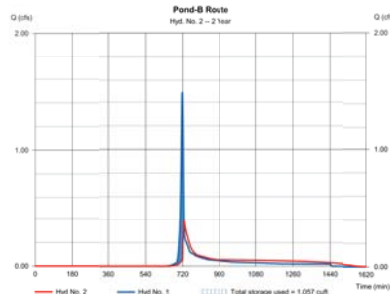
Thursday, 05/11/2017

Hvd. No. 2

Pond-B Route

Hydrograph type	= Reservoir	Peak discharge	= 0.391 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 3,019 cuft
Inflow hvd. No.	= 1 - D.A. B	Reservoir name	= Pond-B
Reservoir name	= Pond-B	Max. Storage	= 1,057 cuft

Storage Indication method used:



Hydrograph Summary Report

Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

Hvd. No.	Hydrograph Type	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuft)	Maximum Elevation (ft)	Total Storage Used (cuft)	Hydrograph Description
1	SCS Runoff	1.498	1	718	3,022	---	---	D.A. B
2	Reservoir	0.391	1	726	3,019	803.13	1,057	Pond-B Route

Det Facility B-2yr gwe Return Period: 2 Year Thursday, 05/11/2017

Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

Thursday, 05/11/2017

Hvd. No. 2

Pond-B Route

Hydrograph type	= Reservoir	Peak discharge	= 0.391 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 3,019 cuft
Inflow hvd. No.	= 1 - D.A. B	Reservoir name	= Pond-B
Reservoir name	= Pond-B	Max. Storage	= 1,057 cuft

Storage Indication method used:

Continued on next page >>>

Time (min)	Inflow (cfs)	Elevation (ft)	Cv A	Cv B	Cv C	PFR	W A	W B	W C	W D	Exit	Outflow (cfs)
674	0.015	801.03	1.401	0.004	---	---	---	---	---	---	---	0.004
675	0.016	801.03	1.497	0.004	---	---	---	---	---	---	---	0.004
676	0.016	801.04	1.600	0.005	---	---	---	---	---	---	---	0.005
677	0.017	801.04	1.707	0.005	---	---	---	---	---	---	---	0.005
678	0.018	801.04	1.821	0.005	---	---	---	---	---	---	---	0.005
679	0.019	801.04	1.937	0.006	---	---	---	---	---	---	---	0.006
680	0.020	801.04	2.060	0.006	---	---	---	---	---	---	---	0.006
681	0.021	801.05	2.187	0.007	---	---	---	---	---	---	---	0.007
682	0.022	801.05	2.322	0.007	---	---	---	---	---	---	---	0.007
683	0.023	801.06	2.460	0.007	---	---	---	---	---	---	---	0.007
684	0.024	801.06	2.608	0.008	---	---	---	---	---	---	---	0.008
685	0.025	801.06	2.758	0.008	---	---	---	---	---	---	---	0.008
686	0.027	801.07	2.914	0.009	---	---	---	---	---	---	---	0.009
687	0.028	801.07	3.078	0.009	---	---	---	---	---	---	---	0.009
688	0.029	801.07	3.249	0.010	---	---	---	---	---	---	---	0.010
689	0.030	801.08	3.421	0.010	---	---	---	---	---	---	---	0.010
690	0.031	801.08	3.604	0.011	---	---	---	---	---	---	---	0.011
691	0.033	801.09	3.793	0.011	---	---	---	---	---	---	---	0.011
692	0.035	801.09	3.997	0.012	---	---	---	---	---	---	---	0.012
693	0.039	801.10	4.223	0.013	---	---	---	---	---	---	---	0.013

Continued on next page >>>

Pond-B Route

Hydrograph Discharge Table

Time (min)	Inflow (cfs)	%	Cv A	Cv B	Cv C	PFR	W A	W B	W C	W D	Exit	Outflow (cfs)
694	0.046	801.10	4.347	0.013	---	---	---	---	---	---	---	0.013
695	0.055	801.11	4.347	0.014	---	---	---	---	---	---	---	0.014
696	0.064	801.12	4.347	0.014	---	---	---	---	---	---	---	0.014
697	0.080	801.13	4.347	0.015	---	---	---	---	---	---	---	0.015
698	0.097	801.15	4.347	0.016	---	---	---	---	---	---	---	0.016
699	0.116	801.17	4.347	0.017	---	---	---	---	---	---	---	0.017
700	0.137	801.19	4.347	0.018	---	---	---	---	---	---	---	0.018
701	0.161	801.22	4.347	0.019	---	---	---	---	---	---	---	0.019
702	0.188	801.25	4.347	0.020	---	---	---	---	---	---	---	0.020
703	0.217	801.28	4.347	0.022	---	---	---	---	---	---	---	0.022
704	0.249	801.33	4.347	0.023	---	---	---	---	---	---	---	0.023
705	0.294	801.38	4.347	0.025	---	---	---	---	---	---	---	0.025
706	0.323	801.44	4.347	0.027	---	---	---	---	---	---	---	0.027
707	0.369	801.50	4.347	0.029	---	---	---	---	---	---	---	0.029
708	0.424	801.56	4.347	0.031	---	---	---	---	---	---	---	0.031
709	0.493	801.66	4.347	0.033	---	---	---	---	---	---	---	0.033
710	0.577	801.77	4.347	0.036	---	---	---	---	---	---	---	0.036
711	0.676	801.89	4.347	0.039	---	---	---	---	---	---	---	0.039
712	0.792	802.01	4.347	0.041	---	---	---	---	---	---	---	0.041
713	0.922	802.09	4.347	0.043	---	---	---	---	---	---	---	0.043
714	1.069	802.18	4.347	0.045	---	---	---	---	---	---	---	0.045
715	1.230	802.24	4.347	0.046	---	---	---	---	---	---	---	0.046
716	1.398	802.40	4.347	0.049	---	---	---	---	---	---	---	0.049
717	1.462	802.53	4.347	0.051	---	---	---	---	---	---	---	0.051
718	1.498	802.66	4.347	0.053	---	---	---	---	---	---	---	0.053
719	1.441	802.80	4.347	0.055	---	---	---	---	---	---	---	0.055
720	1.331	802.92	4.347	0.057	0.055	---	---	---	---	---	---	0.112
721	1.168	803.01	4.347	0.058	0.135	---	---	---	---	---	---	0.213

Continued on next page >>>

Pond-B Route

Hydrograph Discharge Table

Time (min)	Inflow (cfs)	Elevation (ft)	Cv A	Cv B	Cv C	PFR	W A	W B	W C	W D	Exit	Outflow (cfs)
722	0.974	803.06	4.347	0.059	0.226	---	---	---	---	---	---	0.287
723	0.776	803.09	4.347	0.059	0.278	---	---	---	---	---	---	0.338
724	0.599	803.11	4.347	0.060	0.313	---	---	---	---	---	---	0.372
725	0.461	803.12	4.347	0.060	0.329	---	---	---	---	---	---	0.389
726	0.367	803.12	4.347	0.060	0.332	---	---	---	---	---	---	0.391
727	0.301	803.12	4.347	0.060	0.336	---	---	---	---	---	---	0.395
728	0.261	803.13	4.347	0.060	0.340	---	---	---	---	---	---	0.375
729	0.241	803.11	4.347	0.060	0.362	---	---	---	---	---	---	0.362
730	0.223	803.10	4.347	0.059	0.289	---	---	---	---	---	---	0.349
731	0.229	803.09	4.347	0.059	0.279	---	---	---	---	---	---	0.338
732	0.225	803.09	4.347	0.059	0.269	---	---	---	---	---	---	0.329
733	0.220	803.08	4.347	0.059	0.260	---	---	---	---	---	---	0.319
734	0.216	803.08	4.347	0.059	0.252	---	---	---	---	---	---	0.311
735	0.212	803.07	4.347	0.059	0.243	---	---	---	---	---	---	0.302

Hydrograph Report

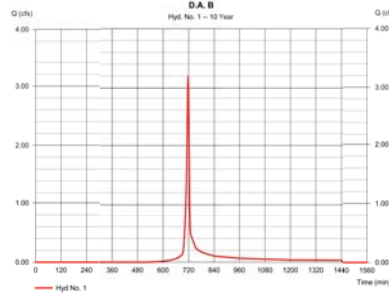
Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

Thursday, 05/11/2017

Hvd. No. 1

D.A. B

Hydrograph type	= SCS Runoff	Peak discharge	= 3.193 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 6,442 cuft
Drainage area	= 0.790 ac	Curve number	= 77
Basin slope	= 0.0 %	Hydraulic length	= 0.8
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

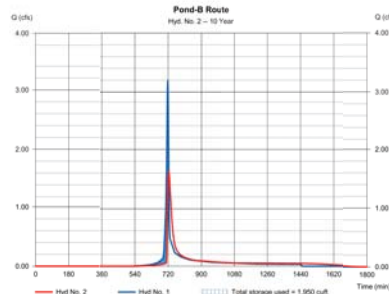
Thursday, 05/11/2017

Hvd. No. 2

Pond-B Route

Hydrograph type	= Reservoir	Peak discharge	= 1.635 cfs
Storm frequency	= 10 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 6,439 cuft
Inflow hvd. No.	= 1 - D.A. B	Reservoir name	= Pond-B
Reservoir name	= Pond-B	Max. Storage	= 1,950 cuft

Storage Indication method used:



Hydrograph Summary Report

Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

Hvd. No.	Hydrograph Type	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuft)	Maximum Elevation (ft)	Total Storage Used (cuft)	Hydrograph Description
1	SCS Runoff	3.193	1	718	6,442	---	---	D.A. B
2	Reservoir	1.635	1	723	6,439	804.00	1,950	Pond-B Route

Det Facility B-10yr gwe Return Period: 10 Year Thursday, 05/11/2017

Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v15.0

Thursday, 05/11/2017

Hvd. No. 2

Pond-B Route

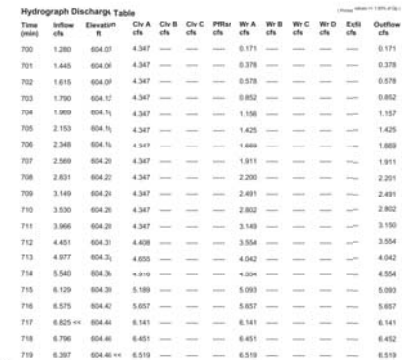
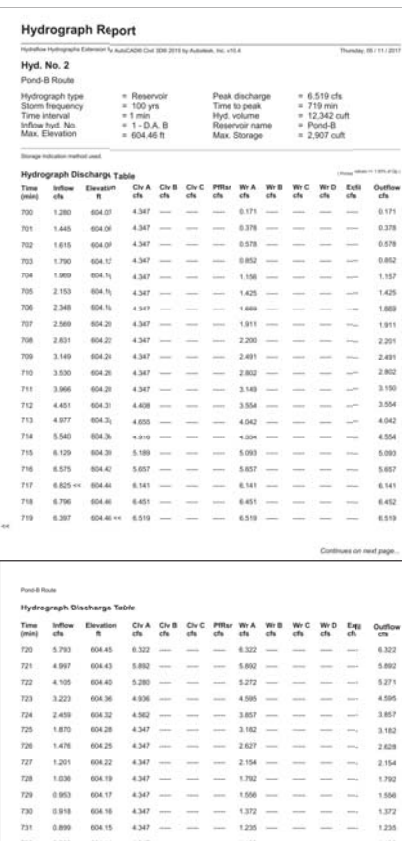
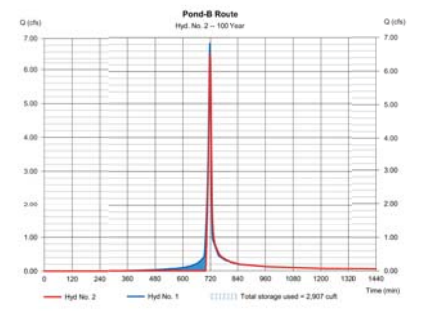
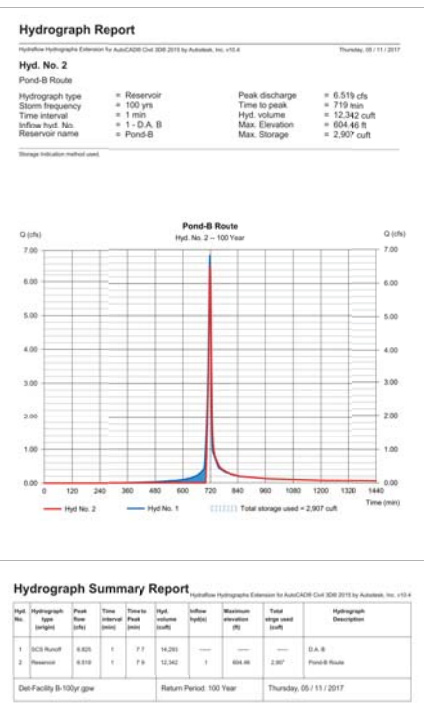
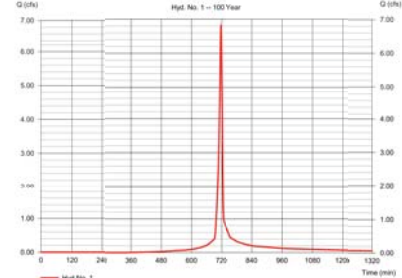
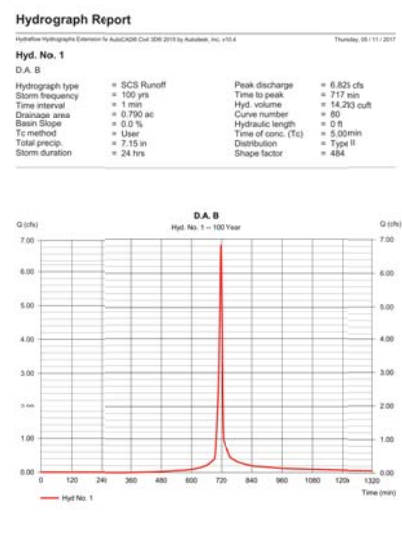
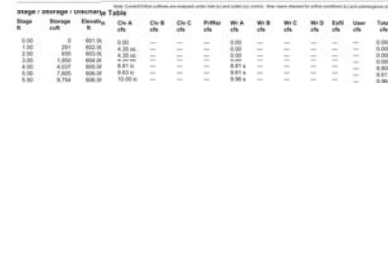
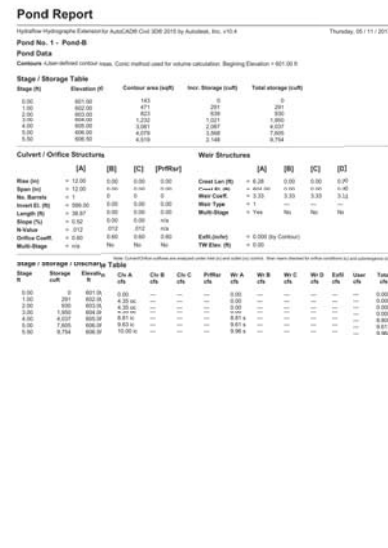
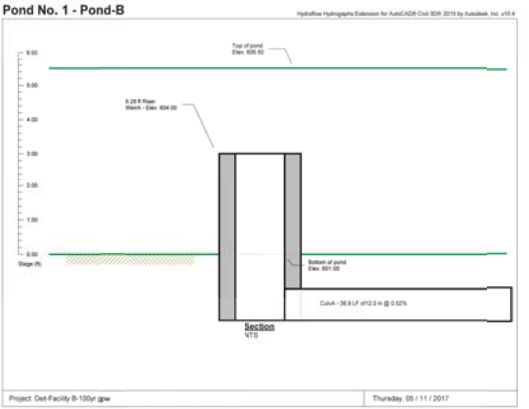
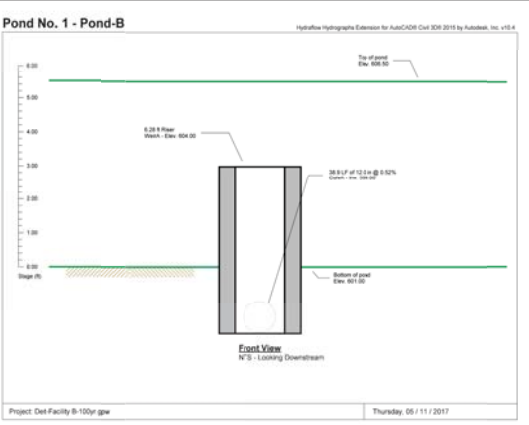
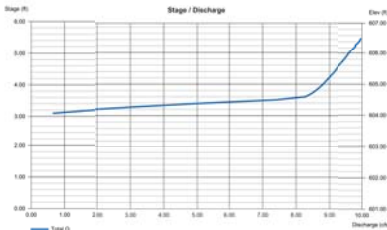
Hydrograph type	= Reservoir	Peak discharge	= 1.635 cfs
Storm frequency	= 10 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 6,439 cuft
Inflow hvd. No.	= 1 - D.A. B	Reservoir name	= Pond-B
Max. Elevation	= 804.00 ft	Max. Storage	= 1,950 cuft

Storage Indication method used:

Pond-B Route

Hydrograph Discharge Table

Time (min)	Inflow (cfs)	Elevation (ft)	Cv A	Cv B	Cv C	PFR	W A	W B	W C	W D	Exit	Outflow (cfs)
713	2.173	803.8	4.347	0.060	0.399	---	---	---	---	---	---	0.458
714	2.446	803.8	4.347	0.062	0.604	---	---	---	---	---	---	0.606
715	2.766	803.37	4.347	0.063	0.820	---	---	---	---	---	---	0.804
716	3.012	803.48	4.347	0.065	0.995	---	---	---	---	---	---	1.000
717	3.169	803.50	4.347	0.066	1.147	---	---	---	---	---	---	1.213
718	3.193	803.71	4.347	0.068	1.277	---	---	---	---	---	---	1.344
719	3.236	803.71	4.347	0.069	1.394	---	---	---	---	---	---	1.453
720	2.774	803.69	4.347	0.070	1.496	---	---	---	---	---	---	1.536
721	2.412	803.66	4.347	0.071	1.523	---	---	---	---	---	---	1.594
722	1.894	803.69	4.347	0.071	1.555	---	---	---	---	---	---	1.628
723	1.576	804.0	4.347	0.071	1.584	---	---	---	---	---	---	1.635
724	1.209	803.56	4.347	0.071	1.551	---	---	---	---	---	---	1.622
725	0.825	803.56	4.347	0.071	1.521	---	---	---	---	---	---	1.592
726	0.733	803.51	4.347	0.071	1.481	---	---	---	---	---	---	1.551
727	0.598	803.96	4.347	0.069	1.431	---	---	---	---	---	---	1.500
728	0.517	803.91	4.347	0.069	1.378	---	---	---	---	---	---	1.446
729	0.477	803.75	4.347	0.068	1.320	---	---	---	---	---	---	1.391
730	0.480	803.70	4.347	0.067	1.264	---	---	---	---	---	---	1.337
731	0.451	803.65	4.347	0.067	1.206	---	---	---	---	---	---	1.273
732	0.443	803.60	4.347	0.066	1.151	---	---	---	---	---	---	1.217
733	0.433	803.56	4.347	0.066	1.094	---	---	---	---	---	---	1.158
734	0.424	803.52	4.347	0.065	1.040	---	---	---	---	---	---	1.105
735	0.415	803.48	4.347	0.065	0.987	---	---	---	---	---	---	1.051
736	0.406	803.44	4.347	0.064	0.936	---	---	---	---	---	---	1.001
737	0.387	803.41	4.347	0.064	0.886	---	---	---	---	---	---	0.951
738	0.368	803.38	4.347	0.063	0.831	---	---	---	---	---	---	0.895
739	0.379	803.35	4.347	0.063	0.776	---	---	---	---	---	---	0.839



Pond Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Pond No. 1 - Pond-C

Continuity: A-100 defined outflow area. Continuity used for volume calculation. Beginning Elevation = 597.00 ft

Stage / Storage Table	Stage (ft)	Contour area (sqft)	Inlet Storage (cuft)	Total storage (cuft)
	5.00	597.00	0	0
	1.00	598.00	100	100
	2.00	599.00	200	200
	3.00	600.00	300	300
	4.00	601.00	400	400
	5.00	602.00	500	500
	6.00	603.00	600	600
	7.00	604.00	700	700
	8.00	605.00	800	800
	9.00	606.00	900	900
	10.00	607.00	1000	1000
	11.00	608.00	1100	1100
	12.00	609.00	1200	1200
	13.00	610.00	1300	1300
	14.00	611.00	1400	1400
	15.00	612.00	1500	1500
	16.00	613.00	1600	1600
	17.00	614.00	1700	1700
	18.00	615.00	1800	1800
	19.00	616.00	1900	1900
	20.00	617.00	2000	2000
	21.00	618.00	2100	2100
	22.00	619.00	2200	2200
	23.00	620.00	2300	2300
	24.00	621.00	2400	2400
	25.00	622.00	2500	2500
	26.00	623.00	2600	2600
	27.00	624.00	2700	2700
	28.00	625.00	2800	2800
	29.00	626.00	2900	2900
	30.00	627.00	3000	3000
	31.00	628.00	3100	3100
	32.00	629.00	3200	3200
	33.00	630.00	3300	3300
	34.00	631.00	3400	3400
	35.00	632.00	3500	3500
	36.00	633.00	3600	3600
	37.00	634.00	3700	3700
	38.00	635.00	3800	3800
	39.00	636.00	3900	3900
	40.00	637.00	4000	4000
	41.00	638.00	4100	4100
	42.00	639.00	4200	4200
	43.00	640.00	4300	4300
	44.00	641.00	4400	4400
	45.00	642.00	4500	4500
	46.00	643.00	4600	4600
	47.00	644.00	4700	4700
	48.00	645.00	4800	4800
	49.00	646.00	4900	4900
	50.00	647.00	5000	5000
	51.00	648.00	5100	5100
	52.00	649.00	5200	5200
	53.00	650.00	5300	5300
	54.00	651.00	5400	5400
	55.00	652.00	5500	5500
	56.00	653.00	5600	5600
	57.00	654.00	5700	5700
	58.00	655.00	5800	5800
	59.00	656.00	5900	5900
	60.00	657.00	6000	6000
	61.00	658.00	6100	6100
	62.00	659.00	6200	6200
	63.00	660.00	6300	6300
	64.00	661.00	6400	6400
	65.00	662.00	6500	6500
	66.00	663.00	6600	6600
	67.00	664.00	6700	6700
	68.00	665.00	6800	6800
	69.00	666.00	6900	6900
	70.00	667.00	7000	7000
	71.00	668.00	7100	7100
	72.00	669.00	7200	7200
	73.00	670.00	7300	7300
	74.00	671.00	7400	7400
	75.00	672.00	7500	7500
	76.00	673.00	7600	7600
	77.00	674.00	7700	7700
	78.00	675.00	7800	7800
	79.00	676.00	7900	7900
	80.00	677.00	8000	8000
	81.00	678.00	8100	8100
	82.00	679.00	8200	8200
	83.00	680.00	8300	8300
	84.00	681.00	8400	8400
	85.00	682.00	8500	8500
	86.00	683.00	8600	8600
	87.00	684.00	8700	8700
	88.00	685.00	8800	8800
	89.00	686.00	8900	8900
	90.00	687.00	9000	9000
	91.00	688.00	9100	9100
	92.00	689.00	9200	9200
	93.00	690.00	9300	9300
	94.00	691.00	9400	9400
	95.00	692.00	9500	9500
	96.00	693.00	9600	9600
	97.00	694.00	9700	9700
	98.00	695.00	9800	9800
	99.00	696.00	9900	9900
	100.00	697.00	10000	10000
	101.00	698.00	10100	10100
	102.00	699.00	10200	10200
	103.00	700.00	10300	10300
	104.00	701.00	10400	10400
	105.00	702.00	10500	10500
	106.00	703.00	10600	10600
	107.00	704.00	10700	10700
	108.00	705.00	10800	10800
	109.00	706.00	10900	10900
	110.00	707.00	11000	11000
	111.00	708.00	11100	11100
	112.00	709.00	11200	11200
	113.00	710.00	11300	11300
	114.00	711.00	11400	11400
	115.00	712.00	11500	11500
	116.00	713.00	11600	11600
	117.00	714.00	11700	11700
	118.00	715.00	11800	11800
	119.00	716.00	11900	11900
	120.00	717.00	12000	12000
	121.00	718.00	12100	12100
	122.00	719.00	12200	12200
	123.00	720.00	12300	12300
	124.00	721.00	12400	12400
	125.00	722.00	12500	12500
	126.00	723.00	12600	12600
	127.00	724.00	12700	12700
	128.00	725.00	12800	12800
	129.00	726.00	12900	12900
	130.00	727.00	13000	13000
	131.00	728.00	13100	13100
	132.00	729.00	13200	13200
	133.00	730.00	13300	13300
	134.00	731.00	13400	13400
	135.00	732.00	13500	13500
	136.00	733.00	13600	13600
	137.00	734.00	13700	13700
	138.00	735.00	13800	13800
	139.00	736.00	13900	13900
	140.00	737.00	14000	14000
	141.00	738.00	14100	14100
	142.00	739.00	14200	14200
	143.00	740.00	14300	14300
	144.00	741.00	14400	14400
	145.00	742.00	14500	14500
	146.00	743.00	14600	14600
	147.00	744.00	14700	14700
	148.00	745.00	14800	14800
	149.00	746.00	14900	14900
	150.00	747.00	15000	15000
	151.00	748.00	15100	15100
	152.00	749.00	15200	15200
	153.00	750.00	15300	15300
	154.00	751.00	15400	15400
	155.00	752.00	15500	15500
	156.00	753.00	15600	15600
	157.00	754.00	15700	15700
	158.00	755.00	15800	15800
	159.00	756.00	15900	15900
	160.00	757.00	16000	16000
	161.00	758.00	16100	16100
	162.00	759.00	16200	16200
	163.00	760.00	16300	16300
	164.00	761.00	16400	16400
	165.00	762.00	16500	16500
	166.00	763.00	16600	16600
	167.00	764.00	16700	16700
	168.00	765.00	16800	16800
	169.00	766.00	16900	16900
	170.00	767.00	17000	17000
	171.00	768.00	17100	17100
	172.00	769.00	17200	17200
	173.00	770.00	17300	17300
	174.00	771.00	17400	17400
	175.00	772.00	17500	17500
	176.00	773.00	17600	17600
	177.00	774.00	17700	17700
	178.00	775.00	17800	17800
	179.00	776.00	17900	17900
	180.00	777.00	18000	18000
	181.00	778.00	18100	18100
	182.00	779.00	18200	18200
	183.00	780.00	18300	18300
	184.00	781.00	18400	18400
	185.00	782.00	18500	18500
	186.00	783.00	18600	18600
	187.00	784.00	18700	18700
	188.00	785.00	18800	18800
	189.00	786.00	18900	18900
	190.00	787.00	19000	19000
	191.00	788.00	19100	19100
	192.00	789.00	19200	19200
	193.00	790.00	19300	19300
	194.00	791.00	19400	19400
	195.00	792.00	19500	19500
	196.00	793.00	19600	19600
	197.00	794.00	19700	19700
	198.00	795.00	19800	19800
	199.00	796.00	19900	19900
	200.00	797.00	20000	20000
	201.00	798.00	20100	20100
	202.00	799.00	20200	20200
	203.00	800.00	20300	20300
	204.00	801.00	20400	20400
	205.00	802.00	20500	20500
	206.00	803.00	20600	20600
	207.00	804.00	20700	20700
	208.00	805.00	20800	20800
	209.00	806.00	20900	20900
	210.00	807.00	21000	21000
	211.00	808.00	21100	21100
	212.00	809.00	21200	21200
	213.00	810.00	21300	21300
	214.00	811.00	21400	21400
	215.00	812.00	21500	21500
	216.00	813.00	21600	21600
	217.00	814.00	21700	21700
	218.00	815.00	21800	21800
	219.00	816.00	21900	21900
	220.00	817.00	22000	22000
	221.00	818.00	22100	22100
	222.00	819.00	22200	22200
	223.00	820.00	22300	22300
	224.00	821.00	22400	22400
	225.00	822.00	22500	22500
	226.00	823.00	22600	22600
	227.00	824.00	22700	22700
	228.00	825.00	22800	22800
	229.00	826.00	22900	22900
	230.00	827.00	23000	23000
	231.00	828.00	23100	23100
	232.00	829.00	23200	23200
	233.00	830.00	23300	23300
	234.00	831.00	23400	23400
	235.00	832.00	23500	23500
	236.00	833.00	23600	23600
	237.00	834.00	23700	23700

Hydrograph Report

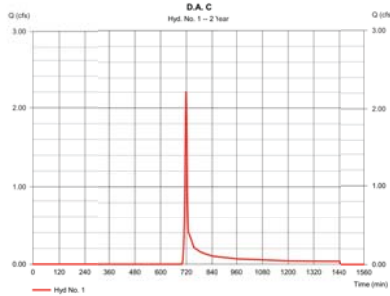
Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 1

D.A.C

Hydrograph type	= SCS Runoff	Peak discharge	= 2.207 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 4,801 cuft
Drainage area	= 2,030 ac	Curve number	= 68
Basin slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.50 min
Total precip	= 3.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

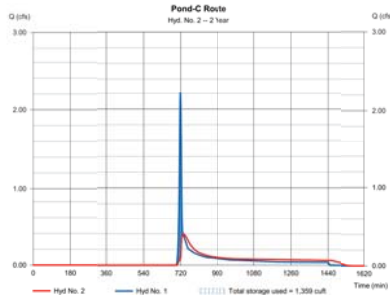
Thursday, 05/11/2017

Hyd. No. 2

Pond-C Route

Hydrograph type	= Reservoir	Peak discharge	= 0.396 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 4,800 cuft
Inflow hyd. No.	= 1-D.A.C	Max. Elevation	= 599.0 ft
Reservoir name	= Pond-C	Max. Storage	= 1,359 cuft

Storage Indication method used:



Hydrograph Summary Report

Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

No.	Hydrograph Type	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuft)	Maximum Elevation (ft)	Total Storage Used (cuft)	Hydrograph Description
1	SCS Runoff	2.207	1	718	4,801	---	---	D.A.C
2	Reservoir	0.396	1	730	4,800	599.0	1,359	Pond-C Route

Det Facility C-2yr.gw Return Period: 2 Year Thursday, 05/11/2017

Hydrograph Report

Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 2

Pond-C Route

Hydrograph type	= Reservoir	Peak discharge	= 0.396 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 4,800 cuft
Inflow hyd. No.	= 1-D.A.C	Reservoir name	= Pond-C
Max. Elevation	= 599.0 ft	Max. Storage	= 1,359 cuft

Storage Indication method used:

Time (min)	Inflow (cfs)	Elevation (ft)	Chv A (cfs)	Chv B (cfs)	Chv C (cfs)	Pdflw (cfs)	Wv A (cfs)	Wv B (cfs)	Wv C (cfs)	Wv D (cfs)	Exit (cfs)	Outflow (cfs)
703	0.363	597.01	1.689	0.006	---	---	---	---	---	---	---	0.006
704	0.096	597.06	2.955	0.011	---	---	---	---	---	---	---	0.011
705	0.137	597.10	4.778	0.018	---	---	---	---	---	---	---	0.018
706	0.187	597.15	4.959	0.022	---	---	---	---	---	---	---	0.022
707	0.249	597.20	4.959	0.027	---	---	---	---	---	---	---	0.027
708	0.326	597.30	4.959	0.033	---	---	---	---	---	---	---	0.033
709	0.424	597.40	4.959	0.039	---	---	---	---	---	---	---	0.039
710	0.547	597.59	4.959	0.045	---	---	---	---	---	---	---	0.045
711	0.698	597.88	4.959	0.053	---	---	---	---	---	---	---	0.053
712	0.880	598.01	4.959	0.059	---	---	---	---	---	---	---	0.059
713	1.094	598.07	4.959	0.061	---	---	---	---	---	---	---	0.061
714	1.344	598.15	4.959	0.063	---	---	---	---	---	---	---	0.063
715	1.629	598.24	4.959	0.066	---	---	---	---	---	---	---	0.066
716	1.887	598.36	4.959	0.069	---	---	---	---	---	---	---	0.069
717	2.094	598.46	4.959	0.072	---	---	---	---	---	---	---	0.072
718	2.207	598.62	4.959	0.075	---	---	---	---	---	---	---	0.075
719	2.177	598.76	4.959	0.078	---	---	---	---	---	---	---	0.078
720	2.052	598.86	4.959	0.081	0.015	---	---	---	---	---	---	0.085
721	1.831	598.94	4.959	0.082	0.069	---	---	---	---	---	---	0.151
722	1.549	599.00	4.959	0.084	0.146	---	---	---	---	---	---	0.229

Continuation next page...

Pond-C Route

Time (min)	Inflow (cfs)	Elevation (ft)	Chv A (cfs)	Chv B (cfs)	Chv C (cfs)	Pdflw (cfs)	Wv A (cfs)	Wv B (cfs)	Wv C (cfs)	Wv D (cfs)	Exit (cfs)	Outflow (cfs)
723	1.250	599.04	4.959	0.084	0.207	---	---	---	---	---	---	0.202
724	0.977	599.06	4.959	0.085	0.256	---	---	---	---	---	---	0.335
725	0.760	599.08	4.959	0.085	0.278	---	---	---	---	---	---	0.364
726	0.610	599.09	4.959	0.085	0.295	---	---	---	---	---	---	0.381
727	0.504	599.09	4.959	0.085	0.303	---	---	---	---	---	---	0.387
728	0.439	599.10	4.959	0.086	0.309	---	---	---	---	---	---	0.394
729	0.407	599.10	4.959	0.086	0.310	---	---	---	---	---	---	0.396
730	0.384	599.10	4.959	0.086	0.310	---	---	---	---	---	---	0.396
731	0.368	599.10	4.959	0.086	0.310	---	---	---	---	---	---	0.396
732	0.362	599.10	4.959	0.086	0.310	---	---	---	---	---	---	0.396
733	0.375	599.10	4.959	0.086	0.309	---	---	---	---	---	---	0.394
734	0.369	599.10	4.959	0.086	0.308	---	---	---	---	---	---	0.393
735	0.362	599.10	4.959	0.086	0.306	---	---	---	---	---	---	0.392
736	0.350	599.09	4.959	0.085	0.304	---	---	---	---	---	---	0.390
737	0.348	599.09	4.959	0.085	0.303	---	---	---	---	---	---	0.388
738	0.341	599.09	4.959	0.085	0.300	---	---	---	---	---	---	0.386
739	0.334	599.09	4.959	0.085	0.298	---	---	---	---	---	---	0.382
740	0.327	599.09	4.959	0.085	0.295	---	---	---	---	---	---	0.380
741	0.320	599.09	4.959	0.085	0.292	---	---	---	---	---	---	0.377
742	0.312	599.08	4.959	0.085	0.289	---	---	---	---	---	---	0.374
743	0.304	599.08	4.959	0.085	0.285	---	---	---	---	---	---	0.371
744	0.297	599.08	4.959	0.085	0.282	---	---	---	---	---	---	0.367
745	0.289	599.08	4.959	0.085	0.278	---	---	---	---	---	---	0.363
746	0.281	599.08	4.959	0.085	0.274	---	---	---	---	---	---	0.359
747	0.273	599.07	4.959	0.085	0.269	---	---	---	---	---	---	0.354
748	0.265	599.07	4.959	0.085	0.265	---	---	---	---	---	---	0.350
749	0.257	599.07	4.959	0.085	0.260	---	---	---	---	---	---	0.345

Continuation next page...

Hydrograph Report

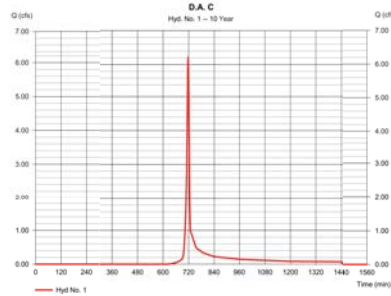
Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 1

D.A.C

Hydrograph type	= SCS Runoff	Peak discharge	= 6.216 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 12,504 cuft
Drainage area	= 2,030 ac	Curve number	= 70
Basin slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.50 min
Total precip	= 4.48 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

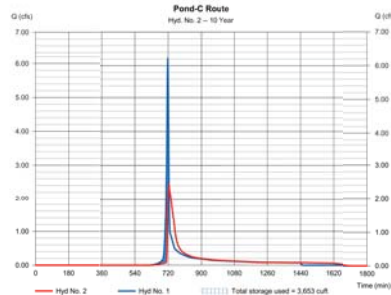
Thursday, 05/11/2017

Hyd. No. 2

Pond-C Route

Hydrograph type	= Reservoir	Peak discharge	= 2.448 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 12,504 cuft
Inflow hyd. No.	= 1-D.A.C	Max. Elevation	= 600.25 ft
Reservoir name	= Pond-C	Max. Storage	= 3,653 cuft

Storage Indication method used:



Hydrograph Summary Report

Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

No.	Hydrograph Type	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuft)	Maximum Elevation (ft)	Total Storage Used (cuft)	Hydrograph Description
1	SCS Runoff	6.216	1	718	12,504	---	---	D.A.C
2	Reservoir	2.448	1	724	12,504	600.25	3,653	Pond-C Route

Det Facility C-10yr.gw Return Period: 10 Year Thursday, 05/11/2017

Hydrograph Report

Hydroflow Hydrographs Extension by AutoCAD Civil 3D 2010 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyd. No. 2

Pond-C Route

Hydrograph type	= Reservoir	Peak discharge	= 2.448 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 12,504 cuft
Inflow hyd. No.	= 1-D.A.C	Reservoir name	= Pond-C
Max. Elevation	= 600.25 ft	Max. Storage	= 3,653 cuft

Storage Indication method used:

Pond-C Route

Hydrograph Discharge Table												
Time (min)	Inflow (cfs)	Elevation (ft)	Chv A cfs	Chv B cfs	Chv C cfs	Pdflw cfs	Wv A cfs	Wv B cfs	Wv C cfs	Wv D cfs	Exit cfs	Outflow cfs
710	3.508	598.12	4.959	0.082	0.058							0.143
711	3.920	598.12	4.959	0.084	0.104							0.268
712	3.394	599.11	4.959	0.086	0.340							0.426
713	3.350	599.11	4.959	0.088	0.557							0.645
714	4.526	599.13	4.959	0.090	0.822							0.912
715	5.178	599.16	4.959	0.092	1.112							1.205
716	5.721	599.18	4.959	0.095	1.361							1.406
717	6.099	599.73	4.959	0.098	1.577							1.675
718	6.216	599.17	4.959	0.100	1.770							1.871
719	5.967	600.30	4.959	0.102	1.930							2.037
720	5.498	600.39	4.959	0.104	2.032							2.136
721	4.814	600.48	4.959	0.106	2.109							2.214
722	4.006	600.11	4.959	0.106	2.163	0.027						2.296
723	3.184	600.14	4.959	0.106	2.193	0.113						2.412
724	2.498	600.15	4.959	0.106	2.202	0.139						2.448
725	1.887	600.14	4.959	0.106	2.196	0.121						2.424
726	1.501	600.13	4.959	0.106	2.179	0.073						2.396
727	1.229	600.10	4.959	0.106	2.156	0.008						2.270
728	1.066	600.18	4.959	0.105	2.128							2.234
729	0.944	600.15	4.959	0.105	2.098							2.203
730	0.850	600.12	4.959	0.104	2.067							2.172
731	0.833	600.39	4.959	0.104	2.036							2.140
732	0.915	600.36	4.959	0.103	2.004							2.107
733	0.888	600.41	4.959	0.103	1.972							2.075
734	0.880	600.11	4.959	0.102	1.941							2.043
735	0.882	599.17	4.959	0.102	1.899							2.001
736	0.844	599.14	4.959	0.101	1.855							1.961
Continues on next page.												
Placed C Road												
Hydrograph Discharge Table												
Time (min)	Inflow (cfs)	Elevation (ft)	Chv A cfs	Chv B cfs	Chv C cfs	Pdflw cfs	Wv A cfs	Wv B cfs	Wv C cfs	Wv D cfs	Exit cfs	Outflow cfs
737	0.826	599.19	4.959	0.101	1.812							1.912
738	0.808	599.16	4.959	0.100	1.786							1.886
739	0.799	599.16	4.959	0.099	1.722							1.802
740	0.770	599.16	4.959	0.099	1.679							1.738
741	0.752	599.17	4.959	0.098	1.634							1.679
742	0.733	599.71	4.959	0.098	1.589							1.687
743	0.713	599.19	4.959	0.097	1.546							1.644
744	0.694	599.16	4.959	0.097	1.501							1.597
745	0.675	599.19	4.959	0.096	1.456							1.552
746	0.655	599.16	4.959	0.096	1.412							1.508
747	0.636	599.19	4.959	0.095	1.369							1.464
748	0.616	599.16	4.959	0.095	1.326							1.420
749	0.596	599.19	4.959	0.094	1.284							1.376
750	0.576	599.16	4.959	0.094	1.243							1.332
751	0.556	599.16	4.959	0.093	1.199							1.289
752	0.537	599.16	4.959	0.093	1.143							1.236
753	0.520	599.14	4.959	0.092	1.094							1.186
754	0.506	599.42	4.959	0.092	1.048							1.136
755	0.494	599.16	4.959	0.092	1.001							1.093
756	0.485	599.19	4.959	0.091	956							1.047
757	0.477	599.16	4.959	0.091	913							1.003
758	0.471	599.19	4.959	0.090	872							963
759	0.466	599.13	4.959	0.090	828							925
760	0.461	599.32	4.959	0.090	800							893
761	0.457	599.16	4.959	0.090	767							857
762	0.453	599.29	4.959	0.089	737							827
763	0.448	599.26	4.959	0.089	710							799
764	0.444	599.27	4.959	0.089	684							769

Pond Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Pond Data

Continuity values defined without mass. Continuity method used for volume calculation. Beginning Elevation = 600.00 ft

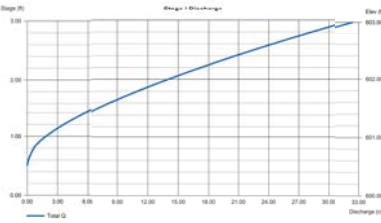
Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Inlet Storage (cuft)	Total storage (cuft)
0.00	600.00	2,160	0	0
0.50	600.50	2,260	1,200	1,200
1.00	601.00	2,370	2,400	2,400
1.50	601.50	2,470	3,600	3,600
2.00	602.00	2,570	4,800	4,800
2.50	602.50	2,670	6,000	6,000
3.00	603.00	2,770	7,200	7,200
3.50	603.50	2,870	8,400	8,400
4.00	604.00	2,970	9,600	9,600
4.50	604.50	3,070	10,800	10,800
5.00	605.00	3,170	12,000	12,000
5.50	605.50	3,270	13,200	13,200
6.00	606.00	3,370	14,400	14,400

Culvert / Office Structures

[A]	[B]	[C]	[D]	[E]	[F]
Rise (ft)	= 0.00	Inactive	Inactive	Crest Len (ft)	= 1.00
Riser (ft)	= 0.00	0.00	0.00	Crest Len (ft)	= 1.00
No. Riser	= 0	0	0	Wear Coef.	= 2.00
Length (ft)	= 0.00	0.00	0.00	Wear Type	= Round
Wear (ft)	= 0.00	0.00	0.00	Multi-Stage	= No
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)

Note: Continuity values are entered under the [A] column and [B] column. The [C] column is for [D] and [E] columns.



Pond Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Pond Data

Continuity values defined without mass. Continuity method used for volume calculation. Beginning Elevation = 600.00 ft

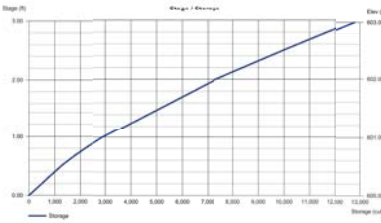
Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Inlet Storage (cuft)	Total storage (cuft)
0.00	600.00	2,160	0	0
0.50	600.50	2,260	1,200	1,200
1.00	601.00	2,370	2,400	2,400
1.50	601.50	2,470	3,600	3,600
2.00	602.00	2,570	4,800	4,800
2.50	602.50	2,670	6,000	6,000
3.00	603.00	2,770	7,200	7,200
3.50	603.50	2,870	8,400	8,400
4.00	604.00	2,970	9,600	9,600
4.50	604.50	3,070	10,800	10,800
5.00	605.00	3,170	12,000	12,000
5.50	605.50	3,270	13,200	13,200
6.00	606.00	3,370	14,400	14,400

Culvert / Office Structures

[A]	[B]	[C]	[D]	[E]	[F]
Rise (ft)	= 0.00	Inactive	Inactive	Crest Len (ft)	= 1.00
Riser (ft)	= 0.00	0.00	0.00	Crest Len (ft)	= 1.00
No. Riser	= 0	0	0	Wear Coef.	= 2.00
Length (ft)	= 0.00	0.00	0.00	Wear Type	= Round
Wear (ft)	= 0.00	0.00	0.00	Multi-Stage	= No
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)

Note: Continuity values are entered under the [A] column and [B] column. The [C] column is for [D] and [E] columns.



Pond Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Pond Data

Continuity values defined without mass. Continuity method used for volume calculation. Beginning Elevation = 600.00 ft

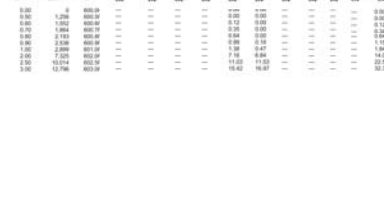
Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Inlet Storage (cuft)	Total storage (cuft)
0.00	600.00	2,160	0	0
0.50	600.50	2,260	1,200	1,200
1.00	601.00	2,370	2,400	2,400
1.50	601.50	2,470	3,600	3,600
2.00	602.00	2,570	4,800	4,800
2.50	602.50	2,670	6,000	6,000
3.00	603.00	2,770	7,200	7,200
3.50	603.50	2,870	8,400	8,400
4.00	604.00	2,970	9,600	9,600
4.50	604.50	3,070	10,800	10,800
5.00	605.00	3,170	12,000	12,000
5.50	605.50	3,270	13,200	13,200
6.00	606.00	3,370	14,400	14,400

Culvert / Office Structures

[A]	[B]	[C]	[D]	[E]	[F]
Rise (ft)	= 0.00	Inactive	Inactive	Crest Len (ft)	= 1.00
Riser (ft)	= 0.00	0.00	0.00	Crest Len (ft)	= 1.00
No. Riser	= 0	0	0	Wear Coef.	= 2.00
Length (ft)	= 0.00	0.00	0.00	Wear Type	= Round
Wear (ft)	= 0.00	0.00	0.00	Multi-Stage	= No
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)
W. Value	= 0.00	0.00	0.00	W. Value	= 0.00 (By Contract)

Note: Continuity values are entered under the [A] column and [B] column. The [C] column is for [D] and [E] columns.



Hydrograph Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

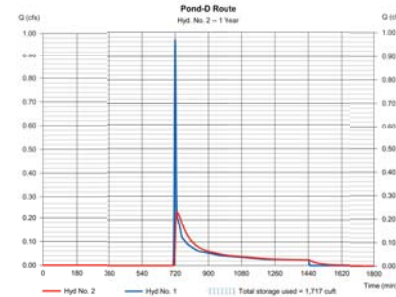
Thursday, 05/11/2017

Hyt. No. 2

Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 0.234 cfs
Storm frequency	= 1 yr	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 2,545 cuft
Inflow Hyd. No.	= 1-D.A. D	Reservoir name	= Pond-D
Max. Elevation	= 600.65 ft	Max. Storage	= 1,717 cuft

Storage calculation method used: Wet pond routing start elevation = 600.00 ft



Hydrograph Report

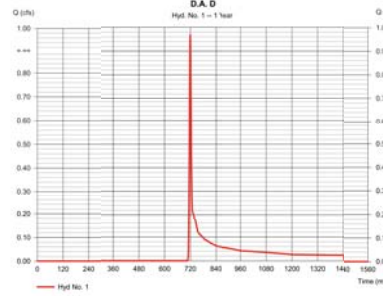
Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyt. No. 1

D.A. D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.998 cfs
Storm frequency	= 1 yr	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 2,550 cuft
Drainage area	= 2,000 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Storm duration	= 2.50 hr	Distribution	= Type II
		Shape factor	= 454



Hydrograph Summary Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

Hyt. No.	Hydrograph Type	Peak Flow (cfs)	Time to Peak (min)	Hyd. Volume (cuft)	Inflow Hyd. No.	Reservoir Name	Total Storage Used (cuft)	Hydrograph Description
1	SCS Runoff	0.998	719	2,550	---	---	---	D.A. D
2	Reservoir	0.234	728	2,545	1	Pond-D	1,717	Pond-D Route

Det Facility D-1yr.gw

Return Period: 1 Year

Thursday, 05/11/2017

Hydrograph Report

Hydrograph Hydrographs Extension for AutoCAD Civil 3D 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyt. No. 2

Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 0.234 cfs
Storm frequency	= 1 yr	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 2,545 cuft
Inflow Hyd. No.	= 1-D.A. D	Reservoir name	= Pond-D
Max. Elevation	= 600.65 ft	Max. Storage	= 1,717 cuft

Storage calculation method used: Wet pond routing start elevation = 600.00 ft

Hydrograph Discharge Table													Channel Information																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Time (min)	Inflow (cfs)	Elevation (ft)	Clv A (cfs)	Clv B (cfs)	Clv C (cfs)	PMR (cfs)	W A (cfs)	W B (cfs)	W C (cfs)	W D (cfs)	W E (cfs)	W F (cfs)	W G (cfs)	W H (cfs)	W I (cfs)	W J (cfs)	W K (cfs)	W L (cfs)	W M (cfs)	W N (cfs)	W O (cfs)	W P (cfs)	W Q (cfs)	W R (cfs)	W S (cfs)	W T (cfs)	W U (cfs)	W V (cfs)	W W (cfs)	W X (cfs)	W Y (cfs)	W Z (cfs)	W AA (cfs)	W AB (cfs)	W AC (cfs)	W AD (cfs)	W AE (cfs)	W AF (cfs)	W AG (cfs)	W AH (cfs)	W AI (cfs)	W AJ (cfs)	W AK (cfs)	W AL (cfs)	W AM (cfs)	W AN (cfs)	W AO (cfs)	W AP (cfs)	W AQ (cfs)	W AR (cfs)	W AS (cfs)	W AT (cfs)	W AU (cfs)	W AV (cfs)	W AW (cfs)	W AX (cfs)	W AY (cfs)	W AZ (cfs)	W BA (cfs)	W BB (cfs)	W BC (cfs)	W BD (cfs)	W BE (cfs)	W BF (cfs)	W BG (cfs)	W BH (cfs)	W BI (cfs)	W BJ (cfs)	W BK (cfs)	W BL (cfs)	W BM (cfs)	W BN (cfs)	W BO (cfs)	W BP (cfs)	W BQ (cfs)	W BR (cfs)	W BS (cfs)	W BT (cfs)	W BU (cfs)	W BV (cfs)	W BW (cfs)	W BX (cfs)	W BY (cfs)	W BZ (cfs)	W CA (cfs)	W CB (cfs)	W CC (cfs)	W CD (cfs)	W CE (cfs)	W CF (cfs)	W CG (cfs)	W CH (cfs)	W CI (cfs)	W CJ (cfs)	W CK (cfs)	W CL (cfs)	W CM (cfs)	W CN (cfs)	W CO (cfs)	W CP (cfs)	W CQ (cfs)	W CR (cfs)	W CS (cfs)	W CT (cfs)	W CU (cfs)	W CV (cfs)	W CW (cfs)	W CX (cfs)	W CY (cfs)	W CZ (cfs)	W DA (cfs)	W DB (cfs)	W DC (cfs)	W DD (cfs)	W DE (cfs)	W DF (cfs)	W DG (cfs)	W DH (cfs)	W DI (cfs)	W DJ (cfs)	W DK (cfs)	W DL (cfs)	W DM (cfs)	W DN (cfs)	W DO (cfs)	W DP (cfs)	W DQ (cfs)	W DR (cfs)	W DS (cfs)	W DT (cfs)	W DU (cfs)	W DV (cfs)	W DW (cfs)	W DX (cfs)	W DY (cfs)	W DZ (cfs)	W EA (cfs)	W EB (cfs)	W EC (cfs)	W ED (cfs)	W EE (cfs)	W EF (cfs)	W EG (cfs)	W EH (cfs)	W EI (cfs)	W EJ (cfs)	W EK (cfs)	W EL (cfs)	W EM (cfs)	W EN (cfs)	W EO (cfs)	W EP (cfs)	W EQ (cfs)	W ER (cfs)	W ES (cfs)	W ET (cfs)	W EU (cfs)	W EV (cfs)	W EW (cfs)	W EX (cfs)	W EY (cfs)	W EZ (cfs)	W FA (cfs)	W FB (cfs)	W FC (cfs)	W FD (cfs)	W FE (cfs)	W FF (cfs)	W FG (cfs)	W FH (cfs)	W FI (cfs)	W FJ (cfs)	W FK (cfs)	W FL (cfs)	W FM (cfs)	W FN (cfs)	W FO (cfs)	W FP (cfs)	W FQ (cfs)	W FR (cfs)	W FS (cfs)	W FT (cfs)	W FU (cfs)	W FV (cfs)	W FW (cfs)	W FX (cfs)	W FY (cfs)	W FZ (cfs)	W GA (cfs)	W GB (cfs)	W GC (cfs)	W GD (cfs)	W GE (cfs)	W GF (cfs)	W GH (cfs)	W GI (cfs)	W GJ (cfs)	W GK (cfs)	W GL (cfs)	W GM (cfs)	W GN (cfs)	W GO (cfs)	W GP (cfs)	W GQ (cfs)	W GR (cfs)	W GS (cfs)	W GT (cfs)	W GU (cfs)	W GV (cfs)	W GW (cfs)	W GX (cfs)	W GY (cfs)	W GZ (cfs)	W HA (cfs)	W HB (cfs)	W HC (cfs)	W HD (cfs)	W HE (cfs)	W HF (cfs)	W HG (cfs)	W HI (cfs)	W HJ (cfs)	W HK (cfs)	W HL (cfs)	W HM (cfs)	W HN (cfs)	W HO (cfs)	W HP (cfs)	W HQ (cfs)	W HR (cfs)	W HS (cfs)	W HT (cfs)	W HU (cfs)	W HV (cfs)	W HW (cfs)	W HX (cfs)	W HY (cfs)	W HZ (cfs)	W IA (cfs)	W IB (cfs)	W IC (cfs)	W ID (cfs)	W IE (cfs)	W IF (cfs)	W IG (cfs)	W IH (cfs)	W IJ (cfs)	W IK (cfs)	W IL (cfs)	W IM (cfs)	W IN (cfs)	W IO (cfs)	W IP (cfs)	W IQ (cfs)	W IR (cfs)	W IS (cfs)	W IT (cfs)	W IU (cfs)	W IV (cfs)	W IW (cfs)	W IX (cfs)	W IY (cfs)	W IZ (cfs)	W JA (cfs)	W JB (cfs)	W JC (cfs)	W JD (cfs)	W JE (cfs)	W JF (cfs)	W JG (cfs)	W JH (cfs)	W IJ (cfs)	W JK (cfs)	W JL (cfs)	W JM (cfs)	W JN (cfs)	W JO (cfs)	W JP (cfs)	W JQ (cfs)	W JR (cfs)	W JS (cfs)	W JT (cfs)	W JU (cfs)	W JV (cfs)	W JW (cfs)	W JX (cfs)	W JY (cfs)	W JZ (cfs)	W KA (cfs)	W KB (cfs)	W KC (cfs)	W KD (cfs)	W KE (cfs)	W KF (cfs)	W KG (cfs)	W KH (cfs)	W KI (cfs)	W KJ (cfs)	W KL (cfs)	W KM (cfs)	W KN (cfs)	W KO (cfs)	W KP (cfs)	W KQ (cfs)	W KR (cfs)	W KS (cfs)	W KT (cfs)	W KU (cfs)	W KV (cfs)	W KW (cfs)	W KX (cfs)	W KY (cfs)	W KZ (cfs)	W LA (cfs)	W LB (cfs)	W LC (cfs)	W LD (cfs)	W LE (cfs)	W LF (cfs)	W LG (cfs)	W LH (cfs)	W LI (cfs)	W LJ (cfs)	W LK (cfs)	W LL (cfs)	W LM (cfs)	W LN (cfs)	W LO (cfs)	W LP (cfs)	W LQ (cfs)	W LR (cfs)	W LS (cfs)	W LT (cfs)	W LU (cfs)	W LV (cfs)	W LW (cfs)	W LX (cfs)	W LY (cfs)	W LZ (cfs)	W MA (cfs)	W MB (cfs)	W MC (cfs)	W MD (cfs)	W ME (cfs)	W MF (cfs)	W MG (cfs)	W MH (cfs)	W MI (cfs)	W MJ (cfs)	W MK (cfs)	W ML (cfs)	W MM (cfs)	W MN (cfs)	W MO (cfs)	W MP (cfs)	W MQ (cfs)	W MR (cfs)	W MS (cfs)	W MT (cfs)	W MU (cfs)	W MV (cfs)	W MW (cfs)	W MX (cfs)	W MY (cfs)	W MZ (cfs)	W NA (cfs)	W NB (cfs)	W NC (cfs)	W ND (cfs)	W NE (cfs)	W NF (cfs)	W NG (cfs)	W NH (cfs)	W NI (cfs)	W NJ (cfs)	W NK (cfs)	W NL (cfs)	W NM (cfs)	W NN (cfs)	W NO (cfs)	W NP (cfs)	W NQ (cfs)	W NR (cfs)	W NS (cfs)	W NT (cfs)	W NU (cfs)	W NV (cfs)	W NW (cfs)	W NX (cfs)	W NY (cfs)	W NZ (cfs)	W OA (cfs)	W OB (cfs)	W OC (cfs)	W OD (cfs)	W OE (cfs)	W OF (cfs)	W OG (cfs)	W OH (cfs)	W OI (cfs)	W OJ (cfs)	W OK (cfs)	W OL (cfs)	W OM (cfs)	W ON (cfs)	W OO (cfs)	W OP (cfs)	W OQ (cfs)	W OR (cfs)	W OS (cfs)	W OT (cfs)	W OU (cfs)	W OV (cfs)	W OW (cfs)	W OX (cfs)	W OY (cfs)	W OZ (cfs)	W PA (cfs)	W PB (cfs)	W PC (cfs)	W PD (cfs)	W PE (cfs)	W PF (cfs)	W PG (cfs)	W PH (cfs)	W PI (cfs)	W PJ (cfs)	W PK (cfs)	W PL (cfs)	W PM (cfs)	W PN (cfs)	W PO (cfs)	W PP (cfs)	W PQ (cfs)	W PR (cfs)	W PS (cfs)	W PT (cfs)	W PU (cfs)	W PV (cfs)	W PW (cfs)	W PX (cfs)	W PY (cfs)	W PZ (cfs)	W QA (cfs)	W QB (cfs)	W QC (cfs)	W QD (cfs)	W QE (cfs)	W QF (cfs)	W QG (cfs)	W QH (cfs)	W QI (cfs)	W QJ (cfs)	W QK (cfs)	W QL (cfs)	W QM (cfs)	W QN (cfs)	W QO (cfs)	W QP (cfs)	W QQ (cfs)	W QR (cfs)	W QS (cfs)	W QT (cfs)	W QU (cfs)	W QV (cfs)	W QW (cfs)	W QX (cfs)	W QY (cfs)	W QZ (cfs)	W RA (cfs)	W RB (cfs)	W RC (cfs)	W RD (cfs)	W RE (cfs)	W RF (cfs)	W RG (cfs)	W RH (cfs)	W RI (cfs)	W RJ (cfs)	W RK (cfs)	W RL (cfs)	W RM (cfs)	W RN (cfs)	W RO (cfs)	W RP (cfs)	W RQ (cfs)	W RR (cfs)	W RS (cfs)	W RT (cfs)	W RU (cfs)	W RV (cfs)	W RW (cfs)	W RX (cfs)	W RY (cfs)	W RZ (cfs)	W SA (cfs)	W SB (cfs)	W SC (cfs)	W SD (cfs)	W SE (cfs)	W SF (cfs)	W SG (cfs)	W SH (cfs)	W SI (cfs)	W SJ (cfs)	W SK (cfs)	W SL (cfs)	W SM (cfs)	W SN (cfs)	W SO (cfs)	W SP (cfs)	W SQ (cfs)	W SR (cfs)	W SS (cfs)	W ST (cfs)	W SU (cfs)	W SV (cfs)	W SW (cfs)	W SX (cfs)	W SY (cfs)	W SZ (cfs)	W TA (cfs)	W TB (cfs)	W TC (cfs)	W TD (cfs)	W TE (cfs)	W TF (cfs)	W TG (cfs)	W TH (cfs)	W TI (cfs)	W TJ (cfs)	W TK (cfs)	W TL (cfs)	W TM (cfs)	W TN (cfs)	W TO (cfs)	W TP (cfs)	W TQ (cfs)	W TR (cfs)	W TS (cfs)	W TT (cfs)	W TU (cfs)	W TV (cfs)	W TW (cfs)	W TX (cfs)	W TY (cfs)	W TZ (cfs)	W UA (cfs)	W UB (cfs)	W UC (cfs)	W UD (cfs)	W UE (cfs)	W UF (cfs)	W UG (cfs)	W UH (cfs)	W UI (cfs)	W UJ (cfs)	W UK (cfs)	W UL (cfs)	W UM (cfs)	W UN (cfs)	W UO (cfs)	W UP (cfs)	W UQ (cfs)	W UR (cfs)	W US (cfs)	W UT (cfs)	W UU (cfs)	W UV (cfs)	W UW (cfs)	W UX (cfs)	W UY (cfs)	W UZ (cfs)	W VA (cfs)	W VB (cfs)	W VC (cfs)	W VD (cfs)	W VE (cfs)	W VF (cfs)	W VG (cfs)	W VH (cfs)	W VI (cfs)	W VJ (cfs)	W VK (cfs)	W VL (cfs)	W VM (cfs)	W VN (cfs)	W VO (cfs)	W VP (cfs)	W VQ (cfs)	W VR (cfs)	W VS (cfs)	W VT (cfs)	W VU (cfs)	W VV (cfs)	W VW (cfs)	W VX (cfs)	W VY (cfs)	W VZ (cfs)	W WA (cfs)	W WB (cfs)	W WC (cfs)	W WD (cfs)	W WE (cfs)	W WF (cfs)	W WG (cfs)	W WH (cfs)	W WI (cfs)	W WJ (cfs)	W WK (cfs)	W WL (cfs)	W WM (cfs)	W WN (cfs)	W WO (cfs)	W WP (cfs)	W WQ (cfs)	W WR (cfs)	W WS (cfs)	W WT (cfs)	W WU (cfs)	W WV (cfs)	W WW (cfs)	W WX (cfs)	W WY (cfs)	W WZ (cfs)	W XA (cfs)	W XB (cfs)	W XC (cfs)	W XD (cfs)	W XE (cfs)	W XF (cfs)	W XG (cfs)	W XH (cfs)	W XI (cfs)	W XJ (cfs)	W XK (cfs)	W XL (cfs)	W XM (cfs)	W XN (cfs)	W XO (cfs)	W XP (cfs)	W XQ (cfs)	W XR (cfs)	W XS (cfs)	W XT (cfs)	W XU (cfs)	W XV (cfs)	W XW (cfs)	W XX (cfs)	W XY (cfs)	W XZ (cfs)	W YA (cfs)	W YB (cfs)	W YC (cfs)	W YD (cfs)	W YE (cfs)	W YF (cfs)	W YG (cfs)	W YH (cfs)	W YI (cfs)	W YJ (cfs)	W YK (cfs)	W YL (cfs)	W YM (cfs)	W YN (cfs)	W YO (cfs)	W YP (cfs)	W YQ (cfs)	W YR (cfs)	W YS (cfs)	W YT (cfs)	W YU (cfs)	W YV (cfs)	W YW (cfs)	W YX (cfs)	W YY (cfs)	W YZ (cfs)	W ZA (cfs)	W ZB (cfs)	W ZC (cfs)	W ZD (cfs)	W ZE (cfs)	W ZF (cfs)	W ZG (cfs)	W ZH (cfs)	W ZI (cfs)	W ZJ (cfs)	W ZK (cfs)	W ZL (cfs)	W ZM (cfs)	W ZN (cfs)	W ZO (cfs)	W ZP (cfs)	W ZQ (cfs)	W ZR (cfs)	W ZS (cfs)	W ZT (cfs)	W ZU (cfs)	W ZV (cfs)	W ZW (cfs)	W ZX (cfs)	W ZY (cfs)	W ZZ (cfs)
713	0.242	6000.51					0.003																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		</																																																																																																						

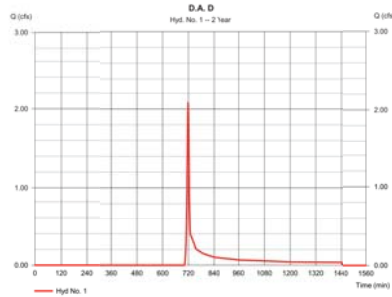
Hydrograph Report

Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Thursday, 05/11/2017

Hyd. No. 1
D.A.D

Hydrograph type	= SCS Runoff	Peak discharge	= 2.079 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 4.618 cuf
Drainage area	= 2.090 ac	Curve number	= 67
Basin slope	= 0.0 %	Hydraulic length	= 0.8
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

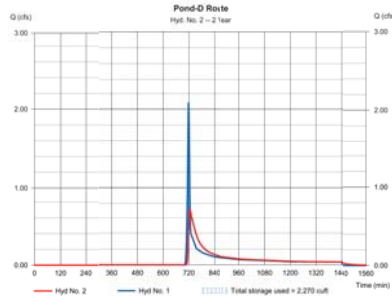
Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 0.732 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 4.603 cuf
Inflow hyd. No.	= 1 - D.A.D	Max. Elevation	= 600.82 ft
Reservoir name	= Pond-D	Max. Storage	= 2.270 cuf

Storage Induction method used: Wet pond routing start elevation = 600.50 ft.



Hydrograph Summary Report

Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Hyd. No.	Hydrograph Type	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuf)	Maximum Elevation (ft)	Total Storage Used (cuf)	Hydrograph Description
1	SCS Runoff	2.079	1	718	4.618	---	---	D.A.D
2	Reservoir	0.732	1	725	4.603	600.82	2.270	Pond-D Route

Det Facility D-2yr.gw Return Period: 2 Year Thursday, 05/11/2017

Hydrograph Report

Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 0.732 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 4.603 cuf
Inflow hyd. No.	= 1 - D.A.D	Reservoir name	= Pond-D
Max. Elevation	= 600.82 ft	Max. Storage	= 2.270 cuf

Storage Induction method used: Wet pond routing start elevation = 600.50 ft.

(Storage Induction = 1.000 ft/cfs)

Time (min)	Inflow cfs	Elevation ft	Chv A cfs	Chv B cfs	Chv C cfs	PFR cfs	W-A cfs	W-B cfs	W-C cfs	W-D cfs	Exit cfs	Outflow cfs
709	0.343	600.57	---	---	---	---	0.010	---	---	---	---	0.010
710	0.458	600.57	---	---	---	---	0.016	---	---	---	---	0.016
711	0.602	600.57	---	---	---	---	0.027	---	---	---	---	0.027
712	0.775	600.58	---	---	---	---	0.043	---	---	---	---	0.043
713	0.981	600.59	---	---	---	---	0.066	---	---	---	---	0.066
714	1.222	600.61	---	---	---	---	0.100	---	---	---	---	0.100
715	1.500	600.61	---	---	---	---	0.144	---	---	---	---	0.144
716	1.794	600.64	---	---	---	---	0.202	---	---	---	---	0.202
717	1.961	600.67	---	---	---	---	0.274	---	---	---	---	0.274
718	2.079	600.70	---	---	---	---	0.356	---	---	---	---	0.356
719	2.061	600.73	---	---	---	---	0.440	---	---	---	---	0.440
720	1.950	600.76	---	---	---	---	0.521	---	---	---	---	0.521
721	1.746	600.78	---	---	---	---	0.593	---	---	---	---	0.593
722	1.481	600.81	---	---	---	---	0.649	0.001	---	---	---	0.651
723	1.197	600.81	---	---	---	---	0.688	0.015	---	---	---	0.686
724	0.938	600.82	---	---	---	---	0.708	0.018	---	---	---	0.723
725	0.732	600.82	---	---	---	---	0.714	0.018	---	---	---	0.732
726	0.588	600.82	---	---	---	---	0.710	0.016	---	---	---	0.726
727	0.486	600.82	---	---	---	---	0.699	0.013	---	---	---	0.712
728	0.424	600.81	---	---	---	---	0.685	0.009	---	---	---	0.694

Continued on next page...

Pond-D Route

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Chv A cfs	Chv B cfs	Chv C cfs	PFR cfs	W-A cfs	W-B cfs	W-C cfs	W-D cfs	Exit cfs	Outflow cfs
729	0.363	600.81	---	---	---	---	0.670	0.005	---	---	---	0.674
730	0.381	600.80	---	---	---	---	0.654	0.002	---	---	---	0.656
731	0.375	600.80	---	---	---	---	0.639	---	---	---	---	0.639
732	0.369	600.79	---	---	---	---	0.624	---	---	---	---	0.624
733	0.363	600.78	---	---	---	---	0.610	---	---	---	---	0.610
734	0.357	600.78	---	---	---	---	0.596	---	---	---	---	0.596
735	0.351	600.78	---	---	---	---	0.582	---	---	---	---	0.582
736	0.344	600.78	---	---	---	---	0.569	---	---	---	---	0.569
737	0.338	600.77	---	---	---	---	0.557	---	---	---	---	0.557
738	0.331	600.77	---	---	---	---	0.545	---	---	---	---	0.545
739	0.324	600.77	---	---	---	---	0.533	---	---	---	---	0.533
740	0.317	600.77	---	---	---	---	0.522	---	---	---	---	0.522
741	0.310	600.76	---	---	---	---	0.511	---	---	---	---	0.511
742	0.303	600.76	---	---	---	---	0.500	---	---	---	---	0.500
743	0.295	600.75	---	---	---	---	0.489	---	---	---	---	0.489
744	0.288	600.75	---	---	---	---	0.479	---	---	---	---	0.479
745	0.280	600.74	---	---	---	---	0.469	---	---	---	---	0.469
746	0.273	600.74	---	---	---	---	0.459	---	---	---	---	0.459
747	0.265	600.74	---	---	---	---	0.450	---	---	---	---	0.450
748	0.257	600.73	---	---	---	---	0.440	---	---	---	---	0.440
749	0.249	600.73	---	---	---	---	0.431	---	---	---	---	0.431
750	0.241	600.73	---	---	---	---	0.421	---	---	---	---	0.422
751	0.233	600.72	---	---	---	---	0.412	---	---	---	---	0.412
752	0.226	600.72	---	---	---	---	0.403	---	---	---	---	0.403
753	0.219	600.72	---	---	---	---	0.395	---	---	---	---	0.395
754	0.213	600.71	---	---	---	---	0.386	---	---	---	---	0.386
755	0.208	600.71	---	---	---	---	0.378	---	---	---	---	0.378
756	0.205	600.71	---	---	---	---	0.369	---	---	---	---	0.369

Continued on next page...

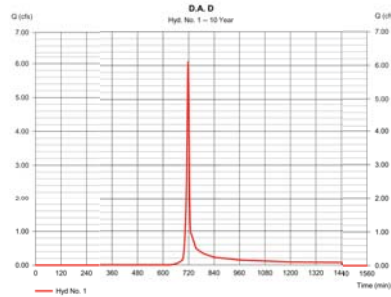
Hydrograph Report

Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Thursday, 05/11/2017

Hyd. No. 1
D.A.D

Hydrograph type	= SCS Runoff	Peak discharge	= 6.113 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 12.321 cuf
Drainage area	= 2.090 ac	Curve number	= 69
Basin slope	= 0.0 %	Hydraulic length	= 0.8
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

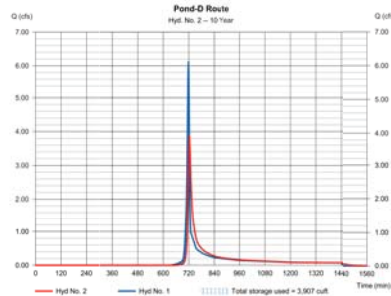
Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 3.884 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 12.313 cuf
Inflow hyd. No.	= 1 - D.A.D	Max. Elevation	= 601.23 ft
Reservoir name	= Pond-D	Max. Storage	= 3.907 cuf

Storage Induction method used: Wet pond routing start elevation = 600.50 ft.



Hydrograph Summary Report

Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Hyd. No.	Hydrograph Type	Peak Flow (cfs)	Time Interval (min)	Time to Peak (min)	Hyd. Volume (cuf)	Maximum Elevation (ft)	Total Storage Used (cuf)	Hydrograph Description
1	SCS Runoff	6.113	1	718	12.321	---	---	D.A.D
2	Reservoir	3.884	1	722	12.313	601.23	3.907	Pond-D Route

Det Facility D-10yr.gw Return Period: 10 Year Thursday, 05/11/2017

Hydrograph Report

Hydrologic Hydrographs Extension by AutoCAD Civil 3D® 2015 by Autodesk, Inc. v15.4

Thursday, 05/11/2017

Hyd. No. 2
Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 3.884 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 12.313 cuf
Inflow hyd. No.	= 1 - D.A.D	Reservoir name	= Pond-D
Max. Elevation	= 601.23 ft	Max. Storage	= 3.907 cuf

Storage Induction method used: Wet pond routing start elevation = 600.50 ft.

(Storage Induction = 1.000 ft/cfs)

Time (min)	Inflow cfs	Elevation ft	Chv A cfs	Chv B cfs	Chv C cfs	PFR cfs	W-A cfs	W-B cfs	W-C cfs	W-D cfs	Exit cfs	Outflow cfs
690	0.143	600.55	---	---	---	---	0.041	---	---	---	---	0.041
691	0.149	600.55	---	---	---	---	0.043	---	---	---	---	0.043
692	0.180	600.55	---	---	---	---	0.048	---	---	---	---	0.048
693	0.177	600.55	---	---	---	---	0.050	---	---	---	---	0.050
694	0.205	600.56	---	---	---	---	0.054	---	---	---	---	0.054
695	0.243	600.56	---	---	---	---	0.058	---	---	---	---	0.058
696	0.290	600.56	---	---	---	---	0.064	---	---	---	---	0.065
697	0.354	600.57	---	---	---	---	0.072	---	---	---	---	0.072
698	0.425	600.58	---	---	---	---	0.082	---	---	---	---	0.082
699	0.507	600.58	---	---	---	---	0.095	---	---	---	---	0.095
700	0.598	600.59	---	---	---	---	0.111	---	---	---	---	0.111
701	0.700	600.60	---	---	---	---	0.130	---	---	---	---	0.130
702	0.811	600.62	---	---	---	---	0.153	---	---	---	---	0.153
703	0.932	600.63	---	---	---	---	0.181	---	---	---	---	0.181
704	1.065	600.64	---	---	---	---	0.214	---	---	---	---	0.214
705	1.210	600.66	---	---	---	---	0.254	---	---	---	---	0.254
706	1.370	600.68	---	---	---	---	0.301	---	---	---	---	0.301
707	1.557	600.70	---	---	---	---	0.356	---	---	---	---	0.356
708	1.785	600.73	---	---	---	---	0.420	---	---	---	---	0.420
709	2.066	600.75	---	---	---	---	0.496	---	---	---	---	0.496

Continued on next page...

Hydrograph Report

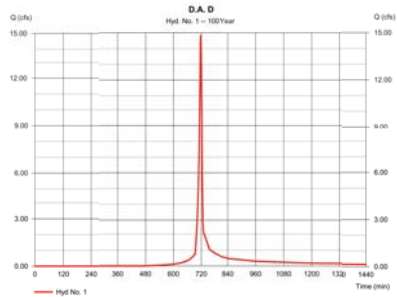
Hydroflow Hydrographs Extension by AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyl. No. 1

D.A. D

Hydrograph type	= SCS Runoff	Peak discharge	= 14.82 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 hrs
Time interval	= 1 min	Hyl. volume	= 30,114 cuf
Drainage area	= 2,090 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00min
Total precip.	= 7.15 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= .484



Hydrograph Report

Hydroflow Hydrographs Extension by AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

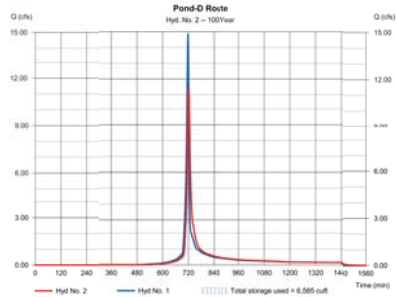
Thursday, 05/11/2017

Hyl. No. 2

Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 11.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyl. volume	= 30,114 cuf
Inflow hnd. No.	= 1 - D.A. D	Max. Elevation	= 601.53 ft
Reservoir name	= Pond-D	Max. Storage	= 6,585 cuf

Storage Indication method used: The pond routing start elevation is 600.00 ft.



Hydrograph Summary Report

Hydroflow Hydrographs Extension by AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyl. No.	Hydrograph type	Peak flow (cfs)	Time to peak (hrs)	Hyl. volume (cuf)	Inflow (cfs)	Maximum elevation (ft)	Total storage used (cuf)	Hydrograph Description
1	SCS Runoff	14.82	1	719	30,102	---	---	D.A. D
2	Reservoir	11.48	1	721	30,114	1	601.53	Pond-D Route

Det. Facility: D-100yr gww

Return Period: 100 Year

Thursday, 05/11/2017

Hydrograph Report

Hydroflow Hydrographs Extension by AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 05/11/2017

Hyl. No. 2

Pond-D Route

Hydrograph type	= Reservoir	Peak discharge	= 11.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyl. volume	= 30,114 cuf
Inflow hnd. No.	= 1 - D.A. D	Reservoir name	= Pond-D
Max. Elevation	= 601.53 ft	Max. Storage	= 6,585 cuf

Storage Indication method used: The pond routing start elevation is 600.00 ft.

(Storage values in 100's of cu ft.)

Time (min)	Inflow cfs	Elevation ft	Civ. A cfs	Civ. B cfs	Civ. C cfs	PFR cfs	W. A cfs	W. B cfs	W. C cfs	W. D cfs	Exit cfs	Outflow cfs
625	0.176	600.00	---	---	---	0.115	---	---	---	---	---	0.115
626	0.179	600.00	---	---	---	0.117	---	---	---	---	---	0.117
627	0.182	600.00	---	---	---	0.119	---	---	---	---	---	0.119
628	0.185	600.00	---	---	---	0.122	---	---	---	---	---	0.122
629	0.188	600.00	---	---	---	0.124	---	---	---	---	---	0.124
630	0.191	600.00	---	---	---	0.126	---	---	---	---	---	0.126
631	0.194	600.00	---	---	---	0.129	---	---	---	---	---	0.129
632	0.197	600.00	---	---	---	0.131	---	---	---	---	---	0.131
633	0.200	600.01	---	---	---	0.133	---	---	---	---	---	0.133
634	0.204	600.01	---	---	---	0.136	---	---	---	---	---	0.136
635	0.207	600.01	---	---	---	0.138	---	---	---	---	---	0.138
636	0.211	600.01	---	---	---	0.141	---	---	---	---	---	0.141
637	0.216	600.01	---	---	---	0.143	---	---	---	---	---	0.144
638	0.220	600.01	---	---	---	0.146	---	---	---	---	---	0.146
639	0.224	600.01	---	---	---	0.149	---	---	---	---	---	0.149
640	0.229	600.01	---	---	---	0.152	---	---	---	---	---	0.152
641	0.233	600.02	---	---	---	0.155	---	---	---	---	---	0.155
642	0.238	600.02	---	---	---	0.158	---	---	---	---	---	0.158
643	0.242	600.02	---	---	---	0.161	---	---	---	---	---	0.161
644	0.247	600.02	---	---	---	0.164	---	---	---	---	---	0.164

Continues on next page...

Pond-D Route

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Civ. A cfs	Civ. B cfs	Civ. C cfs	PFR cfs	W. A cfs	W. B cfs	W. C cfs	W. D cfs	Exit cfs	Outflow cfs
701	2.643	600.81	---	---	---	0.916	0.119	---	---	---	---	1.035
702	2.579	600.81	---	---	---	1.022	0.188	---	---	---	---	1.210
704	2.579	600.81	---	---	---	1.139	0.273	---	---	---	---	1.414
704	3.700	600.59	---	---	---	1.289	0.375	---	---	---	---	1.664
705	4.086	601.01	---	---	---	1.408	0.492	---	---	---	---	1.900
706	4.500	601.01	---	---	---	1.541	0.611	---	---	---	---	2.152
707	4.975	601.01	---	---	---	1.685	0.740	---	---	---	---	2.426
708	5.543	601.11	---	---	---	1.848	0.887	---	---	---	---	2.732
709	6.234	601.15	---	---	---	2.035	1.072	---	---	---	---	3.108
710	7.069	601.19	---	---	---	2.248	1.281	---	---	---	---	3.529
711	8.055	601.21	---	---	---	2.504	1.543	---	---	---	---	4.047
712	9.194	601.21	---	---	---	2.795	1.843	---	---	---	---	4.639
713	10.32	601.21	---	---	---	3.140	2.214	---	---	---	---	5.354
714	11.62	601.41	---	---	---	3.532	2.640	---	---	---	---	6.172
715	13.00	601.51	---	---	---	3.974	3.129	---	---	---	---	7.103
716	14.08	601.59	---	---	---	4.406	3.672	---	---	---	---	8.128
717	14.77	601.67	---	---	---	4.948	4.232	---	---	---	---	9.179
718	14.82	601.71	---	---	---	5.383	4.749	---	---	---	---	10.14
719	14.05	601.79	---	---	---	5.741	5.154	---	---	---	---	10.89
720	12.80	601.83	---	---	---	5.952	5.401	---	---	---	---	11.35
721	11.16	601.83	---	---	---	6.002	5.460	---	---	---	---	11.48
722	9.164	601.82	---	---	---	5.991	5.169	---	---	---	---	11.22
723	7.227	601.79	---	---	---	5.642	5.039	---	---	---	---	10.88
724	5.536	601.73	---	---	---	5.204	4.635	---	---	---	---	9.929
725	4.226	601.60	---	---	---	4.895	4.174	---	---	---	---	9.089
726	3.344	601.50	---	---	---	4.454	3.703	---	---	---	---	8.187
727	2.727	601.53	---	---	---	4.099	3.289	---	---	---	---	7.368

Continues on next page...

Pond-D Route

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Civ. A cfs	Civ. B cfs	Civ. C cfs	PFR cfs	W. A cfs	W. B cfs	W. C cfs	W. D cfs	Exit cfs	Outflow cfs
728	2.358	601.47	---	---	---	3.745	2.874	---	---	---	---	6.619
729	2.171	601.42	---	---	---	3.434	2.531	---	---	---	---	5.965
730	1.994	601.37	---	---	---	3.168	2.243	---	---	---	---	5.411
731	2.052	601.31	---	---	---	2.941	2.000	---	---	---	---	4.941
732	2.011	601.29	---	---	---	2.746	1.792	---	---	---	---	4.539
733	1.970	601.26	---	---	---	2.583	1.624	---	---	---	---	4.208
734	1.928	601.23	---	---	---	2.438	1.474	---	---	---	---	3.912
735	1.887	601.20	---	---	---	2.309	1.341	---	---	---	---	3.650
736	1.846	601.18	---	---	---	2.200	1.223	---	---	---	---	3.434
737	1.803	601.16	---	---	---	2.104	1.126	---	---	---	---	3.242
738	1.761	601.14	---	---	---	2.016	1.053	---	---	---	---	3.089
739	1.719	601.13	---	---	---	1.936	0.975	---	---	---	---	2.911
740	1.676	601.11	---	---	---	1.863	0.904	---	---	---	---	2.766
741	1.633	601.10	---	---	---	1.797	0.841	---	---	---	---	2.638
742	1.590	601.08	---	---	---	1.740	0.789	---	---	---	---	2.529
743	1.547	601.07	---	---	---	1.686	0.741	---	---	---	---	2.428
744	1.504	601.06	---	---	---	1.636	0.696	---	---	---	---	2.333
745	1.461	601.05	---	---	---	1.589	0.654	---	---	---	---	2.243
746	1.417	601.04	---	---	---	1.544	0.614	---	---	---	---	2.158
747	1.373	601.03	---	---	---	1.502	0.575	---	---	---	---	2.077
748	1.329	601.02	---	---	---	1.461	0.539	---	---	---	---	2.001
749	1.285	601.01	---	---	---	1.423	0.505	---	---	---	---	1.927
750	1.241	601.00	---	---	---	1.386	0.471	---	---	---	---	1.857
751	1.198	600.99	---	---	---	1.346	0.438	---	---	---	---	1.794
752	1.157	600.98	---	---	---	1.308	0.406	---	---	---	---	1.713
753	1.119	600.97	---	---	---	1.271	0.376	---	---	---	---	1.647
754	1.087	600.97	---	---	---	1.237	0.349	---	---	---	---	1.586
755	1.062	600.96	---	---	---	1.205	0.324	---	---	---	---	1.529

Continues on next page...



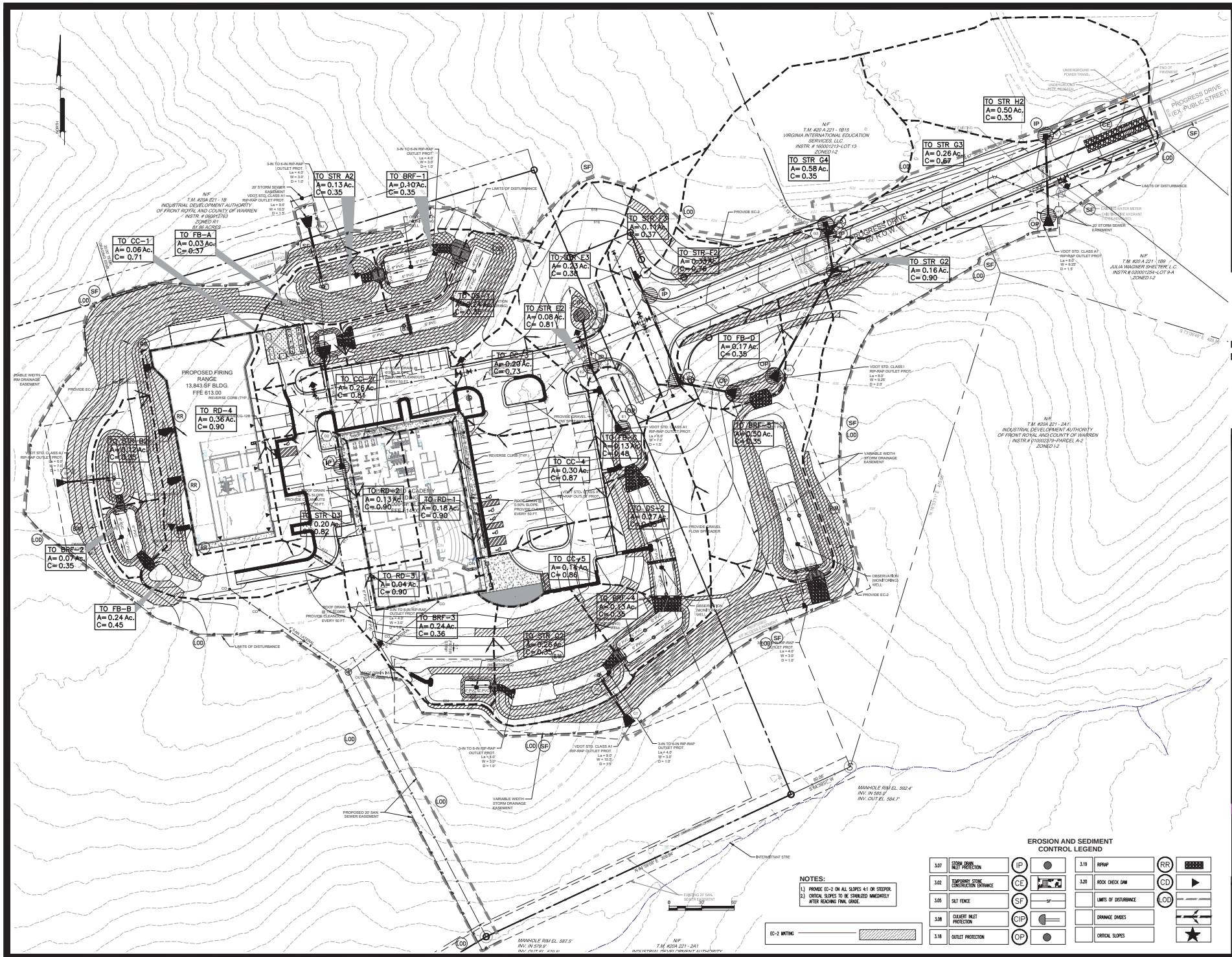


TABLE 3.31-B
(Revised June 2003)
TEMPORARY SEEDING SPECIFICATIONS
QUICK REFERENCE FOR ALL REGIONS

APPLICATION DATES	SPECIES	APPLICATION RATES
Sept. 1 - Feb. 15	50/50 Mix of Annual Ryegrass (olium multi-florum) & Cereal (Winter) Rye (Secale cereale)	50 -100 (lbs/acre)
Feb. 16 - Apr. 30	Annual Ryegrass (olium multi-florum)	60 -100 (lbs/acre)
May 1 - Aug. 31	German Millet	50 (lbs/acre)

FERTILIZER & LIME

- Apply 10-10-10 fertilizer at a rate of 450 lbs. / acre (or 10 lbs. / 1,000 sq. ft.)
- Apply Pulverized Agricultural Limestone at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

NOTE:
1 - A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
2 - Incorporate the lime and fertilizer into the top 4 - 6 inches of the soil by disking or by other means.
3 - When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin #4, 2003 Nutrient Management for Development Sites at <http://www.dcr.state.va.us/esw/66.htm#pubs>

TABLE 3.32-C
(Revised June 2003)

PERMANENT SEEDING SPECIFICATIONS FOR APPALACHIAN/MOUNTAIN AREA

LAND USE	SPECIES	APPLICATION RATES
Minimum Care Lawn (Commercial or Residential)	Tall Fescue ¹ Perennial Ryegrass ² Kentucky Bluegrass ³	90-100% 0-10% 0-10%
		TOTAL: 200-250 lbs.
High-Maintenance Lawn	Minimum of three (3) up to five (5) varieties of Kentucky Bluegrass from approved list for use in Virginia	TOTAL: 125 lbs.
General Slope (3:1 or less)	Tall Fescue ¹ Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop ⁴	125 lbs. 2 lbs. 20 lbs.
		TOTAL: 150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	Tall Fescue ¹ Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop ⁴ Crownvetch ⁵	108 lbs. 2 lbs. 20 lbs. 20 lbs.
		TOTAL: 150 lbs.

- When selecting varieties of turfgrass, use the Virginia Crop Improvement Association (VCA) recommended turfgrass variety list. Quality seed will bear a label indicating that they are approved by VCA. A current turfgrass variety list is available at the local County Extension office or through VCA at 804-746-4884 or at <http://sudan.ces.vt.edu/turf/turfpublications/publications2.html>
- Perennial Ryegrass will germinate faster and at lower soil temperatures than Tall Fescues, thereby providing cover and erosion resistance for seedbed.
- Use seasonal nurse crop in accordance with seeding dates as stated below:
March, April - May 15th Annual Rye
May 16th - August 15th Fowlit Millet
August 16th - September, October Annual Rye
November - February Winter Rye
- All legume seed must be properly inoculated. If Flitapea is used, increase to 30 lbs/acre. If Weeping Lovegrass is used, include in any slope or low maintenance mixture during warmer seeding periods, increase to 30-40 lbs/acre.

FERTILIZER & LIME

- Apply 10-20-10 fertilizer at a rate of 500 lbs. / acre (or 12 lbs. / 1,000 sq. ft.)
- Apply Pulverized Agricultural Limestone at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

NOTE:
1 - A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
2 - Incorporate the lime and fertilizer into the top 4 - 6 inches of the soil by disking or by other means.
3 - When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin #4, 2003 Nutrient Management for Development Sites at <http://www.dcr.state.va.us/esw/66.htm#pubs>

LONG TERM MAINTENANCE AND REPAIR PLAN
MOWING: ALL GRASSES SHOULD BE MOWED 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. THEY SHOULD BE MOWED AGAIN IN THE EARLY FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES SUCH AS SERICEA LESPEDEZA AND CROWN VETCH CAN BE PERMITTED TO GROW ON THE DAM OR IN ANY PART OF THE EMERGENCY SLOPEWAY.

LIMING AND FERTILIZING: THE SOIL SHOULD BE SAMPLED ACCORDING TO RECOMMENDED PROCEDURES AT LEAST ONCE EVERY 4 YEARS. THE SAMPLE SHOULD BE TESTED AT A QUALIFIED SOIL TESTING LABORATORY (SUCH AS THE ONE AT VPM&U). LIME AND FERTILIZER SHOULD BE APPLIED IN ACCORDANCE WITH RECOMMENDATIONS BASED ON THE TESTS.

REPLANTING AND OVER SEEDING: IF VEGETATION COVERS LESS THAN 40% OF THE SOIL SURFACE, LIME, FERTILIZER AND SEED IN ACCORDANCE WITH CURRENT RECOMMENDATIONS FOR NEW SEEDING. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF THE SOIL SURFACE, LIME, FERTILIZER AND OVER SEED IN ACCORDANCE WITH CURRENT RECOMMENDATIONS.

REMOVING TRASH AND DEBRIS: TRASH, LITTER AND VEGETATION (OTHER THAN GRASS) WILL BE REMOVED AS NEEDED (BUT NO LESS THAN TWO TIMES PER YEAR) TO PREVENT OBSTRUCTION TO THE FLOW OF WATER, TO PREVENT MOVEMENT OF TRASH AND LITTER TO DOWNSTREAM PROPERTIES, TO MAINTAIN THE INTEGRITY OF THE STRUCTURE, TO PROVIDE AN ATTRACTIVE APPEARANCE AND TO MINIMIZE WATER POLLUTION.

REMOVING SEDIMENT: SOIL MATERIALS (INCLUDING CLAY, SILT, SAND AND GRAVEL) WILL BE REMOVED BEFORE THE DETENTION POOL LOSES 10% OF THE DESIGNED STORAGE CAPACITY.

SEDIMENT DISPOSAL: SEDIMENT DISPOSAL SHOULD BE IN ACCORDANCE WITH CURRENT PROCEDURES FOR DISPOSAL OF SEDIMENT, WHERE REQUIRED BY THE APPROPRIATE AUTHORITIES. THE SEDIMENT WILL BE TESTED FOR APPROPRIATE POLLUTANTS AT THE OWNER'S EXPENSE BEFORE IT IS REMOVED FROM THE POND.

REPAIRS: REPAIR SLIDES, SLUMPS AND ERODED AREAS PROMPTLY AND IN A WORKMANLIKE MANNER TRASH RACKS, PIPES, HEADWALLS, ETC. WILL BE MAINTAINED, REPAIRED AND/OR REPLACED AS NEEDED TO MAINTAIN THE INTEGRITY OF THE STRUCTURE. EXPOSED METAL SURFACES WILL BE PAINTED TO MINIMIZE DAMAGE DUE TO RUST.

MAINTENANCE INSPECTIONS: THE OWNER WILL BE RESPONSIBLE FOR INSPECTING EACH STORMWATER MANAGEMENT STRUCTURE AFTER EACH SIGNIFICANT RAINFALL. ONCE EACH YEAR A REPRESENTATIVE OF DEQ WILL JOINTLY INSPECT EACH STORMWATER MANAGEMENT STRUCTURE. APPROPRIATE ACTION WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. ALL MAINTENANCE COSTS WILL BE BORNE BY THE OWNER, WHERE STRUCTURES ARE TO BE MAINTAINED BY MORE THAN ONE PARTY, ALLOCATION OF COSTS WILL BE IN ACCORDANCE WITH TERMS SET FORTH IN THE MAINTENANCE AGREEMENT. KEYS TO LOCKED ACCESS POINTS SHALL BE AVAILABLE TO DEQ PERSONNEL UPON REQUEST.

MAINTENANCE RECORDS: THE LANDOWNER, OR SOMEONE DESIGNATED BY THE LANDOWNER, SHALL INSPECT THE DETENTION POND WITHIN 24 HOURS AFTER EACH RAINFALL EVENT OF ONE INCH OR MORE OF RAIN. THE OWNER OR THE DESIGNEE SHALL KEEP WRITTEN RECORDS OF ALL INSPECTIONS. THE RECORDS SHALL ALSO INCLUDE MAINTENANCE AND REPAIRS PERFORMED. COPIES OF THESE RECORDS SHALL BE PROVIDED TO THE TOWN UPON REQUEST.

THE WATER QUALITY FEATURES SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR APPROVAL BY DEQ AND THE TOWN OF FRONT ROYAL.

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION
THIS SITE IS LOCATED IN THE TOWN OF FRONT ROYAL, VA AT THE END OF PROGRESS DRIVE. THE PROJECT INVOLVES THE CONSTRUCTION OF TWO (2) BUILDINGS, TRAIL, ASILES AND PARKING LOTS, PEDESTRIAN ACCESS AREAS, SITE LANDSCAPING AND LIGHTING, CLOSED TECHNOLOGY PARK AND WATER MAIN AND SANITARY SEWER EXTENSION AND ON A 18+/- ACRE PARCEL. THE PROPOSED LOT IS PART OF THE EXISTING HAPPY CREEK DRIVE. THE LAND DISTURBANCE FOR THIS PROJECT IS 7.39 ACRES.

EXISTING SITE CONDITIONS
THE SITE IS CURRENTLY VACANT WITH OPEN FIELDS AND SMALL AREAS OF VEGETATION. THERE IS A KNOLL LOCATED ON THE EAST SIDE OF THE LOT THAT RUNS TOWARDS THE SOUTHWEST. EXISTING DRAINAGE PATTERNS ARE TO THE WESTWEST, WEST, SOUTH AND SOUTHEAST. ELEVATIONS RANGE FROM 65.0 TO 62.00 ACROSS THE SITE WITH VARYING SLOPES FROM 2% TO 15%.

ADJACENT PROPERTY
THE SITE IS BOUNDED BY VACANT PROPERTY ON ALL SIDES. THERE ARE SPORTS FIELDS TO THE NORTHEAST OF THE SITE THAT ARE ASSOCIATED WITH DEVELOPED PARCEL AT THE END OF PROGRESS DRIVE.

OFF-SITE AREAS
THERE ARE NO OFF-SITE AREAS ASSOCIATED WITH THE PROJECT OTHER THAN THE EXTENSION OF PROGRESS DRIVE TO PROVIDE ACCESS TO THE SITE.

SOILS
THE USDA SOIL SURVEY MAPS THE PREDOMINANT SOILS FOR THIS SITE ARE 23B AND 23C LOO SILT LOAM (HYD B) WITH SLOPES VARYING FROM 2 TO 15 PERCENT. THE SOILS HAVE MODERATE PERMEABILITY, MEDIUM RUNOFF, MODERATE SHRINK-SWELL POTENTIAL, AND MODERATE TO SEVERE EROSION HAZARD. SEE THE COVER SHEET FOR SOILS MAPPING.

CRITICAL AREAS
CRITICAL AREAS, IF ANY, ARE MARKED BY A STAR AND CONSIST OF 3:1 SLOPES. THESE SLOPES HAVE THE POTENTIAL FOR GREATER EROSION AND SHALL BE IMMEDIATELY STABILIZED AFTER REACHING FINAL GRADE.

EROSION AND SEDIMENT CONTROL MEASURES
UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO THE MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL

STRUCTURAL MEASURES
SEDIMENT BASINS AND TRAPS, PERMITTER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES DISTURBED AREAS BEFORE IT LEAVES THE SITE. CONSTRUCTION ENTRANCE WITH WASH RACK (3.02) SHALL BE INSTALLED AT THE LOCATION SHOWN ON THE PHASE 1 PLAN TO PREVENT MUD AND DEBRIS FROM BEING TRACKED ONTO ROADWAYS.

SILT FENCE (3.05) SHALL BE INSTALLED AS SHOWN ON THE PLANS TO FILTER RUNOFF FROM DISTURBED AREAS BEFORE IT LEAVES THE SITE. STORM DRAIN INLET PROTECTION (3.07) SHALL BE PROVIDED ON ALL EXISTING DRAINAGE INLETS TO PREVENT SEDIMENT FROM ENTERING, ACCUMULATING IN AND BEING TRANSFERRED BY A CULVERT OR STORM SEWER SYSTEM. SEE ADDITIONAL DETAILS ON THIS SHEET FOR DIRT BAG AND SILT SACK DEVICES AS ALTERNATIVE INLET PROTECTION MEASURES.

TEMPORARY DRAINAGE DIKES (3.09) SHALL BE INSTALLED TO DIVERT RUNOFF FROM UPLAND AREAS TO A STABILIZED OUTLET SUCH AS A SEDIMENT TRAP OR SEDIMENT BASIN. DIVERSION DIKES SHALL BE LINED WITH EC-2 FOR STABILIZATION.

SEDIMENT TRAPS (3.13) SHALL BE INSTALLED IN SMALL DRAINAGE AREAS TO DETAIN SEDIMENT-LADEN RUNOFF LONG ENOUGH TO ALLOW THE MAJORITY OF SEDIMENT TO SETTLE OUT.

OUTLET PROTECTION (3.18) SHALL BE PLACED AT THE ENDS OF ALL DIVERSION DIKES WHERE FLOWS ENTER SEDIMENT TRAPS TO DISSIPATE ENERGY FROM STORMWATER FLOWS ENTERING THE TRAPS.

ROCK CHECK DAMS (3.20) SHALL BE INSTALLED TO ALLOW DIVERSION DIKES TO REDUCE THE VELOCITY OF CONCENTRATED FLOWS BEING DIVERTED TO SEDIMENT TRAPS.

TEMPORARY SEEDING (3.31) AND/OR PERMANENT SEEDING (3.32) SHALL BE PLACED ON ALL CRITICAL SLOPES (3:1 OR GREATER) AND AS NEEDED TO STABILIZE DISTURBED AREAS.

PHASE II
ALL CONTROLS INSTALLED IN PHASE I SHOULD REMAIN UNTIL THE SITE IS STABILIZED.

SEDIMENT TRAP PONDING SHALL NOT IMPACT THE CONSTRUCTION OF ANY BIO-RETENTION FACILITY. WHERE NECESSARY, SEDIMENT TRAP PONDING AREAS IN THE VICINITY OF A PROPOSED BIO-RETENTION FACILITY SHALL BE DOWATERED, CLEANED AND STABILIZED PRIOR TO CONSTRUCTING THE IMPACTED FACILITY.

SILT FENCE WITH WIRE SUPPORT (3.05) SHALL BE ADDED TO AREAS DOWNSTREAM OF THE SEDIMENT BASIN AND SEDIMENT TRAP WHEN THEY ARE REMOVED AND SHALL REMAIN UNTIL UPLAND AREAS ARE STABILIZED.

TEMPORARY SEEDING (3.31) AND/OR PERMANENT SEEDING (3.32) SHALL BE PLACED ON ALL CRITICAL SLOPES (3:1 OR GREATER) AND AS NEEDED TO STABILIZE DISTURBED AREAS.

VEGETATIVE MEASURES
PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN (7) DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE.

TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN (7) DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN FOURTEEN (14) DAYS. PERMANENT SOIL STABILIZATION SHALL BE APPLIED TO ALL AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN SIX (6) MONTHS.

TOPSOIL THAT HAS BEEN STOCKPILED SHALL BE SURROUNDED WITH SILT FENCE AND PROTECTED BY MULCH AND/OR TEMPORARY VEGETATION IMMEDIATELY AFTER GRADING.

ALL EARTH BERMS, DIVERSIONS AND SEDIMENT TRAP EMBANKMENTS ARE TO BE MACHINE-COMPACTED, IMMEDIATELY SEEDED AND MULCHED (HAY MULCH OR STRAW) FOR TEMPORARY AND/OR PERMANENT VEGETATIVE COVER WITHIN FIVE (5) DAYS AFTER GRADING.

MANAGEMENT STRATEGIES
CONSTRUCTION SHALL BE SEQUENCED SUCH THAT GRADING OPERATIONS WILL BEGIN AND END AS QUICKLY AS POSSIBLE.

THE SITE SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES. THE MAINTENANCE OF THESE MEASURES THROUGHOUT THE PROJECT ARE CRITICAL TO THE EFFECTIVENESS OF THE PROGRAM.

AFTER AREAS ABOVE CONTROLS HAVE BEEN STABILIZED, THE CONTROLS SHALL BE CLEANED UP AND REMOVED.

ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND MULCHED WITHIN FIVE (5) DAYS OF COMPLETION OF GRADE. ALL SLOPES SHALL BE SEEDED AND MULCHED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE BROKEN OR EXPOSED TO THE ELEMENTS SHALL BE IMMEDIATELY STABILIZED SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.

DRAINAGE SWALES SHALL BE STABILIZED WITH CHECK DAMS UNTIL VEGETATION HAS BEEN WELL ESTABLISHED, AT WHICH TIME THE CHECK DAMS SHALL BE REMOVED.

CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN AGGREGATE TEMPORARY OR PERMANENT CHANNEL, FLUME, OR SLOPE DRAIN STRUCTURE.

WHENEVER WATER SEEPS FROM A SLOPE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.

ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.

UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:
1) MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
2) EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.

EFFLUENT FROM Dewatering OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.

UNPULVERIZED USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION. RE-STABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THESE REGULATIONS.

APPLICABLE SAFETY REGULATIONS SHALL BE COMPLIED WITH.

WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED OR PUBLIC DRAINAGE, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICLE TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER.

ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE LOCAL PROGRAM AUTHORITY. TRAPPED SEDIMENT AND THE DISTURBED SOILS AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.

DEVICES LISTED ABOVE ARE CONSIDERED MINIMUM EROSION AND SEDIMENT CONTROLS. ADDITIONAL CONTROL MEASURES MAY BE NECESSARY DUE TO CONTRACTOR PHASING OR OTHER UNFORESEEN CONDITIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADDITIONAL MEASURES TO THOSE SHOWN, AS NEEDED, IN ORDER TO CONTROL EROSION AND CONTAIN SEDIMENT ON-SITE. ALL MEASURES SHALL BE INSTALLED ACCORDING TO THE STANDARDS AND SPECIFICATIONS IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESH). ANY CHANGES MADE TO THIS PLAN MUST BE RESUBMITTED FOR APPROVAL WITHOUT EXCEPTION.

MAINTENANCE
ALL CONTROL MEASURES SHALL BE INSPECTED DAILY BY THE SITE SUPERINTENDENT OR HIS REPRESENTATIVE AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES OF RAIN PER 24 HOUR PERIOD. ANY DAMAGED STRUCTURAL MEASURES ARE TO BE REPAIRED BY THE END OF THE DAY. SEEDED AREAS SHALL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STAND OF GRASS IS MAINTAINED. ALL AREAS SHALL BE FERTILIZED AND RESEED AS NEEDED UNTIL GRASS IS ESTABLISHED.

TRAPPED SEDIMENT IS TO BE REMOVED AS REQUIRED TO MAINTAIN 50% TRAP EFFICIENCY AND DISPOSED OF BY SPREADING ON SITE.

GRAVEL OUTLETS SHALL BE CHECKED REGULARLY FOR SEDIMENT BUILD-UP. IF THE GRAVEL OUTLET IS CLOGGED BY SEDIMENT, IT SHALL BE REMOVED AND CLEANED OR REPLACED IMMEDIATELY.

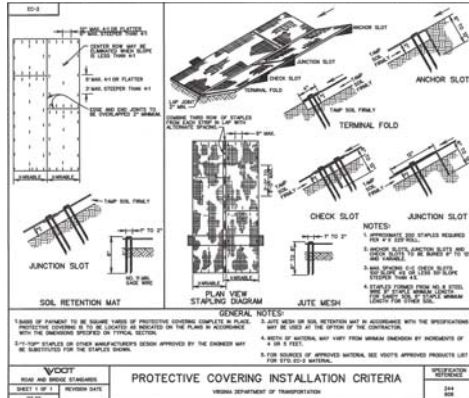
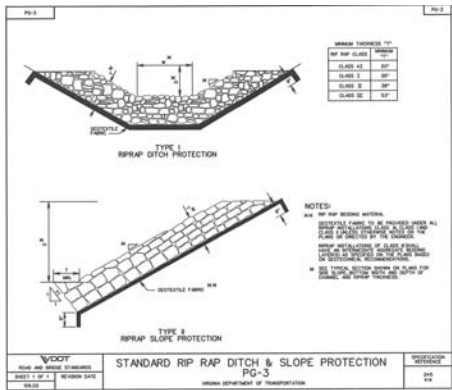
THE CONTRACTOR IS RESPONSIBLE FOR KEEPING EXISTING PUBLIC ROADS IN A CLEAN, DUST AND MUD FREE, CONDITION AT ALL TIMES.

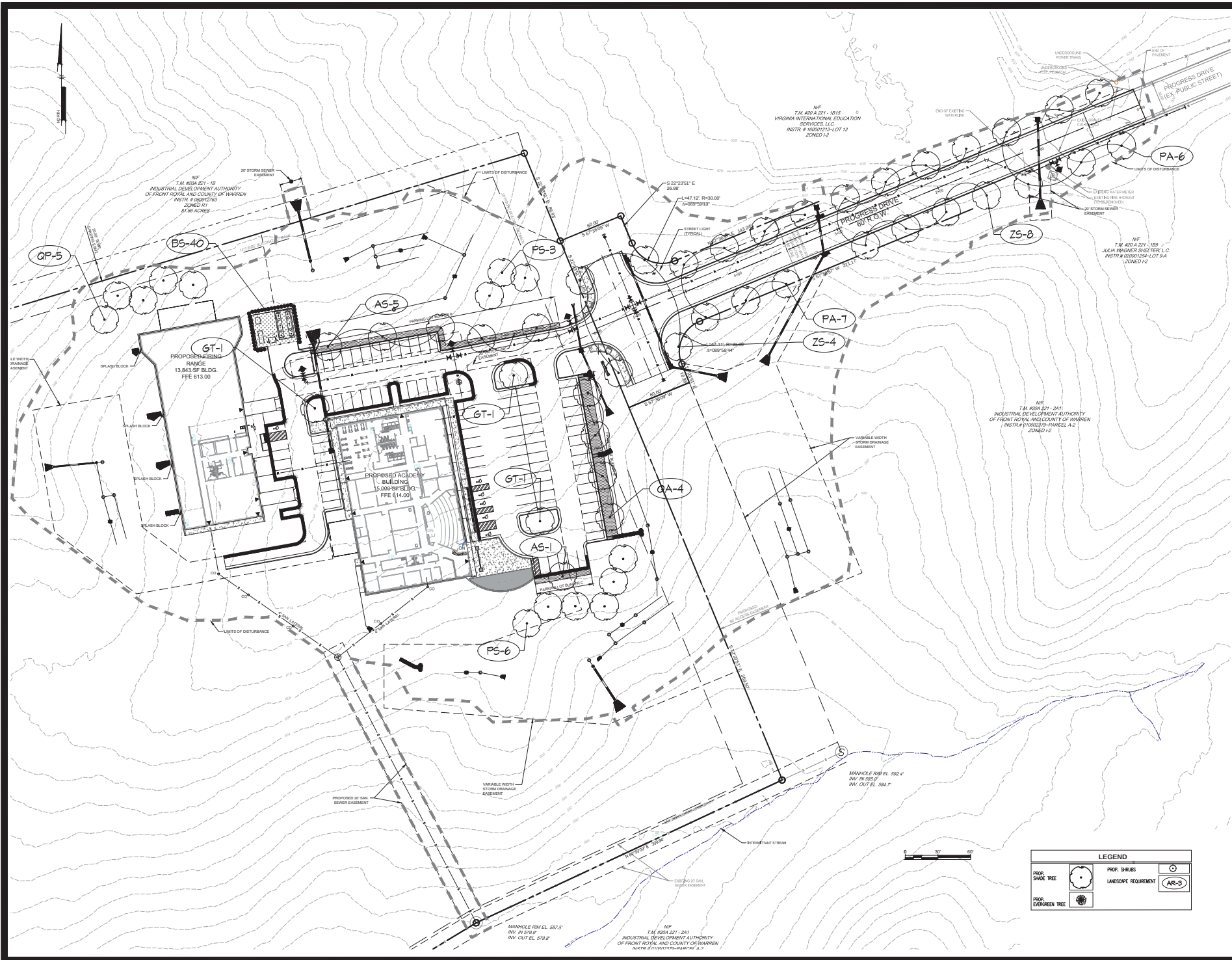
PERMANENT STABILIZATION
ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINAL GRADING. SEEDING SHALL BE DONE ACCORDING TO STANDARD AND SPECIFICATION NO. 3.32 OF THE VESH. PERMANENT STABILIZATION IS DEFINED AS 50% UNIFORM COVERAGE ON THE ENTIRE SITE, ABILITY TO INHIBIT EROSION AND MATURE ENOUGH TO SURVIVE, INCLUDING 2-3 INCH CUTTINGS.

- PHASES OF LAND DISTURBANCE ACTIVITIES
- MANDATORY PRE-CONSTRUCTION CONFERENCE SHALL BE SCHEDULED AS REQUIRED BY REGULATIONS.
 - CLEARING AND GRUBBING FOR SEDIMENT CONTROL DEVICES ONLY.
 - INSTALLATION OF ALL PHASE I EROSION & SEDIMENT CONTROL DEVICES.
 - OBTAIN COUNTY INSPECTOR APPROVAL.
 - ROUGH GRADE SITE.
 - RESTORATION AND STABILIZATION OF DISTURBED AREAS.
 - INSTALL BIORETENTION FILTERS ONLY AFTER ALL UPLAND AREAS ARE STABILIZED.
 - REMOVE ALL EROSION & SEDIMENT CONTROL MEASURES WITH THE APPROVAL OF THE INSPECTOR.

SEEDING NOTES:

- TOPSOIL SHALL BE SPREAD AT A MINIMUM DEPTH OF 4".
- FILTERED AGRICULTURAL LIMESTONE SHALL BE INCORPORATED INTO SOIL AT A RATE OF 92 LB. PER 1000 S.F. (2 TONS PER ACRE).
- FERTILIZE WITH 10-20-10 AT A RATE OF 12 LBS. PER 1000 S.F. (600 LBS. PER ACRE).
- SEED MIX SHALL CONSIST OF 50% WINTER RYE AND 50% KENTUCKY BLUEGRASS APPLIED AT THE RATE OF 200 LBS. PER ACRE.
- STRAW MULCH SHALL BE APPLIED TO ALL SEEDED AREAS AT THE RATE OF 3500 LBS. PER ACRE AND INCORPORATED INTO CUTBACK OR UNSEEDED AREAS APPLIED AT A RATE OF 200 GALLONS PER ACRE.





LEGEND	
PROP. SPACE TREE	PROP. SHRUBS
PROP. EVERGREEN TREE	LANDSCAPE REQUIREMENT
	AR-3

MOSELEY ARCHITECTS

3200 NORFOLK STREET, RICHMOND, VA 23290
PHONE (804) 794-7555 FAX (804) 355-6600
WWW.MOSELEYARCHITECTS.COM

SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY

FRONT ROYAL WARREN COUNTY ECONOMIC DEVELOPMENT AUTHORITY

FRONT ROYAL, VIRGINIA

PROJECT NO: 160339 DATE: JULY 26, 2016

REVISIONS:

DATE	DESCRIPTION
11/22/16	REV. FOR REG COMMENTS
3/26/17	REV. FOR REG & TOWN
5/27/17	REV. FOR REG COMMENTS
6/12/17	REV. FOR AGENCY COMMENTS
7/10/17	REV. FOR TOWN
8/14/17	REV. FOR TOWN COMMENTS

LANDSCAPE PLAN

C36

GENERAL CONDITIONS:

SCOPE OF WORK

THE LANDSCAPE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR AND EQUIPMENT TO COMPLETE ALL LANDSCAPE WORK AS SHOWN ON THE PLANS AND SPECIFICATIONS.

NOTE: IF THE CONTRACTOR HAS ACCORDING TO THE PLANT LIST, HE/SHE SHOULD THOROUGHLY CHECK THE PLANT LIST QUANTITIES WITH THE SYMBOLS SHOWN ON THE PLANS. TO BE SURE THERE ARE NO DISCREPANCIES. IF THERE IS A DISCREPANCY BETWEEN THE DRAWING AND THE LIST ON THE PLANS, THE DRAWING TAKES PRECEDENCE.

STANDARDS

- ALL PLANT MATERIAL WILL CONFORM TO THE CURRENT ISSUE OF THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION (ANLA).
- PLANT MATERIAL SHALL BE SELECTED FROM NURSERIES THAT HAVE BEEN INSPECTED AND CERTIFIED BY STATE PLANT INSPECTORS.
- COLLECTED MATERIAL MAY BE USED ONLY WHEN APPROVED BY OWNER'S REPRESENTATIVE.
- NONCULATURE WILL BE IN ACCORDANCE WITH HORTIS # BY L.A. WALEY.

SUBSTITUTIONS

IT IS THE LANDSCAPE CONTRACTOR'S RESPONSIBILITY TO MAKE EVERY REASONABLE EFFORT TO FIND THE MATERIAL SPECIFIED BY THE ARCHITECT. THE LANDSCAPE CONTRACTOR MAY OFFER SUBSTITUTIONS TO THE LANDSCAPE ARCHITECT FOR INSURANCE CONSIDERATION. THE LANDSCAPE CONTRACTOR WILL NOTIFY THE LANDSCAPE ARCHITECT IF THERE ARE KNOWN DISEASES OR INSECT RESISTANT SPECIES THAT CAN BE SUBSTITUTED FOR A SELECTED PEST-FREE PLANT. THE CONTRACTOR SHALL SUBMIT A PRICE BID AS PER PLAN PLUS PRICE CLARIFICATIONS FOR ALL RECOMMENDED SUBSTITUTIONS.

SUBSTITUTIONS

IT IS THE INTENT TO ELIMINATE POST-BID SUBSTITUTIONS. HOWEVER, IN THE EVENT THAT THE CONTRACT MATERIAL HAS BECOME UNAVAILABLE, AN APPROPRIATE SUBSTITUTION MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE.

UTILITIES AND UNDERGROUND FEATURES

THE LANDSCAPE CONTRACTOR SHALL NOTIFY UTILITY COMPANIES AND/OR THE GENERAL CONTRACTOR IN ADVANCE OF CONSTRUCTION TO LOCATE UTILITIES.

- IF THERE IS A CONFLICT WITH THE UTILITIES AND THE PLANTING, THE LANDSCAPE ARCHITECT SHALL BE RESPONSIBLE FOR RELOCATING PLANTS PRIOR TO THE PLANTING PROCESS. ANY COST DUE TO RELOCATING AFTER PLANTING SHALL BE BORNE BY THE OWNER.

DRAINAGE

IF PLANTS ARE TO BE INSTALLED IN AREAS THAT SHOW OBVIOUS POOR DRAINAGE, AND THE PLANTS ARE INAPPROPRIATE FOR THAT CONDITION, THE LANDSCAPE CONTRACTOR SHALL BE RELOCATED. THE CONTRACTOR SHALL BE ALLOWED TO ALLOW FOR DRAINAGE CORRECTION AT A NEGOTIATED COST, OR THE PLANT SELECTION MODIFIED BY THE LANDSCAPE ARCHITECT TO ACCOMMODATE THE POOR DRAINAGE SITUATION.

WARRANTY

- THE STANDARD WARRANTY IS FOR A ONE (1) YEAR PERIOD, EXCLUDING BULBS, SOILS AND ANNUALS, COMMENCING ON THE DATE OF INITIAL ACCEPTANCE. ALL PLANTS SHALL BE ALIVE AND IN SATISFACTORY GROWTH AT THE END OF THE GUARANTEE PERIOD.
- BULBED AND BURLAPPED PLANTS:
 - BULBED AND BURLAPPED PLANTS SHALL BE DUG WITH FIRM ROOT BALLS FREE OF NOXIOUS WEEDS. THERE SHOULD BE NO EXCESS SOIL ON TOP OF THE ROOT BALL OR AROUND THE TRUNK.
 - BALL SIZE SHALL BE IN ACCORDANCE WITH ANLA STANDARDS.
 - CALIPER AND HEIGHT MEASUREMENTS IN SIZE GRADING SHALL SINGLE-TRUNK TREES, CALIPER SHALL TAKE PRECEDENCE OVER HEIGHT. CALIPER OF THE TRUNK SHALL BE TAKEN 4" ABOVE THE GROUND LEVEL, UP TO INCLUDING 4" CALIPER SIZE AND 12" ABOVE THE GROUND LEVEL OF LARGER TREES. FOR MULTIPLE-TRUNK TREES, HEIGHT MEASUREMENT SHALL TAKE PRECEDENCE OVER CALIPER.
- CONTAINER-GROWN STOCK:
 - THE SIZE OF CONTAINER-GROWN SHRUBS IS MEASURED BY HEIGHT AND WIDTH OF PLANT. CONTAINER-GROWN TREES ARE MEASURED BY THE SAME STANDARDS LISTED IN A.3. ABOVE. THE ROOT SYSTEM OF CONTAINER-GROWN PLANTS SHALL BE WELL-DEVELOPED AND WELL-DISTRIBUTED THROUGHOUT THE CONTAINER.
 - ALL CONTAINER-GROWN TREES AND SHRUBS THAT HAVE CIRCULAR AND WRITTEN ROOTS SHALL BE TREATED IN THE FOLLOWING MANNER PRIOR TO PLANTING: USING A KNIFE OR SHARP BLADE, MAKE 4-5 CUTS, 1" DEEP, THE LENGTH OF THE ROOT BALL, TO CUT ALL CIRCULATING ROOTS. SEE PLANTING PROCEDURES FOR ALL CONTAINER-GROWN TREES & SHRUBS IN THIS SECTION.
 - ALL CONTAINER-GROWN PLANTS SHOULD BE GROUPED AND WATERED DAILY UNTIL THEY ARE PLANTED IN THE LANDSCAPE. THE SOIL SHALL BE KEPT MOIST WITH THE EQUIVALENT OF ONE INCH OF RAINFALL PER WEEK.

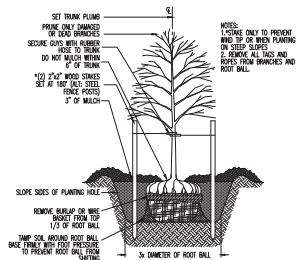
- PRUNING SHALL BE DONE BEFORE PLANTING OR DURING THE PLANTING OPERATION. PRUNING DETAIL FOR TREES IN THIS SECTION.
- ALL PLANT MATERIAL IN TRUCKS SHALL BE COVERED TO KEEP MATERIAL FROM DRYING OUT. THE CONTAINER SHALL COMPLY WITH STATE AND LOCAL LAWS PERTAINING TO THE TRANSPORT OF MATERIALS.
- TREES SHALL BE PLACED IN AN IMPROVED POSITION WITH THE ROOTBALL COVERED BY MULCH AND KEPT MOIST. TREES AND SHRUBS SHOULD NOT BE LEFT ON SITE UNPLANTED FOR MORE THAN 24 HOURS WITHOUT ADEQUATE WATER TO INSURE ROOTS SURVIVE.

INSPECTION

- PLANTS MAY BE SUBJECT TO INSPECTION AND APPROVAL BY THE OWNER OR OWNER'S REPRESENTATIVE AT THE PLACE OF GROWTH OR HOLDING YARD FOR CONFORMITY TO SPECIFICATION REQUIREMENTS AS TO QUALITY, SIZE AND VARIETY.
- PLANTS DAMAGED IN HANDLING OR TRANSPORTATION CAN BE REJECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
- STATE NURSERY INSPECTION CERTIFICATES SHALL BE FURNISHED TO THE LANDSCAPE ARCHITECT UPON REQUEST.

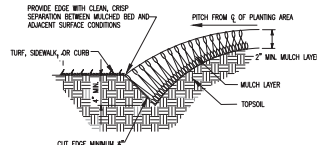
PLANTING PROCEDURES FOR ALL CONTAINER-GROWN TREES & SHRUBS

- REMOVE THE PLANT EITHER BY CUTTING OR INVERTING THE CONTAINER.
- FOR UNTRAINED PLASTIC CONTAINER GROWN PLANTS WITH CIRCULATING ROOTS, USE A SHARP KNIFE TO MAKE 1" CUTS THE LENGTH OF THE ROOTBALL.
- PLANT SHRUBS TO TREES AT THE HEIGHT OF 1/8 OF THE HEIGHT OF THE ROOTBALL ABOVE EXISTING GRADE.
- APPLY A 2 TO 3" THICK LAYER OF APPROVED MULCH. KEEP MULCH 4" AWAY FROM THE TRUNK OF ALL TREES AND SHRUBS.
- PLANTS GROWN IN ROOT CONTAINERS MUST HAVE THE PLANT REMOVED DURING THE PLANTING OPERATION. NO ADDITIONAL SLASHING OF THE ROOTBALL IS NECESSARY.



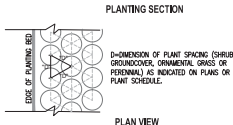
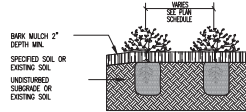
TREE PLANTING

NOT TO SCALE



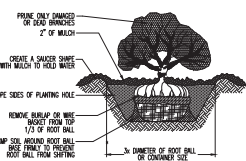
TYPICAL MULCH EDGING DETAIL

NOT TO SCALE



GROUNDCOVER, ORNAMENTAL GRASS OR PERENNIAL PLANTING DETAIL

NOT TO SCALE



SHRUB PLANTING

NOT TO SCALE

EVERGREEN TREE PLANTING

NOT TO SCALE

LANDSCAPE CALCULATIONS:

PROPOSED LOT CALCULATIONS:

INTERIOR
TOTAL AREA OF PAVING: 34,048 SF.
UNPAVED AREA REQUIRED: 1,227 SF. FLOODS
UNPAVED AREA PROVIDED: 1,400 SF. (FLOODS)
TREES REQUIRED: N/A
TREES PROVIDED: 5

PERMANENT

LANDSCAPE BUFFER A
BUFFER WIDTH REQUIRED: 5 FT.
BUFFER WIDTH PROVIDED: 5 FT.
LENGTH OF BUFFER: 154 LF.
TREES REQUIRED: 1 (1 PER 50 SF.)
TREES PROVIDED: 5

LANDSCAPE BUFFER B

BUFFER WIDTH REQUIRED: 10 FT.
BUFFER WIDTH PROVIDED: 10 FT.
LENGTH OF BUFFER: 154 LF.
TREES REQUIRED: 4 (1 PER 40 SF.)
TREES PROVIDED: 4

LANDSCAPE BUFFER C

BUFFER WIDTH REQUIRED: 5 FT.
BUFFER WIDTH PROVIDED: 5 FT.
LENGTH OF BUFFER: 20 LF.
TREES REQUIRED: 1 (1 PER 50 SF.)
TREES PROVIDED: 1

SHEET TREE CALCULATIONS:

TOTAL LENGTH OF SHEET PROVIDED: 1,228 LF.
SHEET TREES REQUIRED: 25 (1 PER 50 SF.)
SHEET TREES PROVIDED: 25

DAMAGED SCREENING:

DAMAGED SCREENING REQUIRED: YES
DAMAGED SCREENING PROVIDED: YES

TREE CANOPY REQUIREMENTS:

ADDITIONAL CANOPY AREA REQUIRED TO MEET TREE COVERAGE REQUIREMENTS: 4,531 SF.
ADDITIONAL CANOPY AREA PROVIDED TO MEET TREE COVERAGE REQUIREMENTS: 4,250 SF. (14' x 30' OIL TREES x 30 x 470 SF.)

GENERAL PLANT LIST

SUBST.	SYMBOL	COMMON NAME	SIZE	SPACING	QUANTITY
AS	1	RED ACACIA	2 1/2" CAL.	AS SHOWN	6
AS	2	LEUCODENDRON BURNING BUSH	2 1/2" CAL.	AS SHOWN	1
PA	3	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	4	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	5	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	6	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	7	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	8	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	9	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	10	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	11	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13
PA	12	FLORIDA YACHTSMAN'S PALM	2 1/2" CAL.	AS SHOWN	13

SUBST.	SYMBOL	COMMON NAME	SIZE	SPACING	QUANTITY
BE	1	BELLS BELL	2 1/2" CAL.	AS SHOWN	40

MAINTENANCE OF LANDSCAPING NOTES:

- ALL LANDSCAPED AREA SHALL BE MAINTAINED IN GOOD CONDITION BY OWNER.
- REASONABLE PROVISIONS SHALL BE MADE FOR PROTECTION FROM VEHICLES, PEDESTRIANS, OR SHOPPING CARTS.
- DEAD OR DYING VEGETATION SHALL BE REPLACED AT DIRECTION OF ADMINISTRATOR.
- SHRUBS SHALL BE REPLACED AT A SIZE CONSISTENT WITH THAT OF EXPECTED FOR SPECIES AND THE SAME INSTALLATION.
- TREES SHALL BE REPLACED AT A SIZE OF 0.5" CALIPER ABOVE 2" FOR EVERY YEAR SINCE INSTALLATION UP TO 5" CALIPER.

Chapter 156 TOWN OF FRONT ROYAL MUNICIPAL CODE Chapter 156

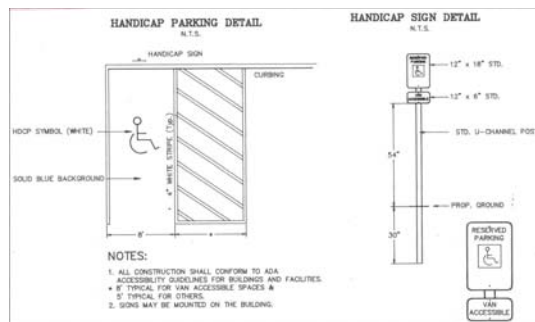
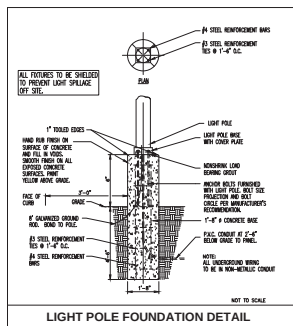
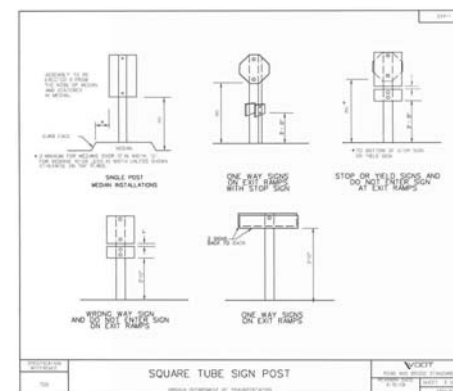
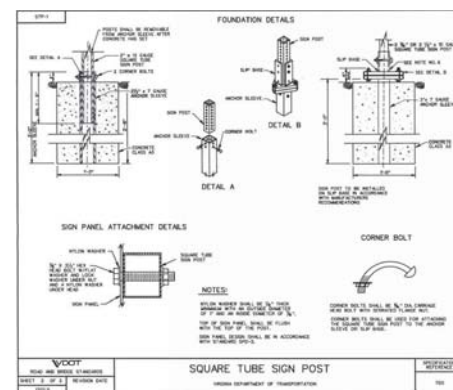
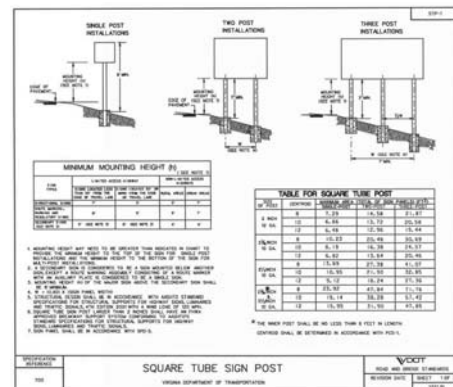
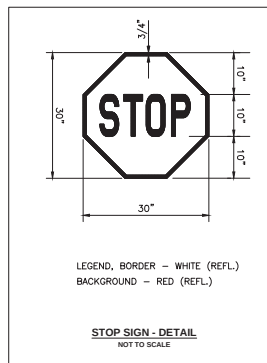
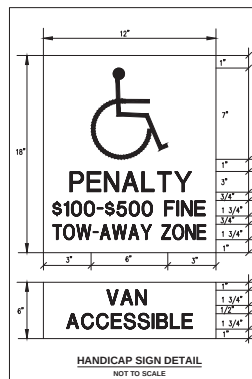
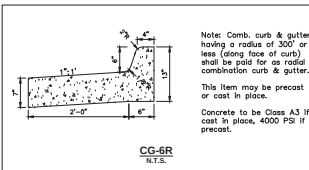
Tree Canopy Calculation Worksheet Town of Front Royal			
Phase III to only the green shaded cells below			
A1. Site Size	Total Site Area in square feet	91,171	89,513
A2. Choose the % canopycover required based on the requirements of Section 156-6.A. of the Town Code	10% 15% 20%	10.00 %	
A3. Multiply line A2 by line A1 to calculate Required Canopy Cover for Site in Sq. Feet	91,171	8,951	
B. Tree Preservation (per Section 156-6.B.)			
B1. Existing Tree Canopy Cover (Insert Square Feet Area calculated from Town Planning Dept. or on-site survey of all trees)	91,171	0	
B2. Tree Canopy to be preserved of the overall site (Insert Sq. Feet Area calculated from Town Planning Dept. or on-site survey of all trees)	91,171	0	
B3. Canopy Preservation (Insert Multiply B2 x 1.5)	91,171	0	
B4. Canopy Remaining to meet Requirements (Subtract A3 - B3)	91,171	0	
B5. If a negative number appears in B4, canopy requirements have been met. Otherwise, please go to Section C or D.	Have been met	N/A	
C. New Tree Planting			
C1. Canopy (In B4) remaining to meet requirements (B4)	91,171	8,951	
C2. Refer to Front Royal Tree Cover Guide for species list and 10 year projected canopy to fulfill minimum canopycover on line C1	91,171	9,180	
C3. Projected canopy coverage (In B4) from plantings (Insert Sq. Feet)	91,171	-229	
C4. Canopy remaining to meet requirements (C1 - C3)	91,171	-229	
C5. If C3 is a negative number, canopy requirements have been met. Otherwise, please go to Section D.	Have been met	YES	
D. Exceptions			
D1. Has A3 been met? (Preferably through preservation &/or new plantings) If not calculate amount owed below	91,171	0	
D2. Amount for Tree Plant (20 x \$3.00)	91,171	N/A	

NOTE: THE 25 STREET TREES ALONG PROGRESS DRIVE PROVIDE FOR 8,500 SF. OF TREE CANOPY COVERAGE ABOVE THE REQUIRED 8,951 SF. WHICH IS PROVIDED ON SITE.

SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY FRONT ROYAL WARREN COUNTY ECONOMIC DEVELOPMENT AUTHORITY FRONT ROYAL, VIRGINIA

PROJECT NO:	DATE:
156-16	JULY 20, 2016
REVISION:	DESCRIPTION:
01/20/16	REV. PER DOD COMMENTS
02/01/16	REV. PER DOD COMMENTS
03/01/16	REV. PER DOD COMMENTS
04/01/16	REV. PER DOD COMMENTS
05/01/16	REV. PER DOD COMMENTS
06/01/16	REV. PER DOD COMMENTS
07/01/16	REV. PER DOD COMMENTS
08/01/16	REV. PER DOD COMMENTS

LANDSCAPE DETAILS



1. All proposed signing and pavement marking shall be in accordance with the most current edition of each of the following and any revision thereto:
 - A. Manual on Uniform Traffic Control Devices.
 - B. The Virginia Supplement to the Manual on Uniform Traffic Control Devices.
 - C. The Virginia Department of Transportation Road and Bridge Specifications.
 - D. The Virginia Department of Transportation Road and Bridge Standards.
2. All pavement markings shall be thermoplastic (Type B, Class I), EXCEPT lane lines which shall be paint (Type A).
3. Proposed sign locations are approximate and shall be modified in the field to avoid conflict with underground utilities or other obstructions, and to comply with standards referenced in Note 1.
4. Any existing pavement markings, which will conflict with proposed pavement markings, shall be completely (100%) eradicated.
5. Limits shown of proposed markings are approximate and shall be modified in the field to insure that the proposed pavement markings continue until existing pavement markings can be matched.
6. All signs shall be in accordance with VDOT Standard WSP-1 unless noted.
7. Sign support posts shall not be located within 3' of the 5'-foot wide sidewalk.
8. Proposed posted speed limits require an engineering speed study stamped by a licensed professional engineer be submitted to V.D.O.T. for review and approval prior to erecting signs.
9. All signs and pavement markings shall be reviewed in the field with the VDOT Inspector prior to installation.
10. All permanent sign posts to be tube type posts VDOT STP-1. Wooden posts only allowed for construction traffic signage.

Bond Estimate

MONETARY GUARANTY ESTIMATE WORKSHEET

Project Name Skyline Criminal Justice Academy
 Prepared By David Frank, PLA Pennoni Associates Inc

Date 23-Aug-17

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Cost</u>	<u>Percent</u>	<u>Balance</u>
A. Streets						
1 Bituminous Concrete Surface	590	LF	\$27 08	\$31,954 40		
2 Base Course Bit Conc	590	LF	\$47 06	\$83,296 20		
3 Aggregate Sub-base	590	LF	\$13 60	\$8,024 00		
4 Curb & Gutter 6 or 7	1170	L F	\$50 64	\$59,248 80		
5 Curb HC Ramps	2	Each	\$780 00	\$1,560 00		
6 Sidewalk (6' wide, concrete)	74	S Y	\$44 00	\$3,256 00		
Sub-Total for Streets				\$187,339 40		
B. Storm Sewer						
1 Pipe RCCP, Classes II - IV						
12"	8	L F	\$32 40	\$259 20		
15"	358	L F	\$32 40	\$11,599 20		
2 End Section						
15"	4	Each	\$250 00	\$1,000 00		
3 Drainage Inlet	8	Each	\$2,040 00	\$16,320 00		
Sub-Total for Storm Sewer				\$29,178 40		
C. Water Line						
1 Pipe,						
6"	10	L F	\$40 00	\$400 00		
8"	746	L F	\$45 00	\$33,570 00		
2 Valve						
6"	1	Each	\$550 00	\$550 00		
8"	4	Each	\$750 00	\$3,000 00		
3 Fittings (Tees,Bends,Crosses,Reducers and Offsets)	4		\$350 00	\$1,400 00		
Sub-Total for Water Line				\$38,920 00		
D. Miscellaneous						
1 Landscaping, Street Tree	25	L S	\$250 00	\$6,250 00		
2 Street Sign	1	Each	\$150 00	\$150 00		
3 Stormwater management	1	each	\$26,525 84	\$26,525 84		
Sub-Total for Miscellaneous				\$32,925 84		
E. Total Cost						
1 Sub-Totals						
		Streets		\$187,339 40		
		Storm Sewer		\$29,178 40		
		Water Line		\$38,920 00		
		Miscellaneous		\$32,925 84		
		Grand Sub-Total		\$288,363 64		
		10% Contingency		\$28,836 36		
		TOTAL COST		\$317,200 00		

**SUBDIVISION
PERFORMANCE
BOND**

(Annual Premium until Released
by Obligee)

Travelers Casualty and Surety Company of America
Hartford, Connecticut 06183

Bond No.: 106649277

KNOW ALL PERSONS BY THESE PRESENTS, That we, Howard Shockey & Sons, Inc.,
called the Principal, and Travelers Casualty and Surety Company of America, a CT corporation,
called the Surety, are held and firmly bound unto Town of Front Royal, VA,
called the Obligee, in the sum of Three Hundred Seventeen Thousand Two Hundred Dollars and 00/100
(\$ 317,200.00) for the payment thereof said Principal and Surety bind themselves, jointly and
severally, as provided herein.

WHEREAS, in order to file a plat or subdivision map, or to obtain a permit, the Principal has entered
into a contract with the Obligee which requires the Principal make certain improvements to the land as
more particularly set forth in Skyline Regional Criminal Justice Academy (Streets, Storm sewer, Water lines, Landscaping)
(hereinafter referred to as the "Contract").

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall construct the
improvements described in the Contract on or before September 18, 2018 (or within such
further extensions of time that shall be granted by Obligee in writing and consented to in writing by
Surety), then this obligation shall be void, otherwise to remain in full force and effect. This obligation
is subject to the following conditions:

1. This bond runs to the benefit of the named Obligee only, and no other person shall have any
rights under this bond. No claim shall be allowed against this bond after the expiration of one year
from the date set forth in the preceding paragraph, or one year from the end of the latest extension of
time consented to in writing by Surety, whichever occurs last. If the limitation set forth in this bond is
void or prohibited by law, the minimum period of limitation available to sureties as a defense in the
jurisdiction of the suit shall be applicable.

2. This bond is not a forfeiture obligation, and in no event shall the Surety's liability exceed the
reasonable cost of completing the improvements described in the Contract not completed by the
Principal, or the sum of this bond, whichever is less.

Signed this 18th day of September, 2017.

Howard Shockey & Sons, Inc.

(Principal)

By: _____

Travelers Casualty and Surety Company of America

By: Chad Warren Johnson, Attorney-in-Fact

Surety Phone No. 757-628-2316





POWER OF ATTORNEY

Farmington Casualty Company
 Fidelity and Guaranty Insurance Company
 Fidelity and Guaranty Insurance Underwriters, Inc.
 St. Paul Fire and Marine Insurance Company
 St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
 Travelers Casualty and Surety Company
 Travelers Casualty and Surety Company of America
 United States Fidelity and Guaranty Company

Attorney-In Fact No. 224751

Certificate No. 005346658

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Chad Warren Johnson, Melody H. Meyer, and Jessica Laux

of the City of Glen Allen, State of Virginia, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 24th day of January, 2013.

Farmington Casualty Company
 Fidelity and Guaranty Insurance Company
 Fidelity and Guaranty Insurance Underwriters, Inc.
 St. Paul Fire and Marine Insurance Company
 St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
 Travelers Casualty and Surety Company
 Travelers Casualty and Surety Company of America
 United States Fidelity and Guaranty Company



State of Connecticut
 City of Hartford ss.

By:

Robert L. Raney, Senior Vice President

On this the 24th day of January, 2013, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
 My Commission expires the 30th day of June, 2016.



Marie C. Tetreault, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 18th day of September, 2017


Kevin E. Hughes, Assistant Secretary



To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.



STORMWATER MANAGEMENT FACILITIES MAINTENANCE RESPONSIBILITY AGREEMENT

This Agreement this day of _____ by and between **Front Royal Warren County Economic Development Authority** hereinafter called the "Owner", and the **Town of Front Royal, Virginia**, a municipal corporation, hereinafter called the "Town".

WHEREAS, the Owner is the owner of certain real property described as Tax Map No 20A22-1- Parcel 1B as recorded by deed in the land records of Warren County, Virginia, in Deed Book 404 Page 121, and hereinafter called the "Property".

WHEREAS, the Owner is proceeding to build on and develop the Property certain improvements thereto; and

WHEREAS, the Site Plan/Subdivision Plan known as Skyline Criminal Justice Academy, also hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the Town, provides for reasonable detention of storm water within the confines of the property; and

WHEREAS, the Town and the Owner, its successors and assigns, including any homeowners/property owners association, agree that the health, safety, and welfare of the residents of the Town of Front Royal, Virginia, require that the on-site storm water management facilities shall be constructed by Owner in accordance with the plans and specifications identified in the Plan, and shall be continuously maintained on the Property to keep them in good working condition so the these facilities are performing their design functions; and that these facilities shall continuously use Best Management Practices (BMP) listed and defined as being in effect at the time of the signing of this Agreement, to hereinafter use BMP for said facilities in accordance with the following:

- Keep the detention pond mowed/trimmed to adequately control the quantity and quality of stormwater drainage, and clean of debris;
- Keep the level spreader mowed/trimmed and clean of debris;
- Ensure that all culverts and pipes are free of debris and able to flow freely.
- Prevent placement of physical items (stumps, trees, structures, vehicles, no fill material or unauthorized regrading, etc.) that would otherwise impact the operation of the pond as designed.

WHEREAS, the parties recognize and agree that the improvements the Owner intends to place on the Property, including the on-site storm water management facilities, will, in the event of failure thereof, be up-hill (up-stream) of an unnamed tributary leading approximately 7,000 LF to the Shenandoah River, with potentially negative, even catastrophic, results to the downstream properties and the users thereof,

WHEREAS, the Town requires that on-site storm water management/BMP facilities as shown on the Plan be constructed and adequately maintained by the Owner, its successors and assigns, including any Industrial Park or Property Owners Association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management/BMP facilities shall be constructed by the Owner, its successors and assigns, in accordance with the plans and specifications identified in the plan. The Owner, its successors and assigns, including any homeowners/property owners association, shall adequately maintain the stormwater management/BMP facilities to the levels described at the signing of this Agreement. Adequate maintenance is herein defined as

good working condition so that these facilities are performing their design functions. The Owner, its successors and assigns, shall permit, upon reasonable advance notice given by the Town to the Owner, defined herein as not less than twenty-four (24) hours' notice, to inspect the stormwater management/BMP facility. The purpose of the inspection is to assure safe and proper functioning of the facilities. Advance notice by the Town to the Owner shall not be required in the event of an emergency situation or a good-faith complaint given to the Town, where such emergency or complaint gives the Town reasonable cause to believe that the stormwater management/BMP facility may be subject to failure of any one its intended purposes.

2. The Owner, its successors and assigns, hereby grant permission to the Town, its authorized agents and employees, to enter upon the Property and to inspect the stormwater management/BMP facilities whenever there is an emergency situation. The Town shall provide the Owner, its successors and assigns, copies of the inspection findings and a proposal to commence with the repairs if necessary.
3. In the event the Owner, its successors and assigns, fails to maintain the stormwater management/BMP facilities in good working condition, after seeking permission from the Owner, the Town may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Owner, its successors and assigns. This provision shall not be construed to allow the Town to erect any structure of permanent nature on the land of the Owner outside of the easement for the stormwater management/BMP facilities. It is expressly understood and agreed that the Town is under no obligation nor has any authority to routinely maintain or repair said facilities, and in no event, shall this Agreement be construed to impose any such obligation nor grant such authority to the Town.
4. The Owner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. The maintenance schedule for the stormwater management/BMP facilities at the time of the signing of this agreement and outlined on the approved plans shall be followed.
5. A maintenance escrow fund shall be established in the amount of One Thousand Dollars (\$1,000.00) to ensure recovery of cost for future maintenance activities required by the Town.
6. This Agreement imposes no liability of any kind whatsoever on the Town and the Owner agrees to hold the Town harmless from any liability in the event the stormwater management/BMP facilities fail to operate properly.
7. This Agreement shall be recorded among the land records of Warren County, Virginia, and shall constitute a covenant running with the land, and shall be binding on the owner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

[SIGNATURES AND ACKNOWLEDGMENT NEXT PAGES FOLLOWING]

WITNESS the following signatures and seals:

Owner: FRONT ROYAL WARREN COUNTY ECONOMIC DEVELOPMENT AUTHORITY

STATE OF _____

COUNTY OF _____

The foregoing Agreement was acknowledged before me this _____ day of _____,
2017.

NOTARY PUBLIC

My Commission Expires: _____

Notary Registration: _____ [SEAL]

[SIGNATURES AND ACKNOWLEDGMENT FOR TOWN NEXT PAGE FOLLOWING]

TOWN OF FRONT ROYAL, VIRGINIA

Joe Waltz, Town Manager

STATE OF _____

COUNTY OF _____

The foregoing Agreement was acknowledged before me this _____ day of _____,
2017.

NOTARY PUBLIC

My Commission Expires: _____

Notary Registration Number: _____

SEAL:

Approved as to form:

Town Attorney

Date

000058 AUG 21 2017

**DECLARATION OF RESTRICTIONS OF CERTAIN PARCELS OF LAND OWNED BY THE
INDUSTRIAL DEVELOPMENT AUTHORITY OF FRONT ROYAL**

THIS DECLARATION OF RESTRICTIVE COVENANTS is made this 15th day of August, 2017, by the Industrial Development Authority of the Town of Front Royal and the County of Warren, Virginia, operating as the Economic Development Authority, "EDA", or "Declarant".

WHEREAS, the EDA, is the owner of certain properties situated in the Town of Front Royal ("Town"), County of Warren ("County"), Virginia;

WHEREAS, certain properties of the Declarant are listed and described below, and hereinafter referred collectively as the "**Properties**";

1. Tax Identification Number 20A221 1, presently consisting of approximately 49.55 acres, with the Town/County boundary traversing the parcel, the portion within the Town zoned R-1, and the portion within the County zoned Agricultural, hereinafter individually referred to in this Declaration as "**Property A**"; and
2. Tax Identification Number 20A221 1B, presently consisting of approximately 32.5018 acres, and zoned R-1, hereinafter individually referred to herein as "**Property B**"; and
3. Tax Identification Number 20A221 2A1, presently consisting of approximately 66.9288 acres, and zoned I-2 District, hereinafter individually referred to herein as "**Property C**"; and

WHEREAS, the Declarant presently desires to develop a portion of **Property B** for the intended use of the Skyline Regional Criminal Justice Academy; and,

WHEREAS, the proposed development of **Property B** includes the extension of Progress Drive, as illustrated by **Exhibit A**, that shall be extended to a proposed intersection of a future public road, subject to approval of a subdivision plan and final plats by the Town;

WARRANT
L

000059 AUG 21 5

WHEREAS, such future public road, as referenced above, and as illustrated on **Exhibit A**, is intended to be extended to the north to access **Property A**, and any remainder of **Property B**, for future development purposes, and to the south to access **Property C**, and any remainder of **Property B**, for future development purposes;

WHEREAS, the extension of Progress Drive, as designed, requires approval of several special exceptions to the Town Code by the Town Council of Front Royal, Virginia;

WHEREAS, in consideration of such special exceptions, and other planning considerations, the **Declarant**, as owner of the **Properties**, for the **Declarant**, (which includes by reference all Declarant's heirs, executors, administrators, successors and assigns), declares that the **Properties**, and any subdivisions or re-subdivisions thereof, are held and hereafter shall be conveyed, subject to the following covenants, rights, reservations, limitations, and restrictions:

Definitions:

Declarant: The owner of the **Properties**, which includes by reference all Declarant's heirs, executors, administrators, successors and assigns.

Director: The Director of Planning and Zoning for the Town of Front Royal, Virginia, or his designee.

Improvements: Sidewalk improvements, any necessary or appropriate conduits for underground electrical lines and other utility pipes and lines, and above-grade street lights

Properties: The **Properties** above described, and any subdivisions or re-subdivisions thereof.

Restriction I.

The Declarant shall construct the Improvements located within the Intersection of Progress Drive Extension and the future public road ("Future Road"), as illustrated on **Exhibit A**, at such time that the future public road ("Future Road") is extended beyond the intersection, either to the north, or to the south.

VIA REGISTRATION
L.L.O.

000060 AUG 21 2011

Restriction II.

The Declarant shall construct all sidewalk improvements, as illustrated on **Exhibit A**, at such time that the Town of Front Royal may initiate a sidewalk construction project on Progress Drive. In lieu of the requirement for construction, and upon acceptance by the Town, the applicant may pay to the Town the equivalence of all costs incurred by the Town for design and construction of said sidewalk and street light improvements, also including ancillary improvements, such as, but not limited to, conduit and electric utility lines.

Conditions Applicable to Restrictions I and II.

- A. In lieu of the requirement for construction of said Improvements, and upon acceptance by the Town, the Declarant may pay to the Town the equivalence of all costs incurred by the Town for design and construction of said Improvements. If Declarant elects to pay the Town the equivalence for all said costs of Improvements as aforesaid in the preceding sentence, payment for the Improvements shall be due by the Declarant to the Town upon sale, lease or conveyance of the first lot or parcel by the Declarant.
- B. In lieu of completion and acceptance by the Town of all required Improvements, prior to commencing construction of Improvements, or at the time of the first sale, lease or conveyance of the first lot or parcel by the Declarant, whichever event first occurs, Declarant shall provide a development surety, such as a performance bond, cash escrow or letter of credit, for the purpose of ensuring that the required site Improvements are satisfactorily completed within a time period agreed upon by the Town. The amount of the development surety shall be calculated by the Town based on the projected cost of installation of the Improvements. The amount of such development surety shall not exceed the total of the estimated cost of construction based on unit prices for new public or private sector construction in the locality and a reasonable allowance for estimated administrative costs, inflation, and potential damage to existing roads or utilities, which shall not exceed twenty-five percent (25%) of the estimated construction costs, except in circumstances when Virginia Code § 15.2-2241.A.5, or its successor statute, requires localities to limit such estimated costs to ten percent (10%). Such development surety shall be payable to and held by the Town, in a form approved by the Town.

Attorney. No development security shall be terminated without the Town's consent, and not without at least sixty (60) days' advance notice to the Town.

- C. No Improvement that is subject to a development surety as set forth herein shall be approved, nor a building or land disturbance permit issued for development, until the development surety instrument for that particular Improvement, development, or phase of development, has been submitted and certified by the Town Planning & Zoning Director (the "Director") as being consistent with this Declaration.
- D. Upon completion of part or all of the Improvements covered by a development security, the Declarant may request for a partial or final release of the development surety, as provided below (unless otherwise altered by future requirements of Town or State Code, in which case the below requirements shall be amended *mutatis mutandis*:
1. All requests from the Declarant shall be submitted in writing.
 2. The Director shall make periodic partial releases of the development surety as provided in Virginia Code § 15.2-2245, or its successor statute.
 3. 3. Periodic partial releases may not occur before the completion of at least thirty percent (30%) of the public facilities covered by any bond, escrow, letter of credit, or other performance guarantee. Town Council shall not be required to execute more than three periodic partial releases in any twelve (12) month period.
 4. Within thirty (30) days after receipt of a written notice by the Declarant of completion of part or all of any required Improvements, the Director shall respond in writing to the Declarant in one of the following ways: (i) grant the partial or final release; or (ii) inform the Declarant of any specified defects or deficiencies in construction to the Improvements and suggest corrective measures.
 5. If the Director fails to take action within the thirty (30) day period, the request of the Declarant shall be deemed approved and a partial release shall be granted. No final release shall be granted until after expiration of the thirty (30) day period and there is an additional request in writing sent by certified mail by the subdivider to the Town Manager. If the Town Manager fails to take action on the request within ten (10) working days of receipt of the request, it shall be deemed approved and final release shall be granted to the subdivider.

WARREN COUNTY, VIRGINIA
CLERK OF COURTS

000062 AUG 21 2015

6. No development surety shall be reduced to less than 10 percent of the original development surety amount.
- E. Upon final completion and acceptance or approval of the site improvements and upon receipt from the Declarant of a certification of final completion from a professional engineer, land surveyor, or Director, the Director shall release any remaining development surety to the Declarant. A public improvement shall be deemed to be accepted when it is accepted by and taken over for operation and maintenance by the Town or State agency or department responsible for maintaining and operating the improvement.
- F. The Town may make use of the development surety if either: (i) the subdivider/developer fails to timely renew the development surety, when necessary to prevent the development surety from terminating, or (ii) the Planning Director, upon consultation with the Town Engineer and Town Attorney, determines that any of the improvements have not been completed in a timely manner and the completion of the improvements is deemed necessary to protect the public health, safety or general welfare.
- G. When a new street or road is incomplete, permits for new construction may not be issued to more than (1) incomplete street or road segment at a time.

Restriction III.

Declarant shall extend the future public road, as illustrated on **Exhibit A.** to the north and/or to the south, to intersect with a public street other than Progress Drive. at such time that the **Properties** are developed in the future; except that, such requirement to extend the future public road shall not apply to the development of the Skyline Criminal Justice Academy. This requirement may only be modified by Town Council.

Declarant affirms that the person signing below has authority to execute this instrument pursuant to duly authorized resolution of the Declarant.

**The Industrial Development Authority of the
Town of Front Royal and County of Warren, Virginia,
Operating as
Economic Development Authority (SEAL)
[SIGNATURE AND SEALS NEXT PAGE]**

000053 AUG 21 2017

By: [Signature]

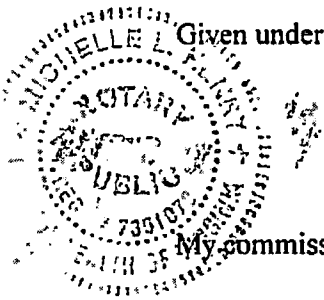
(SEAL)

Name/Title

STATE OF VIRGINIA

COUNTY OF WARREN, TO-WIT:

The foregoing instrument was acknowledged before me, a Notary Public in and for the State and County aforesaid, this day of Aug 15, 2017, by: Jennifer McDonald, Executive Director (Title) of the Industrial Development Authority of the Town of Front Royal and Warren County, Virginia, operating as the Economic Development Authority.



Given under my hand this 15 day of August, 2017.

#7360170

[Signature]

Notary Public

My commission expires:

4/30/18

INSTRUMENT 170004428
RECORDED IN THE CLERK'S OFFICE OF
WARREN COUNTY CIRCUIT ON
August 21, 2017 AT 12:32 PM
DARYL L. FUNK, CLERK
RECORDED BY: JKS

[Signature]

Property A

Future Public Road

Intersection

Progress Drive Extension

Property B

Future Public Road

Property C

EXHIBIT A

MOSELEYARCHITECTS



SKYLINE REGIONAL CRIMINAL JUSTICE ACADEMY
FRONT ROYAL WARREN COUNTY ECONOMIC
DEVELOPMENT AUTHORITY
FRONT ROYAL, VIRGINIA

DATE	DESCRIPTION
01/11/2017	PRELIMINARY
02/14/2017	REVISED
03/14/2017	REVISED
04/17/2017	REVISED

SITE PLAN

C5

COURT ADDRESS:
1 EAST MAIN STREET
FRONT ROYAL, VA 22630
PHONE #: 540-635-2435



OFFICIAL RECEIPT
WARREN COUNTY CIRCUIT
DEED RECEIPT

DATE : 08/21/2017 TIME : 12:35:00
RECEIPT # : 17000009793 TRANSACTION # : 17082100024
CASHIER : JXS REGISTER # : A566
INSTRUMENT : 170004428 BOOK : PAGE :
GRANTOR : INDUST DEVEL AUTH OF THE TOWN OF FRONT ROYAL
GRANTEE : COUNTY OF WARREN VIRGINIA
RECEIVED OF : INDUST DEVEL AUTH OF THE TOWN OF FRONT ROYAL
ADDRESS :

CASE # : 187CLR170004428
FILING TYPE : DRC PAYMENT : FULL PAYMENT
RECORDED : 08/21/2017 AT : 12:32
EX : N LOC : CO
EX : N PCT : 100%

DATE OF DEED : 08/21/2017
CREDIT/DEBIT CARD : \$22.66
DESCRIPTION 1 : DECLARATIONS OF RESTRICTIVE COVENANTS
NAMES : 0
CONSIDERATION : \$0.00 AVAL : \$0.00

PAGES : 006 OP : 0
MAP : PIN :

ACCOUNT CODE	DESCRIPTION	PAID
035	VOF FEE	\$1.00
145	VSLF	\$1.50
407	CONVENIENCE FEE	\$0.66

ACCOUNT CODE	DESCRIPTION	PAID
106	(TTF) TECHNOLOGY TRUST FUND FEE (CIRCUIT COURT)	\$5.00
301	DEEDS	\$14.50

TENDERED : \$ 22.66
AMOUNT PAID : \$ 22.66

13



**Town of Front Royal, Virginia
Council Agenda Statement**

Page 1
Item No. 13

Meeting Date: September 25, 2017

Agenda Item: COUNCIL APPROVAL – Budget Amendment for Leach Run Parkway

Summary: Council is requested to approve a budget amendment for additional revenue and expense for the Leach Run Parkway Project in the amount of \$586,613.39

Budget/Funding: 4500-3410206 Highway Maintenance Reimbursements - \$586,613.39
4500-47957 Highway Maintenance Leach Run Parkway - \$586,613.39

Attachments: None

Meetings: Discussed at September 15, 2017 Work Session

Staff

Recommendation: Approval ✓ Denial

Proposed Motion: I move that Council approve a budget amendment for additional revenue and expense for the Leach Run Parkway Project in the amount of \$586,613.39

ROLL CALL VOTE REQUIRED

*Note: Motions are the formal & final proposal of Council,
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved By: JW

14



**Town of Front Royal, Virginia
Council Agenda Statement**

Page 1
Item No. 14

Meeting Date: September 25, 2017

Agenda Item: COUNCIL APPROVAL – Bid for two (2) vehicles in Public Works

Summary: Council is requested to approve the bid from Virginia State Contract with Colonial Ford Truck Sales at a cost of \$64,754.40 for the purchase of two (2) ³/₄ ton Ford F250 4X4 pickup trucks for the Water Treatment Plant and Water & Sewer Maintenance department.

Budget/Funding: Funding available in the Department of Public Works FY18 budget, Water Treatment Plant line item 9601-47005 Motor Vehicle and split evenly with the Water Line Maintenance item 9602-47005 Motor Vehicles and the Sewer Line Maintenance line item 9802-47005 Motor Vehicles

Attachments: Memorandum from Purchasing Agent and the Manager of Vehicle Equipment Maintenance

Meetings: None

Staff

Recommendation: Approval ✓ Denial

Proposed Motion: I move that Council approve the bid from Virginia State Contract with Colonial Ford Truck Sales at a cost of \$64,754.40 for the purchase of two (2) F250 pickup trucks for the Water Treatment Plant and the Water & Sewer Maintenance Department

*Note: Motions are the formal & final proposal of Council,
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved by: 



MEMORANDUM

Date: September 19, 2017
To: Tina Presley, Administrative Assistant
Jennifer Berry, Clerk of Council
From: Cindy Hartman, Purchasing Agent
RE: Agenda Item

A handwritten signature in purple ink, appearing to be "C. Hartman", is written next to the "From:" line.

I have received a memo from Don McPaters Vehicle/Equipment Maintenance Manager, requesting the purchase of two (2) vehicles for vehicles that are going out of service, one (1) from the Water Treatment Plant and the other from Water & Sewer Line Maintenance. The purchase will be for a pickup truck only, with utility bodies and service lights to be ordered at a later time. The Virginia State Contract with Colonial Ford Truck Sales offers the trucks at a cost of \$32,377.20 each. These State Contracts are competitively bid to meet the Virginia Public Procurement Act requirements. Due to the volume the awarded dealers sell to various agencies throughout Virginia, there is a substantial cost savings over the invoice price. As vehicles are "rolling stock", and also due to the dollar amount, the purchase would need Town Council approval. Please add this to the September 25, 2017 Council agenda for their action.

Staff recommends the purchase of two (2) ¾ ton Ford F250 4x4 pickup trucks with regular cab and long bed for a total cost of \$64,754.40.

Funding is allocated for this purchase in the FY18 budget, Water Treatment Plant line item 9601 – 47005 "Motor Vehicles", the Water Line Maintenance line item 9602-47005 "Motor Vehicles", and the Sewer Line Maintenance line item 9802-47005 "Motor Vehicles".

MEMORANDUM

TO: Cindy Hartman, Purchasing Agent

FROM: Donald B McPaters, Manager of Vehicle Equipment Maint.

SUBJECT: Purchase of Water Plant #631 Pickup replacement and Water Sewer Maintenance #674 Chevy Impala.

DATE: August 23, 2015

I am request the purchase of two pickup chassis through the Virginia State contract for vehicle #631 a 2002 Chevy 2500 HD Pickup and vehicle #674 a 2005 Chevy Impala for this year budget. The pickup chassis has a price of $\$32,377.20 \times 2 = \$64,754.40$. The Water Plant had \$40,000.00 and Water Sewer Maintenance had \$45,000.00.

This doesn't include the utility bodies and lights. They will be purchase by phone quotes for other venders.

15



Town of Front Royal, Virginia Council Agenda Statement

Page 1
Item No. 15

Meeting Date: September 25, 2017

Agenda Item: PUBLIC HEARING – Adoption of Property Maintenance Code and Establishment of a Rental Inspections District (*1st Reading*)

Summary: Council is requested to affirm on its first reading to amend and re-enact Chapter 9 (Buildings) of the Front Royal Municipal Code to adopt a Property Maintenance Code and to establish a Rental Inspection District, pursuant to Virginia Code § 36-105.1:1 and Part III, Virginia Maintenance Code of the Virginia Uniform Statewide Building Code, current adopted edition, as presented. If approved the Town would be able to address blight and deterioration of buildings and the Rental Inspection District would include the same boundaries as the Historic District and the designated CDBG Downtown Revitalization area.

Note: Council held a Public Hearing to receive Public Input on August 28, 2017

Budget/Funding: None

Attachments: Proposed Ordinance, Letter of Request and Memo from Director of Planning/Zoning

Meetings: Work Sessions held February 13, July 3, July 17 and August 7. Public Hearing to Receive Public Input on August 28, 2017.

Staff

Recommendation: Approval ✓ Denial _____

Proposed Motion: I move that Council affirm on its first reading to amend and re-enact Chapter 9 of the Front Royal Municipal Code to adopt a Property Maintenance Code and Establish a Rental Inspections District, as presented.

ROLL CALL VOTE REQUIRED

*Note: Motions are the formal & final proposal of Council
proposed motions are offered by Staff for guidance

*To be clear and concise, motions should be made in the positive

Approved By: JW

TOWN COUNCIL WORK SESSION

FEBRUARY 13, 2017



PROPERTY MAINTENANCE & RENTAL INSPECTIONS

Referral to the Planning Commission

PROPERTY MAINTENANCE & RENTAL INSPECTIONS

LOCAL DISCUSSION:

Pros

- *Deteriorating Buildings/Poor Maintenance*
- *Blight/Property Values*
- *Rental Complaints*
- *Derelict Buildings*



Cons

- *Additional costs for landlords*
- *Regulation*
- *Additional staff for administration*
- *Legal costs*

*A Lifelong
Community*



*A Popular
Destination*



*Preserved
Assets*



*A Vibrant
Town*





PRESERVED ASSETS. *The Town's historic buildings will be restored for new uses, natural assets will be preserved, and the Town will be clean and attractive.*

Front Royal's has many assets, both historic buildings, and natural and civic assets. This theme envisions a future where Front Royal has succeeded in preserving, protecting and enhancing its many physical assets. There are a number of historic structures in various states of use, non-use or repair or disrepair in the Town.★ Challenges identified include absentee ownership, or lack of maintenance and upkeep,

which were issues not just with historic buildings but in some other areas of the Town. The restoration, re-use, rehabilitation of historic structures and façades was a dominant and popular

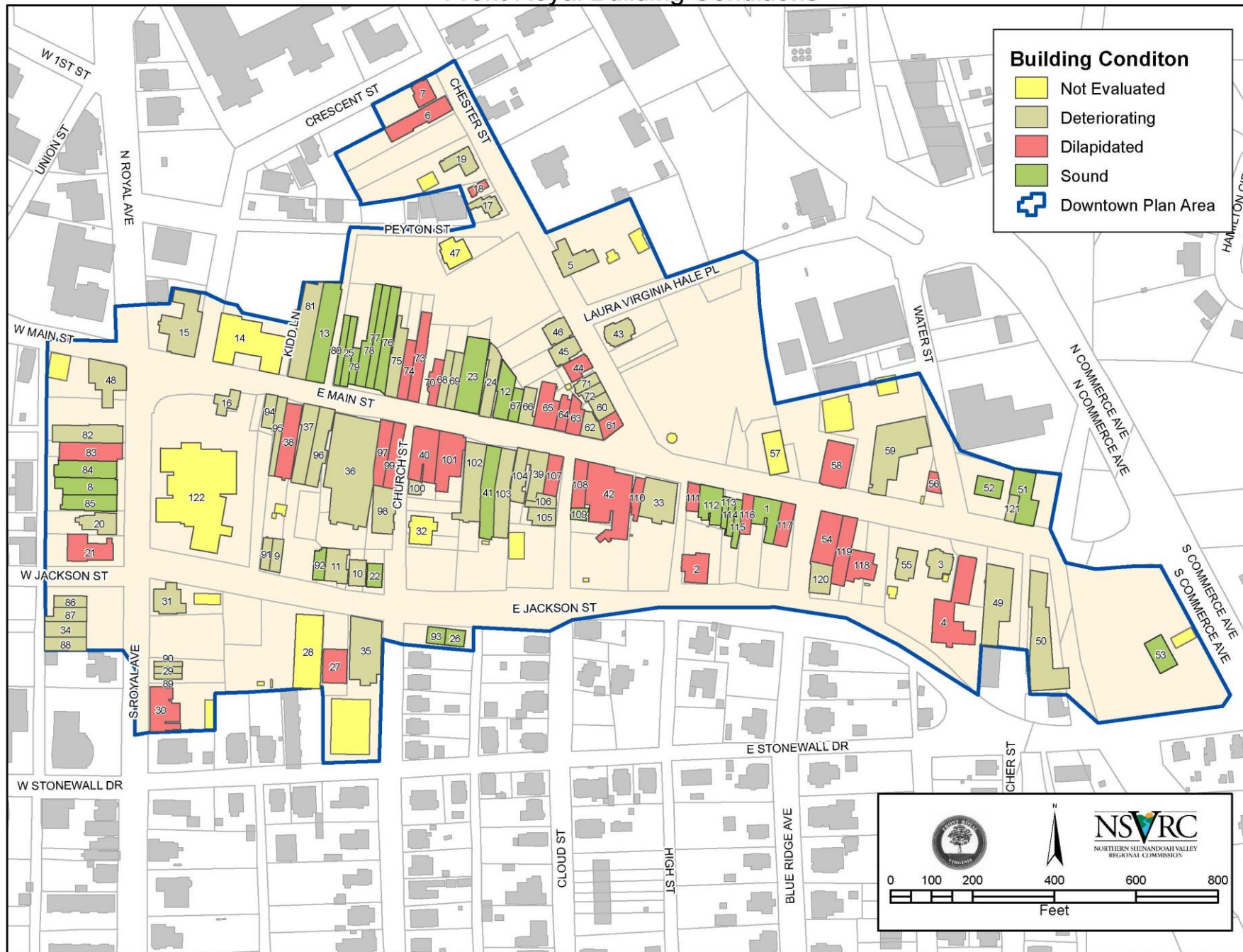
4. Affordable and diverse housing for many income levels, with accountable landlords.

A wide range of housing options contributes to Front Royal's vision as a lifelong community where people of all ages and stages in life can meet their housing needs. The options should include a wide range of housing types from single-family homes to apartments above downtown stores. Possible supporting actions or ideas include:



- 4.1 Enforce maintenance standards for rental properties .
- 4.2 Promote new housing types that are attractive to seniors, making it possible for them to age in place rather than leaving Front Royal.
- 4.3 Purchase the "Silk Mill" for preservation. It may be used as a public amenity, such as a museum, or a private use such as outlet stores or housing.
- 4.4 Encourage the return of old houses from business use to housing use.
- 4.5 Increase single-family housing in the greater downtown area.
- 4.6 Encourage energy efficient rental housing development.
- 4.7 Encourage construction of more affordable apartments.

Front Royal Building Conditions



Note: Surveyed building condition determined using Dunbar & Associates "Building Condition Survey" criteria. Municipal buildings (County Court House, Town Office, Police Department & Visitors Center), sheds/storage facilities and places of worship were excluded from the building inventory.

PROPERTY MAINTENANCE & RENTAL INSPECTIONS

LEGAL AUTHORITY (Optional Provisions):

- Virginia Uniform Building Code, Virginia Maintenance Code, Part III
- Virginia Code § 36-105.1:1

PROPERTY MAINTENANCE & RENTAL INSPECTIONS

PLANNING COMMISSION:

- July 20, 2016 – Public Input Meeting
- November 30, 2016 – Public Hearing

PROPERTY MAINTENANCE & RENTAL INSPECTIONS

PLANNING COMMISSION'S RECOMMENDATION:

- Adopt Virginia Maintenance Code (Town-Wide)
- Establish Rental Inspection Program within a designated Rental Inspection District
- Other

PROPERTY MAINTENANCE & RENTAL INSPECTIONS

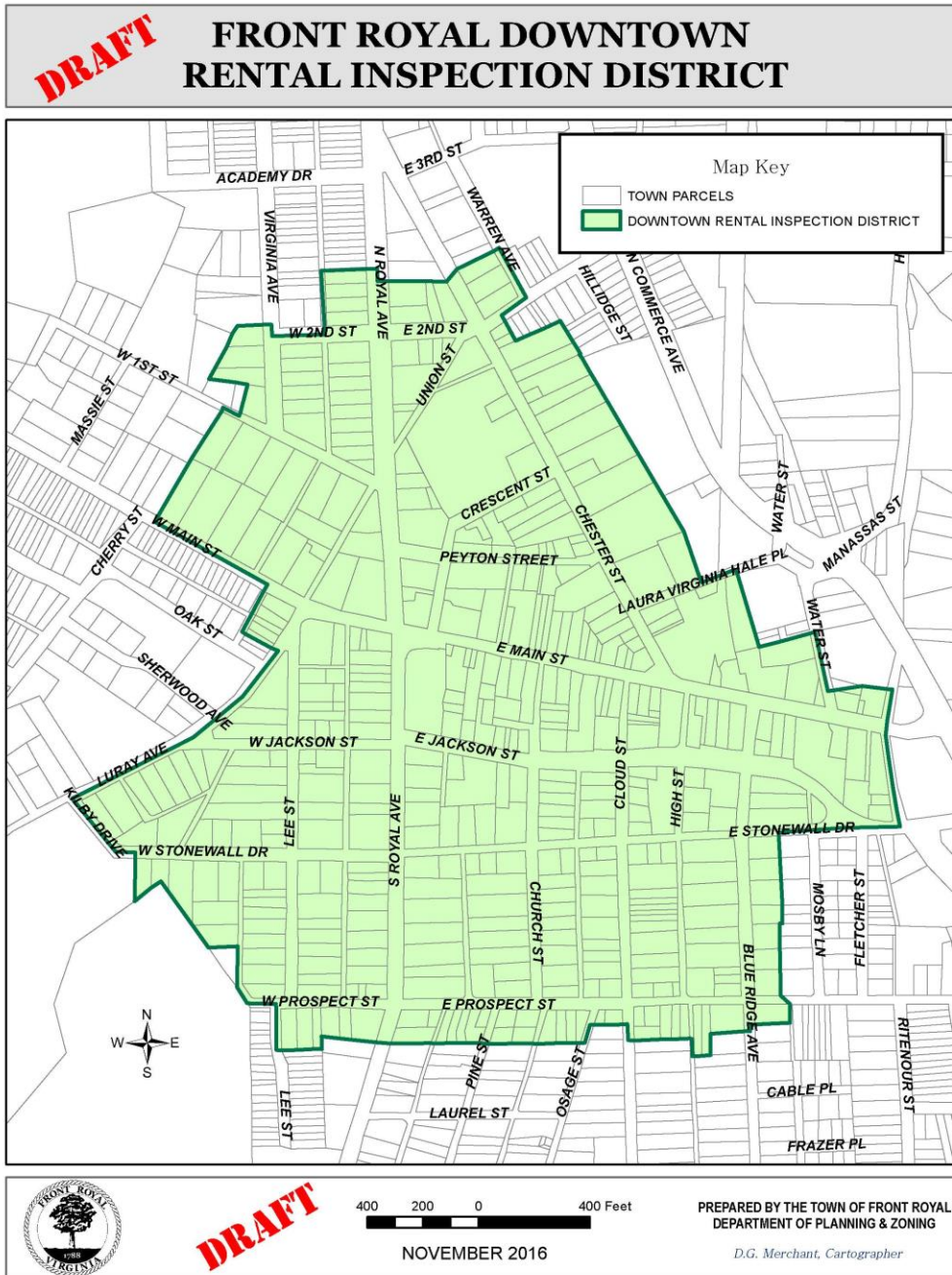
Virginia Maintenance Code:

- Many localities enforce on complaint basis, typically from the exterior.
- Attached guide provides list of items an inspection would inspect.
- Structural alterations not required unless they endanger life or health.
- Building permits would be required as normal for required work.

PROPERTY MAINTENANCE & RENTAL INSPECTIONS

Rental Inspections:

- Based on a designated Rental Inspection District.
- Requires Town Council to pass Findings on the District (9-300).
- Landlords required to notify Town of rental units.
- Inspection of rental units every 4 years, unless a violation is known.
- Interior inspections.
- No fee for initial inspection. \$100 for subsequent inspections (if necessary).
- Buildings with more than ten (10) rental units only require 10% of units (2 minimum).
- Appeal process.
- Misdemeanor violations.



Rental Inspection District:

- Downtown area.
- 300 units estimated.
- May add individual properties also by separate findings of Town Council.

Other Supporting Information:

- Virginia Maintenance Code Requirements (DRAFT GUIDEBOOK)
- Comparative look at programs of similar jurisdictions.
- DRAFT Amendment to Town Code Chapter 9
- Virginia Maintenance Code (2012)
- Virginia Code 36-105.1:1

Locality	Population ¹	Maintenance Code	Rental Inspections	Building Inspections	Total Staff / Inspectors	Fees ⁴	Rental Units
Culpeper ²	17,145 (5 th)	No ²	No	No	N/A	N/A	n/a
Winchester	26,203	Yes	Yes	Yes	6 / 4 ³	35/0/50	3,700
South Boston	7,989 (16 th)	Yes	Yes	No	1 / 1	50/0/0	unknown
Williamsburg	14,068	Yes	Yes	Yes	6 / 1	50/0/0	unknown
Blacksburg	42,620 (2 nd)	Yes	Yes	Yes	5 / 1	0/0/100	2,500
Herndon	23,292 (3 rd)	Yes	Yes	Yes	6 / 3	70/30/60	30-60 buildings
Pulaski	8,948 (10 th)	Yes	Yes	Yes	3 / 1	0/0/100	24-30 buildings
Front Royal (PROPOSED)	15,038 (7 th)	Yes	Yes	No	2 / 1 ⁵	0/100/100	300+ est.

- 2014 US Census reported population estimates.
- The Town of Culpeper did not adopt the full property maintenance code, opting to only adopt the dilapidated structure portion of Part III of the PMC. Building permits and inspection are handled by Culpeper County.
- The City of Winchester is divided into 4 Rental Inspection areas, each managed by a different inspector.
- Fees show the fees for the Initial Inspection/1st Re-inspection/ 2nd Re-inspection
- Establishment of a program in the Town, as proposed, would require 1 FT inspector. In addition, a PT employee is proposed that would share duties within the Department of Planning & Zoning. The alternative administrative approach would be to establish an agreement with Warren County Building Inspections to administer the program.

DRAFT AMENDMENT

“Building Code, Maintenance Code, and Rental Inspections” (4)

This draft amendment to the Town Code proposes the adoption of the Virginia Maintenance Code (2012); establishment of a Property Maintenance Code Official; and creation of a Residential Rental Inspection District. The following language also includes the existing provisions of Chapter 9 and language that reserves the Town’s right to establish a Building Department and designates Warren County to administer the building code, as previously established by an agreement in 1983, until such time that the Town may establish a building department.

Chapter 9

BUILDINGS BUILDING CODE, MAINTENANCE CODE AND RENTAL INSPECTIONS

- 9-1 ~~REMOVAL, REPAIR, ETC., OF CERTAIN BUILDINGS AND STRUCTURES~~**
[remove in full]
- 9-2 ~~REMOVAL, REPAIR, ETC., OF BUILDINGS AND OTHER STRUCTURES~~**
~~HARBORING ILLEGAL DRUG USE~~
[relocate to Chapter 145-4 in full]

ARTICLE 1: BUILDING CODE REGULATIONS

9-100 BUILDING CODE

- A.** In accordance with the Code of Virginia § 36-105, the Town of Front Royal hereby reserves its authority to establish a Town Building Department, and a Local Board of Building Code Appeals (LBBCA), herein referred to generally as the “Board of Appeals,” to administer and enforce the mandatory provisions of the Virginia Uniform Building Code, including Part I, Construction Code, and Part II, Rehabilitation Code, and including future amendments thereto, and all codes incorporated by reference therein. Such codes shall generally be referred to herein generally as the “Building Code.”
- B.** Under the provisions of this Chapter, Town Council may elect to pass a resolution to officially establish a Town Building Department to administer and enforce the Building Code. Such resolution shall also include the establishment of a Board of Appeals, as described further herein. Upon adoption of such resolution of Town Council the Town hereby adopts the Building Code, and all such duties and requirements specified therein.
- C.** Until such time that the Town elects to establish a Town Building Department and Town Board of Appeals, the Town shall enter into an agreement with the local

governing body of another county or municipality or with some other agency, or an approved state agency for such administration, enforcement and appeals resulting therefrom.

(1) The February 8, 1983 agreement with Warren County shall remain in effect at the passing of this ordinance until such time that the agreement is terminated, renewed or amended. This agreement establishes Warren County as the Building Department for the Town, including the Warren County Board of Building Code Appeals as the appeals board for the Town.

D. At such time that Town Council may establish a Building Department and Board of Appeals, the Town Manager shall appoint a Building Official to administer and enforce the Building Code. Such Building Official shall meet the required qualification and certification requirements, and shall maintain all permanent records of the Building Department, including applications received, permits, certificates, notices and orders issued, fees collected and reports of inspection in accordance with the Library of Virginia's General Schedule Number Six. The Building Official shall administer and enforce the Building Code, and may establish procedures and policies as may be necessary for such administration and enforcement. All codes and procedures shall be made available for the public to view and/or obtain copies from the office of the Building Official during established normal business hours.

E. As specified under Subsection B, Town Council shall appoint five (5) members to a Board of Appeals upon adoption of a Town Building Department. The membership of the Board shall be established in compliance with the following requirements, unless more stringent requirements are required by the Building Code.

(1) All members of the Board of Appeals shall live within Warren County, Virginia, and at least three (3) members shall reside within the Town.

(2) Town Council may appoint two (2) alternate members who shall be called by the board chair to hear appeals during the absence or disqualification of a member. Alternate members shall possess the qualifications required for board membership.

(3) At least three (3) members shall have no less than five (5) years knowledge and experience in the construction industry. Members that do not have knowledge and experience in the construction industry shall have an equivalent experience in the real estate, law, architecture, or engineering professions.

(4) No employee or official of the Town may serve as a Board Member.

- (5) Compensation, meeting dates, voting procedures, officers, term limits and other procedures of the Board of Appeals shall be established in by-laws that are approved by Town Council.
- (6) The Board of Appeals shall be used as the appeals board for the Virginia Maintenance Code and Rental Inspection Program.
- (7) The Board of Appeals shall be reviewed by the Virginia Department of Housing and Community Development.

ARTICLE 2: MAINTENANCE CODE REGULATIONS

9-200 ADOPTION OF MAINTENANCE CODE

- A. To ensure the protection of the public health, safety and welfare, the Town hereby adopts the optional provisions of the Virginia Uniform Building Code, including Part III, Virginia Maintenance Code, future amendments thereto, and including codes incorporated by reference therein, herein also generally referred to generally as the "Maintenance Code," as related to building regulations that facilitate the maintenance, rehabilitation, development and reuse of existing buildings at the least possible cost to ensure the protection of the public health, safety and welfare of Town residents. Furthermore, in accordance with §36-99 of the Code of Virginia, the purpose of this code is to protect the health, safety and welfare of the residents of the Commonwealth of Virginia, provided that buildings and structures should be permitted to be maintained at the least possible cost consistent with recognized standards of health, safety, energy conservation and water conservation, including provision necessary to prevent overcrowding, rodent or insect infestation, and garbage accumulation; and barrier-free provisions for the physically handicapped and aged.
- B. The Town Manager shall appoint a Maintenance Code Official to administer and enforce the Virginia Maintenance Code. The Maintenance Code Official shall meet the required qualifications, certification requirements, and training requirements of the Maintenance Code. All codes, policies and procedures shall be made available for the public to view and/or obtain copies from the office of the Maintenance Code Official during established normal business hours.
- C. The Town shall appoint a Board of Appeals to consider all appeals that may arise from the provisions of this Article. Such Board of Appeals shall be established under the criteria found within Chapter 9, Section 100, Subsection E. Alternatively, the Town may elect to use the Board of Appeals used by another county or municipality, or with some other agency, provided that an agreement is entered into with the appropriate local government board, or an approved state agency.

ARTICLE 3: RENTAL INSPECTIONS**9-300. FINDINGS.**

Town Council has found that within the residential rental inspection districts established herein, each of the following conditions exist:

- A. There is a need to protect the public health, safety and welfare of the occupants of dwelling units inside the residential rental inspection district described and established herein;
- B. The residential rental dwelling units in the residential rental inspection district are in need of inspection to prevent deterioration, taking into account the number, age and condition of the residential dwelling rental units inside the residential rental inspection district; and
- C. The inspection of residential rental dwelling units inside the residential rental inspection district is necessary to maintain safe, decent and sanitary living conditions for tenants and other residents living in the residential rental inspection district.
- D. The Town Council has further found that, for each of the individual residential rental dwelling units described in section 9-301 of this article, one (1) of the following conditions exists:
 1. There is a need to protect the public health, welfare and safety of the occupants of that individual dwelling unit;
 2. The individual dwelling unit is either blighted or in the process of deteriorating; or
 3. There is evidence of violations of the Building Code that affect the safe, decent and sanitary living conditions for tenants living in such individual dwelling unit

9-301. APPLICABILITY.

- A. The provisions of this article shall apply to all rental dwelling units within a residential rental inspection district designated by Town Council and to individual residential dwelling units outside designated residential rental inspection districts made subject to this article, as provided by Virginia Code § 36-105.1:1(B)(3).
- B. A residential rental inspection district, as shown on the map labeled "Rental Inspection Districts 20__" and filed in the Town Clerk's office on _____, 20__, is hereby established and made subject to the requirements of this article. Maps detailing this residential rental inspection district shall be available in the office of the Maintenance Code Official.
- C. The following individual rental dwelling units that are outside the residential rental inspection district are hereby made subject to this article:

(1) *Reserved*

- D. Town council may designate additional residential rental inspection districts or make other individual residential rental units outside the residential rental inspection district subject to this article after notice and a public hearing thereon, as provided by Virginia Code § 36-105.1:1. A separate finding for each individual dwelling unit shall be made by the local governing body prior to designation of individual residential rental units outside of a residential rental inspection district that (i) there is a need to protect the public health, welfare and safety of the occupants of that individual dwelling unit; (ii) the individual dwelling unit is either (a) blighted or (b) in the process of deteriorating; or (iii) there is evidence of violations of the Building Code that affect the safe, decent and sanitary living conditions for tenants living in such individual dwelling unit.

9-302. IMPLEMENTATION; NOTIFICATION REQUIREMENT FOR OWNERS.

- A. The owner of any dwelling unit within a residential rental inspection district shall notify the Maintenance Code Official in writing if such dwelling unit is used for rental purposes. Such notice shall be provided within ninety (90) days of adoption of this chapter; or within ninety (90) days of the transfer of ownership or a change. No fee shall be required for such notification by the owner; nor shall there be a penalty for not providing said notification within the ninety (90) days period.
- B. The Maintenance Code Official may develop a form for such notification requirement that includes the following information: (i) the address and a brief description of the rental dwelling unit; (ii) the name, street address and telephone number of the owner of the property; (iii) the name, street address and telephone number of the managing agent, if any; (iv) the number of people who occupy each dwelling unit, and (v) the family status of the occupants. Such form shall not require the name or social security number of any tenant.
- C. If the Maintenance Code Official has reason to believe that an owner has failed to provide the required notice of a residential rental dwelling unit within the residential rental inspection district, or any other individually designated properties subject to this article, he or she shall provide a written notice to the owner setting a seven (7) day deadline for the owner to provide such written notification. The penalty for the willful failure of an owner of a dwelling unit who is using the dwelling unit for residential rental purposes to comply with the written notification requirement shall be a civil penalty of fifty dollars (\$50.00) per unit. For purposes of this section, notice from the Maintenance Code Official sent by regular first class mail to the last known address of the owner as shown on the current real estate tax assessment books or current real estate tax assessment records shall be deemed compliance with this requirement.

9-303. RENTAL CERTIFICATE OF COMPLIANCE REQUIRED.

No owner or managing agent shall rent or offer to rent a residential rental dwelling unit within a residential rental inspection district or an individual residential rental dwelling outside a residential rental inspection district that is subject to this article without a rental certificate of compliance therefor, issued after a satisfactory inspection of the property by the building official or his or her designee.

9-304. INSPECTIONS, GENERALLY.

- A. The Maintenance Code Official shall cause an inspection to be made of each rental dwelling unit located within a residential rental inspection district, within four (4) years of the designation of the residential rental inspection district for compliance with the provisions of the Maintenance Code that affect the safe, decent and sanitary living conditions for the tenants of such property. The Maintenance Code Official is hereby authorized to establish schedules to accomplish the inspection of dwelling units in different areas within the residential rental inspection district. The Maintenance Code Official shall inspect any individual residential rental dwelling unit that is outside a residential rental inspection district within ninety (90) days of the date the dwelling unit is made subject to this article. After such inspection, the owner and the managing agent, if any, will be provided with a list of any violations found and the date by which such violations must be corrected. Following the initial inspection of a residential rental dwelling unit subject to this article, the Maintenance Code Official may inspect any residential rental dwelling unit in a residential rental inspection district, not otherwise exempted, annually.
- B. Upon a determination that a rental dwelling unit is in compliance with the provisions of the existing structure regulations of the Maintenance Code, a rental certificate of compliance shall be issued to the owner. No certificate shall be issued until all inspection fees are paid. The certificate shall be valid for a term of four (4) years. Upon the initial or periodic inspection of a residential rental dwelling unit subject to this article for compliance with the Maintenance Code, the property shall be exempt from this article's inspection requirements for four (4) years, provided there are no building code violations that affect the safe, decent and sanitary living conditions for the tenants of the residential rental dwelling unit. However, upon the sale of a residential rental dwelling unit, the Maintenance Code Official may perform an inspection of the dwelling unit. Residential rental dwelling units shall be exempt from the inspection requirement of this article for four (4) years from the date of issuance of a certificate of occupancy or rental certificate for the unit by the Maintenance Code Official. Any inspection exemption granted for a rental dwelling unit prior to _____, 20____, shall be valid for the period as initially granted, unless revoked as provided herein.
- C. There shall be no fee for the initial inspection required by this article or the first re-inspection. If all violations are not corrected at the time of the first re-inspection, then the fee for the second and any subsequent re-inspection for the original violation shall be one hundred dollars (\$100.00).
- D. The Maintenance Code Official, or his or her duly authorized agent, shall have the right to inspect any rental dwelling unit within a residential rental inspection district

or other individual residential dwelling units subject to this article at any reasonable time, in order to carry out an inspection required by this section. The owner, managing agent, occupant, or other person in charge of the premises shall permit the Maintenance Code Official, or his or her duly authorized agent, access to any dwelling unit within a residential rental inspection district or any individual residential dwelling unit subject to this article for the purpose of conducting an inspection authorized by this article. In the event the Maintenance Code Official or his or her authorized agent is denied access to a dwelling unit, he or she may apply for an administrative search warrant in order to gain access to the premises.

- E. Nothing in this article shall prohibit an inspection of any residential rental dwelling unit or individual residential dwelling unit subject to this article for a violation of the Virginia Uniform Statewide Building Code, pursuant to a complaint, as required herein.
- F. The owner or managing agent may appeal the Maintenance Code Official's determination of a violation of the Maintenance Code to the Board of Appeals.

9-305. INITIAL AND PERIODIC INSPECTIONS OF MULTI-FAMILY DWELLING UNITS.

- A. If a multi-family development has more than ten (10) dwelling units, in the initial and periodic inspections, the Maintenance Code Official shall inspect not less than two (2) and not more than ten (10) percent of the dwelling units of that multi-family development, which includes all of the multi-family buildings which are part of that multi-family development. However, no inspection fee shall be charged for more than ten (10) dwelling units. Two (2) family dwellings and multi-family dwelling units with three (3) to nine (9) dwelling units are not exempt from the inspection requirements of this article.
- B. The inspected dwelling units of a multi-family development shall be selected by the Maintenance Code Official. At the time of inspection, no violations of the Virginia Uniform Statewide Building Code shall exist. If the Maintenance Code Official determines upon inspection of the sampling of dwelling units that there are violations of the Maintenance Code that affect the safe, decent and sanitary living conditions for the tenants of such multi-family dwelling unit, the Maintenance Code Official may inspect as many dwelling units as necessary to enforce the Maintenance Code.
- C. If the dwelling units that are inspected are in compliance with the provisions and all other applicable codes and ordinances, then a rental certificate of compliance shall be issued as provided herein.
- D. Nothing in this section shall serve to exempt the owner, managing agent, or tenant of a multi-family dwelling unit from compliance with all applicable statutes, laws, and ordinances, including the Virginia Uniform Statewide Building Code.

9-306. REVOCATION OF EXEMPTION FROM INSPECTION.

- A. The Maintenance Code Official may revoke an inspection exemption granted pursuant to Chapter 9-307(b) upon finding that the residential rental dwelling unit is in violation of the building code during the exemption period.
- B. Before revoking an exemption, the Maintenance Code Official shall notify the owner, managing agent, and tenant of the violation, in writing, via first class mail, specifying the nature of the violation; establishing a deadline for correction of the violation, which shall be no less than seven (7) and no greater than thirty (30) days; and stating that the exemption will be revoked on a date certain unless the Maintenance Code Official's determination of the existence of a Maintenance Code violation is appealed to the Board of Appeals. The notice shall also set forth the appeal process as herein established.

9-307. APPEAL.

- A. The Board of Appeals designated by Town Council for the Maintenance Code shall serve as the Board of Appeals for all appeals under this article.
- B. The owner, managing agent or tenant may appeal a notice of revocation, or other determination related to the Maintenance Code that is made by the Maintenance Official. Such appeals shall be considered by the Board of Appeals designated for the Maintenance Code under Article 2 of this Chapter.
- B. If an appeal is filed, inspection exemptions shall remain in effect until the appeal is resolved by the Board of Appeals.

ARTICLE 4: GENERAL

9-400 NONLIABILITY OF PERSONNEL ENFORCING CHAPTER.

Nothing in this chapter or in any code adopted by this chapter shall be construed as imposing upon any Town officer or employee duly authorized to administer or enforce the provisions of this chapter any liability or responsibility for damages to any person injured by a defect in any building construction or other work mentioned herein, or by the installation thereof, nor shall the Town government or any official or employee thereof be held as assuming any such liability or responsibility by reason of inspections authorized by this chapter or certificates of approval issued by the building official or property maintenance code official.

9-401 VIOLATIONS

- A. It shall be unlawful for any owner or any other person, firm or corporation to violate any provision of this chapter. Any violation shall be deemed a misdemeanor and any owner or any other person, firm or corporation convicted of a violation shall be punished by a fine of not more than two thousand five hundred dollars (\$2,500.00). In addition, each day the violation continues after conviction or the expiration of the court-ordered abatement period shall constitute a separate offence. If the violation remains uncorrected at the time of conviction,

the court shall order the violator to abate or remedy the violation in order to comply with the applicable Code. Except as otherwise provided by the court for good cause shown, any such violator shall abate or remedy the violation within six (6) months of the date of conviction. Each day during which the violation continues after the court-ordered abatement period has ended shall constitute as separate offence. Any person convicted of a second offense, committed within less than five (5) years after a first offence under this chapter shall be punished by confinement in jail for not more than five (5) days and a fine of not less than \$1,000 nor more than \$2,500, either or both. Provided, however, that the provision for confinement in jail shall not be applicable to any person, firm or corporation, when such violation involves a multiple-family dwelling unit. Any person convicted of a second offense committed within a period of five (5) to ten (10) years of a first offense under this chapter shall be punished by a fine of not less than \$500 nor more than \$2,500. Any person convicted of a third or subsequent offense involving the same property committed within ten (10) years of an offense under this chapter after having been at least twice previously convicted, shall be punished by confinement in jail for not more than ten (10) days and a fine of not less than two thousand five hundred dollars (\$2,500.00) nor more than five thousand dollars (\$5,000.00), either or both. No portion of the fine imposed for such third or subsequent offense committed within ten (10) years of an offense under this chapter shall be suspended.

- B. Any prosecution under this section shall be commenced within the time specifications provided under Virginia Code § 19.2-8.

9-402 PERMIT FEES.

- A. Town Council reserves the right to adopt and publish a schedule of fees for services rendered by either the Building Code Official and/or Maintenance Code Official, and to amend the schedule by separate resolution. Such schedule of fees and any amendment shall be in lieu of any permit fees set forth in any technical code adopted by the Town.
- B. No permit as required by the Town by ordinance or regulation shall be issued unless the fee prescribed for the service shall have been paid, nor shall any amendment to such a permit be approved until any additional fee, if any, due to an increase in the estimated cost of the building or structure, shall also have been paid.

9-403 AUTHORITY TO REQUIRE REMOVAL, REPAIR, ETC., OF BUILDING AND OTHER STRUCTURES.

- A. Owners of real property within the Town shall remove, repair or secure any building, wall or any other structure which might endanger the public health or safety of other residents of the Town.
- B. If an owner fails to do so, the building official may send the owner notice of his or her obligations under this section. Such notice shall be:

- (1) In writing, mailed by certified mail, return receipt requested, sent to the last known address of the property owner; and
 - (2) Published in a newspaper having general circulation in the locality in accordance with the applicable provisions of Code of Virginia §§ 15.2-1426, 15.2-1427.
- C. The Town, through its own agents or employees, may remove, repair or secure any building, wall or any other structure which might endanger the public health or safety of other residents of the Town if the owner and lien holder of the property fails to do so within thirty (30) days following the later of the return of the certified mail receipt or newspaper publication. However, if the structure is deemed to pose a significant threat to public safety and such fact is stated in the notice, the Town may take action to prevent unauthorized access to the building within seven days of such notice. Repair of the structure may include maintenance work to the exterior of a building to prevent deterioration of the building or adjacent buildings.
- D. In the event the Town, through its own agents or employees removes, repairs or secures any building, wall or any other structure pursuant to this section, the cost or expenses thereof shall be chargeable to and paid by the owners of such property and may be collected by the Town as taxes and levies are collected.
- E. Every charge authorized by this section which remains unpaid shall constitute a lien against such property ranking on a parity with liens for unpaid local taxes and enforceable in the same manner as provided Code of Virginia (1950), Title 58.1, Chapter 39, Articles 3 and 4, as amended.
- F. The remedies provided by this section are in addition to, and not in lieu of, any other remedy provided by general law or by the Building Code.

9-404 THROUGH 9-409. *Reserved*

9-410 DEFINITIONS.

The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Building Code means the applicable provisions of the Virginia Uniform Building Code, Part I, Construction Code, and Part II, Rehabilitation Code, including future amendments thereto, and all codes incorporated by reference therein.

Building Code Official means the person that is employed, contracted, or designated with an agreement from another county, municipality or other agency, that has been appointed by the Town to administer and enforce the applicable provisions of the Building Code, as defined herein.

Conditions which immediately affect safe, decent and sanitary living conditions of persons occupying a residential rental dwelling unit, means physical conditions of a residential rental dwelling unit that violate fire safety; lack of or poor condition of sanitary facilities; absence of implied or expressed heating systems or equipment; items which affect the safe operation of electrical and mechanical systems; items which affect structural integrity of the building and/or the ability of the building envelope to keep out weather, or one or more other conditions that if not corrected would be reasonably expected to become conditions that affect the safe, decent and sanitary living conditions of the occupants.

Day means a calendar day.

Disqualifying violation includes those conditions which affect safe, decent and sanitary living conditions of persons occupying a residential rental dwelling unit, or other conditions that violate the provisions of the Virginia Uniform Statewide Building Code, or multiple Building Code violations that indicate in their totality that the dwelling unit is not being properly maintained.

Dwelling unit, means a single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation; or, means a building or structure, or part thereof, that is used for a home or residence by one or more persons who maintain a household. The term dwelling unit shall not include hospitals, nursing homes, convalescent homes or similar facilities providing medical care to the aged, infirm or disabled.

Family means one (1) or more persons related by blood, marriage, or adoption, or under approved foster care.

Follow-up inspection, means the inspection of a property made to determine if violations previously cited have been abated.

Group home means a facility for social rehabilitation or substance abuse or mental health problems that contains a group housing arrangement that provides custodial care but does not provide medical care.

Initial inspection, means the first inspection of a residential rental dwelling unit subject to this article.

Maintenance Code means the applicable provisions of the Virginia Uniform Building Code, Part III, Maintenance Code, and all codes incorporated by reference therein.

Maintenance Code Official means the person that is employed, contracted, or designated with an agreement from another county, municipality or other agency, that has been appointed by the Town to administer and enforce the applicable provisions of the Maintenance Code, as defined herein.

Managing agent means any person having the authority, singly or in combination with another, to enter into an agreement for the occupancy of property subject to this article.

Multi-family dwelling, means a building or structure, or part thereof, that is used by three (3) or more families, each in an individual dwelling unit and living independently of each other.

Multiple-family development, means a building or structure, or part thereof, that is used by ten (10) or more dwelling units on the same premises.

Owner, means the person or entity shown on the current real estate assessment books or current real estate assessment records of the Town or the fee simple owner of the property if ownership has changed since such tax assessment records were last updated.

Periodic inspection, means an inspection of a residential rental dwelling unit conducted upon the exemption period for the unit, or after a follow-up inspection which revealed abatement of cited violations.

Premises, a single lot of record under ownership, or multiple contiguous lots of record that are under the same ownership.

Rent means to lease, sublease, let or otherwise grant for consideration the right to occupy a dwelling unit.

Residential rental inspection district, means a rental inspection district designated by the Town council pursuant to this article.

Residential rental dwelling unit, or as generally referred to as a *rental*, means a dwelling unit that is leased or rented to one or more tenants on a month to month basis or for any period in excess of 30 days including, but not limited to, condominiums, manufactured or mobile homes, single-family detached dwellings, duplex dwellings, townhouse dwellings or multifamily dwellings (which shall include efficiency apartments and condominiums). However, a dwelling unit occupied in part by the owner thereof shall not be construed to be a residential rental dwelling unit unless a tenant occupies a part of the dwelling unit which has its own cooking and sleeping areas, and a bathroom, unless otherwise provided in chapter 175, Zoning, by the Town.

Violations. As applicable to the Maintenance Code, means conditions which affect safe, decent and sanitary living conditions of persons occupying a residential rental dwelling unit include items that violate fire safety; lack of or poor condition of sanitary facilities; absence of adequate heating systems or equipment; items which affect the safe operation of electrical and mechanical systems; items which affect structural integrity of the building and/or the ability of the building envelope to keep out weather, or one or more other conditions that, if not corrected, would be reasonably expected to become conditions that affect the safe, decent and sanitary living conditions of the occupants, or

other conditions that violate the provisions of the Maintenance Code, or multiple Maintenance Code violations that indicate, in their totality, the dwelling unit is not being properly maintained. As applicable to the Building Code, means conditions which are in violation of the Building Code, as defined herein.

This ordinance shall become effective upon passage.

APPROVED:

Hollis L. Tharpe, Mayor

ATTEST:

Jennifer E. Berry, Clerk of Council

THIS ORDINANCE was approved at the Regular Meeting of the Town of Front Royal, Virginia on its second reading, conducted _____ 2017, upon the following recorded vote:

Eugene R. Tewalt	Yes/No	Jacob L. Meza	Yes/No
William A. Sealock	Yes/No	Christopher S. Morrison	Yes/No
John P. Connolly	Yes/No	Gary Gillispie	Yes/No

A public hearing on the above was held on _____, 2017, having been advertised in the Northern Virginia Daily on _____, 2017, and _____, 2017. The Ordinance was enacted at the Regular Meeting of the Town Council held _____ 2017, to become effective immediately.

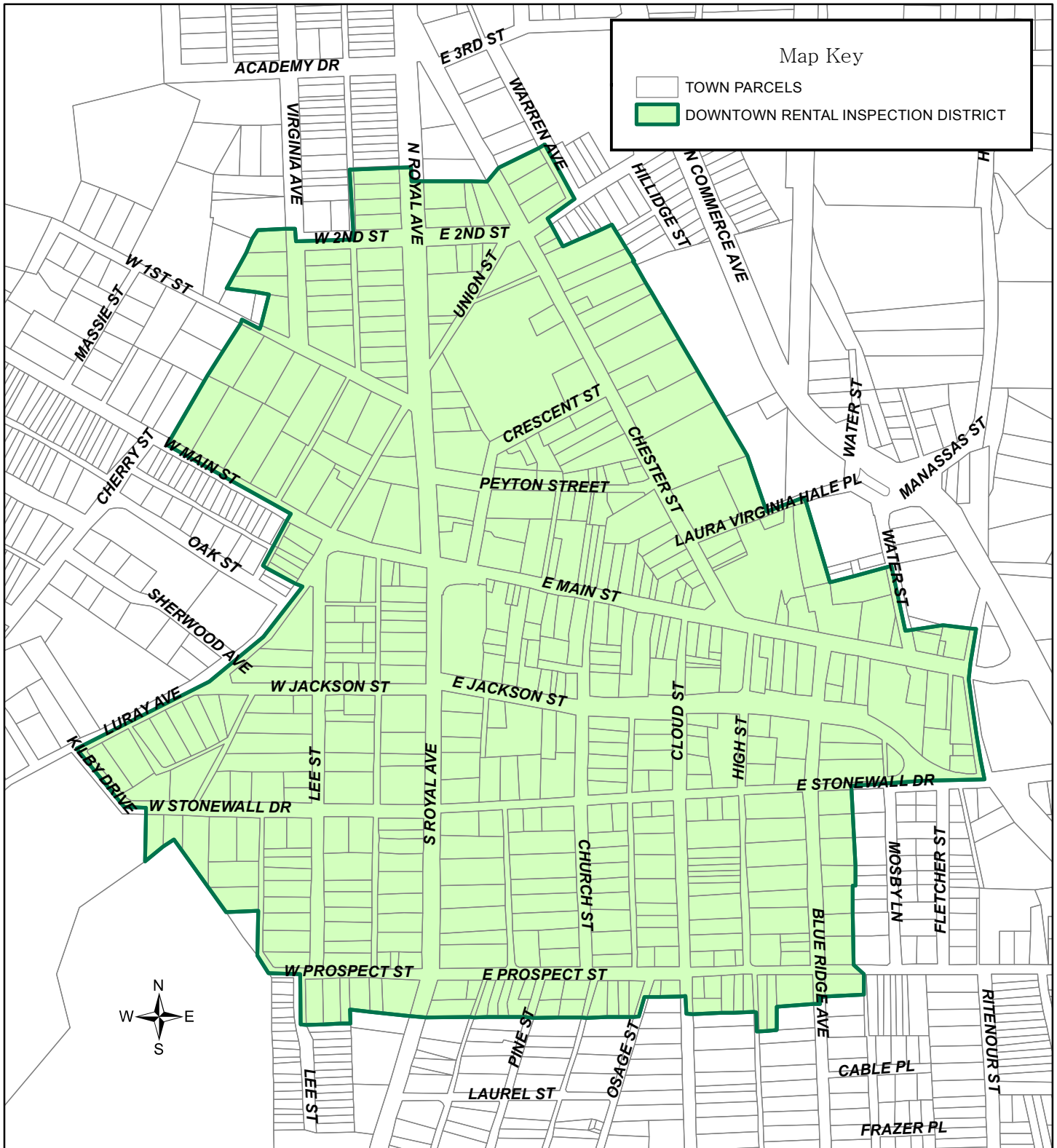
Approved as to form and legality:

Douglas W. Napier, Town Attorney

Date: ____/____/____

DRAFT

FRONT ROYAL DOWNTOWN RENTAL INSPECTION DISTRICT



DRAFT

400 200 0 400 Feet

NOVEMBER 2016

PREPARED BY THE TOWN OF FRONT ROYAL
DEPARTMENT OF PLANNING & ZONING

D.G. Merchant, Cartographer

Virginia Maintenance Code Requirements

Town of Front Royal, Virginia

NOVEMBER 2016

THE VIRGINIA MAINTENANCE CODE

The Town of Front Royal has adopted and enforces the Virginia Maintenance Code (VMC) on all existing structures located in the Town. This code is used in enforcement of the city's Rental Inspection Program and also used to address other structures that are not being adequately maintained. The VMC is part of the Virginia Uniform Statewide Building Code (USBC) and is based on the ICC International Property Maintenance Code, but with amendments made by the state.

Most of the requirements of the VMC are common sense, and a close look at a building usually will tell where repairs or maintenance are needed. This booklet contains a list of items based on the VMC that a Code inspector is likely to check when inspecting an existing building. This simple list is meant to be informative and help the owner or occupant get an idea whether a building meets the VMC requirements.

All buildings must be maintained to meet VMC requirements. However, some buildings constructed many years ago may be well maintained yet still not meet current VMC requirements because of the way they were designed. If the Property Maintenance Code official decides those conditions do not endanger life or health, the code official may choose not to require modifications to bring the building to current Code standards. There are, however, some design or construction features that are considered unsafe and will have to be changed. Some of these features are identified in the description of VMC requirements in this booklet. Some of the more common conditions where alterations or changes may be required are:

- Smoke Detectors
- Electrical service
- Number of electrical outlets required per room
- Windows and means of emergency exit
- Ceiling clearance (mainly in basement or attic spaces) used as living space
- Fire separation between units

In these instances, either the conditions must be corrected or the occupants must leave for their own safety. Depending on the circumstances, the occupants may be allowed to stay for a short period of time, ranging from a few hours to a few days, while repairs are made.

PROVISIONS OF THE VIRGINIA MAINTENANCE CODE

Exterior of Building

The exterior of all buildings must be kept in good repair and the building must be structurally sound and sanitary. Even vacant buildings must meet the provisions of the Maintenance Code, particularly with regard to exterior maintenance.

- **Street Numbers** – Each building should have the street numbers visible so they can be read easily from the street. The numbers should be at least 4 inches tall, placed on the front of the building, and contrast with the background. All units must be identified.
- **Yards** should be free from trash, garbage or inoperable vehicles, and graded so that rainwater drains away from the building and not directly onto adjoining properties.
- **Sidewalks and Driveways** should be kept in good repair, and maintained free from hazardous conditions that could cause someone to trip or fall. Damaged or uneven stair treads may need to be repaired or replaced.

- **Accessory Buildings** like garages, fences and utility buildings should be securable and kept in good repair, free from peeling paint and roof leaks.

- **Foundation Walls** should be straight; corners should be tied in with the rest of the foundation, not cracked and separated. Small cracks are common on old houses and are acceptable. Wide cracks should be sealed to block the entry of water, wind, insects and rodents. Foundations that do not properly support the house load may cause the entire building to be condemned.

- **Exterior Walls and Trim** should be weather tight. Wood surfaces should be painted or stained or have other protective covering or treatment. Brick walls should have no wide cracks that allow rain or wind to pass inside. Aluminum or vinyl siding, shingles or other protective coverings or treatment should not be missing pieces that would allow water to get in the wall or behind the siding.

- **Soffits and Fascia** (or overhangs) should be rot-free and prevent the nesting of birds and insects. Trim or decorative pieces should be securely fastened. As with siding and other trim, bare wood should be painted or stained.

- **Roofs** - The obvious function of the roof is to keep water out of the inside of the building. Roof problems are usually spotted from inside the house. Water stains on ceilings are a good indication that a roof might be leaking (if there is not a leak in the plumbing). Leaks usually occur first in valleys or around flashing. All roofs should be weather tight, properly flashed and maintained in good condition.

- **Chimneys** - Many roofs leak around a chimney. Close attention should be given to the flashing in this area. Older chimneys frequently have loose bricks, which could fall off the roof or inside the chimney, or even cause the chimney to collapse. Chimneys should be maintained with no loose bricks or mortar, free from obstructions, and operate as intended.

- **Gutters and Downspouts** - If gutters are in place they should be securely fastened and work properly. Gutters need to catch the roof water and channel it to a downspout, which then releases the water away from the house. They should not drain directly against the foundation. Rain water from the roof should be diverted away from any exterior entry door.

- **Stairs** of more than 4 steps should have handrails between 34 and 38 inches high and guardrails not less than 36 inches high, that are strong and secure enough to support a person. Treads and risers should be intact and firmly attached. Installation of new stairs, rails or guards may require a building permit.

- **Porches** - Porch roofs must be maintained just like the main roof. Columns should be rot-free and standing straight. Wood columns should be painted or stained. If the porch is more than 30 inches above the ground, it should have railings or guardrails at least 36 inches high that are strong enough to keep a person from falling. Decking and ceiling boards should not be loose, rotten or missing.

- **Exterior Doors** should close tightly so that the weather, rain, snow and wind cannot pass through. The door hardware should latch securely, lock and unlock from the inside easily. They should be strong enough to secure the building. Exterior doors may not have double keyed (key required on both sides) deadbolts. Interior deadbolts must have thumb latches or other hardware for the door. Interior grade doors may not be used for entrances from the exterior.

- **Windows** are for light, ventilation, and emergency escape. They should keep out the weather and be securable. All windows shall be easily operable and capable of being held open by

window hardware. Habitable rooms (bedroom, living room, eating area, bathroom, and kitchen) should have a window that opens, however mechanical ventilation to the exterior is allowed as an alternative in bathrooms. Any window that is required for ventilation or escape must be operable. A small tight crack in the glass might not be cited as a violation, but an exposed broken edge would. Storm windows are not required but if present should be in a safe condition and operate as designed. Windows that have been nailed or screwed shut or painted and caulked, such that the window no longer operates as intended must be returned to a working condition.

- **Insect Screens** - Every window or door required for ventilation is also required to have an insect screen in place from April 1 through December 1. The screens should be small mesh to keep out insects. Full window screens or adjustable sliders meet code. Screen doors must be self-closing.

- **Vacant Buildings** must be kept secure from entry and kept in good repair with no exterior violations of the code.

- **Swimming Pools, Spas and Hot Tubs** - Swimming pools shall be maintained in a clean and sanitary condition, and in good repair. Swimming pools, hot tubs and spas containing more than 24 inches of water must be completely surrounded by a fence or barrier at least 48 inches in height. Gates or doors in such barriers shall be self-closing and self-latching.

Basic Systems

Every living unit must have water, electricity and heat. Absence of any of these may cause the unit to be condemned.

- **Water System** - Every resident must have access to a bathtub or shower and sink supplied with hot and cold water of enough volume and pressure for the fixtures to operate properly and a working toilet. All plumbing fixtures must work properly and be securely anchored. Drains should drain freely. Water heaters should have a pressure relief valve and discharge pipe, and supply adequate hot water of at least 110 degrees Fahrenheit to every required faucet. Gas water heaters must be installed properly, including the gas supply line and exhaust vent, and should not be located in any bathroom, bedroom or any other occupied room that is normally closed.

- **Electrical System** - This is probably the most potentially dangerous part of a dwelling and deserves close attention. Each dwelling unit or apartment must be served by electrical service of at least 60 amperes, three wires (120/240 volt), and possibly more if the electrical load requires it. Any service of less than 60 amps per unit is considered unsafe and unacceptable. The size of all wires must be adequate to safely carry the current that may be demanded. Insulation on all wires, including service entrance cables, should be intact. Use of extension cords should be avoided and in some cases may be so dangerous as to be prohibited. Every bedroom, living room, dining room and kitchen must have at least two working electrical outlets. Bathrooms must have one outlet. Laundry areas should have one grounded outlet. Fuse panels should not be over-fused, and fuse stats may be required. Tenant access to fuse or breaker panels is encouraged but not required if 24- hour maintenance service is available. All GFCI (ground fault circuit interrupter) receptacles must test and reset properly. Receptacles should not be painted over, covers must be intact, and should be firmly attached to structure.

Heating is required from October 15 to May 1. In normal winter conditions the heating system must be able to maintain a temperature of at least 65 degrees within the unit. When the temperature is below the designated outdoor design temperature requirements for our area, requirements may be lowered, provided the heating system is operating at full capacity. The ability of the heating system to keep the unit warm will also be affected by the building's

insulation and weather-tightness of windows and doors. Fuel supply lines must be safely installed and free of leaks. Furnace exhaust must be safely vented without leaks. Space heaters may not be used as the sole means of heat for a unit or apartment.

- **Cooling** if supplied, must operate as designed from May 15 to October 1.
- **Changes** in materials or design features of buildings may be prohibited in Historic Districts.

Interior of Building

The interior of a building must be kept sound, sanitary and in good repair. The occupant of each living unit is responsible for keeping it clean, sanitary and free of garbage and trash.

- **Interior Doors** are for privacy and should close and latch properly. Bathrooms and bedrooms require doors with working hardware. Double keyed deadbolts are not allowed. There should be no hasps or padlocks on interior doors.
- **Interior Walls and Ceilings** should be free of holes, wide cracks, loose or falling plaster, and flaking or peeling paint. Settlement cracks in older houses are common and acceptable. All repairs/patches must be painted.
- **Floors** must be solid, intact, sanitary and free of holes. Large cracks, uneven surfaces and decayed areas must be repaired. Floors must be capable of bearing normal loads.
- **Clearances** - Ceiling heights of kitchens, bedrooms, bathrooms and hallways should be at least 7 feet or the originally built height. Kitchens should have at least 3 feet of passageway between cabinets. All other rooms should be at least 7 feet wide.
- **Bedrooms** need a door for privacy, at least two electrical outlets, and a window that opens for ventilation and light. Each bedroom should be at least 70 square feet for one occupant, or 50 square feet for each occupant if more than one. Bedrooms should be arranged so that occupants do not pass through one bedroom to get to another bedroom, bathroom, or living space.
- **Bathrooms** should have a door for privacy, an electrical outlet (newly installed outlets must be a ground fault circuit interrupter), toilet, sink and tub or shower with hot and cold water, and an operable window or mechanical ventilation to exhaust moisture.
- **Kitchens** should have two electrical outlets, a sink and a window that can be opened for ventilation or an exhaust fan. Any appliances such as a stove, refrigerator, or garbage disposal unit must be installed correctly and work properly, including the gas line to a gas stove. A kitchen may not be used for sleeping.
- **Pest Extermination** - The owner of any structure is responsible for extermination within the structure prior to renting or leasing a unit and all common areas. The occupant of any structure is responsible for the *continued* rodent and pest-free condition of the structure. If the infestation was caused by defects in the structure, the owner is responsible for pest extermination. In multifamily properties, both the owner and the tenant may be responsible.
- **Common Areas** like public hallways and stairs should be properly lighted for safety and security. The owner is responsible for the condition of the common areas. Common areas should be kept free of excessive clutter or storage that might block emergency egress.

• **Emergency Exits** – Every story above the second story should be provided with at least two different exits to the ground unless third story rooms are part of a second story unit. Any bedroom in a basement must either have an operable window large enough to get through, or have easy access to two independent exits out of the building. If locked, exit doors should be easy to open without keys in an emergency. Dead bolts keyed from both sides are not allowed. Doors cannot have hasps capable of being padlocked. Exits should not lead through other apartments or bathrooms. Exit paths should not be restricted by anything that could prevent a person from escaping during an emergency.

• **Smoke Detectors** must be operable and are required on every floor level including basements, in each bedroom, and in the immediate area of the bedrooms. Battery-powered smoke detectors are acceptable. The property owner is responsible for providing functioning smoke detectors at the beginning of a tenancy, and the resident generally is responsible for their continue operation by replacing old batteries. Visual alarms should be provided for the hearing-impaired. Hard wired smoke detectors, if installed, must be maintained in working order.

• **Fire Hazards** – the area around water heaters, furnaces and other heat producing devices should be free from storage or accumulations of flammable materials.

ITEMS NOT REQUIRED or covered by the Virginia Maintenance Code include cable television, telephones, intercoms, microwave ovens, antennas, window blinds or draperies, or the color of ceilings, walls, carpet or floors.

The preceding is a summary of the Code and is offered only for general guidance. If you need more detailed information the Department of Planning and Zoning staff will gladly explain or elaborate on any Code requirement.

You may also wish to get your own copy of the VMC. This Code is based on the ICC International Property Maintenance Code and is available at their web site (www.iccsafe.org) or booksellers.

RENTAL CERTIFICATE OF COMPLIANCE PROGRAM

The Rental Inspection program is designed to protect and enhance the quality of the town's housing stock and eliminate dangerous living conditions. The VMC provides the standards for these inspections. Inspections are intended to:

- Help protect the health, safety and welfare of the occupants through identifying conditions that could be dangerous or injurious.
- Help prevent decaying rental properties and the resulting negative impact they have on neighborhoods through identifying conditions that are damaging to the building.
- Provide for compliance with the VMC.

Once notified, residential rental property owners are required to inform the city of any units they own that are within the rental inspection districts.

RENTAL INSPECTION

During the inspection, the inspector will do a thorough check of the building. It will not always be possible to verify that every item is installed and working properly. (For example, a vacant unit in the summer may not have fuel for the heating system to be tested. However, water and electricity must be available for the unit to be inspected.) The inspector will identify conditions that must be corrected and the owner will be given a reasonable amount of time to make necessary repairs.

When the inspection is completed, the inspector will do one of three things:

- Issue a Certificate of Exemption, meaning no violations of the VMC were found. The owner will also be given a copy of the Certificate of Exemption. However, if the unit becomes in violation of the Maintenance Code during the exemption period the certificate may be revoked.
- Issue a Notice of Violation which will give a period of time to correct the violations. The length of time given will depend on several factors, such as extent of the repairs, seriousness of the conditions, and time of year.
- Issue a Notice of Unsafe/Unfit Structure. The time given to make repairs or vacate the unit may range from a matter of hours to several days, depending on the seriousness or danger of the code violations.

When the owner has made the needed repairs, the owner will notify the inspector and the unit will be re-inspected to verify that violations have been corrected. Note: Many repairs require a building permit. Not getting a building permit when required is against the law. If the conditions cited aren't corrected in the time given, the owner may be summoned to General District Court.

BUILDING PERMITS

There are several types of permits – building, electrical, plumbing and mechanical are the most common. In this booklet, all of these types are referred to as “building permits” unless stated otherwise. A permit authorizes specific work to be performed as provided by the USBG and are issued by the Warren County Building Inspections Department. A Zoning Permit issued by the Town of Front Royal is also required for most building permits.

When Permits are Required

Building permits are required before most major work to a building can be carried out but not usually for “ordinary repairs.”

Examples of major work that requires a permit include:

- Removing any part of a wall
- Cutting any structural support
- Altering or replacing a water supply, sewer line, gas line, furnace, electrical wiring or venting
- Work affecting public health or general safety
- Change of use
- Adding dwelling units or rooms
- Changing fuel supply type for comfort heat or water heaters
- Moving or demolishing a structure

Examples of ordinary work that would not require a permit include:

- Painting
- Roof patching or replacement (except in a historic district)
- Replacement of plumbing or electrical appliances or fixtures with similar equipment, including water heaters (Gas appliances require a permit)
- Repair or replacement of doors and windows of similar size in the same location (except in a historic district)
- Siding repairs or vinyl siding (except in a historic district)

Who May Get a Permit

A building permit may be obtained by the property owner or a licensed contractor qualified to do the work.

Who May do the Work Under a Permit

A property owner or qualified contractor may perform the work.

If you have any questions, please contact:

Building Permits

Code Enforcement

Planning & Zoning

Locality	Population	Prop Maint Code	Rental Insp Code	Bldg Insp Department	Total Staff/ Inspectors	Fees ³ Initial/Reinsp
Culpeper¹	17,145	No	No	No	N/A	N/A
Winchester	26,203	Yes	Yes	Yes	6/4 ²	35/0/50
South Boston	7,989	Yes	Yes	No	1 /1	50/0/0
Williamsburg	14,068	Yes	Yes	Yes	6/1	50/0/0
Blacksburg	42,620	Yes	Yes	Yes	5/1	0/0/100
Herndon	23,292	Yes	Yes	Yes	6/3	70/30/60
Pulaski	8,948	Yes	Yes	Yes	3/1	0/0/100

1. The Town of Culpeper did not adopt the full property maintenance code, opting to only adopt the dilapidated structure portion of Part III of the PMC. Building permits and inspection are handled by Culpeper County.
2. The City of Winchester is divided into 4 Rental Inspection areas, each with its own inspector.
3. Rental Inspection Fees are shown for: Initial Inspection/1st Reinspection/ 2nd Reinspection.