TOWN COUNCIL REGULAR MEETING

21 Main Street

Tuesday, July 08, 2025 at 9:00 AM

AGENDA

Possible additions to the agenda and related materials are not set forth herein.

Times set forth are approximate and may be adjusted as necessary.

I. WORKSESSION - 9:00 AM

A. Planning Commission Update

B. Ville Nova Subdivision Temporary Construction Easement

C. Financial Advisor Presentation

D. Outreach Updates: TC request Mr. Semple and Ms. O'Halloran

E. Homeland Security & IT Security Discussion

F. Finance and Public Safety Committee Outlines.

G. Tiffany Estates

H. Crosswalk Discussion: Mr. Kovalik Request

I. Agenda Review

II. REGULAR MEETING - 6:30 PM

A. INVOCATION.

B. PLEDGE OF ALLEGIANCE.

C. PROCLAMATIONS AND RECOGNITIONS.

D. CITIZEN'S TIME.

E. APPROVAL OF THE AGENDA.

F. PUBLIC HEARINGS.

a. **Zoning Ordinance Text Amendment - ZOTA-25-1 – A Text Amendment to Remove Data Centers as a Permissible Use within the Industrial District.** On March 22, 2025, Town Council adopted a Resolution to initiate a text amendment to Articles 3, 9, and 12 of the Town of

Warrenton Zoning Ordinance. This text amendment is for the purpose of removing Data Centers as a Permissible Use within the Industrial District, and therefore make Data Centers an impermissible Use within the Town of Warrenton.

G. CONSENT AGENDA.

a. LBBCA Advertisement Request

b. Town of Warrenton CFPF Round 5 Award Notification Letter - CFPF-25-05-69

H. NEW BUSINESS.

a. Resolution of the Town Council of the Town of Warrenton, Virginia Declaring Its Intention to Reimburse Itself from the Proceeds of One or More Tax-Exempt Financings for Certain Expenditures Made and/or to be Made in Connection with Town Capital Projects

I. UNFINISHED BUSINESS.

J. TOWN ATTORNEY'S REPORT.

K. TOWN MANAGER'S REPORT.

L. COUNCILMEMBERS TIME.

M. ADJOURNMENT.

Community Development Department

STAFF REPORT

Town Council Meeting Date:	July 8, 2025
Agenda Title:	Planning Commission Update
Requested Action:	Informational Purposes
Staff Lead:	Denise Harris, Planning Manager

EXECUTIVE SUMMARY

The Planning Commission cancelled their June meetings. Next meeting will be July 15, 2025.

BACKGROUND

No Minutes are available because the June meeting was cancelled.

STAFF RECOMMENDATION

For Informational Purposes.

COMMUNITY DEVELOPMENT STAFF REPORT

Council Meeting Date:	July 8, 2025
Agenda Title:	Ville Nova Subdivision- Off-site Temporary Construction Easement
Requested Action:	Approval to establish an off-site temporary construction easement to allow connection to an existing sanitary sewer connection on Town owned property
Department / Agency Lead:	Community Development
Staff Lead:	Amber Heflin

EXECUTIVE SUMMARY

EXO Development, LLC, the applicant and property owner, has officially requested to establish an off-site temporary construction easement located on Town owned property, known as Academy Hill Park, to establish a new sanitary sewer connection to serve the proposed 17 lot by-right subdivision currently under review with Town staff.

BACKGROUND

The Site Development Plan for the proposed 17 lot subdivision was submitted on January 25, 2024. The project has had three subsequent reviews by staff to address various comments. The final plat was submitted on November 13, 2024, and has undergone two reviews since its original submission. The off-site easement plat was submitted on September 6, 2024, and has undergone five reviews since its original submission.
The off-site easement is being requested to allow a connection to an existing sanitary sewer line adjacent to the Academy Hill Park, through a temporary construction easement. The easement would allow a connection to the closest feasible point for sanitary sewer due to existing topography challenges on Academy Hill Road. The temporary construction easement across the park will allow the developer to connect into the existing line adjacent to the subject property and allow the Town the right and ability to continue to maintain the line once construction has been completed.

Service Level/Collaborative Impact

Approval of the temporary construction easement will allow the applicant to connect to an existing sanitary sewer line adjacent to the park and will allow the Town to assume maintenance responsibilities due to the line being located on Town property. The proposed method of connection is the most cost-effective from a building and operational standpoint, as gravitational sewer flow is preferred for Town-owned and maintained lines rather than mechanically pumped sewer. The approval of the temporary construction easement and the construction of the sanitary sewer lines will be a benefit to the Town's future plans for restrooms at Academy Hill Park.

Fiscal Impact

There is no fiscal impact to the Town.

Legal Impact

The approval to establish the temporary construction easement has no direct legal impact to the Town.

ATTACHMENTS

1. Proposed Easement Plat
2. Sheet C-301- Site Development Plan for Ville Nova Subdivision

NOTES:

1. THE SUBJECT PROPERTY SHOWN HEREON IS IN THE NAME OF THE TOWN OF WARRENTON, AS RECORDED IN DEED BOOK 108 PAGE 90, AMONG THE LAND RECORDS OF FAUQUIER COUNTY, VIRGINIA AND HAVING A PARCEL IDENTIFICATION NUMBER OF 6984-63-2742 PER THE DEPARTMENT OF ASSESSMENTS AND IS ZONED PSP.
2. THE BOUNDARY INFORMATION IS BASED ON DEEDS, PLATS OF RECORD, AND A BOUNDARY SURVEY PREPARED BY THIS FIRM ON FEBRUARY 27, 2024.
3. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT, AND THEREFORE, MAY BE SUBJECT TO RESTRICTIONS, COVENANTS, AND/OR EASEMENTS, WRITTEN OR IMPLIED.
4. HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE VIRGINIA COORDINATE SYSTEM (VCS) 1983 - NORTH AS ESTABLISHED FROM A CURRENT GPS SURVEY.
5. THE SUBJECT PROPERTIES ARE LOCATED IN OTHER AREAS ZONE X (AREAS OF MINIMAL FLOOD HAZARD) PER MAP ENTITLED "FEMA, NATIONAL FLOOD INSURANCE PROGRAM, FLOOD INSURANCE RATE MAP, FAUQUIER COUNTY, VIRGINIA, AND INCORPORATED AREAS, PANEL 308 OF 550", MAP NUMBER 51061C0308D, WITH A MAP REVISED DATE OF APRIL 25, 2024.
6. THE CENTERLINE OF ACADEMY HILL ROAD IS ALSO THE NORTHERN PROPERTY LINE.

OWNER'S CONSENT STATEMENT

THE CONVEYANCE OF EASEMENTS ON THE LAND DESCRIBED HEREIN IS WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRES OF THE UNDERSIGNED OWNERS, PROPRIETORS, AND TRUSTEE.

BY: _____

NOTARY

I, _____, A NOTARY PUBLIC AT LARGE WHOSE COMMISSION WILL EXPIRE ON _____
DO HEREBY CERTIFY THAT WHOSE NAME JUST SIGNED TO THE FOREGOING OWNERS CONSENT AND DEDICATION DATED _____ HAVING ACKNOWLEDGED THE SAME BEFORE ME IN MY STATE AFORESAID.

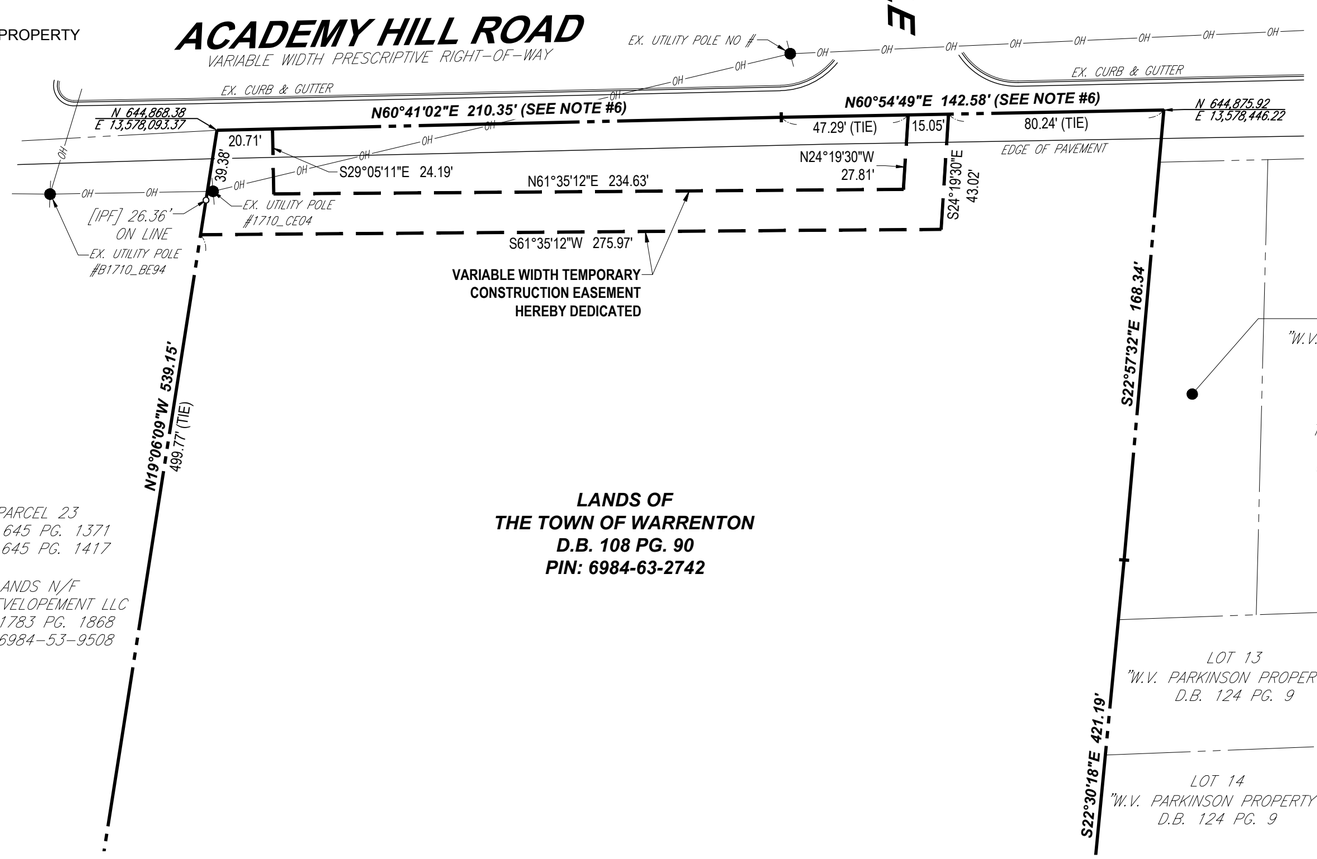
GIVEN UNDER MY HAND THIS ____ DAY OF _____

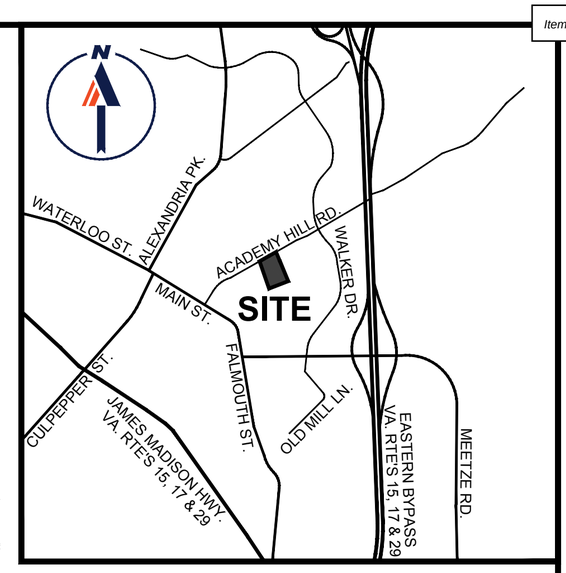
_____
NOTARY PUBLIC DATE

CERTIFICATE OF APPROVAL

THE DEDICATION OF A VARIABLE WIDTH TEMPORARY CONSTRUCTION EASEMENT ON THE PROPERTY OF THE TOWN OF WARRENTON IS APPROVED IN ACCORDANCE WITH THE EXISTING SUBDIVISION REGULATIONS AND MAY BE ADMITTED TO RECORD.

_____
TOWN OF WARRENTON AND TOWN COUNCIL DATE
AGENT FOR FAUQUIER COUNTY
BOARD OF SUPERVISORS





SITE LOCATION MAP
SCALE: 1" = 2,000'

SURVEYOR'S CERTIFICATE

I, ROBERT C. HARR, JR., A DULY LICENSED LAND SURVEYOR IN THE COMMONWEALTH OF VIRGINIA, DO HEREBY CERTIFY THAT THE PROPERTY SHOWN HEREON IS NOW IN THE NAME OF THE TOWN OF WARRENTON AS ACQUIRED IN DEED BOOK 108 PAGE 90, AMONG THE LAND RECORDS OF FAUQUIER COUNTY, VIRGINIA.

COMMONWEALTH OF VIRGINIA
ROBERT C. HARR, JR.
Lic. No. 3111
LAND SURVEYOR

3.26.25
ROBERT C. HARR, JR. DATE
VIRGINIA LICENSED LAND SURVEYOR NO. 3111

1"= 40'

LEGEND

○ [IPF]	IRON PIPE FOUND
——OH——	OVERHEAD WIRES

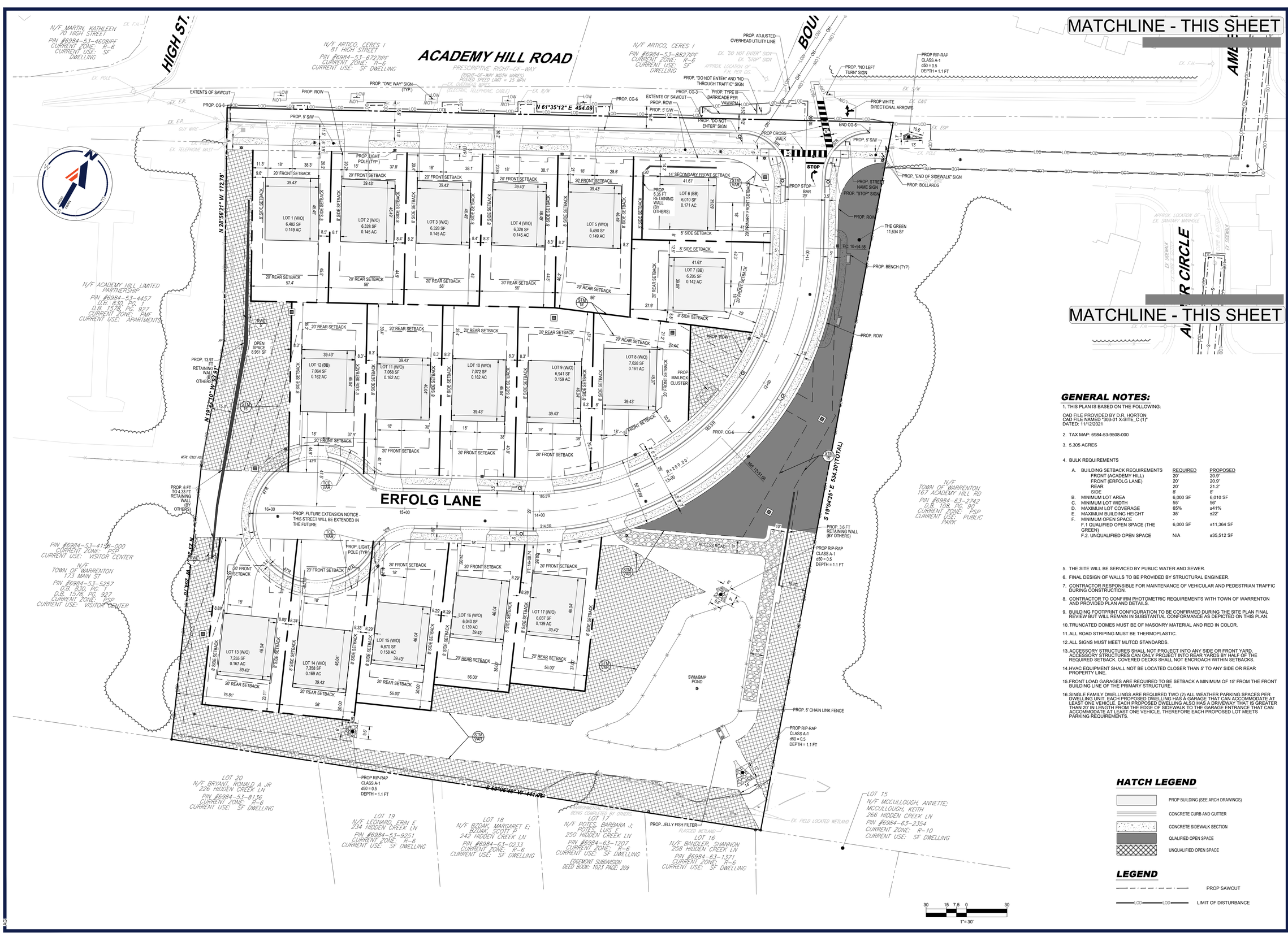
APPROVAL BLOCK

PLAT SHOWING
DEDICATION OF A VARIABLE WIDTH
TEMPORARY CONSTRUCTION EASEMENT
ON THE LANDS OF
THE TOWN OF WARRENTON
DEED BOOK 108 PAGE 90
CENTER MAGISTERIAL DISTRICT
TOWN OF WARRENTON
FAUQUIER COUNTY, VIRGINIA
SCALE: 1"=40' DATE: JULY 12, 2024
DRAWN: CT SHEET: 1 OF 1

NO.	REVISION	DATE
1	REVISED PER COUNTY COMMENTS	10/03/2024
2	REVISED PER COUNTY COMMENTS	11/19/2024
3	REVISED PER COUNTY COMMENTS	12/10/2024
4	REVISED PER EASEMENT CHANGES	03/26/2025

BOHLER
12825 WORLDGATE DRIVE, SUITE 700
HERNDON, VIRGINIA 20170
703.709.9500
www.bohlerengineering.com
UPSTATE NEW YORK ■ BOSTON, MA ■ NEW YORK METRO ■ WARREN, NJ ■ PHILADELPHIA/SOUTHERN NJ ■ LEHIGH VALLEY, PA ■ SOUTHEASTERN PA
BALTIMORE, MD ■ SOUTHERN MARYLAND ■ NORTHERN VIRGINIA ■ WASHINGTON, DC ■ CENTRAL VIRGINIA ■ CHARLOTTE, NC ■ RALEIGH, NC

S-EASE-PLAT-VAB230190.00.4A.dwg



GENERAL NOTES:

1. THIS PLAN IS BASED ON THE FOLLOWING:

   CAD FILE PROVIDED BY D.R. HORTON
   CAD FILE NAMED "303-01 X-SITE_C (1)"
   DATED: 11/12/2021

2. TAX MAP: 6984-53-9508-000

3. 5.305 ACRES

4. BULK REQUIREMENTS

		REQUIRED	PROPOSED
A.	BUILDING SETBACK REQUIREMENTS		
	FRONT (ACADEMY HILL)	20'	20.9'
	FRONT (ERFOLG LANE)	20'	20.9'
	REAR	20'	21.2'
	SIDE	8'	8'
B.	MINIMUM LOT AREA	6,000 SF	6,010 SF
C.	MINIMUM LOT WIDTH	55'	56'
D.	MAXIMUM LOT COVERAGE	65%	±41%
E.	MAXIMUM BUILDING HEIGHT	35'	±22'
F.	MINIMUM OPEN SPACE	-	-
	F.1 QUALIFIED OPEN SPACE (THE GREEN)	6,000 SF	±11,364 SF
	F.2. UNQUALIFIED OPEN SPACE	N/A	±35,512 SF

5. THE SITE WILL BE SERVICED BY PUBLIC WATER AND SEWER.
6. FINAL DESIGN OF WALLS TO BE PROVIDED BY STRUCTURAL ENGINEER.
7. CONTRACTOR RESPONSIBLE FOR MAINTENANCE OF VEHICULAR AND PEDESTRIAN TRAFFIC DURING CONSTRUCTION.
8. CONTRACTOR TO CONFIRM PHOTOMETRIC REQUIREMENTS WITH TOWN OF WARRENTON AND PROVIDED PLAN AND DETAILS.
9. BUILDING FOOTPRINT CONFIGURATION TO BE CONFIRMED DURING THE SITE PLAN FINAL REVIEW BUT WILL REMAIN IN SUBSTANTIAL CONFORMANCE AS DEPICTED ON THIS PLAN.
10. TRUNCATED DOMES MUST BE OF MASONRY MATERIAL AND RED IN COLOR.
11. ALL ROAD STRIPING MUST BE THERMOPLASTIC.
12. ALL SIGNS MUST MEET MUTCD STANDARDS.
13. ACCESSORY STRUCTURES SHALL NOT PROJECT INTO ANY SIDE OR FRONT YARD. ACCESSORY STRUCTURES CAN ONLY PROJECT INTO REAR YARDS BY HALF OF THE REQUIRED SETBACK. COVERED DECKS SHALL NOT ENCROACH WITHIN SETBACKS.
14. HVAC EQUIPMENT SHALL NOT BE LOCATED CLOSER THAN 5' TO ANY SIDE OR REAR PROPERTY LINE.
15. FRONT LOAD GARAGES ARE REQUIRED TO BE SETBACK A MINIMUM OF 15' FROM THE FRONT BUILDING LINE OF THE PRIMARY STRUCTURE.
16. SINGLE FAMILY DWELLINGS ARE REQUIRED TWO (2) ALL WEATHER PARKING SPACES PER DWELLING UNIT. EACH PROPOSED DWELLING HAS A GARAGE THAT CAN ACCOMMODATE AT LEAST ONE VEHICLE. EACH PROPOSED DWELLING ALSO HAS A DRIVEWAY THAT IS GREATER THAN 20' IN LENGTH FROM THE EDGE OF SIDEWALK TO THE GARAGE ENTRANCE THAT CAN ACCOMMODATE AT LEAST ONE VEHICLE. THEREFORE EACH PROPOSED LOT MEETS PARKING REQUIREMENTS.

HATCH LEGEND

- PROP BUILDING (SEE ARCH DRAWINGS)
- CONCRETE CURB AND GUTTER
- CONCRETE SIDEWALK SECTION
- QUALIFIED OPEN SPACE
- UNQUALIFIED OPEN SPACE

LEGEND

- PROP SAWCUT
- LOD LOD LIMIT OF DISTURBANCE

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABILITY SERVICES
PERMITTING SERVICES
TRANSPORTATION SERVICES

THE BOHLER CIVIL DESIGN AND CONTENT OF THIS PLAN ARE PROPRIETARY AND SHALL NOT BE COPIED OR USED FOR ANY PURPOSE, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM BOHLER. ONLY APPROVED AND SEALED PLANS SHALL BE UTILIZED FOR CONSTRUCTION PURPOSES. © BOHLER, INC.

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	06/21/2024	PER TOWN COMMENTS	MNK / KSR
2	09/26/2024	PER TOWN COMMENTS	ANB / CDH

811 Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

NOT APPROVED FOR CONSTRUCTION

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	VAB230190.00
DRAWN BY:	ANB/MNK
CHECKED BY:	KSR
DATE:	01/18/2024
CAD I.D.:	SITE -0

PROJECT:

PROP. SITE PLAN DOCUMENTS

FOR

EXO DEVELOPMENT, LLC

ACADEMY HILL

ACADEMY HILL ROAD
TOWN OF WARRENTON
VIRGINIA

BOHLER
28 BLACKWELL PARK LANE, SUITE 201
WARRENTON, VIRGINIA 20186
Phone: (540) 349-4500
Fax: (540) 349-0321
VA@BohlerEng.com

COMMONWEALTH OF VIRGINIA
KATHERINE ROBERTS
Lic. No. 0402060193
09/26/2024
PROFESSIONAL ENGINEER

SHEET TITLE:

SITE PLAN

SHEET NUMBER:

C-301

REVISION 2 - 09/26/2024

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8, 2025
Agenda Title:	Financial Advisor Presentation
Requested Action:	Consider adoption of the Resolution of the Town Council of the Town of Warrenton, Virginia Declaring Its Intention to Reimburse Itself from the Proceeds of One or More Tax-exempt Financings for Certain Expenditures Made and/or to be Made in Connections with Town Capital Projects
Department / Agency Lead:	Finance & Procurement
Staff Lead:	Stephanie Miller, Director of Finance & Procurement

EXECUTIVE SUMMARY

The Fiscal Year 2026 Adopted Budget includes projected debt funding for General Fund and Water and Sewer capital projects and General Fund capital asset replacements. The Town has almost fully drawn down the 2022 bond that was issued for Water and Sewer capital projects. It is anticipated that the Town will need to issue debt in Fall 2025 to provide adequate funding for the planned projects.

BACKGROUND

Davenport & Company, LLC serves as the Town's municipal financial advisor. Staff has provided Davenport with the Town's Adopted 2026 – 2031 Capital Improvement Program. This document outlines the six-year plan for our capital needs, including General and Water and Sewer capital projects and capital asset replacements.

Kyle Laux, Senior Vice President, will provide an overview of a proposed Plan of Finance, which includes a dual-track process for issuing debt in Fall 2025. This will consist of a solicitation for bank loans and an application to the Virginia Resources Authority (VRA) pooled financing program. The solicitation will be structured to allow for different financing options that provide varying terms in alignment with the underlying assets.

Mr. Laux will also discuss the potential benefits of obtaining a credit rating so that the Council may determine if they wish to proceed with that process at this time.

In anticipation of a debt issuance later this year, bond counsel has drafted a proposed reimbursement resolution. This allows the Town to reimburse itself from future bond proceeds for capital expenditures incurred 60 days prior to the debt issuance.

STAFF RECOMMENDATION

Staff recommends approval of the reimbursement resolution to offer flexibility in claiming reimbursement from future bond proceeds for capital expenditures incurred 60 days prior to the date of issuance.

Service Level/Collaborative Impact

The adoption of the reimbursement resolution enables the Town to fund ongoing capital projects from a future debt issuance.

Policy Direction/Warrenton Plan 2040

Some of the many goals of Warrenton Plan 2040 that are supported by the Town's 2026-2031 CIP include:

- CF-4: Ensure healthy, safe, adequate water and wastewater services.
- CF-5: To provide a fiscally responsible infrastructure that maintains a high quality of life for residents, supports current businesses, and attracts new employers with a stable tax structure.
- P-2: The Town of Warrenton's Parks, Open Space and Environment serve as key elements to the Town's public health infrastructure.
- T-1: Improve multi-modal capacity and safety that encourages trips by walking, bicycling, and transit.
- T-2: Enhance the traveling experience by creating great streets.
- T-3: Promote livability in the Town by creating great places where residents and visitors feel welcome and safe.
- T-4: Provide an equitable and connected Multi-Modal Network.

Fiscal Impact

The adoption of the reimbursement resolution will provide the Town with flexibility to reimburse capital expenditures incurred prior to the date of debt issuance.

Legal Impact

The adoption of the reimbursement resolution does not obligate the Town to issue debt. It provides flexibility to reimburse Town funds from future debt proceeds, if subsequently issued.

ATTACHMENTS

1. Resolution of the Town Council of the Town of Warrenton, Virginia Declaring Its Intention to Reimburse Itself from the Proceeds of One or More Tax-Exempt Financings for Certain Expenditures Made And/Or to Be Made in Connection with Town Capital Projects

July 8, 2025
Town Council
Regular Meeting
Res. No.

RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF WARRENTON, VIRGINIA DECLARING ITS INTENTION TO REIMBURSE ITSELF FROM THE PROCEEDS OF ONE OR MORE TAX-EXEMPT FINANCINGS FOR CERTAIN EXPENDITURES MADE AND/OR TO BE MADE IN CONNECTION WITH TOWN CAPITAL PROJECTS

WHEREAS, the Town of Warrenton, Virginia **(the "Town")** is a political subdivision organized and existing under the laws of the Commonwealth of Virginia; and

WHEREAS, the Town has paid, beginning no earlier than sixty days prior to adoption of this resolution, and will pay, on and after the date hereof, certain expenditures **(the "Expenditures")** in connection with Town general fund and utility projects identified in the Town's capital improvement plan and/or capital items identified in the Town's fiscal year 2026 budget **(the "Projects")**; and

WHEREAS, the Town Council of the Town **(the "Council")** has determined that those moneys previously advanced no earlier than sixty days prior to the date of this resolution and to be advanced on and after the date hereof to pay the Expenditures are available only for a temporary period and it is necessary to reimburse the Town for the Expenditures from the proceeds of one or more issues of tax-exempt notes, bonds or similar obligations **(together, the "Bonds")**; and

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COUNCIL OF THE TOWN OF WARRENTON, VIRGINIA, AS FOLLOWS:

Section 1. The Council hereby declares the Council's intent to reimburse the Town with the proceeds of the Bonds for Expenditures with respect to the Projects made on and after sixty days prior to the date of adoption of this resolution. The Town reasonably expects on the date hereof that it will reimburse itself for the Expenditures with the proceeds of the Bonds.

Section 2. Each Expenditure was and will be either (a) of a type properly chargeable to a capital account under general federal income tax principles (determined in each case as of the date of the Expenditures), (b) a cost of issuance with respect to the Bonds, (c) a nonrecurring item that is not customarily payable from current revenues, or (d) a grant to a party that is not related to or an agent of the Town so long as such grant does not impose any obligation or condition (directly or indirectly) to repay any amount to or for the benefit of the Town.

Section 3. The maximum principal amount of the Bonds expected to be issued for the Projects is $21,700,000.

Section 4. The Town will make a reimbursement allocation, which is a written allocation by the Town that evidences the Town's use of proceeds of the Bonds to reimburse an Expenditure, no later than 18 months after the later of the date on which the Expenditure is paid or the Projects are placed in service or abandoned, but in no event more than three years after the date on which the Expenditure is paid. The Town recognizes that exceptions are available for certain "preliminary expenditures," costs of issuance, certain de minimis amounts, expenditures by "small issuers" (based on the year of issuance and not the year of expenditure) and expenditures for construction projects of at least 5 years.

Section 5. This resolution shall take effect immediately upon its passage.

The Town Recorder of the Town Council of the Town of Warrenton, Virginia hereby certifies that the above-referenced resolution was adopted by a majority vote of the Town Council at a regular meeting of the Town Council, duly called and held on July 8, 2025, during an open meeting, as follows:

Votes:
Ayes:
Nays:
Absent from Vote:
Absent from Meeting:

For Information:
Finance & Procurement Director
Town Attorney

ATTEST: _____
Town Recorder

DAVENPORT & COMPANY

Town of Warrenton, Virginia

FY 2026 Plan of Finance

July 8, 2025

Member NYSE | FINRA | SIPC

Background

- Davenport & Company LLC ("Davenport") serves as Financial Advisor to the Town of Warrenton, VA (the "Town").
- Davenport presented a Financial Review to Town Council during the FY 2026 Budget process to brief the Town Council on the financial status of the Town.
- The Town adopted the FY 2026 Budget which included revenue increases to support both operating and capital costs.
- Davenport was asked to present a Plan of Finance for the identified FY 2026 Capital Projects – these include both General Fund and Water & Sewer Fund capital. Additional details are included herein.

Goals and Objectives

- Identify the capital investments approved via the FY 2026 Budget.
- Review long-term borrowing and short-term interest rate trends.
- Present a Plan of Finance that provides the Town flexibility and the most cost-effective access to financing.
- Present a preliminary timetable for action.

FY 2026 Capital Projects

- Within the Adopted FY 2026 Budget, the Town has identified approximately $22.8 million in capital projects via the Capital Improvement Plan ("CIP) and Capital Asset Replacement Program ("CARP").
  - The CIP generally captures larger, long-lived assets such as infrastructure improvements, buildings, etc.
  - The CARP includes shorter useful life assets such as equipment, fleet vehicles, etc.

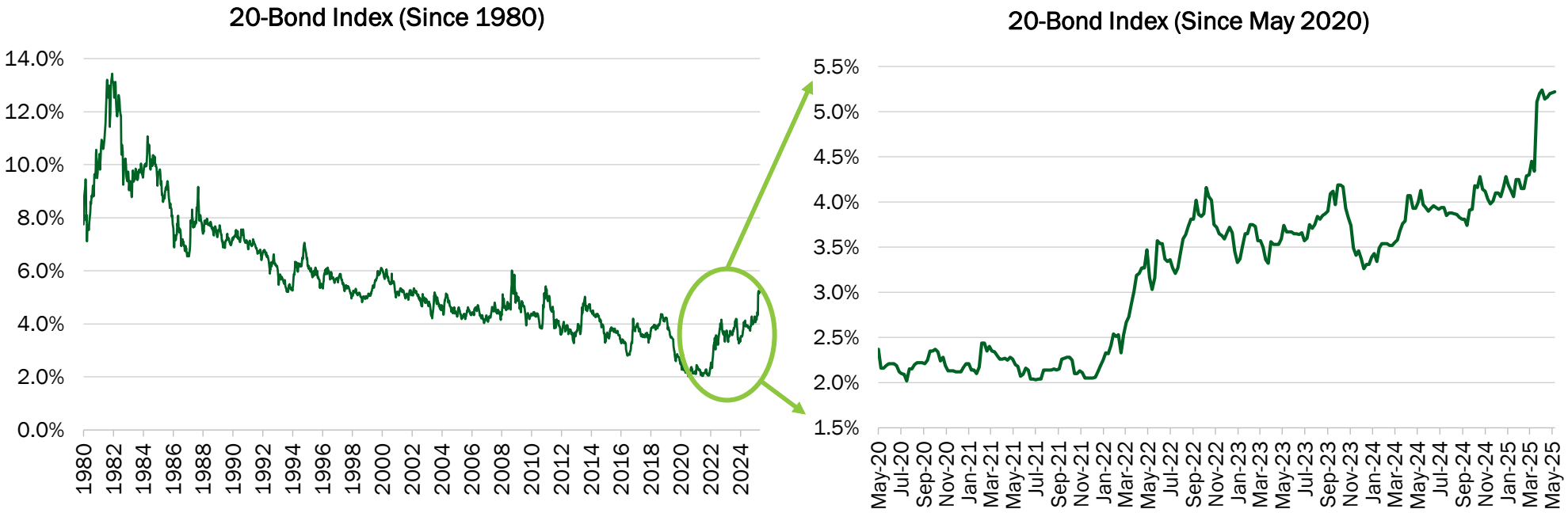
Fund		Estimate
General Fund CIP	$	2,526,936
General Fund CARP		2,756,241
General Fund Sub-total		5,283,177
Water & Sewer Fund CIP		16,416,489
Water & Sewer Fund CARP		1,070,000
Water & Sewer Fund Sub-total		17,486,489
FY 2026 CIP & CARP Total	**$**	**22,769,665**

Debt Funding
~$21.7 million

Cash Funding
$1.07 million

- Debt funding capital projects spreads the cost of the capital over the time frame in which tax-payers/users will benefit from the project.

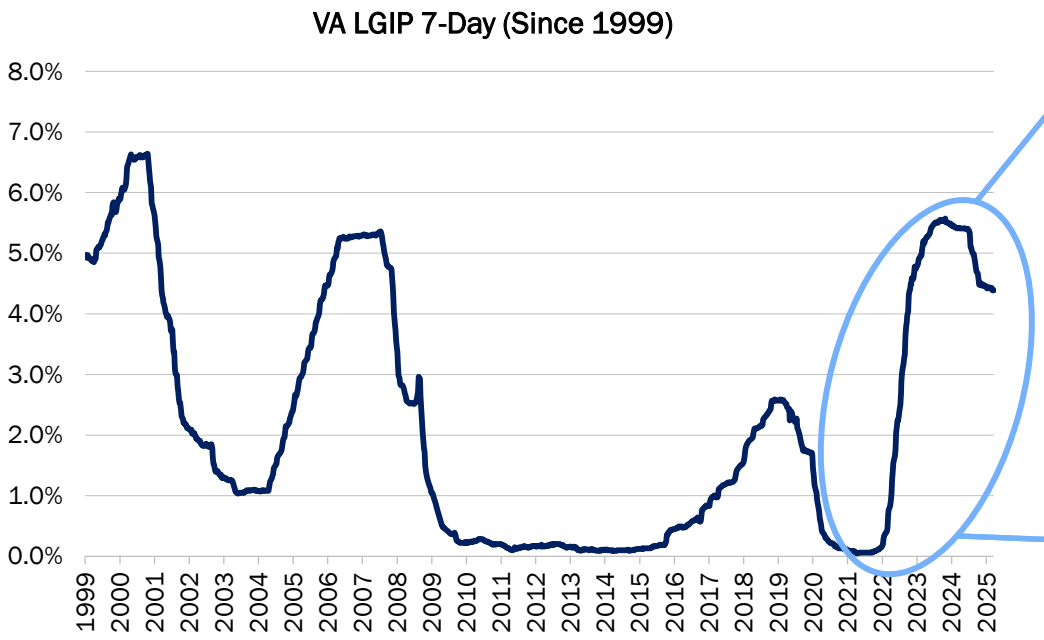
Interest Rate Environment | Tax-Exempt

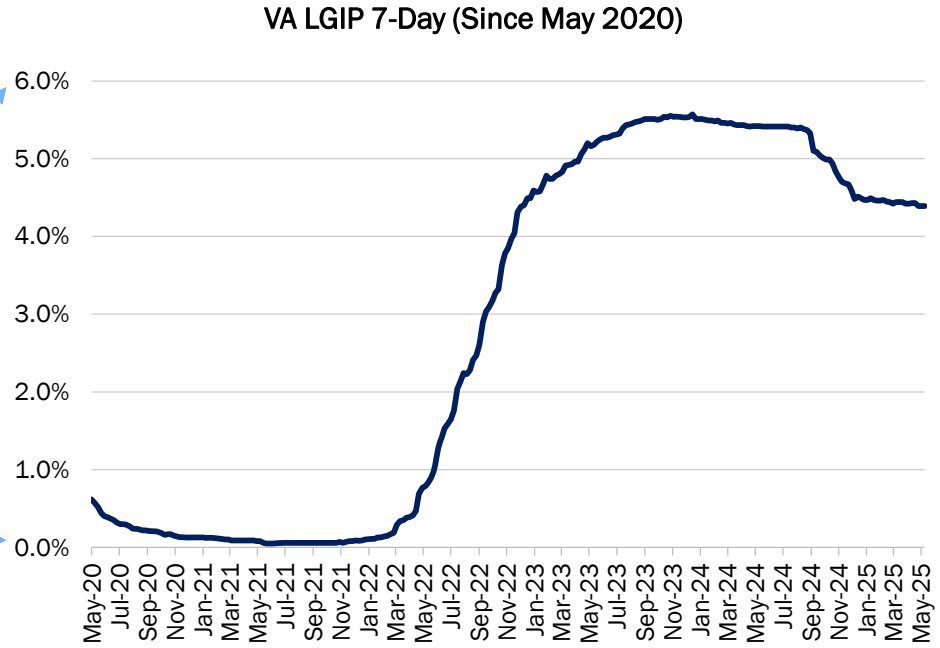


Interest rates for highly-rated, tax-exempt borrowers, remain historically favorable.

The 20-year interest rates above show the Bond Buyer's "20-Bond Index" which consists of 20 tax-exempt bonds with an average rating of 'Aa2'/'AA' (Moody's / S&P) that mature in 20 years. The 20-Bond Index serves as a general indicator of prevailing interest rates for tax-exempt borrowers. Updated as of 06/26/2025.

Reinvestment Rate Trends | LGIP 7-Day Rate





Short-term reinvestment rates have increased to levels last seen over a decade ago.

The above charts show VA-LGIP 7 Day rate data as of 06/2

Plan of Finance

- The majority of the FY 2026 Capital Program consists of Water & Sewer infrastructure projects.

- The multi-year planning undertaken as part of the budget process contemplated a 30-year repayment term for the Water & Sewer CIP projects.
  - Repayment over 30 years for Water & Sewer infrastructure is typical in the industry, given the type of assets financed.

- Similar to prior financings, the General Fund CIP contemplates a 20-year repayment term.

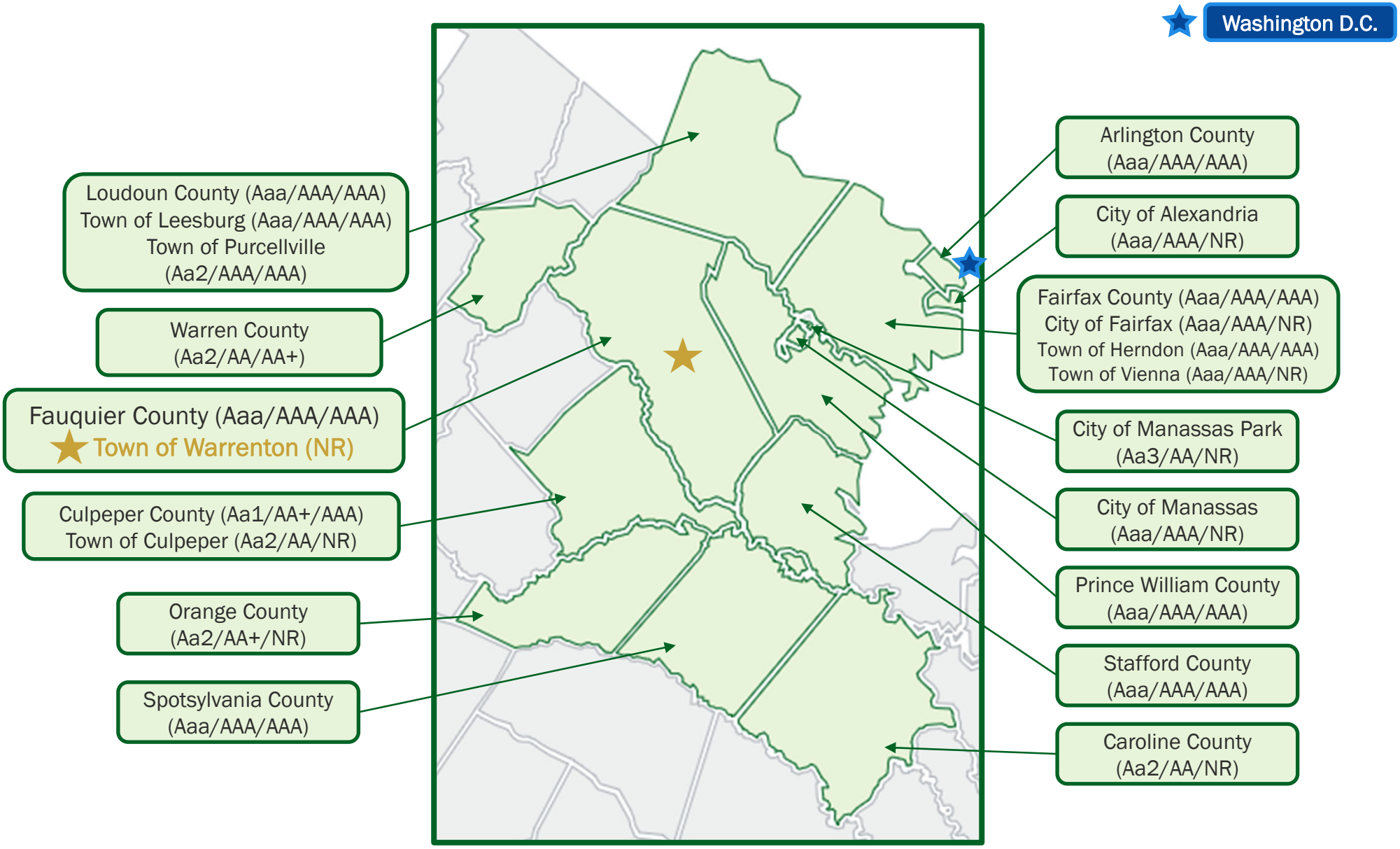
- The General Fund CARP contemplates a 7-15 year repayment term to reflect the shorter-lived assets.
  - The Water and Sewer Fund CARP is anticipated to be cash-funded.

- The individual debt schedules for each program can be aggregated into one loan for purposes of securing financing. The repayment can be broken out internally to ensure the General Fund and Water & Sewer Funds remain independent from one another.

Plan of Finance (cont.)

- Given the size (~$21.7 million) and potential term of the loan, Davenport recommends that the Town secure credit ratings to access the Public Credit Markets.
- Davenport recommends that the Town consider formally engaging **Moody's** and **Standard & Poor's** for credit ratings.
- Maintaining multiple credit ratings is typical, as shown on the following page.
- Issuances in the Public Credit Markets commonly go out 30 years, and in some instances, longer.
- The Public Credit Markets provide the Town with the most flexibility in terms of repayment structure, issuance timing, final maturity, etc.

Peer Credit Ratings

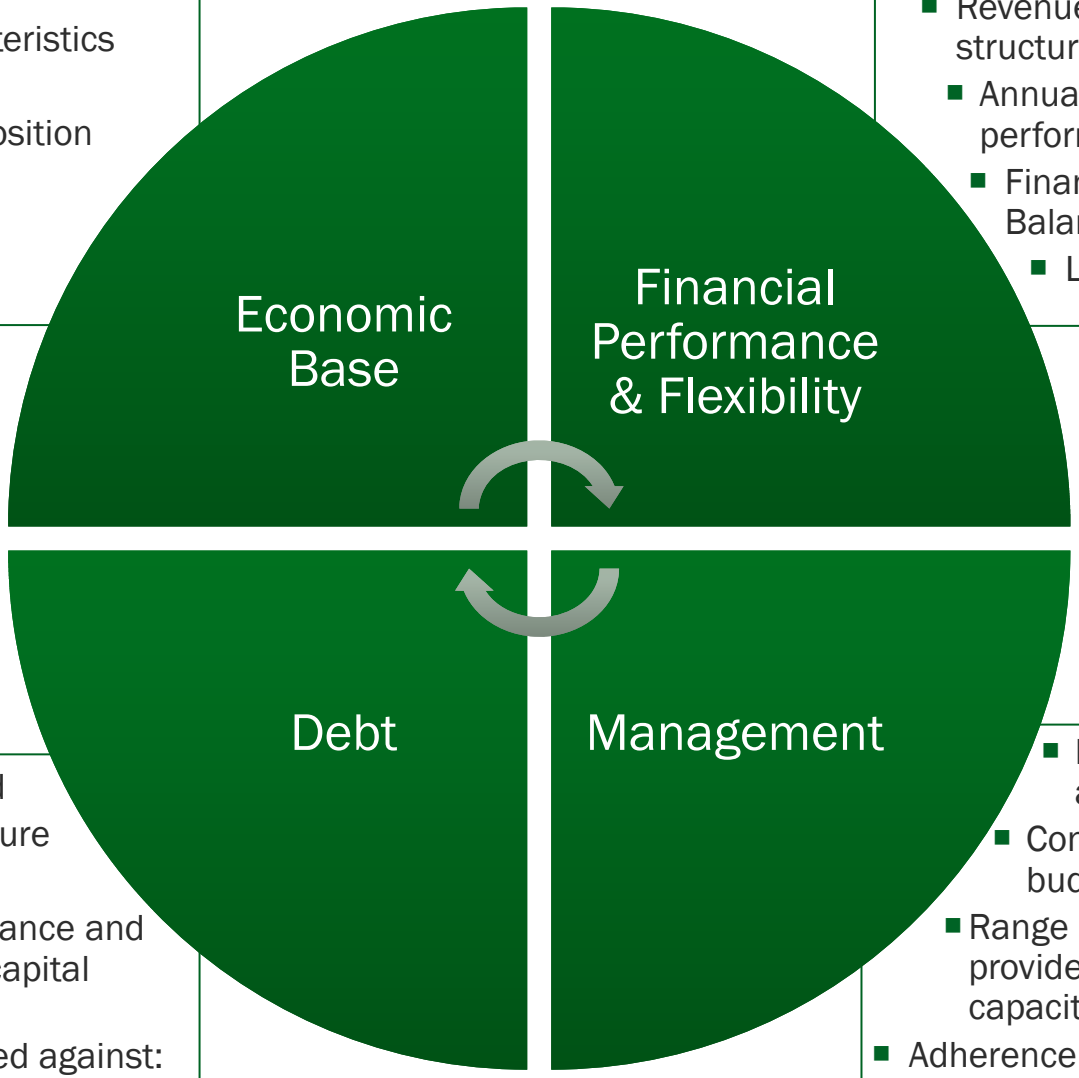


Credit Rating Key (Moody's/S&P/Fitch). Sourced from each respective rating agency as of June 29, 2025.

Additional Considerations

- The Town has been historically well-run from a financial perspective.
- The Town's CIP and CARP programs total nearly $125 million over the next 6 years.
- The FY 2026 issuance will be the first in a series of borrowings to support the Town's capital program.
- Credit ratings provide local governments, like Warrenton, with the widest variety of financing options for capital projects.
- The following page describes in summary form the rating agency criteria (i.e. how the rating agencies arrive at their credit ratings).

Key Drivers to a Credit Rating



- Demographic Characteristics
- Tax Base
- Industry Mix & Composition
- Local and Regional Growth patterns

[Moody's = 30% / S&P = 20% / Fitch = 44%]

- Revenue & Expenditure structure and patterns
  - Annual Operating & Budgetary performance
    - Financial flexibility/Fund Balance position
      - Long-Term Financial Plan

[Moody's = 30% / S&P = 40% / Fitch = 35%]

[Moody's = 30% / S&P = 20% / Fitch = 21%]

- Nature of the pledged security & debt structure
- Balance between accelerated debt issuance and under-investment in capital facilities
- Debt Burden measured against: Tax Base & Total Budget

[Moody's = 10% / S&P = 20%]

- Financial Forecasting and management
- Consistent and prudent budgeting practices
- Range and growth of services provided in relation to capacity to provide services
- Adherence to long-range financial planning and policies

Note: %'s are from Moody's updated methodology November 2022/ S&P updated methodology September 2024 / Fitch updated methodology Apri

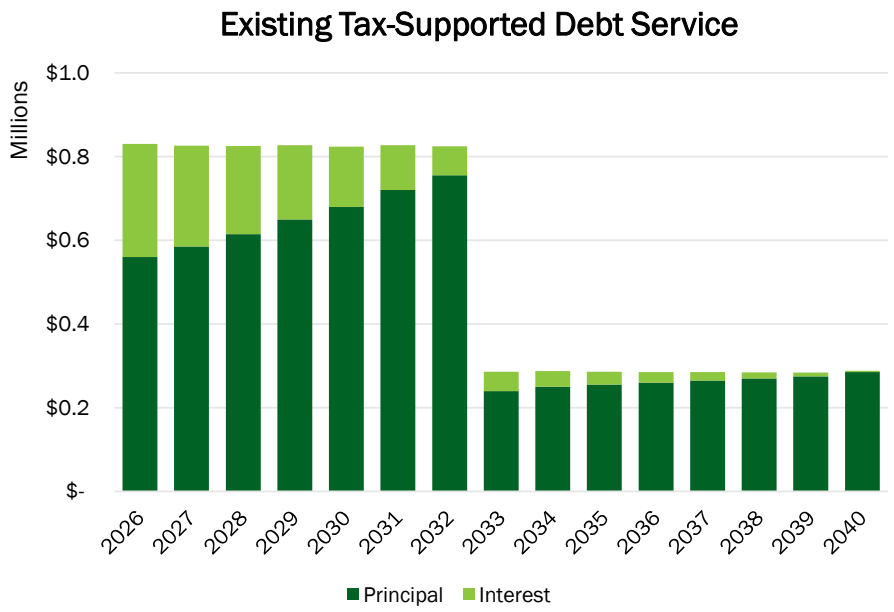
Advantages of a Credit Rating

- From a financial and capital perspective, the Town is well positioned to meet future challenges.

- As such, obtaining strong inaugural Issuer Credit Rating(s) from the National Credit Rating Agencies (i.e. Moody's and S&P) could produce multiple benefits for the Town including, but not limited to:
  - Improving the favorability of interest rates and terms that the Town could achieve for any potential future borrowings or refinancings;
  - Acting as a signal of strength to the business community about the governance, management, and financial health of the Town, which can help further drive economic development opportunities;
  - Providing a basis of comparison between the Town and other localities within the region and nationally;
  - Serving as an external and independent validation of the strength of Town operations; and,
  - Acting as a "check and balance" in the event a future Council(s) move in a direction(s) that does not follow industry standard "best practices."

General Fund Planning Estimate

Existing Tax–Supported Debt Profile



Existing Tax-Supported Debt Service				
Fiscal Year	Principal	Interest	Total	Payout Ratio
2026	$ 560,000	$ 270,169	$ 830,169	8.4%
2027	585,000	240,828	825,828	17.2%
2028	615,000	210,078	825,078	26.4%
2029	650,000	177,663	827,663	36.2%
2030	680,000	143,581	823,581	46.4%
2031	720,000	107,706	827,706	57.2%
2032	755,000	69,909	824,909	68.5%
2033	240,000	46,063	286,063	72.1%
2034	250,000	37,656	287,656	75.8%
2035	255,000	31,041	286,041	79.7%
2036	260,000	25,569	285,569	83.6%
2037	265,000	20,106	285,106	87.5%
2038	270,000	14,653	284,653	91.6%
2039	275,000	8,978	283,978	95.7%
2040	285,000	3,028	288,028	100.0%
Total	**$ 6,665,000**	**$1,407,028**	**$ 8,072,028**	

Summary of Outstanding Tax-Supported Debt

Series	Original Par	Par Outstanding	Interest Rate	Final Maturity
G.O. Refunding Bond, Series 2021B	$ 8,720,000	$ 6,665,000	5.125% - 2.037%	10/1/2039
	Total	$ 6,665,000		

Source: Davenport Debt Model.

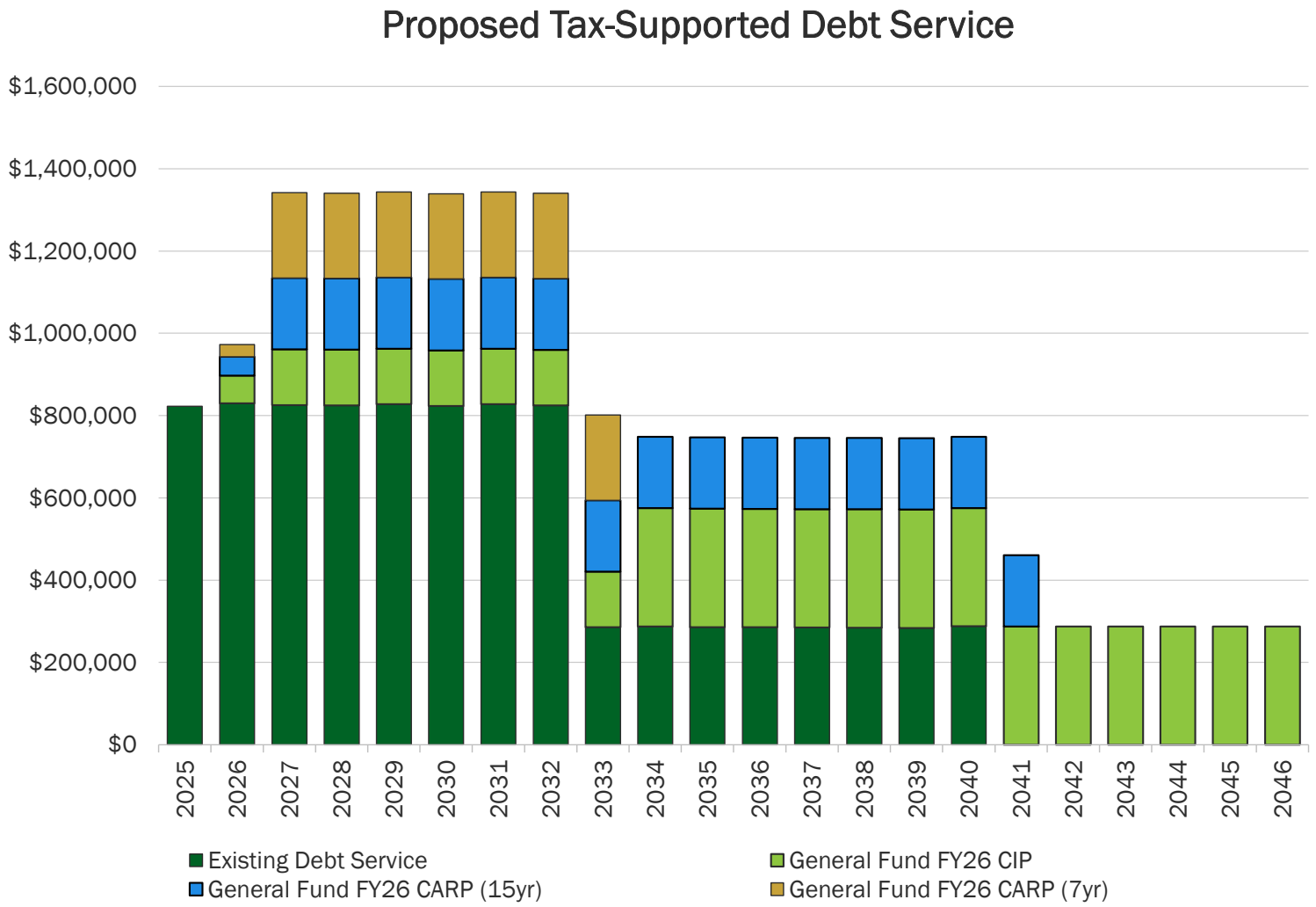
General Fund FY 2026 Debt Service Estimates

- As shown below, Davenport has estimated the debt service associated with the General Fund portion of the FY 2026 Adopted Capital Program.
  - General Fund CIP ($2.5M) utilizes a 5.0% planning interest rate and a 20-year repayment term.
  - General Fund CARP (15yr/$1.7M) utilizes a 5.0% planning interest rate and a 15-year repayment term.
  - General Fund CARP (7yr/$1.1M) utilizes a 5.0% planning interest rate and a 7-year repayment term.

	A	B	C	D	E = Sum(B:D)
Fiscal Year	Existing Debt Service	General Fund FY26 CIP	General Fund FY26 CARP (15yr)	General Fund FY26 CARP (7yr)	Total Proposed Debt Service
2026	$ 830,169	$ 67,500	$ 45,000	$ 30,000	$ 142,500
2027	825,828	135,000	173,416	207,384	515,800
2028	825,078	135,000	173,416	207,384	515,800
2029	827,663	135,000	173,416	207,384	515,800
2030	823,581	135,000	173,416	207,384	515,800
2031	827,706	135,000	173,416	207,384	515,800
2032	824,909	135,000	173,416	207,384	515,800
2033	286,063	135,000	173,416	207,384	515,800
2034	287,656	287,431	173,416	-	460,847
2035	286,041	287,431	173,416	-	460,847
2036	285,569	287,431	173,416	-	460,847
2037	285,106	287,431	173,416	-	460,847
2038	284,653	287,431	173,416	-	460,847
2039	283,978	287,431	173,416	-	460,847
2040	288,028	287,431	173,416	-	460,847
2041	-	287,431	173,416	-	460,847
2042	-	287,431	-	-	287,431
2043	-	287,431	-	-	287,431
2044	-	287,431	-	-	287,431
2045	-	287,431	-	-	287,431
2046	-	287,431	-	-	287,431

General Fund FY 2026 Debt Service Estimates (cont.)

- The graph below shows how the FY 2026 General Fund Capital Program layers onto the Town's existing Tax-Supported Debt Profile.



Impact on Key Debt Ratios

- In the graph below, Davenport has projected the impact the Fiscal Year 2026 General Fund borrowing would have on the Town's Tax-Supported Debt vs. Assessed Value Financial Policy.

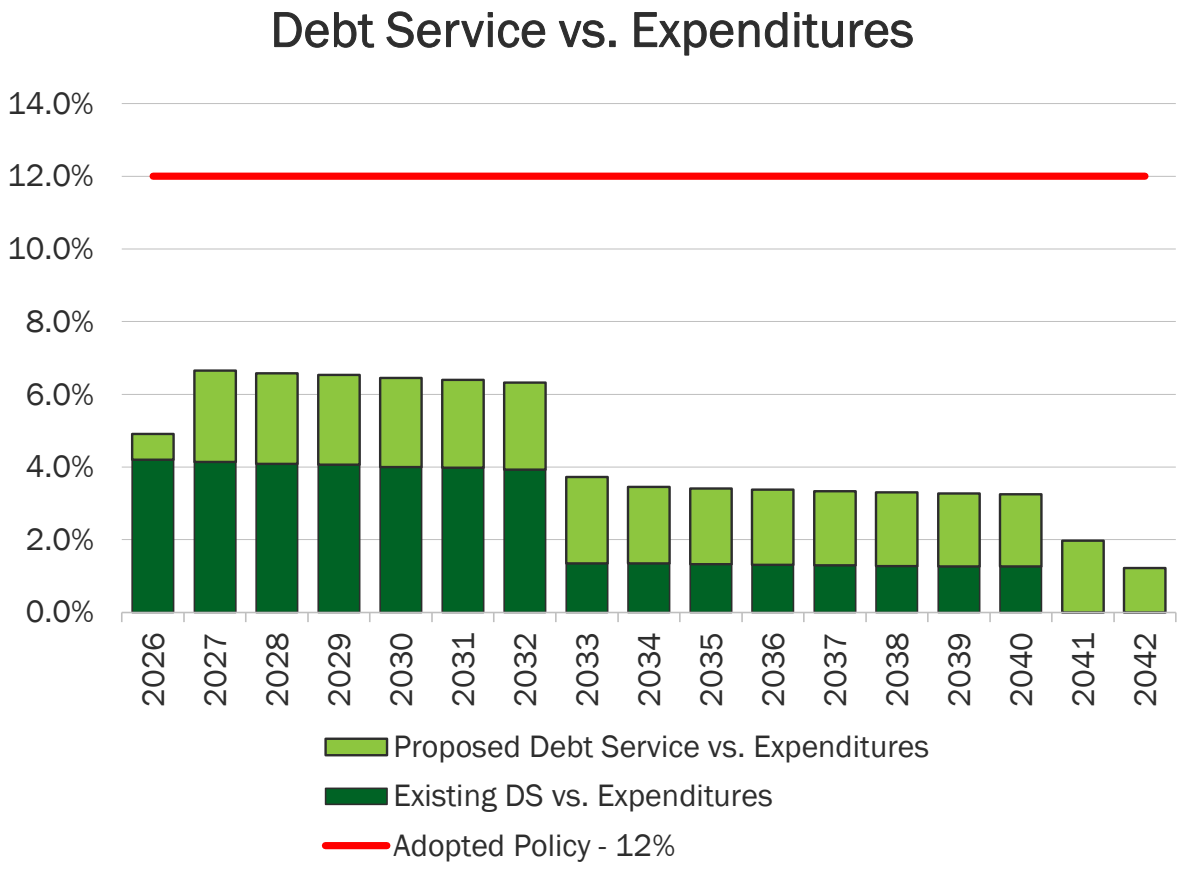
- After the Fiscal Year 2026 borrowing for the CIP and CARP, the Town would continue to be within policy levels for Debt vs. Assessed Value.

Note: Assessed Value is based on the 2024 Audit ($2,354,371,869). Assessed Value is grown at 1% annually.

Impact on Key Debt Ratios (cont.)

- In the graph below, Davenport has projected the impact the Fiscal Year 2026 General Fund borrowing would have on the Town's Tax-Supported Debt Service vs. Expenditures Financial Policy.

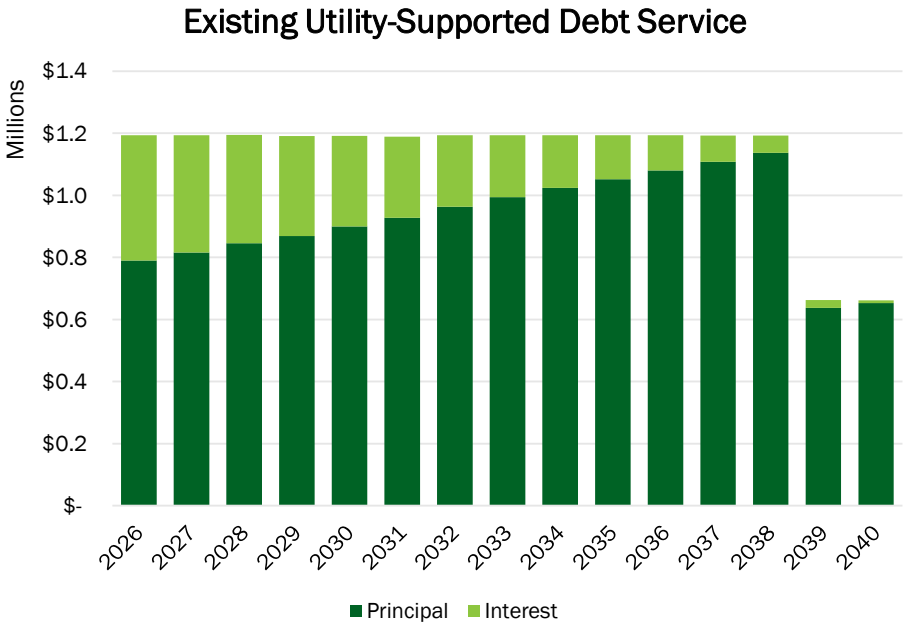
- After the Fiscal Year 2026 borrowing for the CIP and CARP, the Town would continue to be within policy levels for Debt Service vs. Expenditures.



Note: Expenditures are based on the 2024 Audit value ($19,392,167). Expenditures are grown at 1% annually.

Water & Sewer Fund Planning Estimate

Existing Utility–Supported Debt Profile



Existing Utility-Supported Debt Service			
Fiscal Year	Principal	Interest	Total
2026	$ 790,000	$ 403,510	$ 1,193,510
2027	816,000	377,130	1,193,130
2028	845,000	349,773	1,194,773
2029	869,000	321,497	1,190,497
2030	899,000	292,303	1,191,303
2031	927,000	262,033	1,189,033
2032	963,000	230,602	1,193,602
2033	994,000	199,539	1,193,539
2034	1,024,000	169,822	1,193,822
2035	1,052,000	141,308	1,193,308
2036	1,080,000	113,252	1,193,252
2037	1,108,000	84,558	1,192,558
2038	1,137,000	55,225	1,192,225
2039	637,000	24,996	661,996
2040	653,000	8,403	661,403
Total	$ 13,794,000	$3,033,951	$ 16,827,951

Summary of Outstanding Utility-Supported Debt

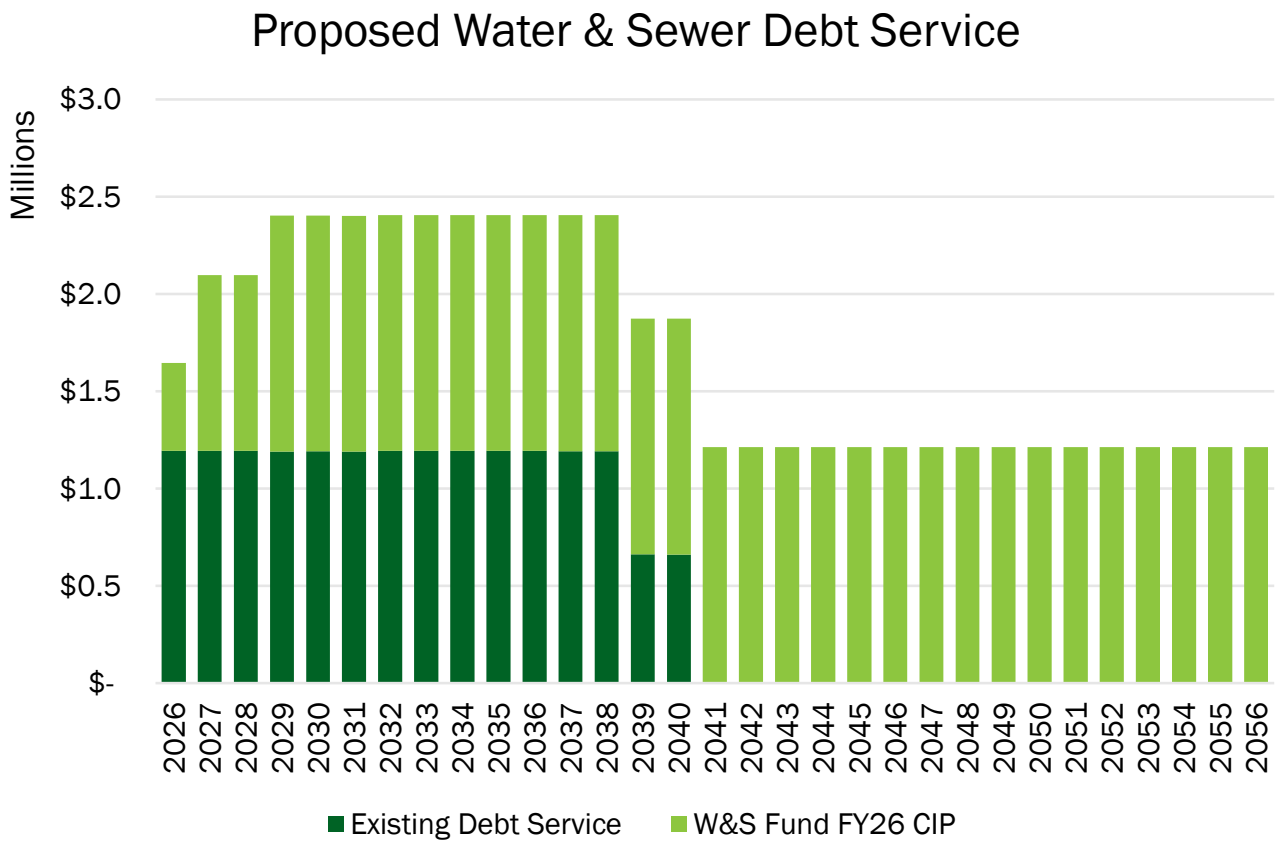
Series	Original Par	Par Outstanding	Interest Rate	Final Maturity
G.O. Refunding Bond, Series 2021A	$ 6,935,000	$ 5,722,000	2.750%	1/15/2038
G.O. Refunding Bond, Series 2021B	3,975,000	3,405,000	5.125% - 2.037%	10/1/2039
G.O. Bond, Water & Sewer Financing 2022	5,150,000	4,667,000	2.900%	10/1/2039
	Total	$ 13,794,000		

Source: Davenport Debt Model.

W&S Fund FY 2026 Debt Service Estimates

- The estimate below contemplates a 30-year term, a planning interest rate of 5.0%, and a project fund of roughly **$16.4 million**.
  - It is assumed that the FY 2026 Water and Sewer Fund CARP is cash funded.

- **The estimated debt service payments below fit within the multi-year rate planning that the Town has completed over the last several years.**



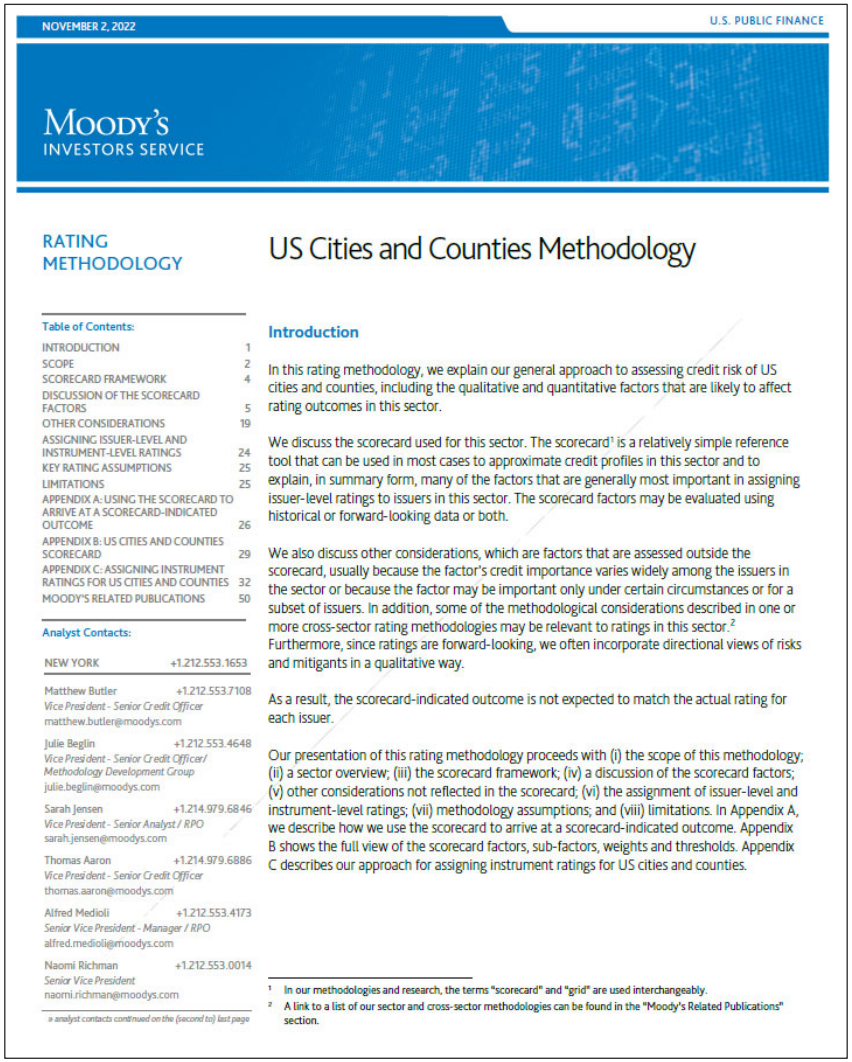
Proposed Financing Schedule

Proposed Next Steps – Public Sale

Timing	Action
Tuesday, July 8	▪ Davenport to present the FY 2026 Plan of Finance to Town Council. Obtain Town Council feedback and preliminary approval to move forward with engaging the Credit Rating Agencies.
Months of July and August	▪ Prepare Preliminary Official Statement and Credit Package for Credit Rating Agency Meetings.
Tuesday, September 9	▪ Town Council holds Public Hearing and Adopts authorizing documentation.
Month of October	▪ Credit Rating Meetings
Mid November	▪ Bond Sale via competitive bidding process in the public credit markets.
Mid December	▪ Closing. Funds advanced to the Town.

Appendix

Moody's Rating Methodology Overview



NOVEMBER 2, 2022 U.S. PUBLIC FINANCE

MOODY'S INVESTORS SERVICE

RATING METHODOLOGY

US Cities and Counties Methodology

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Introduction

In this rating methodology, we explain our general approach to assessing credit risk of US cities and counties, including the qualitative and quantitative factors that are likely to affect rating outcomes in this sector.

We discuss the scorecard used for this sector. The scorecard[1] is a relatively simple reference tool that can be used in most cases to approximate credit profiles in this sector and to explain, in summary form, many of the factors that are generally most important in assigning issuer-level ratings to issuers in this sector. The scorecard factors may be evaluated using historical or forward-looking data or both.

We also discuss other considerations, which are factors that are assessed outside the scorecard, usually because the factor's credit importance varies widely among the issuers in the sector or because the factor may be important only under certain circumstances or for a subset of issuers. In addition, some of the methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector.[2] Furthermore, since ratings are forward-looking, we often incorporate directional views of risks and mitigants in a qualitative way.

As a result, the scorecard-indicated outcome is not expected to match the actual rating for each issuer.

Our presentation of this rating methodology proceeds with (i) the scope of this methodology; (ii) a sector overview; (iii) the scorecard framework; (iv) a discussion of the scorecard factors; (v) other considerations not reflected in the scorecard; (vi) the assignment of issuer-level and instrument-level ratings; (vii) methodology assumptions; and (viii) limitations. In Appendix A, we describe how we use the scorecard to arrive at a scorecard-indicated outcome. Appendix B shows the full view of the scorecard factors, sub-factors, weights and thresholds. Appendix C describes our approach for assigning instrument ratings for US cities and counties.

[1] In our methodologies and research, the terms "scorecard" and "grid" are used interchangeably.
[2] A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

- On November 2, 2022, Moody's Investors Service ("Moody's") updated its US Local Governments General Obligation Debt methodology and assumptions.
- Under the new methodology, an initial indicative rating via a scorecard is calculated from a weighted average of four key factors.
  - Economy (30%).
  - Financial Performance (30%).
  - Institutional Framework (10%).
  - Leverage (30%).
- Below the line qualitative adjustments can be made based upon certain factors not included in the quantitative score.
- Analysts present this information to a rating committee that ultimately determines the Credit Rating.

Source: Moody's US Cities and Counties Methodology published November 2, 2022.

S&P Global Ratings Methodology Overview

S&P Global
Ratings

Criteria | Governments | U.S. Public Finance

Methodology For Rating U.S. Governments

September 9, 2024

This report does not constitute a rating action.

This article presents S&P Global Ratings' criteria for determining a stand-alone credit profile (SACP) and assigning issuer credit ratings and issue credit ratings to U.S. governments, which include U.S. states, counties, municipalities, school districts, and special government districts. These criteria apply only to U.S. governments not in scope of other issuer credit rating (ICR) criteria.

Although the scope of activities may vary, governments share the following characteristics:

- Leadership is elected or is appointed by others who are elected;
- The entity provides public services and/or public infrastructure; and
- The entity is supported directly or indirectly by taxes and fees levied on residents or funds transferred from other levels of government.

For information about the initial publication of this article as of Sep 9th, 2024, including key changes, the impact on ratings, and superseded criteria, see "New U.S. Government Rating Methodology Published," Sept. 9, 2024.

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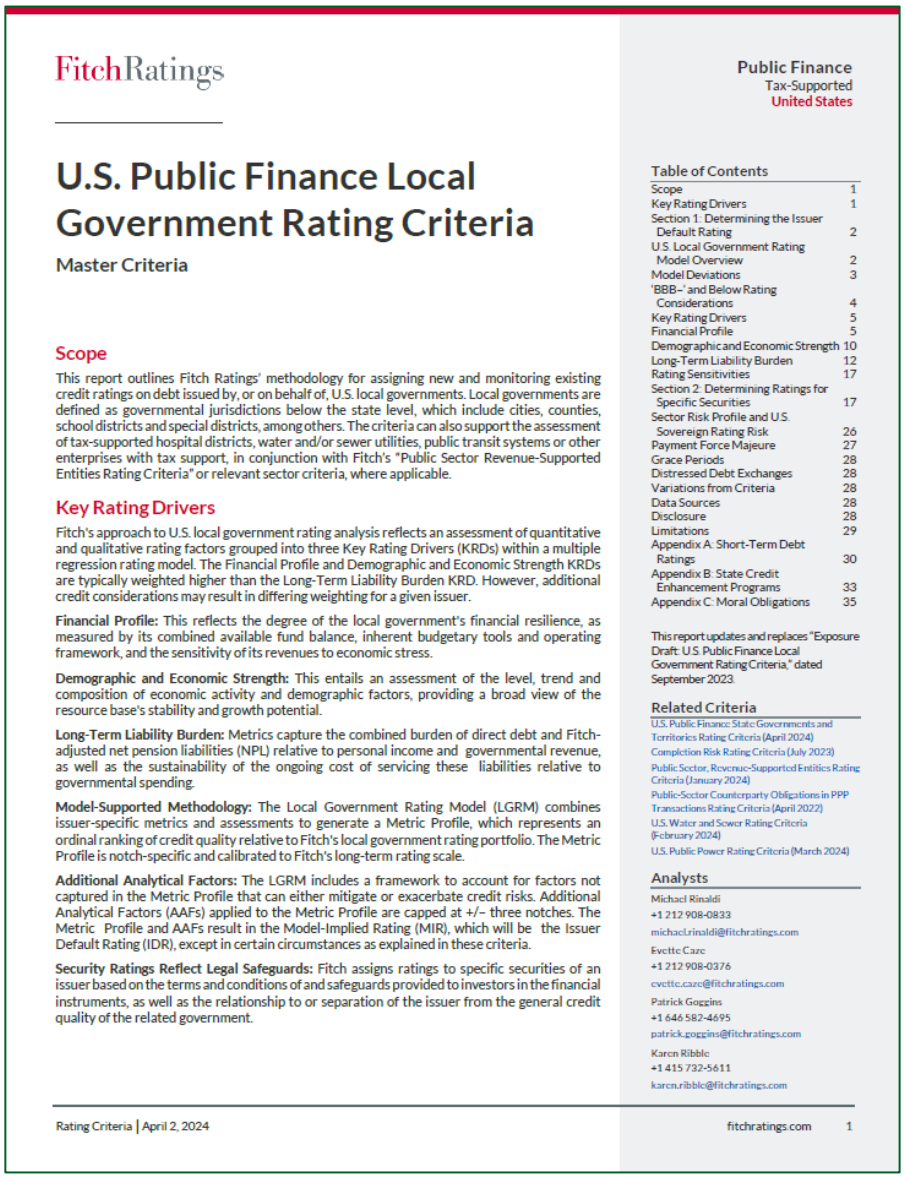
spglobal.com/ratings

- On September 9, 2024, S&P Global Ratings ("S&P") published new criteria to determine the credit ratings of U.S. Governments.
- The criteria utilizes a scorecard matrix composed of two components:
  - Institutional Framework: the formal rules and laws by which a government operates.
  - Individual Credit Profile: the creditworthiness of the particular government analyzed via specific credit factors.
- Analysts present their scoring to a Rating Committee to determine the ultimate Credit Rating.

--Institutional framework assessment--	--Individual credit profile--										
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
1	aaa	aaa	aa+	aa	aa-	a+	a	a-	bbb	bb+	bb-
2	aaa	aa+	aa	aa-	a+	a	a-	bbb+	bbb-	bb	b+
3	aa+	aa	aa-	a+	a	a-	bbb	bbb-	bb+	bb-	b
4	aa-	a+	a	a-	bbb+	bbb	bb+	bb	bb-	b	b-
5	a	a-	bbb+	bbb	bbb-	bb+	bb-	b+	b	b-	b-
6	bbb+	bbb	bbb-	bb+	bb	bb-	b+	b	b-	b-	b-

Source: S&P Ratings Methodology For Rating U.S. Governments published September 9, 2024.

Fitch Methodology Overview



FitchRatings

Public Finance
Tax-Supported
United States

U.S. Public Finance Local Government Rating Criteria

Master Criteria

Scope

This report outlines Fitch Ratings' methodology for assigning new and monitoring existing credit ratings on debt issued by, or on behalf of, U.S. local governments. Local governments are defined as governmental jurisdictions below the state level, which include cities, counties, school districts and special districts, among others. The criteria can also support the assessment of tax-supported hospital districts, water and/or sewer utilities, public transit systems or other enterprises with tax support, in conjunction with Fitch's "Public Sector Revenue-Supported Entities Rating Criteria" or relevant sector criteria, where applicable.

Key Rating Drivers

Fitch's approach to U.S. local government rating analysis reflects an assessment of quantitative and qualitative rating factors grouped into three Key Rating Drivers (KRDs) within a multiple regression rating model. The Financial Profile and Demographic and Economic Strength KRDs are typically weighted higher than the Long-Term Liability Burden KRD. However, additional credit considerations may result in differing weighting for a given issuer.

Financial Profile: This reflects the degree of the local government's financial resilience, as measured by its combined available fund balance, inherent budgetary tools and operating framework, and the sensitivity of its revenues to economic stress.

Demographic and Economic Strength: This entails an assessment of the level, trend and composition of economic activity and demographic factors, providing a broad view of the resource base's stability and growth potential.

Long-Term Liability Burden: Metrics capture the combined burden of direct debt and Fitch-adjusted net pension liabilities (NPL) relative to personal income and governmental revenue, as well as the sustainability of the ongoing cost of servicing these liabilities relative to governmental spending.

Model-Supported Methodology: The Local Government Rating Model (LGRM) combines issuer-specific metrics and assessments to generate a Metric Profile, which represents an ordinal ranking of credit quality relative to Fitch's local government rating portfolio. The Metric Profile is notch-specific and calibrated to Fitch's long-term rating scale.

Additional Analytical Factors: The LGRM includes a framework to account for factors not captured in the Metric Profile that can either mitigate or exacerbate credit risks. Additional Analytical Factors (AAFs) applied to the Metric Profile are capped at +/– three notches. The Metric Profile and AAFs result in the Model-Implied Rating (MIR), which will be the Issuer Default Rating (IDR), except in certain circumstances as explained in these criteria.

Security Ratings Reflect Legal Safeguards: Fitch assigns ratings to specific securities of an issuer based on the terms and conditions of and safeguards provided to investors in the financial instruments, as well as the relationship to or separation of the issuer from the general credit quality of the related government.

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This report updates and replaces "Exposure Draft: U.S. Public Finance Local Government Rating Criteria," dated September 2023.

Related Criteria

U.S. Public Finance State Governments and Territories Rating Criteria (April 2024)
Completion Risk Rating Criteria (July 2023)
Public Sector, Revenue-Supported Entities Rating Criteria (January 2024)
Public-Sector Counterparty Obligations in PPP Transactions Rating Criteria (April 2022)
U.S. Water and Sewer Rating Criteria (February 2024)
U.S. Public Power Rating Criteria (March 2024)

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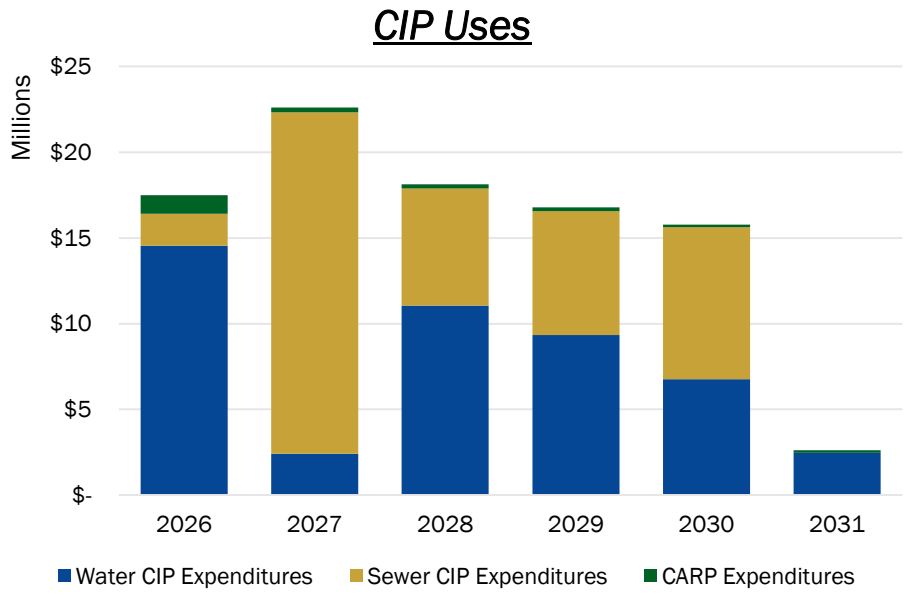
- On April 2, 2024, FitchRatings ("Fitch") published its new U.S. Public Finance Local Government Rating Criteria.
- The new methodology reflects an assessment of quantitative and qualitative rating factors grouped into three Key Rating Drivers:
  - Financial Profile (35%).
  - Demographic and Economic Strength (44%).
  - Long-Term Liability Burden (21%).
- The new methodology includes a scorecard estimated outcome with potential notching factors that impact an issuer's final credit rating.

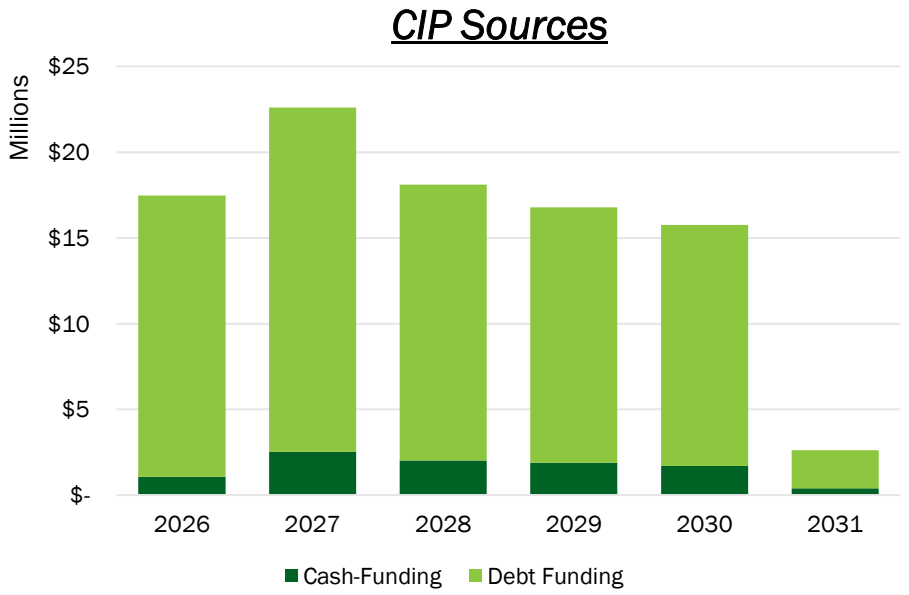
Source: Fitch Ratings U.S. Public Finance Local Government Rating Criteria published April 2, 2024.

Water & Sewer Multi-Year Planning

Water and Sewer Fund CIP / CARP

- The Water and Sewer CIP and CARP totals roughly $93 million over the next six years.





FY	2026	2027	2028	2029	2030	2031	Total
Water CIP Expenditures	$ 14,542,982	$ 2,420,000	$ 11,055,982	$ 9,339,000	$ 6,765,000	$ 2,475,000	$ 46,597,965
Sewer CIP Expenditures	1,873,507	19,910,000	6,836,451	7,218,211	8,855,000	-	44,693,168
CARP Expenditures	1,070,000	285,000	230,000	230,000	150,000	150,000	2,115,000
Total Uses	**17,486,489**	**22,615,000**	**18,122,433**	**16,787,211**	**15,770,000**	**2,625,000**	**93,406,133**
Cash-Funding	1,070,000	2,518,000	2,019,243	1,885,721	1,712,000	397,500	9,602,464
Debt Funding	16,416,489	20,097,000	16,103,190	14,901,490	14,058,000	2,227,500	83,803,669
Total Sources	**$ 17,486,489**	**$ 22,615,000**	**$ 18,122,433**	**$ 16,787,211**	**$ 15,770,000**	**$ 2,625,000**	**$ 93,406,133**

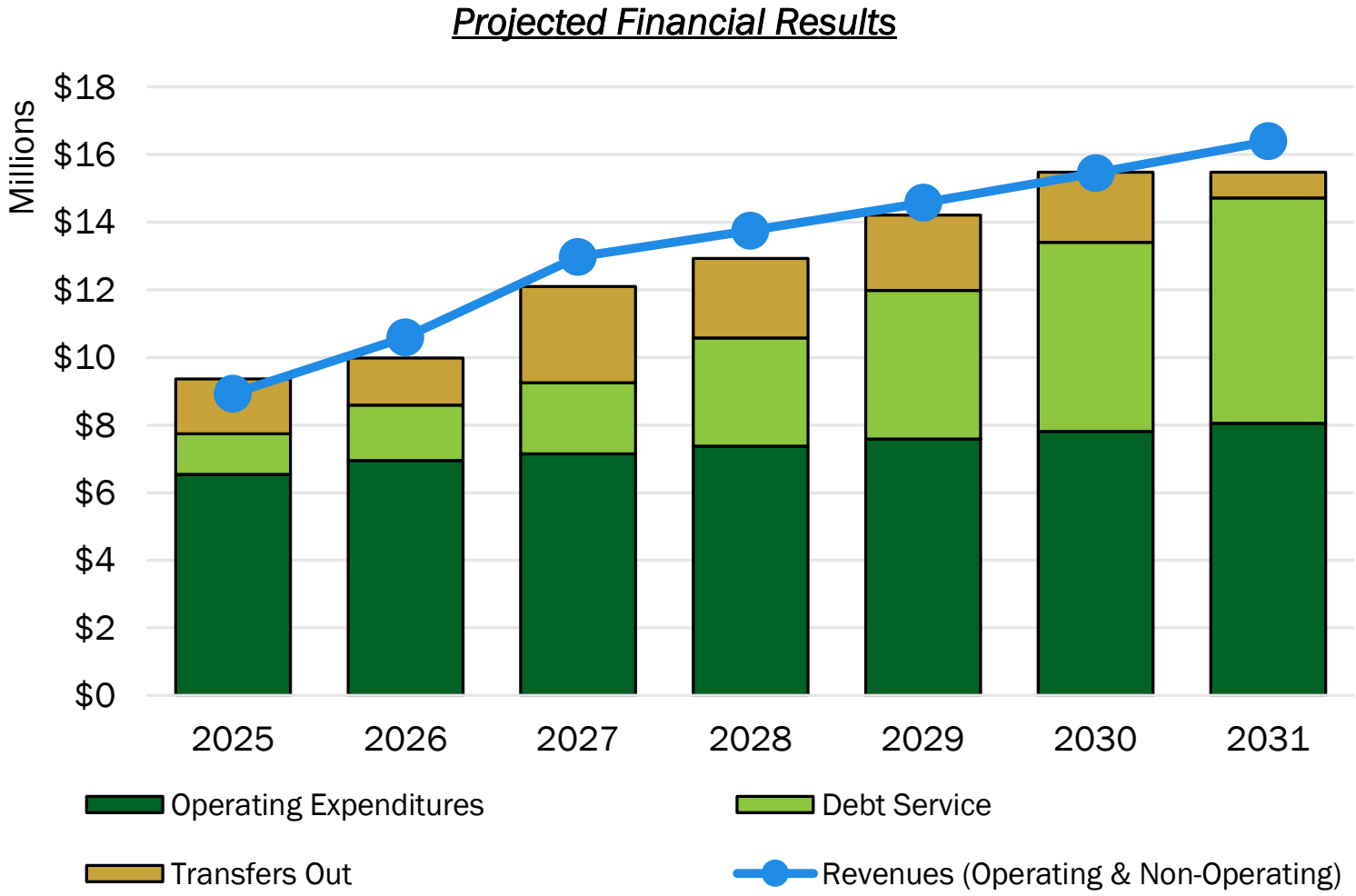
Water and Sewer Fund Projected Debt Service

FY	Existing Debt Service	FY 2026 Issuance	FY 2027 Issuance	FY 2028 Issuance	FY 2029 Issuance	FY 2030 Issuance	FY 2031 Issuance	Total
Totals	**$ 16,827,951**	**$ 32,576,660**	**$ 43,758,684**	**$ 35,062,665**	**$ 32,446,116**	**$ 30,609,523**	**$ 4,850,100**	**$ 196,131,699**
2026	1,193,510	406,308	-	-	-	-	-	1,599,818
2027	1,193,130	812,616	-	-	-	-	-	2,005,746
2028	1,194,773	812,616	1,105,335	-	-	-	-	3,112,724
2029	1,190,497	1,090,897	1,105,335	885,675	-	-	-	4,272,405
2030	1,191,303	1,090,897	1,483,858	885,675	819,582	-	-	5,471,315
2031	1,189,033	1,090,897	1,483,858	1,188,976	819,582	773,190	-	6,545,535
2032	1,193,602	1,090,897	1,483,858	1,188,976	1,100,248	773,190	122,513	6,953,283
2033	1,193,539	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	122,513	7,217,999
2034	1,193,822	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	7,260,237
2035	1,193,308	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	7,259,723
2036	1,193,252	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	7,259,667
2037	1,192,558	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	7,258,973
2038	1,192,225	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	7,258,640
2039	661,996	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,728,411
2040	661,403	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,727,818
2041	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2042	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2043	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2044	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2045	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2046	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2047	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2048	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2049	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2050	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2051	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2052	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2053	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2054	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2055	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2056	-	1,090,897	1,483,858	1,188,976	1,100,248	1,037,969	164,467	6,066,415
2057	-	-	1,483,858	1,188,976	1,100,248	1,037,969	164,467	4,975,518
2058	-	-	-	1,188,976	1,100,248	1,037,969	164,467	3,491,660
2059	-	-	-	-	1,100,248	1,037,969	164,467	2,302,685
2060	-	-	-	-	-	1,037,969	164,467	1,202,436
2061	-	-	-	-	-	-	164,467	164,467

*Note: Estimates assume a 30-year debt service structure comprised of 2 years of interest only followed by 28 years of level debt service. A 5.0% interest rate has been utilized for planning purposes.

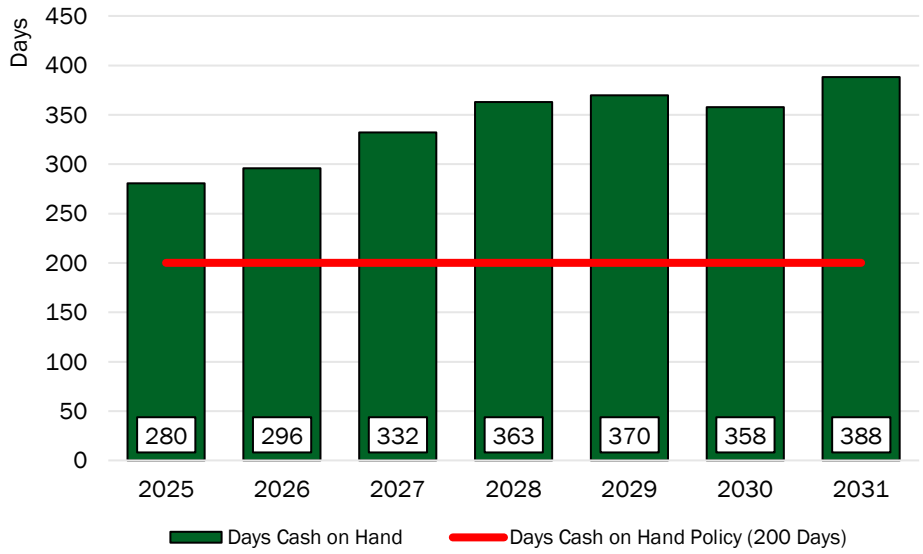
A 10% contingency has been added to each Project Fund for COI, DSRF, etc..

Water and Sewer Fund Projected Financials

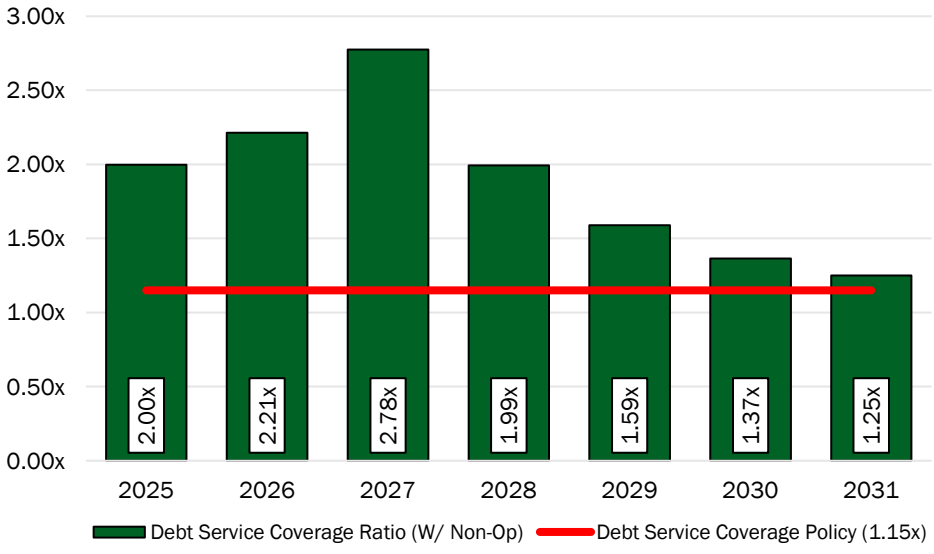


Water and Sewer Fund Projected Financial Ratios

Days Cash on Hand



Debt Service Coverage Ratio



FY	2026	2027	2028	2029	2030	2031
Debt Service Coverage Ratio	2.21x	2.78x	1.99x	1.59x	1.37x	1.25x
Days Cash on Hand	296	332	363	370	358	388
Ending Cash Balance	$ 5,634,347	$ 6,509,079	$ 7,329,615	$ 7,688,884	$ 7,663,393	$ 8,566,236

Municipal Advisor Disclaimer

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Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8, 2025
Agenda Title:	Outreach and Transparency Initiatives Discussion
Requested Action:	Discussion
Department / Agency Lead:	Frank Cassidy, Town Manager
Staff Lead:	Frank Cassidy, Town Manager

EXECUTIVE SUMMARY

Since being promoted to your Town Manager, we have been changing the culture of our operations. This cultural shift is directed to providing the best government services. This means government services that are predictable, consistent, and open to all we serve. One of the foundational implementations for this has been the development and implementation through our Human Capital Department called "Excellence in Action." This is not just a catch phrase, this captures our mission of developing and building the best services for our community every day and in everything we do. It started with our leadership training via a training program designed and tailored to our Town by our Human Capital and Parks and Recreation Directors. A series of training modules were presented and the foundation for change and excellence was laid. This is being implemented for all staff through our implementation of continuous improvement initiatives. This requires a commitment to empowerment, leadership at every level, accountability, and responsibility. It is an establishment or support for our staff and providing opportunities for them to be the subject matter experts we have hired them to be. To implement policies, procedures, and protocols based on professional standards and requirements and to follow them. Gain training and certifications to advance their knowledge and professionalism. To accomplish this, we established openness and transparency in all we do.

Our "Excellence in Action" initiative has a multi-pronged approach to building strong teams, developing efficiencies in operations, and ensuring every staff member at every level is respected and has input in finding solutions. Every department and function thereof are required to follow this approach. Communication is one leg of this effort, and the most outward facing.

Therefore, I appreciate this opportunity to elaborate on our efforts and successes specifically regarding public information, transparency, and outreach. This involves the active participation of every department and is a major part of our initiative of "Excellence in Action."

These are designed to develop a government that is transparent, predictable and consistent. Today we will be discussing our efforts. A better-informed community, builds a more effective government.

BACKGROUND

We recognize the need to build trust in our government. We also understand we had to change our direction, our culture. Trust is manifested in openness, healthy discussions, and education. This must be instilled in the operational culture of the organization. In government, this approach is referred to as transparency. A definition of transparency to provide context for today's discussion is from Simon Sinek:

> Transparency doesn't mean sharing every detail. Transparency means providing the context for the decisions we make.

When addressing transparency in government, we can also refer to the meaning of transparency which includes openness, honesty, ethics, and an adherence to policies and procedures. It involves making information accessible and understandable, fostering trust and accountability, and encouraging engagement at every level. Communications for transparency must include the following:

- **Openness and Honesty:** Sharing of information when requested. Providing explanations for restrictions, definitions of terms and acronyms, and providing as many details as possible.
- **Communication:** Our driving initiative to stay connected, be informed, be engaged drives our outreach and reinforces the commitment of education and public involvement.
- **Accountability:** A big part of building trust through transparency is admitting when we are wrong while also admitting if systems and processes need changing, we have the courage to do so. We learn from our mistakes, not hide behind them.
- **Accessibility:** We encourage everyone to ask questions and request information at every level. Go beyond FOIA requests, talk to staff and our Team.

The outline above serves as the basis of our communications objectives as we will discuss today. Our transparency initiatives also include being proactive with our efforts, accessible, being honest, and accountable. To accomplish this effectively, we have established policies, templates, consistent reporting formats, and regular distributions of information from daily operations to agenda items, to emergency alerts, special events, and so on. These efforts also require citizen engagement and participation. As you will see, this is also part of our commitment to transparency.

STAFF RECOMMENDATION

Discussion- Q&A

Service Level/Collaborative Impact

N/A

Policy Direction/Warrenton Plan 2040

Meets and Includes all Policy Direction to include Fostering an open operational based on predictable, consistent governing.

Fiscal Impact

N/A

Legal Impact

N/A

ATTACHMENTS

1. Memo to Transparency Committee to Mr. Semple on April 3, 2025
2. Annual Report Fiscal Year 24
3. Data Consistency Project Reference Materials and Index
4. Related emails

From: "Denise Harris" <dharris@warrentonva.gov>
Sent: Tue, 24 Jun 2025 18:56:35 +0000
To: "Frank Cassidy" <fcassidy@warrentonva.gov>
Cc: "Rob Walton" <rwalton@warrentonva.gov>
Subject: Meetings

Frank,

The Transparency Committee may be interested to know that staff previously conducted research on meeting disclosure policies in other jurisdictions for the Planning Commission. During their discussion on the Bylaw update, they explored the following approaches, while weighing the pros and cons for the benefit of the Town:

1. No outside meetings with applicants.
2. Meetings only with staff in attendance.
3. Meetings that they record and if the applicant objects, then the meeting ends.

The Town's Planning Commission updated their bylaws this year to include the following:

It is understood that Planning Commission meetings are best conducted through the adopted Regular Meeting and Work Session schedule. Meeting held outside the adopted schedule with the public, business interests, or applicants shall be conducted in the following manner:

- ***All meetings shall be conducted pursuant the Va. Code § 2.2-3700, et seq.***
- ***Planning Commissioners shall disclose all meetings by reporting them verbally at the next Planning Commission meeting before any subsequent vote is taken on the subject the meeting was related to in part or in whole. Such disclosures shall include whether the matter is a conflict of interest or a personal interest of the Planning Commissioner pursuant to Va. Code 2.2- 3100, et seq.***
- ***The purpose of such meetings is limited to fact finding and clarification for all parties.***
- ***Planning Commissioners shall not make a commitment of their voting intent in such meeting.***
- ***Planning Commissioners are encouraged to contact the Community Development Department staff prior to such meetings to gather facts on the subject matter and to be aware of any potential legal ramifications before speaking to the subject matter. Staff will attend such meeting.***
- ***Any information received by an individual Planning Commissioner, whether in person, by telephone, in writing, or by electronic means, that is relevant to the matter before the Planning Commission should be forwarded to the Community Development Department staff for distribution to the entire Planning Commission.***

- ***The term "public" in this section does not include persons employed by the Town of Warrenton or elected or appointed to any seat on the Town of Warrenton Town Council or Planning Commission.***

This language closely follows the Town of Vienna's PC Bylaws. In researching multiple jurisdictions, it was found that most do not have formal policies in writing.

Denise M. Harris, AICP
Planning Manager
Community Development Department

21 Main Street
Warrenton, VA 20186
(540) 347-1101 x145
warrentonva.gov

EXPERIENCE WARRENTON VIRGINIA

TOWN OF WARRENTON

Year-In-Review
Fiscal Year 2024
July 1, 2023 - June 30, 2024

A Message From Your Town Manager

Welcome to the Fiscal Year 2024 Year In Review; and what a year it has been!

I am honored to be your new Town Manager after serving our wonderful Town in a variety of roles since my hire in August 2017. I was appointed interim Town Manager in April 2023 and "full time" Town Manager in January 2024. Our time over the last seven years has helped us learn, grow, and celebrate as a Town, as a Team, and as a community; couple this with all the accomplishments of the last year, and I am sure you will agree we are "Excellence in Action." We are moving forward with a purpose of providing consistent, predictable, professional, and efficient service to all of our Town residents, business owners, and visitors.

Our *Year in Review* is designed to provide you with an overall view of some of the great things we have been accomplishing as a Team. We are dedicated to preserving the greatness of our Town while managing the internal and external pressures of growth.

Accomplishments from the Office of the Town Manager are instilling problem-solving tactics governed by maintaining an ethical approach to leadership at every level of operations. This incorporates the elements of ensuring our decisions are moral, legal, in line with Town policies and procedures, and they are ethical.

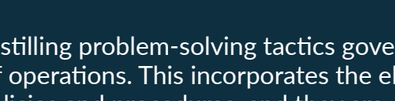
A few projects accomplished from the Office of the Town Manager were finalizing the St. Leonard's Farm Deed at the Wastewater Treatment Plant, an internal restructure to allow for more internal opportunities and retention, and navigating through the asbestos incident. There was also the re-purposing of the old town hall building at 18 Court Street to allow meeting space for the public, office space for the VFW, and for use of the Farmers Market on the weekend.

Next, through the establishment of a Communications Manager, who developed a team approach to outreach and messaging, we have integrated the operational principle that government is open to the people, especially on the local level. Simply put, we work for you, and the greatest change is within communities. This governing principle ensures our commitment to outreach and education. In the world of government, we believe these two are inseparable. The complexity of government operations and programs is a challenge to navigate. It is our job, as government employees, to help everyone understand what terminology we use, how systems work, and who works them. This builds trust, collaboration, communication, teamwork, and an energized commitment to doing great things.

Local government is where the health, safety, and welfare of our community are focused. We are focused on being good stewards with tax dollars, making sure we are working for the best interest of the community, and, for our Town, ensuring we hold true to our governing motto of "Excellence in Action." It is this focus on government objectives and operations that makes our Town so great. Our staff is exceptional; our businesses are exceptional; and beyond any doubt, our Town is exceptional.

Please take time to go through our "Year in Review." I'm sure you will agree, we are doing many great things, moving forward with a focus on the greatness of our Town.

I look forward to continuing our journey as we grow, learn, work, play, and celebrate together.



Frank Cassidy, Town Manager

TOWN COUNCIL

MAYOR
H.E. Carter Nevill

WARD 1
Heather D. Sutphin

WARD 2
William T. Semple II

WARD 3
Brett A. Hamby

WARD 4, VICE MAYOR
James N. Hartman III

WARD 5
John B. Heroux II
Eric F. Gagnon

AT-LARGE
David A. McGuire

AT-LARGE
Paul W. Mooney

From Left to Right: Heather Sutphin, William Semple, Brett Hamby, Carter Nevill, James Hartman, Eric Gagnon. Not pictured: Paul Mooney and David McGuire

STRATEGIC RETREAT & GOALS

Town Council held their strategic retreat in January facilitated by the Virginia Institute of Government. The strategic retreat allows goals to be set by the Council to direct staff to create the budget within the Council's priorities directly impacting all service levels of the Town and affecting all aspects of Plan Warrenton 2040. Council engaged in retreat exercises and learned about roles and responsibilities as well as best practices in local government policy. Council is continuing with the following strategic goals:

Resiliency: Financial and Workforce

Preparedness: Technology and Utilities

Livability: Affordable Housing

TOWN CLERK HIGHLIGHTS

of FOIAs

438

Completed the Data Consistency Project which reformatted all staff reports, nomenclature, and minutes format across Town Council, Boards, and Commissions.

Revamped staff quarterly reports to ensure information is clear and concise for both Town Council and citizens.

Highlights

Launched Town Talks and Neighborhood Talks in collaboration with the Town Manager and staff. This was a part of the Town's continued mission of community outreach and education.

Developed the Town's first Strategic Communications Plan and Operating Procedures to better align the Town's communications both internally and externally.

Administered a Town Communication's Survey to engage the community on social media, the Town Crier, and the Town's overall communications.

Updates to the Town's website for easier access to information and to enhance transparency with Town projects and reports.

Trained Town staff on website management to ensure information on the Town's website is accurate and available to the public.

Initiated a website re-design to enhance navigation on the Town's website.

Pardon Our Dust Meeting for Broadview Avenue Project

Scan the QR Code to visit the Town's Website to find information on Town projects, services, and programs!

Town Talks and Neighborhood Talks

These community outreach and engagement forums started with the Town Manager initiating a "Meet the Town Manager" at the Farmer's Market. As the Communications Office was created, we broadened the forum to include our staff to help answer questions which became Town Talks. It further evolved into Neighborhood Talks as the weather got nicer and gave residents the opportunity to share their concerns with staff. It also gave residents easier access to these events as it was directly in their neighborhoods. Make sure you look out on social and media and the website for future Talks.

Town and Neighborhood Talks	Website Visits	Social Media Followers	Press Releases
7	488,237	22.6 Thousand	7

EXCELLENCE IN ACTION

What is Excellence in Action?

- *Excellence in Action is what we live by!*
- *Our Town Vision and Values guide our actions.*
- *Embracing change, adapting as needed, communicating effectively, & collaborating at all levels is our passion.*
- *We know we perform our best when we a trusted, included, respected, & supported*

Building Permits Approved

455

Inspections Conducted

1,755

Certificates of Appropriateness

78

Zoning Violations

62

Highlights

Awarded $912,390 from the Septic Local Partners Program by the Virginia Department of Environmental Quality to implement septic improvements to residents. The Town has hired RK&K to administer the project.

Implemented yearly fire inspections of all non-residential structures.

Established fire lanes within neighborhoods where parking was causing issues with Emergency Services and Public Works vehicles.

Assisted the Warrenton Arts Commission with the completion of the steps at the intersection of Third Street and Horner Street. Currently working with the commission for a mural on the retaining wall at the intersection of Horner Street and First Street.

Kicked-off the Comprehensive Zoning Ordinance Update. The Town has hired Clarion to consult on the project.

Completed the Historic District Survey with the Virginia Department of Historic Resources. The state approved our Historic District to match that of the National Historic District which allows residents within the district to receive benefits.

Implemented the Town's Property Maintenance and Code Enforcement Plan. The Town currently has over 60 active cases.

Initiated and Established the forming of the Town's Local Board of Building Code Appeals.

Oversees the functions and operations of the Planning Commission, Architectural Review Board, Board of Zoning Appeals, and Local Board of Building Code Appeals.

Site Development Plans Approved

14

Special Use Permits Approved

4

Pre-Application Meetings

16

Zoning Ordinance Text Amendments Approved

4

Town of WARRENTON

ZONING ORDINANCE UPDATE

connections. community. character.

Scan the QR Code to visit the Town's Zoning Code Update website to stay up to date on the project!

Item D.

The Town of Warrenton is updating its Zoning Ordinance. A key goal of the project is to implement key recommendations relating to land use in the Town's recently adopted comprehensive plan, Plan Warrenton 2040. The project will also make the Town's updated Ordinance more internally consistent, streamlined in language and processes, more user-friendly with the inclusion of additional graphics and tables, and aligned with contemporary zoning best practices.

Community Outreach

Historic District Survey Public Forum

Zoning Ordinance Update Public Forum

Neighborhood Talks

Warrenton Arts Commission

Events and Programs

- Step-tember Challenge
- Halloween Parade
- Halloween Trunk or Treat
- Halloween Flashlight Candy Hunt
- Halloween Fitness Classes: Aqua Zumba, Glow Ride, Pound Class,
- Holiday House Decorating Contest
- Swim with Santa
- Swimming Easter Egg Hunt
- Morning Easter Egg Hunt
- Flashlight Egg Hunt
- Dog-A-Palooza
- Kids to Parks Day
- Play All Day
- Warrenton Town Limits Festival

PARKS AND RECREATION

Eva Walker Park Master Plan

The department has kicked-off the Eva Walker Park Master Plan with our contractor Kimley Horn. Phase 1 consists of developing cost estimated and construction drawings for the total concept to determine the relative costs of each proposed element and to understand the comprehensive infrastructure impacts. This phase also includes costs related to necessary site drainage improvements and soil mitigation.

Community Outreach

Neighborhood Talks

Snowplow Visit to C.M. Bradley

Town Talks

Scan the QR Code to visit the Parks and Recreation Website Page to view events, programs, fitness, and more!

Award

Eva Walker Park Commemorative Garden Award for Best New Renovation/ Additions at the Virginia Recreation and Parks Society Annual Conference.

Farmers Market

The Town continued its partnership with Experience Old Town Warrenton (EOTW) for the Farmers Market. Beginning with the Holiday Market, the Farmer's Market transitioned to their new location on Court and Hotel Streets and inside 18 Court Street. The Holiday Market had about 45 vendors each week in December. The Winter Market continued at the new location on Court Street and inside 18 Court Street with about 25 vendors each week. Peak season kicked off on April 20 with about 40 vendors weekly.

# of WARF Visitors	# of WARF Members	# of Fitness Classes	# of Park Rentals
107,069	884	2,878	104

Trash Collected	Leaves Collected	Recycling Collected	Brush Collected
3,645.35 Tons	231.75 Tons	484.51 Tons	164.02 Tons

Highlights

Completed the Winchester Street Paving Project. This included the paving of Winchester Street along with Roebling Street, Jackson Street, Chappell Street, Forbes Street, North Court, Stuyvesant Street, Old Orchard Lane, Pelham Street, Clay Street, Diagonal Street, Fauquier Road, Solgrove Road, and Evans Avenue.

Installed sidewalk, curb, and gutter on Lower South Fourth Street for better access to and from the Warrenton Branch Greenway.

Repaired sidewalk and storm inlet repairs on Winchester Street. This allowed for ADA upgrades.

Partnered with the Human Capital Department on the creation of the Commercial Driver's License Program for Public Works employees.

Upgraded the traffic light systems at Branch Avenue, Culpeper Street, Waterloo Street, and Van Roijen Street.

Repaired sidewalk on North Third Street as this was hazardous from the concrete breaking off.

Re-branded the Traffic Task Force from the Traffic Coalition Group to be more action-oriented. This group has conducted numerous tests on different streets and neighborhoods in Town.

Conducted sidewalk, curb, and gutter repairs and replacements on Oak Springs Drive which included over 30 handicap ramps.

Tested multiple traffic patterns at the Courthouse Square Intersection to help address pedestrian and traffic safety at this intersection.

Maintained the cemetery which is 18 acres with over 8,000 gravesites which includes mowing, weed eating, trees, and the opening and closing of gravesites.

Rehabilitated Old Town Hall at 18 Court Street to be made available for public use. This was a part of the Facilities comprehensive plan to maintain all Town facilities.

Completed the re-paving of Walker Drive along with repairing sidewalks, storm inlets, and ADA improvements.

The Richard Wines Award for a Public Utilities Employee

James Pyne

The Richard Wines Award for a Public Works Employee

Roger Heflin

2023 Recipient of the National Association of Fleet Administrators- Top 50 Green Fleets & 2023 Rookie of the Year

Community Outreach

Snowplow Visit to C.M. Bradley

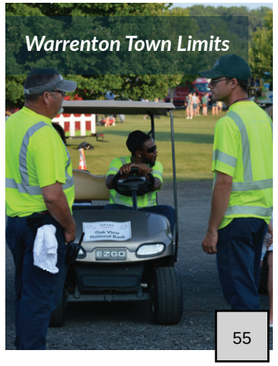
Earth Day at Rady Park

Town Talks

Touch A Truck

Snowplow Naming Contest Visit to Public Works

Trunk or Treat



Warrenton Town Limits

Highlights

Completed the rehabilitation of the Gravity Sludge Thickener at the Wastewater Treatment Plant.

Conducted a Preliminary Assessment of the Rady Park Stream Restoration Project (CIP #SM-003). The Rady Park stream is badly eroded that causes safety issues for equipment and local park users.

Finalized the engineering and design of the Primary Clarifier's and Sludge Pump Station at the Wastewater Treatment Plant (CIP #S-001 and CIP #S-007). These projects are critical to the Town's infrastructure as this equipment is beyond their expected useful lifespan.

Replaced the Waterline on Rappahannock Street (CIP #W-004) to a more resilient material and that is not susceptible to breaks and water loss.

Concluded the engineering of the Second Digester at the Wastewater Treatment Plant which uses bacteria to break down wastewater biosolids and this piece of equipment is past end of life (CIP #S-003).

Completed the engineering for the secondary clarifier and sludge pump at the Wastewater Treatment Plant (CIP #S-006). This equipment is critical to the Wastewater Treatment Plant as it captures and removes wastewater solids.

Finalized the preliminary engineering for the Clearwell Project at the Water Treatment Plant which allows for storage and additional resiliency (CIP #W-001).

Continued with the I&I Reduction Project which seeks to reduce inflow and infiltration into the wastewater system from heavy rainfall events and from broken/damaged piping (CIP #S-002). This project is always ongoing and has been for several years.

Scan the QR Code to view more about these projects in the FY24 Budget labeled 2024-2029 Capital Improvement Plan.

Awards

Earlier this year we congratulated our Water Treatment Plant Professionals for receiving the ***2023 Gold Award for Outstanding Performance in Water Treatment Operations*** from the Virginia Department of Health.

The Team also received the ***CDC's Water Fluoridation Quality Award*** for achieving optimal fluoridation levels.

Community Outreach

Stormwater Poster Contest

Field Trip from FHS to WWTP

Snowplow Visit to St. James

WWTP at Touch A Truck

Utilities Crew at Touch A Truck

Stream Clean-Ups

Average Daily Facility Water Production	Average Daily Wastewater Flow	Miles of Sewer Lines	Miles of Water Lines
1.1 Million Gallons	1.7 Million Gallons	69.8 Miles	89.8 Miles

Water Main Breaks	Feet of Sewer Lateral Repaired	Feet of Sewer Main Cleaned	Feet of Sewer Main Inspected
9	447 Feet	2,670 Feet	7,301 Feet

POLICE

Calls for Service	Special Events Worked	# of Reported Accidents	# of Parking Tickets
20,984	148	228	1,373

Events and Community Outreach

- National Night Out
- Halloween Parade
- Halloween Trunk or Treat
- Halloween Flashlight Candy Hunt
- Easter Egg Hunt
- Coffee with a Cop
- Chief for the Day
- Ride to School with the Police
- Special Olympics Torch Run
- Cast with a Cop
- Flags Project at Warrenton Cemetery with the American Legion Post 72 for Memorial Day, Labor Day, & Veteran's Day
- Shop with a Cop
- Joint Community Academy

Accreditation

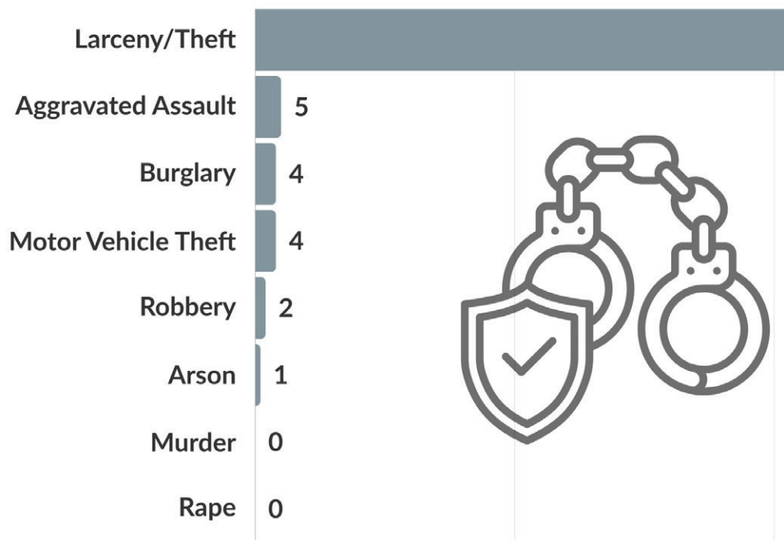
On March 7, 2024, Chief Carter and select members of the Department's accreditation team appeared before the Virginia Law Enforcement Professional Standards Commission (VLEPSC) at their quarterly meeting in Chincoteague, VA. At the meeting, the Commission reviewed a report from a team of law enforcement accreditation assessors that in November 2023 assessed the Warrenton Police Department's adherence to State accreditation standards over the prior four-year term. The Commission found the WPD in compliance and awarded it a fifth consecutive accreditation award. Chief Carter was in charge of the Police Department and oversaw preparation for the assessment during the last two four-year accreditation cycles.

Awards

Corporal Shaver Officer of the Year from the Warrenton Ruritan Club

Lieutenant Pierce graduation from Leadership Fauquier

Deputy Chief Arnold graduation from FBI Academy



Major Crimes

The graph here reports on the eight major crimes the Police Department reports on. We are proud that these numbers show that the Town is remaining safe and public safety is our top priority.

Highlights

Installed a new internet-based phone system at three Town building locations which ensures continuity of operations and bridged the gap between technology and daily functions.

Implemented a cybersecurity awareness training tool which significantly improved the Town's security posture.

Entered the planning stages for implementing an Enterprise Resource Planning (ERP) software package which aims to centralize data management for real-time collaboration and decision-making across Town department.

Replaced wireless infrastructure at Public Works and Water Treatment Plant, meeting the needs of staff for mobile communications which enhanced the security and reliability of essential operations.

Relocated the Town Hall Audio Visual (AV) systems to create reliable infrastructure and improved live-stream performance.

Started a security educational campaign which successfully reduced phishing attacks.

Created a monthly IT newsletter for staff featuring security awareness and training tips.

Attended many Town Talks to answer any community questions and to be engaged.

Collaborated with Fauquier County for the use of the Council Chambers at 21 Main Street for County to hold their Board of Supervisors Meetings.

Scan the QR Code to view live streaming of Town Council Meetings and view past recordings of other public meetings!

INFORMATION TECHNOLOGY

Public Meetings Produced

53

Online Meeting Engagement

4,538 views

Help Desk Tickets

2,218

Average Resolution for Help Desk Tickets

40 Hours

New Business Licenses

62

Utility Accounts

5,030

Meals Tax Accounts

90

# of Vendo Invoices Paid

7,891

Highlights

Worked with the Town Manager to develop the Fiscal Year 2025 Budget. Supported budget work sessions and provided additional information to Council prior to budget adoption in June.

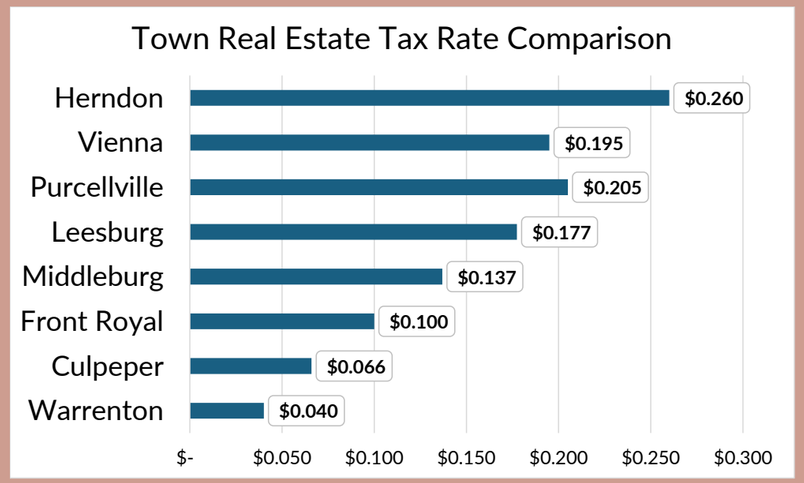
Implemented OpenGov budgeting software to facilitate the creation of the budget and enhance transparency.

Updated Town financial policies to ensure compliance with applicable laws and regulations, and to safeguard and properly account for public funds and other assets.

Provided Finance 101 training to educate Town staff on policies and procedures for the Finance Department.

Published a Budget in Brief document that shows the highlights of the budget to make it easier for citizens to understand.

Obtained the highest opinion possible for the external audit of the Town's financial statements, required annually per Virginia Code.



The chart above compares real estate tax rates for our peer communities. The last time the Town's Real Estate Tax Rate was changed was in Fiscal Year 2023, when it was decreased from $.05 to $.0401.

The Finance Department won a Certificate of Achievement for Excellence in Financial Reporting from the Government Finance Officers Association (GFOA) for the 30th year in a row.

They won for the first time, the GFOA's Distinguished Budget Presentation Award.

FINANCE

Highlights

Conducted a Benefits Survey to employees requesting their feedback on the Town's benefit programs and offerings to ensure the Town continues to provide the best benefits programs to employees.

Implemented a Citizen Misconduct Policy to ensure employees are entitled to work under the safest conditions possible.

Initiated an internal Health Care Committee which established program guidelines and assisted in identifying the FY25 benefits program.

Town Talks

Assisted the Town Manager with the creation of the Town Manager Guiding Principles and Employee Culture beliefs.

Streamlined the internal recruiting processes and procedures.

Closed out of Classification and Compensation Study.

Conducted an Organizational Staffing Study Review with departments to review their internal processes and procedures as it related to hiring and retention.

Participated in community outreach events at a Job Fair Event at Kettle Run High School and Town Talks events.

Scan the QR Code to view job opportunities at the Town!

Awards

Kasey Braun and Dennis Merz completed the LEAD Program which provides local government leaders essential skills they can directly apply in their organizations to make positive change.

Chris Melmer received the 2023 Life Saving Award from the Fauquier Chamber of Commerce with recognition from Senator Mark Warner.

Employee Events

- Employee Picnic
- Employee Appreciation & Holiday Luncheon
- Manager's Training

Risk and Emergency Management Highlights

Conducted multiple staff trainings including Defensive Driving, Active Threat, Federal Emergency Management Agency (FEMA), Workers Compensation & Employee Reporting, Occupational Safety & Health Administration (OSHA), and Virginia Occupational Safety & Health (VOSH) best practices.

Communicated and tracked severe weather systems that could pose dangerous threats to daily operations and Town citizens to ensure the safety of Town employees and citizens.

Streamlined training processes and procedures for the Town's Commercial Driver's License (CDL) Academy in collaboration with Public Works and Fleet & Facilities Management. This year the Town had eight CDL graduates from the academy.

Navigated the Town through an asbestos incident at Town Hall in compliance with OSHA & VOSH workplace safety best practices.

RESOURCES

Facebook
Follow the Main, the Police Department, and the Parks and Recreation pages to stay up to date on events, programs, and projects.

Instagram
Follow the Main, the Police Department, and the Parks and Recreation pages to stay up to date on events, programs, and projects.

Website
The Town's website has all the information you need about the Town's services and more. Visit www.warrentonva.gov.

Town Crier
The quarterly newsletter provides residents information on events, programs, important dates, and more. Mailed quarterly and available on the Town's website.

Press Releases
The Town publishes press releases on important topics and are available on the Communications Page on the Town's website.

Live Stream
The Town live streams Town Council meetings and the other public meetings are recorded for viewing after. These recordings are available on the Town's website.

Notify Me
Sign up for Town news, events, traffic alerts, and more. Sign up is available on the Town's website under Notify Me.

Public Meetings Calendar
Check out the Town's public meetings calendar on the website to stay up to date on when all public meetings are happening.

Events & Programs Calendar
Check out the Town's events and programs calendar to stay up to date on all the fun events the Town is putting on!

Town of Warrenton
P.O. Box 341
Warrenton, VA 20188-0341

PRSRT
US POSTAGE
PAID
MANASSAS VA
PERMIT NO 100

Town Hall

21 Main Street
Warrenton, VA 20186
(540) 347-1101
www.warrentonva.gov

TOWN OF WARRENTON

TOWN MANAGER

21 Main Street
Warrenton, VA 20186
(540) 347-1101

MEMORANDUM

TO: **William Semple, Vice Mayor, Chairman Transparency Commission**

FROM: **Frank Cassidy, Town Manager**

DATE: **April 3, 2025**

RE: **Outreach Initiatives for Transparency in Government**

This memo is to provide an overview of the outreach initiatives we have implemented over the last two years.

It has been a year since I was first promoted to your Town Manager, and since the publication of the 23/24 Year in Review. I would like to take this opportunity to elaborate on our efforts and successes specifically regarding public information, transparency, and outreach. This involves the active participation of every department and is a major part of our initiative of "Excellence in Action."

These are designed to develop a government that is transparent, predictable and consistent. Some of these programs are:

Overview of Initiatives:

- A full-time Communications Manager-
  - Citizens Academy – "Your Town Academy"
  - Town Talks
  - Neighborhood Talks
  - First Friday participation
  - Improved relationships with local press
  - More active on social media and continuous push to the website for information.
  - Production of our "Town Crier" to be timely and focused on education
  - An annual report
  - EM updates and posts.
  - Projects section on the website for information and updates on the various projects to include Broadview Avenue.
  - Website improvements with additional reports available online to include financial, projects, press releases, and emergency management.
  - More use of our Town Alert system through the website to include weather, traffic impacts, and project alerts.
  - Increased public forums on various topics to include Main Street, Broadview, and Zoning Ordinance Update.

    - The production of more informational documents to include brochures and booklets.
    - The creation of a “communications center” for residents in the Council Chambers for residents to get information on programs and services.
- Refine our Emergency Operations and develop an efficient response system.
    - Citizen Preparedness Guide
    - FEMA information booklets and handouts
    - Tabletop exercises
    - Collaboration with all participating agencies and departments
- Developed an action-oriented traffic safety initiative, with an active “hot line” and email for direct communication for complaints and concerns.
    - Developed a localized response stepped to address specific issues and concerns
    - Adopted Vision Zero and 20 is Plenty safety initiatives
- Have Improved Town Manager to Council Communications-
    - Weekly reports with improvements designated to each Ward outlined specific operations of a higher priority and are used as a highlight of operations.
    - Emergency response updates to include pre-event announcements, updates during events, a hotline for information, updated social media posts, and updated operational manuals.
    - Weekly Council draft agenda items to ensure ability for Council to review and to solicit input and recommendations in advance of the final agenda.
- Have improved our communications and collaboration with the County
    - Regular meetings with the County Administrator.
    - County Economic Development housed in Town Hall
    - Shared use of our government spaces.
    - Working to relocate our salt shed.
- Have improved project announcements and updates from Community Development and the Planning Commission
    - Regular monthly updates on the Council Agenda
    - Zoning rewrite committee with public forums and meetings
    - Established the Warrenton Arts Commission for public education through the arts
    - Detailed quarterly reports
    - Emails and information on new projects as they occur.
- Increased outreach regarding projects
    - Project Manager and other Town staff actively engages with businesses and residents affected by construction.
- Roads and construction- Broadview and Main St for example
    - Regular project updates as we receive them from the contractors
    - Posted project updates on website
    - Door-to-door notices and induvial responses from our Project Manager
    - Public forums
    - Incorporation into Town Talks
- All Other Town Departments (Public Works, Utilities, Parks and Rec, Human Capital, Police, Finance, and IT)

- Improved overall community outreach, education, programs, and events. To name a few (can provide a full list if wanted):
  - Touch a Truck
  - Facility Tours and Ride A Longs
  - National Night Out
  - Stormwater contest
  - Warm Up Wednesdays at the WARF
  - Career Fairs

Additional:

A copy of last year's "Year in Review" is provided as further illustration of these initiatives.

The Town of Warrenton
P.O. Box 341
Warrenton, VA 20188
P (540) 347-1101
F (540) 349-2414

Data Consistency Project Reference Index

1. Data Consistency Project Memo-Quarterly Report Template
2. Town Council Quarterly Report Template Q1 July, August, September
3. Quarterly Reports Due Dates
4. Data Consistency Project Memo-Staff Report
5. Staff Report Template – Explained
6. Memo-Resolution, Ordinance, and Proclamation Numbering System update.
7. Staff Report Template
8. Resolution Template TOW
9. Powerpoint Template - Data Consistency Project
10. Town of Warrenton PowerPoint Template

TOWN OF WARRENTON

TOWN CLERK

21 Main Street
Warrenton, VA 20186
(540) 347-1101

MEMORANDUM

TO: Senior Leadership

THROUGH: The Office of the Town Manager.

FROM: Mr. Stephen Clough, Town Clerk.

DATE: February 8th, 2024.

RE: Quarterly Report Format and Informational Changes

Data consistency project: The data consistency project is an update to the standard templates for documents used across the Town. This project began in the Fall of 2023 with updates across multiple document types including staff reports and resolutions. This project is designed to facilitate a more consistent way of disseminating information across all forms of Governance within the Town. Examples of documents to be updated are the PowerPoint template, quarterly report template, name plates for meetings, and other commonly used formats. Some document templates will be updated and communicated while others will be completely new. Questions or suggestions regarding this project should be directed to the Town Clerk.

Quarterly reporting program: The Quarterly report program is designed to enable data reporting to the Town Council and the Citizens of Warrenton. The program is being refined to allow for the inclusion of these reports in the budgeting process to better communicate the needs and success of the Town on a departmental level.

Items and data analysis should tie back to Plan Warrenton 2040, the Strategic Plan and the Yearly Strategic Goals laid out at the Strategic Retreat.

The due date for the Quarterly Reports is laid out in an additional Memo. It is expected that each department will utilize the attached template and format for this report.

The template outlines a few key areas that should be the focus of the report.

1) **Department introduction:** A **brief** overview of the department, essential functions, and duties. (No more than one paragraph.)
2) **Commendable Achievements:**
    a. Work completed and notable achievements in the quarter.
    b. Training updates, progress made by staff members and individuals.
3) **Project Progress:**
    a. Large scale projects and the impactful items.
4) **Charts and information:** Data displayed with analysis. Utilize this as needed to tell the

story.

a. **Data:** Organize Department data for consistency within the department. Each board, working group, commission should be called out.
   - Annual comparison at the end of calendar year
     - Comparison of previous quarter
     - Compare data that tells the story
   - Use graphs and visual aids to show the story
     - Analysis should be after the graphs presented
       - Tell the story,
         - The facts will back up the story,
           - The data will back up the facts.
       - **Show don't tell.**

Raw data should be added in a separate report as an appendix if needed. Don't crowd the information! The Financial Report, CIP, and Street Maintenance Report should be in the formats that they are already in.

February-2024 Update: The reporting dates have been changed as of January 2024 to align with the Fiscal Year, not the Calendar year. Due dates have not changed, but the titling has.

Attachments:

1) Quarterly Staff Report Template
2) Quarterly Staff report list and due dates

Quarterly Report

(insert Department Name) Department

Town Council Meeting Date: November 12, 2024

First Quarter 2025: July, August, September

Please accept this as the quarterly report for the ***(insert Department Name)*** department

Department introduction:

Commendable Achievements:

Project Progress:

Charts and information:

Data:

TOWN OF WARRENTON

TOWN CLERK

21 Main Street
Warrenton, VA 20186
(540) 347-1101

MEMORANDUM

TO: **Mr. Frank Cassidy. Interim Town Manager**

FROM: **Mr. Stephen Clough, Town Clerk**

RE: **Quarterly Report Due Dates and Report List**

Quarterly Report Due Dates

Quarterly Report Items are due on the same deadline as the Agenda Items are due to the Town Clerk.

Quarter One

July, August, September

Reports to Council are due in November.

Quarter Two

October, November December

Reports to Council are due in February.

Quarter Three

January, February March,

Reports to Council are due in May.

Quarter Four

April, May, June

Reports to Council are due in August.

Current Staff reports

- Finance
- Parks and Recreation
- Police
- Community Development
- Public Works and Utilities
    - CIP
    - Street Maintenance
    - Facilities and Fleet Management
- Human Capital
    - Emergency Management

TOWN OF WARRENTON

TOWN CLERK

21 Main Street
Warrenton, VA 20186
(540) 347-1101

MEMORANDUM

TO: **All Staff**

THROUGH: Senior Leadership, Town Manager

FROM: Mr. Stephen Clough, CMC, Town Clerk

DATE: November 2023.

RE: Data Consistency Project Part Three: Staff Report Template for Boards, Commissions, and Town Council

This memo is an update to all Staff regarding the update of the Staff Report template to be used across all boards, committees, commissions, and Town Council meetings.

Data consistency project:
The data consistency project is an update to the standard templates for documents used across the Town. This project began in the Fall of 2023 with updates across multiple document types including staff reports and resolutions. This project is designed to facilitate a more consistent way of disseminating information across all forms of Governance within the Town. Examples of documents to be updated are the PowerPoint template, quarterly report template, name plates for meetings, and other commonly used formats. Some document templates will be updated and communicated while others will be completely new. Questions or suggestions regarding this project should be directed to the Town Clerk.

Implementation Timeline:
Effective January 1st, 2024, the new Staff Report template will be required to be used for all applicable boards, committees, commissions, and Town Council meetings.

Changes and Updates:
The Following Changes have been made to the Template:

1) Eric Gagnon has been added as the new Ward 5 Councilmember.
2) The **"Service Level/Policy Impact"** item has been changed to **"Service Level/Collaborative Impact."**
3) An additional Item has been added titled, "**Policy Direction/Warrenton Plan 2040."**

Staff Report Template:

The Staff Report Template is available on the O: Drive under the following:

O:\1TOWN MANAGERS OFFICE\Resolutions, Proclamations, Staff Reports & Ordinances

The Staff Report document is the main document to convey information through the meeting agenda items. Staff reports are used in all departments with a common template and can be carried over from the Town Council to the Planning Commission, the Board of Zoning Appeals, and the Architectural Review Board.

This template can be slightly modified to suit the needs of the item being brought forth.

The current direction of the Town Council is to bring items to them for information one month before required action is necessary for an item.

To use this template, focus on the narrative of the item you're bringing forth.

Tell the story: The facts will back up the story, The Data will back up the facts.

Items added to the meeting agendas should have the following:

1) Staff report
2) Supporting documents if necessary
3) Presentations if necessary
4) Legislation if necessary- Legislation should be included for multiple courses of action. It is the Staff's job to advise the Council, Boards, and Commissions, not to dictate their actions.

If the agenda Item is for information purposes only, the staff recommendation should be: "Receive the information on the report. "

If a category does not apply to your particular item the response should be: "N/A."

The new subheading "**Policy Direction/Warrenton Plan 2040"** should include specific tie ins to the Comprehensive Plan, Warrenton 2040 and any Legal or Council policy that has this item coming before the Boards, Commissions, and Town Council.

The newly edited subheading **"Service Level / Policy Impact"** should explain how the agenda item and subsequent staff recommendations would affect other relevant services provided by the Town and the individuals tasked with enforcement of the staff recommendation. It should also explain what collaboration would be necessary with other departments and the impact of such.

Naming Template:
Should include the word Staff Report- Agenda item title. For example:

- Staff Report- Item name
- Staff Report- Approval of Minutes
- Staff Report- Department Overview
- Staff Report- SUP 2024-XX

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	The date at which the staff report is to be presented, Updated each meeting.
Agenda Title:	A title that is unique and acknowledges the contents of the specific staff report. This should match with the agenda item title for the meeting.
Requested Action:	A shortened description of the requested action. Maximum 1-2 sentences.
Department / Agency Lead:	Department or agenda responsible for the information in this report.
Staff Lead:	Individual or group of individuals that are presenting the information.

EXECUTIVE SUMMARY

The executive summary is a brief description of the item going before the council with the focus on the pertinent information and the rationale of bringing the item before the Council/Commission/Board.

BACKGROUND

Background information is the history of the item and reference materials to support the topic. Timelines, previous actions, reference materials, and ancillary information are all appropriate for this area. The elongated and in-depth basis for the staff recommendation. The reasoning may be legal, social, scientific, fiscal, medical, and/or justified by other means not explicitly mentioned. Explain in a manner that is easy to understand for those unfamiliar with this topic, the relationship between the issue presented, the staff recommendation, and the justification.

STAFF RECOMMENDATION

Staff recommendations should include the course of action that the Council may take without being binding. Staff can recommend, but the policy direction and actions of the Council/Commission/Board remain their own decision.

Service Level/Collaborative Impact

Explain how the agenda item and subsequent staff recommendations would affect other relevant services provided by the Town and the individuals tasked with enforcement of the staff recommendation. Explain what collaboration would be necessary with other departments and the impact of such.

Policy Direction/Warrenton Plan 2040

A required tie in of the item to the Warrenton Plan 2040 and the policy direction that required this item to be brought before the Council.

Fiscal Impact

Explains what monetary impact the staff recommendation would have on various parties involved in the resolution. This includes from where funding is sourced, the total costs incurred, revenue generated, and/or other fiscal impacts not mentioned.

Legal Impact

A section required for certain staff recommendations that explains the legal course of action necessary for implementation and/or legal necessity to act on this topic.

ATTACHMENTS

1. Optional attachments allow for potential citations, reports, and other means of intellectual support that led the author to their conclusion and recommendation.
2.
3.

TOWN OF WARRENTON

TOWN CLERK

21 Main Street
Warrenton, VA 20186
(540) 347-1101

MEMORANDUM

TO: **All Staff**

THROUGH: Senior Leadership, Town Manager

FROM: Mr. Stephen Clough, CMC, Town Clerk

DATE: May 15th, 2024.

RE: Update: Resolution, Ordinance, and Proclamation Numbering System

---

This memo is an update to all Staff regarding the enaction of a Resolution, Ordinance, and Proclamation Numbering System to be used across all boards, committees, commissions, and Town Council meetings.

Implementation Timeline:
Effective May 15th, 2024, the Resolution, Ordinance, and Proclamation Numbering System will be enacted by the Town Clerk on all signed Resolutions, Ordinances, and Proclamations. Resolution and Proclamation numbers will not be assigned until they are adopted by the Town Council. Ordinance Numbers will be assigned before consideration by the Council.

Resolution, Ordinance, and Proclamation Numbering System:
The numbering system is being modified for the start of 2024. Resolutions, and Proclamations, will all have new numbering items for internal and external tracking. An index and copy of each piece of legislation will be added to the Munidocs site for tracking and transparency.

Ordinance Numbering System:
Ordinances will be numbered according to the Town Code with the Year and progression number for the ordinance.

(Ordinance)-(Year)- (Ordinance Number)

Naming Convention:
The naming convention will have an abbreviation of the type of legislation being signed, the year, the month adopted, and an assigned number based on the number of pieces of legislation passed before in that meeting.

(Type of Legislation)- (last two digits of the year)-(month)- (resolution number)

Examples:

- RES-24-09-09, RES-24-10-03
- PRO-24-02-14, PRO-24-03-01
- Ordinance 2024-01, Ordinance 2024-02.

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:
Agenda Title:
Requested Action:
Department / Agency Lead:
Staff Lead:

EXECUTIVE SUMMARY

BACKGROUND

STAFF RECOMMENDATION

Service Level/Collaborative Impact

Policy Direction/Warrenton Plan 2040

Fiscal Impact

Legal Impact

ATTACHMENTS

1.
2.
3.

Lato: **Font 10**

WHEREAS, bold, including comma

No acronyms in the **RE:** line; all CAPS and **bold**

October 11, 2022
Town Council
Regular Meeting
Res. No. From Clerk

A RESOLUTION AUTHORIZING THE TOWN MANAGER TO SIGN AN AMENDMENT OF THE TRI-PARTY WATER AND SEWER AGREEMENT TO PROVIDE SEWER AND WATER TO GPIN'S 6995-23-0001-000 AND 6995-23-3305-000 SUBJECT TO CONDITIONS

1 Space

WHEREAS, Warrenton, VA (Hereinafter "the Town") is a municipal corporation located within the County of Fauquier; and { semi-colon with ***and*** }

1 Space

WHEREAS, the Town in its proprietary capacity owns and operates water & sewer utility systems within the municipality and in certain cases outside of the corporate limits when applications for the privilege of same have been granted pursuant to Article 17 of the Town Code; and { semi-colon with ***and*** }

1 Space

WHEREAS, Fauquier County (Hereinafter "the County") is a political subdivision of the Commonwealth of Virginia which does not operate any sewer or water facilities in its own capacity; and { semi-colon with ***and*** }

1 Space

WHEREAS, the Fauquier County Water & Sanitation Authority ("WSA") is an authority created and organized to provide sewer and water service with Fauquier County and, which operates under the Virginia Water & Waste Authorities Act, Chapter 51, of Title 15.2 of the Code of Virginia, 1950, as amended, hereinafter referred to as "the Virginia Code,"; and { semi-colon with ***and*** }

1 Space

WHEREAS, the Morgan Companies (the "Applicant") seek to develop certain properties identified as GPIN's 6995-23-0001-000 and 6995-23-3305-000 (the "Property"), located within Fauquier County but outside the Town limits, which can only happen if the Town, the County, and WSA amend the Tri-Party Agreement to allow the Town to provide public water and public wastewater services to the Property; and { semi-colon with ***and*** }

1 Space

WHEREAS, a memorandum prepared by Timmons Group, dated September 23, 2022, indicates the Applicant's proposed development on the Property will need approximately 12,000 gallons per day (gpd) of water for the grocery store, retail shops, coffee shop, convenience store with gas pumps, and fast-food eating establishment; and { semi-colon with ***and*** }

1 Space

WHEREAS, the Town is in the process of having the Water and Sewer System Growth and Capacity Evaluation study updated which will estimate the current and buildout water demands and sewer flows for areas where the Town has prior service commitments; and { semi-colon with ***and*** }

1 Space

WHEREAS, the Town's commitment to provide water and sewer service to this project is contingent on if the water and Sewer System Growth and Capacity Evaluation indicates that sufficient capacities exist in both the water and sewer systems; and { semi-colon with ***and*** }

1 Space

Wording in blue is always the same – remainder of the paragraph should match the title

NOW, THEREFORE, BE IT RESOLVED that the Warrenton Town Council Hereby is Authorizing the Town manager to sign an amendment of the Tri- Party Water and Sewer Agreement to provide sewer and water to GPIN'S 6995-23-0001-000 and 6995-23-3305-000 subject to conditions; { semi-colon with ***no and*** }

1 Space

BE IT FURTHER RESOLVED if the study shows that the Town has the excess capacity to provide public water and public sewer to the subject parcels, to provide public water and public sewer service to the subject parcels under the conditions that a.) the proposed uses, and square footages of each as indicated on the memorandum prepared by the Timmons Group, are approved by the

County; b.) public water service and sewage discharge shall be limited to 12,000 gpd on average within any thirty (30) day period on an as-needed and as-available based, and c.) the applicant shall diligently pursue all necessary approvals and begin construction within five (5) years from the date of October 11, 2022; { semi-colon with ***no and*** }

1 Space

BE IT FURTHER RESOLVED that the Town of Warrenton Town Council conditionally agrees to provide the requested public water and sewer service to the subject parcels if the Tri-Party Agreement shall require reconsideration if the average usage exceeds 12,000 gpd within any 30-day period or if the owner of the parcel(s) decides to change the use of any building that would increase the need for public water and treatment of sewage discharge; { semi-colon with ***no and*** }

1 Space

BE IT FURTHER RESOLVED that the Town of Warrenton Town Council will consider the subject Property as part of the Boundary Line Adjustment discussion; { semi-colon with ***no and*** }

1 Space

BE IT FURTHER RESOLVED that the Town of Warrenton Town Council reserves the right to restrict certain uses from operation on the subject parcels which will be identified during the Town's review of the Comprehensive Plan Amendment, Rezoning and Special Exception applications; { semi-colon with ***no and*** }

1 Space

BE IT FURTHER RESOLVED that the applicant shall be responsible for obtaining approval to amend the Tri-Party Agreement from the County and WSA to allow the Property to be serviced with water and sewer by the Town of Warrenton; { semi-colon with ***no and*** }

1 Space

BE IT FURTHER RESOLVED that the Town Manager and Town Attorney may take all appropriate, reasonable and necessary steps to effect and execute said agreement to amend the Tri-Party Agreement within the limitations set out in the recitals above; { semi-colon with ***no and*** }

1 Space

BE IT FURTHER RESOLVED that the Town reserves the right to charge a premium for any water usage over the maximum gallon per day limit in an amount intended to match the greater of (a) additional capital expenses anticipated to accrue as a result of the excess water usage or (b) such amount as will effectively deter excess usage. { always end with a period }

1 Space

ATTACHMENT: Memorandum of Understanding

ATTACHMENT:
In Caps

1 Space

Votes:

Ayes:

Nays:

Absent from Vote:

Absent from Meeting:

Bold Text

1 Space

For Information:

Community Development Director,
Town Attorney

"**For Information:**" is bold
Department or Agency
No names or phone numbers are listed

"Attest:" line is always at the bottom of the last page "

ATTEST: _____

Town Recorder

TOWN OF WARRENTON

TOWN CLERK

21 Main Street
Warrenton, VA 20186
(540) 347-1101

MEMORANDUM

TO: **All Staff**

THROUGH: Senior Leadership, Town Manager

FROM: Mr. Stephen Clough, CMC, Town Clerk

DATE: November 2023.

RE: Data Consistency Project Part One: PowerPoint Template for Boards, Commissions, and Town Council

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This memo is an update to all Staff regarding the enaction of a standard PowerPoint template to be used across all boards, committees, commissions, and Town Council meetings.

Data consistency project: The data consistency project is an update to the standard templates for documents used across the Town. This project began in the Fall of 2023 with updates across multiple document types including staff reports and resolutions. This project is designed too facilitate a more consistent way of disseminating information across all forms of Governance within the Town. Examples of documents to be updated are the PowerPoint template, quarterly report template, name plates for meetings, and other commonly used formats. Some document templates will be updated and communicated while others will be completely new. Questions or suggestions regarding this project should be directed to the Town Clerk.

Implementation Timeline: Please being to utilize the new template immediately. The expectation is that the new standard is in place to be mandatory by January 1st, 2024.

PowerPoint Template:

1) The PowerPoint template is available on the O: Drive under the folder PowerPoints for Mtgs; it is titled "00 Town of Warrenton PowerPoint Template".

2) There are four slide colors with instructions on how to apply the template. You will need to update the first slide with the title or topic of your presentation, then choose one of the four color combinations to use as the background for your presentation. Once you have decided which color background to use, delete the other color combinations.

3) There should be only one background color throughout your presentation. You will also need to update the footer of the presentation with the title or topic.

Naming Template: should include the date of your meeting, the board, and the agenda item topic. For example,

- 10.14.23_PC_Clerk Report

- 10.14.23_BZA_Finance Report
- 10.14.23_ARB_Zoning Report
- 10.14.23_TC_Town Manager Report

EXPERIENCE

WARRENTON

VIRGINIA

EST. 1810

TOPIC/AGENDA ITEM

Town Council Regular Meeting
October 10th, 2023

HOW TO USE THIS TEMPLATE

- Pick ONE of the four background colors and Text color combinations to use for each presentation and delete the rest.
- Use the Lato Font
- Do not use transitions
- Do not set to auto progress to the next slide.
- Start and end with the Title slide updated to your presentation and date

HOW TO USE THIS TEMPLATE

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- Do not use transitions
- Do not set to auto progress to the next slide.
- Start and end with the Title slide updated to your presentation and date

Questions?

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8, 2025
Agenda Title:	Homeland Security- Cyber Security Discussion
Requested Action:	Discussion
Department / Agency Lead:	Emergency Management, IT, and Police
Staff Lead:	Frank Cassidy, Town Manager

EXECUTIVE SUMMARY

Over the past several months, Federal agencies, including the Department of Homeland Security and CISA, have issued a series of cybersecurity alerts aimed at state and local governments. These alerts are intended to raise awareness of active and emerging threats such as ransomware, supply chain vulnerabilities, and targeted phishing campaigns. They serve as both a warning and a guide, offering recommended mitigation strategies to help protect critical infrastructure and public-sector data.

In response, the Town has maintained a focused and proactive cybersecurity program. Through ongoing alignment with national best practices, regular system audits, and the use of layered defenses, including access control, data segmentation, and endpoint monitoring, the Town continues to build resilience and protect its data assets against outside threats.

BACKGROUND

The Town operates in an evolving threat environment where both cyber and physical security risks are increasingly complex and interconnected. In recent months, the Department of Homeland Security and other federal agencies have issued a series of alerts addressing a broad spectrum of threats, including cyberattacks, infrastructure vulnerabilities, insider risks, and potential physical security incidents.

These alerts are designed to increase situational awareness and preparedness across all levels of government. While some threats are national in scale, they offer valuable guidance to local jurisdictions on how to strengthen operational resilience, secure critical systems, and protect public assets.

The Town regularly reviews and incorporates the guidance from these alerts into its broader risk management strategy. To remain compliant with our formal agreements with several external agencies, we must adhere to their established rules and procedures for data interconnection and information sharing. We are also subject to established rules and procedures that govern data access and define who is

authorized to access specific information. By combining physical and cybersecurity measures, such as access control, data segmentation, surveillance, and endpoint protection, the Town continues to refine its ability to prevent, detect, and respond to a range of security threats that could impact service continuity and public safety.

STAFF RECOMMENDATION

Staff recommends continued support and prioritization of the Town's integrated security strategy in response to ongoing federal alerts and the evolving threat landscape. This includes maintaining momentum on cybersecurity initiatives already underway, while also reinforcing physical security measures and preparedness protocols.

We recommend the following specific actions:

- Ongoing alignment with federal guidance from agencies such as DHS and CISA
- Continued investment in cybersecurity technologies, including endpoint protection, data segmentation, and monitoring tools
- Regular review and testing of incident response and recovery plans
- Staff-wide security awareness training that covers both cyber and physical threat scenarios
- Cross-department collaboration to ensure that security policies and procedures are implemented consistently and effectively
- Ongoing improvement of data access policies and procedures, including the application of least privilege principles, role-based access controls, and regular audits to ensure that only authorized individuals have access to sensitive information

By endorsing this approach, the Town can ensure it remains prepared, resilient, and responsive to the range of threats identified in recent alerts, while upholding our commitment to protecting Town operations, data, and public services.

Service Level/Collaborative Impact

N/A

Policy Direction/Warrenton Plan 2040

Community Facilities Goals:
CF-1 Through CF-6

Fiscal Impact

N/A

Legal Impact

N/A

ATTACHMENTS

1. XXXXXXXXXXXXX
2. Related emails

Homeland and Cybersecurity Update

Town Council Regular Meeting
July 8, 2025

Warrenton OEM: Independent & Recognized

- **Office of Emergency Management (OEM):**
  - Dedicated to Town-specific emergency preparedness & response.
  - Streamlined organization for rapid, effective action.
- **VDEM Recognition (April 2025):**
  - Officially recognized as an **independent Emergency Management Agency** by Virginia Department of Emergency Management.
- **Five-Year Achievement:**
  - Culmination of a robust, five-year effort.
  - Established a strong, independent emergency management jurisdiction within the Town

Collaborative Security: EM, Police & IT

- **Integrated Approach:** Effective Homeland Security relies on seamless coordination between these key departments.
- **Emergency Management:**
  - Leads overall preparedness, response, and recovery efforts.
  - Relies on Police for on-the-ground security and IT for communication/data.
- **Police Department:**
  - Provides law enforcement, incident response, and physical security.
  - Leverages IT for intelligence, communication, and digital forensics.
  - Works with EM on incident command and public safety.
- **Information Technology (IT):**
  - Secures critical infrastructure, networks, and data.
  - Enables secure communication for EM and Police during crises.
  - Provides tools for threat intelligence and cyber incident response.
- **Shared Goal:** Protect citizens, critical assets, and maintain operational continuity against all threats.

Interagency Information Sharing & Classification

- **Crucial for Security:** Effective Homeland Security depends on seamless, secure information exchange across Federal, State, and Local levels.
- **Data Classification Levels:**
  - **Unclassified:** Publicly releasable information.
  - **For Official Use Only (FOUO):**
    - Unclassified, but sensitive.
    - Not for public release; requires safeguarding.
    - Protects privacy, proprietary info, or law enforcement-sensitive data.
  - **Classified (Confidential, Secret):**
    - Information that could cause damage to national security if disclosed.
    - Strict access and handling protocols.
- **Ensuring Proper Handling:** Classification dictates who can access, share, and store information, safeguarding sensitive data while enabling necessary collaboration.

INTERAGENCY INFORMATION SHARING

DEPARTMENT OF INFORMATION TECHNOLOGY

IT Overview

The Town is continuing its proactive cybersecurity initiative to strengthen our defense posture, safeguard sensitive data, and ensure continuity of government services. This initiative reflects our long-term commitment to protecting critical systems and upholding public trust.

Our approach emphasizes:

- A layered defense strategy to mitigate evolving threats
- Responsible data stewardship and secure information sharing
- Controlled access to sensitive systems and services
- Alignment with national and state cybersecurity standards
- Ongoing readiness to detect, respond to, and recover from incidents

This strategic focus ensures the Town remains resilient and adaptive in an increasingly complex digital environment.

Current Cybersecurity Threat Landscape

Homeland Security alerts:

- Ransomware targeting local governments
- Increased phishing (geopolitical ties)
- Critical public sector software vulnerabilities

Relevance and Our Response

Why it matters: Highlights need for vigilance, modernizations, and layered security

Staff Objectives:

- Summarize federal alerts
- Review Town's readiness
- Outline integrity measures taken – including hardening of Town systems and networks

IT Data Security & Compartmentalization Strategy

The Town is continuing its ongoing review and progress in strengthening data security through structured access and oversight:

- **Data Classification**
- **Compartmentalized Access (Least Privilege)**
- **Role-Based Access Controls (RBAC)**
- **Audit & Monitoring**

Key Principle: Protecting Data by Limiting Access

Rather than over-securing individual files or accounts, our approach is to **protect the entire environment by ensuring data access is controlled and traceable.** Keeping sensitive information compartmentalized—and only accessible to those with a legitimate need—adds resilience against both accidental and malicious breaches.

INTERAGENCY INFORMATION SHARING

DEPARTMENT OF INFORMATION TECHNOLOGY

EXPERIENCE WARRENTON VIRGINIA EST. 1810

Questions?

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
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William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8th, 2025
Agenda Title:	Finance And Public Safety Committee Outlines.
Requested Action:	Discuss the outline, goals, and guidance for the newly formed committees.
Department / Agency Lead:	Town Council
Staff Lead:	Town Council

EXECUTIVE SUMMARY

Over the course of the budget discussions The Town Council created a Public Safety Committee and A finance Committee. The Town Council had requested that a discussion be held in July once the budget had been passed to outline goals for the committees.

BACKGROUND

The Town Council created a Finance Committee consisting of Mr. Paul Mooney and Vice Mayor William Semple.

The Town Council created a Public Safety Committee consisting of Mr. David McGuire and Ms. Michele O'Halloran.

STAFF RECOMMENDATION

Outline goals, priorities, and directives for the newly formed committees.

Service Level/Collaborative Impact

The Committees will require input and expertise from multiple Town departments and members of the Council.

Policy Direction/Warrenton Plan 2040

The Committees will help the Town address all aspects of Warrenton, Plan 2040.

Fiscal Impact

Fiscal impact study has not been conducted.

Legal Impact

A legal Impact study has not been conducted.

ATTACHMENTS

1.
2.
3.

STAFF REPORT

Town Council Meeting Date:	July 8, 2025
Agenda Title:	Tiffany Estates Tri-Party Agreement
Requested Action:	Consider the Request
Department / Agency Lead:	Community Development
Staff Lead:	Rob Walton, Director of Community Development

EXECUTIVE SUMMARY

The Owner of 7287 Blackwell Road, Mr. David Dobson, seeks an amendment to the Tri-Party Agreement for public water service for twenty-three (23) single family dwelling units. The parcel is approximately 32.1783 acres in size and zoned to the R-1 District within Fauquier County. A Construction Plan (Attachment 1 – portion) is currently under review by Fauquier County's Department of Community Development and the request to amend the Tri-Party Agreement by the county was submitted on May 28, 2025 (Attachment 2). On February 9, 2016, The Warrenton Town Council unanimously approved a request for public water service for up to twenty-eight (28) lots at that time (Attachment 3). The Minutes from that meeting also indicated the applicant's willingness to contribute $10,000 for traffic analysis and improvements to a three-way stop at the intersection of Oak Springs Drive and Blackwell Road intersection. In addition, the applicant also committed to paying three times the in-Town availability fee rate for water. Due to the lapse of time from the previous Town Council approval, the Town Attorney has asked the Town Council to re-affirm the provision of public water.

BACKGROUND

On February 9, 2016, The Warrenton Town Council unanimously approved a request for public water service for up to twenty-eight (28) lots at that time. Since that time, the applicant has not received approval from Fauquier County, nor WSA, to officially amend the Tri-Party Agreement. The applicant submitted a request to Fauquier County on May 28, 2025, asking the County to consider amending the Tri-Party Agreement. The County is currently reviewing a construction plan (CONP-23-019202) for 23 single family detached lots with an additional lot for SWM and open space.

STAFF RECOMMENDATION

Consider the request.

Service Level / Policy Impact

Using the estimate of 300 gallons per day (gpd) per dwelling, the total water usage impact is estimated to be 6,900 gpd. The previous proposal, in 2016, of 28 single family detached dwellings was estimated to consume 8,400 gpd.

Legal Impact

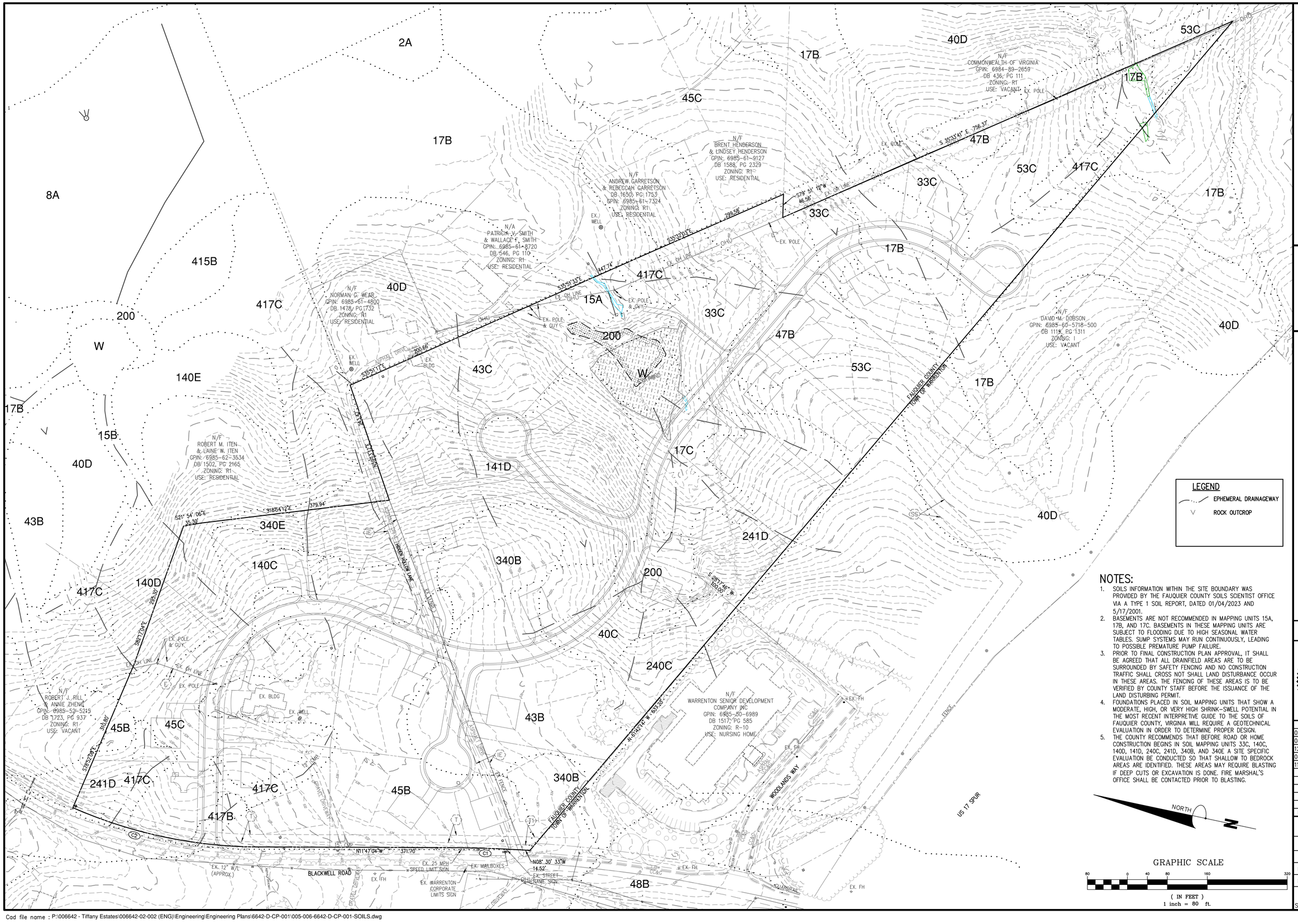
The amendment to the Tri-Party Agreement was assented to by the Town in 2016. As it stands, the Town has "accepted" the terms of the amendment and will continue to accept the terms of the amendment until such acceptance it withdrawn. This can only occur through an instrument of "equal dignity" (*Justus v. Lowell*, 32 Va. Cir. 32 (1993)) – for instance, if the amendment was agreed to via resolution by the Town Council, the Town requires a resolution to withdraw its agreement.

Withdrawal can occur until all parties assent and agree to the Tri-Party Agreement. Currently, since Fauquier County has not assented to the amendment, the Town has the ability to reconsider its approval.

Considering nine years have passed since the Town assented to the amendment, it is well justified to reconsider the amendment before it is executed.

ATTACHMENTS

1. Construction Plan – Overall Lot Layout
2. Cover Letter from Applicant to County
3. Minutes from February 9, 2025 Warrenton Town Council Meeting
4. Proposed Agreement from Applicant
5. Letter from Town Attorney to County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N/F
ROBERT M. ITEN
& LAINE W. ITEN
GPIN: 6985-62-3534
DB 1502, PG 2165
ZONING: R1
USE: RESIDENTIAL
N/F
NORMAN C. WEAR
GPIN: 6985-61-4800
DB 1478, PG 732
ZONING: R1
USE: RESIDENTIAL
N/A
PATRICK V. SMITH
& WALLACE F. SMITH
GPIN: 6985-61-8720
DB 546, PG 110
ZONING: R1
USE: RESIDENTIAL
N/F
ANDREW GARRETSON
& REBECCAH GARRETSON
DB 1650, PG 1753
GPIN: 6985-61-7324
ZONING: R1
USE: RESIDENTIAL
N/F
BRENT HENDERSON
& LINDSEY HENDERSON
GPIN: 6985-61-9127
DB 1588, PG 2329
ZONING: R1
USE: RESIDENTIAL
N/F
COMMONWEALTH OF VIRGINIA
GPIN: 6984-89-2659
DB 436, PG 111
ZONING: RT
USE: VACANT
N/F
DAVID M. DOBSON
GPIN: 6985-60-5718-500
DB 1119, PG 1311
ZONING: I
USE: VACANT
N/F
ROBERT J. RILL
& ANNIE ZHENG
GPIN: 6985-52-5215
DB 1723, PG 937
ZONING: R1
USE: VACANT
N/F
WARRENTON SENIOR DEVELOPMENT
COMPANY INC
GPIN: 6985-50-6989
DB 1517, PG 585
ZONING: R-10
USE: NURSING HOME
S35°51'33"E 1447.74'
S35°51'17"E 200.66'
S35°32'01"E 299.58'
S79° 51' 12"W 46.56'
S 35°33'41" E 756.37'
S18°54'12"E 379.94'
S21° 54' 06"E 35.30'
S68°17'06"E 295.30'
S78°32'09"E 310.80'
N11°47'04"W 371.70'
N08° 30' 33"W 14.52'
S 68°17'46" W 100.00'
N 61°42'14" W 635.26'
BLACKWELL ROAD
WOODLANDS WAY
US 17 SPUR
FAUQUIER COUNTY
TOWN OF WARRENTON
EX. WELL
EX. BLDG
EX. POLE & GUY
EX. POLE & CHY
EX. OH LINE
EX. POLE
EX. 25 MPH SPEED LIMIT SIGN
EX. MAILBOXES
EX. STREET NAME SIGN
EX. WARRENTON CORPORATE LIMITS SIGN
EX. 12" W/L (APPROX.)
EX. FH
EX. CURB
EX. GUTTER
EX. SIDEWALK
EX. TREE LINE
EX. FENCE
EX. CULVERT
EX. SS
EX. SWALE
EX. DRAINAGE DITCH
EX. GRAVEL DRIVEWAY
EX. ASPHALT DRIVEWAY
PROP. CMP
PROP. 24" CMP
PROP. 18" CMP
PROP. 12" CMP
PROP. 6" W/L
PROP. FH
PROP. GATE VALVE
PROP. 8" W/L
PROP. 12" W/L
PROP. 24" W/L
PROP. 8" SS
PROP. 6" SS
PROP. MH
PROP. CLEANOUT
PROP. SILT FENCE
PROP. SUPER SILT FENCE
PROP. CONSTRUCTION ENTRANCE
PROP. INLET PROTECTION
PROP. CURB INLET
PROP. DROP INLET
PROP. STORM MH
PROP. STORM MH W/ GRATE
PROP. STORM MH W/ GRATE & BOOT
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JD
James P. Downey, P.C.
Attorney and Counselor At Law

May 28, 2025

Kevin T. Carter
Supervisor Center District
Fauquier County Board of Supervisors
Fauquier County Administration
10 Hotel Street
Warrenton, Virginia 20186

Re: Tri-Party Agreement

Dear Supervisor Carter:

I am writing on behalf of my client David M. Dobson, concerning an amendment to the Tri-Party Agreement among the County, Town of Warrenton ("Town") and Water and Sanitation Authority ("WSA"), as that relates to the development known as Tiffany Estates. As you may recall, Tiffany Estates is located in the County on Blackwell Road, adjacent to the Town/County boundary line, and has in its most current plat, now under review 23 homesites. Tiffany has pending approval for extension of water from the Town to serve the project for up to 28 homesites. Approval of the waterline extension outside the Town boundaries requires an amendment to the Tri-Party Agreement, so that all three parties give their approval, before the extension can be granted. The Town Council voted unanimously on February 9, 2016, to approve the extension.

I am asking to have the County take this matter forward and adopt the necessary Resolution and then sign the amendment that I have drafted (attached). It is my understanding that WSA has no strong position on this and likely will sign, so long as the County and Town do so. This is entirely within the County's Center Service District, and Town public water is already provided to adjacent properties in the County on the North and West sides, namely Warrenton Lakes community at Nordix Drive and Ivy Hill community on Ivy Hill Drive. I will be taking this matter back to the Town, via its Town Manager, to begin the process of submitting the Amended Tri-Party Agreement to the Town Council to authorize signature, if that is necessary. I am happy to meet with you and any staff members who may need to provide input on this matter.

Very truly yours,

James P. Downey

Enclosure
cc: Melissa G. Michelson, County Attorney
Janelle J. Downes, County Administrator
Holly Meade, Director, Fauquier County Community Development
Frank Cassidy, Town Manager
J. Chapman Petersen, Town Attorney
Benjamin R. Shoemaker, Executive Director, WSA
Henry C. Day, Counsel to WSA
JPD/cmh

possible funding source for the Initial Project. The issuance and sale of any obligations of the Town to VRA or any other lender shall only be approved upon subsequent action of Town Council.

Other Actions. All other actions of Town officials in conformity with the purposes and intent of this Resolution and in furtherance of the consideration of the Initial Project by VRA and the solicitation and evaluation of other financing options for the Initial Project are ratified, approved and confirmed. Town officials, the Financial Advisor and Bond Counsel, each as directed by the Town Manager, are authorized to prepare and provide any information or certifications considered necessary or desirable in connection with the application to the Pool Program and the consideration by VRA of the Town's application thereunder or any other financing options as directed by the Town Manager.

Effectiveness and Filing of Resolution. This Resolution shall become effective immediately upon its passage. Any ordinances or resolutions inconsistent herewith previously adopted by the Town Council are amended to be consistent with this Resolution.

On a motion by Mr. Lewis, seconded by Mr. Kravetz, the resolution was adopted on a 7-0 Council vote (for: Reynolds, Polster, Wood, Williams, Lubowsky, Kravetz, Lewis; against: none).

Consideration of provision of water service to Tiffany Estates.

Mr. Godfrey noted that there was additional information on the Council desk concerning additional proffers. He stated that Mr. David Dobson had requested that the Town serve his proposed 28-home development north of the Town located on Blackwell Road with Town water. The property is not in the designated service area as defined by the Town and County. He stated that the impact of the development is to consume 8,400 gallons per day of available water capacity based upon the standard 300 gpd per dwelling daily equivalent. He indicated that at the current rate structure the developer would pay $277,200 in one-time availability fees, which is based upon twice the in-town rate. He noted that the size and quality of the houses planned for subdivision it is estimated that the water consumption for the entire development would generate an estimated $1192/month in water user charges. As the project is in the County, the Town will not incur any costs related to Town services for the development. Mr. Godfrey stated that at the Utility Committee meeting Mr. Wood noted the possible traffic impact that the development would have on the Oak Springs/Blackwell Road intersection. He said that Mr. Dobson proffered an additional $10,000 for a traffic analysis and a proposed three-way stop at the intersection. The Manager stated that at that meeting Mr. Lubowsky, Chairman of the Utility Committee, had suggested a three-tier availability fee structure. The first would be at the current rate for in-Town connections. Two would be for twice the in-Town rate for the connections who are in the service area, and the third would be three times the current in-Town rate for out of Town and out of service area. Mr. Lubowsky had noted at the meeting that Mr. Dobson's request preceded the suggested fee structure. Mr. Godfrey noted that the Utility Committee recommendation was to serve the property with Town water. The additional proffer just made by Mr. Dobson was that he would proffer the three times the in-Town for the availability fee for water. Ms. Reynolds questioned if that would be in addition to the $10,000 proffered for public safety and Mr.

Godfrey noted that is what he proffered. Mr. Robinson asked Mr. Dobson, for the record, if that was correct and he indicated it was.

Mr. Lubowsky noted that the Manager was correct and the three tiered approach was discussed. However, it was noted that Mr. Dobson's request was grandfathered. He stated that Mr. Dobson did not attend the worksession and he contacted him to attend the Council meeting because it was not voted upon.

Mr. Robinson asked if it was Mr. Dobson's understanding that he would pay the three times in-Town availability fee and Mr. Dobson assured that was correct.

Mr. Lubowsky moved that the 28 taps sought by the applicant for the Tiffany Estates development on Blackwell Road be approved subject to conditions contained in the recent communication (part of the record). Mr. Wood seconded the motion.

Mr. Kravetz indicated his concern that the Town continues to give away its water and there would be a point in the future when it would be prohibitive. He stated that there are several substantial in-Town properties which would require water. He was inclined to vote for provision of water but that would the last out-of-town property he would vote for provision of water in the future. Ms. Reynolds noted that her concerns somewhat echoes Mr. Kravetz's and there are four sizable properties within the Town to be developed. She noted that the water availability needed is based on current zoning. She stated all the properties are zoned industrial. One of the properties is in the process of changing the zoning to a mixed use which would have some residential most likely incorporated. She noted she was more inclined to provide water to Town developments rather than in the County and it encourages people to develop in Town. She noted she would support Mr. Dobson's request with what he had proffered.

Mr. Polster noted that it was another great opportunity to partner with the County before making a decision and consider the impacts on them. Mr. Lubowsky reminded Council that the applicant is by-right in the County and there was water there which could be provided by wells. He noted that there would also be no additional impact on the school seats, traffic, etc.

On a vote of 7-0 (for: Reynolds, Polster, Wood, Williams, Lubowsky, Kravetz, Lewis; against: none) Council approved providing water to Tiffany Estates at the three times the in-Town availability fee rate and an additional $10,000 proffer for public safety.

REPORTS AND COMMUNICATIONS.

Report from Town Attorney.

Mr. Robinson noted that he would like an approval to advertise for the electronic meeting participation for the March Council meeting. On a motion by Mr. Lewis, seconded by Mr. Polster, Council approved advertisement of the proposed Code change on a vote of 7-0 (for: Reynolds, Polster, Wood, Williams, Lubowsky, Kravetz, Lewis; against: none).

AMENDMENT and MODIFICATION TO FAUQUIER COUNTY/TOWN OF WARRENTON/WSA MASTER SEWER & WATER AGREEMENT

This Amendment and Modification to the Fauquier County/Town of Warrenton/WSA Master Sewer and Water Agreement ("the Triparty Agreement") is made and entered into this ____ day of _____, 2025, by and between Fauquier County (" the County"), Town of Warrenton ("the Town") and David M. Dobson ("Dobson").

A. Recitals

R-l. The County is a political subdivision of the Commonwealth of Virginia which does not operate any sewer and water facilities in its own capacity.

R-2. The County has established certain water and sewer service areas under its comprehensive plan for the land around the Town and elsewhere within its boundaries.

R-3. Dobson has received approval from the Town for water service to be extended to an area within the surrounding County area, subject to an amendment to the Triparty Agreement; and the parties wish to make the said amendment;

R-4. The Town owns and operates water distribution and sewage treatment systems located both within and without its corporate limits pursuant to Section 15.2-2109 of the Virginia Code.

R-5. In connection with the Project, the County, the Fauquier County Water and Sanitation Authority ("'FCWSA") and the Town have agreed to modify the previously established provision of sewer and water services to the residents of the County in the Warrenton Service Area, as the same is defined in the Fauquier County Comprehensive Plan, in a certain Master Sewer and Water Agreement dated June 28, 2001 (the "Tri-Party Agreement").

Resolutions have been adopted by the parties, authorizing execution of this agreement; now therefore

B. Consideration

In consideration of the mutual benefits accruing to the parties, the receipt and sufficiency of which are acknowledged,

C. Agreement

1. SERVICE AREA

1.1 The parties agree that the area to be included in the "Town Water Service Area," as designated in the Triparty Agreement as Exhibit "B" shall be expanded to include the area PIN Nos. 6985-60-5718-000 and 6985-51-6810-000.

1.2 Subject to all of the conditions set forth in this Agreement, the Town agrees to provide water service to the Property up to a maximum number of 23 water service taps, allocated as set forth in Subparagraph 1.4 below.

1.3 The Parties hereto agree that the provision of water service by the Town to the Property is conditioned upon: (i) the County approving the proposed Tiffany Estates development subdivision in approximately the same form as submitted as the Tiffany Estates layout (and in conformance with Exhibit "A" hereto), but with 23 R-1 lots, and noting that any material change in the subdivision layout application shall be subject to further County approval; and (ii) the Project, including after being constructed, shall at all times be in substantial conformance with the layout as approved. In the event that the conditions precedent set forth in (i) and (ii) are not satisfied, the Town shall have no obligation to provide water service to the Property. In the event that any portion of the Project then built or under construction is not in substantial conformance with the approved layout, or if Dobson shall at any time fail to be in compliance with the terms of this Agreement, then the Town shall be entitled to withhold all

future connections to the water system unless and until the Project is brought into substantial conformance with the approved layout and/or Dobson is in compliance herewith.

1.4 Subject to all of the conditions set forth herein, Dobson shall receive water service for a maximum of twenty-three (23) R-1 zoned lots.

1.5 Dobson shall build the Project water infrastructure to Town standards, and shall connect the Project water system to the existing Town water system in at least two places proximate to the Property as designed by the Town, all at Dobson's expense. Dobson shall post the construction bonds required by the Town, and the Town shall have the right to approve the water system plans and specifications and to inspect the installation of the system, all in the same manner as if the system were in the Town. Dobson shall include in its recorded covenants for the Property a prohibition against any lot owner drilling an on-site well for private use.

1.6 Dobson shall pay the Town fees in accordance with the terms set forth in Attachment A.

2. DESIGN AND CONSTRUCTION OF WATER FACILITIES

2.1 The Parties acknowledge that Section 3 of the Master Agreement shall govern design and construction matters.

2.2 The Parties agree that the Town shall have the right to acquire easements for such lines necessary or appropriate to service the relevant portion of the Property and Dobson shall timely cooperate to grant same, as the Town may request from time to time.

2.3 The Parties agree that the County shall not be liable for the cost of the design, construction and maintenance or operation of any water facility to be constructed to serve the Tiffany Estates.

3. RATES FOR SERVICES

3.1 The Town shall have the right and obligation to establish water service rates, from time to time and at its discretion, as set forth in Section 5 of the Master Agreement.

4. CONDITIONS PRECEDENT AND STATUTORY APPROVALS.

4.1 Conditions precedent to the effectuation of this Agreement:

a) The Master Agreement shall be fully executed and shall become effective by its terms; and

b) This Agreement shall have been adopted by the County's Board of Supervisors; and

c) This Agreement shall have been adopted by the Town Council of the Town.

d) This Agreement shall have been adopted and executed by David Dobson and David Dobson's attorney (licensed in Virginia) shall have provided the other parties hereto with a written legal opinion stating that Dobson's officers or members signing this Agreement have due authority to do so, and that this Agreement, including all of the conditions set forth herein, is a legal, valid and binding obligation of Dobson, fully enforceable against Dobson in accordance with its terms.

4.2 The parties agree that the adoption of this Agreement by the County's Board of Supervisors, and by the Town Council of the Town shall be deemed to be, with respect to the Project, approvals for the provision of services (subject to the conditions set forth herein) as required under the Virginia Code.

4.3 The County hereby approves, subject to the conditions set forth herein, the provision of water service by the Town to the Property.

4.4 The Recitals set forth above are substantive and are fully incorporated into this Agreement.

5. MISCELLANEOUS PROVISIONS.

5.1 Governing Law. This Agreement shall be construed and enforced in accordance with the laws of the Commonwealth of Virginia.

5.2 Recitals and Headings. The Recitals hereof are an integral part of this Agreement, and contain substantive obligations. The captions and headings herein are for convenience and reference only and in no way define or limit the scope or content of this Agreement or in any way affect its provisions.

5.3 Binding Effect. This Agreement shall be deemed to run with the land and shall be binding upon, and inure to the benefit of, the Parties hereto and their respective legal representatives, successors and assigns, including each party with an interest in the Property or any part thereof such as any homeowners' association or similar organization.

5.4 Assignment. This Agreement is assignable by Dobson provided that he may not do so prior to the later of (i) approval of the layout by the County and (ii) the recordation of this document. Should Dobson sell or assign a majority interest in the Project to another developer or entity (other than collateral assignments to secure financing for the Project, and then only until any action taken by the financier in respect of the collateral, whereupon it shall be deemed to be an assignee), then (a) the assignee or purchaser shall take its interest(s) subject to the obligations of Dobson as set forth in this Agreement; and (b) it shall notify the Town and the County of its contact information in accordance with Subparagraph 5.1 above. Such notification shall occur within ten (10) days of the effective date of the assignment or purchase. Each such assignee or purchaser shall acknowledge to the Town and the County in a signed writing that it is

specifically bound by this Agreement, and no such assignment shall be effective until receipt by the Town and the County of this written acknowledgment contemplated herein.

5.5 Entire Agreement. This Agreement contains the full and final agreement among the parties hereto with respect to the provision of water service to the Property. In the event of any conflict between this Agreement and the Master Agreement, this Agreement shall control.

5.6 Modification and Waiver. No change or modification of this Agreement shall be valid unless the same is in writing and properly executed by each of the Parties hereto pursuant to due authority. No waiver of any of the provisions of this Agreement shall be valid unless the same is in writing and is properly executed with due authority by the party against whom it is sought to be enforced.

5.7 This Agreement may be recorded in the land records of the Circuit Court of Fauquier County by any party hereto.

6. NOTICES.

6.1 Any and all notices, requests or other communications hereunder shall be deemed to have been duly given if in writing and if transmitted by hand-delivery or by registered or certified mail, return receipt requested, and first class postage prepaid as follows:

TO TOWN:	Mayor, Town of Warrenton 21 Main Street Warrenton, VA 20186
Copy to:	Town Attorney 21 Main Street Warrenton, VA 20186
TO FAUQUIER:	Chairman, Board of Supervisors Fauquier County 10 Hotel Street, Suite 208 Warrenton, VA 20186

Copy To: County Attorney
10 Hotel Street, 2nd Floor
Warrenton, VA 20186

DOBSON: David M. Dobson
9198 North Cliff Lane
Rixeyville, VA 22737

Copy to: James P. Downey, Esq.
JAMES P. DOWNEY, P.C.
298 Falmouth Street
Warrenton, VA 20186

Notices shall be deemed effective when received.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement under seal as of the day and year set forth above.

ATTEST:

TOWN OF WARRENTON, a Virginia Municipal Corporation

_____

By:_____(SEAL)

APPROVED AS TO FORM:

_____
Town Attorney

Commonwealth of Virginia,
County of Fauquier, to wit:

The foregoing instrument was acknowledged before me in the above jurisdiction this _____ day of _____, 2025, by _____as Town Manager for the Town of Warrenton.

(Notary Seal)

_____
Notary Public
Notary Registration Number _____
My Commission Expires _____

FAUQUIER COUNTY WATER AND
SANITATION AUTHORITY

BY:_____

Commonwealth of Virginia,
County of Fauquier, to wit:

The foregoing instrument was acknowledged before me in the above jurisdiction this

_____ day of _____, 2025, by _____as

_____ for the Fauquier County Water and Sanitation Authority.

(Notary Seal)

_____
Notary Public
Notary Registration Number _____
My Commission Expires _____

FAUQUIER COUNTY BOARD OF
SUPERVISORS

BY:_____

Commonwealth of Virginia,
County of Fauquier, to wit:

The foregoing instrument was acknowledged before me in the above jurisdiction this

_____day of _____, 2025, by _____as

_____ for the Fauquier County Board of Supervisors

(Notary Seal)

_____
Notary Public
Notary Registration Number _____
My Commission Expires _____

CHAP PETERSEN & ASSOCIATES, PLC

J. Chapman Petersen+*
Sharon Kim Petersen
+also or ++only admitted in DC
**also admitted in MD*
^admitted in NY

Patrick R. Corish+
prc@petersenfirm.com
Direct: 571-407-7672

Federico J. Zablah
Christopher T. Robertson+
Dylan M. Phillips
Janice M. Jang+^

June 5, 2025

Via first-class mail and electronic mail

Supervisor Kevin T. Carter
Chairman of Fauquier County Board of Supervisors
Fauquier County Administration Center
10 Hotel Street
Warrenton, VA 20186
Kevin.carter@fauquiercounty.gov

Copy to:

James P. Downey, Esq.
298 Falmouth St.
Warrenton, VA 20186
infor@jamesdowneylaw.com

Copy to:

Melisa G. Michaelson, Esq.
Fauquier County Attorney
10 Hotel Street, 2nd Fl.
Warrenton, VA 20186
Melisa.michelsen@littensipe.com

Re: Tiffany Estate Tri-Party Agreement Amendment

Chairman Carter, Mr. Downey, and Ms. Michelsen,

We are in receipt of a copy of Mr. Downey's May 28, 2025 letter to Supervisor Kevin T. Carter on behalf of his client, Mr. David Dobson, regarding a Tri-Party Agreement (the

"Agreement") between Fauquier County (the "County"), the Town of Warrenton, VA (the "Town"), and the Fauquier County Water and Sewer Authority ("WSA").

The Letter concerns a proposed amendment to the Agreement in consideration of the pending approval for an extension of water services beyond the Town's municipal boundaries to provide services to a development known as Tiffany Estates for up to twenty-eight (28) homes[1]. Apparently, the Town had voted to approve the amendment to the Agreement on February 9, 2016 – **9 years ago**. The proposed amendment was never approved by either the County or the WSA, and thus sits in limbo.

We understand Mr. Dobson's desire to complete the ratification of the amendments to the Agreement in order to develop the Tiffany Estate development site, however, given the several-years delay in the having the amendment reviewed and ratified by all parties, it is appropriate for the Town to revisit and review the amendment in order to ensure the amendment is still in the Town's interest to expand its water services as desired by Mr. Dobson.

Please take this as notice that the Town will be placing consideration of this amendment on its formal docket for discussion the next available work session for Town's Council. We ask that any consideration by the County and the WSA be postponed until this matter can be revisited by the Town so as to avoid any unwarranted misunderstanding concerning the amendment's full ratification.

Should you wish to discuss these matters with us, please contact me at prc@petersenfirm.com or call (571) 407-7672.

Very truly yours,

Patrick R. Corish, Esq.

cc: J. Chapman Petersen, Esq.
Frank Cassidy, Town Manager
Rob Walton, Town Director of Community Development

[1] The proposed amendment, however, denotes only twenty-three (23) sites would be serviced.

TIFFANY ESTATES

CONSTRUCTION PLAN

CONP-23-019202

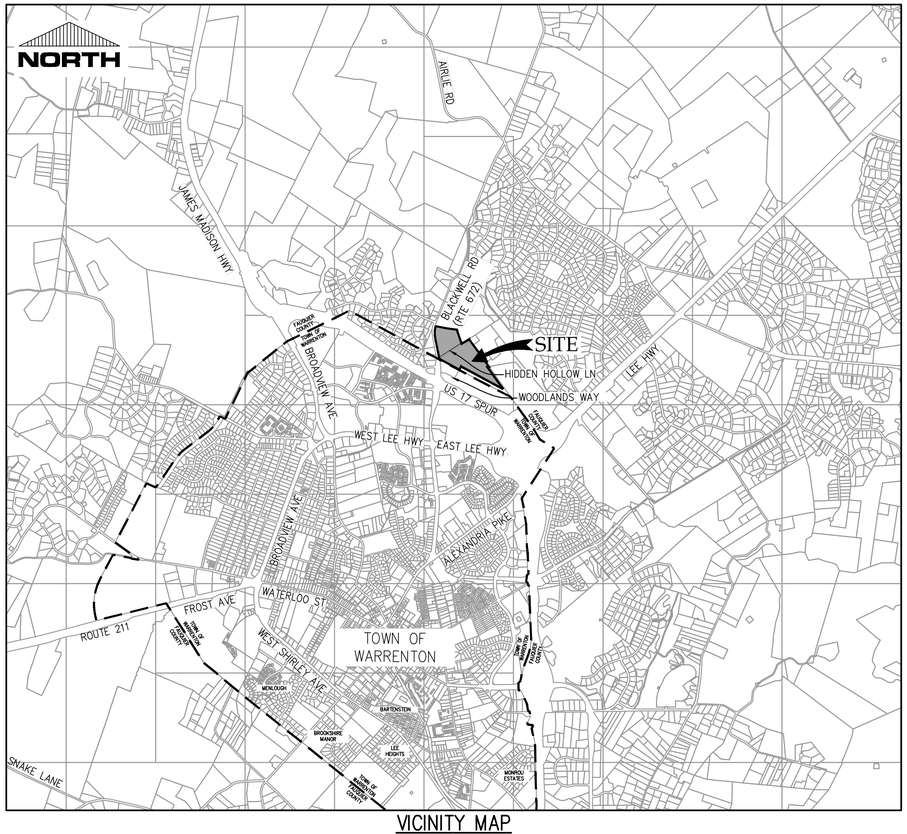
CENTER MAGISTERIAL DISTRICT
WARRENTON SERVICE DISTRICT
FAUQUIER COUNTY, VIRGINIA

GENERAL NOTES

1. THE PROPERTY SHOWN HEREON IS DESIGNATED AS FAUQUIER COUNTY PARCEL IDENTIFICATION NUMBER (GPIN) 6985-51-6810-000 AND 6985-60-5718-000. THE TOTAL PARCEL AREA IS 32.18 ACRES. THE SITE IS CURRENTLY ZONED R1.
2. THIS PROPERTY IS IN THE NAME OF DAVID M. DOBSON AS RECORDED IN DEED BOOK 1119 AT PAGE 1311 AND DEED BOOK 1119 AT PAGE 1316 AMONG THE LAND RECORDS OF FAUQUIER COUNTY.
3. THE PLAT AND THE SURVEY UPON WHICH THIS PLAN IS BASED SHOWS ONLY THOSE IMPROVEMENTS THAT ARE OBSERVABLE AND CAN BE LOCATED USING NORMAL SURVEY METHODS. THE INTERIOR IMPROVEMENTS SHOWN HEREON ARE COMPILED FROM AN AERIAL SURVEY OF THE PROPERTY. THERE IS NO GUARANTEE THAT THE UTILITIES SHOWN HEREON COMPRISE ALL UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED NOR THAT THE UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. UNDERGROUND UTILITIES HAVE NOT BEEN PHYSICALLY LOCATED.
4. THE SUBJECT PROPERTY IS LOCATED ON FEMA FLOOD INSURANCE RATE MAP FOR FAUQUIER COUNTY, VIRGINIA, COMMUNITY PANEL NUMBER 51061C0306D, EFFECTIVE DATE APRIL 25, 2024. THE PROPERTY IS LOCATED IN ZONE X.
5. THERE ARE CURRENTLY NO MAPPED DAM BREAK INUNDATION ZONES ON THE SITE.
6. TOPOGRAPHIC INFORMATION SHOWN HEREON WAS OBTAINED FROM AN AERIAL SURVEY OF THE PROPERTY CONDUCTED BY BOWMAN CONSULTING GROUP, LTD. ON SEPTEMBER 28, 2022 AND IS SHOWN AT A 2' CONTOUR INTERVAL. OFFSITE TOPOGRAPHIC INFORMATION WAS OBTAINED FROM FAUQUIER COUNTY GIS INFORMATION AND IS SHOWN AT A 5' CONTOUR INTERVAL. VERTICAL INFORMATION SHOWN IS BASED ON NAVD 88.
7. THE BOUNDARY INFORMATION SHOWN HEREON IS COMPILED FROM EXISTING LAND RECORDS OF FAUQUIER COUNTY AND A FIELD SURVEY BY BOWMAN CONSULTING GROUP, LTD. ON FEBRUARY 17-24, 2022. THE HORIZONTAL DATUM AS REFERENCED HEREON WAS ESTABLISHED BY STATIC GPS CONTROL METHODS. THE HORIZONTAL DATUM IS REFERENCED TO VIRGINIA STATE GRID, NORTH ZONE, NAD 83 (2011) AND IS REFERENCED IN U.S. SURVEY FEET.
8. NO EVIDENCE WAS FOUND OF: EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS WITHIN RECENT MONTHS; CHANGES IN STREET RIGHT OF WAY LINES EITHER COMPLETED OR PROPOSED, AND AVAILABLE FROM THE CONTROLLING JURISDICTION; RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS; THE PROPERTY BEING USED AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.
9. THE EXISTING PROPERTY SHOWN HEREIN IS PROPOSED TO BE SUBDIVIDED INTO RESIDENTIAL LOTS. THE PROPOSED PLAN IS FOR THE CONSTRUCTION OF 21 RESIDENTIAL UNITS, ONE EXISTING HOME THAT WILL REMAIN ON A PROPOSED LOT, AND FOUR RESIDUAL OPEN SPACE LOTS.
10. SEWER SERVICE FOR ALL RESIDENTIAL LOTS SHALL BE PROVIDED BY INDIVIDUAL ON-LOT DRAINFIELDS. WATER SERVICE WILL BE PROVIDED BY THE TOWN OF WARRENTON.
11. METHODS AND MATERIALS USED IN THE CONSTRUCTION OF THE IMPROVEMENTS HEREIN SHALL CONFORM TO THE CURRENT FAUQUIER COUNTY CONSTRUCTION STANDARDS AND SPECIFICATIONS AND/OR CURRENT VDOT STANDARDS AND SPECIFICATIONS.
12. MEASURES TO CONTROL EROSION AND SILTATION, INCLUDING DETENTION PONDS SERVING AS SILT BASINS DURING CONSTRUCTION, MUST BE PROVIDED PRIOR TO ISSUANCE OF THE SITE DEVELOPMENT PERMIT. THE APPROVAL OF THESE PLANS IN NO WAY RELIEVES THE DEVELOPER OR HIS AGENT OF THE RESPONSIBILITIES CONTAINED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.
13. A PERMIT MUST BE OBTAINED FROM VDOT PRIOR TO CONSTRUCTION IN EXISTING STREET RIGHT-OF-WAY.
14. APPROVAL OF THIS PLAN DOES NOT GUARANTEE ISSUANCE OF AN ENTRANCE PERMIT BY VDOT WHEN SUCH PERMIT IS REQUIRED UNDER STATE LAW.
15. THE EXACT LOCATION OF ALL GUARD RAILS WILL BE DETERMINED BY VDOT. A JOINT INSPECTION WILL BE HELD WITH THE DEVELOPER, AND REPRESENTATIVES OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) TO DETERMINE IF AND WHERE GUARD RAIL AND/OR PAVED DITCHES WILL BE NEEDED. THE DEVELOPER WILL BE RESPONSIBLE FOR PROVIDING GUARDRAIL AND PAVED DITCHES AS DETERMINED BY THIS JOINT INSPECTION." REFER TO VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) GUARD RAIL AND PAVED DITCH SPECIFICATIONS.
16. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE.
17. WARNING SIGNS, MARKERS, BARRICADES OR FLAG MEN SHOULD BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
18. ALL UNSUITABLE MATERIAL SHALL BE REMOVED FROM THE CONSTRUCTION LIMITS OF THE ROADWAY BEFORE PLACING EMBANKMENT.
19. ALL PAVEMENT SECTIONS SHOWN ON THESE PLANS ARE PRELIMINARY. FINAL PAVEMENT DESIGN SHALL BE PERFORMED UPON RECEIPT OF CBR TESTING.
20. ALL SPRINGS SHALL BE CAPPED AND PIPED TO THE NEAREST STORM SEWER MANHOLES OR CURB INLET. THE PIPE SHALL BE MINIMUM 6" DIAMETER AND CONFORM TO VDOT STANDARD SB-1.
21. CONSTRUCTION DEBRIS SHALL BE CONTAINERIZED IN ACCORDANCE WITH THE VIRGINIA LITTER CONTROL ACT; NO LESS THAN ONE LITTER RECEPTACLE SHALL BE PROVIDED AT THE CONSTRUCTION SITE.
22. NOTIFICATION SHALL BE GIVEN TO THE APPROPRIATE UTILITY COMPANY PRIOR TO CONSTRUCTION OF WATER AND/OR SANITARY SEWER LINES. INFORMATION SHOULD ALSO BE OBTAINED FROM THE APPROPRIATE AUTHORITY CONCERNING PERMITS, CUT SHEETS, AND CONNECTIONS TO EXISTING LINES.
23. WHEN GRADING IS PROPOSED WITHIN EASEMENTS OF UTILITIES, LETTERS OF PERMISSION FROM ALL INVOLVED COMPANIES MUST BE PROVIDED TO FAUQUIER COUNTY PRIOR TO ISSUANCE OF GRADING AND/OR SITE DEVELOPMENT PERMITS.
24. THE DEVELOPER WILL BE RESPONSIBLE FOR THE RELOCATION OF ANY UTILITIES WHICH ARE REQUIRED AS A RESULT OF THIS PROJECT.
25. THERE ARE NO KNOWN GRAVE SITES LOCATED ON THIS PROPERTY. IN THE EVENT GRAVE SITES ARE DISCOVERED DURING CONSTRUCTION, THE OWNER AND ENGINEER MUST BE NOTIFIED IMMEDIATELY.
26. THE CONTRACTOR IS TO VERIFY FIELD CONDITIONS PRIOR TO AND DURING CONSTRUCTION AND NOTIFY BOWMAN CONSULTING GROUP IMMEDIATELY OF ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THE APPROVED PLAN.
27. CONTROLLED FILLS SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY METHOD "A" PER STANDARD PROCTOR AASHTO-T99, ASTM-D698, OR VTM-1 AS APPLICABLE. DENSITY SHALL BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER AND RESULTS SUBMITTED TO VDOT AND FAUQUIER COUNTY PRIOR TO PAVEMENT CONSTRUCTION.
28. CONTRACTORS SHALL NOTIFY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATING OR BLASTING AT LEAST TWO (2) WORKING DAYS, BUT NOT MORE THAN TEN (10) WORKING DAYS, PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION.
29. CONTRACTOR SHALL SCHEDULE INSPECTION OF PUBLIC IMPROVEMENTS AND OBTAIN APPROPRIATE APPROVALS PRIOR TO COVERING OVER IMPROVEMENTS, INCLUDING ELECTRICAL INSTALLATIONS.
30. EXISTING WETLANDS SHOWN HEREON WERE DELINEATED BY BOWMAN CONSULTING GROUP, LTD., DATED OCTOBER 2022.
31. THE PROPOSED PLAN DOES NOT INCLUDE THE DEMOLITION OF ANY EXISTING BUILDINGS. A SEPARATE PERMIT IS REQUIRED FOR THE DEMOLITION OF THE EXISTING BUILDINGS. IF BLASTING IS REQUIRED A BLASTING PLAN SHALL BE COORDINATED WITH FCWSA PRIOR TO ALL BLASTING.
32. THIS PLAN HAS BEEN PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND DOES NOT NECESSARILY INDICATE ANY OR ALL ENCUMBRANCES ON THE SUBJECT PROPERTY.

ESTIMATED AVERAGE DAILY WATER USAGE

WATER MAIN CALCULATIONS:
FACILITY TO BE SERVED:
SINGLE FAMILY RESIDENTIAL = 350 GPD PER UNIT = 22 UNITS x 350 GPD = 7,700 GPD



VICINITY MAP
SCALE: 1" = 2000'

OWNER
DAVID M. DOBSON
9198 NORTH CLIFF LANE
RIXEYVILLE, VA 22737
(540) 937-7010

APPLICANT
MARONDA HOMES
7051 HEATHCOTE VILLAGE WAY
SUITE 255
GAINESVILLE, VA 20155
(703) 743-4250
ATTN: BRYAN HURST

NOTES:
1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, PRIOR TO THE INSTALLATION OF ANY UTILITIES, TO VERIFY THAT ADEQUATE COVER SHALL BE PROVIDED OVER ALL UTILITIES AS SHOWN ON THESE PLANS, INCLUDING BUT NOT LIMITED TO THE AREAS OF STREAMS AND/OR WETLANDS CROSSINGS.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE STREAM BED ELEVATIONS AT THE CULVERT LOCATIONS TO ENSURE THE CULVERTS WILL BE COUNTER-SUNK AS SHOWN IN THIS PLAN. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO INSTALLATION OF SAID CULVERTS.
3. ALL DETAILS AND SPECIFICATIONS HEREIN ARE PROVIDED FROM THE MANUFACTURER OR GOVERNING LOCALITY. BCG ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR VERIFICATION OF THE ACCURACY OF SAID DETAILS OR SPECIFICATIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR MANUFACTURER TO VERIFY THE ACCURACY OF DETAILS OR SPECIFICATIONS AND TO PROVIDE MATERIALS TESTING ON ANY MATERIALS TO BE USED IN THE CONSTRUCTION OF THIS PROJECT PRIOR TO THEIR INSTALLATION.

NOTICE TO CONTRACTORS AND OWNERS:
CERTIFICATION OF STORM SEWERS, STORMWATER CONVEYANCE CHANNELS, STORMWATER MANAGEMENT DEVICES, ETC. SHALL BE PROVIDED TO FAUQUIER COUNTY PRIOR TO RELEASE OF RELATED SECURITIES. THE CERTIFICATION SHALL BE IN ACCORDANCE WITH THE FAUQUIER COUNTY DESIGN STANDARDS MANUAL.

PRIOR TO STARTING CONSTRUCTION:
THE CONTRACTOR MUST CONSULT WITH THE CERTIFYING PROFESSIONALS (INCLUDING GEOTECHNICAL ENGINEERS) WHO WILL PROVIDE THE CERTIFICATIONS OF THESE MEASURES. THIS CERTIFICATION INCLUDES ALL ASPECTS OF DESIGN AND CONSTRUCTION AND MUST BE ACCOMPANIED BY AS-BUILT PLANS AND, WHERE APPLICABLE, A GEOTECHNICAL INSPECTIONS REPORT.

VDOT NOTE:
THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE 2011 VDOT SECONDARY STREET ACCEPTANCE REQUIREMENTS.

MISS UTILITY
CALL "MISS UTILITY" AT 1-800-257-7777, 48 HOURS PRIOR TO THE START OF WORK. THE EXCAVATOR MUST NOTIFY ALL PUBLIC UTILITY COMPANIES WITH UNDER GROUND FACILITIES IN THE AREA OF PROPOSED EXCAVATION AND HAVE THOSE FACILITIES LOCATED BY THE UTILITY COMPANIES PRIOR TO COMMENCING EXCAVATION. THE EXCAVATOR IS RESPONSIBLE FOR COMPLIANCE WITH REQUIREMENTS OF THE TOWN OF FRONT ROYAL, VIRGINIA CODES AND REGULATIONS.

ENGINEER'S CERTIFICATION:
I HEREBY CERTIFY THAT THE PROPERTY SHOWN HEREON IS NOW IN THE NAME OF DAVID M. DOBSON, RECORDED IN DEED BOOK 1119 AT PAGE 1311 (GPIN 6985-60-5718-000) AND IN DEED BOOK 1119 AT PAGE 1316 (GPIN 6985-51-6810-000) AMONG THE LAND RECORDS OF FAUQUIER COUNTY, VIRGINIA.

SIGNATURE

ENGINEER'S CERTIFICATION:
I HEREBY CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS CORRECT AND COMPLIES WITH STATE AND FAUQUIER COUNTY CODES AND ORDINANCES.

SIGNATURE

APPROVAL BLOCK

FAUQUIER COUNTY	DATE
FAUQUIER COUNTY HEALTH DEPARTMENT	DATE
FAUQUIER COUNTY REVIEW ENGINEER (SWM, BMP, PRIVATE STREETS)	DATE
FAUQUIER COUNTY SOIL SCIENTIST	DATE
FAUQUIER COUNTY ENVIRONMENTAL DIVISION	DATE
TOWN OF WARRENTON	DATE
VDOT	DATE

SHEET INDEX

NO.	DESCRIPTION
1	COVER SHEET
2	LEGEND, ABBREVIATIONS, AND NOTES
3	SITE TABULATIONS, NOTES, DETILS & TYPICAL SECTIONS
4	EXISTING CONDITIONS & DEMOLITION PLAN
5	TYPE 1 SOILS MAP
6	TYPE 1 SOILS REPORT
7	OVERALL & KEY PLAN
8 - 10	LAYOUT PLAN
11 - 13	GRADING PLAN
14 - 16	UTILITY AND EASEMENT PLAN
17 - 18	NICOLAS WAY PLAN & PROFILE
19	NOAH COURT AND NASH COURT PLAN & PROFILE
20 - 21	SIGHT DISTANCE PLAN & PROFILES
22	RETAINING WALL PLAN & PROFILES
23 - 25	WATERLINE PLAN & PROFILES
26	STORM SEWER PROFILES
27	DRAINAGE DIVIDES MAP
28 - 29	STORM SEWER COMPUTATIONS
30	OVERLAND RELIEF MAP
31 - 32	EROSION & SEDIMENT CONTROL PLAN - PHASE I
33 - 34	EROSION & SEDIMENT CONTROL PLAN - PHASE II
35	EROSION AND SEDIMENT CONTROL NARRATIVE & NOTES
36 - 37	EROSION AND SEDIMENT CONTROL NOTES & DETAILS
38	PRE-DEVELOPED DRAINAGE DIVIDES
39	POST-DEVELOPED DRAINAGE DIVIDES
40	SWM NARRATIVE & CALCULATIONS
41 - 42A	SWM CALCULATIONS
43	BMP & LAND COVER MAP
44	BMP CALCULATIONS
45 - 46	SWM POND 'A' DETAILS
47	BIORETENTION BASIN 'A' DETAILS
48 - 49	SWM NOTES & DETAILS
50	TREE INVENTORY PLAN
51 - 52	LANDSCAPE PLAN
53	LANDSCAPE NOTES & DETAILS
54	WATER NOTES & DETAILS
55 - 55A	VDOT DETAILS
56	BOND ESTIMATE
57 - 58	GEOTECHNICAL RECOMMENDATIONS

OSE CERTIFICATION:
I HEREBY CERTIFY THAT MY SOIL AND SITE EVALUATION(S), SEWER DISPOSAL SYSTEM DESIGN(S) AND/OR SIZE(S) AND LOCATION(S) OF THE SEWAGE DISPOSAL FIELD(S) AS SHOWN ON SHEETS 11-13 OF THE CONSTRUCTION PLAN COMPLIES WITH ALL APPLICABLE LAWS, REGULATIONS AND POLICIES IMPLIED BY THE VIRGINIA DEPARTMENT OF HEALTH AND FAUQUIER COUNTY. FURTHERMORE, I CERTIFY THAT ALL REQUIRED STATEMENTS CONCERNING SAID INDIVIDUAL SEWAGE DISPOSAL SYSTEMS HAVE BEEN INCLUDED ON SHEETS 11-13 OF THE TIFFANY ESTATES CONSTRUCTION PLAN.

SIGNATURE DATE

Bowman

Bowman Consulting Group Ltd
1300 Central Park Boulevard
Fredericksburg, Virginia 22401
Phone: (540) 371-0268
bowman.com
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COVER SHEET
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION
DATE	DESCRIPTION

WED	WED	WED
DESIGN	DRAWN	CHKD

SCALE H: V:
JOB No. 6642-02-002
DATE : FEBRUARY 10, 2023
FILE No. 6642-D-CP-001
SHEET 1 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\001-6642-D-CP-001-COVER.dwg

LEGEND

EXISTING	DESCRIPTION	PROPOSED
40	INDEX CONTOUR	40
38	INTERMEDIATE CONTOUR	38
EX. E/P	EDGE OF PAVEMENT	PROP. E/P
EX. C & G	CURB AND GUTTER	CG-6
	TRANSITION FROM CG-6 TO CG-6R	CG-6R
	PROPOSED HEADER CURB	
	PROPERTY LINE	
	DEPARTING PROPERTY LINE	
	LOT LINE	
	RIGHT-OF-WAY	
	CENTERLINE	
	FLOOD PLAIN	
	CLEARING AND GRADING	
	TREE LINE	
	FLOW LINE OF SWALE	
	STREAM	
	OVERLAND RELIEF PATHWAY	
x	FENCE LINE	x
	EASEMENT	
EX 8" W/L	WATER LINE	8" DIP W/L
EX. W/V	WATER VALVE	PROP. W/V
EX. R.	REDUCER	PROP. R.
EX 8" SAN.	SANITARY SEWER	8" PVC SAN
EX 18"	STORM SEWER	18" RCP
	CABLE TV	CATV
E	ELECTRIC SERVICE	E
T	TELEPHONE SERVICE	T
G	GAS LINE	G
+ 25.32	SPOT ELEVATION	+25.32
⌀	UTILITY POLE	⌀
	SIGN	
EX A-1	SANITARY SEWER IDENTIFIER	A 1/A
EX 2-2	STORM DRAIN IDENTIFIER	2 1/2
W	EASEMENT IDENTIFIER	W
	WATER METER	
	FIRE HYDRANT	
	PARKING INDICATOR INDICATES THE NUMBER OF TYPICAL PARKING SPACES	25
	STREET LIGHT	
	VEHICLES PER DAY (TRAFFIC COUNT)	255 VPD
	TEST PIT LOCATION RECOMMENDED/REQUIRED	TP
	CRITICAL SLOPE SLOPES TO BE STABILIZED PURSUANT TO VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK	
	HANDICAP RAMP (CG-12) DENOTES LOCATION OF STD VDOT CG-12 AND/OR JURISDICTIONAL STANDARD RAMP CONSTRUCTION	
	DENOTES CLEAR SIGHT TRIANGLE	
EX. PINE 15" OAK	TREE	
	BENCHMARK	BM #1 TRV #1 ELEV=101.62
	ASPHALT TRAIL	
	CONCRETE SIDEWALK	
	END WALLS	
	END SECTIONS	
	STOP SIGN	
	STREET SIGN	
OHE	OVERHEAD ELECTRIC	OHE
OHT	OVERHEAD TELEPHONE	OHT
VAN	HANDICAP PARKING SPACE (VAN)	VAN
	RIP RAP	
	CROSSWALK	

ABBREVIATIONS

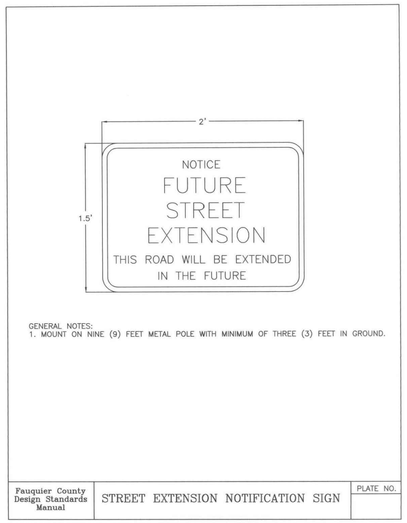
A	A	AREA OF ARC
	AD	ALGEBRAIC DIFFERENCE
	ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
	AC.	ACRE
	AGGR.	AGGREGATE
	ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
	ASPH	ASPHALT
	AWWA	AMERICAN WATER WORKS ASSOCIATION
B	B	BREADTH
	BC	BOTTOM OF CURB
	BF	BASEMENT FLOOR
	BLDG	BUILDING
	BM	BENCHMARK
	BMP	BEST MANAGEMENT PRACTICES
	BOV	BLOW OFF VALVE
	BRL	BUILDING RESTRICTION LINE
	BVCS	BEGINNING VERTICAL CURVE STATION
	BVCE	BEGINNING VERTICAL CURVE ELEVATION
	BW	BOTTOM OF WALL
C	c,e	CENTER CORRECTION ON VERTICAL CURVE
	C	COEFFICIENT OF RUNOFF
	CATV	CABLE TELEVISION
	CB	CATCH BASIN OR CHORD BEARING
	CC	CENTER TO CENTER
	CFS (Q)	CUBIC FEET PER SECOND
	CH	CHORD
	CG	CURB AND GUTTER
	CIP	CAST IRON PIPE
	C	CENTERLINE
	CL	CLASS
	CMP	CORRUGATED METAL PIPE
	CONC.	CONCRETE
	CO	CLEAN OUT
	CONT.	CONTINUATION
	CS	CURB STOP
	CT	COURT
	C/L	CENTERLINE
D	D,d	DEPTH
	DA	DRAINAGE AREA
	DB	DEED BOOK
	DET.	DETAIL
	DI	DROP INLET
	DIA.	DIAMETER
	DIP	DUCTILE IRON PIPE
	DM	DROP MANHOLE
	DR.	DRIVE
	DRNG	DRAINAGE
	DRWG.	DRAWING
	D/W	DRIVE WAY
	Δ	DELTA
	DU	DWELLING UNITS
	DOM	DOMESTIC
E	e	RATE OF SUPER ELEVATION
	EC	EROSION CONTROL
	EGL	ENERGY GRADIENT LINE
	EQC	ENVIRONMENTAL QUALITY CORRIDOR
	ESM'T	EASEMENT
	EG	EDGE OF GUTTER
	ELEV.	ELEVATION
	ENT.	ENTRANCE
	EP	EDGE OF PAVEMENT
	ES	END SECTION
	EVCS	ENDING VERTICAL CURVE STATION
	EVCE	ENDING VERTICAL CURVE ELEVATION
	EW	END WALL
	EX.	EXISTING
	ELEC.	ELECTRICAL
	EBL	EAST BOUND LANE
F	F	FIRE LINE
	FAR	FLOOR AREA RATIO
	FC	FACE OF CURB
	FCWA	FAIRFAX COUNTY WATER AUTHORITY
	FF	FIRST FLOOR
	FG	FINISHED GRADE
	FH	FIRE HYDRANT
	FL	FLOW LINE
	FP	FLOOD PLAIN
	FS	FACTOR OF SAFETY
	FT.	FOOT
	FCPA	FAIRFAX COUNTY PARK AUTHORITY
	FOY.	FOYER
	FPS	FEET PER SECOND
G	g	GRAVITY
	G	GAS
	GFA	GROSS FLOOR AREA
	Gr.	GRADE
	GR	GUARD RAIL
	GAR	GARAGE
H	H,h	HEIGHT
	H	HEAD
	HC	HANDICAPPED PARKING SPACE
	HGL	HYDRAULIC GRADIENT LINE
	HP	HIGH POINT
	HR	HAND RAIL
	HT.	HEIGHT
	HW	HEADWATER
I	I	RAINFALL INTENSITY
	ID	INSIDE DIAMETER
	IN	INCH
	INV.	INVERT
	IP	IRON PIPE
	IPF	IRON PIPE FOUND
	IPS	IRON PIPE SET
J	JB	JUNCTION BOX
K	K	SIGHT DISTANCE COEFFICIENT
	Ke	CULVERT ENTRANCE LOSS COEFFICIENT
L	L	LENGTH
	LAT.	LATERAL
	LF	LINEAR FOOT
	LL	LOWER LEVEL
	LOS	LINE OF SIGHT
	LP	LOW POINT
	LS	LOADING SPACE
	LCG	LIMITS OF CLEARING & GRADING
	LT	LEFT
M	M	MONUMENT FOUND
	MECH.	MECHANICAL
	MH	MANHOLE
	MI.	MILE
	MPH	MILES PER HOUR
	MS	MEDIAN STRIP
	MSL	MEAN SEA LEVEL
	MIN	MINIMUM
	MAX	MAXIMUM
N	N/F	NOW OR FORMERLY
	NFA	NET FLOOR AREA
	NO.,#	NUMBER
	NBL	NORTH BOUND LANE
	N/A	NOT APPLICABLE
O	OC	ON CENTER
	OD	OUTSIDE DIAMETER
	OH	OVERHANG
	O/H	OVERHEAD
P	P	PERIMETER
	PC	POINT OF CURVATURE
	PCC	POINT OF COMPOUND CURVE
	PCEP	POINT OF CURVE EDGE OF PAVEMENT
	PCTC	POINT OF CURVATURE TOP OF CURB
	PFM	PUBLIC FACILITIES MANUAL
	PG.	PAGE
	PGL	POINT OF GRADE LINE
	PI	POINT OF INTERSECTION
	PL	PROPERTY LINE
	PRC	POINT OF REVERSE CURVES
	PRELIM.	PRELIMINARY
	PROP.	PROPOSED
	PT	POINT OF TANGENCY
	PVC	POINT OF VERTICAL CURVATURE
	PVC	POLY VINYL CHLORIDE
	PVI	POINT OF VERTICAL INTERSECTION
	PVM'T	PAVEMENT
	PVRC	POINT OF VERTICAL REVERSE CURVE
	PVT	POINT OF VERTICAL TANGENT
	P&P	PLAN AND PROFILE
Q	Q(C.F.S.)	AMOUNT OF RUNOFF
R	R,r	RADIUS
	REQD	REQUIRED
	RCP	REINFORCED CONCRETE PIPE
	RD.	ROAD
	RET.	RETAINING
	REV.	REVISION
	RR	RAILROAD
	RTE.	ROUTE
	R/W	RIGHT OF WAY
	RGP	ROUGH GRADING PLAN
	ROM	REMOTE OUTSIDE MONITOR
	RMA	RESOURCE MANAGEMENT AREA
	RPA	RESOURCE PROTECTION AREA
	RT	RIGHT
S	S	SPEED OR SLOPE
	SAN.	SANITARY
	SBL	SOUTH BOUND LANE
	SD	SIGHT DISTANCE
	SECT.	SECTION
	SEW.	SEWER
	SH.	SHOULDER
	SF	SQUARE FEET
	SP.	SPACE
	SP	SITE PLAN
	SPEC.	SPECIFICATION
	STA.	STATION
	STD.	STANDARD
	STK.	STACK
	STM.	STORM
	SVC.	SERVICE
	SWM	STORM WATER MANAGEMENT
	S/W	SIDE WALK
	Sx	CROSS SLOPE
T	T	TANGENT
	TB	TEST BORE
	TC	TOP OF CURB
	Tc	TIME OF CONCENTRATION
	TEL	TELEPHONE
	TP	TEST PIT
	TP	TREE PROTECTION
	TB	TOP OF BANK
	TW	TOP OF WALL
	TW	TAILWATER
U	UD	UNDERDRAIN
	UG	UNDERGROUND
	UL	UPPER LEVEL
	UP	UTILITY POLE
	VAN	HANDICAPPED VAN PARKING SPACE
V	V	VELOCITY
	V	VOLUME
	VA	VIRGINIA
	VC	VERTICAL CURVE
	VDOT	VA. DEPT. OF TRANSPORTATION
	VF	VERTICAL FOOT
W	W	WEIGHT OR WIDTH
	W/M	WATER MAIN
	WBL	WEST BOUND LANE
	WQIA	WATER QUALITY IMPACT ASSESSMENT
X	XF	TRANSFORMER
Y	YI	YARD INLET
	YR	YEAR

GENERAL NOTES AND SPECIFICATIONS

1. ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM TO CURRENT FAUQUIER COUNTY AND/OR VIRGINIA DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS AND FCWSA UTILITY STANDARDS MANUAL STANDARDS AND SPECIFICATIONS.
2. ALL CONSTRUCTION SHALL COMPLY WITH THE LATEST U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION RULES AND REGULATIONS. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING A SAFE CONSTRUCTION SITE AND COMPLYING WITH ALL OSHA REGULATIONS.
3. THE ENGINEER SHALL NOT HAVE CONTROL OVER OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK SHOWN ON THESE PLANS. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S SCHEDULES OR FAILURE TO CARRY OUT THE WORK. THE ENGINEER IS NOT RESPONSIBLE FOR ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS, OR THEIR AGENTS OR EMPLOYEES, OR OF ANY OTHER PERSONS PERFORMING PORTIONS OF THE WORK.
4. THE CONTRACTOR SHALL CONTACT MISS UTILITY AT 1-800-257-7777, UTILITY COMPANY REPRESENTATIVES, PERFORM TEST PITS, REVIEW CURRENT TEST PIT DATA, AND WHATEVER OTHER OPERATIONS AVAILABLE TO INSURE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES IN THE AREA OF CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY BOWMAN CONSULTING GROUP, LTD. OF ANY POTENTIAL CONFLICTS PRIOR TO COMMENCING CONSTRUCTION.
5. THE CONTRACTOR MUST HAVE THE APPROVED CONSTRUCTION DRAWINGS IN POSSESSION PRIOR TO THE START OF CONSTRUCTION. AT LEAST ONE (1) COPY OF THE APPROVED PLANS, WITH REVISIONS, MUST BE KEPT ON-SITE AT ALL TIMES. ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE. ALSO, A REPRESENTATIVE OF THE DEVELOPER MUST BE AVAILABLE AT ALL TIMES.
6. UTILITY COMPANIES SHALL BE NOTIFIED 72 HOURS IN ADVANCE OF ANY EXCAVATION.
7. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD BEFORE STARTING CONSTRUCTION AND NOTIFY THE DESIGN ENGINEER OF ANY DISCREPANCIES.
8. THE CONTRACTOR SHALL CAREFULLY EXAMINE THE SITE AND MAKE ALL INSPECTIONS NECESSARY IN ORDER TO DETERMINE THE FULL EXTENT OF THE WORK REQUIRED TO MAKE THE PROPOSED WORK CONFORM TO THE DRAWINGS AND SPECIFICATIONS. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE NATURE AND LOCATION OF THE WORK, CONDITIONS, AND CONFORMATION AND CONDITION OF EXISTING GROUND SURFACE AND THE CHARACTER OF THE EQUIPMENT AND FACILITIES NEEDED PRIOR TO AND DURING PROSECUTION OF THE WORK. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE CHARACTER, QUANTITY AND QUALITY OF SURFACE AND SUBSURFACE MATERIALS OR OBSTACLES TO BE ENCOUNTERED. ANY INACCURACIES OR DISCREPANCIES BETWEEN THE DRAWINGS AND SPECIFICATIONS MUST BE BOUGHT TO THE OWNER'S ATTENTION IN ORDER TO CLARIFY THE EXACT NATURE OF THE WORK TO BE PERFORMED PRIOR TO THE COMMENCEMENT OF ANY WORK.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN THE MOST CURRENT APPROVED ARCHITECTURAL PLANS AND COORDINATE SAME WITH THE SITE PLAN, PRIOR TO BEGINNING CONSTRUCTION OPERATIONS.
10. IF WHEN DURING THE COURSE OF CONSTRUCTION, ANY OBJECT OF AN UNUSUAL NATURE IS ENCOUNTERED, THE CONTRACTOR SHALL CEASE WORK IN THAT AREA AND IMMEDIATELY NOTIFY THE PROPER AUTHORITY, FAUQUIER COUNTY, AND THE ARCHITECT/ENGINEER.
11. THE EXISTING UNDERGROUND UTILITIES SHOW HEREON ARE BASED UPON AVAILABLE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK AND FOR ANY DAMAGES WHICH OCCUR BY HIS FAILURE TO LOCATE OR PRESERVE THESE UNDERGROUND UTILITIES. IF DURING CONSTRUCTION OPERATIONS THE CONTRACTOR SHOULD ENCOUNTER UTILITIES OTHER THAN THOSE SHOWN ON THE PLANS, HE SHALL IMMEDIATELY NOTIFY THE ENGINEER AND TAKE NECESSARY AND PROPER STEPS TO PROTECT THE FACILITY AND ASSURE THE CONTINUANCE OF SERVICE.
12. ALL STEPS WITH THREE OR MORE RISERS SHALL HAVE HAND RAILS.
13. STANDARD GUARD RAIL AND HAND RAILS SHALL BE INSTALLED AT HAZARDOUS LOCATIONS AS DESIGNATED DURING THE FINAL INSPECTION BY FAUQUIER COUNTY, AND/OR VDOT.
14. THE CONTRACTOR SHALL ERECT STREET SIGNS AND TRAFFIC CONTROL SIGNS AS INDICATED ON THE SUBDIVISION CONSTRUCTION PLANS. THE SIGNS SHALL CONFORM TO VDOT AND COUNTY SPECIFICATIONS. ALL PROPOSED SIGNS ARE TO BE INSTALLED PER STP-1 OF THE 2016 ROAD AND BRIDGE STANDARDS.
15. CONTROLLED FILLS SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY METHOD "A" PER STANDARD PROCTOR AASHTO-T99, ASTM-D698, OR VTM-1 AS APPLICABLE. DENSITY SHALL BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER AND RESULTS SUBMITTED TO FAUQUIER COUNTY PRIOR TO PAVEMENT CONSTRUCTION.
16. COMPACTION OF BACKFILL IN UTILITY TRENCHES SHALL BE IN ACCORDANCE WITH FAUQUIER COUNTY AND/OR VDOT STANDARDS & SPECIFICATIONS AND FCWSA UTILITY STANDARDS MANUAL STANDARDS AND SPECIFICATIONS.
17. ALL FILL SOILS UNDER EXPANDED PAVED AREAS SHALL BE COMPACTED TO 95% OF THEORETICAL MAXIMUM DENSITY AS DETERMINED BY ASTM SPECIFICATION D-698 STANDARD PROCTOR METHOD, WITH + OR - 2% OF OPTIMUM MOISTURE FOR THE FULL WIDTH OF ANY DEDICATED RIGHT-OF-WAY AND ALL PARKING LOTS; PRIVATE STREETS; PARKING BAYS; CURB AND GUTTER; AND SIDEWALKS ADJACENT TO STREETS AND PARKING LOTS (NOT INTENDED TO INCLUDE LEAD WALKS), WITH UPPER 1.0 FT. COMPACTED TO 100% OF THE MAXIMUM DRY DENSITY PER ASTM D-698.
18. OPEN CUTTING OF PAVED OR SURFACE TREATED ROADS IS NOT PERMITTED. ALL UTILITIES WHICH WILL BE PLACED UNDER EXISTING STREETS SHALL BE BORED OR JACKED. ANY EXCEPTIONS, DUE TO EXTENUATING CIRCUMSTANCES, SHALL BE ADDRESSED AT THE PERMIT STAGE.
19. ADDITIONAL DITCH LININGS OR SEDIMENT AND EROSION CONTROL MEASURES SHALL BE PROVIDED, AT THE DEVELOPER'S EXPENSE, AS DETERMINED NECESSARY BY VDOT AND/OR FAUQUIER COUNTY DURING FIELD REVIEW. ALL COSTS SHALL BE ASSUMED BY THE DEVELOPER.
20. A SMOOTH GRADE SHALL BE MAINTAINED FROM THE CENTERLINE OF EXISTING ROAD TO PROPOSED CURB AND GUTTER AND/OR PROPOSED EDGE OF PAVEMENT TO PRECLUDE THE FORMING OF FALSE GUTTERS AND/OR THE PONDING OF ANY WATER IN THE ROADWAY. REMOVE AND RECONSTRUCT EXISTING PAVEMENT AND/OR CURB AS DICTATED BY FIELD CONDITIONS TO PROVIDE POSITIVE DRAINAGE AT TIE-IN-POINTS.
21. PRIOR TO CONSTRUCTION OF STREET WIDENING, CONTRACTOR SHALL OBTAIN 25-FOOT FIELD SURVEYED CROSS SECTIONS OF EXISTING STREET. BASED ON INFORMATION OBTAINED AND CONTRACTOR'S OORDINATION WITH VDOT AND COUNTY INSPECTOR(S), MILLING AND/OR OVERLAY, OF EXISTING ROADWAY MAY BE REQUIRED TO AVOID FALSE GUTTERS, MAINTAIN POSITIVE DRAINAGE, AND TO GAIN ACCEPTANCE OF THE CONSTRUCTED IMPROVEMENTS. ADDITIONAL OVERLAY AND/OR MILLING MAY NECESSITATE ADJUSTMENTS TO THE EDGE OF PAVEMENT AND/OR CURB ELEVATIONS SHOWN ON THIS PLAN.
22. PROPOSED SIDEWALKS MUST BE CONSTRUCTED WITH UD3 UNDERDRAINS WHEN LONGITUDINAL GRADES ARE 3% OR GREATER UNLESS SOIL TEST CONFIRM THAT THEY ARE NOT NEEDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION (APPLIES TO SIDEWALK IN RIGHT-OF-WAY ONLY). ALL SIDEWALKS TO BE 4" THICK CONCRETE UNLESS OTHERWISE SHOWN ON THE PLAN.
23. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGE TO THE EXISTING ROADS AND UTILITIES WHICH OCCURS AS A RESULT OF THE PROJECT CONSTRUCTION WITHIN OR CONTIGUOUS TO THE EXISTING RIGHT-OF-WAY. CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTMENTS AND/OR RECONSTRUCTION OF ALL UTILITY COVER (MANHOLE FRAMES AND COVERS, VALVE BOX COVERS, ETC.) TO MATCH THE FINISHED GRADES OF THE AREAS AFFECTED BY THE CONSTRUCTION
24. ALL UTILITIES INCLUDING UTILITY POLES DESIGNATED TO BE RELOCATED SHALL BE RELOCATED PRIOR TO CONSTRUCTION AT THE DEVELOPER'S EXPENSE.
25. THE DESIGN OF PAVEMENT PLACED WITHIN THE RIGHT-OF-WAY SHOULD EQUAL OR EXCEED THE THICKNESS OF THE EXISTING PAVEMENT.
26. OVERLAY OF EXISTING PAVEMENT SHALL BE MINIMUM OF 1 1/2 INCH DEPTH; ANY COST ASSOCIATED WITH PAVEMENT OVERLAY, OR THE MILLING OF EXISTING PAVEMENT TO OBTAIN REQUIRED DEPTH, SHALL BE ASSUMED BY THE DEVELOPER.
27. THE PAVEMENT DESIGN AND DEPTH OF STREETS SHOWN HEREON IS BASED ON AN ASSUMED CBR VALUE. PRIOR TO CONSTRUCTION SOIL TESTS OF SUBGRADE MUST BE PERFORMED BY A GEOTECHNICAL ENGINEER OF RECORD AND MUST BE SUBMITTED TO THE ENGINEER FOR ACTUAL DETERMINATION AND CALCULATION OF THE REQUIRED PAVEMENT DESIGN AND SUBBASE THICKNESS. NO PAVEMENT CONSTRUCTION MAY COMMENCE WITHOUT THE FINAL PAVEMENT DESIGN APPROVAL BY FAUQUIER COUNTY AND/OR VDOT.
28. STREET CUT AND PATCH WORK IN PUBLIC RIGHT-OF-WAY REQUIRED FOR UTILITIES INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH COUNTY AND/OR VDOT STANDARDS AND SPECIFICATIONS.
29. THE DEVELOPER IS RESPONSIBLE FOR ALL TRAFFIC CONTROL. THE DEVELOPER SHALL SUBMIT A SIGNING, STRIPING AND/OR SIGNALIZATION PLAN TO VDOT LAND DEVELOPMENT SECTION A MINIMUM OF 30 DAYS PRIOR TO PERMIT APPLICATION. THE DEVELOPER SHALL NOT COMMENCE CONSTRUCTION OF ANY PAVEMENT COURSE WITHOUT AN APPROVED STRIPING PLAN.
30. ALL RIGHT-OF-WAY DEDICATED FOR PUBLIC USE SHALL BE CLEAR AND UNENCUMBERED.
31. EROSION AND SEDIMENT CONTROL WILL BE INSTALLED IN ACCORDANCE WITH THE CURRENT EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND THE REGULATIONS OF FAUQUIER COUNTY.
32. AN AIR QUALITY PERMIT WILL BE OBTAINED IF REQUIRED.
33. ANY LIGHTING SHOWN HEREON IS AS SPECIFIED BY THE CLIENT AND IS INCLUDED FOR INFORMATION PURPOSES ONLY, AS DIRECTED BY THE OWNER AND/OR PUBLIC AGENCY REQUIREMENTS. BOWMAN CONSULTING GROUP, LTD. HAS NOT PERFORMED THE LIGHTNING DESIGN, AND THEREFORE DOES NOT WARRANT AND IS NOT RESPONSIBLE FOR THE DEGREE AND/OR ADEQUACY OF ILLUMINATION ON THIS PROJECT.
34. ALL UNDERGROUND UTILITIES WITHIN THE STREET RIGHT-OF-WAY SHALL BE INSTALLED TO THE REQUIRED DISTANCE BEYOND THE RIGHT-OF-WAY LINE PRIOR TO THE INSTALLATION OF ANY SUBBASE MATERIAL, CURB AND GUTTER OR SIDEWALK.
35. ALL SURFACED STREETS SHALL BE MAINTAINED IN A CLEAR CONDITION; FREE OF DUST, MUD OR SNOW AT ALL TIMES. THE DEVELOPER SHALL PROVIDE ADEQUATE MEANS TO CLEAN TRUCKS AND OTHER EQUIPMENT USING SURFACED STREETS.
36. THE APPROVAL OF THIS PLAN SHALL IN NO WAY GRANT PERMISSION BY THE COUNTY FOR THE DEVELOPER TO TRESPASS ON OFF-SITE PROPERTIES.
37. THE APPROVAL OF THESE PLANS SHALL IN NO WAY RELIEVE THE DEVELOPER OR HIS AGENT OF COMPLYING WITH OTHER APPLICABLE LOCAL, STATE, AND FEDERAL REQUIREMENTS.
38. THESE PLANS MAKE NO REPRESENTATION AS TO THE SUBSURFACE CONDITIONS AND THE PRESENCE OF SUBSURFACE WATER OR THE NEED FOR SUBSURFACE DRAINAGE FACILITIES.
39. STORM SEWER AND CULVERT PIPE SHALL CONFORM TO VDOT ROAD AND BRIDE SPECIFICATIONS SECTION 232 AND VDOT ROAD AND BRIDGE STANDARD PC-1.
40. THE DEVELOPER IS RESPONSIBLE FOR SECURING ALL REQUIRED PERMITS PRIOR TO CONSTRUCTION.
41. THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING ALL NECESSARY INSPECTIONS.
42. EMERGENCY VEHICLE ACCESS SHALL BE PROVIDED DURING ALL PHASES OF CONSTRUCTION.
43. WHERE IMPROVEMENTS ARE PROPOSED WITHIN EXISTING EASEMENTS OF RECORD, THE DEVELOPER SHALL OBTAIN WRITTEN PERMISSION FROM THE AUTHORITIES THAT ARE DOMINANT TENEMENTS OF THESE EASEMENTS FOR PERMIT FOR ANY DISTURBANCES WITHIN THESE AREAS PRIOR TO CONSTRUCTION.
44. ALL FINISHED GRADING, SEEDING, SODDING OR PAVING SHALL BE DONE IN SUCH A MANNER TO PRECLUDE THE PONDING OF WATER.
45. TYPICAL SECTIONS ARE INTENDED TO SHOW GENERAL FEATURES OF THE PROPOSED CONSTRUCTION. FOR EXACT DETAILS AT ANY GIVEN LOCATION, SEE THE SITE PLAN SHEETS.
46. ALL HANDICAP RAMPS SHALL BE BUILT IN ACCORDANCE WITH THE MOST CURRENT EDITION OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE STANDARDS.
47. ALL GAS LINES REQUIRE A MINIMUM OF 1 FOOT VERTICAL AND 5 FEET HORIZONTAL SEPARATION. CONSTRUCTION WITHIN 10 FEET OF THE GAS LINE REQUIRES A GAS LINE REPRESENTATIVE TO BE PRESENT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE GAS COMPANY PRIOR TO CONSTRUCTION.
48. NO TREES SHALL BE PLANTED IN THE WATER AND SEWER EASEMENTS. NO PLANTINGS SHALL BE WITHIN 5 FEET OF A FIRE HYDRANT.

CONSTRUCTION NOTES FOR VDOT (REV. 9/19/2017)

1. SUBDIVISIONS ONLY - THESE REQUIREMENTS WERE PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF (SELECT ONE):
   - O VDOT'S 2005 SUBDIVISION STREET REQUIREMENTS (SSR)
   - O VDOT'S 2009 SECONDARY STREET ACCEPTANCE REQUIREMENTS (SSAR)
   - O VDOT'S 2011 SECONDARY STREET ACCEPTANCE REQUIREMENTS (SSAR 2011)
2. ALL WORK SHOWN HEREON SHALL BE IN STRICT ACCORDANCE WITH THE LATEST ROAD AND BRIDGE STANDARDS AND THE LATEST ROAD AND BRIDGE SPECIFICATIONS OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) AND COUNTY ORDINANCES.
3. IT IS THE INTENT OF THESE DRAWINGS TO SHOW ALL NECESSARY WORK. ANY ITEM OF WORK NOT SPECIFICALLY SHOWN, BUT NECESSARY TO ELIGIBILITY FOR ACCEPTANCE IS HEREBY IMPLIED.
4. A VDOT PERMIT MUST BE OBTAINED PRIOR TO STARTING CONSTRUCTION WITHIN ANY STATE HIGHWAY RIGHTS-OF-WAY.
5. THE CONTRACTOR/OWNER SHALL PERFORM CBR TESTING ON THE SUBGRADE IN ACCORDANCE WITH VDOT SPECIFICATIONS BY A CERTIFIED GEOTECHNICAL ENGINEER TO DETERMINE BASE AND PAVEMENT DESIGNS, AND THIS INFORMATION MUST BE FORWARDED TO VDOT AND REVIEWED PRIOR TO PLACEMENT OF AGGREGATE BASE.
6. THE CONTRACTOR/OWNER MUST SPECIFY IN WRITING TO VDOT PRIOR TO CONSTRUCTION, THE TYPE OF SUBBASE, BASE AND SURFACE PAVEMENT TO BE UTILIZED ON EACH STREET FOR EACH TRAFFIC GROUP.
7. THE CONTRACTOR SHALL NOTIFY VDOT 72 HOURS PRIOR TO PLACEMENT OF BASE MATERIALS AND PRIOR TO THE PLACEMENT OF ASPHALT MATERIAL TO ENSURE VDOT'S ABILITY TO PERFORM TESTING, SUCH AS PROOF-ROLLING, DEPTH CHECKS, COMPACTION, AND CONTAMINATION. OPTION: A CERTIFIED ANALYSIS FROM A PRIVATE ENGINEERING/TESTING FIRM MAY BE SUBMITTED WITHIN 7 WORKING DAYS OF THE REQUIRED TESTS. 72 HOURS NOTICE IS STILL REQUIRED PRIOR TO EACH ACTIVITY.
8. ALL CULVERT AND DRIVEWAY PIPES SHALL BE OF A TYPE APPROVED BY VDOT AND THE LOCALITY. NOTE THAT THE USE OF CORRUGATED METAL PIPE IN ANY LOCATION WILL ONLY BE CONSIDERED AFTER THE REQUIREMENTS OF STANDARD PC-1, TABLES C AND D OF THE 2016 ROAD AND BRIDGE STANDARDS ARE ADDRESSED.
9. ALL ENTRANCE PIPES FOR DRIVEWAYS SHALL BE A MINIMUM OF 15" IN DIAMETER, AND 30' IN LENGTH (CONCRETE CULVERTS MAY BE 28' IN LENGTH), UNLESS OTHERWISE APPROVED BY VDOT. DRIVEWAY CULVERTS IN CUL-DE-SACS SHALL BE CONCRETE. SEE APPROVED ROAD PLANS FOR THE PROPER CULVERT SIZES.
10. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD BEFORE STARTING CONSTRUCTION AND NOTIFY THE DESIGN ENGINEER OF ANY DISCREPANCIES.
11. THE CONTRACTOR SHALL ERECT STREET SIGNS AND TRAFFIC CONTROL SIGNS AS INDICATED ON THE SUBDIVISION CONSTRUCTION PLANS. THE SIGNS SHALL CONFORM TO VDOT AND COUNTY SPECIFICATIONS. ALL PROPOSED SIGNS ARE TO BE INSTALLED PER STP-1 OF THE 2016 ROAD AND BRIDGE STANDARDS. ALL PAVEMENT MARKINGS INSTALLED WITHIN VDOT RIGHT-OF-WAY WILL BE TYPE B CLASS I THERMOPLASTIC.
12. A MINIMUM 35' PAVEMENT FILLET RADIUS IS RECOMMENDED.
13. THE CONTRACTOR SHALL DO SUCH OVERLOT GRADING AS NECESSARY TO PRECLUDE THE PONDING OF WATER ADJACENT TO THE ROADWAY.
14. SLOPE EASEMENTS WILL BE REQUIRED AT ALL LOCATIONS WHERE THE TOP OF THE CUT OR THE TOE OF THE FILL EXCEEDS THE PROPOSED DEDICATION OF RIGHT-OF-WAY. SEE PLAT FOR EXACT LOCATION.
15. IF RUNNING WATER IS PRESENT IN ANY OUTLET CHANNEL DURING CONSTRUCTION WHERE DITCH PROTECTION IS REQUIRED, THE BOTTOM OF THE CHANNEL SHALL BE LINED WITH RIP-RAP STONE WITH EC-1 PLACEMENT. FURTHER, EC-2 OR EC-3 MUST HAVE A MINIMUM WIDTH OF 4' IN FILL SECTIONS, AND 5' IN CUT SECTIONS.
16. THE CONTRACTOR SHALL BE RESPONSIBLE TO SEE THAT ALL EROSION AND SEDIMENT CONTROL STANDARDS ARE MET, AND THE CONTRACTOR MUST SEED AND MULCH ALL DISTURBED AREAS ALONG WITH ALL GRADED AREAS WITHIN THE PROPOSED RIGHT-OF-WAY IN ACCORDANCE WITH VDOT STANDARDS AND SPECIFICATIONS.
17. FINAL LOCATION OF MANHOLES, VALVES, FIRE HYDRANTS, AND OTHER APPURTENANCES SHALL NOT CONFLICT WITH OR CONSTRICT ROADWAY DRAINAGE. CONTRACTOR SHALL ADJUST MANHOLES AND/OR DITCH ALIGNMENT TO ENSURE PROPER ROADSIDE DRAINAGE, COMPATIBLE WITH EXISTING FIELD CONDITIONS.
18. ALL WATER, SANITARY SEWER, AND STORM SEWER TRENCHES SHALL BE COMPACTED TO 95% DENSITY IN 6" LAYERS. COMPACTION TESTS MAY BE REQUIRED BY VDOT.
19. VDOT WILL REQUIRE DENSITY TESTS FROM A CERTIFIED ENGINEERING FIRM FOR ALL CULVERT INSTALLATIONS WITH A DIAMETER OF 36" OR LARGER.
20. VIDEO



TOWN OF WARRENTON
Department of Public Works & Utilities
PO BOX 341
WARRENTON, VIRGINIA 20188
http://www.warrentonva.gov
TELEPHONE (540) 347-1858
FAX (540) 349-2414

February 15, 2024

Mr. David M. Dobson
9198 North Cliff Lane
Rixeyville, Virginia 22737

Re: Revised Water & Sewer Availability-Tiffany Estates: Parcels
PIN 6985-51-6810-000, 6985-60-5718-000 (Fauquier County),
& PIN 6985-60-5718-500 (Town of Warrenton)

Dear Mr. Dobson:

This letter is to provide information regarding the availability of public water and/or sanitary sewer services to the referenced properties from the Town of Warrenton system.

PIN 6985-60-5718-500 is currently within the Town limits and consists of 21.773 acres, zoned Industrial/Limited. Therefore, both water and sanitary sewer can be made available to this portion of the property. A sanitary trunk sewer runs through this parcel. A water main is not currently on the parcel, so a water main will need to be extended through the property. With the information available at this time, the potential projected water and sewer requirements for this property is estimated between 7,000 and 8,000 gallons per day.

PIN 6985-51-6810-000 and 6985-60-5718-000 are outside the Town limits and currently within the Fauquier County Center Service District. The property is zoned R-1. Neither of these properties are within the area covered by the Tri-Party Agreement for wastewater or water services from the Town at this time. However, there have been discussions about including these parcels within the service area for water. The combined land area of these parcels is 32.171 acres. If approved, that would allow a maximum of from 25 to 28 lots with septic drainfields. This would require a maximum of 7,500 to 8,400 gallons per day of water demand from the Town.

If you have any questions or need additional information, please don't hesitate to ask.

Sincerely,

Paul A. Bernard, P.E.
Town Engineer, Public Works & Utilities

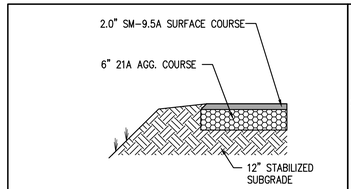
Cc: Steven Friend, Assistant Director of Public Utilities
Will Duncanson, Bowman Consulting

David M. Dobson ("Owner") hereby provides authorization for appropriate County and State personnel permission to enter the property shown hereon for their review and approval of the enclosed construction plan and for inspection purposes.

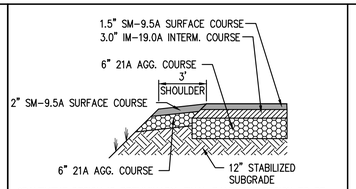
David M. Dobson

By: David M. Dobson, Owner

Name: DAVID M. DOBSON, OWNER

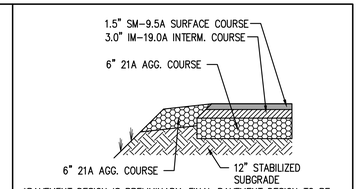


LIGHT DUTY ASPHALT PAVING SECTION
(NOT TO SCALE)



*PAVEMENT DESIGN IS PRELIMINARY. FINAL PAVEMENT DESIGN TO BE BASED UPON FIELD OBTAINED CBR VALUES TAKEN IN THE PRESENCE OF THE VDOT INSPECTOR.

STANDARD ASPHALT PAVING SECTION AT CUL-DE-SAC
(NOT TO SCALE)



*PAVEMENT DESIGN IS PRELIMINARY. FINAL PAVEMENT DESIGN TO BE BASED UPON FIELD OBTAINED CBR VALUES TAKEN IN THE PRESENCE OF THE VDOT INSPECTOR.

STANDARD ASPHALT PAVING SECTION
(NOT TO SCALE)

TRANSPORTATION NOTES:

1. METHOD AND MATERIALS USED SHALL CONFORM TO CURRENT FAUQUIER COUNTY AND VDOT STANDARDS AND/OR SPECIFICATIONS.
2. CONTACT VDOT AND FAUQUIER COUNTY TWO DAYS BEFORE EXCAVATION IN ANY STATE RIGHT-OF-WAY. A SPECIAL EXCAVATION PERMIT MAY BE REQUIRED WHEN WORKING IN THE RIGHT OF WAY.
3. DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION, CONTROL AND SAFETY OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY FAUQUIER COUNTY.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC CONTROL.
5. ALL UTILITIES INCLUDING UTILITY POLES DESIGNATED TO BE RELOCATED SHALL BE RELOCATED PRIOR TO BUILDING CONSTRUCTION.
6. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGE TO THE EXISTING ROADS AND UTILITIES WHICH OCCURS AS A RESULT OF THE PROJECT CONSTRUCTION WITHIN OR CONTIGUOUS TO THE EXISTING RIGHT-OF-WAY.
7. A SMOOTH GRADE SHALL BE MAINTAINED FROM THE CENTERLINE OF EXISTING ROAD TO PROPOSED CURB AND GUTTER AND/OR PROPOSED EDGE OF PAVEMENT TO PRECLUDE THE FORMING OF FALSE GUTTERS AND/OR THE PONDING OF ANY WATER IN THE ROADWAY. REMOVE AND RECONSTRUCT EXISTING PAVEMENT AND/OR CURB AS DICTATED BY FIELD CONDITIONS TO PROVIDE POSITIVE DRAINAGE AT TIE-IN-POINTS.
8. OVERLAY OF EXISTING PAVEMENT SHALL BE MINIMUM OF 1 1/2 INCHES DEPTH; ANY COST ASSOCIATED WITH PAVEMENT OVERLAY, OR THE MILLING OF EXISTING PAVEMENT TO OBTAIN REQUIRED DEPTH, SHALL BE ASSUMED BY THE CONTRACTOR.
9. ALL RIGHT-OF-WAY DEDICATED FOR PUBLIC USE SHALL BE CLEAR AND UNENCUMBERED.

PAVEMENT NOTES:

1. AN ACTUAL COPY OF THE CBR REPORT IS TO BE SUBMITTED PRIOR TO THE PLACEMENT OF THE AGGREGATE BASE MATERIAL. THE PRELIMINARY DESIGN IS BASED ON A CBR VALUE OF 4 AND A RESILIENCY FACTOR (RF) OF 1.0 PER THE VDOT PAVEMENT DESIGN GUIDE. IF THE CBR AND RF VALUES ARE LESS THAN THOSE ASSUMED, THE PAVEMENT SECTION SHALL BE INCREASED BASED ON THE GEOTECHNICAL ENGINEER'S RECOMMENDATION.
2. ALL FINAL PAVEMENT AND BASE COURSE THICKNESS MAY BE DESIGNED IN ACCORDANCE WITH THE "DESIGN GUIDE FOR SUBDIVISION ROAD PAVEMENTS IN VIRGINIA", BY N.K. VASWANI, AND SHALL BE BASED ON A SUFFICIENT NUMBER OF CBR TEST TO DETERMINED THE TRUE SUPPORT VALUES OF THE VARIOUS SOILS IN THE SUBGRADE.
3. SUFFICIENT ENGINEER CERTIFIED CBR TESTS MUST BE RUN TO DETERMINE THE SOIL SUPPORT VALUE (SSV) OF THE VARIOUS SOILS IN THE SUBGRADE.
4. ALL BASE, SUBBASE AND SUBGRADE MATERIAL SHALL BE COMPACTED TO 95% AS DETERMINED BY AASHTO T-99 METHOD "A" WITHIN 20% OF OPTIMUM MOISTURE.
5. STONE SUBBASE MATERIAL SHALL EXTEND UNDER THE CURB AND GUTTER A MINIMUM DISTANCE OF 18" FROM THE FACE OF CURB. THE STONE THICKNESS UNDER THE CURB AND GUTTER SHALL BE THE PAVEMENT DEPTH IN EXCESS OF THE 7" DEPTH OF THE GUTTER FACE BUT NO LESS THAN 4".
6. SUBGRADE MUST BE APPROVED BY FAUQUIER COUNTY AND VDOT FOR GRADE, TEMPLATE, AND COMPACTION BEFORE AGGREGATE IS PLACED.
7. ENTRANCES SHALL BE MILLED FOR CLEAN JOINT WITH EXISTING PAVEMENT.
8. THE PRICE BID FOR SAW CUTTING OF THE EXISTING PAVEMENT IS TO INCLUDE REMOVING, AND DISPOSING OF THE EXISTING PAVEMENT AND MATERIALS. WIDTH OF THE REMOVED SECTION IS 6" MIN.
9. THE USE OF AN AGGREGATE SPREADER IS REQUIRED WHEN PLACING AGGREGATE BASE.
10. PRIME COAT MUST BE APPLIED TO BASE MATERIAL PRIOR TO PLACEMENT OF ASPHALT (PRIME COAT RC-250 @ 0.3 GAL/SY).

ENVIRONMENTAL PERMIT NOTES

1. THE CONTRACTOR SHALL ENSURE THAT EROSION AND SEDIMENT (E&S) CONTROL DEVICES ARE IN PLACE PRIOR TO CLEARING AND GRADING AND THAT THEY ARE MAINTAINED IN GOOD WORKING ORDER TO MINIMIZE IMPACTS TO STATE WATERS IN ACCORDANCE WITH THE CURRENT EDITION OF THE VIRGINIA EROSION AND SEDIMENTATION HANDBOOK. ALL EARTHWORK OPERATION SHALL BE CARRIED OUT IN SUCH A MANNER AS TO PREVENT THE EROSION OF THESE MATERIALS AND PRECLUDE THEIR ENTRY INTO STATE WATERS. THESE CONTROLS SHALL REMAIN IN PLACE UNTIL THE AREA STABILIZES. SOIL STABILIZATION PRACTICES SHALL BE APPLIED TO ALL DENUDED AREAS WITHIN 7 DAYS AFTER FINAL GRADE IS REACHED WITHIN ANY IMPACT AREA.
2. ALL UTILITY WORK IN STATE WATERS SHALL BE PERFORMED IN A MANNER AS TO MINIMIZE DISTURBANCE AND THE AREA MUST BE RETURNED TO ITS ORIGINAL CONTOURS AND STABILIZED.
3. THE POURING OF CONCRETE DIRECTLY INTO STATE WATERS SHALL BE STRICTLY PROHIBITED.
4. CONTINUOUS FLOW OF PERENNIAL SPRINGS SHALL BE MAINTAINED. PIPES AND CULVERTS SHALL BE COUNTERSUNK A MINIMUM OF 6 INCHES TO PROVIDE FOR THE RE-ESTABLISHMENT OF NATURAL STREAM BOTTOM AND A LOW STREAM CHANNEL.

CONSTRUCTION NOTES

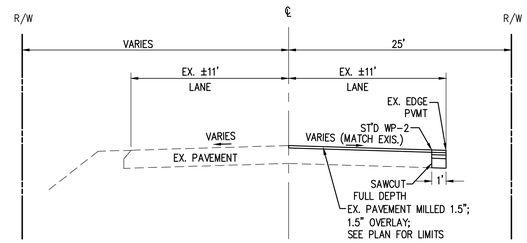
1. ALL WORK SHOWN HEREON SHALL BE IN STRICT ACCORDANCE WITH THE FAUQUIER COUNTY CODE AND CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. WHERE CONFLICTS EXIST BETWEEN THE CONSTRUCTION PLANS AND FAUQUIER COUNTY CODE, SPECIFICATIONS, OR STANDARDS AND THE VIRGINIA EROSION AND SEDIMENT CONTROL MANUAL, THE CONTRACTOR SHALL CONTACT THE ENGINEER FOR A RESOLUTION OF THE CONFLICT.
3. CONTRACTOR IS RESPONSIBLE FOR SCHEDULING A PRE-CONSTRUCTION MEETING WITH THE ENGINEER, VDOT AND FAUQUIER COUNTY OFFICIAL A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD BEFORE STARTING CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY DIFFERENCES.
5. CONTRACTOR SHALL BE RESPONSIBLE TO SEE THAT ALL EROSION AND SEDIMENT CONTROL STANDARDS ARE MET AND THE CONTRACTOR SHALL SEED AND MULCH ALL DISTURBED AREAS IN ACCORDANCE WITH COUNTY STANDARDS.
6. ALL WATER AND SEWER LINE TRENCHES SHALL BE COMPACTED TO 95% DENSITY IN 6" LAYERS. COMPACTION TESTS MAY BE REQUIRED BY THE COUNTY.
7. THE CONTRACTOR IS RESPONSIBLE FOR SECURING APPROPRIATE CONSTRUCTION PERMITS REQUIRED BY VDOT AND FAUQUIER COUNTY.
8. CLEARING AND GRUBBING IS TO BE CONFINED TO THOSE AREAS NEEDED FOR CONSTRUCTION. NO TREES OR SHRUBS IN UN-GRADED AREAS ARE TO BE CUT WITHOUT THE PERMISSION OF THE OWNER.
9. WHERE UNSUITABLE MATERIAL IS ENCOUNTERED IN THE SITE, IT SHALL BE REMOVED FROM THE ENTIRE SITE AND REPLACED WHERE NECESSARY WITH SUITABLE MATERIAL TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER.
10. ALL VEGETATION AND OVERBURDEN TO BE REMOVED FROM SITE PRIOR TO THE CONSTRUCTION OF THE SUBGRADE.
11. ALL GROWTH OF TREES AND VEGETATION SHALL BE CLEARED AND GRUBBED FOR THE ENTIRE RIGHT OF WAY. OTHER TREES AND VEGETATION WHICH OBSTRUCT SIGHT DISTANCES AT ROAD INTERSECTIONS SHALL BE REMOVED.
12. THE GRADE LINES DENOTE TOP OF FINISHED PAVEMENT UNLESS SHOWN OTHERWISE ON TYPICAL SECTIONS OR PLANS.
13. CONTRACTOR SHALL DO GRADING AS NECESSARY TO PRECLUDE THE PONDING OF WATER ADJACENT TO THE ROADWAY.

GRADING AND DRAINAGE NOTES:

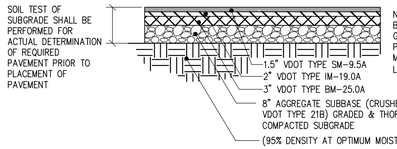
1. THE CONTRACTOR SHALL DISPOSE OF ALL SURPLUS MATERIAL OFF-SITE IN AN APPROVED AREA AND IN ACCORDANCE WITH THE APPROVED E&S PLAN.
2. DISTURBED AREAS NOT TO BE PAVED, LANDSCAPED, OR SODDED SHALL BE TOPSOILED, SEEDED, AND MULCHED ACCORDING TO VESCH STANDARDS. GRADED AREAS AT A SLOPE OF 3:1 OR STEEPER SHALL HAVE SURFACE ROUGHENING IN ACCORDANCE TO VESCH STANDARDS.
3. THE CONTRACTOR SHALL MAINTAIN DRAINAGE FACILITIES AT ALL TIMES DURING CONSTRUCTION. PROVIDE TEMPORARY FACILITIES, PUMPING ARRANGEMENTS, AND/OR CONNECTIONS AS REQUIRED TO MAINTAIN DRAINAGE.
4. CONTRACTOR SHALL MATCH EXISTING GRADE WHERE NEW SIDEWALK/ASPHALT/CURB/GUTTER MEETS EXISTING SIDEWALK/ASPHALT/CURB/GUTTER, RESPECTIVELY.
5. HANDICAPPED RAMPS AND CURB RAMPS SHALL BE INSTALLED AT 8.33% MAXIMUM SLOPE AND 2% MAX. CROSS SLOPE. HANDICAP PARKING SPACES AND AISLES SHALL BE INSTALLED AT 2% MAX. SLOPE IN ANY DIRECTION.
6. PAVEMENT SUBGRADES SHALL BE PREPARED IN ACCORDANCE WITH THE GEOTECHNICAL SPECIFICATIONS.

SITE CONSTRUCTION NOTES:

1. CONTRACTOR TO VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD BEFORE STARTING CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. IF RUNNING WATER IS PRESENT IN OUTLET CHANNELS DURING CONSTRUCTION WHERE DITCH PROTECTION IS REQUIRED, THE BOTTOM OF THE CHANNEL SHALL BE LINED WITH RIP-RAP STONE, FURTHER, EC-2 OR EC-3 MUST HAVE A MINIMUM WIDTH OF 4' FILL SECTIONS AND 5' CUT SECTIONS.
3. CONTRACTOR SHALL BE RESPONSIBLE TO SEE THAT ALL EROSION AND SEDIMENT CONTROL STANDARDS ARE MET AND THE CONTRACTOR TO SEED AND MULCH ALL DISTURBED AREAS IN ACCORDANCE WITH FAUQUIER COUNTY STANDARDS.
4. FINAL LOCATION OF MANHOLES SHALL NOT CONFLICT WITH OR CONSTRICT ROADSIDE DRAINAGE, CONTRACTOR SHALL ADJUST MANHOLES AND/OR DITCH ALIGNMENT TO INSURE PROPER ROADSIDE DITCH DRAINAGE COMPATIBLE WITH EXISTING FIELD CONDITIONS.
5. ALL WATER AND SEWER LINE TRENCHES SHALL BE COMPACTED TO 95% DENSITY IN 6" LAYERS.
6. THIS SITE SHALL BE CONSTRUCTED IN CONFORMANCE TO THE FAUQUIER DESIGN STANDARDS MANUAL AND THE PLATES/DETAILS LOCATED WITHIN.

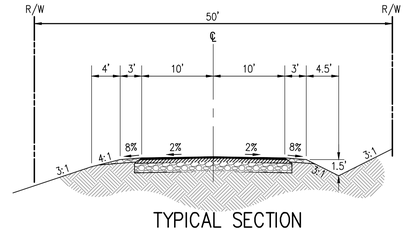


TYPICAL SECTION
BLACKWELL RD
THRU ENTRANCE
NOT TO SCALE

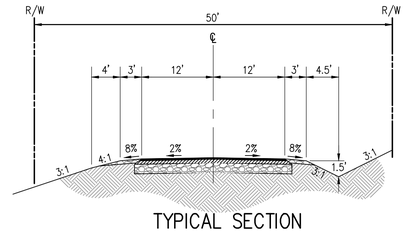


NOTE: PAVEMENT DESIGNED FOR 3,000 ADT. FINAL PAVEMENT DESIGN SHALL BE BASED ON EXISTING PAVEMENT DEPTHS OR ACTUAL CBR TEST, WHICHEVER IS GREATER. SUBBASE AND PAVEMENT DEPTHS SHALL MATCH OR EXCEED EXISTING PAVEMENT DEPTHS, AS DETERMINED BY PAVEMENT CORES. ALL MATERIALS AND METHODS OF CONSTRUCTION TO CONFORM TO THE APPLICABLE REQUIREMENTS OF THE LATEST EDITION OF VDOT'S ROAD AND BRIDGE STANDARDS AND SPECIFICATIONS..

TYPICAL BLACKWELL ROAD PAVEMENT SECTION
NOT TO SCALE



TYPICAL SECTION
NASH CT & NOAH CT
GS-SSAR SHOULDER & DITCH
25 MPH DESIGN SPEED (ADT 0-400)
NOT TO SCALE



TYPICAL SECTION
NICOLAS WAY
GS-SSAR SHOULDER & DITCH
25 MPH DESIGN SPEED (ADT UP TO 2000)
NOT TO SCALE

STREET CLASSIFICATION CHART

STREET NAME	CLASSIFICATION	DESIGN ADT (VPD)	PROPOSED ADT (VPD)	DESIGN SPEED (MPH)	POSTED SPEED (MPH)	ROW WIDTH	MINIMUM CENTERLINE RADIUS	MINIMUN SIGHT DISTANCE (FT) STOPPING	MINIMUN SIGHT DISTANCE (FT) INTERSECTION	PAVEMENT WIDTH (EP TO EP)	SHOULDER WIDTH
NICOLAS WAY	LOCAL ROAD (DITCH)	UP TO 2000	280	25	25	50'	200'	155'	280'	24'	3'
NOAH COURT	LOCAL ROAD (DITCH)	UP TO 2000	30	25	25	50'	200'	155'	280'	20'	3'
NASH COURT	LOCAL ROAD (DITCH)	UP TO 2000	30	25	25	50'	200'	155'	280'	20'	3'

SITE TABULATION

ZONING REQUIREMENTS

GPIN:
ZONING: R-1 CONVENTIONAL
PROPOSED USE: DWELLING, SINGLE FAMILY DETACHED

AREA TABULATION

GPIN 6985-60-5718-000 (PORTION):	22.1728 AC
GPIN 6985-51-6810-000:	10.0055 AC
TOTAL	32.1783 AC

PER ZONING ORDINANCE SECTION 2-308(4):
In all other zoning district categories, the maximum density shall be calculated on the gross area of the lot except that:

A. Only fifty (50) percent density allowance shall be calculated on that area of a lot comprised of existing water bodies.

B. Only thirty (30) percent density allowance shall be calculated on that area of a lot comprised of slopes in excess of twenty-five (25) percent grade.

C. Only fifty (50) percent density allowance shall be calculated on that area of a lot comprised of slopes in excess of fourteen (14) percent but equal to or less than twenty-five (25) percent grade.

D. No density allowance shall be calculated for any area of a lot in an existing street right-of-way, floodplain, or quarry.

DENSITY CALCULATIONS	
PROJECT AREA =	32.1783 AC
ALLOWED DENSITY =	0.90 DU/AC.
EX. WATER BODIES =	0.5474 AC.
50% OF AREA =	0.2737 AC.
SLOPES >25% =	2.2035 AC.
30% OF AREA =	0.6610 AC.
SLOPES >14% &=25% =	8.8476 AC.
50% OF AREA =	4.4238 AC.
FLOODPLAIN =	0.0000 AC.
0% OF AREA	0.0000 AC.
REMAINDER OF AREA =	20.5798 AC.
100% OF AREA=	20.5798 AC.
NET DENSITY AREA=	**25.9384**
TOTAL LOTS ALLOWED = *(BASED ON 0.90 DU/AC)*	**23 LOTS**
PROPOSED LOTS =	**22 LOTS**

ZONING COMPLIANCE TABLE (ZONE R-1)				
ZONING REQUIREMENT	REQUIRED		PROVIDED	
MAXIMUM DENSITY =	0.90	DU/AC	0.85	DU/AC
MINIMUM LOT SIZE =	40,000	SQ.FT.	43,569	SQ.FT.
MINIMUM LOT WIDTH =	135	FT	135	FT
MINIMUM FRONT YARD =	60	FT	60	FT
MINIMUM SIDE AND REAR YARD =	25	FT	25	FT
MAXIMUM BUILDING HEIGHT =	35	FT	35	FT
MAXIMUM LOT COVERAGE =	-		-	
*MINIMUM OPEN SPACE =	25	%	N/A	

*FEWER THAN 25 LOTS PROPOSED. OPEN SPACE REQUIREMENTS DO NOT APPLY.

PROPOSED LOT TABULATIONS

LOT NO.	LOT WIDTH (BRL)	AREA (SF)	AREA (AC)
1	220.40	45,423	1.04
2	229.25	48,665	1.12
3	358.99	46,319	1.06
4	143.14	43,592	1.00
5	144.72	43,793	1.01
6	331.45	56,200	1.29
7	215.55	45,676	1.05
8	211.86	45,492	1.04
9	145.74	43,583	1.00
10	145.50	43,650	1.00
11	145.50	43,650	1.00
12	333.56	50,306	1.15
13	271.80	119,572	2.74
14	270.93	55,483	1.27
15	135.00	53,092	1.22
16	181.59	43,627	1.00
17	390.87	43,641	1.00
18	442.48	54,053	1.24
19	167.18	43,569	1.00
20	261.68	43,581	1.00
21	209.28	49,162	1.13
22	287.19	51,935	1.19

TOTAL AREA IN LOTS:	1,114,064 SF	
	25.58 ACRES	
RIGHT-OF-WAY DEDICATION:	163,545 SF	
	3.75 ACRES	
OPEN SPACE PARCEL A:	18,884 SF	
	0.43 ACRES	
OPEN SPACE PARCEL B:	73,671 SF	
	1.69 ACRES	
OPEN SPACE PARCEL C:	31,523 SF	
	0.72 ACRES	
TOTAL AREA IN OPEN SPACE:	124,078 SF	
	2.85 ACRES	
TOTAL SITE AREA:	32.17833 ACRES	

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Phone: (540) 371-0268
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SITE TABULATIONS, NOTES, DETAILS & TYPICAL SECTIONS

TIFFANY ESTATES
CONSTRUCTION PLANS

CENTER MAGISTERIAL DISTRICT — FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: N/A V:	

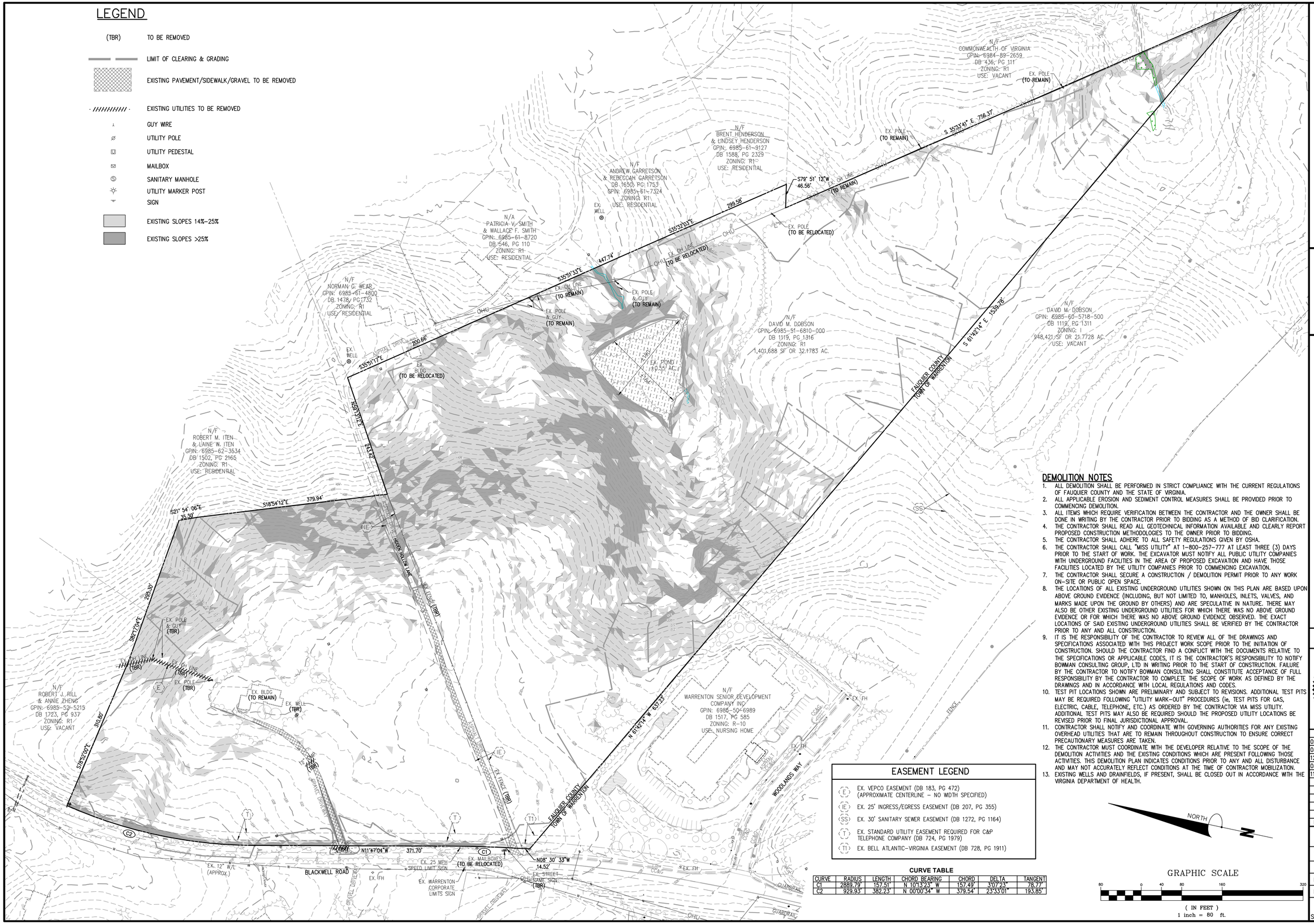
JOB No. 6642-02-002
DATE : FEBRUARY 10, 2023
FILE No. 6642-D-CP-001

SHEET 3 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\003-6642-D-CP-001-NTS.dwg

LEGEND

(TBR)	TO BE REMOVED
	LIMIT OF CLEARING & GRADING
	EXISTING PAVEMENT/SIDEWALK/GRAVEL TO BE REMOVED
	EXISTING UTILITIES TO BE REMOVED
	GUY WIRE
	UTILITY POLE
	UTILITY PEDESTAL
	MAILBOX
	SANITARY MANHOLE
	UTILITY MARKER POST
	SIGN
	EXISTING SLOPES 14%-25%
	EXISTING SLOPES >25%



DEMOLITION NOTES

1. ALL DEMOLITION SHALL BE PERFORMED IN STRICT COMPLIANCE WITH THE CURRENT REGULATIONS OF FAUQUIER COUNTY AND THE STATE OF VIRGINIA.
2. ALL APPLICABLE EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PROVIDED PRIOR TO COMMENCING DEMOLITION.
3. ALL ITEMS WHICH REQUIRE VERIFICATION BETWEEN THE CONTRACTOR AND THE OWNER SHALL BE DONE IN WRITING BY THE CONTRACTOR PRIOR TO BIDDING AS A METHOD OF BID CLARIFICATION.
4. THE CONTRACTOR SHALL READ ALL GEOTECHNICAL INFORMATION AVAILABLE AND CLEARLY REPORT PROPOSED CONSTRUCTION METHODOLOGIES TO THE OWNER PRIOR TO BIDDING.
5. THE CONTRACTOR SHALL ADHERE TO ALL SAFETY REGULATIONS GIVEN BY OSHA.
6. THE CONTRACTOR SHALL CALL "MISS UTILITY" AT 1-800-257-777 AT LEAST THREE (3) DAYS PRIOR TO THE START OF WORK. THE EXCAVATOR MUST NOTIFY ALL PUBLIC UTILITY COMPANIES WITH UNDERGROUND FACILITIES IN THE AREA OF PROPOSED EXCAVATION AND HAVE THOSE FACILITIES LOCATED BY THE UTILITY COMPANIES PRIOR TO COMMENCING EXCAVATION.
7. THE CONTRACTOR SHALL SECURE A CONSTRUCTION / DEMOLITION PERMIT PRIOR TO ANY WORK ON-SITE OR PUBLIC OPEN SPACE.
8. THE LOCATIONS OF ALL EXISTING UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED UPON ABOVE GROUND EVIDENCE (INCLUDING, BUT NOT LIMITED TO, MANHOLES, INLETS, VALVES, AND MARKS MADE UPON THE GROUND BY OTHERS) AND ARE SPECULATIVE IN NATURE. THERE MAY ALSO BE OTHER EXISTING UNDERGROUND UTILITIES FOR WHICH THERE WAS NO ABOVE GROUND EVIDENCE OR FOR WHICH THERE WAS NO ABOVE GROUND EVIDENCE OBSERVED. THE EXACT LOCATIONS OF SAID EXISTING UNDERGROUND UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO ANY AND ALL CONSTRUCTION.
9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW ALL OF THE DRAWINGS AND SPECIFICATIONS ASSOCIATED WITH THIS PROJECT WORK SCOPE PRIOR TO THE INITIATION OF CONSTRUCTION. SHOULD THE CONTRACTOR FIND A CONFLICT WITH THE DOCUMENTS RELATIVE TO THE SPECIFICATIONS OR APPLICABLE CODES, IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY BOWMAN CONSULTING GROUP, LTD IN WRITING PRIOR TO THE START OF CONSTRUCTION. FAILURE BY THE CONTRACTOR TO NOTIFY BOWMAN CONSULTING SHALL CONSTITUTE ACCEPTANCE OF FULL RESPONSIBILITY BY THE CONTRACTOR TO COMPLETE THE SCOPE OF WORK AS DEFINED BY THE DRAWINGS AND IN ACCORDANCE WITH LOCAL REGULATIONS AND CODES.
10. TEST PIT LOCATIONS SHOWN ARE PRELIMINARY AND SUBJECT TO REVISIONS. ADDITIONAL TEST PITS MAY BE REQUIRED FOLLOWING "UTILITY MARK-OUT" PROCEDURES (ie, TEST PITS FOR GAS, ELECTRIC, CABLE, TELEPHONE, ETC.) AS ORDERED BY THE CONTRACTOR VIA MISS UTILITY. ADDITIONAL TEST PITS MAY ALSO BE REQUIRED SHOULD THE PROPOSED UTILITY LOCATIONS BE REVISED PRIOR TO FINAL JURISDICTIONAL APPROVAL.
11. CONTRACTOR SHALL NOTIFY AND COORDINATE WITH GOVERNING AUTHORITIES FOR ANY EXISTING OVERHEAD UTILITIES THAT ARE TO REMAIN THROUGHOUT CONSTRUCTION TO ENSURE CORRECT PRECAUTIONARY MEASURES ARE TAKEN.
12. THE CONTRACTOR MUST COORDINATE WITH THE DEVELOPER RELATIVE TO THE SCOPE OF THE DEMOLITION ACTIVITIES AND THE EXISTING CONDITIONS WHICH ARE PRESENT FOLLOWING THOSE ACTIVITIES. THIS DEMOLITION PLAN INDICATES CONDITIONS PRIOR TO ANY AND ALL DISTURBANCE AND MAY NOT ACCURATELY REFLECT CONDITIONS AT THE TIME OF CONTRACTOR MOBILIZATION.
13. EXISTING WELLS AND DRAINFIELDS, IF PRESENT, SHALL BE CLOSED OUT IN ACCORDANCE WITH THE VIRGINIA DEPARTMENT OF HEALTH.

EASEMENT LEGEND

(E)	EX. VEPCO EASEMENT (DB 183, PG 472) (APPROXIMATE CENTERLINE – NO WIDTH SPECIFIED)
(IE)	EX. 25' INGRESS/EGRESS EASEMENT (DB 207, PG 355)
(SS)	EX. 30' SANITARY SEWER EASEMENT (DB 1272, PG 1164)
(T)	EX. STANDARD UTILITY EASEMENT REQUIRED FOR C&P TELEPHONE COMPANY (DB 724, PG 1979)
(T1)	EX. BELL ATLANTIC-VIRGINIA EASEMENT (DB 728, PG 1911)

CURVE TABLE

CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
C1	2889.79'	157.51'	N 10°13'23" W	157.49'	3°07'23"	78.77'
C2	929.93'	382.23'	N 00°00'34" W	379.54'	23°33'01"	193.85'

NORTH

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

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EXISTING CONDITIONS & DEMOLITION PLAN

TIFFANY ESTATES
CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT — FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
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11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=80'
V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 4 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\004-6642-D-CP-001-EXC.dwg

LEGEND

- EPHEMERAL DRAINAGEWAY
- ROCK OUTCROP

NOTES:

1. SOILS INFORMATION WITHIN THE SITE BOUNDARY WAS PROVIDED BY THE FAUQUIER COUNTY SOILS SCIENTIST OFFICE VIA A TYPE 1 SOIL REPORT, DATED 01/04/2023 AND 5/17/2001.
2. BASEMENTS ARE NOT RECOMMENDED IN MAPPING UNITS 15A, 17B, AND 17C. BASEMENTS IN THESE MAPPING UNITS ARE SUBJECT TO FLOODING DUE TO HIGH SEASONAL WATER TABLES. SUMP SYSTEMS MAY RUN CONTINUOUSLY, LEADING TO POSSIBLE PREMATURE PUMP FAILURE.
3. PRIOR TO FINAL CONSTRUCTION PLAN APPROVAL, IT SHALL BE AGREED THAT ALL DRAINFIELD AREAS ARE TO BE SURROUNDED BY SAFETY FENCING AND NO CONSTRUCTION TRAFFIC SHALL CROSS NOT SHALL LAND DISTURBANCE OCCUR IN THESE AREAS. THE FENCING OF THESE AREAS IS TO BE VERIFIED BY COUNTY STAFF BEFORE THE ISSUANCE OF THE LAND DISTURBING PERMIT.
4. FOUNDATIONS PLACED IN SOIL MAPPING UNITS THAT SHOW A MODERATE, HIGH, OR VERY HIGH SHRINK-SWELL POTENTIAL IN THE MOST RECENT INTERPRETIVE GUIDE TO THE SOILS OF FAUQUIER COUNTY, VIRGINIA WILL REQUIRE A GEOTECHNICAL EVALUATION IN ORDER TO DETERMINE PROPER DESIGN.
5. THE COUNTY RECOMMENDS THAT BEFORE ROAD OR HOME CONSTRUCTION BEGINS IN SOIL MAPPING UNITS 33C, 140C, 140D, 141D, 240C, 241D, 340B, AND 340E A SITE SPECIFIC EVALUATION BE CONDUCTED SO THAT SHALLOW TO BEDROCK AREAS ARE IDENTIFIED. THESE AREAS MAY REQUIRE BLASTING IF DEEP CUTS OR EXCAVATION IS DONE. FIRE MARSHAL'S OFFICE SHALL BE CONTACTED PRIOR TO BLASTING.

NORTH

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

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TYPE 1 SOILS MAP
TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=80' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 5 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\005-006-6642-D-CP-001-SOILS.dwg

MAP UNIT SYMBOL	SOIL NAME SLOPE	SOIL DESCRIPTION	General Characteristics: SOIL FEATURES				K_{sat}	LAND POTENTIALS	DEVELOPMENT POTENTIAL AND PROBLEMS USING: CENTRAL WATER AND CENTRAL SEWER	DEVELOPMENT POTENTIAL AND PROBLEMS USING: CONVENTIONAL SEPTIC TANK AND DRAINFIELD
15A	Seneca loam	Very deep, moderately w ell drained, yellow ish-brow n loamy soils w ith intermittent high w ater tables in concave sw ales and along small drainagew ays; developed in recent colluvium and local w ash from crystalline and metamorphic uplands	Slope (%)	0 - 2	Erosion Hazard Potential:	Slight	Surface: Moderate	**AGRICULTURE**	POOR Frequent flooding; intermittent high w ater table; concentrated runoff from higher areas; low bearing capacity w hen w et	NOT SUITED High w ater table Landscape position
			Bedrock Depth (in.):	> 60	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	20-40	K Factor (subsoil):	0.28	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
		May have Hydric Soil Inclusions	Bearing Capacity:	Mod.				MODERATELY HIGH		
17B	Middleburg loam	Very deep, w ell drained, brow n loamy soils in concave sw ales and along small drainagew ays; developed in recent colluvium and local w ash from crystalline uplands	Slope (%)	2-7	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	POOR Frequent flooding; intermittent high w ater table; concentrated runoff from higher areas; low bearing capacity w hen w e	NOT SUITED Landscape position
			Bedrock Depth (in.):	> 60	K Factor (surface):	0.37	Subsoil: Moderate	PRIME CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
		May have Hydric Soil Inclusions	Bearing Capacity:	Mod.				HIGH		
17C	Middleburg loam	Very deep, w ell drained, brow n loamy soils in concave sw ales and along small drainagew ays; developed in recent colluvium and local w ash from crystalline uplands	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	POOR Frequent flooding; intermittent high w ater table; concentrated runoff from higher areas; low bearing capacity w hen w e	NOT SUITED Landscape position
			Bedrock Depth (in.):	> 60	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
		May have Hydric Soil Inclusions	Bearing Capacity:	Mod.				HIGH		
33C	Brinklow silt loam	Moderately deep, w ell drained, yellow ish-red silty soils on strongly sloping sideslopes; developed in residuum from sericite and biotite schist, gneiss and phyllites.	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	FAIR Shallow to rock	POOR Shallow to rock
			Bedrock Depth (in.):	20-40	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B	Weathered Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.			Hard Bedrock: Impermeable	MODERATELY HIGH		
40C	Myersville silt loam, stony	Deep, w ell drained, strong brow n silty soils on rolling summits and strongly sloping backslopes; developed in residuum from greenstone and chloritic schist	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	FAIR Shallow to rock	MARGINAL Shallow to rock
			Bedrock Depth (in.):	40-60	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B	Weathered Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				MODERATELY HIGH		
43B	Alanthus silt loam	Very deep, w ell drained, yellow ish-red silty soils on undulating summits and gently sloping backslopes; developed in residuum from greenstone and chloritic schist	Slope (%)	2-7	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	GOOD	GOOD
			Bedrock Depth (in.):	>60	K Factor (surface):	0.37	Subsoil: Moderate	PRIME CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				HIGH		
43C	Alanthus silt loam	Very deep, w ell drained, yellow ish-red silty soils on strongly sloping backslopes; developed in residuum from greenstone and chloritic schist	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	GOOD	GOOD
			Bedrock Depth (in.):	>60	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				HIGH		
45B	Fauquier silt loam	Very deep, w ell drained, red clayey soils on undulating summits and gently sloping backslopes; developed in residuum from massive greenstone and chloritic schist	Slope (%)	2-7	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	GOOD	MARGINAL Slow percolation
			Bedrock Depth (in.):	>60	K Factor (surface):	0.32	Subsoil: Moderate	PRIME CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.28	Substratum: Moderate			
			Shrink-Sw ell Potential	Mod.	Hydrologic Group:	C		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				HIGH		
45C	Fauquier silt loam	Very deep, w ell drained, red clayey soils on strongly sloping backslopes; developed in residuum from massive greenstone and chloritic schist	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	GOOD	MARGINAL Slow percolation
			Bedrock Depth (in.):	>60	K Factor (surface):	0.32	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.28	Substratum: Moderate			
			Shrink-Sw ell Potential	Mod.	Hydrologic Group:	C		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				HIGH		
47B	Elioak - Fauquier complex	ELIOAK Very deep, w ell drained, micaceous, dark red clayey soils on undulating summits and gently sloping backslopes; developed in residuum from micaceous acid crystalline rock and chloritic schist	Slope (%)	2 - 7	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	GOOD	MARGINAL Slow percolation
			Bedrock Depth (in.):	>60	K Factor (surface):	0.32	Subsoil: Moderate	PRIME CROPLAND		
			Watertable Depth (in.):	> 40	K Factor (subsoil):	0.28	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	C		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	low				MODERATELY HIGH		
		FAUQUIER Very deep, w ell drained, red clayey soils on undulating summits and gently sloping backslopes; developed in residuum from micaceous acid crystalline rock and chloritic schist	Slope (%)	2 - 7	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**		
			Bedrock Depth (in.):	>60	K Factor (surface):	0.32	Subsoil: Moderate	PRIME CROPLAND		
			Watertable Depth (in.):	> 40	K Factor (subsoil):	0.28	Substratum: Moderate			
			Shrink-Sw ell Potential	Mod.	Hydrologic Group:	C		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				HIGH		
53C	Glenelg loam	Very deep, w ell drained, micaceous, dark brow n loamy soils on rolling summits and strongly sloping backslopes; developed in residuum from micaceous acid crystalline rock	Slope (%)	7-15	Erosion Hazard Potential:	High	Surface: Moderate	**AGRICULTURE**	GOOD High mica content in substratum may interfer w ith compaction	GOOD
			Bedrock Depth (in.):	>60	K Factor (surface):	0.32	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.43	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	low				MODERATE		

MAP UNIT SYMBOL	SOIL NAME SLOPE	SOIL DESCRIPTION	General Characteristics: SOIL FEATURES				K_{sat}	LAND POTENTIALS	DEVELOPMENT POTENTIAL AND PROBLEMS USING: CENTRAL WATER AND CENTRAL SEWER	DEVELOPMENT POTENTIAL AND PROBLEMS USING: CONVENTIONAL SEPTIC TANK AND DRAINFIELD
140C	Pignut silt loam	Moderately deep, w ell drained, strong brow n silty soils w ith few rock outcrops, stones and boulders on convex strongly sloping backslopes in highly dissected landscapes; developed in residuum from greenstone	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	FAIR Shallow to rock	POOR Shallow to rock
			Bedrock Depth (in.):	20-40	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	C	Weathered Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.			Hard Bedrock: Impermeable	MODERATELY LOW		
140D	Pignut silt loam	Moderately deep, w ell drained, strong brow n silty soils on moderately steep backslopes in highly dissected landscapes; developed in residuum from greenstone	Slope (%)	15-25	Erosion Hazard Potential:	High	Surface: Moderate	**AGRICULTURE**	FAIR Steep slopes Shallow to rock	POOR Steep slopes Shallow to rock
			Bedrock Depth (in.):	20-40	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	C	Weathered Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.			Hard Bedrock: Impermeable	MODERATELY LOW		
141D	Pignut - Alanthus Complex, very stony	PIGNUT Moderately deep, w ell drained, strong brow nsilty soils on moderately steep backslopes; surface cover is represented by .01 – 3% stones and cobbles, and 0 – 0.1% rock outcrop; developed in residuum from greenstone	Slope (%)	15-25	Erosion Hazard Potential:	High	Surface: Moderate	**AGRICULTURE**	POOR Steep slopes Shallow to rock Stoniness	POOR Steep slopes Shallow to rock
			Bedrock Depth (in.):	20 - 40	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY PASTURE		
			Watertable Depth (in.):	> 40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	C	Weathered Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.			Hard Bedrock: Impermeable	MODERATELY LOW		
		ALANTHUS Very deep, w ell drained, yellow ish-red silty soils on moderately steep backslopes; surface cover is represented by .01 – 3% stones and cobbles, and 0 – 0.1% rock outcrop; developed in residuum from greenstone	Slope (%)	15-25	Erosion Hazard Potential:	High	Surface: Moderate	**AGRICULTURE**		
			Bedrock Depth (in.):	>60	K Factor (surface):	0.37	Subsoil: Moderate	PRIME PASTURE		
			Watertable Depth (in.):	> 40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				MODERATELY LOW		
200	Cut and/or Fill	Disturbed areas of cutting and/ or filling	**HIGHLY VARIABLE**							
240C	Catoctin silt loam (shallow phase)	Shallow , w ell drained, olive brow n, loamy- skeletal soils on strongly sloping backslopes; may have a few cobbles and/or stones on the surface; developed in residuum from greenstone	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	POOR Shallow to rock	NOT SUITED Shallow to rock
			Bedrock Depth (in.):	10-20	K Factor (surface):	0.32	Subsoil: Moderate	PRIME PASTURE		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.17	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	D	Hard Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				LOW		
241D	Pignut - Alanthus Complex	PIGNUT Moderately deep, w ell drained, strong brow n silty soils on moderately steep backslopes; soil surface may contain a few cobbles and/or stones; developed in residuum from greenstone	Slope (%)	15-25	Erosion Hazard Potential:	High	Surface: Moderate	**AGRICULTURE**	POOR Shallow to rock; Steep slopes	POOR Shallow to rock; Steep slopes
			Bedrock Depth (in.):	20 - 40	K Factor (surface):	0.37	Subsoil: Moderate	PRIME PASTURE		
			Watertable Depth (in.):	> 40	K Factor (subsoil):	0.23	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	C	Weathered Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.			Hard Bedrock: Impermeable	MODERATE		
		ALANTHUS Very deep, w ell drained, yellow ish-red silty soils on moderately steep backslopes; soil surface may contain a few cobbles and/or stones; developed in residuum from greenstone	Slope (%)	15-25	Erosion Hazard Potential:	High	Surface: Moderate	**AGRICULTURE**		
			Bedrock Depth (in.):	>60	K Factor (surface):	0.37	Subsoil: Moderate	PRIME PASTURE		
			Watertable Depth (in.):	> 40	K Factor (subsoil):	0.23	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				MODERATELY HIGH		
340B	Catoctin silt loam	Moderately deep, w ell drained, strong brow n loamy-skeletal soils containing more than 35% rock fragments in the subsoil on undulating summits and gently sloping backslopes in highly dissected landscapes; developed in residuum from greenstone	Slope (%)	2-7	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	FAIR Shallow to rock	POOR Shallow to rock
			Bedrock Depth (in.):	20-40	K Factor (surface):	0.32	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.17	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	C	Hard Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				MODERATELY LOW		
340E	Catoctin silt loam	Moderately deep, w ell drained, strong brow n loamy-skeletal soils containing more than 35% rock fragments in the subsoil on steep backslopes in highly dissected landscapes; developed in residuum from greenstone	Slope (%)	25-45	Erosion Hazard Potential:	Very High	Surface: Moderate	**AGRICULTURE**	POOR Shallow to rock; Very steep slopes	NOT SUITED Shallow to rock Very steep slopes
			Bedrock Depth (in.):	20-40	K Factor (surface):	0.32	Subsoil: Moderate	SECONDARY PASTURE		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.17	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	C	Hard Bedrock: Impermeable	**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				MODERATELY LOW		
417B	Middleburg Variant loam	Very deep, w ell drained, brow n loamy soils on gently sloping colluvial benches and toeslopes; developed in recent colluvium from basic crystalline rock materials	Slope (%)	2-7	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	GOOD Intermittent high w ater table	MARGINAL Landscape position
			Bedrock Depth (in.):	>60	K Factor (surface):	0.37	Subsoil: Moderate	PRIME CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				HIGH		
417C	Middleburg Variant loam	Very deep, w ell drained, brow n loamy soils on strongly sloping colluvial benches and toeslopes; developed in recent colluvium from basic crystalline rock materials	Slope (%)	7-15	Erosion Hazard Potential:	Mod.	Surface: Moderate	**AGRICULTURE**	GOOD Intermittent high w ater table	MARGINAL Landscape position
			Bedrock Depth (in.):	>60	K Factor (surface):	0.37	Subsoil: Moderate	SECONDARY CROPLAND		
			Watertable Depth (in.):	>40	K Factor (subsoil):	0.32	Substratum: Moderate			
			Shrink-Sw ell Potential	low	Hydrologic Group:	B		**FORESTRY (HARDWOOD)**		
			Bearing Capacity:	Mod.				HIGH		

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TYPE 1 SOILS REPORT
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: N/A V:

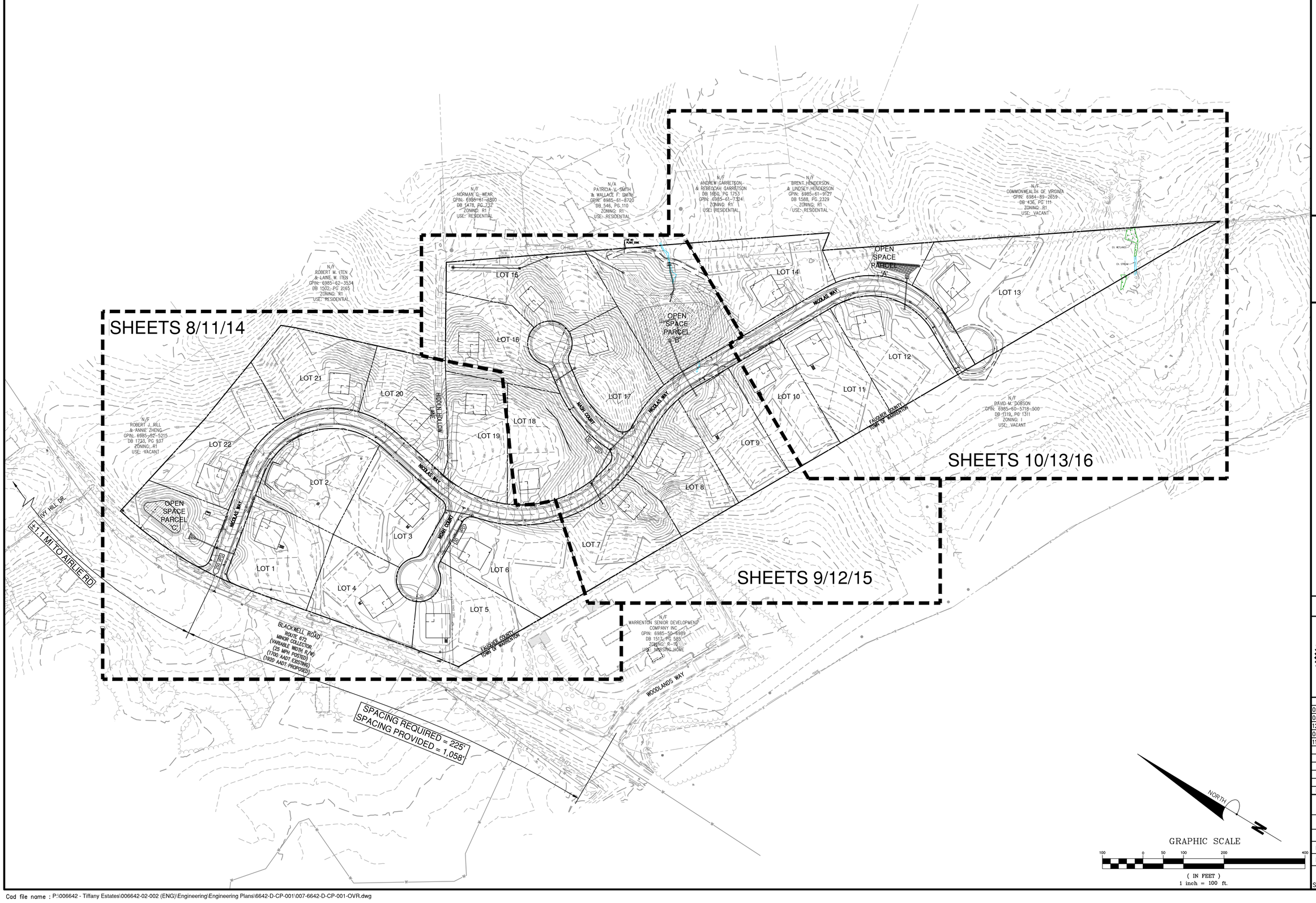
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 6 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\005-006-6642-D-CP-001-SOILS.dwg



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Fredericksburg, Virginia 22401
Phone: (540) 371-0268
bowman.com
Bowman Consulting Group Ltd

OVERALL & KEY PLAN

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
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11/22/24	2nd SUBMISSION
DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=100' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 7 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\007-6642-D-CP-001-OVR.dwg

SIGN LEGEND

SIGN NUMBER	①	②	④
SIGN	STOP		FIRE LANE NO PARKING
STD. NUMBER	R1-1	STREET SIGN	FIRE LANE SIGN
SIZE	30" X 30"	VARIES	12" X 18"

PAVEMENT LEGEND

SEE SHEET 3 FOR PAVEMENT DEPTHS

- DENOTES MILL AND OVERLAY
- DENOTES PROPOSED STANDARD ASPHALT PAVEMENT
- DENOTES PROPOSED LIGHT DUTY ASPHALT PAVEMENT

EASEMENT LEGEND

- (IE) DENOTES PROP. INGRESS/EGRESS EASEMENT
- (TT) DENOTES PROP. TEMPORARY TURNAROUND EASEMENT
- (SI) DENOTES PROP. SIGHT DISTANCE EASEMENT
- (E) EX. VEPCO EASEMENT (DB 183, PG 472) (APPROXIMATE CENTERLINE – NO WIDTH SPECIFIED)
- (IE) EX. 25' INGRESS/EGRESS EASEMENT (DB 207, PG 355)
- (SS) EX. 30' SANITARY SEWER EASEMENT (DB 1272, PG 1164)
- (T) EX. STANDARD UTILITY EASEMENT REQUIRED FOR C&P TELEPHONE COMPANY (DB 724, PG 1979)
- (T1) EX. BELL ATLANTIC–VIRGINIA EASEMENT (DB 728, PG 1911)
- DENOTES PORTION OF EXISTING EASEMENT TO BE VACATED

NOTES

1. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
2. ALL PROPOSED SIGNING AND PAVEMENT MARKING SHALL BE IN ACCORDANCE WITH THE MOST CURRENT EDITION OF EACH OF THE FOLLOWING AND ANY REVISION THERETO:
   - MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
   - THE VIRGINIA SUPPLEMENT TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
   - THE VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS.
   - THE VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE STANDARDS.
3. PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND SHALL BE MODIFIED IN THE FIELD TO AVOID CONFLICT WITH UNDERGROUND UTILIZES OR OTHER OBSTRUCTIONS, AND TO COMPLY WITH STANDARDS REFERENCED IN NOTE 2.
4. ANY EXISTING PAVEMENT MARKINGS, WHICH WILL CONFLICT WITH PROPOSED PAVEMENT MARKINGS, SHALL BE COMPLETELY ERADICATED.
5. LIMITS SHOWN OF PROPOSED MARKINGS ARE APPROXIMATE AND SHALL BE MODIFIED IN THE FIELD TO INSURE THAT PROPOSED PAVEMENT MARKINGS CONTINUE UNTIL EXISTING PAVEMENT MARKINGS CAN BE MATCHED.
6. ALL SIGNAGE SHALL COMPLY WITH ARTICLE 8 OF THE ZONING ORDINANCE.
7. ALL DRIVEWAY ENTRANCES SHALL BE PE-1.
8. DRIVEWAYS MAY BE CONSTRUCTED WITH ASPHALT OR CONCRETE SURFACE.

N/F
ROBERT M. ITEN
& LAINE W. ITEN
GPIN: 6985-62-3534
DB 1502, PG 2165
ZONING: R1
USE: RESIDENTIAL

N/F
ROBERT J. RILL
& ANNIE ZHENG
GPIN: 6985-52-5215
DB 1723, PG 937
ZONING: R1
USE: VACANT

N/F
WARRENTON SENIOR DEVELOPMENT COMPANY INC
GPIN: 6985-50-6989
DB 1517, PG 585
ZONING: R-10
USE: NURSING HOME

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

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Fredericksburg, Virginia 22401
Phone: (540) 371-0268
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LAYOUT PLAN
TIFFANY ESTATES
CONSTRUCTION PLAN
CENTER MAGISTERIAL DISTRICT
FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=40' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 8 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\008-010-6642-D-CP-001-DIM.dwg

PAVEMENT LEGEND

SEE SHEET 3 FOR PAVEMENT DEPTHS

- DENOTES MILL AND OVERLAY
- DENOTES PROPOSED STANDARD ASPHALT PAVEMENT
- DENOTES PROPOSED LIGHT DUTY ASPHALT PAVEMENT

SIGN LEGEND

SIGN NUMBER	①	②	④
SIGN	STOP		FIRE LANE NO PARKING
STD. NUMBER	R1-1	STREET SIGN	FIRE LANE SIGN
SIZE	30" X 30"	VARIES	12" X 18"

NOTES

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EASEMENT LEGEND

- (IE) DENOTES PROP. INGRESS/EGRESS EASEMENT
- (TT) DENOTES PROP. TEMPORARY TURNAROUND EASEMENT
- (SI) DENOTES PROP. SIGHT DISTANCE EASEMENT
- (E) EX. VEPCO EASEMENT (DB 183, PG 472) (APPROXIMATE CENTERLINE – NO WIDTH SPECIFIED)
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- (T1) EX. BELL ATLANTIC-VIRGINIA EASEMENT (DB 728, PG 1911)
- DENOTES PORTION OF EXISTING EASEMENT TO BE VACATED

NORTH

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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Phone: (540) 371-0268
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LAYOUT PLAN

TIFFANY ESTATES

CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
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12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

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WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=40' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 9 OF 58		

EASEMENT LEGEND

- IE — DENOTES PROP. INGRESS/EGRESS EASEMENT
- TT — DENOTES PROP. TEMPORARY TURNAROUND EASEMENT
- SI — DENOTES PROP. SIGHT DISTANCE EASEMENT
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SIGN LEGEND

SIGN NUMBER	①	②	④
SIGN	STOP		FIRE LANE NO PARKING
STD. NUMBER	R1-1	STREET SIGN	FIRE LANE SIGN
SIZE	30" X 30"	VARIES	12" X 18"

PAVEMENT LEGEND

SEE SHEET 3 FOR PAVEMENT DEPTHS

- DENOTES MILL AND OVERLAY
- DENOTES PROPOSED STANDARD ASPHALT PAVEMENT
- DENOTES PROPOSED LIGHT DUTY ASPHALT PAVEMENT

MATCHLINE - BELOW

N/F
ANDREW GARRETSON
& REBECCAH GARRETSON
DB 1650, PG 1753
GPIN: 6985-61-7324
ZONING: R1
USE: RESIDENTIAL

N/F
BRENT HENDERSON
& LINDSEY HENDERSON
GPIN: 6985-61-9127
DB 1588, PG 2329
ZONING: R1
USE: RESIDENTIAL

N/F
COMMONWEALTH OF VIRGINIA
GPIN: 6984-89-2659
DB 436, PG 111
ZONING: R1
USE: VACANT

MATCHLINE - ABOVE

OPEN SPACE PARCEL 'A' 18,884 SF

163,545 SF TO BE DEDICATED TO PUBLIC STREET PURPOSES

LOT 14 55,483 SF

LOT 13 119,572 SF

LOT 12 50,306 SF

LOT 11 43,650 SF

LOT 10 43,650 SF

LOT 9 43,583 SF

OPEN SPACE PARCEL 'B' 73,671 SF

NICOLAS WAY (50' R.O.W.)

MATCHLINE - SHEET 9

N/F
DAVID M. DOBSON
GPIN: 6985-60-5718-500
DB 1119, PG 1311
ZONING: I
USE: VACANT

FAUQUIER COUNTY / TOWN OF WARRENTON

CURVE TABLE

CURVE #	RADIUS	ARC	DELTA
C1	929.93'	229.50'	14°08'26"
C2	25.00'	42.99'	98°31'12"
C3	235.00'	162.48'	39°36'56"
C4	235.00'	187.90'	45°48'43"
C5	235.00'	107.76'	26°16'19"
C6	285.00'	176.32'	35°26'51"
C7	285.00'	283.62'	57°01'03"
C8	25.00'	42.05'	96°22'04"
C9	325.00'	180.18'	31°45'51"
C10	325.00'	11.64'	2°03'09"
C11	25.00'	22.39'	51°19'04"
C12	55.00'	114.39'	119°09'36"
C13	55.00'	99.96'	104°08'02"
C14	55.00'	56.96'	59°20'30"
C15	25.00'	22.39'	51°19'04"
C16	275.00'	158.38'	32°59'50"
C17	25.00'	41.78'	95°45'13"
C18	325.00'	116.42'	20°31'26"
C19	325.00'	61.11'	10°46'24"
C20	225.00'	30.39'	7°44'21"
C21	224.97'	194.25'	49°28'16"
C22	225.00'	128.79'	32°47'47"

CURVE TABLE

CURVE #	RADIUS	ARC	DELTA
C23	175.00'	274.89'	90°00'00"
C24	275.00'	150.22'	31°17'50"
C25	335.00'	59.82'	10°13'54"
C26	335.00'	198.49'	33°56'56"
C27	335.00'	217.51'	37°12'06"
C28	25.00'	35.07'	80°22'11"
C29	25.00'	22.39'	51°19'04"
C30	55.00'	112.82'	117°31'37"
C31	55.00'	112.03'	116°42'13"
C32	55.00'	46.47'	48°24'19"
C33	25.00'	22.39'	51°19'04"
C34	25.00'	36.50'	83°39'23"
C35	335.00'	37.49'	6°24'41"
C36	185.00'	10.29'	3°11'13"
C37	185.00'	350.37'	108°30'45"
C38	25.00'	38.29'	87°45'48"
C39	929.93'	49.49'	3°02'57"
C40	2,889.79'	47.64'	0°56'40"
C41	2,889.79'	109.87'	2°10'42"
C43	275.00'	150.22'	31°17'50"

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

Bowman

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1300 Central Park Boulevard
Fredericksburg, Virginia 22401
Phone: (540) 371-0268
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Bowman Consulting Group Ltd

LAYOUT PLAN
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR.
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=40' V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 10 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\008-010-6642-D-CP-001-DIM.dwg

NOTES:

1. CONTRACTOR SHALL VERIFY ELEV. AT BENCHMARKS PRIOR TO CONSTRUCTION AND SHALL NOTIFY THE ENGINEER IMMEDIATELY WITH ANY DISCREPANCIES.
2. ALL EX. MAJOR UNDERGROUND UTILITIES ARE APPROXIMATE IN LOCATION AND SHALL BE FIELD VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES. ENGINEER SHALL BE NOTIFIED IMMEDIATELY WITH ANY DISCREPANCIES.
3. **CONTRACTOR SHALL COORDINATE CLEARING OF DRAINFIELDS WITH AOSE. NO CONSTRUCTION EQUIPMENT IS ALLOWED ON THE PROPOSED DRAINFIELDS WITHOUT APPROVAL FROM THE AOSE.**
4. LOTS 6, 7, 9, 12, 13, 14, 15, 17, 19, 20, 21, AND 22 HAVE HOUSE FOUNDATION ON FILL MATERIAL. THE CONTRACTOR MUST CONTACT THE BUILDING OFFICIAL TO DETERMINE REQUIRED PROCEDURES PRIOR TO FILL OPERATIONS ON THESE LOTS.

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROP. SPOT ELEVATION
- TC: TOP OF CURB
- FC: FACE OF CURB
- EP: EDGE OF PAVEMENT
- SW: SIDEWALK
- FG: FINISHED GRADE
- FF: FINISHED FLOOR
- HP: HIGH POINT
- LP: LOW POINT
- INV: INVERT

GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft.

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\011-013-6642-D-CP-001-GRP.dwg

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GRADING PLAN
TIFFANY ESTATES
CONSTRUCTION PLAN
CENTER MAGISTERIAL DISTRICT
FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

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WILLIAM E. DUNCANSON JR
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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=40' V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 11 OF 58

LEGEND

66	EXISTING CONTOUR
66	PROPOSED CONTOUR
20.50 EP	PROP. SPOT ELEVATION

TC: TOP OF CURB
FC: FACE OF CURB
EP: EDGE OF PAVEMENT
SW: SIDEWALK
FG: FINISHED GRADE
FF: FINISHED FLOOR
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LP: LOW POINT
INV: INVERT

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NORTH

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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CENTER MAGISTERIAL DISTRICT
FAUQUIER COUNTY, VIRGINIA

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11/22/24	2nd SUBMISSION

DATE	DESCRIPTION	
WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=40' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 12 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\011-013-6642-D-CP-001-GRP.dwg

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LEGEND

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- PROPOSED CONTOUR
- PROP. SPOT ELEVATION
- TC: TOP OF CURB
- FC: FACE OF CURB
- EP: EDGE OF PAVEMENT
- SW: SIDEWALK
- FG: FINISHED GRADE
- FF: FINISHED FLOOR
- HP: HIGH POINT
- LP: LOW POINT
- INV: INVERT

MATCHLINE - BELOW

MATCHLINE - ABOVE

MATCHLINE - SHEET 12

N/F
ANDREW GARRETSON
& REBECCAH GARRETSON
DB 1630, PG 1753
GPIN: 6985-61-7324
ZONING: R1
USE: RESIDENTIAL

N/F
BRENT HENDERSON
& LINDSEY HENDERSON
GPIN: 6985-61-9127
DB 1588, PG 2329
ZONING: R1
USE: RESIDENTIAL

N/F
COMMONWEALTH OF VIRGINIA
GPIN: 6984-89-2659
DB 436, PG 111
ZONING: R1
USE: VACANT

N/F
DAVID M. DOBSON
GPIN: 6985-60-5718-500
DB 1119, PG 1311
ZONING: I
USE: VACANT

EX. WELL

EX. OH LINE (TO BE RELOCATED)

EX. OH LINE (TO REMAIN)

EX. POLE (TO BE RELOCATED)

EX. POLE TO BE OUT (TO REMAIN)

EX. WETLANDS

EX. STREAM

159 SQ. YDS.
STD EC-1 GL A1
REQ'D. TYPE A
INSTALLATION

LIMITS OF CLEARING AND GRADING

RESERVE DRAINFIELD

INSTALL DRAINFIELD

LEVEL SPREADER

OPEN SPACE
PARCEL 'A'
18,884 SF

OPEN SPACE
PARCEL 'B'
73,671 SF

POND ACCESS ROAD (12%)

PERMANENT POOL =441.00

NICOLAS WAY
(50' R.O.W.)

LOT 14
55,483 SF

LOT 13
119,572 SF

LOT 12
50,306 SF

LOT 11
43,650 SF

LOT 10
43,650 SF

LOT 9
43,583 SF

EC-1 (TYP)

EC-2 (TYP)

EC-3 (TYPE 1)

EC-3 (TYPE 3)

EW-12

60'x60' PAD
GF=470.74
FF=472.49
BF=463.49

60'x60' PAD
GF=471.07
FF=478.92
BF=469.92

50'x60' PAD
GF=476.98
FF=476.73
BF=469.73

60'x60' PAD
GF=473.25
FF=475.00
BF=466.00

60'x60' PAD
GF=463.40
FF=465.15
BF=456.15

60'x60' PAD
GF=472.82
FF=474.57
BF=465.57

10-YR WSE =468.22

10-YR WSE =469.39

10-YR WSE =468.36

10-YR WSE =463.52

10-YR WSE =457.60

10-YR WSE =459.51

8" DIP W/L

24" RCP

FAUQUIER COUNTY
TOWN OF WARRENTON

GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft.

NORTH

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\011-013-6642-D-CP-001-GRP.dwg

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Bowman Consulting Group Ltd

GRADING PLAN

TIFFANY ESTATES
CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

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DATE	DESCRIPTION	
WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=40'
V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 13 OF 58

EASEMENT LEGEND

- (SD) DENOTES PROP. STORM DRAINAGE EASEMENT
- (IE) DENOTES PROP. INGRESS/EGRESS EASEMENT
- (W) DENOTES PROP. WATERLINE EASEMENT
- (TT) DENOTES PROP. TEMPORARY TURNAROUND EASEMENT
- (SI) DENOTES PROP. SIGHT DISTANCE EASEMENT
- (SWM) DENOTES PROP. STORMWATER MANAGEMENT EASEMENT
- (ST) DENOTES PROP. 10' STREET TREE EASEMENT
- (E) EX. VEPCO EASEMENT (DB 183, PG 472) (APPROXIMATE CENTERLINE – NO WIDTH SPECIFIED)
- (IE) EX. 25' INGRESS/EGRESS EASEMENT (DB 207, PG 355)
- (SS) EX. 30' SANITARY SEWER EASEMENT (DB 1272, PG 1164)
- (T) EX. STANDARD UTILITY EASEMENT REQUIRED FOR C&P TELEPHONE COMPANY (DB 724, PG 1979)
- (T1) EX. BELL ATLANTIC–VIRGINIA EASEMENT (DB 728, PG 1911)
- DENOTES PORTION OF EXISTING EASEMENT TO BE VACATED

NOTES:
1. ALL EASEMENTS ARE PERMANENT UNLESS SPECIFICALLY NOTED AS TEMPORARY.
2. ALL EASEMENTS ALONG WATER MAINS ARE 15' WIDE EXCEPT AS NOTED OTHERWISE.
3. ALL EASEMENTS ALONG STORM DRAINS ARE AS SHOWN BELOW, EXCEPT AS NOTED OTHERWISE:

PIPE DIAMETER	EASEMENT WIDTH
15"–23"	15'
24"–32"	20'
33"–48"	25'

4. ALL EASEMENTS ARE PUBLIC EXCEPT AS NOTED OTHERWISE.

N/F
ROBERT M. ITEN
& LAINE W. ITEN
GPIN: 6985-62-3534
DB 1502, PG 2165
ZONING: R1
USE: RESIDENTIAL

N/F
ROBERT J. RILL
& ANNIE ZHENG
GPIN: 6985-52-5215
DB 1723, PG 937
ZONING: R1
USE: VACANT

N/F
WARRENTON SENIOR DEVELOPMENT COMPANY INC.
GPIN: 6985-50-6989
DB 1517, PG 585
ZONING: R-10
USE: NURSING HOME

LOT 1 · LOT 2 · LOT 3 · LOT 4 · LOT 5 · LOT 6 · LOT 7 · LOT 16 · LOT 18 · LOT 19 · LOT 20 · LOT 21 · LOT 22

RESERVE DRAINFIELD · INSTALL DRAINFIELD · TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT

NICOLAS WAY (50' R.O.W.) · NOAH COURT (50' R.O.W.) · NASH COURT (50' R.O.W.) · HIDDEN HOLLOW LANE · BLACKWELL ROAD (ROUTE 672, MINOR COLLECTOR, VARIABLE WIDTH R/W, 25 MPH POSTED, 1700 AADT EXISTING, 1920 AADT PROPOSED)

OREN SPACE PARCEL 'C' · BIORETENTION BASIN 'A' TOP(SURFACE)=512.00 BOTTOM=507.50

RETAINING WALL #1 W/ HANDRAIL (DES. BY OTHERS) · RETAINING WALL #2 W/ HANDRAIL (DES. BY OTHERS)

EX. HOUSE TO REMAIN · EX. WELL (TBR) · EX. MAILBOX (TBR) · EX. MAILBOXES (TO BE RELOCATED) · EX. POLE & GUY (TBR) · EX. FENCE (TBR) · EX. DRAINFIELD

PROP. R/W · EX. R/W · EX. 12" W/L (APPROX.) · ASPHALT DRIVEWAY · GRAVEL DRIVEWAY · EX. FH

MATCHLINE - SHEET 15 · FAUQUIER COUNTY TOWN OF WARRENTON

NOTES:
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3. ALL STORM STRUCTURES SHALL HAVE IS-1 INVERT SHAPING, AND SL-1'S (SAFETY LANDINGS) WILL BE REQUIRED IN ALL STRUCTURES WITH A DEPTH OVER 12'. ST-1'S (STEPS) ARE REQUIRED IN ANY STRUCTURE WITH A DEPTH OF 4' OR GREATER.
4. ALL WATERLINES SHALL BE DUCTILE IRON CLASS 52 EXCEPT AS NOTED OTHERWISE.
5. ALL WATER SERVICE LINES SHALL BE TYPE K SOFT COPPER.
6. STORM SEWER PIPE SHALL BE RCP.
7. IN AREAS OF BACKFILL AND FILL, CONTRACTOR SHALL ENSURE UNDERLYING SOIL IN THE UTILITY TRENCH IS COMPACTED TO NOT LESS THAN 95% OF MAXIMUM DENSITY AT A MOISTURE CONTENT WITHIN 2 PERCENTAGE POINTS OF OPTIMUM IN ACCORDANCE WITH ASTM D698

NORTH

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

Bowman

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UTILITY AND EASEMENT PLAN
TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
PROFESSIONAL ENGINEER
11/22/24

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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=40' V:

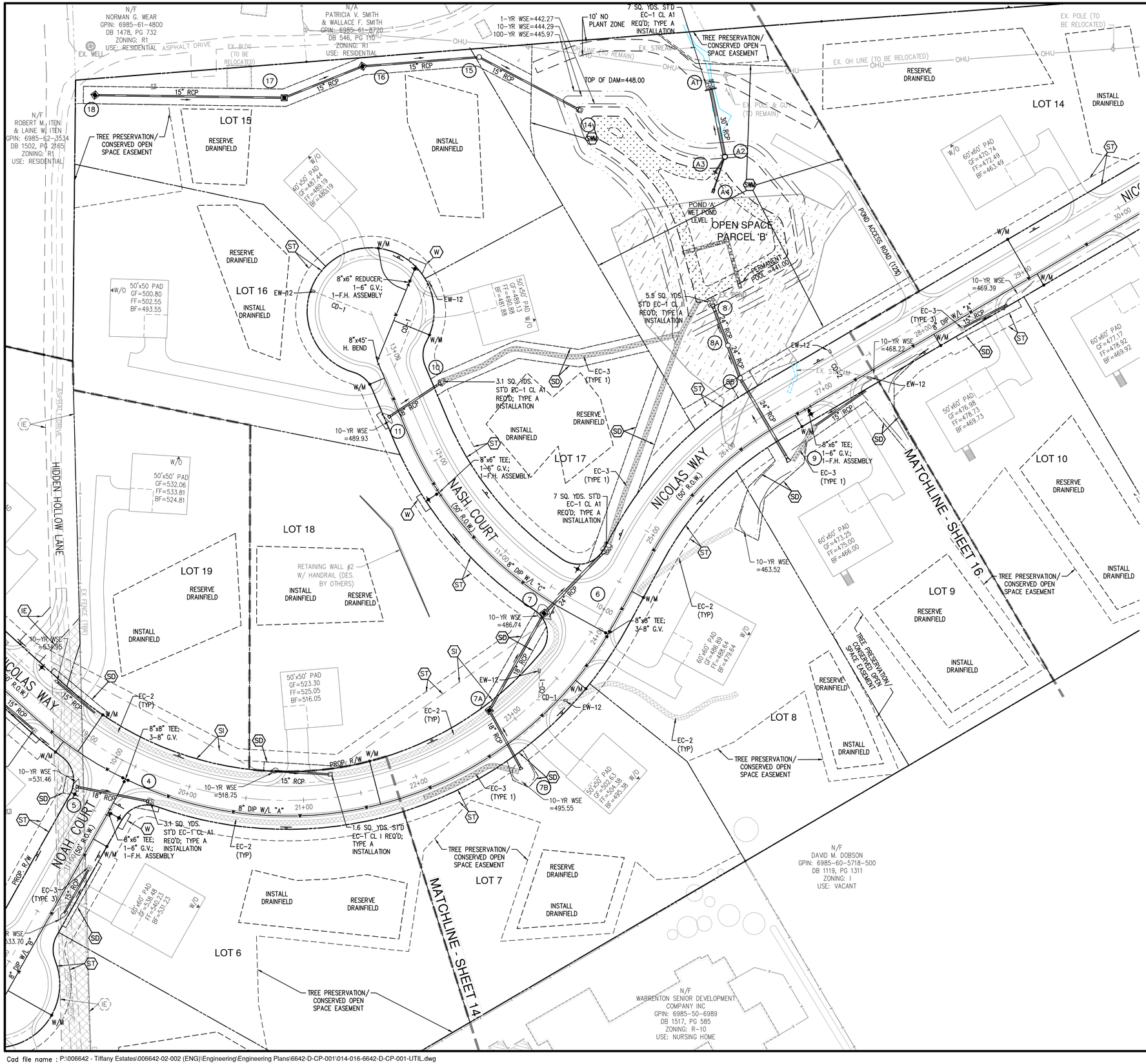
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 14 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\014-016-6642-D-CP-001-UTIL.dwg



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EASEMENT LEGEND

SD	DENOTES PROP. STORM DRAINAGE EASEMENT
IE	DENOTES PROP. INGRESS/EGRESS EASEMENT
W	DENOTES PROP. WATERLINE EASEMENT
TT	DENOTES PROP. TEMPORARY TURNAROUND EASEMENT
SI	DENOTES PROP. SIGHT DISTANCE EASEMENT
SWM	DENOTES PROP. STORMWATER MANAGEMENT EASEMENT
ST	DENOTES PROP. 10' STREET TREE EASEMENT
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33"–48"	25'

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40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

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SCALE H: 1"=40' V:

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DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 15 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\014-016-6642-D-CP-001-UTIL.dwg

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MATCHLINE - BELOW

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT

MATCHLINE - ABOVE

N/F
ANDREW GARRETSON
& REBECCAH GARRETSON
DB 1650, PG 1753
GPIN: 6985-61-7324
ZONING: R1
USE: RESIDENTIAL

N/F
BRENT HENDERSON
& LINDSEY HENDERSON
GPIN: 6985-61-9127
DB 1588, PG 2329
ZONING: R1
USE: RESIDENTIAL

N/F
COMMONWEALTH OF VIRGINIA
GPIN: 6984-89-2659
DB 436, PG 111
ZONING: R1
USE: VACANT

EX. WELL

EX. POLE (TO BE RELOCATED)

EX. OH LINE (TO BE RELOCATED)

EX. OH LINE (TO REMAIN)

EX. POLE & GUY (TO REMAIN)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT

RESERVE DRAINFIELD

INSTALL DRAINFIELD

LOT 14

OPEN SPACE PARCEL 'A'

LEVEL SPREADER

159 SQ. YDS. ST'D EC-1 CL A1 REQ'D; TYPE A INSTALLATION

EX. WETLANDS

EX. STREAM

LOT 13

LOT 12

LOT 11

LOT 10

LOT 9

NICOLAS WAY (50' R.O.W.)

POND ACCESS ROAD (12%)

OPEN SPACE PARCEL 'B'

PERMANENT POOL =441.00

EX. POND

EX. CONTOURS

MATCHLINE - SHEET 15

FAUQUIER COUNTY / TOWN OF WARRENTON

8" DIP W/L "A"

8"x11.25° H. BEND

8"x6" TEE; 1-6" G.V.; 1-F.H. ASSEMBLY

8" PLUG

WATER SAMPLING STATION

EC-1 (TYPE 1)

EC-2 (TYP)

EC-3 (TYPE 3)

EC-3 (TYPE 1)

10-YR WSE =463.52
10-YR WSE =468.22
10-YR WSE =469.39
10-YR WSE =468.36
10-YR WSE =457.60
10-YR WSE =459.51

N/F
DAVID M. DOBSON
GPIN: 6985-60-5718-500
DB 1119, PG 1311
ZONING: I
USE: VACANT

EASEMENT LEGEND

- (SD) DENOTES PROP. STORM DRAINAGE EASEMENT
- (IE) DENOTES PROP. INGRESS/EGRESS EASEMENT
- (W) DENOTES PROP. WATERLINE EASEMENT
- (TT) DENOTES PROP. TEMPORARY TURNAROUND EASEMENT
- (SI) DENOTES PROP. SIGHT DISTANCE EASEMENT
- (SWM) DENOTES PROP. STORMWATER MANAGEMENT EASEMENT
- (ST) DENOTES PROP. 10' STREET TREE EASEMENT
- (E) EX. VEPCO EASEMENT (DB 183, PG 472) (APPROXIMATE CENTERLINE – NO WIDTH SPECIFIED)
- (IE) EX. 25' INGRESS/EGRESS EASEMENT (DB 207, PG 355)
- (SS) EX. 30' SANITARY SEWER EASEMENT (DB 1272, PG 1164)
- (T) EX. STANDARD UTILITY EASEMENT REQUIRED FOR C&P TELEPHONE COMPANY (DB 724, PG 1979)
- (TT) EX. BELL ATLANTIC-VIRGINIA EASEMENT (DB 728, PG 1911)
- DENOTES PORTION OF EXISTING EASEMENT TO BE VACATED

NOTES:
1. ALL EASEMENTS ARE PERMANENT UNLESS SPECIFICALLY NOTED AS TEMPORARY.
2. ALL EASEMENTS ALONG WATER MAINS ARE 15' WIDE EXCEPT AS NOTED OTHERWISE.
3. ALL EASEMENTS ALONG STORM DRAINS ARE AS SHOWN BELOW, EXCEPT AS NOTED OTHERWISE:

PIPE DIAMETER	EASEMENT WIDTH
15"-23"	15'
24"-32"	20'
33"-48"	25'

4. ALL EASEMENTS ARE PUBLIC EXCEPT AS NOTED OTHERWISE.

NORTH

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\014-016-6642-D-CP-001-UTIL.dwg

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UTILITY AND EASEMENT PLAN
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

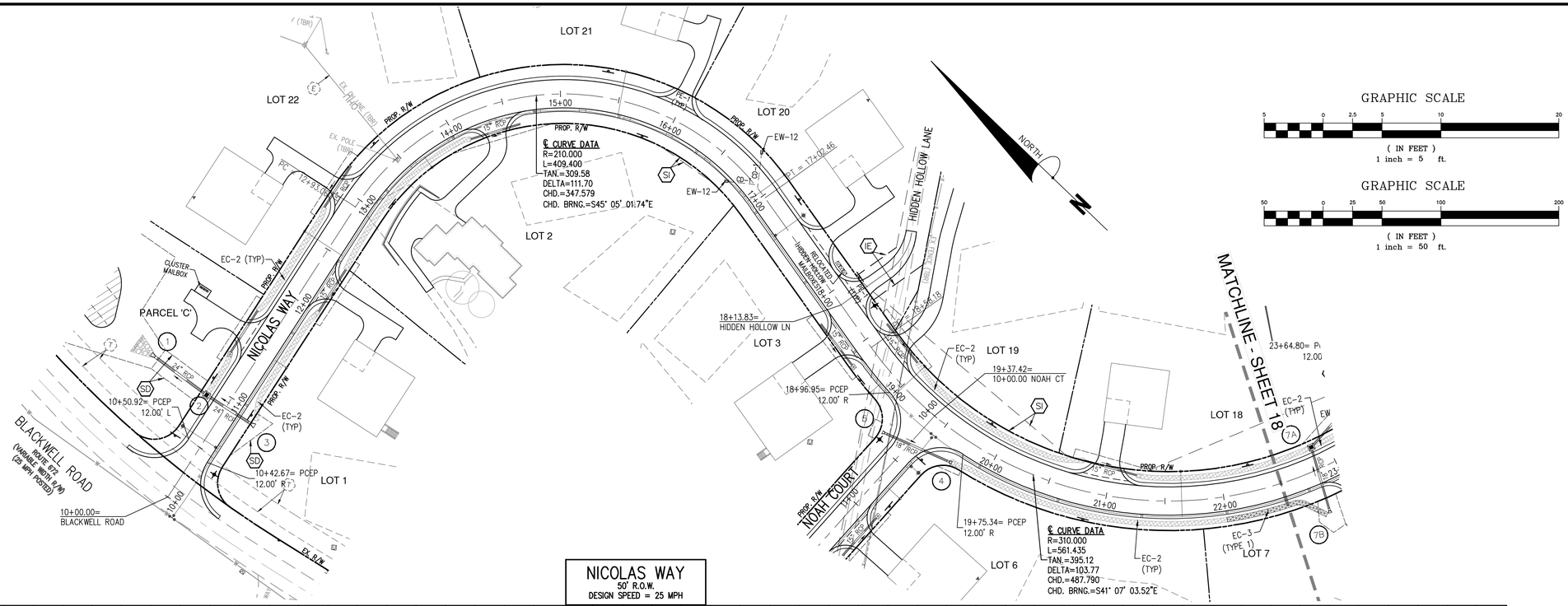
SCALE H: 1"=40' V:

JOB No. 6642-02-002

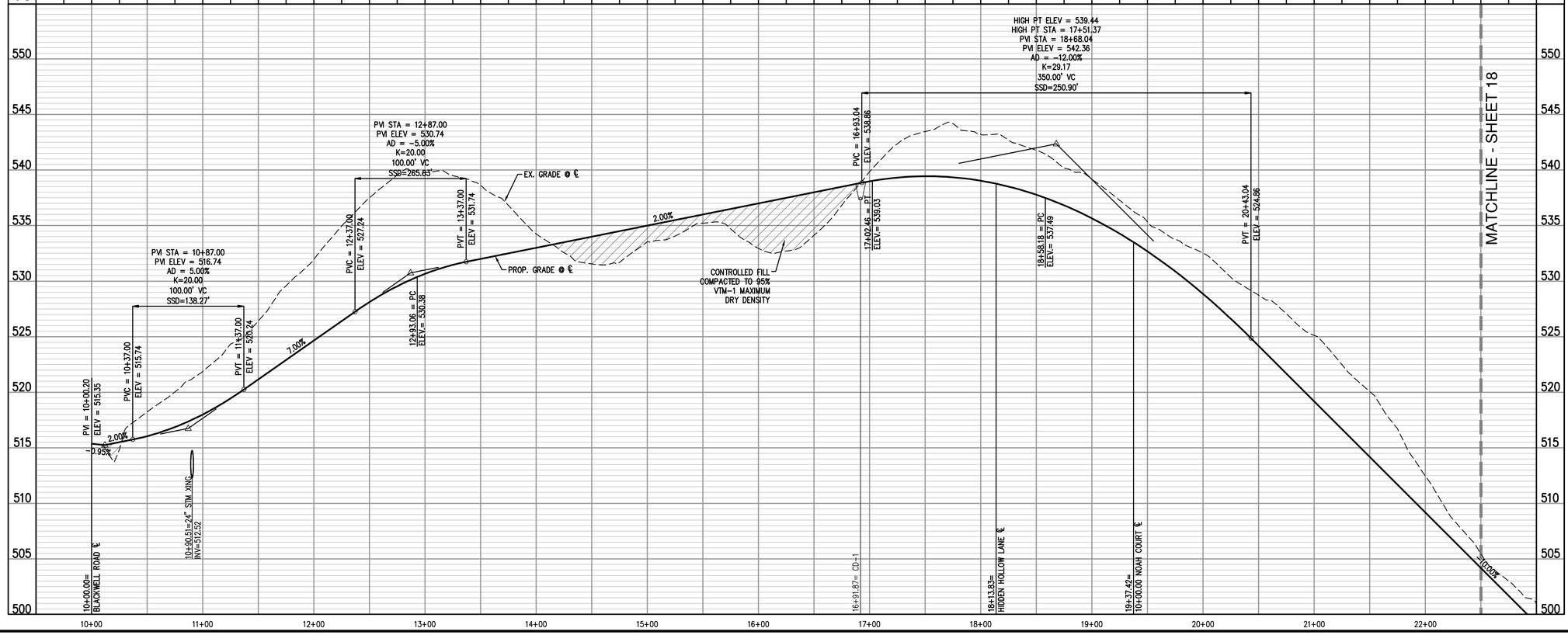
DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 16 OF 58



NICOLAS WAY
50' R.O.W.
DESIGN SPEED = 25 MPH



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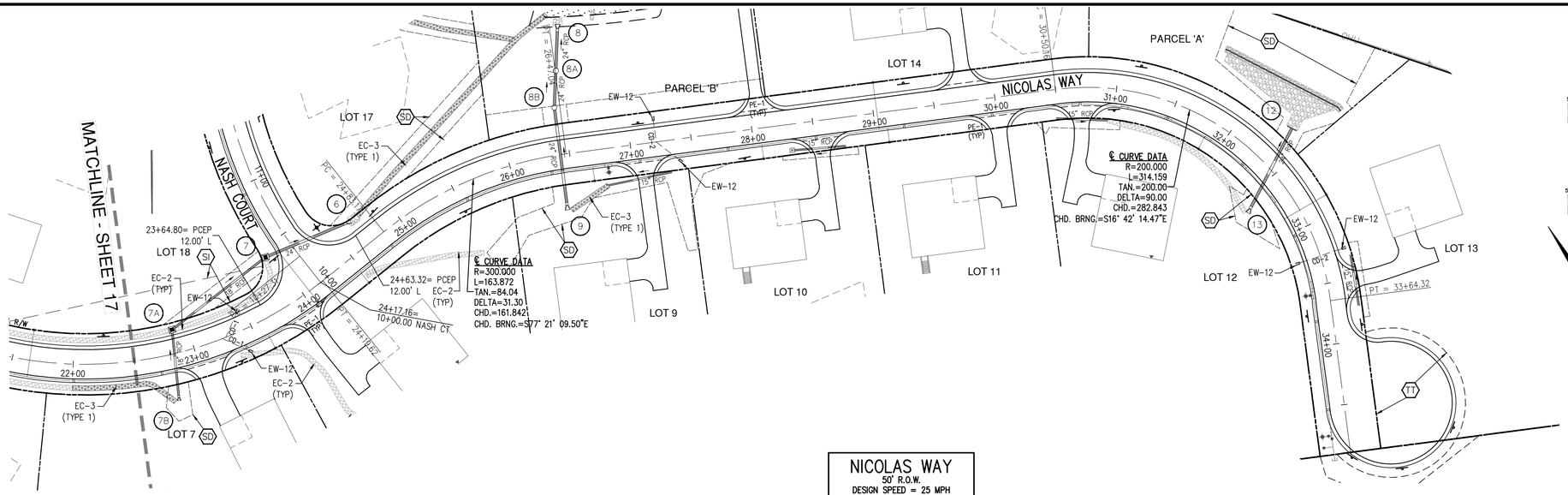


GRAPHIC SCALE

5 0 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.

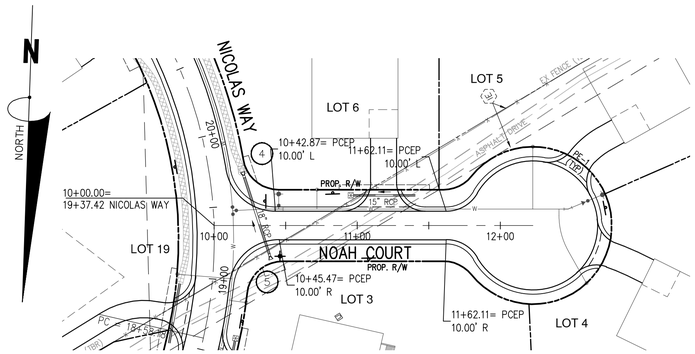
GRAPHIC SCALE

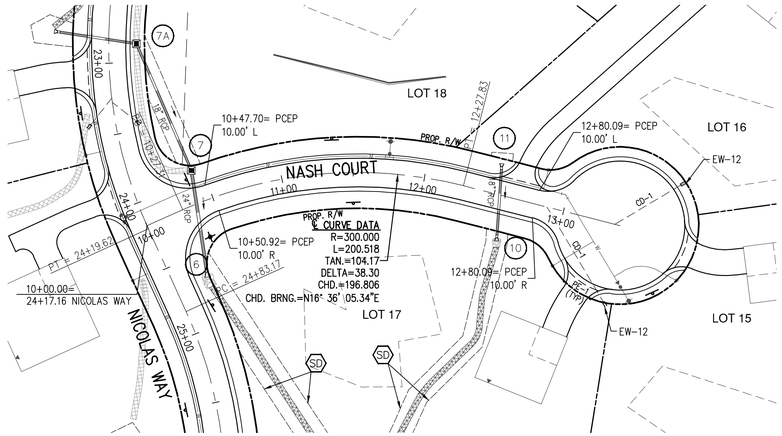
50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

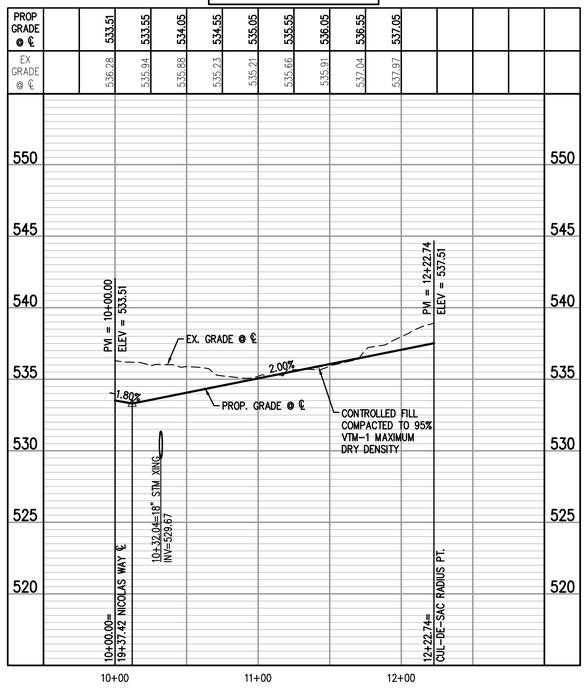
NICOLAS WAY
50' R.O.W.
DESIGN SPEED = 25 MPH

| | | |

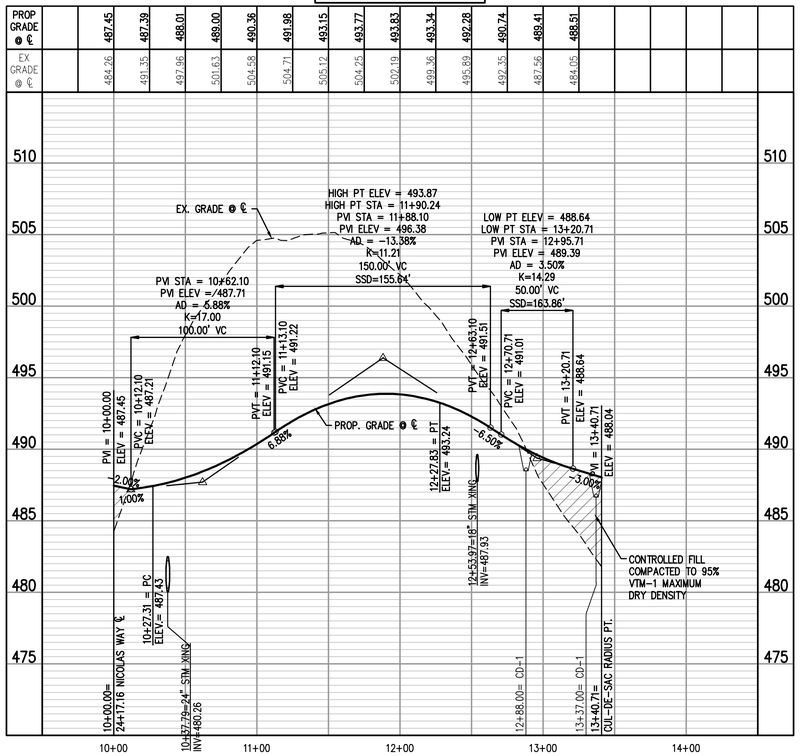




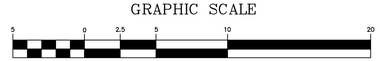
NOAH COURT
50' R.O.W.
DESIGN SPEED = 25 MPH



NASH COURT
50' R.O.W.
DESIGN SPEED = 25 MPH

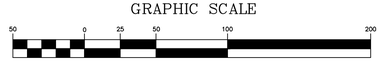


GRAPHIC SCALE



(IN FEET)
1 inch = 5 ft.

GRAPHIC SCALE



(IN FEET)
1 inch = 50 ft.

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NOAH COURT AND NASH COURT PLAN & PROFILE
TIFFANY ESTATES
CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

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11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50'
V: 1"=5'

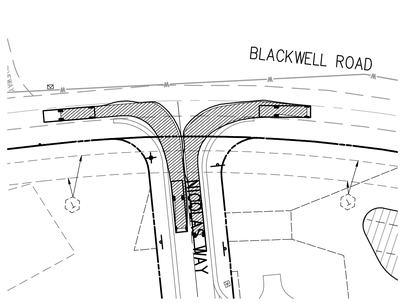
JOB No. 6642-02-002

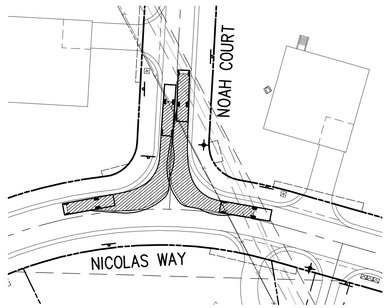
DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

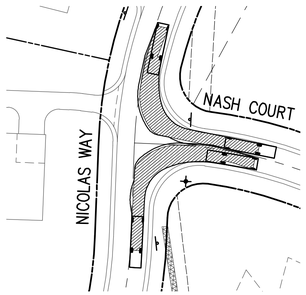
SHEET 19 OF 58

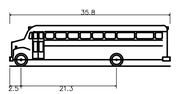
Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\017-019-6642-D-CP-001-RPP.dwg





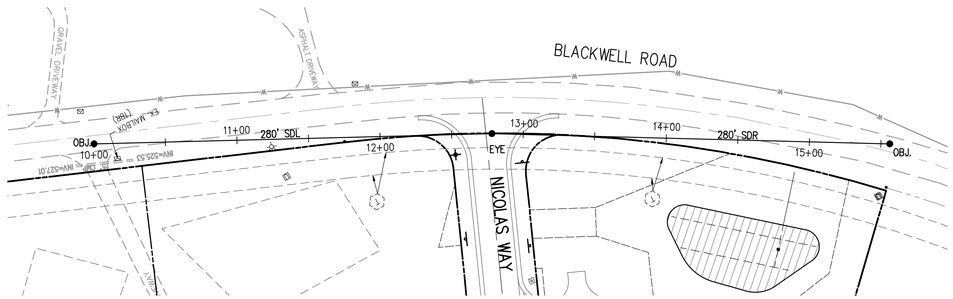
INTERSECTION TURNING MOVEMENT ANALYSIS

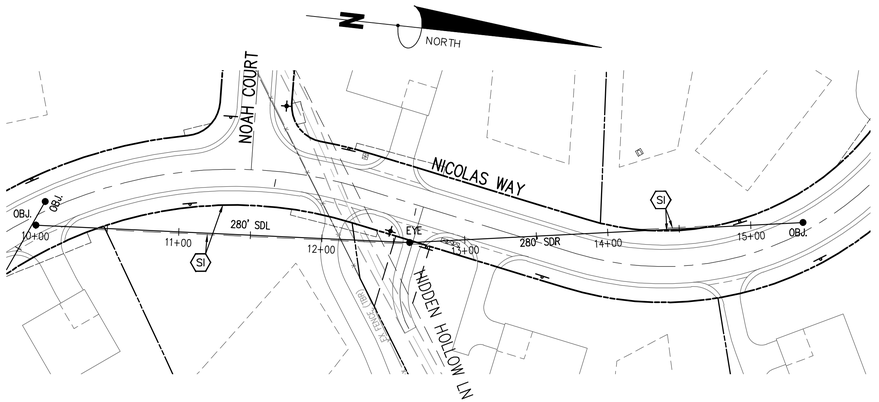


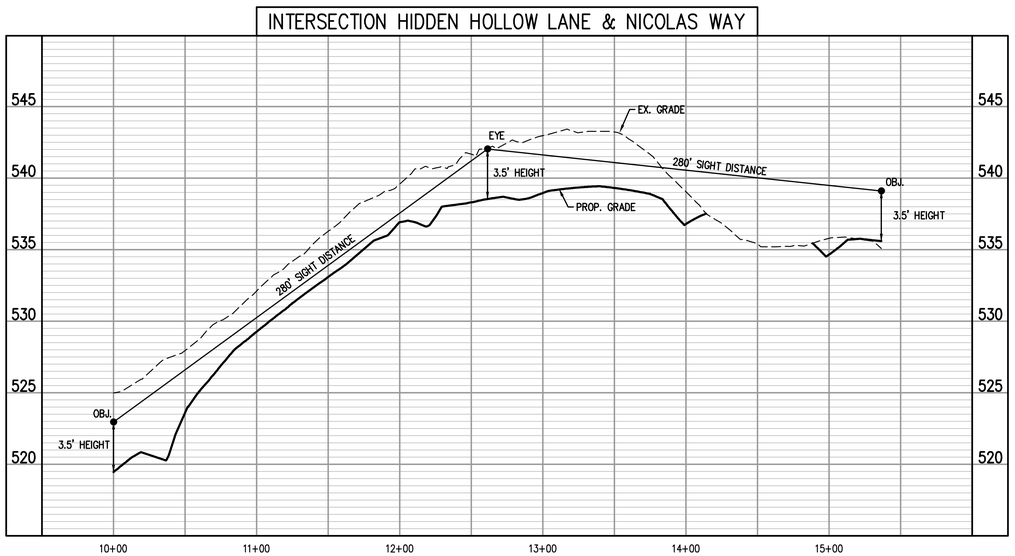


S-BUS-36 - Conventional School Bus (65 pass.)

Overall Length	35.800ft
Overall Width	8.000ft
Overall Body Height	9.063ft
Min Body Ground Clearance	1.184ft
Track Width	8.000ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	37.60°







GRAPHIC SCALE

(IN FEET)
1 inch = 5 ft.

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

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SIGHT DISTANCE PLAN & PROFILES
TIFFANY ESTATES
CONSTRUCTION PLAN
CENTER MAGISTERIAL DISTRICT
FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

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03/14/23	2nd MSR SUBMISSION
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03/15/24	1st SUBMISSION
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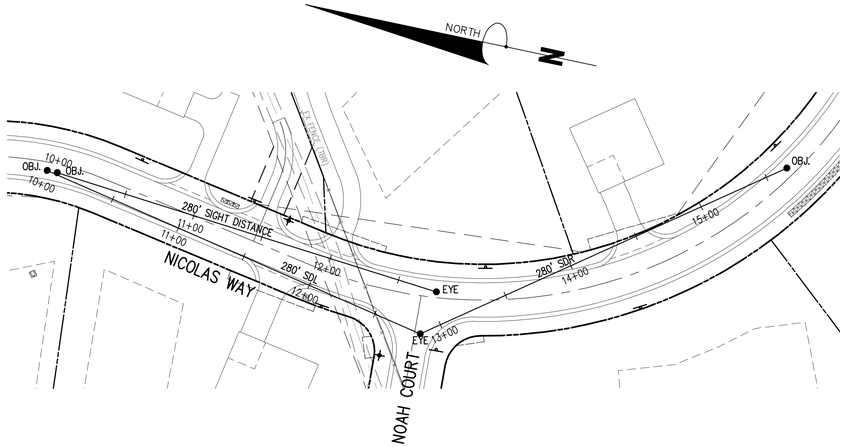
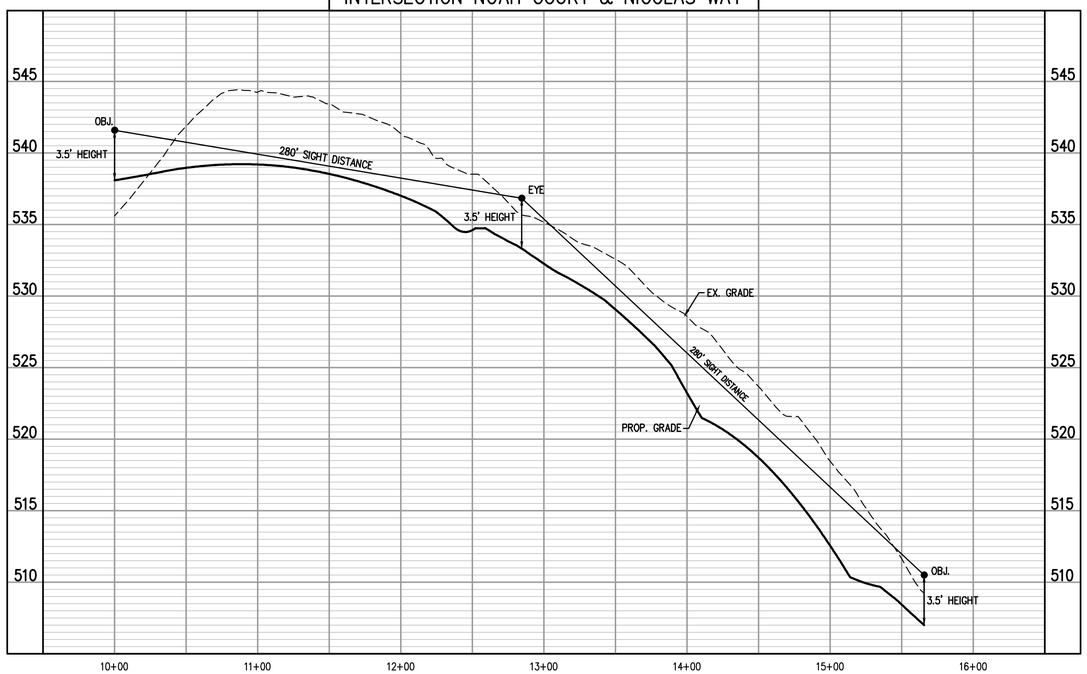
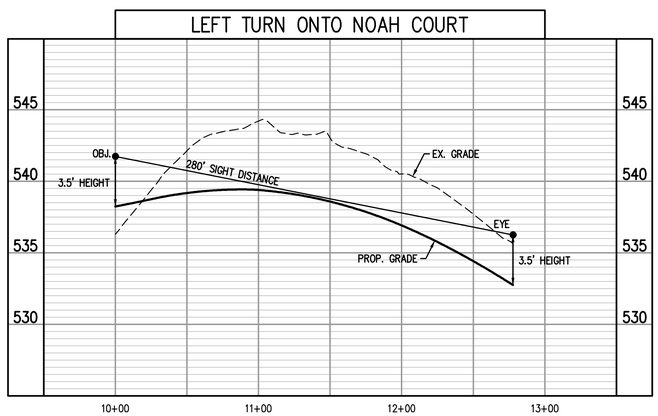
DATE	DESCRIPTION

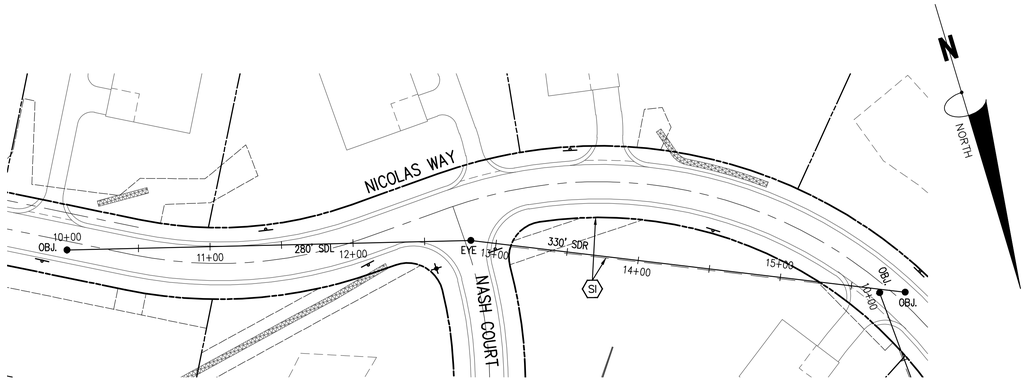
WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=50' V: 1"=5'	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 20 OF 58		

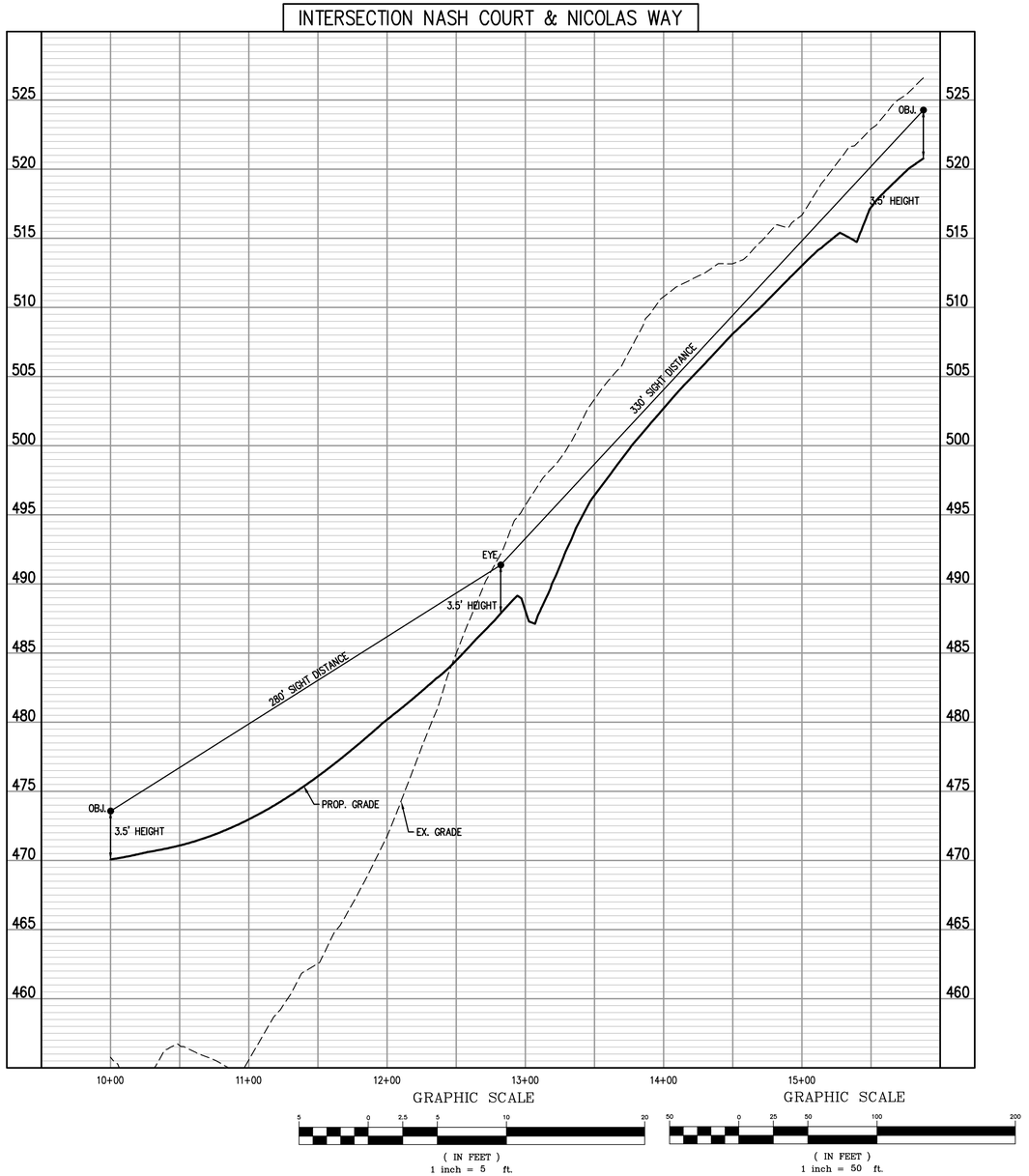
Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\020-021-6642-D-CP-001-STP.dwg











GRAPHIC SCALE

5 0 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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SIGHT DISTANCE PLAN & PROFILES

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
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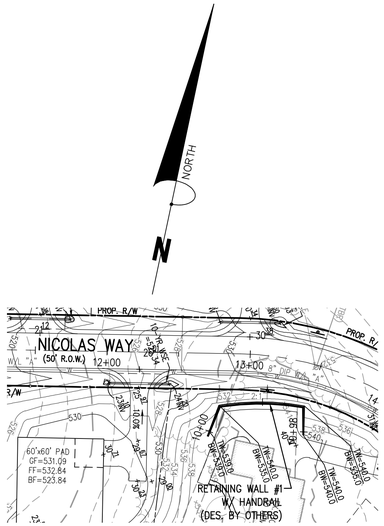
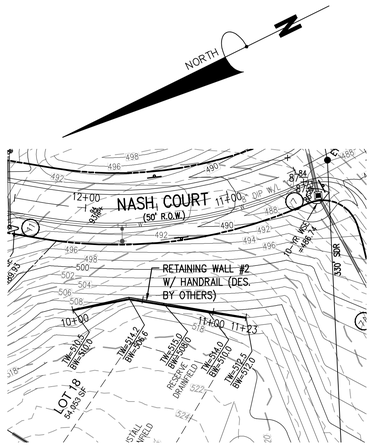
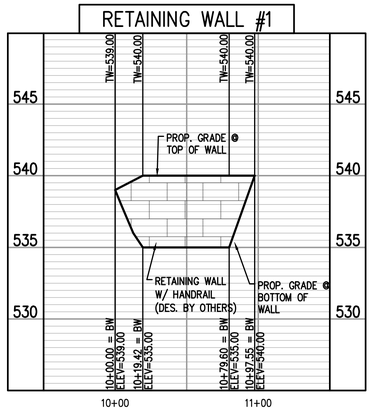
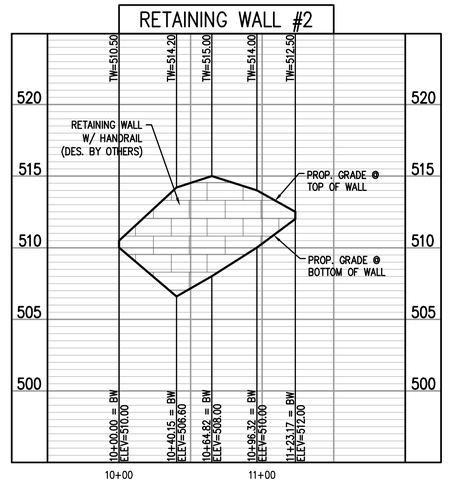
SCALE	H: 1"=50' V: 1"=5'	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 21 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\020-021-6642-D-CP-001-STP.dwg









GRAPHIC SCALE

5 0 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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RETAINING WALL PLAN & PROFILES
TIFFANY ESTATES
CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
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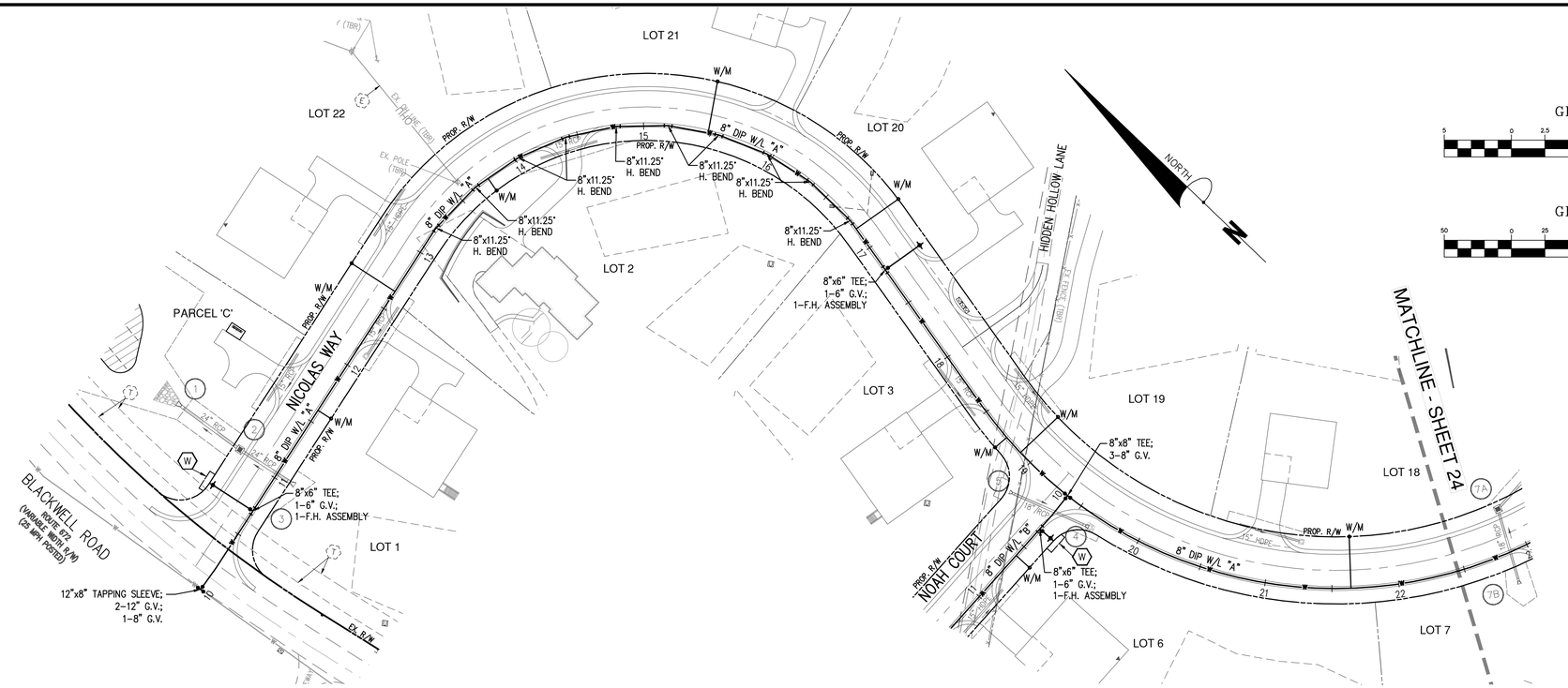
WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=50' V: 1"=5'	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 22 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\022-6642-D-CP-001-RWP.dwg



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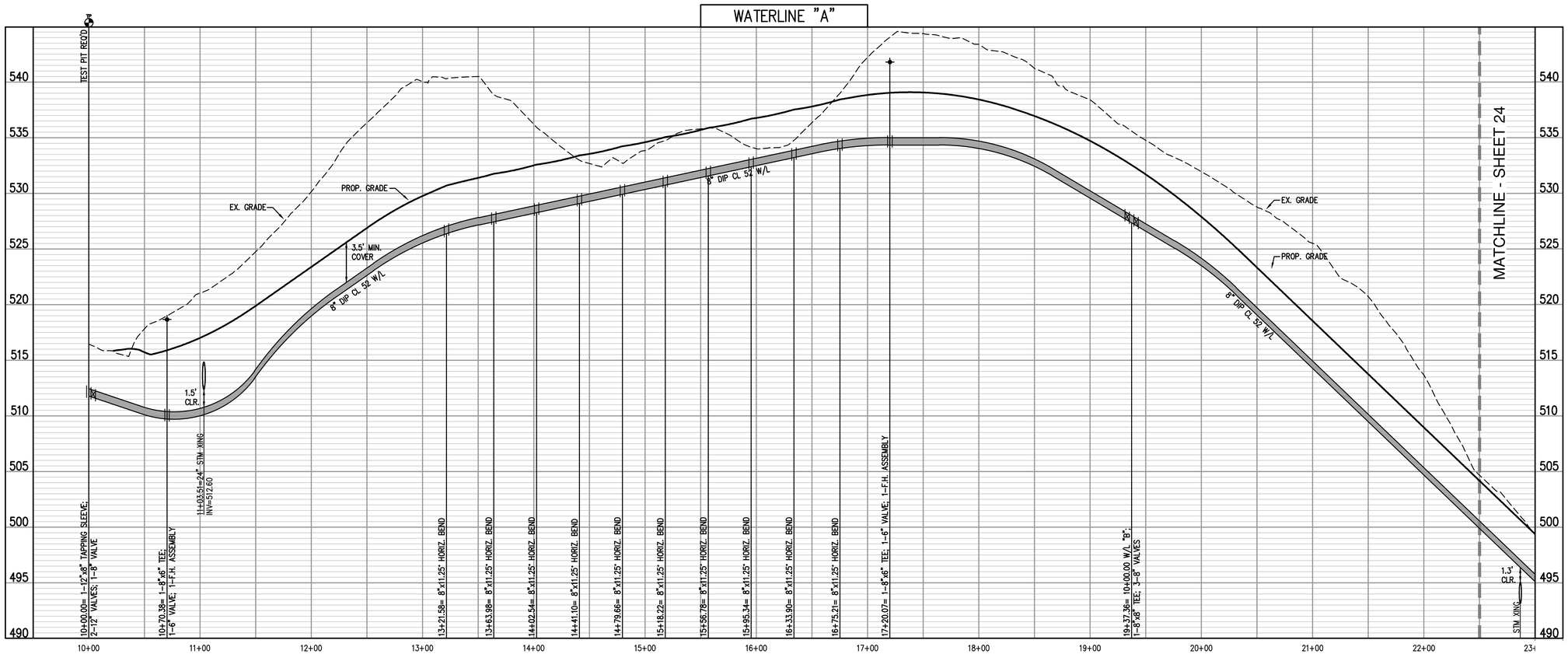

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WATERLINE PLAN & PROFILES
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
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WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50' V: 1"=5'

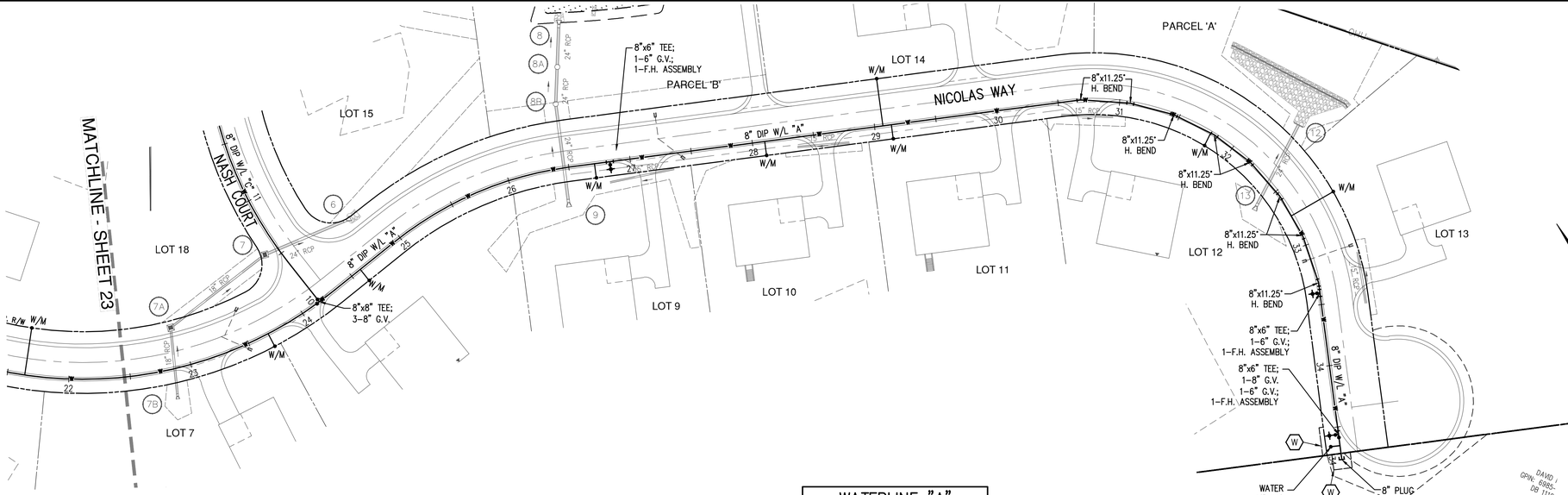
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 23 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\023-025-6642-D-CP-001-WLP.dwg



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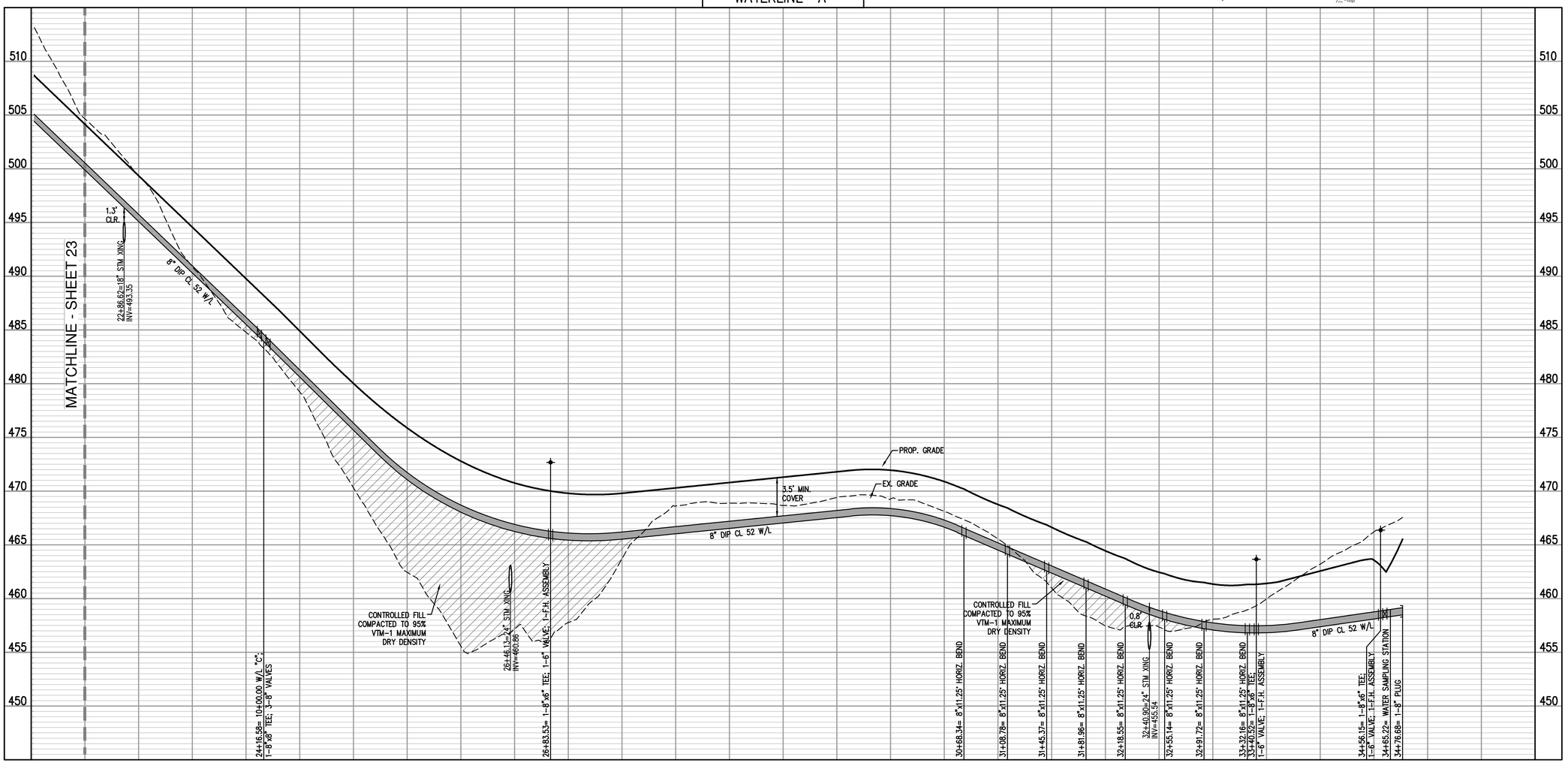

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WATERLINE PLAN & PROFILES

TIFFANY ESTATES

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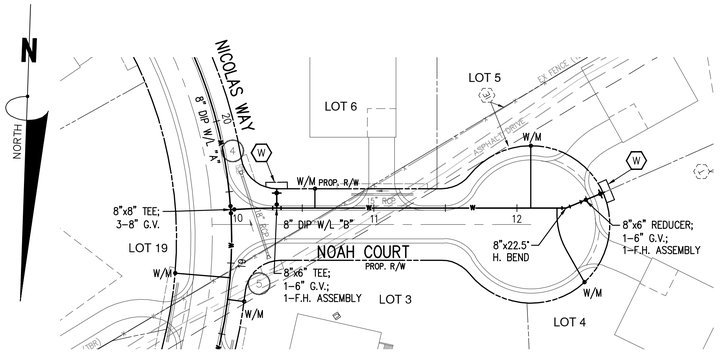
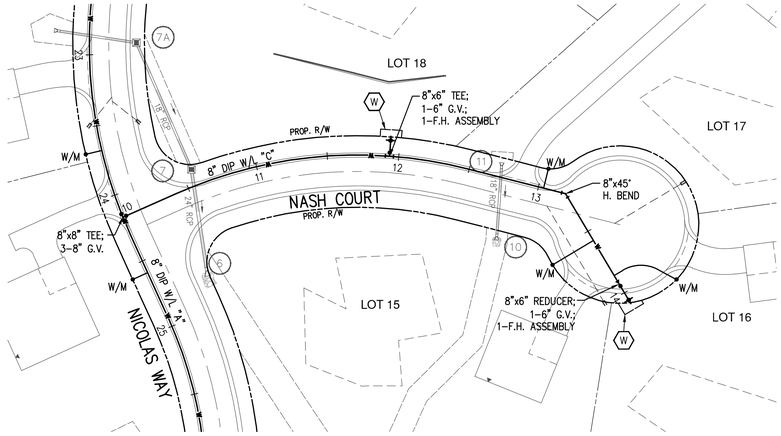
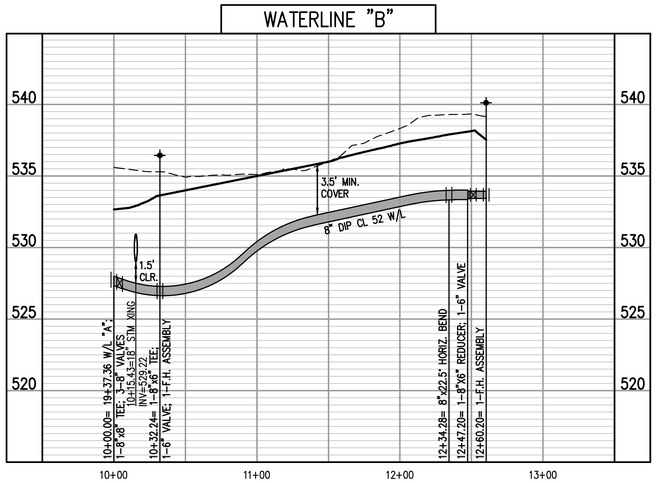
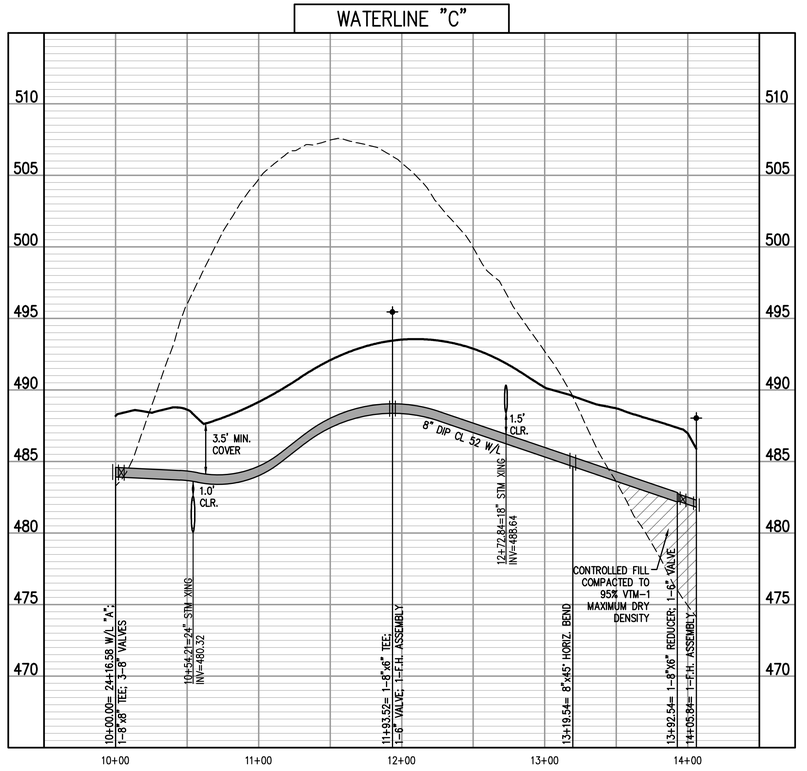
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 24 OF 58		









GRAPHIC SCALE

5 0 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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WATERLINE PLAN & PROFILES

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

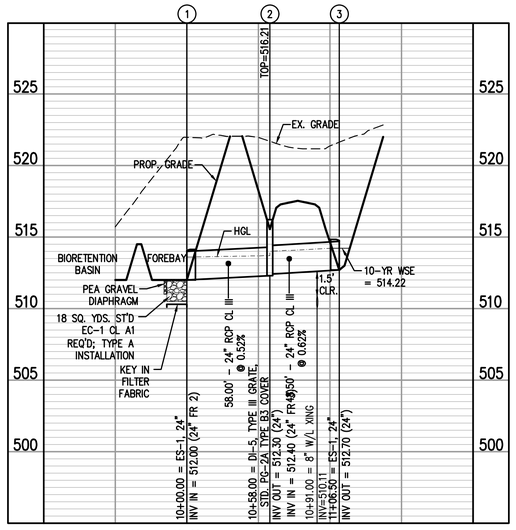
CONP-23-019202
COUNTY PROJECT NUMBER

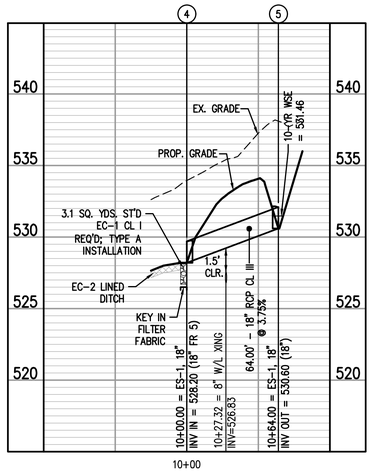
COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

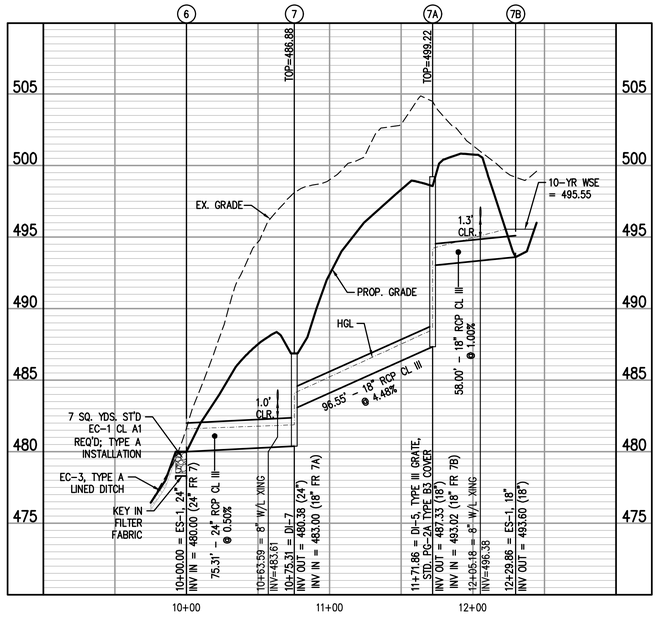
PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION
DATE	DESCRIPTION

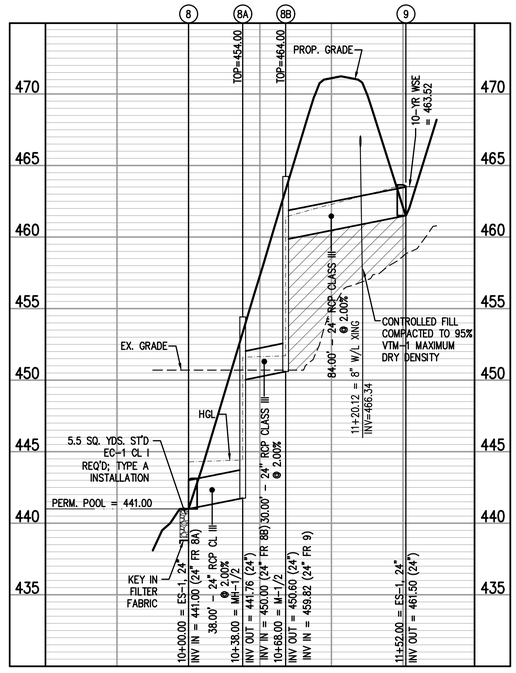
WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=50' V: 1"=5'	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 25 OF 58		

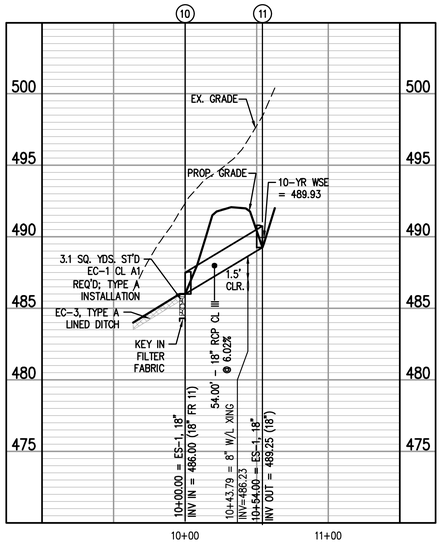
Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\023-025-6642-D-CP-001-WLP.dwg

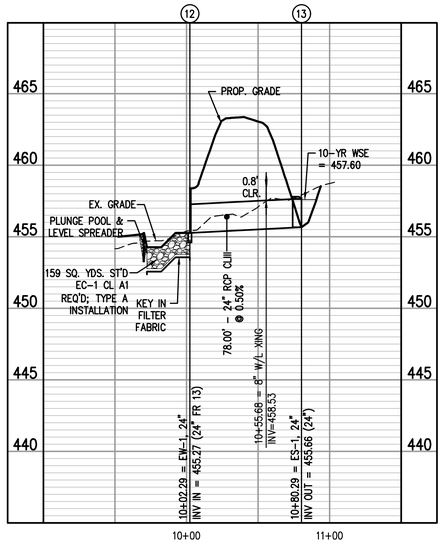


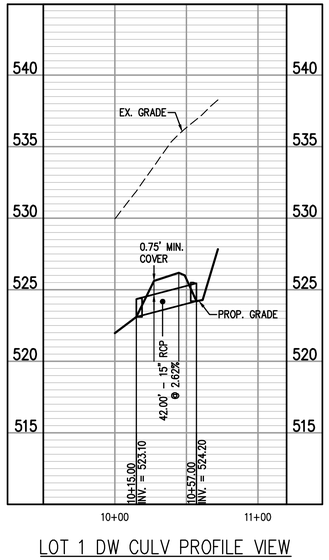




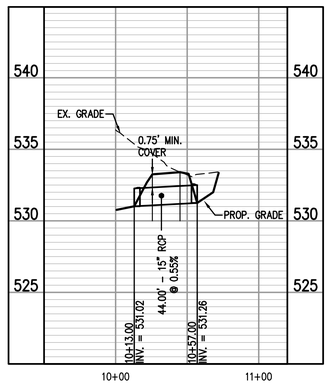




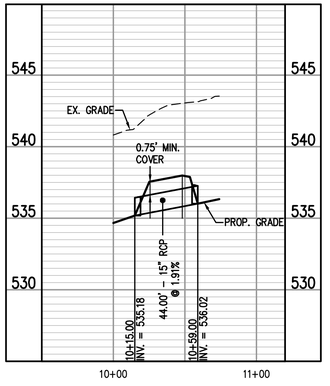




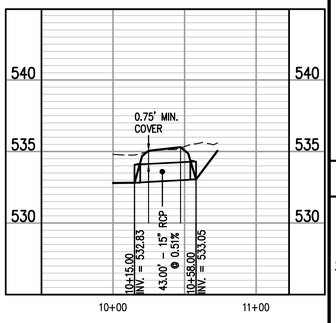
LOT 1 DW CULV PROFILE VIEW



LOT 2 DW CULV PROFILE VIEW



LOT 3 DW CULV PROFILE VIEW



LOT 6 DW CULV PROFILE VIEW

NOTES:

1. ALL STORM STRUCTURES SHALL HAVE IS-1 INVERT SHAPING.
2. SL-1 (SAFETY LANDINGS) SHALL BE REQUIRED IN ALL STRUCTURES WITH A HEIGHT GREATER THAN 12'.
3. ST-1 (STEPS) ARE REQUIRED IN ALL STRUCTURES WITH A HEIGHT GREATER THAN 4'.
4. PIPE BEDDING SHALL BE IN ACCORDANCE WITH VDOT STANDARD PB-1.

GRAPHIC SCALE

5 0 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

Item G.

Bowman

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STORM SEWER PROFILES

TIFFANY ESTATES

CONSTRUCTION PLANS

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
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03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50'
V: 1"=5'

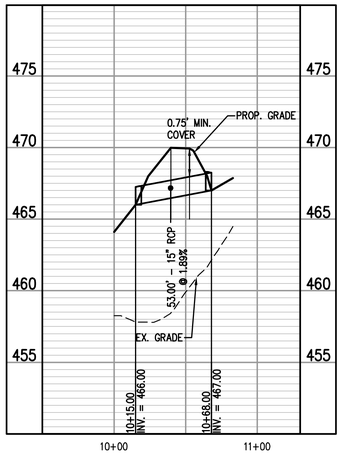
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

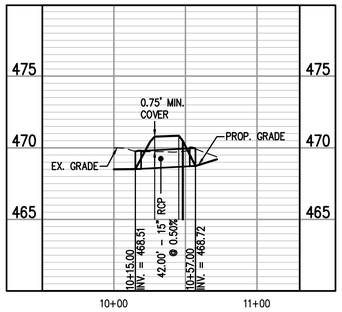
FILE No. 6642-D-CP-001

SHEET 26 OF 58

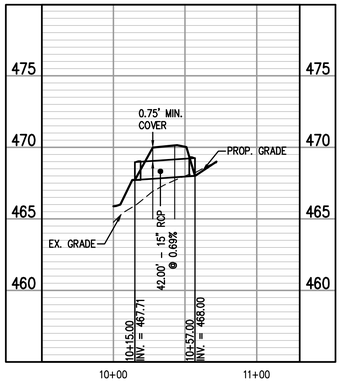
Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\026-26A-6642-D-CP-001-SDP.dwg



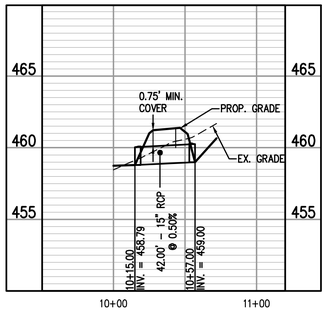
LOT 9 DW CULV PROFILE VIEW



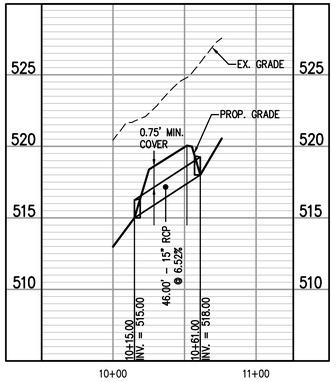
LOT 10 DW CULV PROFILE VIEW



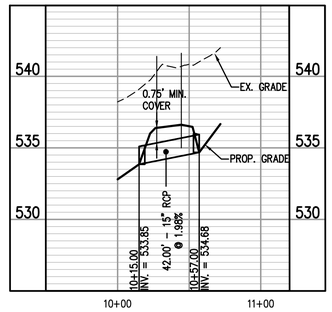
LOT 12 DW CULV PROFILE VIEW



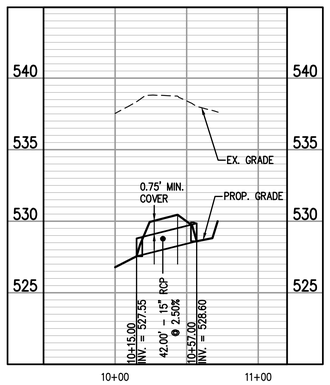
LOT 13 DW CULV PROFILE VIEW



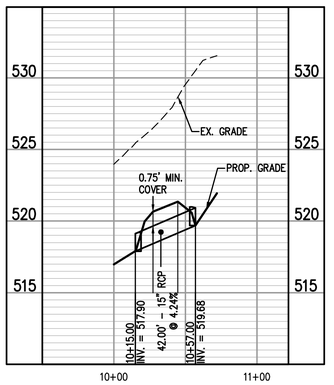
LOT 18 DW CULV PROFILE VIEW



LOT 19 DW CULV PROFILE VIEW



LOT 22 DW CULV PROFILE VIEW



LOT C DW CULV PROFILE VIEW

NOTES:

1. ALL STORM STRUCTURES SHALL HAVE IS-1 INVERT SHAPING.
2. SL-1 (SAFETY LANDINGS) SHALL BE REQUIRED IN ALL STRUCTURES WITH A HEIGHT GREATER THAN 12'.
3. ST-1 (STEPS) ARE REQUIRED IN ALL STRUCTURES WITH A HEIGHT GREATER THAN 4'.
4. PIPE BEDDING SHALL BE IN ACCORDANCE WITH VDOT STANDARD PB-1.

GRAPHIC SCALE

5 0 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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STORM SEWER PROFILES
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
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03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=50' V: 1"=5'	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 26A OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\026-26A-6642-D-CP-001-SDP.dwg

DA LOT 22
DA LOT 2
DA LOT C
DA LOT 1
DA 2
DA 3
DA LOT 3
DA 5
DA LOT 6
DA LOT 19
DA LOT 18
DA 7
DA 7A
DA 7B
DA 11
DA 16
DA 17
DA 18
DA A-A
DA B-B
SURFACE TO BIO 'A'
SURFACE TO POND 'A'
SURFACE TO LEVEL SPREADER
OPEN SPACE PARCEL 'A'
DA LOT 10
DA LOT 12
DA LOT 13
DA 13
DA LOT 9
DA 9
BLACKWELL ROAD
WOODLANDS WAY
US 17 SPUR

LEGEND

- DRAINAGE DIVIDE
- Tc PATH
- A BEGIN OVERLAND FLOW
- B BEGIN SHALLOW CONCENTRATED FLOW
- C BEGIN OPEN CHANNEL FLOW

NORTH

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

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DRAINAGE DIVIDES MAP

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=80' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 27 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\027-6642-D-CP-001-DDM.dwg

DRAINAGE AREA CALCULATIONS

STRUCTURE ID / DRAINAGE AREA	ONSITE DRAINAGE AREA									OFFSITE DRAINAGE AREA									TOTAL DRAINAGE AREA TO STRUCTURE						NOTES
	B SOILS			C SOILS			D SOILS			IMPERVIOUS	A SOILS		B SOILS			C SOILS			D SOILS			CALCULATIONS						
	98	61	55	98	74	70	98	80	77	98	39	30	61	55		70	74		80	77								
	IMPERVIOUS AREA (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	IMPERVIOUS AREA (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	IMPERVIOUS AREA (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	IMPERVIOUS AREA (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	TURF (AC)	WOODS/ PROTECTED OPEN SPACE (AC)	TOTAL DRAINAGE AREA	TOTAL IMPERVIOUS AREA (AC)	TOTAL TURF AREA (AC)	TOTAL WOODS AREA (AC)	CN	RATIONAL C-FACTOR	
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.00	-	-	0.19	0.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.43	0.19	0.24	-	85	0.59	INCL. LOT C&22 D/W
3	0.05	0.26	0.05	0.51	2.87	0.24	-	-	-	0.12	-	-	0.12	-	0.05	-	-	-	-	-	4.28	0.68	3.31	0.29	76	0.43	INCL. LOT 1&2 D/W
LOT C D/W CULVERT	0.00	-	-	0.14	0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.32	0.14	0.18	-	85	0.60	INC. LOT 22 D/W
LOT 1 D/W CULVERT	-	-	-	0.35	1.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.38	0.35	1.03	-	80	0.49	INCL. LOT 2 D/W
LOT 2 D/W CULVERT	-	-	-	0.12	0.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.80	0.12	0.68	-	78	0.44	
LOT 22 D/W CULVERT	-	-	-	0.04	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	0.04	0.07	-	83	0.55	
SURFACE TO BIO 'A'	0.01	0.17	0.05	0.05	0.39	0.04	-	-	-	-	-	-	-	-	-	0.01	-	-	-	-	0.71	0.05	0.56	0.10	71	0.39	
TOTAL TO BIO 'A'	0.0635	0.4338	0.0981	0.7443	3.4982	0.2826	-	-	-	0.1221	-	-	0.1228	-	0.0547	0.0078	-	-	-	-	5.43	0.93	4.11	0.39	76	0.44	
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	0.11	0.26	-	0.23	0.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0707	0.34	0.73	-	78	0.53	INCL. LOT 3 D/W
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	0.03	0.19	-	0.05	0.69	-	0.02	0.02	-	-	-	-	-	-	-	-	-	-	-	-	0.9968	0.10	0.90	-	74	0.41	
7A	0.18	0.45	-	0.06	0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8442	0.24	0.60	-	74	0.51	INCL. LOT 18&19 D/W
7B	0.47	1.42	0.43	0.32	0.76	0.01	0.02	0.19	0.36	-	-	-	0.07	0.02	-	-	0.02	0.02	-	-	4.1079	0.81	2.46	0.84	72	0.45	INCL. 5 & LOT 6 D/W
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9	0.25	1.00	0.04	0.33	1.11	0.64	0.14	0.37	0.08	0.68	-	-	0.58	1.85	0.00	0.04	0.02	0.02	-	-	7.1384	1.39	3.08	2.67	71	0.44	INCL. LOT 9 D/W
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11	-	-	-	0.08	0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7051	0.08	0.63	-	77	0.41	
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
16	0.05	0.36	-	0.11	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5401	0.17	0.37	-	73	0.52	
17	0.03	0.22	-	0.11	0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5689	0.14	0.43	-	75	0.48	
18	-	0.21	0.17	0.18	0.66	-	-	-	-	0.03	-	-	-	0.05	-	0.02	-	-	-	-	1.3161	0.21	0.87	0.24	73	0.43	
LOT 3 D/W CULVERT	-	-	-	0.05	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2003	0.05	0.15	-	80	0.48	
LOT 6 D/W CULVERT	0.09	0.07	-	0.09	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2989	0.18	0.12	-	85	0.68	
LOT 9 D/W CULVERT	0.09	0.43	0.02	0.20	0.60	0.28	-	-	-	-	-	-	-	0.36	-	0.01	-	-	-	-	1.9969	0.29	1.03	0.68	70	0.41	INCL. LOT 10 D/W
LOT 10 D/W CULVERT	-	0.08	-	0.12	0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4178	0.12	0.30	-	78	0.51	
LOT 18 D/W CULVERT	0.05	0.29	-	0.06	0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5635	0.12	0.45	-	72	0.46	INCL. LOT 19 D/W
LOT 19 D/W CULVERT	-	-	-	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0579	0.03	0.03	-	86	0.63	
SURFACE TO POND 'A'	0.15	0.81	-	0.20	1.00	-	0.23	0.45	-	-	-	-	-	-	-	-	-	-	-	-	2.8389	0.58	2.26	-	76	0.46	
TOTAL TO POND 'A'	1.17	4.65	0.63	1.43	5.23	0.65	0.41	1.03	0.44	0.70	-	-	0.65	1.93	0.00	0.06	0.03	0.03	-	-	19.0564	3.71	11.60	3.75	73	0.45	
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13	0.33	1.40	0.47	0.09	0.19	-	-	-	-	-	0.10	0.58	0.77	5.28	-	-	-	-	-	-	9.21	0.42	2.46	6.33	57	0.34	INCL. LOT 12 D/W
LOT 12 D/W CULVERT	0.01	0.02	-	0.03	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	0.05	0.07	-	82	0.57	
LOT 13 D/W CULVERT	0.11	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19	0.11	0.08	-	82	0.66	
SURF. TO LEVEL SPREADER	0.25	0.36	0.03	0.02	0.15	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8522	0.27	0.51	0.07	75	0.52	
TOTAL TO LEVEL SPREADER	0.69	1.84	0.50	0.11	0.34	0.04	-	-	-	-	0.10	0.58	0.77	5.28	-	-	-	-	-	-	10.26	0.80	3.05	6.40	59	0.36	
SECTION A-A (TOTAL)				0.11	0.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.97	0.11	0.86	-	77	0.41	INCL. STR 11
SECTION B-B	0.01	0.00	-	0.02	0.08	0.03	0.12	0.35	0.06	-	-	-	0.13	0.03	-	-	0.01	0.02			0.84	0.14	0.57	0.13	78	0.44	

DITCH COMPUTATIONS

STA TO STA	DRAINAGE AREA (ACRES) INCR.	DRAINAGE AREA (ACRES) ACCUM.	C	C x A INCR.	C x A ACCUM.	Tc (min)	I_2 IN/HR	$Q_{2\text{-year}}$ CFS	I_{10} IN/HR	Q_{10} CFS	SLOPE FT/FT	$V_{q@low}$ FPS	"n"	$V_{2\text{-years}}$ FPS	$d_{2\text{-years}}$ FT	$V_{10\text{-years}}$ FPS	$d_{10\text{-years}}$ FT	LINING
NICOLAS WAY																		
LEFT	*LHS*																	
10+50.00	0.04	0.04	0.60	0.03	0.03	5	5.01	0.13	6.52	0.16	0.0460	3.0	0.03	1.83	0.15	1.96	0.17	GRASS
11+00.00	0.11	0.40	0.59	0.07	0.24	7	4.65	1.11	6.07	1.45	0.0660	4.0	0.05	2.47	0.39	2.64	0.43	EC-2
12+00.00	0.18	0.28	0.63	0.11	0.17	6	4.81	0.82	6.27	1.07	0.0700	4.0	0.05	2.34	0.34	2.50	0.38	EC-2
13+00.00	0.10	0.10	0.55	0.06	0.06	5	5.01	0.28	6.52	0.37	0.0330	3.0	0.03	1.98	0.22	2.12	0.24	GRASS
19+00.00	0.09	0.09	0.69	0.06	0.30	5	5.01	1.49	6.52	1.94	0.0330	3.0	0.03	3.01	0.41	3.21	0.45	GRASS
20+00.00	0.07	0.15	0.61	0.04	0.34	6	4.88	1.65	6.36	2.15	0.0800	4.0	0.05	2.93	0.43	3.13	0.48	EC-2
21+00.00	0.41	0.56	0.39	0.16	0.50	6	4.74	2.36	6.18	3.08	0.1000	4.0	0.05	3.48	0.48	3.72	0.53	EC-2
22+00.00	0.16	0.72	0.69	0.11	0.61	7	4.63	2.81	6.05	3.67	0.1000	4.0	0.05	3.64	0.51	3.89	0.56	EC-2
23+00.00	0.12	0.84	0.48	0.06	0.67	7	4.54	3.02	5.94	3.96	0.1000	4.0	0.05	3.70	0.52	3.96	0.58	EC-2
24+00.00	0.37	0.37	0.39	0.14	0.14	5	5.01	0.73	6.52	0.94	0.1000	4.0	0.05	2.59	0.31	2.77	0.34	EC-2
25+00.00	2.09	6.18	0.33	0.69	2.98	13	3.58	10.66	4.75	14.15	0.1700	7.0	0.05	6.19	0.76	6.65	0.84	EC-3
26+00.00	0.29	6.48	0.41	0.12	3.10	13	3.55	11.01	4.72	14.62	0.1800	7.0	0.05	6.38	0.76	6.85	0.84	EC-3
RIGHT	*RHS*																	
10+50.00	0.09	1.69	0.46	0.04	0.85	12	3.71	3.15	4.91	4.17	0.0460	4.0	0.05	2.80	0.61	3.00	0.68	EC-2
11+00.00	0.18	1.60	0.58	0.11	0.81	12	3.75	3.03	4.96	4.01	0.0660	4.0	0.05	3.17	0.56	3.40	0.63	EC-2
12+00.00	0.43	1.42	0.53	0.23	0.70	11	3.82	2.68	5.04	3.54	0.0700	4.0	0.05	3.14	0.53	3.37	0.59	EC-2
13+00.00	0.11	0.99	0.61	0.07	0.47	10	3.93	1.85	5.19	2.45	0.0330	4.0	0.05	2.16	0.53	2.32	0.59	EC-2
14+00.00	0.47	0.88	0.46	0.22	0.41	10	4.03	1.63	5.31	2.15	0.0200	3.0	0.03	2.55	0.46	2.73	0.51	GRASS
15+00.00	0.16	0.41	0.46	0.07	0.19	7	4.50	0.84	5.89	1.10	0.0200	3.0	0.03	2.16	0.36	2.31	0.40	GRASS
16+00.00	0.20	0.24	0.44	0.09	0.11	6	4.69	0.53	6.13	0.69	0.0200	3.0	0.03	1.92	0.30	2.05	0.33	GRASS
17+00.00	0.05	0.05	0.54	0.03	0.03	5	5.01	0.13	6.52	0.17	0.0150	3.0	0.03	1.21	0.19	1.30	0.21	GRASS
18+00.00	0.06	0.06	0.50	0.03	0.03	5	5.01	0.14	6.52	0.18	0.0150	3.0	0.03	1.24	0.20	1.33	0.22	GRASS
19+00.00	0.24	0.30	0.53	0.13	0.15	6	4.69	0.73	6.13	0.95	0.0330	3.0	0.03	2.51	0.31	2.68	0.34	GRASS
20+00.00	0.08	1.60	0.64	0.05	0.91	12	3.77	3.45	4.99	4.56	0.0800	4.0	0.05	3.52	0.57	3.78	0.63	EC-2
21+00.00	0.16	1.76	0.47	0.08	0.99	12	3.71	3.67	4.91	4.86	0.1000	4.0	0.05	3.89	0.56	4.17	0.62	EC-2
22+00.00	0.24	2.00	0.43	0.10	1.09	12	3.65	3.99	4.84	5.29	0.1000	4.0	0.05	3.97	0.58	4.26	0.64	EC-2
23+00.00	0.11	2.11	0.49	0.06	1.15	13	3.60	4.14	4.78	5.49	0.1000	7.0	0.05	4.01	0.59	4.30	0.65	EC-3
24+00.00	0.11	0.11	0.62	0.07	0.07	5	5.01	0.33	6.52	0.44	0.1800	4.0	0.05	2.66	0.20	2.85	0.23	EC-2
25+00.00	0.14	0.14	0.58	0.08	0.08	5	5.01	0.42	6.52	0.54	0.2200	4.0	0.05	3.03	0.21	3.24	0.24	EC-2
26+00.00	0.24	0.39	0.47	0.11	0.20	6	4.88	0.95	6.36	1.24	0.1800	4.0	0.05	3.46	0.30	3.70	0.33	EC-2
26+50.00	1.54	2.14	0.36	0.56	0.88	13	3.61	3.18	4.80	4.22	0.1300	7.0	0.05	4.14	0.51	4.44	0.56	EC-3
27+50.00	0.07	0.60	0.59	0.04	0.32	6	4.69	1.52	6.13	1.98	0.0150	3.0	0.03	2.25	0.47	2.40	0.52	GRASS
28+00.00	0.34	0.53	0.49	0.17	0.28	6	4.78	1.34	6.24	1.74	0.0150	3.0	0.03	2.17	0.45	2.32	0.50	GRASS
29+00.00	0.18	0.18	0.62	0.11	0.11	5	5.01	0.66	6.52	0.73	0.0150	3.0	0.03	1.75	0.33	1.87	0.36	GRASS
31+00.00	0.14	0.14	0.59	0.08	0.08	5	5.01	0.42	6.52	0.55	0.1450	4.0	0.05	2.60	0.23	2.78	0.26	EC-2
32+00.00	0.18	0.32	0.60	0.11	0.19	6	4.86	0.93	6.33	1.21	0.0700	4.0	0.05	2.41	0.36	2.58	0.40	EC-2
32+50.00	0.06	0.38	0.52	0.03	0.22	6	4.78	1.05	6.24	1.38	0.0900	4.0	0.05	2.74	0.36	2.92	0.40	EC-2
34+00.00	0.69	0.69	0.36	0.25	0.25	5	5.01	1.25	6.52	1.63	0.0300	3.0	0.03	2.77	0.39	2.96	0.43	GRASS
NOAH COURT																		
LEFT	*LHS*																	
10+00.00	0.11	0.45	0.63	0.07	0.30	7	4.65	1.41	6.07	1.84	0.0200	3.0	0.03	2.45	0.44	2.62	0.48	GRASS
11+00.00	0.19	0.34	0.71	0.13	0.23	6	4.81	1.12	6.27	1.47	0.0200	3.0	0.03	2.32	0.40	2.48	0.44	GRASS
12+00.00	0.15	0.15	0.65	0.10	0.10	5	5.01	0.51	6.52	0.66	0.0200	3.0	0.03	1.90	0.30	2.03	0.33	GRASS
RIGHT	*RHS*																	
10+00.00	0.13	0.78	0.53	0.07	0.41	7	4.65	1.90	6.07	2.48	0.0200	3.0	0.03	2.64	0.49	2.83	0.54	GRASS
11+00.00	0.47	0.65	0.50	0.24	0.34	6	4.81	1.64	6.27	2.13	0.0200	3.0	0.03	2.55	0.46	2.72	0.51	GRASS
12+00.00	0.18	0.18	0.59	0.10	0.10	5	5.01	0.52	6.52	0.68	0.0200	3.0	0.03	1.91	0.30	2.05	0.33	GRASS
NASH COURT																		
LEFT	*LHS*																	
10+00.00	0.21	0.63	0.40	0.09	0.24	11	3.92	0.96	5.17	1.26	0.0400	3.0	0.03	2.89	0.33	3.10	0.37	GRASS
11+00.00	0.41	0.41	0.38	0.16	0.16	10	4.00	0.63	5.27	0.83	0.0580	3.0	0.03	2.99	0.26	3.21	0.29	GRASS
13+00.00	0.15	0.15	0.42	0.06	0.06	5	5.01	0.31	6.52	0.40	0.0450	3.0	0.03	2.27	0.21	2.43	0.23	GRASS
RIGHT	*RHS*																	
10+00.00	0.07	0.14	0.65	0.05	0.08	6	4.83	0.41	6.30	0.54	0.0400	3.0	0.03	2.34	0.24	2.50	0.27	GRASS
11+00.00	0.07	0.07	0.53	0.04	0.04	5	5.01	0.18	6.52	0.24	0.0580	3.0	0.03	2.19	0.17	2.34	0.18	GRASS
13+00.00	0.06	0.06	0.53	0.03	0.03	5	5.01	0.16	6.52	0.21	0.0450	3.0	0.03	1.94	0.17	2.07	0.18	GRASS
CROSS SECTIONS																		
SECTION A-A	0.97	0.97	0.41	0.40	0.40	9	4.16	1.66	5.47	2.19	0.2000	7.0	0.05	4.14	0.37	4.43	0.41	EC-3
SECTION B-B	0.84	0.84	0.43	0.36	0.36	5	5.01	1.79	6.52	2.33	0.0500	4.0	0.05	2.51	0.49	2.68	0.54	EC-2

CULVERT/STORM DRAIN Tc PATH CALCULATIONS

STRUCTURE	SHEET FLOW (A-B) LENGTH (L_{sh}) (FT)	SHEET FLOW (A-B) SLOPE (S_{sh}) (FT/FT)	SHEET FLOW (A-B) MANNING'S n (n_{ol})	T_{sh} (MIN)	SHALLOW CONCENTRATED FLOW (B-C) LENGTH (FT)	AVG. SLOPE (FT/FT)	PAVED	Tt (MIN)	CHANNEL FLOW (C-D) LENGTH (FT)	AVG. SLOPE (FT/FT)	n	AREA (FT^2)	WETTED PERIM. (FT)	Tt (MIN)	TOTAL Tc (MIN)	COMMENTS
3	100	0.025	0.24	**13.18**	375	0.078	NO	**1.39**	-	-	-	-	-	**-**	**14.6**	
5	100	0.040	0.24	**10.92**	20	0.120	NO	**0.06**	120.00	0.022	0.030	3.00	6.30	**0.42**	**11.397**	
7	100	0.070	0.24	**8.73**	200	0.205	NO	**0.46**	120.00	0.050	0.030	3.00	6.30	**0.30**	**9.5**	
7B	100	0.070	0.24	**8.73**	480	0.076	NO	**1.80**	-	-	-	-	-	**-**	**10.5**	
9	100	0.050	0.40	**15.03**	539	0.130	NO	**1.54**	-	-	-	-	-	**-**	**16.6**	
11	100	0.085	0.24	**8.08**	175	0.165	NO	**0.45**	105.00	0.120	0.030	3.00	6.30	**0.18**	**8.7**	
13	100	0.045	0.40	**15.67**	870	0.082	NO	**3.14**	-	-	-	-	-	**-**	**18.8**	
LOT 1 D/W CULVERT	100	0.055	0.24	**9.61**	40	0.075	NO	**0.15**	230.00	0.038	0.030	3.00	6.30	**0.66**	**10.4**	
LOT 2 D/W CULVERT	100	0.055	0.24	**9.61**	40	0.075	NO	**0.15**	28.00	0.020	0.030	3.00	6.30	**0.06**	**9.8**	
LOT 9 D/W CULVERT	100	0.100	0.40	**11.39**	356	0.087	NO	**1.25**	111.00	0.020	0.030	3.00	6.30	**0.06**	**12.7**	

Tc= 5 MIN IF NOT LISTED HERE Sheet Flow - (NRCS Method)

STORM SEWER COMPUTATIONS FOR A 10-YR STORM EVENT

Structure From	Structure To	Drainage Area (acre) Incr.	Drainage Area (acre) Accum.	Runoff Coef.	CA Incr.	CA Accum.	Tc (min.)	I (10) (in/hr)	QiVi	Q (10) (cfs)	Slope (%) (min)	Slope (%) (actual)	From Invert Out	To Invert In	From Top	To Top	Structure Depth (ft) From	Minimum Depth (ft) From	n	Diameter (in)	Velocity Full Flow FPS	Velocity Prop. Q (fps)	Length (ft)	Flow Time (min.)	Capacity (cfs)	q/Q (%)	HGL Angle at TO Structure (Degrees)	Remarks
18	17	1.32	1.32	0.43	0.57	0.57	11.40	5.03	11.12	**2.84**	0.19	0.50	458.50	457.68	461.50	467.00	3.00	3.92	0.013	15	3.72	3.91	164.000	0.70	**4.57**	**62.28%**	**23**	
17	16	0.57	1.89	0.48	0.27	0.84	12.10	4.91	48.28	**4.12**	0.41	7.64	457.58	452.00	467.00	455.50	9.42	3.92	0.013	15	14.55	11.72	73.020	0.10	**17.86**	**23.06%**	**17**	
16	15	0.54	2.43	0.52	0.28	1.12	12.20	4.88	58.59	**5.46**	0.71	4.84	451.90	447.00	455.50	451.00	3.60	3.92	0.013	15	11.58	10.73	101.310	0.16	**14.21**	**38.43%**	**32**	
15	14	0.00	2.43	0.00	0.00	1.12	12.36	4.86	61.60	**5.44**	0.71	5.67	446.90	441.40	451.00	-	4.10	3.92	0.013	15	12.53	11.32	97.000	0.14	**15.38**	**35.38%**	**0**	
9	8B	7.14	7.14	0.44	3.14	3.14	16.57	4.28	130.64	**13.43**	0.35	2.00	461.50	459.82	463.50	464.00	2.00	4.67	0.013	24	10.18	9.73	84.000	0.14	**31.99**	**41.99%**	**10**	
8B	8A	0.00	7.14	0.00	0.00	3.14	16.71	4.25	129.76	**13.36**	0.35	2.00	460.60	450.00	464.00	454.00	13.40	4.67	0.013	24	10.18	9.71	30.000	0.05	**31.99**	**41.75%**	**0**	
8A	8	0.00	7.14	0.00	0.00	3.14	16.77	4.25	129.76	**13.36**	0.35	2.00	441.76	441.00	454.00	-	12.24	4.67	0.013	24	10.18	9.71	38.000	0.07	**31.99**	**41.75%**	**0**	
7B	7A	4.11	4.11	0.45	1.85	1.85	10.53	5.17	64.13	**9.56**	0.83	1.00	493.60	493.02	495.10	499.22	1.50	4.17	0.013	18	5.94	6.71	58.000	0.14	**10.50**	**91.01%**	**58**	
7A	7	0.84	4.95	0.51	0.43	2.28	10.67	5.15	149.10	**11.74**	1.25	4.48	487.33	483.00	499.22	486.50	11.89	4.17	0.013	18	12.59	12.70	96.550	0.13	**22.25**	**52.79%**	**15**	
7	6	1.00	5.95	0.41	0.41	2.69	10.80	5.13	79.05	**13.80**	0.37	0.50	480.38	480.00	486.50	-	6.12	4.67	0.013	24	5.12	5.73	75.310	0.22	**16.07**	**85.88%**	**0**	
3	2	4.28	4.28	0.43	1.84	1.84	14.56	4.53	46.16	**8.35**	0.14	0.62	512.70	512.40	514.70	516.21	2.00	4.67	0.013	24	5.66	5.53	48.500	0.15	**17.79**	**46.92%**	**4**	
2	1	0.43	4.71	0.59	0.25	2.10	14.71	4.51	50.46	**9.44**	0.17	0.52	512.30	512.00	516.21	-	3.91	4.67	0.013	24	5.18	5.34	58.000	0.18	**16.27**	**58.03%**	**0**	

APPENDIX 9B-3 LD-347 HYDRAULCIC GRADE LINE COMPUTATIONS
LD-347 REV. 7/00
HYDRAULIC GRADE LINE

STORM FREQUENCY = 10-YR STROM

INLET NUMBER	Outlet Water Surface Elev. (ft)	Do Diameter Outlet (in)	Qo Flow Outlet Pipe (cfs)	Lo Length of Pipe (ft)	Sfo Friction Slope (ft/ft)	Hf Friction Head Loss (ft)	HGL at Invert Out of Structure (ft)	Vo Velocity in Outlet Pipe (fps)	Ho Exit Loss (ft)	Qi Flow Intlet Pipe (cfs)	Vi Velocity in Inlet Pipe (fps)	QiVi	Hi Entrance Headloss (ft)	Angle (Degrees)	H(delta) Headloss at a Bend (ft)	Ht total Junction Losses (ft)	1.3 Ht (ft)	Inlet Shaping (IS-1)	0.5 Ht (ft)	Final H (ft)	Inlet Water Surface Elev. (ft)	Rim Elevation (ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)		
2	**513.60**	24	9.44	58.00	0.0017	**0.10**	**513.70**	5.34	**0.11**	8.35	5.53	46.16	**0.17**	4	**0.02**	**0.30**	-	YES	**0.15**	**0.25**	**513.85**	**516.21**
3	**514.00**	24	8.35	48.50	0.0014	**0.07**	**514.07**	5.53	**0.12**	-	-	-	-	-	-	**0.12**	**0.15**	YES	**0.08**	**0.14**	**514.14**	**514.70**
7	**481.60**	24	13.80	75.31

Culvert Calculator Report
CULVERT 2-3 - 2YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.65
Computed Headwater Elevation	513.99 ft	Discharge	6.26 cfs
Inlet Control HW Elev.	513.93 ft	Tailwater Elevation	513.22 ft
Outlet Control HW Elev.	513.99 ft	Control Type	Entrance Control

Grades			
Upstream Invert	512.70 ft	Downstream Invert	512.40 ft
Length	58.00 ft	Constructed Slope	0.005172 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.86 ft
Slope Type	Steep	Normal Depth	0.86 ft
Flow Regime	Supercritical	Critical Depth	0.89 ft
Velocity Downstream	4.84 ft/s	Critical Slope	0.004677 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	513.99 ft	Upstream Velocity Head	0.34 ft
Ke	0.20	Entrance Loss	0.07 ft

Inlet Control Properties			
Inlet Control HW Elev.	513.93 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	3.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 4-5 - 2YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.53
Computed Headwater Elevation	531.40 ft	Discharge	2.16 cfs
Inlet Control HW Elev.	531.33 ft	Tailwater Elevation	528.52 ft
Outlet Control HW Elev.	531.40 ft	Control Type	Entrance Control

Grades			
Upstream Invert	530.60 ft	Downstream Invert	528.20 ft
Length	64.00 ft	Constructed Slope	0.037500 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.33 ft
Slope Type	Steep	Normal Depth	0.33 ft
Flow Regime	Supercritical	Critical Depth	0.56 ft
Velocity Downstream	7.49 ft/s	Critical Slope	0.004966 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	531.40 ft	Upstream Velocity Head	0.21 ft
Ke	0.20	Entrance Loss	0.04 ft

Inlet Control Properties			
Inlet Control HW Elev.	531.33 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	1.8 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 7A-7B - 2YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	1.08
Computed Headwater Elevation	495.21 ft	Discharge	7.25 cfs
Inlet Control HW Elev.	495.17 ft	Tailwater Elevation	493.90 ft
Outlet Control HW Elev.	495.21 ft	Control Type	Entrance Control

Grades			
Upstream Invert	493.60 ft	Downstream Invert	493.02 ft
Length	58.00 ft	Constructed Slope	0.010000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.92 ft
Slope Type	Steep	Normal Depth	0.92 ft
Flow Regime	Supercritical	Critical Depth	1.04 ft
Velocity Downstream	6.41 ft/s	Critical Slope	0.006918 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	495.21 ft	Upstream Velocity Head	0.47 ft
Ke	0.20	Entrance Loss	0.09 ft

Inlet Control Properties			
Inlet Control HW Elev.	495.17 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	1.8 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 8B-9 - 2YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.84
Computed Headwater Elevation	463.19 ft	Discharge	10.03 cfs
Inlet Control HW Elev.	463.10 ft	Tailwater Elevation	460.57 ft
Outlet Control HW Elev.	463.19 ft	Control Type	Entrance Control

Grades			
Upstream Invert	461.50 ft	Downstream Invert	459.82 ft
Length	84.00 ft	Constructed Slope	0.020000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.77 ft
Slope Type	Steep	Normal Depth	0.77 ft
Flow Regime	Supercritical	Critical Depth	1.13 ft
Velocity Downstream	8.92 ft/s	Critical Slope	0.005208 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	463.19 ft	Upstream Velocity Head	0.46 ft
Ke	0.20	Entrance Loss	0.09 ft

Inlet Control Properties			
Inlet Control HW Elev.	463.10 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	3.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 10-11 - 2YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.39
Computed Headwater Elevation	489.84 ft	Discharge	1.22 cfs
Inlet Control HW Elev.	489.77 ft	Tailwater Elevation	486.21 ft
Outlet Control HW Elev.	489.84 ft	Control Type	Entrance Control

Grades			
Upstream Invert	489.25 ft	Downstream Invert	486.00 ft
Length	54.00 ft	Constructed Slope	0.060185 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.22 ft
Slope Type	Steep	Normal Depth	0.22 ft
Flow Regime	Supercritical	Critical Depth	0.41 ft
Velocity Downstream	7.48 ft/s	Critical Slope	0.004912 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	489.84 ft	Upstream Velocity Head	0.15 ft
Ke	0.20	Entrance Loss	0.03 ft

Inlet Control Properties			
Inlet Control HW Elev.	489.77 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	1.8 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 12-13 - 2YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.81
Computed Headwater Elevation	457.28 ft	Discharge	9.35 cfs
Inlet Control HW Elev.	457.21 ft	Tailwater Elevation	456.32 ft
Outlet Control HW Elev.	457.28 ft	Control Type	Outlet Control

Grades			
Upstream Invert	455.66 ft	Downstream Invert	455.27 ft
Length	78.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	1.09 ft
Slope Type	Mild	Normal Depth	1.10 ft
Flow Regime	Subcritical	Critical Depth	1.09 ft
Velocity Downstream	5.33 ft/s	Critical Slope	0.005093 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	457.28 ft	Upstream Velocity Head	0.43 ft
Ke	0.20	Entrance Loss	0.09 ft

Inlet Control Properties			
Inlet Control HW Elev.	457.21 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	3.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 2-3 - 10YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.76
Computed Headwater Elevation	514.22 ft	Discharge	8.35 cfs
Inlet Control HW Elev.	514.15 ft	Tailwater Elevation	513.37 ft
Outlet Control HW Elev.	514.22 ft	Control Type	Entrance Control

Grades			
Upstream Invert	512.70 ft	Downstream Invert	512.40 ft
Length	58.00 ft	Constructed Slope	0.005172 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	1.02 ft
Slope Type	Steep	Normal Depth	1.02 ft
Flow Regime	Supercritical	Critical Depth	1.03 ft
Velocity Downstream	5.21 ft/s	Critical Slope	0.004938 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	514.22 ft	Upstream Velocity Head	0.41 ft
Ke	0.20	Entrance Loss	0.08 ft

Inlet Control Properties			
Inlet Control HW Elev.	514.15 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	3.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 4-5 - 10YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.62
Computed Headwater Elevation	531.53 ft	Discharge	2.85 cfs
Inlet Control HW Elev.	531.46 ft	Tailwater Elevation	528.56 ft
Outlet Control HW Elev.	531.53 ft	Control Type	Entrance Control

Grades			
Upstream Invert	530.60 ft	Downstream Invert	528.20 ft
Length	64.00 ft	Constructed Slope	0.037500 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.38 ft
Slope Type	Steep	Normal Depth	0.38 ft
Flow Regime	Supercritical	Critical Depth	0.64 ft
Velocity Downstream	8.12 ft/s	Critical Slope	0.005101 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	531.53 ft	Upstream Velocity Head	0.24 ft
Ke	0.20	Entrance Loss	0.05 ft

Inlet Control Properties			
Inlet Control HW Elev.	531.46 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	1.8 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 7A-7B - 10YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	1.30
Computed Headwater Elevation	495.55 ft	Discharge	9.56 cfs
Inlet Control HW Elev.	495.55 ft	Tailwater Elevation	494.08 ft
Outlet Control HW Elev.	495.54 ft	Control Type	Inlet Control

Grades			
Upstream Invert	493.60 ft	Downstream Invert	493.02 ft
Length	58.00 ft	Constructed Slope	0.010000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	1.12 ft
Slope Type	Steep	Normal Depth	1.12 ft
Flow Regime	Supercritical	Critical Depth	1.19 ft
Velocity Downstream	6.74 ft/s	Critical Slope	0.008753 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	495.54 ft	Upstream Velocity Head	0.62 ft
Ke	0.20	Entrance Loss	0.12 ft

Inlet Control Properties			
Inlet Control HW Elev.	495.55 ft	Flow Control	Submerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	1.8 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 8B-9 - 10YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	1.01
Computed Headwater Elevation	463.52 ft	Discharge	13.43 cfs
Inlet Control HW Elev.	463.44 ft	Tailwater Elevation	460.71 ft
Outlet Control HW Elev.	463.52 ft	Control Type	Entrance Control

Grades			
Upstream Invert	461.50 ft	Downstream Invert	459.82 ft
Length	84.00 ft	Constructed Slope	0.020000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.92 ft
Slope Type	Steep	Normal Depth	0.90 ft
Flow Regime	Supercritical	Critical Depth	1.32 ft
Velocity Downstream	9.53 ft/s	Critical Slope	0.005905 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	463.52 ft	Upstream Velocity Head	0.58 ft
Ke	0.20	Entrance Loss	0.12 ft

Inlet Control Properties			
Inlet Control HW Elev.	463.44 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	3.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 10-11 - 10YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.45
Computed Headwater Elevation	489.93 ft	Discharge	1.60 cfs
Inlet Control HW Elev.	489.85 ft	Tailwater Elevation	486.24 ft
Outlet Control HW Elev.	489.93 ft	Control Type	Entrance Control

Grades			
Upstream Invert	489.25 ft	Downstream Invert	486.00 ft
Length	54.00 ft	Constructed Slope	0.060185 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.25 ft
Slope Type	Steep	Normal Depth	0.25 ft
Flow Regime	Supercritical	Critical Depth	0.48 ft
Velocity Downstream	8.10 ft/s	Critical Slope	0.004909 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	489.93 ft	Upstream Velocity Head	0.17 ft
Ke	0.20	Entrance Loss	0.03 ft

Inlet Control Properties			
Inlet Control HW Elev.	489.85 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	1.8 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Culvert Calculator Report
CULVERT 12-13 - 10YR

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 ft	Headwater Depth/Height	0.97
Computed Headwater Elevation	457.59 ft	Discharge	12.59 cfs
Inlet Control HW Elev.	457.53 ft	Tailwater Elevation	456.53 ft
Outlet Control HW Elev.	457.59 ft	Control Type	Outlet Control

Grades			
Upstream Invert	455.66 ft	Downstream Invert	455.27 ft
Length	78.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	1.28 ft
Slope Type	Mild	Normal Depth	1.34 ft
Flow Regime	Subcritical	Critical Depth	1.28 ft
Velocity Downstream	5.95 ft/s	Critical Slope	0.005709 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	457.59 ft	Upstream Velocity Head	0.49 ft
Ke	0.20	Entrance Loss	0.10 ft

Inlet Control Properties			
Inlet Control HW Elev.	457.53 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	3.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

CULVERT SUMMARY

	DA Specifics			Flows			Culvert Info					Headwater Levels			HW/D	
CULVERT	DA (ac.)	C	Tc (min)	I2	I10	I100	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)	Size (in)	Length (ft)	Inv. In	Inv. Out	Slope	2yr WSEL	10yr WSEL	100yr WSEL	(10-YR)	Notes
2-3	4.28	0.43	14.6	3.40	4.53	6.13	6.26	8.35	11.28	24	58	512.70	512.40	0.52%	513.99	514.22	514.51	0.76	
4-5	1.07	0.53	11.4	3.80	5.03	6.76	2.16	2.85	3.84	18	64	530.60	528.20	3.75%	531.40	531.53	531.70	0.62	
7A-7B	4.11	0.45	10.5	3.92	5.17	6.95	7.25	9.56	12.85	18	58	493.60	493.02	1.00%	495.21	495.55	469.29	1.30	
8B-9	7.14	0.44	16.6	3.19	4.28	5.81	10.03	13.43	18.23	24	84	461.50	459.82	2.00%	463.19	463.52	463.96	1.01	
10-11	0.71	0.41	8.7	4.21	5.54	7.44	1.22	1.60	2.15	18	54	489.25	486.00	6.02%	489.84	489.93	490.05	0.45	
12-13	9.21	0.34	18.8	2.99	4.02	5.49	9.35	12.59	17.19	24	78	455.66	455.27	0.50%	457.28	457.60	457.93	0.97	
LOT 1	1.38	0.49	10.4	3.93	5.19	6.97	2.66	3.51	4.71	15	42	524.20	523.10	2.62%	525.17	525.34	-	0.91	
LOT 2	0.80	0.44	9.8	4.03	5.31	7.13	1.43	1.88	2.52	15	44	531.26	531.02	0.55%	531.94	532.05	-	0.63	
LOT 3	0.20	0.48	5.0	5.01	6.52	8.84	0.48	0.63	0.85	15	44	536.02	535.18	1.91%	536.40	536.46	-	0.35	
LOT 6	0.30	0.68	5.0	5.01	6.52	8.84	1.02	1.32	1.80	15	43	533.05	532.83	0.51%	533.62	533.70	-	0.52	
LOT 9	2.00	0.41	12.7	3.63	4.81	6.48	2.97	3.94	5.31	15	53	467.00	466.00	1.89%	468.03	468.22	-	0.98	
LOT 10	0.42	0.51	5.0	5.01	6.52	8.84	1.07	1.39	1.88	15	42	468.72	468.51	0.50%	469.30	469.39	-	0.54	
LOT 12	0.11	0.57	5.0	5.01	6.52	8.84	0.32	0.42	0.57	15	42	468.00	467.71	0.69%	468.31	468.36	-	0.29	
LOT 13	0.19	0.66	5.0	5.01	6.52	8.84	0.64	0.83	1.13	15	42	459.00	458.79	0.50%	459.45	459.51	-	0.41	
LOT 18	0.56	0.46	5.0	5.01	6.52	8.84	1.30	1.69	2.29	15	46	518.00	515.00	6.52%	518.65	518.75	-	0.60	
LOT 19	0.06	0.63	5.0	5.01	6.52	8.84	0.18	0.24	0.32	15	42	534.68	533.85	1.98%	534.91	534.95	-	0.22	
LOT 22	0.10	0.55	5.0	5.01	6.52	8.84	0.28	0.37	0.50	15	42	528.60	527.55	2.50%	528.89	528.93	-	0.26	
LOT C	0.32	0.60	5.0	5.01	6.52	8.84	0.96	1.26	1.70	15	42	519.68	517.90	4.24%	520.23	520.32	-	0.51	

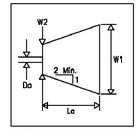
GRATE INLET DESIGN COMPUTATIONS

				SURFACE	10-YR	10-YR	100-YR	100-YR	GRATE DESIGN			DEPTH		TOP	ELEVATION	
Structure #	Type	Area (Ac.)	"C"	Tc	"I"	FLOW	"I"	FLOW	GRATE	PERIM	AREA	10-YR	100-YR	ELEV.	10-YR	100-YR
2	DI-5 (ON GRADE)	0.43	0.59	5.00	6.52	1.66	8.84	2.25	TYPE B3	12.8	3.25	0.195	0.239	516.21	516.41	516.45
7	DI-7	1.00	0.41	9.48	5.39	2.20	7.24	2.96	A-III	12.8	3.25	0.236	0.287	486.50	486.74	486.79
7A	DI-5 (ON GRADE)	0.84	0.51	5.00	6.52	2.81	8.84	3.81	TYPE B3	12.8	3.25	0.277	0.340	499.22	499.50	499.56
16	DI-7	0.54	0.52	5.00	6.52	1.83	8.84	2.48	A-III	12.8	3.25	0.209	0.256	455.50	455.71	455.76
17	DI-7	0.57	0.48	5.00	6.52	1.78	8.84	2.42	A-III	12.8	3.25	0.205	0.251	467.00	467.20	467.25
18	DI-7	1.32	0.43	5.00	6.52	3.69	8.84	5.01	A-III	12.8	3.25	0.333	0.408	461.50	461.83	461.91

GRATE WAS ASSUMED TO BE 50% CLOGGED WHEN CALCULATING THE DEPTH OF FLOW AND ELEVATION

RIPRAP OUTFALL DESIGN CALCULATIONS

OUTFALL STR. #	TW CONDITION	Q (cfs)	PIPE SIZE (in.)	2-YR OUTLET VELOCITY (fps)	La REQUIRED (ft.)	La PROVIDED (ft.)	Do (ft.)	W1 (ft.)	W2 (ft.)	MIN. "T" (FT)	d_{50} (FT)	OUTLET PROTECTION CLASS REQUIRED	NOTES
1	Minimum	9.44	24	4.97	14.00	14.00	2.00	16.00	6.00	1.50	0.8	EC-1 CL A1 DRY RIPRAP	TYPE A
4	Minimum	2.82	18	7.49	4.50	3.75	1.50	4.50	4.50	1.50	0.8	EC-1 CL A1 DRY RIPRAP	TYPE A
6	Minimum	4.48	24	5.44	6.00	3.75	2.00	7.50	6.00	1.50	0.8	EC-1 CL A1 DRY RIPRAP	TYPE A
8	Minimum	15.80	24	8.96	6.00	44.00	2.00	6.00	6.00	2.00	1.1	EC-1 CL I DRY RIPRAP	TYPE A
10	Minimum	1.60	18	7.48	4.50	3.75	1.50	4.50	4.50	1.50	0.8	EC-1 CL A1 DRY RIPRAP	TYPE A
12	Minimum	11.85	24	5.33	6.00	10.00	2.00	6.00	6.00	1.50	0.8	EC-1 CL A1 DRY RIPRAP	TYPE A
14	Minimum	5.44	15	10.61	3.75	4.00	1.25	3.75	3.75	2.00	1.1	EC-1 CL I DRY RIPRAP	TYPE A
A1	Minimum	7.58	30	4.97	7.50	7.50	2.50	7.50	7.50	1.50	0.8	EC-1 CL A1 DRY RIPRAP	TYPE A
LOT 1 D/W CULVERT	Minimum	3.51	15	7.04	3.75	3.75	1.25	3.75	3.75	1.50	0.8	EC-1 CL A1 DRY RIPRAP	TYPE A
LOT 2 D/W CULVERT	Minimum	1.88	15	3.40	3.75	3.75	1.25	3.75	3.75	N/A	N/A	EC-2	TYPE A
LOT 3 D/W CULVERT	Minimum	0.63	15	3.87	3.75	3.75	1.25	3.75	3.75	N/A	N/A	EC-3 TYPE 3	TYPE A
LOT 6 D/W CULVERT	Minimum	1.32	15	3.04	3.75	3.75	1.25	3.75	3.75	N/A	N/A	EC-3 TYPE 3	TYPE A
LOT 9 D/W CULVERT	Minimum	3.94	15	6.51	3.75	3.75	1.25	3.75	3.75	N/A	N/A	EC-3 TYPE 3	TYPE A
LOT 10 D/W CULVERT	Minimum	1.39	15	3.09	3.75	3.75	1.25	3.75	3.75	N/A	N/A	EC-3 TYPE 3	TYPE A
LOT 12 D/W CULVERT	Minimum	0.42	15	2.21	3.75	3.75	1.25	3.75	3.75	N/A	N/A	GRASS	TYPE A
LOT 13 D/W CULVERT	Minimum	0.83	15	2.67	3.75	3.75	1.25	3.75	3.75	N/A	N/A	GRASS	TYPE A
LOT 18 D/W CULVERT	Minimum	1.69	15	8.02	3.75	3.75	1.25	3.75	3.75	2.00	1.1	EC-1 CL I DRY RIPRAP	TYPE A
LOT 19 D/W CULVERT	Minimum	0.24	15	2.92	3.75	3.75	1.25	3.75	3.75	N/A	N/A	GRASS	TYPE A
LOT 22 D/W CULVERT	Minimum	0.37	15	3.62	3.75	3.75	1.25	3.75	3.75	N/A	N/A	EC-2	TYPE A
LOT C D/W CULVERT	Minimum	1.26	15	6.30	3.75	3.75	1.25	3.75	3.75	N/A	N/A	EC-3 TYPE 3	TYPE A



NOTE:
SEE VDOT EC-1 DETAIL

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STORM SEWER COMPUTATIONS
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: N/A V: N/A

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 29 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-

OVERLAND RELIEF NARRATIVE:

THE SITE HAS BEEN GRADED SUCH THAT DURING A 100-YR STORM EVENT THERE IS ADEQUATE OVERLAND RELIEF TO PREVENT THE FLOODING OF ALL ON-SITE STRUCTURES. THIS OVERLAND RELIEF MAP SHOWS THE APPROXIMATE WATER SURFACE AREA OF THE 100-YR STORM EVENT AS IT TRAVELS THROUGH THE SITE.

THE PROPOSED OVERLAND RELIEF PATHS AND ELEVATIONS ARE BASED ON THE ASSUMPTION THAT ALL OF THE INLETS AND CULVERTS ARE 100% CLOGGED.

DENOTES 100-YR OVERLAND RELIEF WATER SURFACE ELEVATION

100 YEAR OVERLAND RELIEF

WEIR/ STRUCTURE	CUMULATIVE CA	Tc (min.)	I (in/hr)	Q100 (cfs)	L (ft)	H (ft)	WEIR ELEV (ft)	100 OVERLAND RELIEF ELEV.
3	1.84	14.60	6.11	11.25	22	0.31	516.00	516.31
5	0.57	11.40	6.74	3.82	15	0.19	533.90	534.09
7	0.41	9.50	7.21	2.95	20	0.13	488.00	488.13
9	3.14	16.50	5.82	18.28	35	0.31	470.10	470.41
11	0.29	8.70	7.44	2.15	25	0.09	492.00	492.09
13	3.13	18.80	5.50	17.23	25	0.37	461.65	462.02
7B	1.85	10.50	6.95	12.85	15	0.43	499.00	499.43
LOT 10 D/W CULVERT	0.21	5.00	8.84	1.88	16	0.12	471.04	471.16
LOT 12 D/W CULVERT	0.06	5.00	8.84	0.57	20	0.04	470.21	470.25

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

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OVERLAND RELIEF MAP
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
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03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=80'
V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 30 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\030-6642-D-CP-001-OLR.dwg

NO.	TITLE	KEY	SYMBOL
3.01	SAFETY FENCE	SAF	
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
	SUPER SILT FENCE	SSF	
3.08	CULVERT INLET PROTECTION	CIP	
3.09	TEMPORARY DIVERSION DIKE	DD	
3.14	TEMPORARY SEDIMENT BASIN	SB	
3.18	OUTLET PROTECTION	OP	
3.31	TEMPORARY SEEDING	TS	
3.38	TREE PRESERVATION & PROTECTION	TP	
	DRAINAGE DIVIDE		

DA TO SSF = 3.33 AC.

DA TO SSF = 1.10 AC.

DA TO SB #1 = 18.23 AC.

DA TO SSF = 3.20 AC.

DA TO SF = 0.92 AC.

LIMITS OF CLEARING AND GRADING

POTENTIAL PORTABLE TOILET LOCATION

POTENTIAL FUEL CONTAINMENT AREA

POTENTIAL DUMPSTER LOCATION

HIDDEN HOLLOW LANE

BLACKWELL ROAD

WASH RACK

MATCHLINE - SHEET 32

POOL ELEV.= 441.75

PLYWOOD BAFFLE

STREAM

Tc PATH

N/F ROBERT M. ITEN & LAINE W. ITEN GPIN: 6985-62-3534 DB 1502, PG 2165 ZONING: R1 USE: RESIDENTIAL

N/F ROBERT J. BILL & ANNIE ZHENG GPIN: 6985-52-5215 DB 1723, PG 932 ZONING: R1 USE: VACANT

N/F WARRENTON SENIOR DEVELOPMENT COMPANY INC GPIN: 6985-50-6989 DB 1517, PG 585 ZONING: R-10 USE: NURSING HOME

N/F DAVID M. DOBSON GPIN: 6985-60-5718-500 DB 1119, PG 1331 ZONING: I USE: VACANT

FAUQUIER COUNTY TOWN OF WARRENTON

NOTES:

1. CONTRACTOR SHALL COORDINATE CLEARING OF DRAINFIELDS WITH AOSE. NO CONSTRUCTION EQUIPMENT IS ALLOWED ON THE PROPOSED DRAINFILEDS WITHOUT APPROVAL FROM THE AOSE.
2. ACCESS TO HIDDEN HOLLOW LANE SHALL REMAIN OPEN DURING ALL PHASES OF CONSTRUCTION.
3. PRIOR TO FINAL CONSTRUCTION PLAN APPROVAL, IT SHALL BE AGREED THAT ALL DRAINFIELD AREAS ARE TO BE SURROUNDED BY SAFETY FENCING AND NO CONSTRUCTION TRAFFIC SHALL CROSS NOT SHALL LAND DISTURBANCE OCCUR IN THESE AREAS. THE FENCING OF THESE AREAS IS TO BE VERIFIED BY COUNTY STAFF BEFORE THE ISSUANCE OF THE LAND DISTURBING PERMIT.

✱ DENOTES CRITICAL AREA

DENOTES TREE PRESERVATION EASEMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

NORTH

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EROSION & SEDIMENT CONTROL PLAN - PHASE I
TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

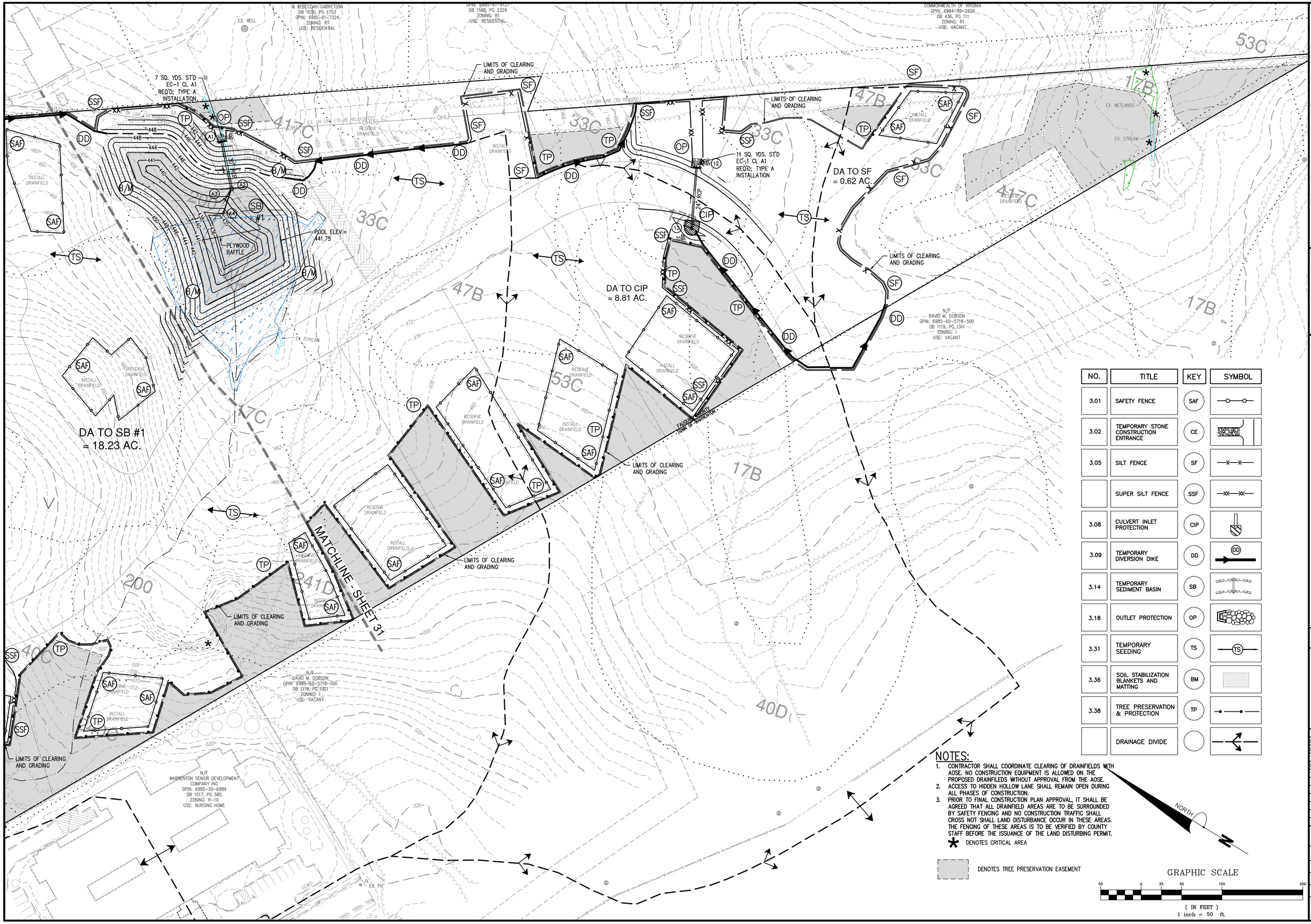
CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION
DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=50' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 31 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\031-032-6642-D-CP-001-ES1.dwg



NO.	TITLE	KEY	SYMBOL
3.01	SAFETY FENCE	SAF	
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
	SUPER SILT FENCE	SSF	
3.08	CULVERT INLET PROTECTION	CIP	
3.09	TEMPORARY DIVERSION DIKE	DD	
3.14	TEMPORARY SEDIMENT BASIN	SB	
3.18	OUTLET PROTECTION	OP	
3.31	TEMPORARY SEEDING	TS	
3.36	SOIL STABILIZATION BLANKETS AND MATTING	BM	
3.38	TREE PRESERVATION & PROTECTION	TP	
	DRAINAGE DIVIDE		

NOTES:

1. CONTRACTOR SHALL COORDINATE CLEARING OF DRAINFIELDS WITH AOSE. NO CONSTRUCTION EQUIPMENT IS ALLOWED ON THE PROPOSED DRAINFILEDS WITHOUT APPROVAL FROM THE AOSE.
2. ACCESS TO HIDDEN HOLLOW LANE SHALL REMAIN OPEN DURING ALL PHASES OF CONSTRUCTION.
3. PRIOR TO FINAL CONSTRUCTION PLAN APPROVAL, IT SHALL BE AGREED THAT ALL DRAINFIELD AREAS ARE TO BE SURROUNDED BY SAFETY FENCING AND NO CONSTRUCTION TRAFFIC SHALL CROSS NOT SHALL LAND DISTURBANCE OCCUR IN THESE AREAS. THE FENCING OF THESE AREAS IS TO BE VERIFIED BY COUNTY STAFF BEFORE THE ISSUANCE OF THE LAND DISTURBING PERMIT.

✱ DENOTES CRITICAL AREA

DENOTES TREE PRESERVATION EASEMENT

NORTH

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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EROSION & SEDIMENT CONTROL PLAN - PHASE I
TIFFANY ESTATES
CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50' V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

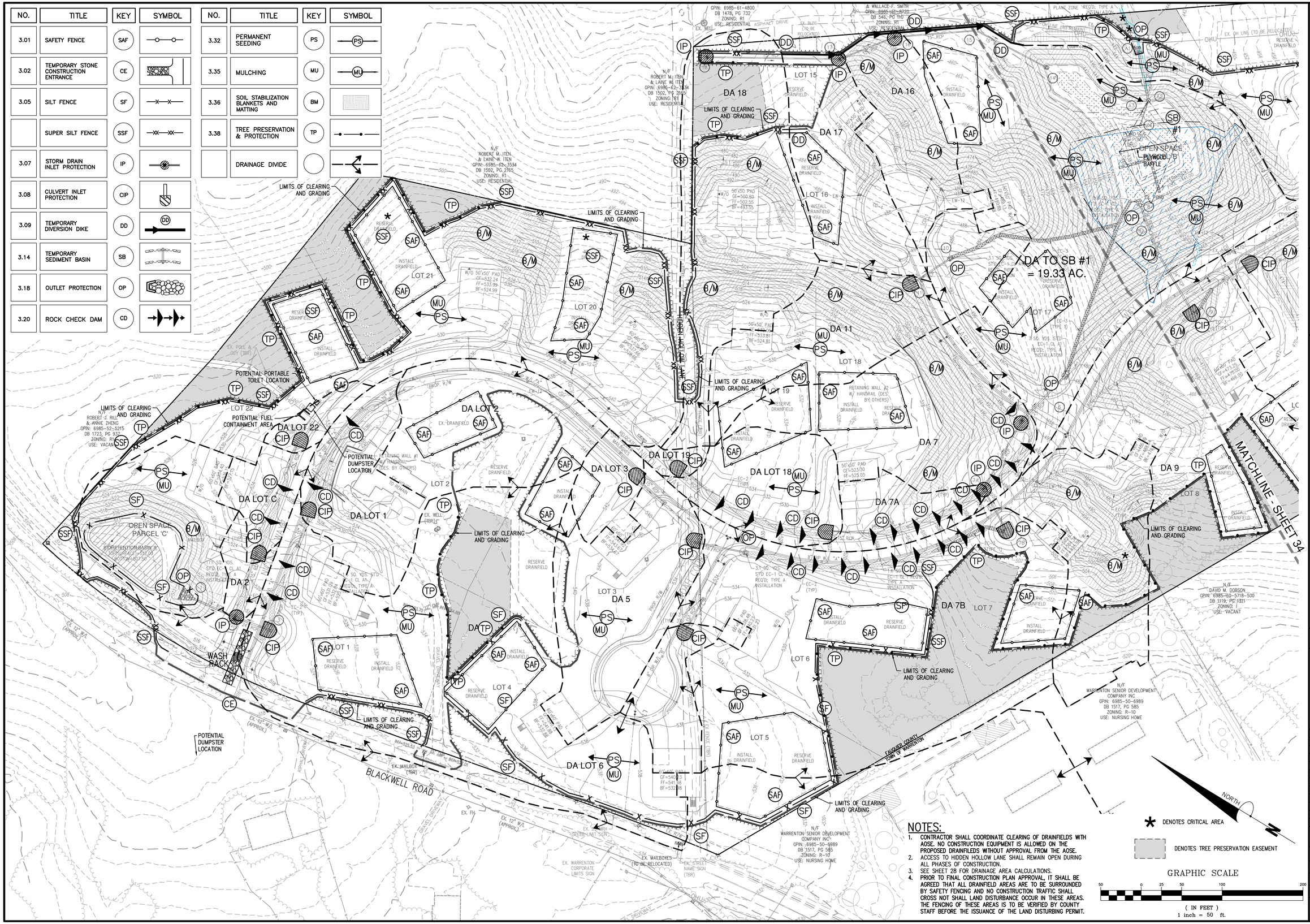
FILE No. 6642-D-CP-001

SHEET 32 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\031-032-6642-D-CP-001-ES1.dwg

NO.	TITLE	KEY	SYMBOL
3.01	SAFETY FENCE	SAF	
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
	SUPER SILT FENCE	SSF	
3.07	STORM DRAIN INLET PROTECTION	IP	
3.08	CULVERT INLET PROTECTION	CIP	
3.09	TEMPORARY DIVERSION DIKE	DD	
3.14	TEMPORARY SEDIMENT BASIN	SB	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	

NO.	TITLE	KEY	SYMBOL
3.32	PERMANENT SEEDING	PS	
3.35	MULCHING	MU	
3.36	SOIL STABILIZATION BLANKETS AND MATTING	BM	
3.38	TREE PRESERVATION & PROTECTION	TP	
	DRAINAGE DIVIDE		



NOTES:

1. CONTRACTOR SHALL COORDINATE CLEARING OF DRAINFIELDS WITH AOSE. NO CONSTRUCTION EQUIPMENT IS ALLOWED ON THE PROPOSED DRAINFILEDS WITHOUT APPROVAL FROM THE AOSE.
2. ACCESS TO HIDDEN HOLLOW LANE SHALL REMAIN OPEN DURING ALL PHASES OF CONSTRUCTION.
3. SEE SHEET 28 FOR DRAINAGE AREA CALCULATIONS.
4. PRIOR TO FINAL CONSTRUCTION PLAN APPROVAL, IT SHALL BE AGREED THAT ALL DRAINFIELD AREAS ARE TO BE SURROUNDED BY SAFETY FENCING AND NO CONSTRUCTION TRAFFIC SHALL CROSS NOT SHALL LAND DISTURBANCE OCCUR IN THESE AREAS. THE FENCING OF THESE AREAS IS TO BE VERIFIED BY COUNTY STAFF BEFORE THE ISSUANCE OF THE LAND DISTURBING PERMIT.

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EROSION & SEDIMENT CONTROL PLAN - PHASE II
TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

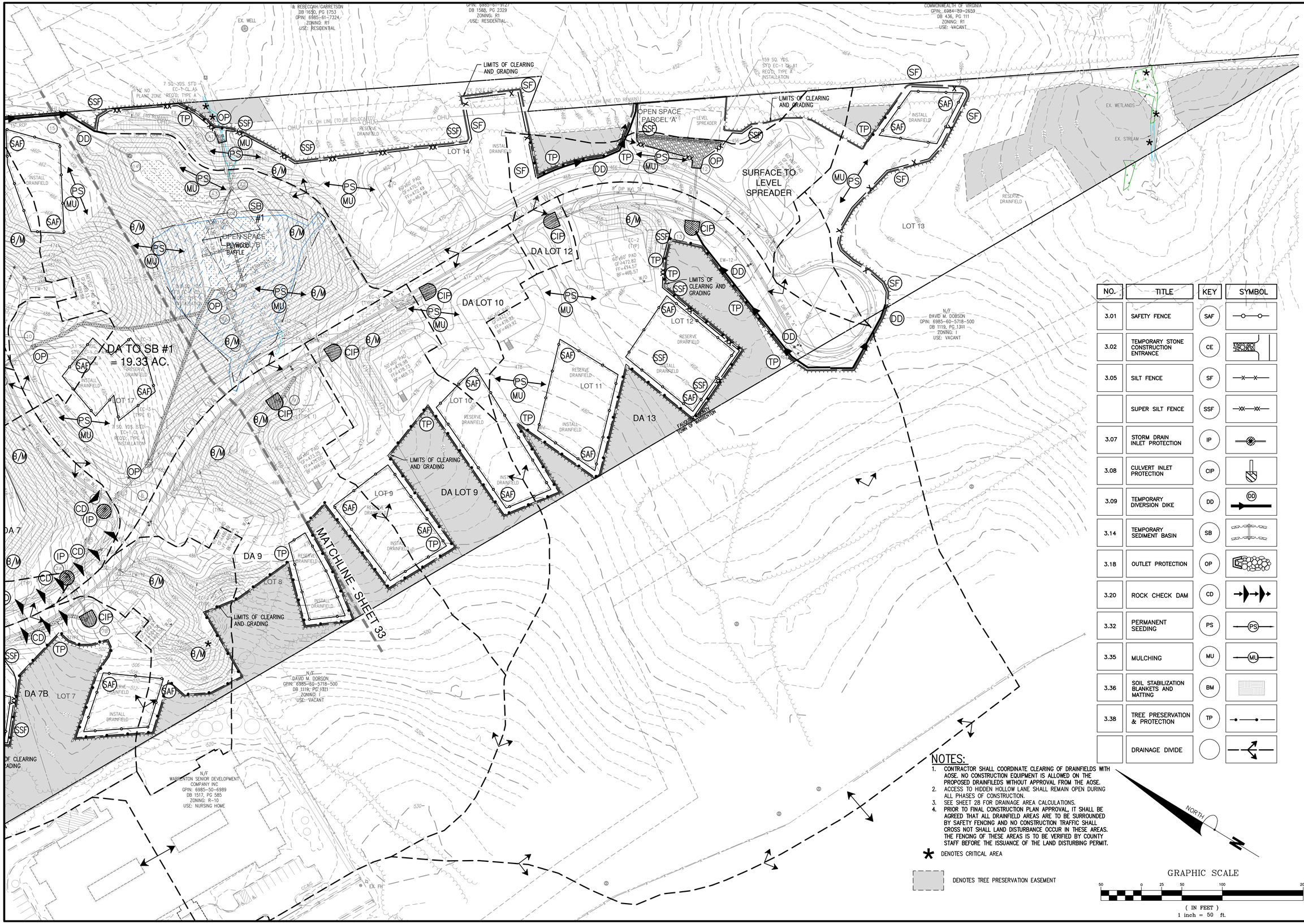
CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION
DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=50' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 33 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\033-034-6642-D-CP-001-ES2.dwg



NO.	TITLE	KEY	SYMBOL
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3.36	SOIL STABILIZATION BLANKETS AND MATTING	BM	
3.38	TREE PRESERVATION & PROTECTION	TP	
	DRAINAGE DIVIDE		

NOTES:

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2. ACCESS TO HIDDEN HOLLOW LANE SHALL REMAIN OPEN DURING ALL PHASES OF CONSTRUCTION.
3. SEE SHEET 28 FOR DRAINAGE AREA CALCULATIONS.
4. PRIOR TO FINAL CONSTRUCTION PLAN APPROVAL, IT SHALL BE AGREED THAT ALL DRAINFIELD AREAS ARE TO BE SURROUNDED BY SAFETY FENCING AND NO CONSTRUCTION TRAFFIC SHALL CROSS NOT SHALL LAND DISTURBANCE OCCUR IN THESE AREAS. THE FENCING OF THESE AREAS IS TO BE VERIFIED BY COUNTY STAFF BEFORE THE ISSUANCE OF THE LAND DISTURBING PERMIT.

* DENOTES CRITICAL AREA

DENOTES TREE PRESERVATION EASEMENT

Bowman

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EROSION & SEDIMENT CONTROL PLAN - PHASE II

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

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02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50' V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 34 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\033-034-6642-D-CP-001-ES2.dwg

EROSION AND SEDIMENT CONTROL NARRATIVE:

PROJECT DESCRIPTION:
THIS PROJECT CONSISTS OF THE CONSTRUCTION OF 22 SINGLE FAMILY DETACHED LOTS AND ASSOCIATED INFRASTRUCTURE. THE SITE IS LOCATED ALONG THE EASTERN SIDE OF BLACKWELL ROAD, TO THE SOUTHEAST OF THE INTERSECTION OF BLACKWELL ROAD AND IVY HILL DRIVE, AND NORTH OF THE US 17 SPUR. THE PROJECT PROPOSES THAT APPROXIMATELY 25.40 ACRES OF LAND BE DISTURBED. ALL AREAS OUTSIDE OF THE PROPOSED ROADWAYS SHALL BE PERMANENTLY SEEDED (APPROXIMATELY 19.7 ACRES) IMMEDIATELY FOLLOWING FINISHED GRADING.

EXISTING CONDITIONS:
THE MAJORITY OF THE SITE DRAINS TOWARDS THE EXISTING POND AND ITS EASTERN BOUNDARY. A PORTION OF THE SITE DRAINS TOWARD THE EXISTING ROADSIDE DITCH ALONG BLACKWELL ROAD. THE EXISTING SITE CONSISTS PRIMARILY OF WOODED AREAS. AN EXISTING HOUSE, WHICH IS TO REMAIN, TWO DRIVEWAYS, AND SMALL YARD AREAS ALSO EXISTING ON THE SITE. THE SLOPES ONSITE RANGE FROM 1% ALONG THE RIDGE TOPS TO 50% ALONG THE VALLEYS.

ADJACENT PROPERTY:
RESIDENTIAL LOTS AND VACANT WOODED LAND BORDER THE SITE TO THE NORTH AND EAST. AN EXISTING DRIVEWAY (HIDDEN HOLLOW LANE) BISECTS THE SITE AND PROVIDES ACCESS TO THE RESIDENTIAL LOTS TO THE NORTH AND EAST. ACCESS TO THESE LOTS SHALL BE MAINTAINED DURING ALL PHASES OF CONSTRUCTION. VACANT WOODED LAND BORDERS THE SITE TO THE SOUTHWEST. BLACKWELL ROAD AND A MEMORY CARE FACILITY BORDER THE SITE TO THE NORTHWEST.

OFF-SITE AREAS:
NO OFFSITE CONSTRUCTION IS PROPOSED WITH THIS DEVELOPMENT. SOIL WILL BE STOCKPILED WITHIN THE APPROVED CLEARING LIMITS AND THE CONTRACTOR SHALL ADHERE TO ALL THE REQUIREMENTS OF THE VESCH. THE STOCKPILES SHALL BE STABILIZED WITH TEMPORARY VEGETATION TO PREVENT SOIL LOSS AND SEDIMENT TRANSPORT FROM THE STOCKPILE ITSELF UNTIL NEEDED. ALL CONSTRUCTION DEBRIS SHALL BE STOCKPILED ONSITE. THE SITE IS ANTICIPATED TO BALANCE CUT AND FILL. IF FOR ANY REASON THE CONTRACTOR NEEDS TO STOCKPILE SOIL OFFSITE OR OUTSIDE OF THE APPROVED CLEARING LIMITS HE SHALL, PRIOR TO LAND DISTURBING ACTIVITIES, SUBMIT A SUPPLEMENTARY EROSION AND SEDIMENT CONTROL PLAN COVERING THE OFFSITE AREAS THAT WILL BE DISTURBED. THE SUPPLEMENTAL PLAN SHALL BE APPROVED BY FAUQUIER COUNTY PRIOR TO CONSTRUCTION ACTIVITY. IF SOIL IS TRANSPORTED OFFSITE, A SOIL TRANSPORT FORM IS REQUIRED TO BE SUBMITTED TO FAUQUIER COUNTY EACH DAY THAT SOIL IS TRANSPORTED TO OR FROM THE SITE.

SOILS:
SEE SHEETS 5-6 FOR THE TYPE 1 SOILS REPORT.

CRITICAL EROSION AREAS:
THE EXISTING STREAM AT THE POND OUTFALL AND THE EXISTING STEEP SLOPES ONSITE ARE CRITICAL AREAS. THEREFORE, CARE SHALL BE TAKEN TO MINIMIZE LAND DISTURBANCE IN THESE AREAS, AND SEDIMENT TRAPPED ON THE SITE. MEASURES HAVE BEEN PROVIDED IN THESE AREAS TO MINIMIZE THE IMPACTS. THE CONTRACTOR SHALL TAKE EXTREME CARE TO PREVENT SEDIMENT LADEN RUNOFF FROM LEAVING THE LIMITS OF CLEARING AND GRADING AND ENTERING ADJACENT PROPERTIES, THE EXISTING ROADWAY, AND THE DENOTED CRITICAL AREAS.

EROSION AND SEDIMENT CONTROL MEASURES:
UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VESCH AND FAUQUIER COUNTY. THE MINIMUM STANDARDS OF THE VESCH SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY A VARIANCE. SEE THIS SHEET FOR THE VESCH MINIMUM STANDARDS.

VEGETATIVE PRACTICES:
1. TEMPORARY SEEDING – 3.31
   ALL DENUDED AREAS WHICH WILL BE LEFT DORMANT FOR EXTENDED PERIODS OF TIME SHALL BE SEEDED WITH FAST GERMINATING TEMPORARY VEGETATION IMMEDIATELY FOLLOWING GRADING. SELECTION OF THE SEED MIXTURE WILL DEPEND ON THE TIME OF YEAR IT IS APPLIED. SEE THIS SHEET MINIMUM STANDARD #1 PERTAINING TO SEEDING.
2. TOPSOILING – 3.30
   TOPSOIL SHALL BE SPREAD ON ALL DISTURBED AREAS OUTSIDE OF IMPERVIOUS AREAS TO PROVIDE SUITABLE GROWTH MEDIUM FOR FINAL STABILIZATION WITH VEGETATION.
3. PERMANENT SEEDING – 3.32
   ALL DENUDED AREAS, WHICH WILL BE LEFT DORMANT FOR EXTENDED PERIODS, SHALL BE SEEDED WITH PERMANENT VEGETATION IMMEDIATELY FOLLOWING GRADING. REFER TO PERMANENT STABILIZATION SECTION FOR MORE INFORMATION.
4. DUST CONTROL – 3.39
   DUST CONTROL MEASURES ARE USED TO PREVENT SURFACE AND AIR MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES AND THE REDUCE THE PRESENCE OF HARMFUL AIRBORNE SUBSTANCES.

STRUCTURAL PRACTICES:
1. SAFETY FENCE – 3.01
   SAFETY FENCE SHALL BE INSTALLED AROUND THE DRAINFIELDS TO PROHIBIT CONSTRUCTION TRAFFIC FROM TRACKING ACROSS THE DRAINFIELDS.
2. TEMPORARY CONSTRUCTION ENTRANCE – 3.02
   A TEMPORARY CONSTRUCTION ENTRANCE SHALL BE INSTALLED AS SHOWN ON THE PLAN. CONSTRUCTION VEHICLES ARE REQUIRED TO CLEAN THEIR WHEELS BEFORE EXITING ONTO THE ROADWAY.
3. SILT FENCE – 3.05
   SILT FENCE AND SUPER SILT FENCE SHALL BE INSTALLED DOWN SLOPE AND ON CONTOURS AS SHOWN ON THE PHASE I AND PHASE II E&S PLAN.
4. STORM DRAIN INLET PROTECTION – 3.07
   ALL STORM SEWER INLETS SHALL BE PROTECTED DURING CONSTRUCTION. SEDIMENT LADEN WATER SHALL BE FILTERED BEFORE ENTERING THE STORM SEWER INLETS.
5. CULVERT INLET PROTECTION – 3.08
   ALL CULVERTS SHALL BE PROTECTED DURING CONSTRUCTION. SEDIMENT LADEN WATER SHALL BE FILTERED BEFORE ENTERING THE CULVERTS.
6. TEMPORARY DIVERSION DIKE – 3.09
   TEMPORARY DIVERSION DIKES WILL DIRECT FLOW INTO THE SEDIMENT TRAPS. THEY WILL BE INSTALLED ALONG THE MAJORITY OF THE LIMITS OF CLEARING AND GRADING AS SHOWN ON THE PHASE I & II E&S PLANS.
7. TEMPORARY SEDIMENT BASIN – 3.14
   THE TEMPORARY SEDIMENT BASIN SHALL BE INSTALLED AS SHOWN ON THE PHASE I AND II PLANS AND PER THE SEDIMENT BASIN COMPUTATIONS AND DETAILS.
8. OUTLET PROTECTION – 3.18
   RIPRAP OUTLET PROTECTION SHALL BE INSTALLED AT THE OUTFALLS OF ALL CULVERTS AND STORM SEWER SYSTEMS TO PREVENT SCOUR AT OUTLETS AND TO MINIMIZE THE POTENTIAL FOR DOWNSTREAM EROSION BY REDUCING THE VELOCITY AND ENERGY OF CONCENTRATED STORMWATER FLOWS.
9. ROCK CHECK DAM – 3.20
   ROCK CHECK DAMS SHALL BE INSTALLED WITHIN DITCHES AS INDICATED ON THE PHASE II E&S PLANS TO REDUCE VELOCITY OF CONCENTRATED STORMWATER FLOWS TO ALLOW ESTABLISHMENT OF PERMANENT LINING AND STABILIZATION.
10. SURFACE ROUGHENING – 3.29
    SURFACE ROUGHENING SHALL BE APPLIED ON ALL SLOPES 3:1 OR STEEPER TO AID IN ESTABLISHMENT OF VEGETATIVE COVER WITH SEED, TO REDUCE RUNOFF VELOCITY AND INCREASE INFILTRATION, AND TO REDUCE EROSION AND PROVIDE FOR SEDIMENT TRAPPING.
11. SOIL STABILIZATION BLANKETS & MATTING – 3.36
    ALL STEEP SLOPES (3:1) SHALL BE PROTECTED BY APPLYING SOIL STABILIZATION BLANKETS AND/OR MATS AS SHOWN ON THE PHASE II E&S PLAN.
12. TREE PRESERVATION & PROTECTION – 3.38
    TREE PROTECTION SHALL BE INSTALLED ALONG THE TREE PRESERVATION AREAS ADJACENT TO THE LIMITS OF DISTURBANCE AS SHOWN ON THE PHASE I & II E&S PLAN.

MANAGEMENT STRATEGIES:
PHASE I:
1. THE LIMITS OF CLEARING AND GRADING SHALL BE FLAGGED PRIOR TO THE PRE-CONSTRUCTION MEETING.
2. CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE. ADDITIONAL PHASE I CONTROLS SHALL BE PLACED PER THIS PLAN AND/OR AT THE REQUEST OF THE COUNTY INSPECTOR.
3. PHASE I WILL BE IMPLEMENTED PRIOR TO MAJOR CLEARING OPERATIONS AND DENUDING OF THE ADDITIONAL AREA TO BE DISTURBED WITH THIS PLAN. TEMPORARY MEASURES AS SHOWN ON THE PHASE I PLAN WILL BE INSTALLED, INCLUDING A CONSTRUCTION ENTRANCE, SILT FENCE, DIVERSION DIKES, AND SEDIMENT BASINS. CONTRACTOR SHALL PROVIDE AVAILABILITY OF A WATER TANK TRUCK AND HOSE AS NECESSARY TO CLEAN ALL VEHICLES AND EQUIPMENT PRIOR TO THEIR EXIT FROM SITE.
4. SEDIMENT TRAPPING MEASURES WILL BE INSTALLED AS A FIRST STEP IN GRADING. DISTURBANCE SHALL BE MINIMIZED TO ONLY PERMIT THEIR INSTALLATION, AND THEY SHALL BE SEEDED AND MULCHED IMMEDIATELY FOLLOWING INSTALLATION. THE CONTRACTOR SHALL STRIVE TO WORK IN STEAM AREAS ON FAIR-WEATHER DAYS, OR PROVIDED METHODS AND EQUIPMENT, SUCH AS DAMMING AND PUMPING, TO DIVERT WATER AWAY FROM ACTIVE CONSTRUCTION AREAS.
5. TEMPORARY SEEDING AND OTHER STABILIZATION WILL FOLLOW IMMEDIATELY AFTER GRADING.
6. AREAS WHICH ARE NOT TO BE DISTURBED WILL BE CLEARLY MARKED WITH FLAGGING.
7. THE TEMPORARY STOCKPILING OF EARTH AND CONSTRUCTION MATERIALS SHALL ONLY BE PERMITTED IN AREAS SCHEDULED FOR DEVELOPMENT. EARTH STOCKPILES SHALL BE STABILIZED WITH TEMPORARY VEGETATION IN ACCORDANCE WITH COUNTY AND STATE EROSION CONTROL PRACTICES. NO STOCKPILING SHALL OCCUR OUTSIDE OF THE PROPOSED LIMITS OF CLEARING AND GRADING UNLESS APPROVED BY FAUQUIER COUNTY.
8. DUST CONTROL – THROUGHOUT THE ACTIVE CONSTRUCTION PHASE OF THIS PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF DUST. DUST CONTROL SHALL BE IN CONFORMANCE WITH THE STD. 3.39 OF THE VA EROSION/SEDIMENT CONTROL HANDBOOK AND/OR VDOT SEC. 511 OF THE VDOT ROAD AND BRIDGE SPECIFICATIONS.
9. THE JOB SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL PRACTICES.

PHASE II:
1. ONCE E&S CONTROLS ARE INSTALLED, AN INITIAL E&S INSPECTION IS REQUIRED PRIOR TO CLEARING AND GRUBBING.
2. AFTER CONTROLS OF PHASE I ARE IN PLACE, CLEARING AND CONSTRUCTION ON THE REMAINDER OF THE SITE MAY PROCEED. THE PROPOSED UTILITIES SHALL BE INSTALLED AS THE SITE IS BEING GRADED.
3. DISTURBED AREAS SHALL BE STABILIZED AS QUICKLY AS POSSIBLE. INLET PROTECTION SHALL BE PROVIDED FOR DRAINAGE SYSTEM INSTALLED DURING CONSTRUCTION.
4. DEWATER ALL PROPOSED SEDIMENT TRAPS AND BASINS TO THE PROPER DEWATERING DEVICE PRIOR TO FINAL CONSTRUCTION.
5. AFTER CONSTRUCTION IS COMPLETE, WITH ALL AREAS OF THE SITE 100% STABILIZED, AND ONLY AFTER WRITTEN APPROVAL OF THE COUNTY INSPECTOR, THE TEMPORARY CONTROLS MAY BE REMOVED. CONSULT WITH THE COUNTY INSPECTOR PRIOR TO CONVERSION OF SEDIMENT BASINS INTO PERMANENCT SWM PONDS.

PERMANENT STABILIZATION:
ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISH GRADING. SEEDING SHALL BE DONE WITH KENTUCKY 31 TALL FESCUE ACCORDING TO STANDARD SPEC 3.32, PERMANENT SEEDING, OF THE HANDBOOK. EROSION CONTROL BLANKETS WILL BE INSTALLED OVER FILL SLOPES WHICH HAVE BEEN BROUGHT TO FINAL GRADE AND HAVE BEEN SEEDED TO PROTECT THE SLOPES FROM RILL AND GULLY EROSION AND TO ALLOW SEED TO GERMINATE PROPERLY. MULCH (STRAW OR FIBER) WILL BE USED ON RELATIVELY FLAT AREAS. IN ALL SEEDING OPERATIONS, SEED, FERTILIZER AND LIME WILL BE APPLIED PRIOR TO MULCHING.

STORMWATER MANAGEMENT:
REFER TO THE STORMWATER MANAGEMENT PLAN LOCATED ON SHEETS 38-49.

MAINTENANCE:
IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH SIGNIFICANT RAINFALL. ALL MEASURES ARE TO BE INSPECTED DAILY BY THE SITE SUPERINTENDENT. ANY DAMAGED MECHANICAL DEVICES SHALL BE REPAIRED AND/OR REPLACED BY THE CLOSE OF THE DAY. NO CONTROLS ARE TO BE REMOVED WITHOUT THE APPROVAL OF THE SITE INSPECTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES OR PENALTIES CAUSED BY HIS FAILURE TO COMPLY WITH THE EROSION AND SEDIMENT CONTROL PROGRAM OR THE DIRECTION OF THE SITE INSPECTOR. THE DESIGN ENGINEER SHALL NOT BE RESPONSIBLE FOR CHANGES TO THE E&S PROGRAM.

THE FOLLOWING ITEMS WILL BE CHECKED IN PARTICULAR:

1. THE SEDIMENT TRAPS AND SEDIMENT BASINS WILL BE CHECKED REGULARLY FOR SEDIMENT CLEANOUT.
2. THE GRAVEL OUTLETS WILL BE CHECKED REGULARLY FOR SEDIMENT BUILDUP WHICH WILL PREVENT DRAINAGE. IF THE GRAVEL IS CLOGGED BY SEDIMENT, IT SHALL BE REMOVED AND CLEANED OR REPLACED.
3. THE SILT FENCE AND SUPER SILT FENCE BARRIERS WILL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES HALF WAY TO THE TOP OF THE BARRIER.
4. THE SEEDED AREAS WILL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STAND IS MAINTAINED. AREAS SHALL BE FERTILIZED AND RE-SEEDED AS NEEDED.
5. THE CONSTRUCTION ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE WASHING AND REWORKING OF EXISTING STONE AS CONDITIONS DEMAND. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY. THE USE OF WATER TRUCKS TO REMOVE MATERIALS DROPPED, WASHED, OR TRACKED ONTO ROADWAYS WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCE.
6. THE DIVERSION DIKES SHALL BE INSPECTED AFTER EVERY RAIN EVENT AND REPAIRS MADE AS NECESSARY. ONCE EVERY TWO WEEKS, WHETHER OR NOT A STORM EVENT HAS OCCURRED, THE DIVERSION DIKES SHALL BE INSPECTED AND REPAIRS MADE IF NEEDED.
7. THE CULVERT INLET PROTECTION SHALL BE INSPECTED REGULARLY AND AFTER EACH RAIN AND REPAIRS MADE AS NEEDED. FOR OPTIONAL STONE COMBINATION, AGGREGATE SHALL BE REPLACED OR CLEANED WHEN INSPECTION REVEALS THAT CLOGGED VOIDS ARE CAUSING PONDING PROBLEMS WHICH INTERFERE WITH ONSITE CONSTRUCTION. SEDIMENT SHALL BE REMOVED WHEN THE THE LEVEL OF SEDIMENT DEPOSITION REACHES HALFWAY TO THE TOP OF THE STONE BARRIER. FOR SILT FENCE OPTION, REFER TO SILT FENCE MAINTENANCE.
8. THE STORM DRAIN INLET PROTECTION SHALL BE INSPECTED REGULARLY AND AFTER EACH RAIN AND REPAIRS MADE AS NEEDED. FOR CURB INLET SEDIMENT RETENTION ROLLS, ENSURE ROLL COVERS THE ENTIRE INLET THROAT. SEDIMENT SHALL BE REMOVED WHEN IT HAS ACCUMULATED ONE-HALF THE EXPOSED HEIGHT OF THE ROLL. FOR SILT FENCE DROP INLET PROTECTION, REFER TO SILT FENCE MAINTENANCE.
9. SOIL STABILIZATION BLANKETS AND MATTING SHALL BE INSPECTED PERIODICALLY AFTER INSTALLATION, PARTICULARLY AFTER RAINSTORMS, TO CHECK FOR EROSION AND UNDERMINING. ANY DISLOCATION OR FAILURE SHOULD BE REPAIRED IMMEDIATELY. IF WASHOUTS OR BREAKAGE OCCURS, RE-INSTALL THE MATERIAL AFTER REPAIRING DAMAGE TO THE SLOPE OR DITCH.

CONSTRUCTION SEQUENCE:
PHASE I E&S
1. FLAG SITE AS DESCRIBED IN THE MANAGEMENT STRATEGIES PRIOR TO PRE-CONSTRUCTION MEETING.
2. INSTALL CONSTRUCTION ENTRANCE WITH MOUNTABLE BERM AT THE CONNECTION TO THE PUBLIC ROADWAY.
3. INSTALL SAFETY FENCE AROUND DRAINFIELDS.
4. INSTALL PERIMETER CONTROLS (DIVERSION DIKES, SILT FENCE, SUPER SILT FENCE, ETC.).
5. INSTALL SEDIMENT BASIN. A STAKE OR SPRAY PAINT MARKER SHALL BE INSTALLED WITHIN THE SEDIMENT BASIN AT THE CLEANOUT POINT.
6. INSTALL ROAD CROSSING CULVERT FROM STRUCTURE 12 TO 13 ALONG WITH CULVERT INLET PROTECTION. INSTALL TEMPORARY OUTLET PROTECTION AS SHOWN ON THE PHASE I PLAN.
7. APPLY TEMPORARY SEEDING AS NEEDED.
8. DAILY INSPECTION AND MAINTENANCE OF E&S CONTROLS AS REQUIRED.

PHASE II E&S
1. INSTALL ADDITIONAL PERIMETER CONTROLS AS NEEDED.
2. ONCE E&S CONTROLS ARE INSTALLED, AN INITIAL E&S INSPECTION IS REQUIRED PRIOR TO CLEARING AND GRUBBING.
3. PERFORM CLEARING AND GRUBBING OPERATIONS.
4. BEGIN ROUGH GRADING AND EARTHWORK OPERATIONS.
5. APPLY TEMPORARY SEEDING WHEN REQUIRED.
6. PERFORM ROUGH GRADING FOR ROADS AND BUILDING PADS.
   6.1. ACCESS TO HIDDEN HOLLOW LANE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
7. INSTALL UTILITIES, STORM DRAINAGE SYSTEM AND STORM DRAIN INLET PROTECTION, AND CULVERTS AND CULVERT INLET PROTECTION.
8. PERFORM ROAD FINE GRADING, INCLUDING AGGREGATE SUBBASE AND PAVING.
   8.1. ONCE NICOLAS WAY HAS BEEN CONSTRUCTED TO HIDDEN HOLLOW LANE AND THE REALIGNED ENTRANCE HAS BEEN CONSTRUCTED, THE EXISTING PORTION OF HIDDEN HOLLOW LANE FROM BLACKWELL ROAD TO NICOLAS WAY MAY BE REMOVED.
9. CONVERT SEDIMENT BASIN #1 TO PERMANENT SWM POND 'A' WHEN ALL UPHILL AREAS HAVE BEEN STABILIZED AND/OR REDIRECTED TO FINAL PROPOSED SWM PONDS AND ONLY AFTER WRITTEN AUTHORIZATION FROM THE COUNTY E&S INSPECTOR HAS BEEN OBTAINED.
10. PERMANENT SEEDING OPERATION.
11. ONCE UPHILL AREAS HAVE BEEN STABILIZED, INSTALL PLUNGE POOL AND LEVEL SPREADER DOWNSTREAM OF STRUCTURE 12 AND INSTALL VEGETATED FILTER STRIP.
12. INSTALL BIORETENTION BASIN 'A' ONCE ALL UPHILL AREAS HAVE BEEN COMPLETELY STABILIZED. SILT FENCE SHALL BE INSTALLED ALONG THE MAXIMUM PONDING DEPTH OF THE BIORETENTION BASIN TO PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING THE AREA WHERE THE ENGINEERED SOILS MEDIA AND STONE RESERVOIR ARE TO BE INSTALLED.
13. DAILY INSPECTION AND MAINTENANCE OF E&S CONTROLS AS REQUIRED.
14. REMOVE E&S CONTROLS WITH APPROVAL FROM THE SITE INSPECTOR.

TOPSOIL NARRATIVE:

FIELD EXPLORATION SHALL BE MADE TO DETERMINE IF THERE IS SUFFICIENT SURFACE SOIL OF GOOD QUALITY TO JUSTIFY STRIPPING. TOPSOIL SHALL BE FRIABLE AND LOAMY (LOAM, SANDY LOAM, SILT LOAM, SANDY CLAY LOAM, CLAY LOAM). IT SHALL BE FREE OF DEBRIS, TRASH, STUMPS, ROCKS, ROOTS, AND NOXIOUS WEEDS, AND SHALL GIVE EVIDENCE OF BEING ABLE TO SUPPORT HEALTHY VEGETATION. IT SHALL CONTAIN NO SUBSTANCE THAT IS POTENTIALLY TOXIC TO PLANT GROWTH.

ALL TOPSOIL SHALL BE TESTED BY A RECOGNIZED LABORATORY FOR THE FOLLOWING CRITERIA:

ORGANIC MATTER: CONTENT SHALL BE NOT LESS THAN 1.5% BY WEIGHT.

pH RANGE: SHALL BE FROM 6.0-7.5. IF pH IS LESS THAN 6.0, LIME SHALL BE ADDED IN ACCORDANCE WITH SOIL TEST RESULTS OR IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE VEGETATIVE ESTABLISHMENT PRACTICE BEING USED.

SOLUBLE SALTS: SHALL NOT EXCEED 500 PPM.

IF ADDITIONAL OFF-SITE TOPSOIL IS NEEDED, IT MUST MEET THE STANDARDS STATED ABOVE.

STRIPPING:
TOPSOIL OPERATIONS SHALL NOT BE PERFORMED WHEN THE SOIL IS WET OR FROZEN. STRIPPING SHALL BE CONFINED TO THE IMMEDIATE CONSTRUCTION AREA. A 4-TO-6 INCH STRIPPING DEPTH IS COMMON, BUT DEPTH MAY VARY DEPENDING ON THE PARTICULAR SOIL. ALL PERIMETER DIKES, BASINS, AND OTHER SEDIMENT CONTROLS SHALL BE IN PLACE PRIOR TO STRIPPING.

STOCKPILING:
TOPSOIL SHALL BE STOCKPILED IN SUCH A MANNER THAT NATURAL DRAINAGE IS NOT OBSTRUCTED AND NO OFF-SITE SEDIMENT DAMAGE SHALL RESULT. STABILIZE OR PROTECT STOCKPILES IN ACCORDANCE WITH MS#2. THE SIDE SLOPES OF THE STOCKPILE SHALL NOT EXCEED 2:1. PERIMETER CONTROLS SHALL BE PLACED AROUND THE STOCKPILE IMMEDIATELY; SEEDING OF STOCKPILES SHALL BE COMPLETED WITHIN 7 DAYS OF THE FORMATION OF THE STOCKPILE, IN ACCORDANCE WITH STD & SPEC 3.31 TEMPORARY SEEDING IF IT IS TO REMAIN DORMANT FOR LONGER THAN 14 DAYS.

SITE PREPARATION PRIOR TO AND MAINTENANCE DURING TOP SOILING:
BEFORE TOPSOILING, ESTABLISH NEEDED EROSION AND SEDIMENT CONTROL PRACTICES. THESE PRACTICES MUST BE MAINTAINED DURING TOPSOILING. PREVIOUSLY ESTABLISHED GRADES ON THE AREAS TO BE TOPSOILED SHALL BE MAINTAINED ACCORDING TO THE APPROVED PLAN. WHERE THE pH OF THE SUBSOIL ID 6.0 OR LESS, OR THE SOIL IS COMPOSED OF HEAVY CLAYS, AGRICULTURAL LIMESTONE SHALL BE SPREAD IN ACCORDANCE WITH THE SOIL TEST OR THE VEGETATIVE ESTABLISHMENT PRACTICE BEING USED. AFTER THE AREAS TO BE TOPSOILED HAVE BEEN BROUGHT TO GRADE, AND IMMEDIATELY PRIOR TO DUMPING AND SPREADING THE TOPSOIL, THE SUBGRADE SHALL BE LOOSENED BY DISCING OR SCARIFYING TO A DEPTH OF AT LEAST 2 INCHES TO ENSURE BONDING OF THE TOPSOIL AND SUBSOIL.

APPLYING TOPSOIL:
TOPSOIL SHALL NOT BE PLACED WHILE IN A FROZEN OR MUDDY CONDITION, WHEN TOPSOIL OR SUBGRADE IS EXCESSIVELY WET, OR IN A CONDITION THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING OR PROPOSED SODDING OR SEEDING. THE TOPSOIL SHALL BE UNIFORMLY DISTRIBUTED TO A MINIMUM COMPACTED DEPTH OF 2 INCHES ON 3:1 OR STEEPED SLOPES AND 4 INCHES ON FLATTER SLOPES. ANY IRREGULARITIES IN THE SURFACE, RESULTING FROM TOPSOILING OR OTHER OPERATIONS, SHALL BE CORRECTED IN ORDER TO PREVENT THE FORMATION OF DEPRESSIONS OR WATER POCKETS.

IT IS NECESSARY TO COMPACT THE TOPSOIL ENOUGH TO ENSURE GOOD CONTACT WITH THE UNDERLYING SOIL AND TO OBTAIN A LEVEL SEEDBED FOR THE ESTABLISHMENT OF HIGH MAINTENANCE TURF. HOWEVER, UNDUE COMPACTION IS TO BE AVOIDED AS IT INCREASES RUNOFF VELOCITY AND VOLUME, AND DETERS SEED GERMINATION. SPECIAL CONSIDERATION SHOULD BE GIVEN TO THE TYPES OF EQUIPMENT USED TO PLACE TOPSOIL IN AREAS TO RECEIVE FINE TURF. AVOID UNNECESSARY COMPACTION BY HEAVY MACHINERY WHENEVER POSSIBLE. IN AREAS WHICH ARE NOT GOING TO BE MOWED, THE SURFACE SHALL BE LEFT ROUGH IN ACCORDANCE WITH SURFACE ROUGHENING STD & SPEC 3.29.

NO SOD OR SEED SHALL BE PLACED ON SOIL WHICH HAS BEEN TREATED WITH SOIL STERILANTS UNTIL SUFFICIENT TIME HAS ELAPSED TO PERMIT DISSIPATION OF TOXIC MATERIALS.

MINIMUM STANDARDS

1. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
2. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCK PILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.
3. A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.
4. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
5. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
6. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.
   A. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAN THREE ACRES.
   B. SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A 25-YEAR STORM OF 24-HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.
7. CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.
8. CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.
9. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.
10. 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.
11. BEFORE NEWLY CONSTRUCTED STORM WATER CONVEYANCE CHANNELS ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHELL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.
12. WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NON-ERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THE STRUCTURES IF ARMORED BY NON-ERODIBLE COVER MATERIALS.
13. WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY STREAM CROSSING CONSTRUCTED OF NON-ERODIBLE MATERIAL SHALL BE PROVIDED.
14. ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS PERTAINING TO W

LIME AND FERTILIZER REQUIREMENTS

LIME AND FERTILIZER NEEDS SHALL BE DETERMINED BY SOIL TESTS. SOIL TESTS MAY BE PERFORMED BY THE COOPERATIVE EXTENSION SERVICE SOIL TESTING LABORATORY AT VPI&SU OR BY A REPUTABLE COMMERCIAL LABORATORY. INFORMATION CONCERNING THE STATE SOIL TESTING LABORATORY IS AVAILABLE FROM COUNTY EXTENSION AGENTS. REFERENCE APPENDIX 3.32–D OF THE VESCH FOR LIMING APPLICATIONS (IN LBS.) NEEDED TO CORRECT UNDESIRABLE pH FOR VARIOUS SOIL TYPES.

TABLE 3.32-F

LBS. OF GROUND AGRICULTURAL LIMESTONE* PER THOUSAND SQUARE FEET NEEDED TO CORRECT pH LEVEL OF ACID SOILS TO 6.5

Existing pH	Soil Texture		
	Sandy Loam	Loam	Clay Loam
6.2	20	35	40
6.0	40	55	70
5.8	55	65	85
5.6	70	80	105
5.4	90	100	125
5.2	105	120	140
5.0	120	140	160
4.8	125	180	205
4.6	155	210	230
4.0	200	250	300

* Lime should always be applied in accordance with the results of a soil test, such as may be obtained through the soil testing laboratory at VPI&SU or through a reputable commercial laboratory.

PERMANENT SEEDING TABLE

TABLE 3.32-D
SITE SPECIFIC SEEDING MIXTURES FOR PIEDMONT AREA

	Total Lbs. Per Acre
Minimum Care Lawn	
- Commercial or Residential	175-200 lbs.
- Kentucky 31 or Turf-Type Tall Fescue	95-100%
- Improved Perennial Ryegrass	0-5%
- Kentucky Bluegrass	0-5%
High-Maintenance Lawn	200-250 lbs.
- Kentucky 31 or Turf-Type Tall Fescue	100%
General Slope (3:1 or less)	
- Kentucky 31 Fescue	128 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
	150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	
- Kentucky 31 Fescue	108 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
- Crownvetch **	20 lbs.
	150 lbs.

* Use seasonal nurse crop in accordance with seeding dates as stated below:
February 16th through April ..... Annual Rye
May 1st through August 15th ..... Foxtail Millet
August 16th through October ..... Annual Rye
November through February 15th ..... Winter Rye

** Substitute Sericea lespedeza for Crownvetch east of Farmville, Va. (May through September use hulled Sericea, all other periods, use unhulled Sericea). If Flatpea is used in lieu of Crownvetch, increase rate to 30 lbs./acre. All legume seed must be properly inoculated. Weeping Lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10-20 lbs./acre in mixes.

TABLE 3.31-B

ACCEPTABLE TEMPORARY SEEDING PLANT MATERIALS

"QUICK REFERENCE FOR ALL REGIONS"

Planting Dates	Species	Rate (lbs./acre)
Sept. 1 - Feb. 15	50/50 Mix of Annual Ryegrass (Lolium multi-florum) & Cereal (Winter) Rye (Secale cereale)	50 - 100
Feb. 16 - Apr. 30	Annual Ryegrass (Lolium multi-florum)	60 - 100
May 1 - Aug 31	German Millet (Setaria italica)	50

TABLE 3.32-E

QUALITY OF SEED*

	Minimum Seed Purity (%)	Minimum Germination (%)
Legumes		
Crownvetch	98	65**
Lespedeza, Korean	97	85**
Lespedeza, Sericea	98	85**
Grasses		
Bluegrass, Kentucky	97	85
Fescue, Tall (Improved, Turf-Type Cultivars)	98	85
Fescue, Tall (Ky-31)	97	85
Fescue, Red	98	85
Redtop	94	80
Reed Canarygrass	98	80
Perennial Ryegrass	98	90
Weeping Lovegrass	98	87
Annuals		
Annual Ryegrass	97	90
German Millet	98	85
Oats	98	80
Cereal Rye	98	85

* Seed containing prohibited or restricted noxious weeds should not be accepted. Seed should not contain in excess of 0.5% weed seed. To calculate percent pure, live seed, multiply germination times purity and divide by 100.

Example: Ky-31 Tall Fescue with a germination of 85 percent and a purity of 97 percent.

97 x 85 = 8245. 8245 ÷ 100 = 82.45 percent pure live seed.

** Includes "hard seed"

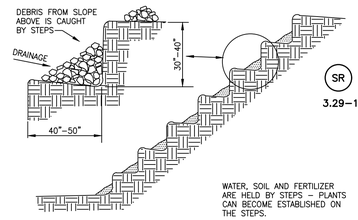
TABLE 3.35-A

ORGANIC MULCH MATERIALS AND APPLICATION RATES

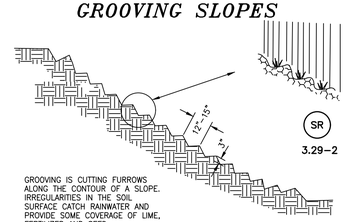
MULCHES:	RATES: Per Acre	RATES: Per 1000 sq. ft.	NOTES:
Straw or Hay	1½ - 2 tons (Minimum 2 tons for winter cover)	70 - 90 lbs.	Free from weeds and coarse matter. Must be anchored. Spread with mulch blower or by hand.
Fiber Mulch	Minimum 1500 lbs.	35 lbs.	Do not use as mulch for winter cover or during hot, dry periods.* Apply as slurry.
Corn Stalks	4 - 6 tons	185 - 275 lbs.	Cut or shredded in 4-6" lengths. Air-dried. Do not use in fine turf areas. Apply with mulch blower or by hand.
Wood Chips	4 - 6 tons	185 - 275 lbs.	Free of coarse matter. Air-dried. Treat with 12 lbs nitrogen per ton. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.
Bark Chips or Shredded Bark	50 - 70 cu. yds.	1-2 cu. yds.	Free of coarse matter. Air-dried. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.

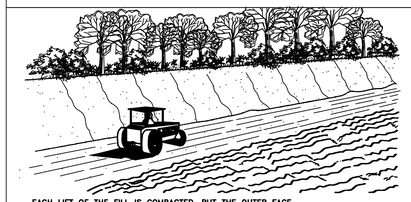
* When fiber mulch is the only available mulch during periods when straw should be used, apply at a minimum rate of 2000 lbs./ac. or 45 lbs./1000 sq. ft.

STAIR STEPPING CUT SLOPES

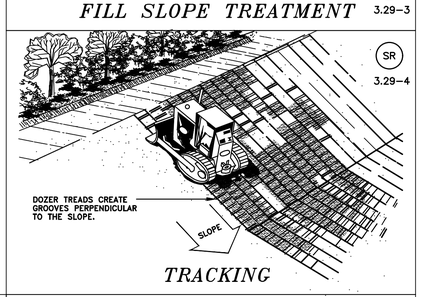


GROOVING SLOPES



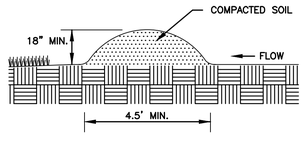


FILL SLOPE TREATMENT



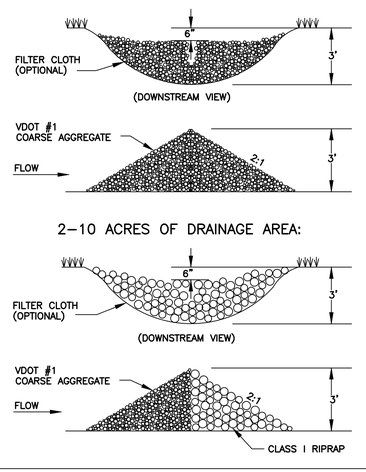
TRACKING

TEMPORARY DIVERSION DIKE 3.09–1

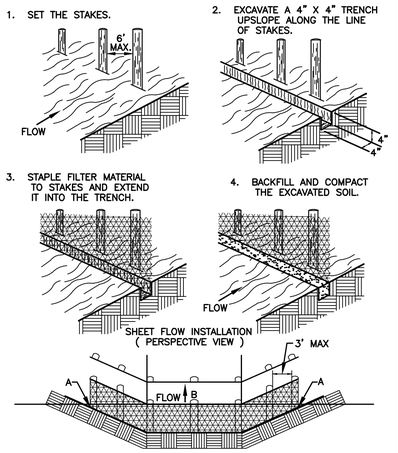


SEE THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK FOR ADDITIONAL CONSTRUCTION SPECIFICATIONS AND MAINTENANCE REQUIREMENTS FOR THE PROPOSED EROSION AND SEDIMENT CONTROL MEASURES SPECIFIED ON THIS PLAN.

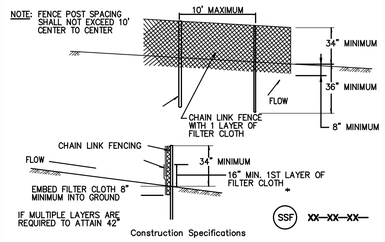
ROCK CHECK DAM 3.20–1



SILT FENCE (WITHOUT WIRE SUPPORT) 3.05–2



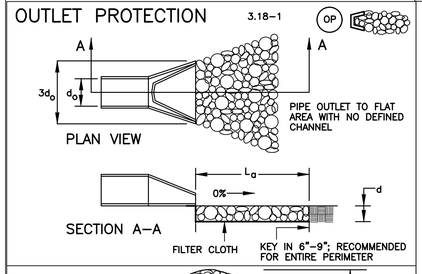
SUPER SILT FENCE

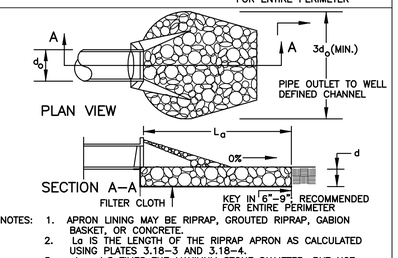


1. Fencing shall be 42" in height and constructed in accordance with the latest VDOT Details for Chain Link Fencing. The specification for a 6' fence shall be used, substituting 42" fabric and 6' length posts.
2. Chain link fence shall be fastened securely to the fence posts with wire ties. The lower tension wire, brace and truss rods, drive anchors and post caps are not required except on the ends of the fence.
3. Filter cloth shall be fastened securely to the chain link fence with ties spaced every 24" at the top and mid section.
4. Filter cloth shall be embedded a minimum of 8" into the ground.
5. When two sections of filter cloth adjoin each other, they shall be overlapped by 6" and folded.
6. Maintenance shall be performed as needed and silt buildups removed when "bulges" develop in the silt fence, or when silt reaches 50% of fence height
7. Filter cloth shall be fastened securely to each fence post with wire ties or staples at top and mid section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal/ft ²/minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

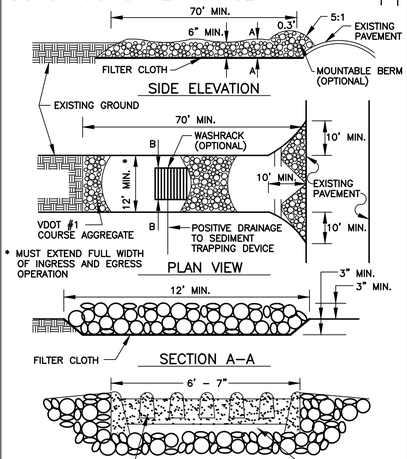
OUTLET PROTECTION 3.18–1



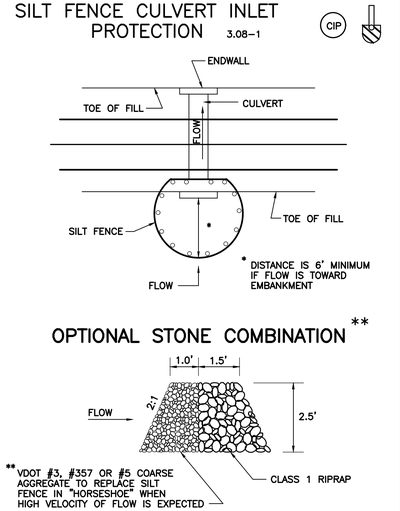


NOTES:
1. APRON LINING MAY BE RIPRAP, GROUTED RIPRAP, GABION BASKET, OR CONCRETE.
2. La IS THE LENGTH OF THE RIPRAP APRON AS CALCULATED USING PLATES 3.18–3 AND 3.18–4.
3. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN 6 INCHES.

TEMPORARY STONE CONSTRUCTION ENTRANCE 3.02–1



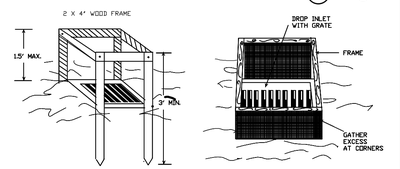
SILT FENCE CULVERT INLET PROTECTION 3.08–1

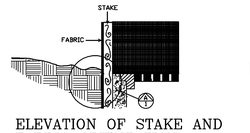


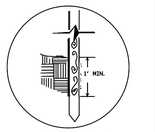
OPTIONAL STONE COMBINATION **

** VDOT #3, #357 OR #5 COARSE AGGREGATE TO REPLACE SILT FENCE IN "HORSESHOE" WHEN HIGH VELOCITY OF FLOW IS EXPECTED

SILT FENCE DROP INLET PROTECTION 3.07–1







SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS. SUCH AS IN STREET OR HIGHWAY MEDIANS.

Item G.

Bowman

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EROSION AND SEDIMENT CONTROL NOTES & DETAILS

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: V:

JOB No. 6642-02-002

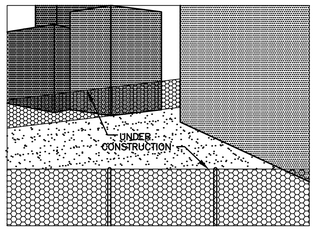
DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

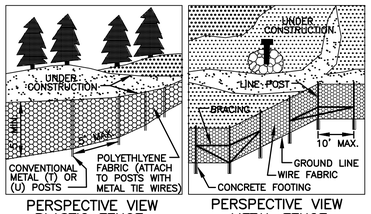
SHEET 36 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\035-037-6642-D-CP-001-ESD.dwg

SAFETY FENCE 3.01-1



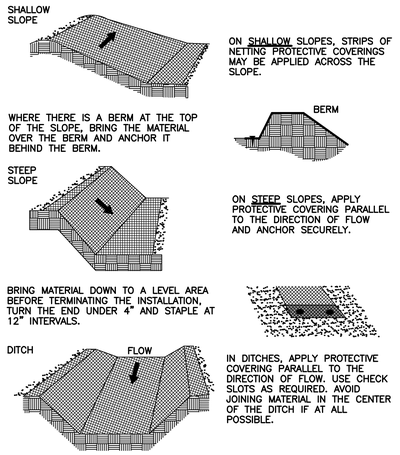
PERSPECTIVE VIEW



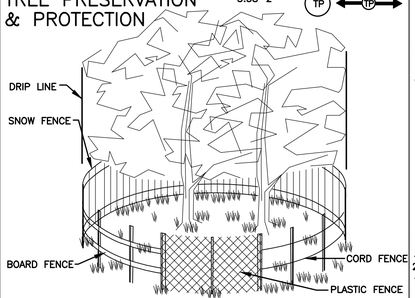
PERSPECTIVE VIEW PLASTIC FENCE

PERSPECTIVE VIEW METAL FENCE

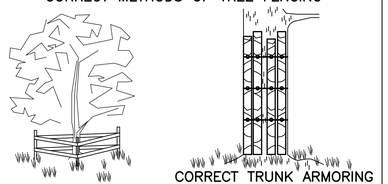
SOIL STABILIZATION BLANKETS TREATMENT – 1 3.36-1



TREE PRESERVATION & PROTECTION 3.38-2



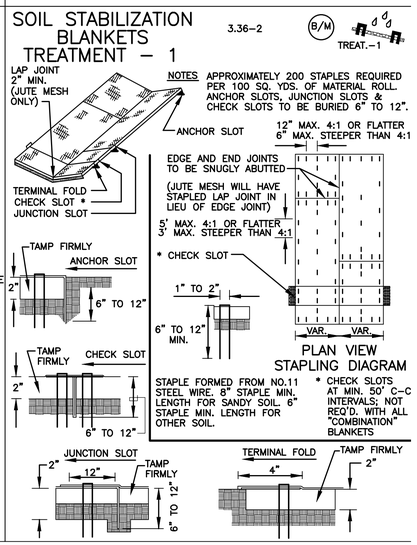
CORRECT METHODS OF TREE FENCING



CORRECT TRUNK ARMORING

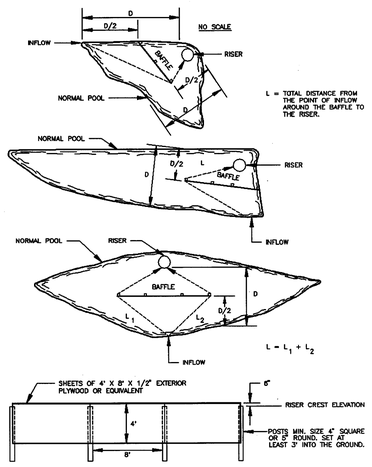
TRIANGULAR BOARD FENCE

SOIL STABILIZATION BLANKETS TREATMENT – 1 3.36-2



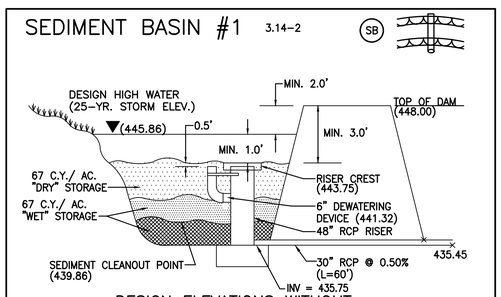
1992 3.14

EXAMPLE PLAN VIEWS OF BAFFLE LOCATIONS IN SEDIMENT BASINS



Source: USDA-SCS Plate 3.14-6

SEDIMENT BASIN #1 3.14-2



DESIGN ELEVATIONS WITHOUT EMERGENCY SPILLWAY
(RISER PASSES 25-YR. EVENT)

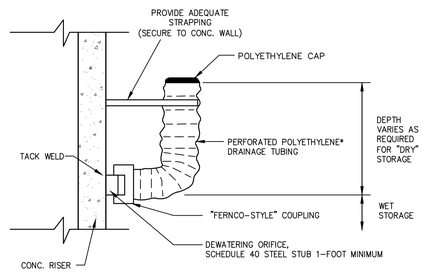
ELEVATIONS IN PARENTHESIS DENOTE ACTUAL DIMENSIONS

PROCEDURE FOR CONVERTING SEDIMENT BASINS:

1. CONVERSION TO THE PERMANENT SWM/BMP FACILITY SHALL TAKE PLACE ONLY AFTER FINAL STABILIZATION IS COMPLETE AND WITH THE WRITTEN AUTHORIZATION FROM THE COUNTY E&S INSPECTOR.
2. PUMP DOWN BASIN–USE APPROVED DE–WATERING MEASURES. EFFLUENT MUST BE FILTERED AND DISCHARGED TO A STABILIZED RECEIVING CHANNEL.
3. REMOVE ACCUMULATED SEDIMENT (AS NEEDED) TO ESTABLISH FINAL GRADE OF THE POND.
4. SEDIMENT MUST BE DISPOSED OF IN AN APPROVED AREA WITHIN THE LIMITS OF CLEARING.
5. GRADE AND ROUGHEN THE BOTTOM OF THE POND TO PREPARE FOR SEEDING.
6. UNPLUG THE LOW FLOW ORIFICE ON STRUCTURE A3 AND THE POND DEWATERING ORIFICE STRUCTURE A4 AND INSTALL DEBRIS/TRASH RACK DEVICE ON THE LOW–FLOW ORIFICE TO PREVENT CLOGGING.
7. PLUG ORIFICE USED FOR TEMPORARY DEWATERING DEVICE.
8. SEED, MULCH, AND TACK JUTE MESH OR OTHER SUITABLE MATTING TO THE BOTTOM OF THE POND.
9. AFTER THE CONVERSION IS COMPLETE, PREPARE AND SUBMIT AS–BUILT PLANS OF THE POND(S) IN CONJUNCTION WITH THE BOND RELEASE REQUEST.

RECOMMENDED DEWATERING SYSTEM FOR SEDIMENT BASINS

N.T.S.



NOTE: WITH CONCRETE RISER, USE PVC SCHEDULE 40 STUB FOR DEWATERING ORIFICE

*DRAINAGE TUBING SHALL COMPLY WITH ASTM F667 AND AASHTO M294

Temporary Sediment Basin #1 - Design Calculations

Storage - Elevation Table

Elevation (ft.)	Area (ft^2)	Volume (cf.)	Volume (cyd.)	Total (cyd.)
435	1620	0.0	0.00	0.00
436	2218	1919.0	71.07	71.07
438	3660	6615.0	245.00	316.07
440	6615	9901.0	366.70	682.78
441	9901	16386.0	606.89	1289.67
442	16386	20233.0	749.37	2039.04
444	20233	24370.0	902.59	2941.63
446	24370	28755.0	1065.00	4006.63
448	28755	28755.0	1065.00	5071.63

Basin Volume Design

Wet Storage:

1. Minimum required volume = 67 cu. Yds. x Total Drainage Area (acres.) = 67 cu. Yds. 19.33 (acres.) = 1295.1 cu. Yds.
2. Available basin volume at dewatering orifice = 1529.5 cu. Yds. at elevation 441.32 (From Storage - Elevation Curve)
3. Available volume before cleanout required. 34 cu. Yds. x 19.33 (acres) = 657.2 cu. Yds.
4. Elevation corresponding to cleanout level = 439.86 (From Storage - Elevation Curve)
5. Distance from invert of dewatering orifice to cleanout level = 1.46

Dry Storage:

6. Minimum required volume = 67 cu. Yds. x Total Drainage Area (acres.) = 67 cu. Yds. 19.33 (acres.) = 1295.1 cu. Yds.
7. Total available basin volume at crest of riser* = 2828.8 cu. Yds. at elevation 443.75 (From Storage - Elevation Curve)
   * Minimum = 134 cu. Yds. / acre of total drainage area. = 2590.2 cu. Yds.

Dewatering Orifice Calculation
Q = S/ 21,600
h = (Top Ris - Wet Stor El)/2
A = Q/((64.32 * h)^.5 * 0.6)
d = 2 * (A/3.1415)^0.5

S= 1295.11 CY
Q= 1.62 cfs
h= 1.22 ft
A= 0.31 ft^2
d= 0.62 ft
d= 7.5 inches

8. Diameter of dewatering orifice = 6.0 in.
9. Diameter of flexible tubing = 8.0 in. (Diameter of dewatering orifice plus 2 inches.)

Preliminary Design Elevations

10. Crest of Riser = 443.75; Top of Dam = 448.00; Design High Water = 446.00; Downstream Toe of Dam = 436.00

Basin Shape

11. Length of Flow L= 290 ft; Effective Width We = 41 ft; Surface Area Normal Pool A = 11976 sf; Length to Width Ratio = 7.0 (with baffle)
    If > 2, baffles are not required
    If < 2, baffles are required

Runoff

Drainage Area:

Impervious:	3.71	Acres	(C=0.90)
Woods:	3.75	Acres	(C=0.25)
Open Space:	0.78	Acres	(C=0.35)
Disturbed:	14.8	Acres	(C=0.60)
Total:	19.33	Acres	
Tc =	7.75	Minutes	
I(2) =	4.40	in/hr	
I(25) =	6.60	in/hr	
C-factor =	0.69		

Time of Concentration:

Sheet Flow	Shallow Concentrated Flow	
L = 100	L = 1150	(ft)
Slope = 0.025	Slope = 0.087	(ft/ft)
n= 0.05	Paved = No	
t= 3.72	t = 4.03	(min)

12. Q_2 = 59.10 cfs
13. Q_{25} = 88.58 cfs

Principal Spillway Design

14. With emergency spillway, required spillway capacity Qp = Q_2 = 59.10 cfs. (Riser and barrel.)
    Without emergency spillway, required spillway capacity Qp = Q25 = 88.58 cfs. (Riser and barrel)
15. Without emergency spillway: Assumed available head (h) = 2.25 ft. Using Q_{25})
    h = Design High Water Elevation - Crest of Riser Elevation
16. Riser diamter (Dr) = 48 in. Actual head (h) = 2.11 ft. (From Plate 3.14-8)
17. Barrel length (l) = 60 ft. Head (H) on barrel through embankment = 9.30 ft.
18. Barrel diameter = 30 in. (From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe].)
19. Trash rack and anti-vortex device Diameter = N/A inches. Install permanent trash rack Height = N/A inches. (from Table 3.14-D)

Anti-Seep Collar Design

20. Depth of water at principal spillway crest (Y) = 7.75 ft; Slope of upstream face of embankment (Z) = 3.00 ft; Slope of principal spillway barrel (Sb) = 0.005 ft/ft; Length of barel in saturated zone (Ls) = 55.06 ft.
21. Number of collars required = N/A dimensions = N/A (From Plate 3.14-12.) Install permanent anti-seepage control

Final Design Elevations

Principal Spillway Crest =	443.75	
Dewatering Orifice Invert =	441.32	
Cleanout Elevation =	439.86	
Embankment Width =	10.00 ft	OK
Dam Height =	12.00	
Dam Side Slopes =	3:1	
Top of Dam =	448.00	
Bottom of Wet Storage =	435.00	
Design High Water = (Q(25) flow)	445.86	
Distance from Design High Water = to Crest of Dam	2.14	OK

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EROSION AND SEDIMENT CONTROL NOTES & DETAILS

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM B. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS

DATE	DESCRIPTION
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: V:

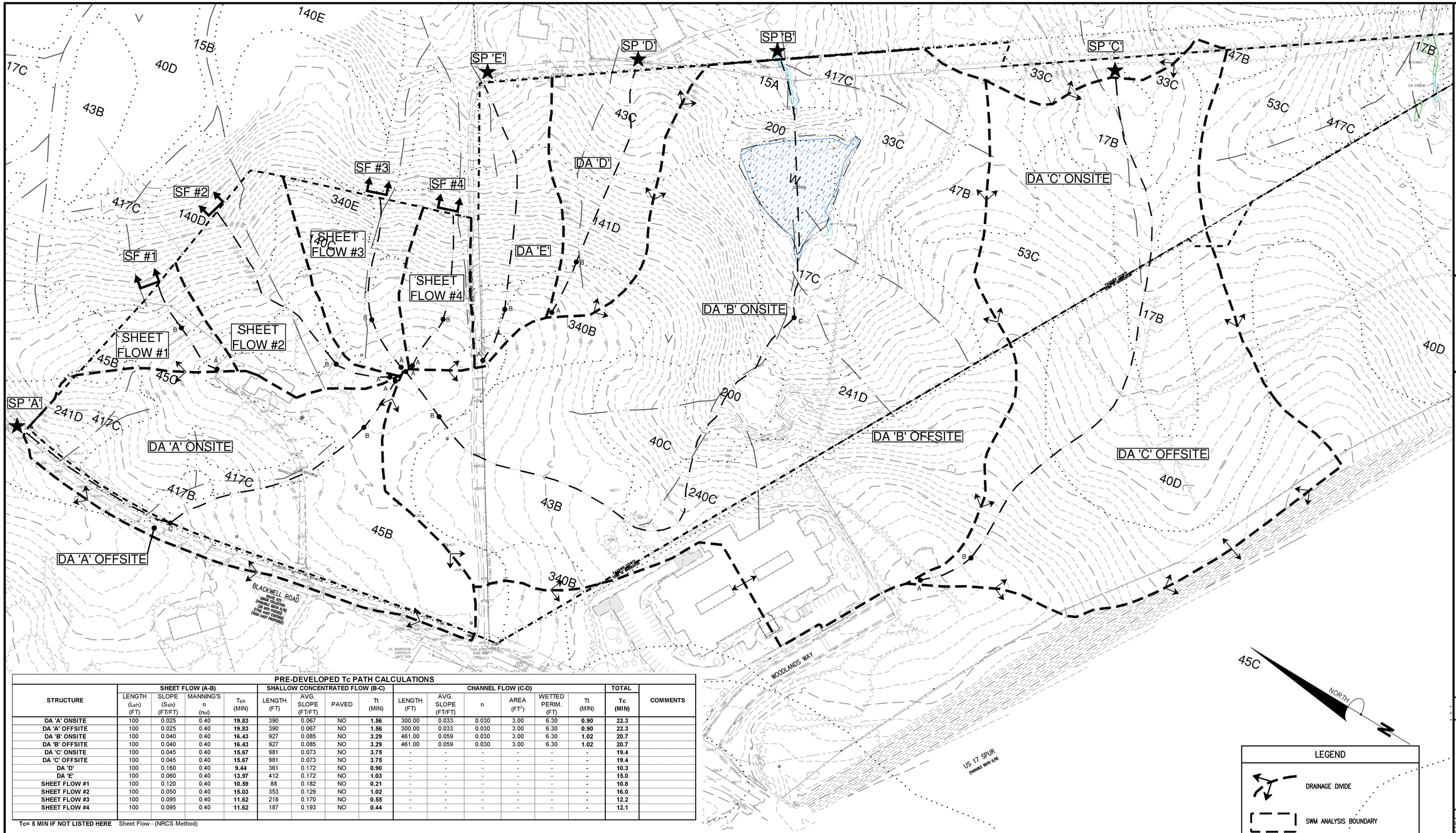
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 37 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\035-037-6642-D-CP-001-ESD.dwg



PRE-DEVELOPED Tc PATH CALCULATIONS

STRUCTURE	SHEET FLOW (A-B) LENGTH (L_{sh}) (FT)	SHEET FLOW (A-B) SLOPE (S_{sh}) (FT/FT)	SHEET FLOW (A-B) MANNING'S n (n_{oi})	SHEET FLOW (A-B) T_{sh} (MIN)	SHALLOW CONCENTRATED FLOW (B-C) LENGTH (FT)	SHALLOW CONCENTRATED FLOW (B-C) AVG. SLOPE (FT/FT)	SHALLOW CONCENTRATED FLOW (B-C) PAVED	SHALLOW CONCENTRATED FLOW (B-C) Tt (MIN)	CHANNEL FLOW (C-D) LENGTH (FT)	CHANNEL FLOW (C-D) AVG. SLOPE (FT/FT)	CHANNEL FLOW (C-D) n	CHANNEL FLOW (C-D) AREA (FT^2)	CHANNEL FLOW (C-D) WETTED PERIM. (FT)	CHANNEL FLOW (C-D) Tt (MIN)	TOTAL Tc (MIN)	COMMENTS
DA 'A' ONSITE	100	0.025	0.40	**19.83**	390	0.067	NO	**1.56**	300.00	0.033	0.030	3.00	6.30	**0.90**	**22.3**	
DA 'A' OFFSITE	100	0.025	0.40	**19.83**	390	0.067	NO	**1.56**	300.00	0.033	0.030	3.00	6.30	**0.90**	**22.3**	
DA 'B' ONSITE	100	0.040	0.40	**16.43**	927	0.085	NO	**3.29**	461.00	0.059	0.030	3.00	6.30	**1.02**	**20.7**	
DA 'B' OFFSITE	100	0.040	0.40	**16.43**	927	0.085	NO	**3.29**	461.00	0.059	0.030	3.00	6.30	**1.02**	**20.7**	
DA 'C' ONSITE	100	0.045	0.40	**15.67**	981	0.073	NO	**3.75**	-	-	-	-	-	**-**	**19.4**	
DA 'C' OFFSITE	100	0.045	0.40	**15.67**	981	0.073	NO	**3.75**	-	-	-	-	-	**-**	**19.4**	
DA 'D'	100	0.160	0.40	**9.44**	361	0.172	NO	**0.90**	-	-	-	-	-	**-**	**10.3**	
DA 'E'	100	0.060	0.40	**13.97**	412	0.172	NO	**1.03**	-	-	-	-	-	**-**	**15.0**	
SHEET FLOW #1	100	0.120	0.40	**10.59**	88	0.182	NO	**0.21**	-	-	-	-	-	**-**	**10.8**	
SHEET FLOW #2	100	0.050	0.40	**15.03**	353	0.129	NO	**1.02**	-	-	-	-	-	**-**	**16.0**	
SHEET FLOW #3	100	0.095	0.40	**11.62**	218	0.170	NO	**0.55**	-	-	-	-	-	**-**	**12.2**	
SHEET FLOW #4	100	0.095	0.40	**11.62**	187	0.193	NO	**0.44**	-	-	-	-	-	**-**	**12.1**	

Tc= 5 MIN IF NOT LISTED HERE Sheet Flow - (NRCS Method)

PRE-DEVELOPED DRAINAGE AREA CALCULATIONS

STRUCTURE ID / DRAINAGE AREA	ONSITE DRAINAGE AREA B SOILS 98 IMPERVIOUS AREA (AC)	B SOILS 61 TURF (AC)	B SOILS 55 WOODS/ PROTECTED OPEN SPACE (AC)	C SOILS 98 IMPERVIOUS AREA (AC)	C SOILS 74 TURF (AC)	C SOILS 70 WOODS/ PROTECTED OPEN SPACE (AC)	D SOILS 98 IMPERVIOUS AREA (AC)	D SOILS 80 TURF (AC)	D SOILS 77 WOODS/ PROTECTED OPEN SPACE (AC)	OFFSITE DRAINAGE AREA IMPERVIOUS 98 IMPERVIOUS AREA (AC)	A SOILS 39 TURF (AC)	A SOILS 30 WOODS/ PROTECTED OPEN SPACE (AC)	B SOILS 61 TURF (AC)	B SOILS 55 WOODS/ PROTECTED OPEN SPACE (AC)	C SOILS 74 TURF (AC)	C SOILS 70 WOODS/ PROTECTED OPEN SPACE (AC)	D SOILS 80 TURF (AC)	D SOILS 77 WOODS/ PROTECTED OPEN SPACE (AC)	TOTAL DRAINAGE AREA TO STRUCTURE CALCULATIONS TOTAL DRAINAGE AREA	0.9 TOTAL IMPERVIOUS AREA (AC)	0.35 TOTAL TURF AREA (AC)	0.3 TOTAL WOODS AREA (AC)	SCS CN	RATIONAL C-FACTOR	NOTES
DA 'A' ONSITE	0.01	0.01	0.64	0.15	0.26	3.36	-	-	-	-	-	-	-	-	-	-	-	-	4.4201	0.16	0.27	3.99	69	0.32	TO SP 'A'
DA 'A' ONSITE (WOODS)	-	-	0.65	-	-	3.77	-	-	-	-	-	-	-	-	-	-	-	-	4.4201	-	-	4.42	68	0.30	TO SP 'A'
DA 'A' OFFSITE	-	-	-	-	-	-	-	-	-	0.30	0.04	-	0.14	-	0.09	0.01	-	-	0.5750	0.30	0.27	0.01	81	0.63	TO SP 'A'
DA 'B' ONSITE	0.20	0.20	6.22	0.04	0.26	5.08	0.39	0.10	1.41	-	-	-	-	-	-	-	-	-	13.8963	0.63	0.56	12.71	65	0.33	TO SP 'B'
DA 'B' ONSITE (WOODS)	-	-	6.63	-	-	5.38	-	-	1.89	-	-	-	-	-	-	-	-	-	13.8963	-	-	13.90	64	0.30	TO SP 'B'
DA 'B' OFFSITE	-	-	-	-	-	-	-	-	-	0.68	-	-	0.65	1.88	0.00	0.04	0.03	0.03	3.3113	0.68	0.68	1.95	66	0.43	TO SP 'B'
DA 'C' ONSITE	-	0.01	2.86	-	0.05	0.46	-	-	-	-	-	-	-	-	-	-	-	-	3.38	-	0.06	3.32	57	0.30	TO SP 'C'
DA 'C' ONSITE (WOODS)	-	-	2.87	-	-	0.51	-	-	-	-	-	-	-	-	-	-	-	-	3.3779	-	-	3.38	57	0.30	TO SP 'C'
DA 'C' OFFSITE	-	-	-	-	-	-	-	-	-	-	0.10	0.58	0.72	4.87	0.01	0.01	-	-	6.29	-	0.83	5.46	53	0.31	TO SP 'C'
DA 'D'	0.01	-	0.92	-	-	0.85	-	-	-	-	-	-	-	-	-	-	-	-	1.78	0.01	-	1.77	62	0.30	
DA 'E'	0.00	-	0.40	0.03	0.02	1.05	-	-	-	-	-	-	-	-	-	-	-	-	1.50	0.03	0.02	1.45	67	0.31	
SHEET FLOW #1	-	0.01	-	0.01	0.01	0.57	-	-	-	-	-	-	-	-	-	-	-	-	0.60	0.01	0.02	0.57	70	0.31	
SHEET FLOW #2	-	-	-	0.04	0.25	1.39	-	-	-	-	-	-	-	-	-	-	-	-	1.68	0.04	0.25	1.39	71	0.32	
SHEET FLOW #3	-	-	-	-	-	1.21	-	-	-	-	-	-	-	-	-	-	-	-	1.21	-	-	1.21	70	0.30	
SHEET FLOW #4	-	-	-	0.03	0.02	0.70	-	-	-	-	-	-	-	-	-	-	-	-	0.75	0.03	0.02	0.70	71	0.32	

LEGEND

- DRAINAGE DIVIDE
- SWM ANALYSIS BOUNDARY
- Tc PATH
- A BEGIN OVERLAND FLOW
- B BEGIN SHALLOW CONCENTRATED FLOW
- C BEGIN OPEN CHANNEL FLOW

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

Bowman

Bowman Consulting Group Ltd
1300 Central Park Boulevard
Fredericksburg, Virginia 22401
Phone: (540) 371-0268
bowman.com
Bowman Consulting Group Ltd

PRE-DEVELOPED DRAINAGE DIVIDES

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=80'
V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 38 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\038-6642-D-CP-001-DDX.dwg

SP 'A'
SP 'B'
SP 'C'
SP 'D'
DA 'A' OFFSITE
DA 'A' ONSITE UNDETAINED
DA BIO 'A'
POND 'A'
DA 'B' ONSITE UNDETAINED
DA LEVEL SPREADER
SF #1
SF #2
SF #3
SF #4
OPEN SPACE PARCEL 'A'
OPEN SPACE PARCEL 'B'
BLACKWELL ROAD
WOODLANDS WAY
US 17 SPUR
(VARIABLE WIDTH R/W)

LEGEND

- DRAINAGE DIVIDE
- SWM ANALYSIS BOUNDARY
- Tc PATH
- A BEGIN OVERLAND FLOW
- B BEGIN SHALLOW CONCENTRATED FLOW
- C BEGIN OPEN CHANNEL FLOW

NORTH

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

Bowman

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POST-DEVELOPED DRAINAGE DIVIDES

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
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WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: 1"=80' V:	
JOB No. 6642-02-002		
DATE : FEBRUARY 10, 2023		
FILE No. 6642-D-CP-001		
SHEET 39 OF 58		

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\039-6642-D-CP-001-DDP.dwg

PRE-DEVELOPED SWM CALCULATIONS

PRE-DEVELOPED MASTER SUMMARY

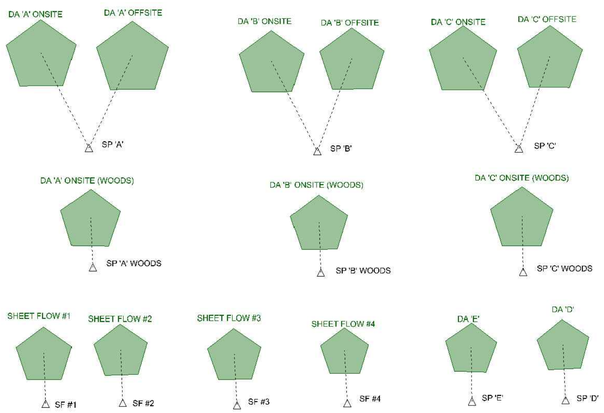
Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
DA 'A' ONSITE	1-YR	1	0.170	12.150	1.57
DA 'A' ONSITE	10-YR	10	0.665	12.100	7.67
DA 'A' OFFSITE	1-YR	1	0.049	12.100	0.56
DA 'A' OFFSITE	10-YR	10	0.135	12.100	1.62
DA 'B' ONSITE	1-YR	1	0.384	12.150	3.04
DA 'B' ONSITE	10-YR	10	1.755	12.100	20.69
DA 'B' OFFSITE	1-YR	1	0.100	12.150	0.84
DA 'B' OFFSITE	10-YR	10	0.437	12.100	5.21
DA 'C' ONSITE	1-YR	1	0.038	12.250	0.11
DA 'C' ONSITE	10-YR	10	0.280	12.100	3.03
DA 'A' ONSITE (WOODS)	1-YR	1	0.158	12.150	1.39
DA 'A' ONSITE (WOODS)	10-YR	10	0.638	12.100	7.30
DA 'B' ONSITE (WOODS)	1-YR	1	0.350	12.150	2.57
DA 'B' ONSITE (WOODS)	10-YR	10	1.674	12.100	19.52
DA 'C' OFFSITE	1-YR	1	0.036	13.450	0.05
DA 'C' OFFSITE	10-YR	10	0.402	12.150	3.81
DA 'C' ONSITE (WOODS)	1-YR	1	0.038	12.250	0.11
DA 'C' ONSITE (WOODS)	10-YR	10	0.280	12.100	3.03
SHEET FLOW #2	1-YR	1	0.075	12.100	0.90
SHEET FLOW #2	10-YR	10	0.274	12.050	3.81
SHEET FLOW #3	1-YR	1	0.050	12.050	0.67
SHEET FLOW #3	10-YR	10	0.190	12.050	2.88
SHEET FLOW #4	1-YR	1	0.034	12.050	0.46
SHEET FLOW #4	10-YR	10	0.122	12.000	1.87
DA 'E'	1-YR	1	0.049	12.100	0.54
DA 'E'	10-YR	10	0.207	12.050	2.93
DA 'D'	1-YR	1	0.037	12.050	0.34
DA 'D'	10-YR	10	0.194	12.000	2.97
SHEET FLOW #1	1-YR	1	0.025	12.050	0.35
SHEET FLOW #1	10-YR	10	0.094	12.000	1.50

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
SP 'A'	1-YR	1	0.219	12.150	2.14
SP 'A'	10-YR	10	0.801	12.100	9.29
SP 'B'	1-YR	1	0.484	12.150	3.88
SP 'B'	10-YR	10	2.192	12.100	25.89
SP 'C'	1-YR	1	0.074	12.550	0.13
SP 'C'	10-YR	10	0.682	12.100	6.79
SP 'A' WOODS	1-YR	1	0.158	12.150	1.39
SP 'A' WOODS	10-YR	10	0.638	12.100	7.30
SP 'B' WOODS	1-YR	1	0.350	12.150	2.57
SP 'B' WOODS	10-YR	10	1.674	12.100	19.52
SP 'C' WOODS	1-YR	1	0.038	12.250	0.11
SP 'C' WOODS	10-YR	10	0.280	12.100	3.03
SF #2	1-YR	1	0.075	12.100	0.90
SF #2	10-YR	10	0.274	12.050	3.81
SF #3	1-YR	1	0.050	12.050	0.67
SF #3	10-YR	10	0.190	12.050	2.88
SF #4	1-YR	1	0.034	12.050	0.46
SF #4	10-YR	10	0.122	12.000	1.87
SP 'E'	1-YR	1	0.049	12.100	0.54
SP 'E'	10-YR	10	0.207	12.050	2.93
SP 'D'	1-YR	1	0.037	12.050	0.34
SP 'D'	10-YR	10	0.194	12.000	2.97
SF #1	1-YR	1	0.025	12.050	0.35
SF #1	10-YR	10	0.094	12.000	1.50

FAUQUIER COUNTY DESIGN STORMS:

NETWORK STORM RETURN EVENT	COLLECTION: FAUQUIER COUNTY, VA TOTAL DEPTH (IN)	RAINFALL TYPE	RNF I.D.
1-YR	2.59	SYNTHETIC CURVE	TYPE II 24 HR
2-YR	3.14	SYNTHETIC CURVE	TYPE II 24 HR
10-YR	4.79	SYNTHETIC CURVE	TYPE II 24 HR
100-YR	8.18	SYNTHETIC CURVE	TYPE II 24 HR



PRE-DEVELOPED NETWORK MAP

POST-DEVELOPED SWM CALCULATIONS

POST-DEVELOPED MASTER SUMMARY

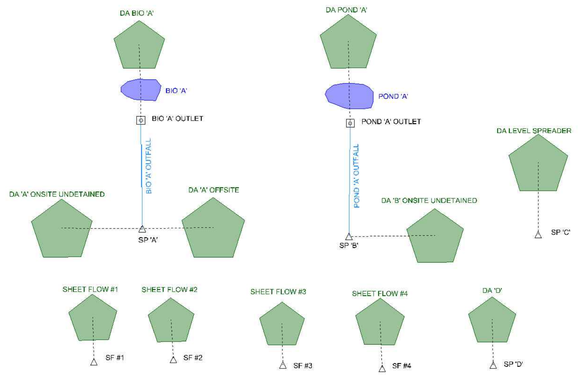
Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
DA 'A' ONSITE	1-YR	1	0.015	11.950	0.25
DA 'A' ONSITE	10-YR	10	0.047	11.950	0.86
DA 'A' OFFSITE	1-YR	1	0.029	11.950	0.53
DA 'A' OFFSITE	10-YR	10	0.074	11.900	1.34
DA 'B' ONSITE UNDETAINED	1-YR	1	0.050	12.050	0.63
DA 'B' ONSITE UNDETAINED	10-YR	10	0.210	12.000	3.27
DA POND 'A'	1-YR	1	0.980	12.100	12.09
DA POND 'A'	10-YR	10	3.363	12.050	46.03
DA LEVEL SPREADER	1-YR	1	0.151	12.200	0.66
DA LEVEL SPREADER	10-YR	10	0.955	12.100	10.95
DA BIO 'A'	1-YR	1	0.339	12.050	4.65
DA BIO 'A'	10-YR	10	1.070	12.050	15.56
SHEET FLOW #2	1-YR	1	0.067	12.000	1.07
SHEET FLOW #2	10-YR	10	0.217	12.000	3.62
SHEET FLOW #3	1-YR	1	0.051	11.950	0.86
SHEET FLOW #3	10-YR	10	0.157	11.950	2.78
SHEET FLOW #4	1-YR	1	0.056	12.050	0.84
SHEET FLOW #4	10-YR	10	0.156	12.000	2.38
DA 'D'	1-YR	1	0.006	12.000	0.08
DA 'D'	10-YR	10	0.034	11.950	0.59
SHEET FLOW #1	1-YR	1	0.023	12.000	0.36
SHEET FLOW #1	10-YR	10	0.078	12.000	1.31

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
SP 'A'	1-YR	1	0.363	12.350	1.52
SP 'A'	10-YR	10	1.172	12.200	9.15
SP 'B'	1-YR	1	1.030	12.100	1.07
SP 'B'	10-YR	10	3.573	12.300	18.52
SP 'C'	1-YR	1	0.151	12.200	0.66
SP 'C'	10-YR	10	0.955	12.100	10.95
SF #2	1-YR	1	0.067	12.000	1.07
SF #2	10-YR	10	0.217	12.000	3.62
SF #3	1-YR	1	0.051	11.950	0.86
SF #3	10-YR	10	0.157	11.950	2.78
SF #4	1-YR	1	0.056	12.050	0.84
SF #4	10-YR	10	0.156	12.000	2.38
SP 'D'	1-YR	1	0.006	12.000	0.08
SP 'D'	10-YR	10	0.034	11.950	0.59
SF #1	1-YR	1	0.023	12.000	0.36
SF #1	10-YR	10	0.078	12.000	1.31

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
BIO 'A' (IN)	1-YR	1	0.339	12.050	4.65	(N/A)	(N/A)
BIO 'A' (OUT)	1-YR	1	0.320	12.350	1.41	510.91	0.102
BIO 'A' (IN)	10-YR	10	1.070	12.050	15.56	(N/A)	(N/A)
BIO 'A' (OUT)	10-YR	10	1.059	12.200	8.80	513.56	0.333
POND 'A' (IN)	1-YR	1	0.980	12.100	12.09	(N/A)	(N/A)
POND 'A' (OUT)	1-YR	1	0.980	14.050	0.95	442.27	0.436
POND 'A' (IN)	10-YR	10	3.363	12.050	46.03	(N/A)	(N/A)
POND 'A' (OUT)	10-YR	10	3.363	12.300	17.73	444.29	1.308



POST-DEVELOPED NETWORK MAP

1-YR ALLOWABLE PEAK FLOWRATE SUMMARY

STUDY POINT A	
AREA	FLOW @ 12.15 HR
DA 'A' OFFSITE	0.56
DA 'A' ONSITE (ENERGY BALANCE)	0.98
TOTAL ALLOWABLE PEAK FLOWRATE	**1.54**

STUDY POINT B	
AREA	FLOW @ 12.15 HR
DA 'B' OFFSITE	0.84
DA 'B' ONSITE (ENERGY BALANCE)	0.99
TOTAL ALLOWABLE PEAK FLOWRATE	**1.83**

SWM NARRATIVE

THE SITE IS LOCATED ALONG THE EASTERN SIDE OF BLACKWELL ROAD, TO THE SOUTHEAST OF THE INTERSECTION OF BLACKWELL ROAD AND IVY HILL DRIVE, AND NORTH OF THE US 17 SPUR. THE EXISTING SITE IS APPROXIMATELY 32.23 ACRES; CONSISTS OF ONE RESIDENTIAL DWELLING, AN EXISTING POND, AN EXISTING DRIVEWAY, AND WOODED AREAS; AND IS COMPRISED OF HYDROLOGIC SOIL GROUPS (HSG) B, C, AND D. THE PROJECT CONSISTS OF THE CONSTRUCTION OF 22 SINGLE FAMILY DETACHED LOTS ALONG WITH ASSOCIATED IMPROVEMENTS.

CONCENTRATED STORMWATER RUNOFF DISCHARGES FROM THE SITE IN TWO DISTINCT LOCATIONS. THE RUNOFF TO STUDY POINT 'A' DISCHARGES TO AN EXISTING ROADSIDE DITCH ALONG BLACKWELL ROAD. THE RUNOFF TO STUDY POINT 'B' DISCHARGES TO AN EXISTING NATURAL CHANNEL DOWNSTREAM OF THE EXISTING POND. AN ADDITIONAL POINT OF ANALYSIS WAS INCLUDED AT STUDY POINT 'C', WHERE RUNOFF DISCHARGES IN A BROAD SWALE REPRESENTATIVE OF SHEET FLOW CONDITIONS IN THE PRE-DEVELOPED CONDITION. TWO ADDITIONAL POINTS OF ANALYSIS WERE INCLUDED AT STUDY POINTS 'D' AND 'E'. THE RUNOFF TO STUDY POINT 'D' DISCHARGES TO AN EXISTING DITCH LOCATED ALONG HIDDEN HOLLOW LANE. THE RUNOFF TO STUDY POINT 'E' DISCHARGES TO A LOW POINT ADJACENT TO HIDDEN HOLLOW LANE AND EITHER FLOW OVER HIDDEN HOLLOW LANE OR DISCHARGES INTO A CULVERT ALL OTHER RUNOFF FROM THE SITE DISCHARGES FROM THE LIMITS OF DISTURBANCE UNDER NON-EROSIVE SHEET FLOW CONDITIONS, AS DEMONSTRATED IN THE SHEET FLOW CALCULATIONS ON SHEET 42A.

ONE LEVEL 1 WET POND (POND 'A'), ONE LEVEL 2 BIORETENTION BASIN (BIORETENTION 'A'), AND ONE LEVEL SPREADER ARE PROPOSED TO PROVIDE WATER QUANTITY CONTROL. STORMWATER RUNOFF WILL BE COLLECTED IN A COMBINATION OF OPEN CHANNELS AND CLOSED CONDUIT STORM SEWER PRIOR TO DISCHARGING TO THE SWM FACILITIES.

CHANNEL PROTECTION

STUDY POINT 'A' IS LOCATED AT THE EXISTING ROADSIDE DITCH ALONG BLACKWELL ROAD. THE DRAINAGE AREA TO THIS OUTFALL WAS SEPARATED INTO AN ONSITE AREA AND AN OFFSITE AREA. THE ENERGY BALANCE EQUATION WAS APPLIED ONLY TO THE ONSITE AREA. THE RUNOFF REDUCTION ACHIEVED BY IMPLEMENTING A LEVEL 2 BIORETENTION BASIN (BIORETENTION 'A') REDUCES THE 1-YR POST-DEVELOPED CURVE NUMBER FROM 76 TO 70. THIS ADJUSTED CURVE NUMBER WAS USED IN THE ENERGY BALANCE EQUATION. PER THE ENERGY BALANCE EQUATION, THE ALLOWABLE PEAK FLOWRATE OF THE 1-YR STORM FROM THE ONSITE AREA IS 0.98 CFS. THE PRE-DEVELOPED 1-YR PEAK FLOWRATE GENERATED BY DA 'A' OFFSITE WAS ADDED TO THE ALLOWABLE PEAK FLOWRATE DETERMINED BY THE ENERGY BALANCE EQUATION TO ACHIEVE A COMBINED ALLOWABLE PEAK FLOWRATE AT STUDY POINT 'A'. THE PRE-DEVELOPED PEAK FLOWRATE AT STUDY POINT 'A' OCCURS AT 12.15 HOURS. THEREFORE, THE PEAK FLOWRATE FOR DA 'A' OFFSITE WAS DERIVED FROM ITS RESPECTIVE HYDROGRAPH AT A TIME OF 12.15 HOURS. AS SUMMARIZED IN THE TABLE ON THIS SHEET, THE TOTAL ALLOWABLE 1-YR PEAK FLOWRATE TO STUDY POINT 'A' IS 1.54 CFS. BY DETAINING RUNOFF IN BIORETENTION 'A', THE POST-DEVELOPED PEAK FLOWRATE IS 1.52 CFS, WHICH IS LESS THAN THE COMBINED ALLOWABLE PEAK FLOWRATE. THEREFORE, THE VSMP CHANNEL PROTECTION REQUIREMENTS HAVE BEEN SATISFIED.

STUDY POINT 'B' IS LOCATED AT AN EXISTING NATURAL CHANNEL DOWNSTREAM OF THE EXISTING POND. THE DRAINAGE AREA TO THIS OUTFALL WAS SEPARATED INTO AN ONSITE AREA AND AN OFFSITE AREA. THE ENERGY BALANCE EQUATION WAS APPLIED ONLY TO THE ONSITE AREA. PER THE ENERGY BALANCE EQUATION, THE ALLOWABLE PEAK FLOWRATE OF THE 1-YR STORM FROM THE ONSITE AREA IS 0.99 CFS. THE PRE-DEVELOPED 1-YR PEAK FLOWRATE GENERATED BY DA 'B' OFFSITE WAS ADDED TO THE ALLOWABLE PEAK FLOWRATE DETERMINED BY THE ENERGY BALANCE EQUATION TO ACHIEVE A COMBINED ALLOWABLE PEAK FLOWRATE AT STUDY POINT 'B'. THE PRE-DEVELOPED PEAK FLOWRATE AT STUDY POINT 'B' OCCURS AT 12.15 HOURS. THEREFORE, THE PEAK FLOWRATE FOR DA 'B' OFFSITE WAS DERIVED FROM ITS RESPECTIVE HYDROGRAPH AT A TIME OF 12.15 HOURS. AS SUMMARIZED IN THE TABLE ON THIS SHEET, THE TOTAL ALLOWABLE 1-YR PEAK FLOWRATE TO STUDY POINT 'B' IS 1.83 CFS. BY DETAINING RUNOFF IN POND 'A', THE POST-DEVELOPED PEAK FLOWRATE IS 1.07 CFS, WHICH IS LESS THAN THE COMBINED ALLOWABLE PEAK FLOWRATE. THEREFORE, THE VSMP CHANNEL PROTECTION REQUIREMENTS HAVE BEEN SATISFIED.

STUDY POINT 'C' IS LOCATED AT AN EXISTING BROAD SWALE REPRESENTATIVE OF SHEET FLOW CONDITIONS. THE PROPOSED ROAD CULVERT CHANNELIZES RUNOFF JUST UPSTREAM OF THIS STUDY POINT. A PLUNGE POOL AND LEVEL SPREADER HAS BEEN INCORPORATED INTO THE CULVERT OUTLET PROTECTION TO ENSURE THE RUNOFF IS CONVERTED TO SHEET FLOW PRIOR TO DISCHARGING FROM THE LIMITS OF DISTURBANCE. PER THE LEVEL SPREADER SHEET FLOW CALCULATIONS ON SHEET 42A, THE DEPTH OF FLOW OVER THE LEVEL SPREADER LIP IS 0.10'.

STUDY POINT 'D' IS LOCATED AT A DITCH ALONGSIDE HIDDEN HOLLOW LANE. PER THE ENERGY BALANCE EQUATION, THE ALLOWABLE PEAK FLOWRATE OF THE 1-YR STORM IS 0.34 CFS. WITH THE REDUCTION IN DRAINAGE AREA TO THIS STUDY POINT, THE POST-DEVELOPED PEAK FLOWRATE IS 0.08 CFS. THEREFORE, THE VSMP CHANNEL PROTECTION REQUIREMENTS HAVE BEEN SATISFIED.

STUDY POINT 'E' IS LOCATED AT A LOW POINT ADJACENT TO HIDDEN HOLLOW LANE. ALL DRAINAGE AREA TO THIS STUDY POINT HAS BEEN REDIRECTED TO STUDY POINT 'B', RESULTING IN NO FLOW TO THIS STUDY POINT IN THE POST-DEVELOPED CONDITION.

FLOOD PROTECTION

THE PRE-DEVELOPED 10-YR FLOWRATE TO STUDY POINT 'A' IS 9.29 CFS. BY DETAINING RUNOFF IN BIORETENTION 'A' THE POST-DEVELOPED FLOWRATE IS 9.15 CFS, WHICH IS LESS THAN PRE-DEVELOPED PEAK FLOWRATE FROM THE 10-YR STORM.

THE PRE-DEVELOPED 10-YR FLOWRATE TO STUDY POINT 'B' IS 25.89 CFS. BY DETAINING RUNOFF IN POND 'A' THE POST-DEVELOPED FLOWRATE IS 18.52 CFS, WHICH IS LESS THAN PRE-DEVELOPED PEAK FLOWRATE FROM THE 10-YR STORM.

A PLUNGE POOL AND LEVEL SPREADER HAS BEEN INCORPORATED INTO THE CULVERT OUTLET PROTECTION AT STUDY POINT 'C' TO ENSURE THE RUNOFF IS CONVERTED TO SHEET FLOW PRIOR TO DISCHARGING FROM THE LIMITS OF DISTURBANCE. PER THE LEVEL SPREADER SHEET FLOW CALCULATIONS ON SHEET 42A, THE DEPTH OF FLOW FROM THE 10-YR STORM OVER THE LEVEL SPREADER LIP IS 0.10'.

THE PRE-DEVELOPED 10-YR FLOWRATE TO STUDY POINT 'D' IS 2.97 CFS. WITH THE REDUCTION IN DRAINAGE AREA TO THIS STUDY POINT, THE POST-DEVELOPED FLOWRATE IS 0.59 CFS, WHICH IS LESS THAN PRE-DEVELOPED PEAK FLOWRATE FROM THE 10-YR STORM.

STUDY POINT 'E' IS LOCATED AT A LOW POINT ADJACENT TO HIDDEN HOLLOW LANE. ALL DRAINAGE AREA TO THIS STUDY POINT HAS BEEN REDIRECTED TO STUDY POINT 'B', RESULTING IN NO FLOW TO THIS STUDY POINT IN THE POST-DEVELOPED CONDITION.

SWM SUMMARY

STUDY POINT	1-YR STORM FLOWRATES PRE/ ALLOWABLE (cfs)	POST (cfs)	PRE/POST DIFFERENCE	CHANNEL PROTECTION COMMENTS	10-YR STORM FLOWRATES PRE (cfs)	POST (cfs)	PRE/POST DIFFERENCE	FLOOD PROTECTION COMMENTS
A	1.54	1.52	-0.02		9.29	9.15	-0.14	
B	1.83	1.07	-0.76		25.89	18.52	-7.37	
C	0.04	0.66	0.62	CONVERTED TO SHEET FLOW	6.79	10.95	4.16	CONVERTED TO SHEET FLOW
D	0.34	0.08	-0.26		2.97	0.59	-2.38	
E	0.54	0.00	-0.54		2.93	0.00	-2.93	
SF #1	0.35	0.36	0.01	SHEET FLOW	1.50	1.31	-0.19	SHEET FLOW
SF #2	0.90	1.07	0.17	SHEET FLOW	3.81	3.62	-0.19	SHEET FLOW
SF #3	0.67	0.86	0.19	SHEET FLOW	2.88	2.78	-0.10	SHEET FLOW
SF #4	0.46	0.84	0.38	SHEET FLOW	1.87	2.38	0.51	SHEET FLOW

VSMP CHANNEL PROTECTION CALCULATIONS

STUDY POINT	DRAINAGE AREA SPECIFICS DA_{pre} (ac)	DA_{post} (ac)	CN_{forest}	CN_{pre}	CN_{post}	$CN_{postAdjusted}$	CHANNEL PROTECTION (1-YR STORM) I.F.	P (in)	RV_{forest} (in)	RV^*_{forest} (ac-in.)	RV_{pre} (in)	RV^*_{pre} (ac-in.)	RV_{post} (in)	RV^*_{post} (ac-in.)	$RV_{postAdjusted}$ (in)	$RV^*_{postAdjusted}$ (ac-in.)	$q_{pForest}$ (cfs)	q_{pPre} (cfs)	$q_{pAllowable}$ (cfs)	NOTES
A	4.42	5.37	68	69	76	70	0.80	2.59	0.43	1.89	0.46	2.04	0.75	4.03	0.50	2.68	1.39	1.57	**0.98**	
B	13.90	17.16	64	65	74	74	0.80	2.59	0.30	4.21	0.33	4.61	0.66	11.32	0.66	11.32	2.57	3.04	**0.99**	
C	3.38	3.52	57	57	70	65	0.80	2.59	0.14	0.46	0.14	0.46	0.50	1.76	0.33	1.17	0.11	0.11	**0.04**	
D	1.78	0.31	62	62	62	62	0.80	2.59	0.25	0.44	0.25	0.44	0.25	0.08	0.25	0.08	0.34	0.34	**0.34**	
E	1.50	0.00	67	67	67	67	0.80	2.59	0.39	0.59	0.39	0.59	0.39	0.00	0.39	0.00	0.54	0.54	**0.54**	

$$RV = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad S = \frac{1000}{CN} - 10$$

Where:
RV = runoff depth (in)
P = rainfall depth (in)
S = potential maximum retention after runoff begins

$$RV^* = RV \times DA$$

Where:
RV* = runoff volume (ac-in)
RV = runoff depth (in)
DA = drainage area (ac.)

Energy Balance Equation:

$$q_{pAllowable} = I.F. \times (q_{pre} \times RV^*_{pre}) / RV^*_{post}$$

Where:
I.F. = Improvement Factor (0.8 for sites > 1 acre or 0.9 for sites ≤ 1 acre
$q_{pAllowable}$ = allowable peak flowrate of runoff from the developed site (cfs)
q_{pre} = peak flowrate of runoff in the pre-developed condition (cfs)

Under no condition shall $q_{pAllowable}$ be greater than q_{pre} nor shall $q_{pAllowable}$ be required to be less than:

$$(q_{forest} \times RV^*_{forest}) / RV^*_{post}$$

Where:
q_{forest} = peak flowrate of runoff from the site in a forested condition (cfs)

Bowman

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SWM NARRATIVE & CALCULATIONS
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: N/A V: N/A
JOB No. 6642-02-002
DATE : FEBRUARY 10, 2023
FILE No. 6642-D-CP-001
SHEET 40 OF 58

Item G.

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\040-042-6642-D-CP-001-SWM.dwg

POND 'A' ELEVATION VOLUME TABLE

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
441.00	0.0	0.227	0.000	0.000	0.000
441.40	0.0	0.351	0.861	0.115	0.115
442.00	0.0	0.376	1.091	0.218	0.333
444.00	0.0	0.464	1.259	0.839	1.172
446.00	0.0	0.559	1.534	1.022	2.194
448.00	0.0	0.660	1.827	1.218	3.413

POND 'A' OUTLET STRUCTURE INPUT

Requested Pond Water Surface Elevations

Minimum (Headwater)	441.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	448.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	443.75	448.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	441.00	448.00
Culvert-Circular	Culvert - 1	Forward	TW	435.75	448.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1
Structure Type: Culvert-Circular

Number of Barrels	1
Diameter	30.0 in
Length	60.00 ft
Length (Computed Barrel)	60.00 ft
Slope (Computed)	0.005 ft/ft
Outlet Control Data	
Manning's n	0.013
Ke	0.500
Kb	0.009
Kr	0.000
Convergence Tolerance	0.00 ft
Inlet Control Data	
Equation Form	Form 1
K	0.0098
M	2.0000
C	0.0398
Y	0.6700
T1 ratio (HW/D)	1.158
T2 ratio (HW/D)	1.304
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,

T1 Elevation	438.64 ft	T1 Flow	27.16 ft³/s
T2 Elevation	439.01 ft	T2 Flow	31.05 ft³/s

Structure ID: Riser - 1
Structure Type: Stand Pipe

Number of Openings	1
Elevation	443.75 ft
Diameter	48.0 in
Orifice Area	12.6 ft²
Orifice Coefficient	0.600
Weir Length	12.57 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: Orifice - 1
Structure Type: Orifice-Circular

Number of Openings	1
Elevation	441.00 ft
Orifice Diameter	6.0 in
Orifice Coefficient	0.600

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

POND 'A' OUTLET STRUCTURE RATING TABLE

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)	Contributing Structures
441.00	0.00	(N/A)	0.00	(no Q: Riser - 1,Orifice - 1,Culvert - 1)
441.50	0.47	(N/A)	0.00	Orifice - 1,Culvert - 1 (no Q: Riser - 1)
442.00	0.82	(N/A)	0.00	Orifice - 1,Culvert - 1 (no Q: Riser - 1)
442.50	1.06	(N/A)	0.00	Orifice - 1,Culvert - 1 (no Q: Riser - 1)
443.00	1.25	(N/A)	0.00	Orifice - 1,Culvert - 1 (no Q: Riser - 1)
443.50	1.42	(N/A)	0.00	Orifice - 1,Culvert - 1 (no Q: Riser - 1)
443.75	1.49	(N/A)	0.00	Orifice - 1,Culvert - 1 (no Q: Riser - 1)
444.00	6.28	(N/A)	0.00	Riser - 1,Orifice - 1,Culvert - 1
444.50	26.19	(N/A)	0.00	Riser - 1,Orifice - 1,Culvert - 1
445.00	54.22	(N/A)	0.00	Riser - 1,Orifice - 1,Culvert - 1
445.50	69.95	(N/A)	0.00	Riser - 1,Culvert - 1 (no Q: Orifice - 1)
446.00	72.08	(N/A)	0.00	Riser - 1,Culvert - 1 (no Q: Orifice - 1)
446.50	74.15	(N/A)	0.00	Riser - 1,Culvert - 1 (no Q: Orifice - 1)
447.00	76.16	(N/A)	0.00	Riser - 1,Culvert - 1 (no Q: Orifice - 1)
447.50	78.12	(N/A)	0.00	Riser - 1,Culvert - 1 (no Q: Orifice - 1)
448.00	80.04	(N/A)	0.00	Riser - 1,Culvert - 1 (no Q: Orifice - 1)

POND 'A' E-V-Q TABLE

Infiltration	
Infiltration Method (Computed)	No Infiltration
Initial Conditions	
Elevation (Water Surface, Initial)	441.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
441.00	0.00	0.000	0.227	0.00	0.00	0.00
441.50	0.47	0.150	0.355	0.00	0.47	73.12
442.00	0.82	0.333	0.376	0.00	0.82	161.95
442.50	1.06	0.526	0.397	0.00	1.06	255.77
443.00	1.25	0.730	0.419	0.00	1.25	354.76
443.50	1.42	0.946	0.442	0.00	1.42	459.06
443.75	1.49	1.057	0.452	0.00	1.49	513.25
444.00	6.28	1.172	0.464	0.00	6.28	573.54
444.50	26.19	1.410	0.487	0.00	26.19	708.61
445.00	54.22	1.660	0.511	0.00	54.22	857.42
445.50	69.95	1.921	0.535	0.00	69.95	999.68
446.00	72.08	2.194	0.559	0.00	72.08	1,134.21
446.50	74.15	2.480	0.584	0.00	74.15	1,274.61
447.00	76.16	2.778	0.609	0.00	76.16	1,420.92
447.50	78.12	3.089	0.634	0.00	78.12	1,573.26
448.00	80.04	3.413	0.660	0.00	80.04	1,731.78

POND 'A' 1-YR ROUTING SUMMARY

Infiltration	
Infiltration Method (Computed)	No Infiltration
Initial Conditions	
Elevation (Water Surface, Initial)	441.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	12.09 ft³/s	Time to Peak (Flow, In)	12.100 hours
Flow (Peak Outlet)	0.95 ft³/s	Time to Peak (Flow, Outlet)	14.050 hours
Elevation (Water Surface, Peak)	442.27 ft		
Volume (Peak)	0.436 ac-ft		

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.980 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.980 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

POND 'A' 1-YR ROUTING CALCULATIONS

Pond Routing Calculations (Total Out)

Time (hours)	Flow (Total In) (ft³/s)	2S/t - O (ft³/s)	2S/t + O (ft³/s)	Infiltration (ft³/s)	Flow (Outlet) (ft³/s)	Volume (ac-ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00	0.000	441.00
11.500	0.00	0.00	0.00	0.00	0.00	0.000	441.00
11.550	0.00	0.00	0.00	0.00	0.00	0.000	441.00
11.600	0.01	0.02	0.02	0.00	0.00	0.000	441.00
11.650	0.07	0.10	0.10	0.00	0.00	0.000	441.00
11.700	0.21	0.37	0.38	0.00	0.00	0.001	441.00
11.750	0.56	1.13	1.14	0.00	0.01	0.002	441.01
11.800	1.18	2.83	2.86	0.00	0.02	0.004	441.02
11.850	2.34	6.26	6.35	0.00	0.04	0.010	441.04
11.900	4.32	12.76	12.92	0.00	0.08	0.021	441.09
11.950	7.01	23.77	24.09	0.00	0.16	0.041	441.16
12.000	9.79	40.05	40.58	0.00	0.26	0.074	441.28
12.050	11.69	60.73	61.53	0.00	0.40	0.122	441.42
12.100	12.09	83.48	84.51	0.00	0.52	0.173	441.56
12.150	10.79	105.16	106.37	0.00	0.60	0.217	441.69
12.200	8.87	123.47	124.82	0.00	0.67	0.255	441.79
12.250	6.99	137.87	139.33	0.00	0.73	0.285	441.87
12.300	5.64	148.95	150.50	0.00	0.77	0.309	441.94
12.350	4.70	157.68	159.29	0.00	0.81	0.327	441.99
12.400	4.02	164.74	166.40	0.00	0.83	0.342	442.02
12.450	3.53	170.61	172.29	0.00	0.84	0.354	442.06
12.500	3.13	175.55	177.26	0.00	0.86	0.364	442.08
12.550	2.80	179.74	181.47	0.00	0.87	0.372	442.10
12.600	2.52	183.30	185.06	0.00	0.88	0.380	442.12
12.650	2.29	186.35	188.12	0.00	0.88	0.386	442.14
12.700	2.11	188.98	190.76	0.00	0.89	0.391	442.15
12.750	1.97	191.26	193.05	0.00	0.90	0.396	442.17
12.800	1.86	193.28	195.08	0.00	0.90	0.400	442.18
12.850	1.77	195.09	196.90	0.00	0.91	0.404	442.19
12.900	1.70	196.73	198.55	0.00	0.91	0.407	442.20
12.950	1.64	198.23	200.06	0.00	0.91	0.410	442.20
13.000	1.58	199.61	201.45	0.00	0.92	0.413	442.21
13.250	1.35	204.91	206.78	0.00	0.93	0.424	442.24
13.300	1.32	205.72	207.58	0.00	0.93	0.426	442.24
13.500	1.20	208.27	210.15	0.00	0.94	0.431	442.26
13.550	1.17	208.76	210.64	0.00	0.94	0.432	442.26
13.600	1.14	209.19	211.08	0.00	0.94	0.433	442.26
13.650	1.12	209.56	211.45	0.00	0.94	0.434	442.26
13.700	1.09	209.88	211.77	0.00	0.94	0.434	442.27
13.750	1.07	210.15	212.04	0.00	0.95	0.435	442.27
13.800	1.05	210.38	212.27	0.00	0.95	0.435	442.27
13.850	1.02	210.56	212.45	0.00	0.95	0.436	442.27
13.900	1.00	210.69	212.58	0.00	0.95	0.436	442.27
13.950	0.98	210.78	212.67	0.00	0.95	0.436	442.27
14.000	0.96	210.83	212.72	0.00	0.95	0.436	442.27
14.050	0.94	210.84	212.73	0.00	0.95	0.436	442.27
14.100	0.92	210.80	212.70	0.00	0.95	0.436	442.27
14.150	0.90	210.73	212.62	0.00	0.95	0.436	442.27
14.200	0.89	210.63	212.52	0.00	0.95	0.436	442.27
14.250	0.87	210.50	212.39	0.00	0.95	0.436	442.27
14.500	0.83	209.56	211.45	0.00	0.94	0.434	442.26
15.000	0.76	206.69	208.56	0.00	0.94	0.428	442.25
15.500	0.69	202.56	204.41	0.00	0.93	0.419	442.23
16.000	0.61	197.16	198.98	0.00	0.91	0.408	442.20
16.500	0.56	190.69	192.48	0.00	0.90	0.395	442.16
17.000	0.53	183.91	185.67	0.00	0.88	0.381	442.13
18.000	0.48	169.81	171.49	0.00	0.84	0.352	442.05
19.000	0.42	154.97	156.57	0.00	0.80	0.322	441.97
20.000	0.36	139.95	141.42	0.00	0.74	0.290	441.88
21.000	0.34	125.43	126.80	0.00	0.68	0.259	441.80
22.000	0.33	112.60	113.86	0.00	0.63	0.233	441.73
23.000	0.32	101.23	102.40	0.00	0.59	0.209	441.66
24.000	0.31	91.11	92.20	0.00	0.55	0.188	441.61
24.050	0.30	90.62	91.71	0.00	0.54	0.187	441.60
24.100	0.27	90.10	91.18	0.00	0.54	0.186	441.60
24.150	0.21	89.50	90.58	0.00	0.54	0.185	441.60
24.200	0.15	88.79	89.86	0.00	0.54	0.184	441.59
24.250	0.10	87.97	89.04	0.00	0.53	0.182	441.59
24.300	0.06	87.07	88.14	0.00	0.53	0.180	441.58
24.350	0.04	86.12	87.18	0.00	0.53	0.178	441.58
24.400	0.03	85.15	86.19	0.00	0.52	0.176	441.57
24.450	0.02	84.15	85.19	0.00	0.52	0.174	441.57
24.500	0.01	83.15	84.18	0.00	0.52	0.172	441.56
24.550	0.01	82.14	83.16	0.00	0.51	0.170	441.56
24.600	0.00	81.14	82.15	0.00	0.51	0.168	441.55
25.000	0.00	73.31	74.26	0.00	0.48	0.152	441.51
26.000	0.00	56.51	57.25	0.00	0.37	0.112	441.39
27.000	0.00	43.57	44.14	0.00	0.29	0.082	441.30
28.000	0.00	33.59	34.03	0.00	0.22	0.061	441.23
29.000	0.00	25.89	26.23	0.00	0.17	0.045	441.18
30.000	0.00	19.96	20.22	0.00	0.13	0.034	441.14
31.000	0.00	15.39	15.59	0.00	0.10	0.026	441.11
32.000	0.00	11.86	12.02	0.00	0.08	0.020	441.08
33.000	0.00	9.15	9.27	0.00	0.06	0.015	441.06
34.000	0.00	7.05	7.14	0.00	0.05	0.011	441.05
35.000	0.00	5.44	5.51	0.00	0.04	0.009	441.04
36.000	0.00	4.19	4.24	0.00	0.03	0.007	441.03
37.000	0.00	3.23	3.27	0.00	0.02	0.005	441.02
38.000	0.00	2.49	2.52	0.00	0.02	0.004	441.02
40.000	0.00	1.48	1.50	0.00	0.01	0.002	441.01
41.900	0.00	0.90	0.91	0.00	0.01	0.001	441.01
41.950	0.00	0.89	0.90	0.00	0.01	0.001	441.01
42.000	0.00	0.88	0.89	0.00	0.01	0.001	441.01
42.050	0.00	0.87	0.88	0.00	0.01	0.001	441.01
42.100	0.00	0.86	0.87	0.00	0.01	0.001	441.01
42.150	0.00	0.85	0.86	0.00	0.01	0.001	441.01
42.200	0.00	0.83	0.85	0.00	0.01	0.001	441.01
42.250	0.00	0.82	0.83	0.00	0.01	0.001	441.01

POND 'A' 10-YR ROUTING SUMMARY

Infiltration	
Infiltration Method (Computed)	No Infiltration
Initial Conditions	
Elevation (Water Surface, Initial)	441.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	46.03 ft³/s	Time to Peak (Flow, In)	12.050 hours
Flow (Peak Outlet)	17.73 ft³/s	Time to Peak (Flow, Outlet)	12.300 hours
Elevation (Water Surface, Peak)	444.29 ft		
Volume (Peak)	1.308 ac-ft		

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	3.363 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	3.363 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

POND 'A' 10-YR ROUTING CALCULATIONS

Pond Routing Calculations (Total Out)

Time (hours)	Flow (Total In) (ft³/s)	2S/t - O (ft³/s)	2S/t + O (ft³/s)	Infiltration (ft³/s)	Flow (Outlet) (ft³/s)	Volume (ac-ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00	0.000	441.00
9.150	0.00	0.00	0.00	0.00	0.00	0.000	441.00
9.200	0.00	0.00	0.00	0.00	0.00	0.000	441.00
9.500	0.02	0.05	0.05	0.00	0.00	0.000	441.00
9.750	0.08	0.49	0.49	0.00	0.00	0.001	441.00
10.000	0.15	1.55	1.57	0.00	0.01	0.002	441.01
10.250	0.26	3.43	3.48	0.00	0.02	0.005	441.02
10.500	0.41	6.40	6.48	0.00	0.04	0.010	441.04
10.750	0.60	10.79	10.93	0.00	0.07	0.018	441.07
11.000	0.89	17.22	17.44	0.00	0.11	0.029	441.12
11.050	0.95	18.81	19.06	0.00	0.12	0.032	441.13
11.100	1.03	20.53	20.79	0.00	0.13	0.035	441.14
11.150	1.11	22.37	22.67	0.00	0.15	0.039	441.15
11.200	1.21	24.38	24.70	0.00	0.16	0.042	441.17
11.250	1.32	26.56	26.91	0.00	0.17	0.047	441.18
11.300	1.45	28.96	29.34	0.00	0.19	0.051	441.20
11.350	1.59	31.58	32.00	0.00	0.21	0.057	441.22
11.400	1.74	34.46	34.91	0.00	0.23	0.062	441.24
11.450	1.90	37.60	38.09	0.00	0.25	0.069	441.26
11.500	2.08	41.04	41.58	0.00	0.27	0.076	441.28
11.550	2.35	44.88	45.47	0.00	0.29	0.085	441.31
11.600	2.87	49.46	50.11	0.00	0.32	0.095	441.34
11.650	3.83	55.44	56.16	0.00	0.36	0.109	441.38
11.700	5.43	63.87	64.70	0.00	0.42	0.130	441.44
11.750	7.98	76.30	77.28	0.00	0.49	0.158	441.52
11.800	11.54	94.69	95.82	0.00	0.56	0.196	441.63
11.850	16.82	121.72	123.05	0.00	0.67	0.252	441.78
11.900	24.39	161.28	162.92	0.00	0.82	0.335	442.01
11.950	33.60	217.34	219.27	0.00	0.96	0.450	442.31
12.000	41.77	290.46	292.71	0.00	1.13	0.601	442.69
12.050	46.03	375.68	378.26	0.00	1.29	0.778	443.11
12.100	45.03	463.89	466.74	0.00	1.43	0.961	443.54
12.150	38.76	539.22	547.67	0.00	4.23	1.122	443.89
12.200	31.00	585.97	608.97	0.00	11.50	1.233	444.13
12.250	23.91	608.47	640.88	0.00	16.20	1.289	444.25
12.300	18.87	615.79	651.25	0.00	17.73	1.308	444.29
12.350	15.43	614.96	650.08	0.00	17.56	1.305	444.28
12.400	12.93	610.19	643.32	0.00	16.56	1.294	444.26
12.450	11.15	603.81	634.26	0.00	15.23	1.278	444.22
12.500	9.74	597.06	624.69	0.00	13.82	1.261	444.19
12.550	8.59	590.50	615.39	0.00	12.45	1.245	444.15
12.600	7.68	584.41	606.77	0.00	11.18	1.229	444.12
12.650	6.92	578.94	599.00	0.00	10.03	1.216	444.09
12.700	6.31	574.11	592.16	0.00	9.02	1.204	444.07
12.750	5.84	569.96	586.27	0.00	8.16	1.194	444.05
12.800	5.48	566.44	581.28	0.00	7.42	1.185	444.03
12.850	5.20	563.50	577.12	0.00	6.81	1.178	444.01
12.900	4.97	561.08	573.68	0.00	6.30	1.172	444.00
12.950	4.78	558.70	570.83	0.00	6.06	1.167	443.99
13.000	4.60	556.39	568.09	0.00	5.85	1.162	443.98
13.250	3.89	546.14	555.90	0.00	4.88	1.138	443.93
13.500	3.42	538.40	546.70	0.00	4.15	1.121	443.89
13.750	3.03	532.52	539.70	0.00	3.59	1.107	443.86
14.000	2.70	527.88	534.20	0.00	3.16	1.097	443.84
14.250	2.44	524.12	529.73	0.00	2.80	1.088	443.82
14.500	2.31	521.44	526.54	0.00	2.55	1.082	443.81
15.000	2.10	518.17	522.66	0.00	2.24	1.075	443.79
15.500	1.88	515.71	519.73	0.00	2.01	1.070	443.78
16.000	1.65	513.34	516.91	0.00	1.78	1.064	443.77
17.000	1.43	510.16	513.15	0.00	1.49	1.057	443.75
18.000	1.28	504.74	507.72	0.00	1.49	1.046	443.72
19.000	1.11	493.36	496.30	0.00	1.47	1.022	443.67
20.000	0.94	476.17	479.06	0.00	1.45	0.986	443.59
21.000	0.88	455.09	457.92	0.00	1.42	0.943	443.49
22.000	0.85	433.89	436.65	0.00	1.38	0.898	443.39
23.000	0.82	412.80	415.49	0.00	1.35	0.854	443.29
24.000	0.79	391.79	394.41	0.00	1.31	0.811	443.19
24.250	0.26	384.52	387.13	0.00	1.30	0.796	443.16
24.500	0.03	372.66	375.23	0.00	1.28	0.772	443.10
24.600	0.01	367.62	370.17	0.00	1.28	0.761	443.07
24.650	0.01	365.10	367.64	0.00	1.27	0.756	443.06
24.700	0.00	362.57	365.11	0.00	1.27	0.751	443.05
25.000	0.00	347.55	350.03	0.00	1.24	0.720	442.98
26.000	0.00	299.89	302.18	0.00	1.15	0.621	442.73
27.000	0.00	255.85	257.97	0.00	1.06	0.531	442.51
28.000	0.00	215.59	217.50	0.00	0.96	0.446	442.30
29.000	0.00	179.20	180.93	0.00	0.87	0.371	442.10
30.000	0.00	146.51	148.04	0.00	0.76	0.304	441.92
32.000	0.00	94.21	95.33	0.00	0.56	0.195	441.63
34.000	0.00	56.74	57.48	0.00	0.37	0.112	441.39
36.000	0.00	33.72	34.16	0.00	0.22	0.061	441.23
38.000	0.00	20.04	20.30	0.00	0.13	0.034	441.14
40.000	0.00	11.91	12.07	0.00	0.08	0.020	441.08
42.000	0.00	7.08	7.17	0.00	0.05	0.011	441.05
44.000	0.00	4.21	4.26	0.00	0.03	0.007	441.03
46.000	0.00	2.50	2.53	0.00	0.02	0.004	441.02
48.000	0.00	1.49	1.51	0.00	0.01	0.002	441.01
50.000	0.00	0.88	0.89	0.00	0.01	0.001	441.01
51.250	0.00	0.64	0.65	0.00	0.00	0.001	441.00
51.450	0.00	0.61	0.61	0.00	0.00	0.001	441.00
51.500	0.00	0.60	0.61	0.00	0.00	0.001	441.00
51.650	0.00	0.57	0.58	0.00	0.00	0.001	441.00
51.700	0.00	0.57	0.57	0.00	0.00	0.001	441.00
51.750	0.00	0.56	0.57	0.00	0.00	0.001	441.00

POND 'A' 100-YR ROUTING SUMMARY

Infiltration	
Infiltration Method (Computed)	No Infiltration
Initial Conditions	
Elevation (Water Surface, Initial)	441.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

*100-YR STORM WAS ROUTED THROUGH POND ASSUMING LOW FLOW ORIFICE WAS 100% CLOGGED.

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	108.92 ft³/s	Time to Peak (Flow, In)	12.050 hours
Flow (Peak Outlet)	71.96 ft³/s	Time to Peak (Flow, Outlet)	12.200 hours
Elevation (Water Surface, Peak)	445.97 ft		
Volume (Peak)	2.179 ac-ft		

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	7.894 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	6.836 ac-ft
Volume (Retained)	1.057 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

POND 'A' 100-YR ROUTING CALCULATIONS

Pond Routing Calculations (Total Out)

Time (hours)	Flow (Total In) (ft³/s)	2S/t - O (ft³/s)	2S/t + O (ft³/s)	Infiltration (ft³/s)	Flow (Outlet) (ft³/s)	Volume (ac-ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00	0.000	441.00
6.500	0.00	0.00	0.00	0.00	0.00	0.000	441.00
7.000	0.06	0.32	0.32	0.00	0.00	0.001	441.00
7.500	0.19	2.82	2.82	0.00	0.00	0.004	441.02
8.000	0.34	8.18	8.18	0.00	0.00	0.013	441.06
8.500	0.

BIORETENTION 'A' ELEVATION VOLUME TABLE

Pond Elevation (ft)	Pond Volume (ac-ft)
507.50	0.000
508.75	0.049
512.00	0.128
512.50	0.178
513.00	0.242
514.00	0.407

BIORETENTION 'A' OUTLET STRUCTURE INPUT

Requested Pond Water Surface Elevations

Minimum (Headwater)	507.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	514.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward	TW	508.00	514.00
Irregular Weir	Weir - 1	Forward	TW	513.00	514.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1
Structure Type: Culvert-Circular

Number of Barrels	1
Diameter	6.0 in
Length	38.00 ft
Length (Computed Barrel)	38.00 ft
Slope (Computed)	0.005 ft/ft

Outlet Control Data

Manning's n	0.010
Ke	0.500
Kb	0.047
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data

Equation Form	Form 1
K	0.0098
M	2.0000
C	0.0398
Y	0.6700
T1 ratio (HW/D)	1.157
T2 ratio (HW/D)	1.304
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,

T1 Elevation	508.58 ft	T1 Flow	0.49 ft³/s
T2 Elevation	508.65 ft	T2 Flow	0.56 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	514.00
3.00	513.00
7.00	513.00
10.00	514.00

Lowest Elevation	513.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

BIORETENTION 'A' OUTLET STRUCTURE RATING TABLE

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)	Contributing Structures
507.50	0.00	(N/A)	0.00	None Contributing
508.00	0.00	(N/A)	0.00	None Contributing
508.50	0.37	(N/A)	0.00	Culvert - 1
509.00	0.74	(N/A)	0.00	Culvert - 1
509.50	0.95	(N/A)	0.00	Culvert - 1
510.00	1.13	(N/A)	0.00	Culvert - 1
510.50	1.29	(N/A)	0.00	Culvert - 1
511.00	1.43	(N/A)	0.00	Culvert - 1
511.50	1.56	(N/A)	0.00	Culvert - 1
512.00	1.67	(N/A)	0.00	Culvert - 1
512.50	1.78	(N/A)	0.00	Culvert - 1
513.00	1.89	(N/A)	0.00	Culvert - 1 + Weir - 1
513.50	7.35	(N/A)	0.00	Culvert - 1 + Weir - 1
514.00	20.44	(N/A)	0.00	Culvert - 1 + Weir - 1

BIORETENTION 'A' E-V-Q TABLE

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	507.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
507.50	0.00	0.000	0.000	0.00	0.00	0.00
508.00	0.00	0.020	0.000	0.00	0.00	9.47
508.50	0.37	0.039	0.000	0.00	0.37	19.31
509.00	0.74	0.055	0.000	0.00	0.74	27.38
509.50	0.95	0.067	0.000	0.00	0.95	33.51
510.00	1.13	0.079	0.000	0.00	1.13	39.61
510.50	1.29	0.092	0.000	0.00	1.29	45.69
511.00	1.43	0.104	0.000	0.00	1.43	51.75
511.50	1.56	0.116	0.000	0.00	1.56	57.79
512.00	1.67	0.128	0.000	0.00	1.67	63.83
512.50	1.78	0.178	0.000	0.00	1.78	87.95
513.00	1.89	0.242	0.000	0.00	1.89	118.86
513.50	7.35	0.324	0.000	0.00	7.35	164.34
514.00	20.44	0.407	0.000	0.00	20.44	217.44

BIORETENTION 'A' 1-YR ROUTING SUMMARY

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	507.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary

Flow (Peak In)	4.65 ft³/s	Time to Peak (Flow, In)	12.050 hours
Flow (Peak Outlet)	1.41 ft³/s	Time to Peak (Flow, Outlet)	12.350 hours
Elevation (Water Surface, Peak)	510.91 ft		
Volume (Peak)	0.102 ac-ft		

Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.339 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.320 ac-ft
Volume (Retained)	0.020 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

BIORETENTION 'A' 1-YR ROUTING CALCULATIONS

Pond Routing Calculations (Total Out)

Time (hours)	Flow (Total In) (ft³/s)	2S/t - O (ft³/s)	2S/t + O (ft³/s)	Infiltration (ft³/s)	Flow (Outlet) (ft³/s)	Volume (ac-ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00	0.000	507.50
11.300	0.01	0.01	0.01	0.00	0.00	0.000	507.50
11.350	0.01	0.03	0.03	0.00	0.00	0.000	507.50
11.400	0.02	0.07	0.07	0.00	0.00	0.000	507.50
11.450	0.03	0.12	0.12	0.00	0.00	0.000	507.51
11.500	0.04	0.20	0.20	0.00	0.00	0.000	507.51
11.550	0.06	0.31	0.31	0.00	0.00	0.001	507.52
11.600	0.10	0.46	0.46	0.00	0.00	0.001	507.52
11.650	0.16	0.72	0.72	0.00	0.00	0.001	507.54
11.700	0.28	1.16	1.16	0.00	0.00	0.002	507.56
11.750	0.48	1.91	1.91	0.00	0.00	0.004	507.60
11.800	0.80	3.19	3.19	0.00	0.00	0.007	507.67
11.850	1.31	5.31	5.31	0.00	0.00	0.011	507.78
11.900	2.16	8.78	8.78	0.00	0.00	0.018	507.96
11.950	3.22	13.80	14.15	0.00	0.17	0.029	508.24
12.000	4.14	20.26	21.16	0.00	0.45	0.044	508.61
12.050	4.65	27.45	29.05	0.00	0.80	0.058	509.14
12.100	4.41	34.43	36.52	0.00	1.04	0.073	509.75
12.150	3.69	40.12	42.54	0.00	1.21	0.085	510.24
12.200	2.87	44.06	46.68	0.00	1.31	0.094	510.58
12.250	2.18	46.37	49.10	0.00	1.37	0.099	510.78
12.300	1.75	47.50	50.29	0.00	1.40	0.101	510.88
12.350	1.45	47.89	50.71	0.00	1.41	0.102	510.91
12.400	1.25	47.79	50.60	0.00	1.40	0.102	510.91
12.450	1.10	47.36	50.14	0.00	1.39	0.101	510.87
12.500	0.98	46.68	49.43	0.00	1.38	0.099	510.81
12.550	0.87	45.82	48.53	0.00	1.36	0.097	510.73
12.600	0.79	44.82	47.48	0.00	1.33	0.095	510.65
12.650	0.72	43.72	46.33	0.00	1.30	0.093	510.55
12.700	0.67	42.55	45.10	0.00	1.28	0.091	510.45
12.750	0.62	41.36	43.84	0.00	1.24	0.088	510.35
12.800	0.59	40.16	42.58	0.00	1.21	0.085	510.24
12.850	0.57	38.97	41.32	0.00	1.18	0.083	510.14
12.900	0.55	37.80	40.09	0.00	1.15	0.080	510.04
12.950	0.53	36.65	38.88	0.00	1.11	0.078	509.94
13.000	0.51	35.54	37.70	0.00	1.08	0.076	509.84
13.050	0.50	34.46	36.55	0.00	1.04	0.073	509.75
13.100	0.48	33.41	35.44	0.00	1.01	0.071	509.66
13.150	0.46	32.40	34.36	0.00	0.98	0.069	509.57
13.200	0.45	31.42	33.31	0.00	0.95	0.067	509.48
13.250	0.44	30.48	32.31	0.00	0.91	0.065	509.40
13.300	0.43	29.59	31.35	0.00	0.88	0.063	509.32
13.350	0.42	28.74	30.44	0.00	0.85	0.061	509.25
13.400	0.41	27.94	29.57	0.00	0.82	0.059	509.18
13.450	0.40	27.17	28.74	0.00	0.79	0.058	509.11
13.500	0.39	26.44	27.96	0.00	0.76	0.056	509.05
13.750	0.35	23.40	24.63	0.00	0.61	0.051	508.83
14.000	0.31	21.25	22.26	0.00	0.50	0.046	508.68
14.250	0.28	19.69	20.53	0.00	0.42	0.042	508.58
14.500	0.27	18.58	19.31	0.00	0.37	0.039	508.50
14.750	0.26	17.77	18.43	0.00	0.33	0.037	508.46
15.000	0.25	17.12	17.73	0.00	0.31	0.036	508.42
15.500	0.22	16.12	16.65	0.00	0.27	0.034	508.37
16.000	0.20	15.32	15.79	0.00	0.23	0.032	508.32
16.500	0.18	14.66	15.08	0.00	0.21	0.031	508.29
17.000	0.17	14.22	14.60	0.00	0.19	0.030	508.26
18.000	0.15	13.63	13.97	0.00	0.17	0.029	508.23
19.000	0.13	13.14	13.43	0.00	0.15	0.027	508.20
20.000	0.11	12.65	12.90	0.00	0.13	0.026	508.17
21.000	0.11	12.30	12.52	0.00	0.11	0.026	508.16
22.000	0.10	12.15	12.36	0.00	0.11	0.025	508.15
23.000	0.10	12.05	12.26	0.00	0.10	0.025	508.14
24.000	0.10	11.96	12.16	0.00	0.10	0.025	508.14
24.050	0.09	11.95	12.15	0.00	0.10	0.025	508.14
24.100	0.08	11.93	12.12	0.00	0.10	0.025	508.13
24.150	0.06	11.88	12.07	0.00	0.10	0.025	508.13
24.200	0.04	11.79	11.98	0.00	0.09	0.025	508.13
24.250	0.02	11.68	11.86	0.00	0.09	0.024	508.12
24.300	0.01	11.55	11.72	0.00	0.08	0.024	508.11
24.350	0.01	11.42	11.57	0.00	0.08	0.024	508.11
24.400	0.01	11.29	11.43	0.00	0.07	0.023	508.10
24.450	0.00	11.16	11.30	0.00	0.07	0.023	508.09
25.000	0.00	10.20	10.26	0.00	0.03	0.021	508.04
25.500	0.00	9.81	9.84	0.00	0.01	0.020	508.02
26.000	0.00	9.63	9.64	0.00	0.01	0.020	508.01
26.050	0.00	9.62	9.63	0.00	0.01	0.020	508.01
26.100	0.00	9.60	9.62	0.00	0.01	0.020	508.01
26.150	0.00	9.59	9.60	0.00	0.00	0.020	508.01
26.200	0.00	9.59	9.59	0.00	0.00	0.020	508.01
26.250	0.00	9.58	9.59	0.00	0.00	0.020	508.01

BIORETENTION 'A' 10-YR ROUTING SUMMARY

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	507.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary

Flow (Peak In)	15.56 ft³/s	Time to Peak (Flow, In)	12.050 hours
Flow (Peak Outlet)	8.80 ft³/s	Time to Peak (Flow, Outlet)	12.200 hours
Elevation (Water Surface, Peak)	513.56 ft		
Volume (Peak)	0.333 ac-ft		

Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.070 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.050 ac-ft
Volume (Retained)	0.020 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

BIORETENTION 'A' 10-YR ROUTING CALCULATIONS

Pond Routing Calculations (Total Out)

Time (hours)	Flow (Total In) (ft³/s)	2S/t - O (ft³/s)	2S/t + O (ft³/s)	Infiltration (ft³/s)	Flow (Outlet) (ft³/s)	Volume (ac-ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00	0.000	507.50
8.750	0.01	0.02	0.02	0.00	0.00	0.000	507.50
9.000	0.02	0.15	0.15	0.00	0.00	0.000	507.51
9.250	0.04	0.46	0.46	0.00	0.00	0.001	507.52
9.500	0.06	0.96	0.96	0.00	0.00	0.002	507.55
9.750	0.08	1.66	1.66	0.00	0.00	0.003	507.59
10.000	0.11	2.62	2.62	0.00	0.00	0.005	507.64
10.250	0.15	3.93	3.93	0.00	0.00	0.008	507.71
10.500	0.21	5.71	5.71	0.00	0.00	0.012	507.80
10.750	0.28	8.11	8.11	0.00	0.00	0.017	507.93
10.800	0.30	8.69	8.69	0.00	0.00	0.018	507.96
10.850	0.32	9.30	9.30	0.00	0.00	0.019	507.99
10.900	0.34	9.92	9.96	0.00	0.02	0.021	508.02
10.950	0.36	10.53	10.61	0.00	0.04	0.022	508.06
11.000	0.38	11.14	11.27	0.00	0.07	0.023	508.09
11.050	0.41	11.74	11.92	0.00	0.09	0.024	508.12
11.100	0.43	12.35	12.58	0.00	0.12	0.026	508.16
11.150	0.46	12.96	13.24	0.00	0.14	0.027	508.19
11.200	0.50	13.59	13.92	0.00	0.17	0.028	508.23
11.250	0.54	14.25	14.63	0.00	0.19	0.030	508.26
11.300	0.59	14.94	15.38	0.00	0.22	0.031	508.30
11.350	0.64	15.66	16.16	0.00	0.25	0.033	508.34
11.400	0.69	16.43	16.99	0.00	0.28	0.035	508.38
11.450	0.75	17.24	17.86	0.00	0.31	0.036	508.43
11.500	0.81	18.10	18.80	0.00	0.35	0.038	508.47
11.550	0.91	19.05	19.82	0.00	0.39	0.040	508.53
11.600	1.13	20.19	21.08	0.00	0.45	0.043	508.61
11.650	1.51	21.77	22.82	0.00	0.53	0.048	508.72
11.700	2.17	24.15	25.45	0.00	0.65	0.052	508.88
11.750	3.13	27.83	29.45	0.00	0.81	0.059	509.17
11.800	4.50	33.43	35.46	0.00	1.01	0.071	509.66
11.850	6.38	41.80	44.31	0.00	1.25	0.089	510.39
11.900	9.13	54.22	57.31	0.00	1.55	0.115	511.46
11.950	12.29	72.18	75.63	0.00	1.73	0.153	512.24
12.000	14.67	95.49	99.13	0.00	1.82	0.201	512.68
12.050	15.56	120.30	125.72	0.00	2.71	0.254	513.08
12.100	14.23	138.81	150.08	0.00	5.64	0.298	513.34
12.150	11.59	149.78	164.63	0.00	7.42	0.325	513.50
12.200	8.83	152.61	170.21	0.00	8.80	0.333	513.56
12.250	6.60	151.51	168.04	0.00	8.26	0.330	513.53
12.300	5.21	148.86	163.32	0.00	7.23	0.322	513.49
12.350	4.25	145.07	158.32	0.00	6.63	0.313	513.43
12.400	3.61	140.97	152.93	0.00	5.98	0.304	513.37
12.450	3.12	136.99	147.70	0.00	5.35	0.294	513.32
12.500	2.75	133.33	142.87	0.00	4.77	0.285	513.26
12.550	2.44	130.02	138.52	0.00	4.25	0.277	513.22
12.600	2.19	127.09	134.66	0.00	3.78	0.270	513.17
12.650	1.98	124.51	131.27	0.00	3.38	0.264	513.14
12.700	1.83	122.28	128.32	0.00	3.02	0.259	513.10
12.750	1.71	120.37	125.81	0.00	2.72	0.254	513.08
12.800	1.62	118.76	123.69	0.00	2.47	0.250	513.05
12.850	1.55	117.42	121.93	0.00	2.25	0.247	513.03
12.900	1.49	116.31	120.46	0.00	2.08	0.245	513.02
12.950	1.44	115.37	119.23	0.00	1.93	0.242	513.00
13.000	1.38	114.42	118.19	0.00	1.88	0.240	512.99
13.250	1.17	108.41	112.14	0.00	1.86	0.228	512.89
13.500	1.03	100.94	104.61	0.00	1.84	0.212	512.77
13.750	0.91	92.43	96.05	0.00	1.81	0.195	512.63
14.000	0.81	83.15	86.70	0.00	1.78	0.175	512.47
14.250	0.74	73.37	76.83	0.00	1.73	0.155	512.27
14.500	0.70	63.50	66.87	0.00	1.69	0.135	512.06
14.550	0.69	61.54	64.89	0.00	1.68	0.131	512.02
14.750	0.67	54.18	57.27	0.00	1.54	0.115	511.46
15.000	0.63	46.31	49.04	0.00	1.37	0.099	510.78
15.500	0.57	34.56	36.66	0.00	1.05	0.074	509.76
16.000	0.50	27.21	28.79	0.00	0.79	0.058	509.12
16.500	0.46	23.12	24.31	0.00	0.60	0.050	508.81
17.000	0.43	21.23	22.24	0.00	0.50	0.046	508.68
17.500	0.41	20.23	21.13	0.00	0.45	0.044	508.61
18.000	0.38	19.56	20.39	0.00	0.42	0.042	508.57
19.000	0.33	18.49	19.21	0.00	0.36	0.039	508.50
20.000	0.28	17.33	17.96	0.00	0.32	0.036	508.43
21.000	0.27	16.44	17.00	0.00	0.28	0.035	508.38
22.000	0.26	16.06	16.58	0.00	0.26	0.034	508.36
23.000	0.25	15.79	16.29	0.00	0.25	0.033	508.35
24.000	0.24	15.54	16.02	0.00	0.24	0.033	508.33
24.250	0.06	14.85	15.28	0.00	0.22	0.031	508.30
24.300	0.04	14.54	14.95	0.00	0.20	0.030	508.28
24.350	0.02	14.22	14.60	0.00	0.19	0.030	508.26
24.400	0.01	13.90	14.25	0.00	0.18	0.029	508.24
24.450	0.01	13.59	13.92	0.00	0.17	0.028	508.23
24.500	0.00	13.30	13.60	0.00	0.15	0.028	508.21
24.750	0.00	12.08	12.29	0.00	0.10	0.025	508.14
25.000	0.00	11.25	11.39	0.00	0.07	0.023	508.10
25.500	0.00	10.29	10.36	0.00	0.03	0.021	508.05
26.000	0.00	9.85	9.88	0.00	0.02	0.020	508.02
26.500	0.00	9.65	9.66	0.00	0.01	0.020	508.01
26.550	0.00	9.63	9.65	0.00	0.01	0.020	508.01
26.600	0.00	9.62	9.63	0.00	0.01	0.020	508.01
26.650	0.00	9.61	9.62	0.00	0.01	0.020	508.01
26.700	0.00	9.60	9.61	0.00	0.01	0.020	508.01
26.750	0.00	9.59	9.60	0.00	0.00	0.020	508.01
26.800	0.00	9.58	9.59	0.00	0.00	0.020	508.01
26.850	0.00	9.57	9.58	0.00	0.00	0.020	508.01
26.900	0.00	9.57	9.57	0.00	0.00	0.020	508.01
26.950	0.00	9.56	9.57	0.00	0.00	0.020	508.00
27.000	0.00	9.55	9.56	0.00	0.00	0.020	508.00

Bowman

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SWM CALCULATIONS
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: N/A V: N/A

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 42 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\040-042-6642-D-CP-001-SWM.dwg

Worksheet for SHEET FLOW #1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.168 ft/ft
Discharge	1.31 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	512.06
0+00	512.03
0+04	511.70
0+19	511.86
0+25	511.87
0+31	511.87
0+36	511.99

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 512.06)	(0+36, 511.99)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.1 ft
Roughness Coefficient	0.030
Elevation	511.80 ft
Elevation Range	511.7 to 512.1 ft
Flow Area	0.5 ft²
Wetted Perimeter	9.9 ft
Hydraulic Radius	0.0 ft
Top Width	9.93 ft
Normal Depth	0.1 ft
Critical Depth	0.1 ft
Critical Slope	0.032 ft/ft
Velocity	2.71 ft/s
Velocity Head	0.11 ft
Specific Energy	0.21 ft
Froude Number	2.165
Flow Type	Supercritical

Cross Section for SHEET FLOW #1

Worksheet for SHEET FLOW #2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.213 ft/ft
Discharge	3.62 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	491.98
0+02	491.73
0+04	491.58
0+09	491.33
0+14	491.32
0+22	491.62
0+25	491.91
0+27	492.16

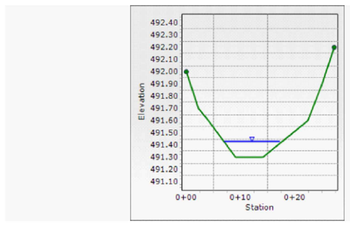
Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 491.98)	(0+27, 492.16)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.1 ft
Roughness Coefficient	0.030
Elevation	491.43 ft
Elevation Range	491.3 to 492.2 ft
Flow Area	0.8 ft²
Wetted Perimeter	10.2 ft
Hydraulic Radius	0.1 ft
Top Width	10.22 ft
Normal Depth	0.1 ft
Critical Depth	0.2 ft
Critical Slope	0.026 ft/ft
Velocity	4.32 ft/s
Velocity Head	0.29 ft
Specific Energy	0.40 ft
Froude Number	2.661
Flow Type	Supercritical

Cross Section for SHEET FLOW #2



Worksheet for SHEET FLOW #3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.219 ft/ft
Discharge	2.78 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	495.39
0+01	495.29
0+02	495.26
0+02	495.24
0+05	495.07
0+14	494.63
0+16	494.61
0+18	494.64
0+25	494.85
0+43	495.40

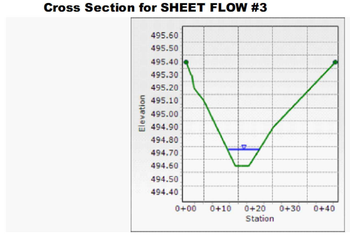
Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 495.39)	(0+43, 495.40)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.1 ft
Roughness Coefficient	0.030
Elevation	494.73 ft
Elevation Range	494.6 to 495.4 ft
Flow Area	0.7 ft²
Wetted Perimeter	9.1 ft
Hydraulic Radius	0.1 ft
Top Width	9.07 ft
Normal Depth	0.1 ft
Critical Depth	0.2 ft
Critical Slope	0.027 ft/ft
Velocity	4.11 ft/s
Velocity Head	0.26 ft
Specific Energy	0.39 ft
Froude Number	2.655
Flow Type	Supercritical

Cross Section for SHEET FLOW #3



Worksheet for SHEET FLOW #4

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.198 ft/ft
Discharge	2.38 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	497.49
0+02	497.33
0+05	497.08
0+12	497.03
0+20	497.34
0+20	497.32
0+22	497.38
0+25	497.47
0+25	497.48

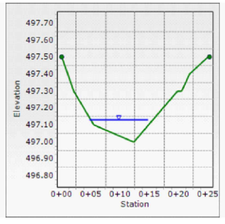
Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 497.49)	(0+25, 497.48)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.1 ft
Roughness Coefficient	0.030
Elevation	497.13 ft
Elevation Range	497.0 to 497.5 ft
Flow Area	0.7 ft²
Wetted Perimeter	10.0 ft
Hydraulic Radius	0.1 ft
Top Width	9.95 ft
Normal Depth	0.1 ft
Critical Depth	0.2 ft
Critical Slope	0.028 ft/ft
Velocity	3.61 ft/s
Velocity Head	0.20 ft
Specific Energy	0.30 ft
Froude Number	2.475
Flow Type	Supercritical

Cross Section for SHEET FLOW #4



Worksheet for LEVEL SPREADER

Project Description	
Solve For	Headwater Elevation

Input Data	
Discharge	10.95 cfs
Crest Elevation	455.27 ft
Tailwater Elevation	455.27 ft
Weir Coefficient	3.33 ft^(1/2)/s
Crest Length	100.0 ft
Number Of Contractions	0

Results	
Headwater Elevation	455.37 ft
Headwater Height Above Crest	0.10 ft
Tailwater Height Above Crest	0.00 ft
Flow Area	10.3 ft²
Velocity	1.07 ft/s
Wetted Perimeter	100.2 ft
Top Width	100.00 ft

Bowman

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SWM CALCULATIONS

TIFFANY ESTATES

CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD
SCALE	H: N/A V: N/A	

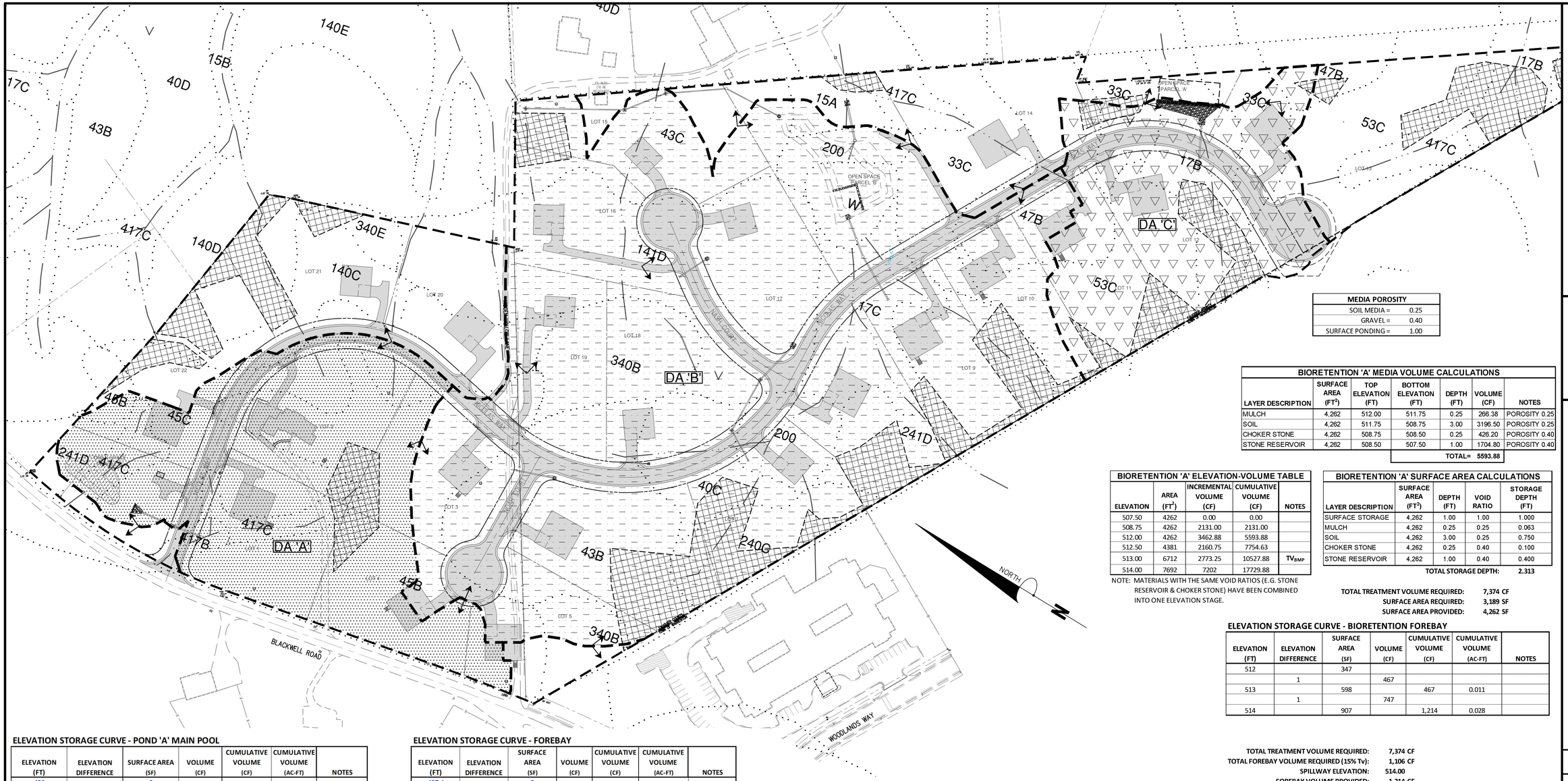
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 42A OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\040-042-6642-D-CP-001-SWM.dwg



MEDIA POROSITY	
SOIL MEDIA =	0.25
GRAVEL =	0.40
SURFACE PONDING =	1.00

BIORETENTION 'A' MEDIA VOLUME CALCULATIONS

LAYER DESCRIPTION	SURFACE AREA (FT^2)	TOP ELEVATION (FT)	BOTTOM ELEVATION (FT)	DEPTH (FT)	VOLUME (CF)	NOTES
MULCH	4,262	512.00	511.75	0.25	266.38	POROSITY 0.25
SOIL	4,262	511.75	508.75	3.00	3196.50	POROSITY 0.25
CHOKER STONE	4,262	508.75	508.50	0.25	426.20	POROSITY 0.40
STONE RESERVOIR	4,262	508.50	507.50	1.00	1704.80	POROSITY 0.40
				TOTAL=	5593.88	

BIORETENTION 'A' ELEVATION-VOLUME TABLE

ELEVATION	AREA (FT^2)	INCREMENTAL VOLUME (CF)	CUMULATIVE VOLUME (CF)	NOTES
507.50	4262	0.00	0.00	
508.75	4262	2131.00	2131.00	
512.00	4262	3462.88	5593.88	
512.50	4381	2160.75	7754.63	
513.00	6712	2773.25	10527.88	TV_{BMP}
514.00	7692	7202	17729.88	

NOTE: MATERIALS WITH THE SAME VOID RATIOS (E.G. STONE RESERVOIR & CHOKER STONE) HAVE BEEN COMBINED INTO ONE ELEVATION STAGE.

BIORETENTION 'A' SURFACE AREA CALCULATIONS

LAYER DESCRIPTION	SURFACE AREA (FT^2)	DEPTH (FT)	VOID RATIO	STORAGE DEPTH (FT)
SURFACE STORAGE	4,262	1.00	1.00	1.000
MULCH	4,262	0.25	0.25	0.063
SOIL	4,262	3.00	0.25	0.750
CHOKER STONE	4,262	0.25	0.40	0.100
STONE RESERVOIR	4,262	1.00	0.40	0.400
			TOTAL STORAGE DEPTH:	2.313

TOTAL TREATMENT VOLUME REQUIRED: 7,374 CF
SURFACE AREA REQUIRED: 3,189 SF
SURFACE AREA PROVIDED: 4,262 SF

ELEVATION STORAGE CURVE - BIORETENTION FOREBAY

ELEVATION (FT)	ELEVATION DIFFERENCE	SURFACE AREA (SF)	VOLUME (CF)	CUMULATIVE VOLUME (CF)	CUMULATIVE VOLUME (AC-FT)	NOTES
512		347				
	1		467			
513		598		467	0.011	
	1		747			
514		907		1,214	0.028	

TOTAL TREATMENT VOLUME REQUIRED: 7,374 CF
TOTAL FOREBAY VOLUME REQUIRED (15% Tv): 1,106 CF
SPILLWAY ELEVATION: 514.00
FOREBAY VOLUME PROVIDED: 1,214 CF

ELEVATION STORAGE CURVE - POND 'A' MAIN POOL

ELEVATION (FT)	ELEVATION DIFFERENCE	SURFACE AREA (SF)	VOLUME (CF)	CUMULATIVE VOLUME (CF)	CUMULATIVE VOLUME (AC-FT)	NOTES
436		0				
	2		2365			
438		3,548		2,365	0.054	
	1.5		6314			
439.5		4,907		8,679	0.199	
	0.5		2840			
440		6,491		11,519	0.264	
	1		8057			
441		9,733		19,577	0.449	
	0.4		4926			
441.4		15,092		24,503	0.563	
	0.6		9379			
442		16,176		33,881	0.778	
	2		36105			
444		19,996		69,986	1.607	
	2		44046			
446		24,114		114,032	2.618	
	2		52825			
448		28,780		166,857	3.831	

TOTAL TREATMENT VOLUME REQUIRED: 18,826 CF
CONTROL ORIFICE ELEVATION: 441.00 (PERM. POOL ELEV.)
WQV MAIN POOL: 19,577 CF

Pond Volume Equations

Volume = (1/3) * (EL2 - EL1) * (Area1 + Area2 + sqr(Area1 * Area2))

Where: EL1, EL2 — Lower and upper elevations of the increment
Area1, Area2 — Areas computed for EL1, EL2, respectively
Volume — Incremental volume between EL1 and EL2

ELEVATION STORAGE CURVE - FOREBAY

ELEVATION (FT)	ELEVATION DIFFERENCE	SURFACE AREA (SF)	VOLUME (CF)	CUMULATIVE VOLUME (CF)	CUMULATIVE VOLUME (AC-FT)	NOTES
437.4		0				
	0.6		115			
438		574		115	0.003	
	1.5		1044			
439.5		826		1,159	0.027	
	0.5		466			
440		1,041		1,625	0.037	
	1		1288			
441		1,551		2,912	0.067	

TOTAL TREATMENT VOLUME REQUIRED: 18,826 CF
TOTAL FOREBAY VOLUME REQUIRED (15% Tv): 2,824 CF
SPILLWAY ELEVATION: 441.00
FOREBAY VOLUME PROVIDED: 2,912 CF

WET POND VOLUME REQUIREMENT

THE TOTAL REQUIRED TREATMENT VOLUME IN THE WET POND IS 18,826 CUBIC FEET (SEE DA 'B' TAB IN VRRM). PER THE ELEVATION-STORAGE TABLE ON THIS SHEET, THE TOTAL TREATMENT VOLUME PROVIDED IN THE PERMANENT POOL IS 19,577 CUBIC FEET, WHICH IS GREATER THAN THE REQUIRED TREATMENT VOLUME.

THE REQUIRE FOREBAY VOLUME IS 15% OF THE REQUIRED TREATMENT VOLUME, OR 2,824 CUBIC FEET. PER THE FOREBAY ELEVATION-STORAGE TABLE ON THIS SHEET, THE TOTAL FOREBAY VOLUME PROVIDED IS 2,912 CUBIC FEET, WHICH IS GREATER THAN THE REQUIRED FOREBAY VOLUME.

BMP NARRATIVE

THE SITE IS LOCATED ALONG THE EASTERN SIDE OF BLACKWELL ROAD, TO THE SOUTHEAST OF THE INTERSECTION OF BLACKWELL ROAD AND IVY HILL DRIVE, AND NORTH OF THE US 17 SPUR. THE EXISTING SITE IS APPROXIMATELY 32.23 ACRES; CONSISTS OF ONE RESIDENTIAL DWELLING, AN EXISTING POND, AN EXISTING DRIVEWAY, AND WOODED AREAS; AND IS COMPRISED OF HYDROLOGIC SOIL GROUPS (HSG) B, C, AND D. THE PROJECT CONSISTS OF THE CONSTRUCTION OF 22 SINGLE FAMILY DETACHED LOTS ALONG WITH ASSOCIATED IMPROVEMENTS.

BASED ON THE LAND COVER PROPOSED WITH THIS PLAN, THE TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED FOR THIS SITE IS 9.70 LB/YR, PER THE VIRGINIA RUNOFF REDUCTION METHOD (VRRM) COMPLIANCE SPREADSHEET FOR REDEVELOPMENT. ONE LEVEL 1 WET POND (POND 'A'), ONE LEVEL 2 BIORETENTION BASIN (BIORETENTION 'A'), AND SHEET FLOW TO A VEGETATED FILTER STRIP ARE PROPOSED TO PROVIDE WATER QUALITY TREATMENT. THE TOTAL PHOSPHOROUS LOAD REDUCTION ACHIEVED BY IMPLEMENTING THESE BMP DEVICES IS 10.61 LB/YR, WHICH IS GREATER THAN THE REQUIRED TOTAL PHOSPHORUS LOAD REDUCTION. THEREFORE, WATER QUALITY REQUIREMENTS HAVE BEEN SATISFIED.

LEGEND

- DRAINAGE DIVIDE
- SWM ANALYSIS BOUNDARY
- IMPERVIOUS AREA (5.27 AC.)
- MANAGED TURF AREA (23.04 AC.)
- FOREST/OPEN SPACE AREA (3.95 AC.)
- AREAS TO WET POND LEVEL 1
- AREAS TO SHEET FLOW TO VEGETATED FILTER STRIP
- AREAS TO BIORETENTION LEVEL 2

BIORETENTION VOLUME REQUIREMENT

THE BASE TREATMENT VOLUME REQUIRED IN BIORETENTION 'A' IS 6,041 CUBIC FEET (SEE DA 'A' TAB IN VRRM). SINCE THE BIORETENTION BASIN WAS DESIGNED AS A LEVEL 2 BIORETENTION BASIN, THE TOTAL TREATMENT VOLUME REQUIRED IS 1.25 TIMES THE BASE TREATMENT VOLUME, OR 7,374 CUBIC FEET. PER THE ELEVATION-STORAGE TABLE ON THIS SHEET, THE TOTAL TREATMENT VOLUME PROVIDED IN THE PERMANENT POOL IS 10,528 CUBIC FEET, WHICH IS GREATER THAN THE REQUIRED TREATMENT VOLUME.

THE REQUIRE FOREBAY VOLUME IS 15% OF THE REQUIRED TREATMENT VOLUME, OR 1,106 CUBIC FEET. PER THE FOREBAY ELEVATION-STORAGE TABLE ON THIS SHEET, THE TOTAL FOREBAY VOLUME PROVIDED IS 1,214 CUBIC FEET, WHICH IS GREATER THAN THE REQUIRED FOREBAY VOLUME.

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

Bowman

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BMP & LAND COVER MAP
TIFFANY ESTATES
CONSTRUCTION PLAN
CENTER MAGISTERIAL DISTRICT
FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=80' V:
JOB No. 6642-02-002
DATE : FEBRUARY 10, 2023
FILE No. 6642-D-CP-001
SHEET 43 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\043-044-6642-D-CP-001-BMP.dwg

DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

BMP Design Specifications List: **2011 Stds & Specs**

Update Summary Sheet

Print Preview | Print

Site Summary

Total Rainfall (in):	43
Total Disturbed Acreage:	27.21

Site Land Cover Summary

Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	13.10	15.09	1.41	29.60	92
Managed Turf (acres)	0.00	0.62	1.02	0.10	1.74	5
Impervious Cover (acres)	0.00	0.22	0.31	0.39	0.92	3
					32.26	100

Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	1.89	1.62	0.44	3.95	12 *
Managed Turf (acres)	0.00	9.96	12.03	1.05	23.04	71
Impervious Cover (acres)	0.00	2.09	2.77	0.41	5.27	16
					32.26	100

* Forest/Open Space areas must be protected in accordance with the Virginia Runoff Reduction Method

Site Tv and Land Cover Nutrient Loads

	Final Post-Development (Post-ReDevelopment & New Impervious)	Post-ReDevelopment	Post-Development (New Impervious)	Adjusted Pre-ReDevelopment
Site Rv	0.31	0.21	0.95	0.08
Treatment Volume (ft³)	36,485	21,485	15,001	7,837
TP Load (lb/yr)	22.92	13.50	9.43	4.92
	Baseline TP Load (lb/yr):	11.4431*	*Reduction below new development load limitation not required	

Pre-ReDevelopment TP Load per acre (lb/acre/yr)	Final Post-Development TP Load per acre (lb/acre/yr)	Post-ReDevelopment TP Load per acre (lb/acre/yr)
0.18	0.71	0.48

Total TP Load Reduction Required (lb/yr)	9.70	2.06	7.64

	Final Post-Development Load (Post-ReDevelopment & New Impervious)	Pre-ReDevelopment
TN Load (lb/yr)	163.99	37.76

Site Compliance Summary

Maximum % Reduction Required Below Pre-ReDevelopment Load	20%

** Note: % Reduction will reduce post-development TP load to less than or equal to baseline load of 11.44 lb/yr (0.41 lb/ac/yr) [Required reduction for Post-ReDev. = Post-ReDev TP load - baseline load of 11.4431 lb/yr], baseline load = site area x 0.41 lb/ac/yr*

Total Runoff Volume Reduction (ft³)	6,902
Total TP Load Reduction Achieved (lb/yr)	10.61
Total TN Load Reduction Achieved (lb/yr)	59.52
Remaining Post Development TP Load (lb/yr)	12.31
Remaining TP Load Reduction (lb/yr) Required	0.00

** TARGET TP REDUCTION EXCEEDED BY 0.91 LB/YEAR **

**Reduction below new development load limitation not required*

Drainage Area Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest/Open (acres)	0.38	1.78	0.54	0.00	0.00	2.70
Managed Turf (acres)	4.15	12.20	2.18	0.00	0.00	18.53
Impervious Cover (acres)	0.84	3.18	0.80	0.00	0.00	4.82
Total Area (acres)	**5.37**	**17.16**	**3.52**	**0.00**	**0.00**	**26.05**

Drainage Area Compliance Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Reduced (lb/yr)	3.33	5.91	1.37	0.00	0.00	10.61
TN Load Reduced (lb/yr)	24.36	25.36	9.80	0.00	0.00	59.52

Drainage Area A Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.10	0.28	0.00	0.38	7
Managed Turf (acres)	0.00	0.48	3.67	0.00	4.15	77
Impervious Cover (acres)	0.00	0.09	0.75	0.00	0.84	16
					5.37	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	**3.93**	**0.81**	**5,898.78**	**0.00**	**3.70**	**3.33**	**0.37**	

Total Impervious Cover Treated (acres)	0.81
Total Turf Area Treated (acres)	3.93
Total TP Load Reduction Achieved in D.A. (lb/yr)	3.33
Total TN Load Reduction Achieved in D.A. (lb/yr)	24.36

Drainage Area B Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.69	0.65	0.44	1.78	10
Managed Turf (acres)	0.00	5.69	5.46	1.05	12.20	71
Impervious Cover (acres)	0.00	1.27	1.50	0.41	3.18	19
					17.16	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
13.a. Wet Pond #1 (Spec #14)	**10.91**	**3.01**	**18,825.55**	**0.00**	**11.81**	**5.91**	**5.91**	

Total Impervious Cover Treated (acres)	3.01
Total Turf Area Treated (acres)	10.91
Total TP Load Reduction Achieved in D.A. (lb/yr)	5.91
Total TN Load Reduction Achieved in D.A. (lb/yr)	25.36

Drainage Area C Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.50	0.04	0.00	0.54	15
Managed Turf (acres)	0.00	1.84	0.34	0.00	2.18	62
Impervious Cover (acres)	0.00	0.69	0.11	0.00	0.80	23
					3.52	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4)	**2.18**	**0.8**	**4,366.16**	**0.00**	**2.74**	**1.37**	**1.37**	

Total Impervious Cover Treated (acres)	0.80
Total Turf Area Treated (acres)	2.18
Total TP Load Reduction Achieved in D.A. (lb/yr)	1.37
Total TN Load Reduction Achieved in D.A. (lb/yr)	9.80

Runoff Volume and CN Calculations

	1-year storm	2-year storm	10-year storm
Target Rainfall Event (in)	2.59	3.14	4.79

Drainage Areas	RV & CN	Drainage Area A	Drainage Area B	Drainage Area C	Drainage Area D	Drainage Area E
CN		76	74	70	0	0
RR (ft³)		4,719	0	2,183	0	0
1-year return period	RV wo RR (ws-in)	0.75	0.66	0.50	0.00	0.00
	RV w RR (ws-in)	0.51	0.66	0.33	0.00	0.00
	CN adjusted	70	74	65	0	0
2-year return period	RV wo RR (ws-in)	1.11	1.00	0.79	0.00	0.00
	RV w RR (ws-in)	0.87	1.00	0.62	0.00	0.00
	CN adjusted	71	74	66	0	0
10-year return period	RV wo RR (ws-in)	2.36	2.20	1.88	0.00	0.00
	RV w RR (ws-in)	2.12	2.20	1.71	0.00	0.00
	CN adjusted	73	74	68	0	0

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BMP CALCULATIONS
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DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=80' V:

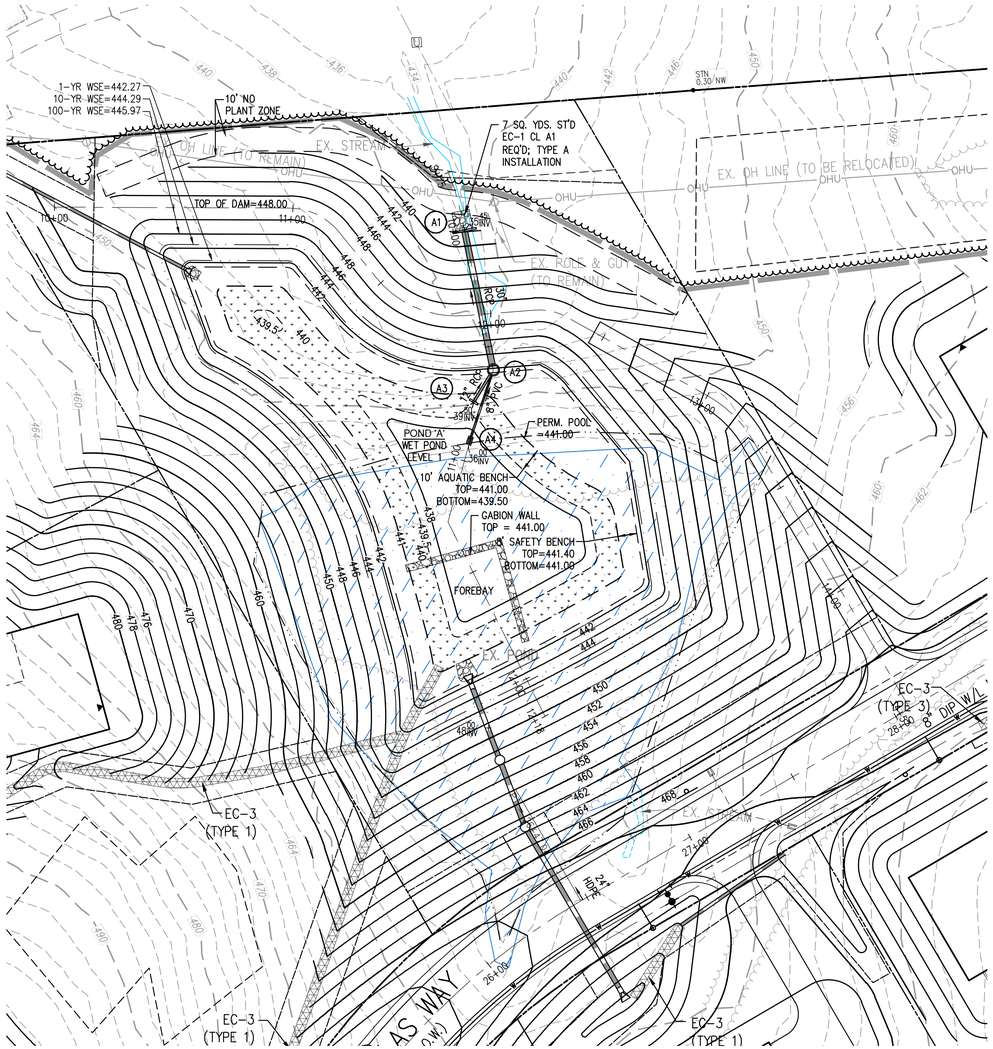
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

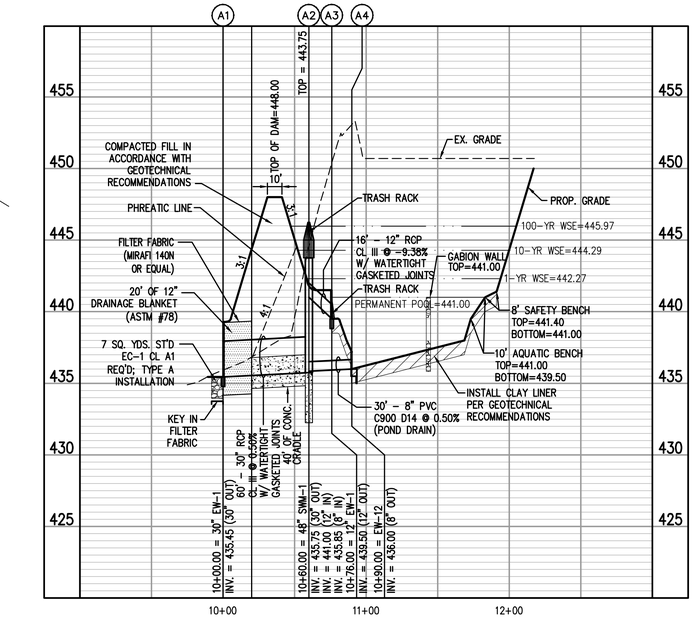
SHEET 44 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\043-044-6642-D-CP-001-BMP.dwg



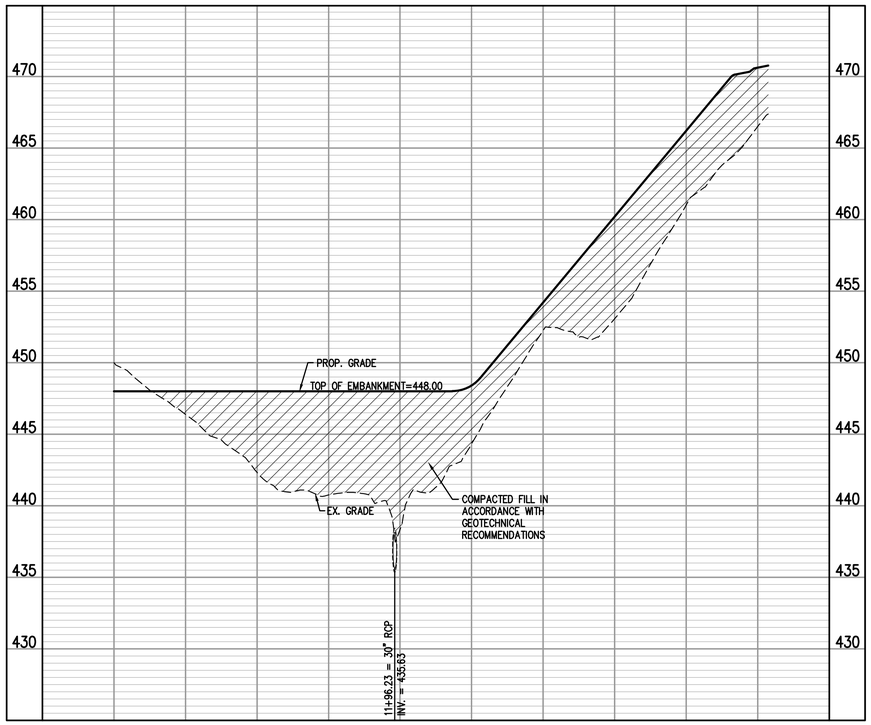
POND 'A' PLAN

SCALE: 1"=30'



PRINCIPAL SPILLWAY PROFILE

HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=5'



EMBANKMENT PROFILE

HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=5'

GRAPHIC SCALE

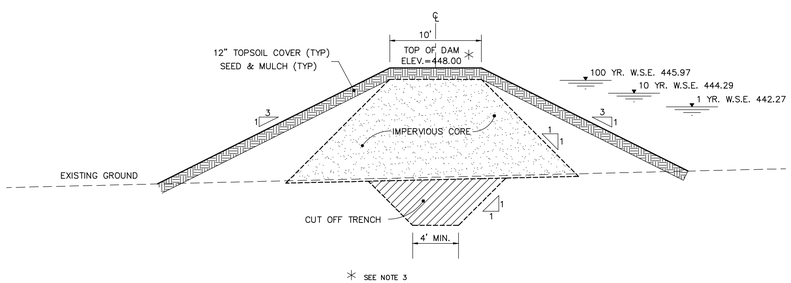
50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.



SECTION THRU DAM EMBANKMENT SWM/BMP POND 'B'

SCALE: NONE

NOTES:

1. THE EMBANKMENT MAY BE CONSTRUCTED AS A HOMOGENOUS EMBANKMENT DAM. FILL MATERIAL SHALL BE TAKEN FROM AN APPROVED, DESIGNATED BORROW AREA. IT SHALL BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6 INCHES, AND FROZEN OR OTHER OBJECTIONABLE MATERIALS. FILL MATERIAL FOR CENTER OF THE EMBANKMENT AND THE CUTOFF TRENCH SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION ML, CL, MH, CH, OR SC. CONSIDERATION MAY BE GIVEN TO THE USE OF OTHER MATERIALS IN THE EMBANKMENT BASED ON THE RECOMMENDATIONS OF A GEOTECHNICAL ENGINEER SUPERVISING THE DESIGN AND CONSTRUCTION.
2. THE FILL SHALL BE CONSTRUCTED AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
3. THE EMBANKMENT SHALL BE CONSTRUCTED TO A MINIMUM ELEVATION 10% HIGHER THAN THE DESIGNED HEIGHT, OR BASED ON GEOTECHNICAL REPORT, TO ALLOW FOR SETTLEMENT WHEN MECHANICAL COMPACTORS ARE USED FOR CONSTRUCTION.
4. THE CUTOFF TRENCH SHALL EXTEND A MINIMUM OF 4' BELOW SUBGADE.
5. DESIGN AND CONSTRUCTION OF THE PROPOSED DAM IS SUBJECT TO RECOMMENDATIONS AND INSPECTION BY A QUALIFIED GEOTECHNICAL ENGINEER.
6. PRINCIPAL SPILLWAY AND RISER STRUCTURE SHALL BE INSTALLED IN ACCORDANCE WITH THE GEOTECHNICAL RECOMMENDATIONS.

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SWM POND 'A' DETAILS

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
PROFESSIONAL ENGINEER
11/22/24

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED	WED	WED
DESIGN	DRAWN	CHKD

SCALE H: AS NOTED V: AS NOTED

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

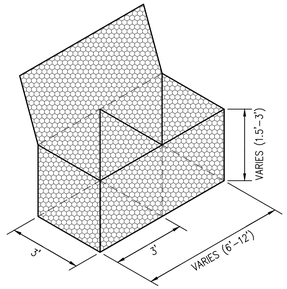
FILE No. 6642-D-CP-001

SHEET 45 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\045-049-6642-D-CP-001-SWM DET.dwg

GABION BASKET CONSTRUCTION SPECIFICATIONS

1. WIRE (ZINC COATED) TO BE 11 GAUGE WIRE OR HEAVIER WITH A MAXIMUM TENSILE STRENGTH OF 75,000 PSI, IN ACCORDANCE WITH ASTM A641/A641M.
2. GALVANIZED (ZINC COATED) WOVEN WIRE MESH (8 x 10 MESH TYPE):
   - WIRE MESH: DIAMETER – 0.120 IN.
   - SELVEDGE WIRE: DIAMETER – 0.153 IN.
   - MESH OPENING: NOMINAL DIMENSION D = 3.25 IN.
3. GALVANIZED (ZINC COATED) LACING WIRE AND INTERNAL STIFFENERS:
   - LACING WIRE: DIAMTER – 0.087 IN.
   - CROSS TIE/STIFFENING WIRE: DIAMETER – 0.087 IN.
   - PREFORMED STIFFENER: DIAMETER – 0.153 IN.
4. STEEL MESH:
   - MESH TENSILE STRENGTH SHALL BE A MINIMUM 3500 LB/FT IN ACCORDANCE WITH ASTM A975 SECTION 13.1.1
   - PUNCH TEST RESISTANCE SHALL HAVE A MINIMUM RESISTANCE OF 6000 LB IN ACCORDANCE WITH ASTM A975 SECTION 13.1.4
   - CONNECTION TO SELVEDGES SHALL HAVE A MINIMUM RESISTANCE OF 1400 LB/FT IN ACCORDANCE WITH ASTM A975
5. OVERLAPPING FASTENERS MAY BE USED IN LIEU OF, OR TO COMPLEMENT, LACING WIRE, PROVIDED:
   - HIGH TENSILE FASTENERS SHALL HAVE A NOMINAL SPACING OF 4 IN. NOT TO EXCEED 6 IN.
   - FASTENERS USED FOR ASSEMBLY OR INSTALLATION IN THE FIELD SHALL BE TESTED FOR COMPLIANCE WITH ASTM A975 SECTION 13.1.2.2. PRODUCER OR SUPPLIER OF THE WIRE MESH SHALL PROVIDE CERTIFICATION NO LATER THAN 15 DAYS PRIOR TO STARTING CONSTRUCTION.
   - THE AVERAGE MINIMUM RESISTANCE OF FASTENERS FROM THE FIELD SHALL NOT BE LOWER THAN 90% OF THE RESISTANCE PROVIDED IN THE CERTIFICATION.
   - GALVANIZED FASTENERS: DIAMETER – 0.12 IN., ACCORDING TO ASTM A764, TYPE B, CLASS 3
   - TESNSILE STRENGTH: 230,000 TO 273,000 PSI IN ACCORDANCE WITH ASTM 764 TABLE 2
   - A PROPERLY FORMED OVERLAPPING FASTENER SHALL HAVE A NOMINAL OVERLAP OF 1 IN. AFTER CLOSURE.
6. FILL GABIONS WITH CLEAN, HARD, ANGULAR TO ROUND, AND DURABLE STONE RANGING IN SIZE FROM 4 IN. TO 8 IN. THE SIZE SHALL BE SUCH THAT A MINIMUM OF TWO LAYERS OF ROCK CAN BE ACHIEVED WHEN FILLING THE GABION.
7. INSTALL GABIONS IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS

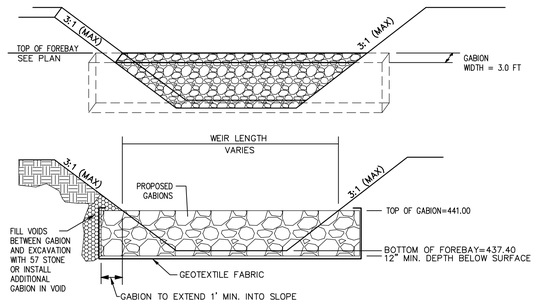


GABION BASKET

NOT TO SCALE

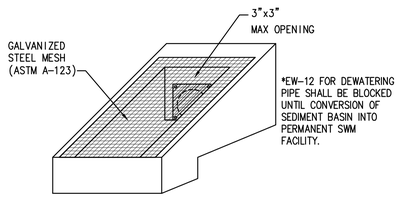
NOTE:

STRUCTURAL AND GEOTECHNICAL ENGINEERS SHALL PROVIDE FINAL DESIGN AND RECOMMENDATIONS FOR THE GABION WALL.



SEDIMENT FOREBAY GABION SECTION

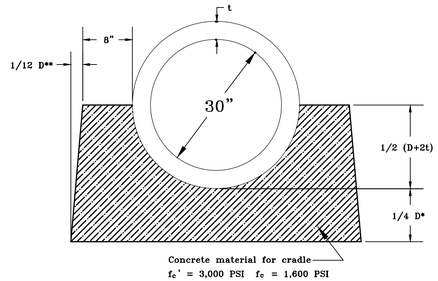
NOT TO SCALE



TYPICAL EW-12 TRASH RACK DETAL

NTS

Concrete Cradle



f_c' = Ultimate compressive strength of concrete

f_c = Design strength of concrete

* But not less than 6"

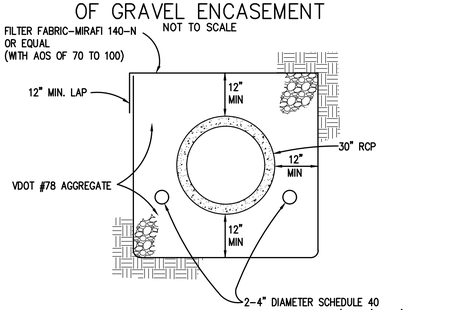
** If the pipe is laid in an excavated trench, then the side walls may conform to the trench shape (ie the trench may become the cradle form)

Source: SCS; ES-154, A2 Cradle

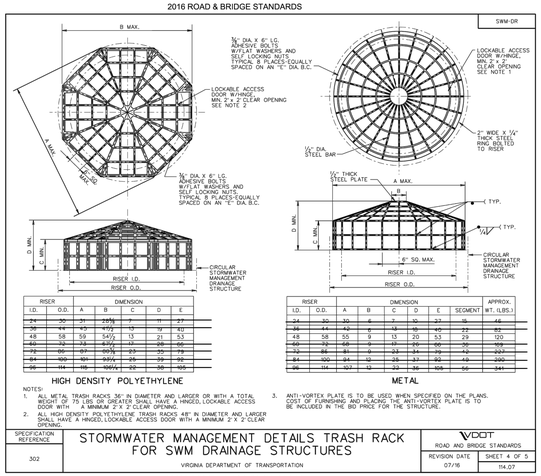
STANDARD CONCRETE CRADLE DETAILS FOR CIRCULAR CONDUITS EXTENDING THROUGH DAM EMBANKMENTS (N.T.S.)

TYPICAL SECTION OF GRAVEL ENCASEMENT

NOT TO SCALE



2016 ROAD & BRIDGE STANDARDS



RISER		DIMENSION					
I.D.	O.D.	A	B	C	D	E	
24	30	21	2'6"&	3	22	27	
36	44	4.5	4'7"	13	19	40	
48	58	5.5	5'10"	13	21	53	
60	72	7.5	6'7"	17	25	66	
72	86	8.5	8'0"	17	25	79	
84	100	10.5	9'4"	25	29	92	
96	114	12	10'6"	25	33	105	

HIGH DENSITY POLYETHYLENE

RISER		DIMENSION						APPROX.
I.D.	O.D.	A	B	C	D	E	SEGMENT	WT. (LBS.)
24	30	30	6	7	10	22	8	48
36	44	42	9	13	16	40	22	85
48	58	55	9	13	20	53	29	120
60	72	68	9	17	20	66	29	157
72	86	81	9	17	20	79	29	193
84	100	94	12	25	23	92	43	260
96	114	107	12	33	26	105	56	341

METAL

NOTES:
1. ALL METAL TRASH RACKS 36" IN DIAMETER AND LARGER OR WITH A TOTAL OPEN AREA OF 75 SQ. FT. OR GREATER SHALL HAVE A HINGED, LOCKABLE ACCESS DOOR WITH A MINIMUM 2' X 2' CLEAR OPENING.
2. ALL HIGH DENSITY POLYETHYLENE TRASH RACKS 48" IN DIAMETER AND LARGER SHALL HAVE A HINGED, LOCKABLE ACCESS DOOR WITH A MINIMUM 2' X 2' CLEAR OPENING.
3. ANTI-VORTEX PLATE IS TO BE USED WHEN SPECIFIED ON THE PLANS. COST OF FURNISHING AND PLACING THE ANTI-VORTEX PLATE IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.

SPECIFICATION REFERENCE	STORMWATER MANAGEMENT DETAILS TRASH RACK FOR SWM DRAINAGE STRUCTURES	VDOT ROAD AND BRIDGE STANDARDS
302	VIRGINIA DEPARTMENT OF TRANSPORTATION	REVISION DATE 07/16 · SHEET 4 OF 5 · 114.07

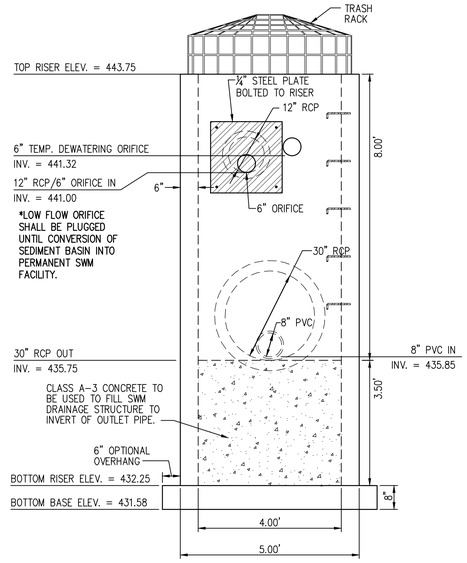
2016 ROAD & BRIDGE STANDARDS

POND OUTLET STRUCTURE NOTES

1. RISER, SPILLWAY AND FOOTING DIMENSIONS AND/OR THICKNESS AS WELL AS REINFORCEMENT, BUOYANCY CALCULATIONS AND THE METHOD OF JOINING THE VARIOUS STRUCTURAL ELEMENTS ARE SUBJECT TO DESIGN BY A PROFESSIONAL STRUCTURAL ENGINEER.
2. CONSTRUCTION AND CONTRACTION JOINTS ARE TO BE PROVIDED AS REQUIRED BY THE LATEST EDITION OF THE ACI CODE.
3. ALL CONNECTION/JOINTS SHALL BE WATERTIGHT.
4. SUBGRADE PREPARATION AND BEDDING REQUIREMENTS FOR ALL STRUCTURAL ELEMENTS ARE SUBJECT TO DESIGN BY A PROFESSIONAL GEOTECHNICAL ENGINEER.
5. PRECAST CONCRETE IS TO ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI. CAST IN PLACE CONCRETE IS TO BE VDOT CLASS A3.
6. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM A-615 (REINFORCING BARS).
7. ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4".
8. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN STRICT CONFORMANCE TO THE LATEST VDOT STANDARDS AND SPECIFICATIONS.
9. TEMPORARY DEWATERING ORIFICE SHALL BE PLUGGED DURING CONVERSION OF SEDIMENT BASIN TO PERMANENT SWM FACILITY.
10. SHOP DRAWINGS ARE TO BE SUBMITTED TO AND APPROVED BY THE ENGINEER PRIOR TO FABRICATION.

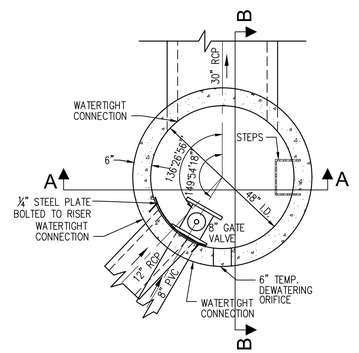
NOTE:

CONCRETE RISER STRUCTURE SHOWN FOR SCHEMATIC PURPOSES ONLY. RISER TOP AND ORIFICE SIZE/ELEVATIONS PER DESIGN INCLUDED IN PLAN. STRUCTURAL AND GEOTECHNICAL ENGINEERS SHALL PROVIDE FINAL DESIGN OF RISER. SHOP DRAWINGS REQUIRED PRIOR TO MANUFACTURING. SHOP DRAWINGS, INCLUDING BUOYANCY CALCULATIONS, SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. ONCE APPROVED BY THE ENGINEER, THE SHOP DRAWINGS SHALL BE SUBMITTED TO THE COUNTY FOR ACCEPTANCE.



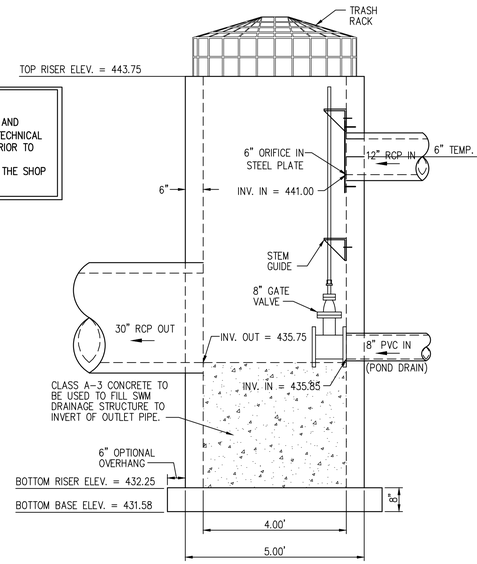
OUTFALL STRUCTURE (SECTION A-A)

SCALE: 1"=2'



OUTFALL STRUCTURE (TOP)

SCALE: 1"=2'



OUTFALL STRUCTURE (SECTION B-B)

SCALE: 1"=2'

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SWM POND 'A' DETAILS

TIFFANY ESTATES

CONSTRUCTION PLAN

CENTER MAGISTERIAL DISTRICT

FAUQUIER COUNTY, VIRGINIA

CONP-23-019202

COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED	WED	WED
DESIGN	DRAWN	CHKD

SCALE H: AS NOTED V: AS NOTED

JOB No. 6642-02-002

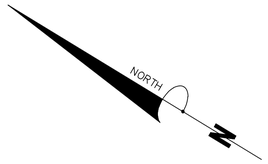
DATE : FEBRUARY 10, 2023

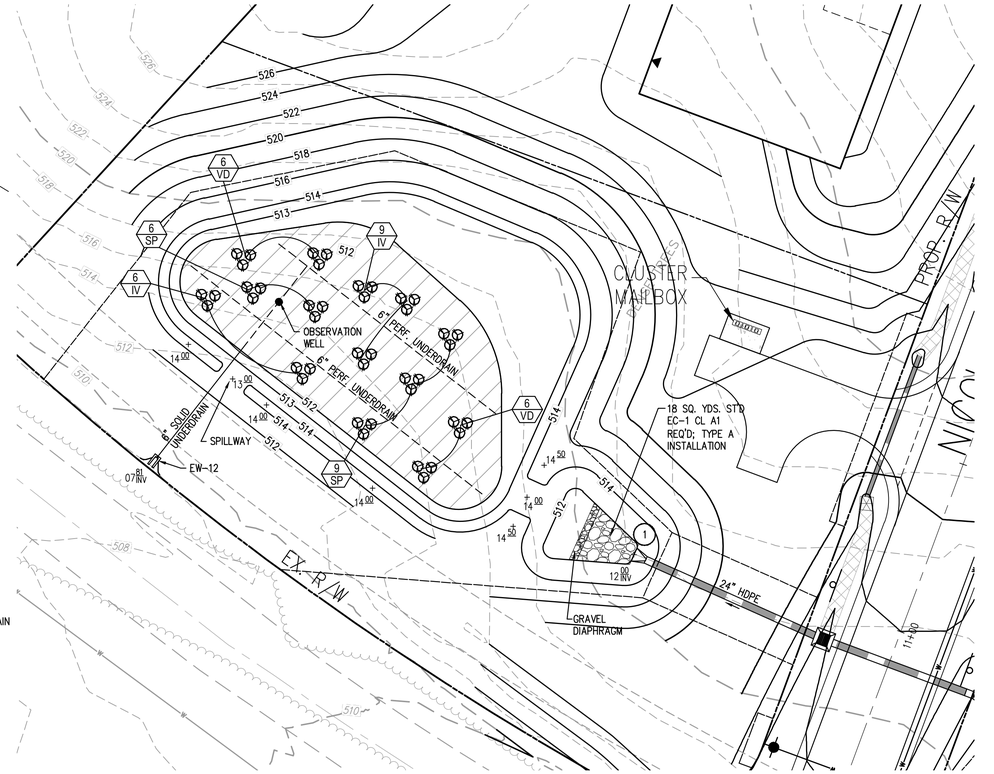
FILE No. 6642-D-CP-001

SHEET 46 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\045-049-6642-D-CP-001-SWM DET.dwg

BIORETENTION BASIN 'A' PLANT SCHEDULE				
BIORETENTION PLANT TEMPLATE: PERENNIAL GARDEN WITH SHRUBS				
QUANTITY		BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
BIORETENTION BASIN STABILIZATION MIX (HERBACEOUS GROUND COVER)					
	20%	AGROSTIS ALBA	REDTOP GRASS	SEED	CONTRACTOR SHALL HYDROSEED DISTRUBED AREAS WITH THE STABILIZATION SEED MIX AT A RATE OF 30 LBS/AC.
	20%	ANDROPOGON GERARDI	BIG BLUESTEM	SEED	
	25%	LOBELIA CARDINALIS	CARDINAL FLOWER	SEED	
	25%	ELYMUS VIRGINICUS	VIRGINIA WILD RYE	SEED	
	10%	PANICUM VIRGATUM	SWITCHGRASS	SEED	
BIORETENTION BASIN SHRUB LAYER					
IV	15	ILEX VERTICILLATA	WINTERBERRY	30"	SHRUBS SHALL BE PLANTED IN CLUSTERS AT APPROXIMATELY 10 FEET ON CENTER AT DENSITIES OF 2 TO 3 FEET ON CENTER.
SP	15	CLETHRA AINIFOLIA	SWEET PEPPER BUSH	30"	
VD	12	VIBURNUM DENTATUM	ARROWOOD	30"	





LEGEND

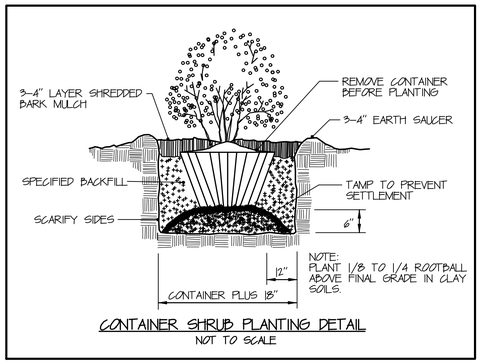
- DENOTES SOLID UNDERDRAIN
- DENOTES PERFORATED UNDERDRAIN
- DENOTES MULCH COVER/ LIMITS OF SOIL MEDIA
- DENOTES SHRUB
- 1 / QR — DENOTES QUANTITY / DENOTES PLANT TYPE

BIORETENTION 'A' PLAN

SCALE: 1"=20' GRAPHIC SCALE

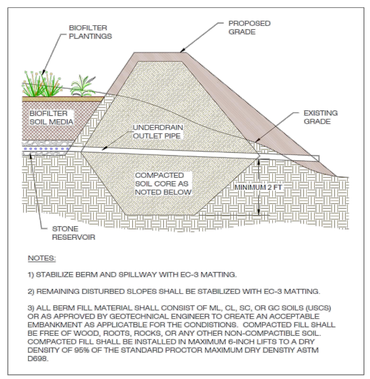
20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.



CONTAINER SHRUB PLANTING DETAIL

NOT TO SCALE

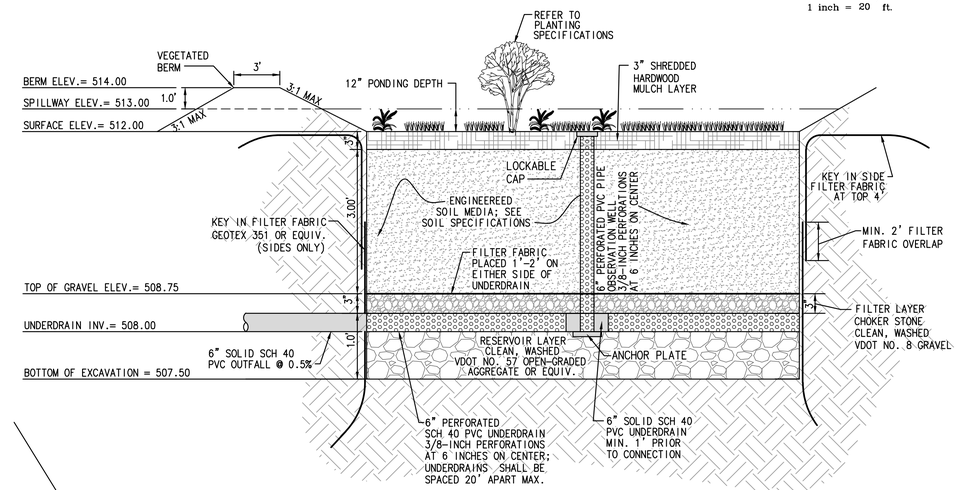


NOTES:

1) STABILIZE BERM AND SPILLWAY WITH EC-3 MATTING.

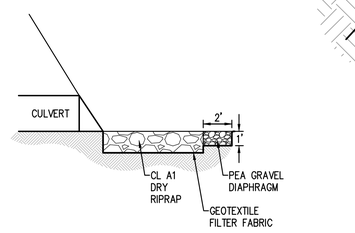
2) REMAINING DISTURBED SLOPES SHALL BE STABILIZED WITH EC-3 MATTING.

3) ALL BERM FILL MATERIAL SHALL CONSIST OF ML, CL, SC, OR GC SOILS (USCS) OR AS APPROVED BY GEOTECHNICAL ENGINEER TO CREATE AN ACCEPTABLE EMBANKMENT AS APPLICATBLE FOR THE CONDISTIONS. COMPACTED FILL SHALL BE FREE OF WOOD, ROOTS, ROCKS, OR ANY OTHER NON-COMPACTIBLE SOIL. COMPACTED FILL SHALL BE INSTALLED IN MAXIMUM 6-INCH LIFTS TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSTIY ASTM D698.



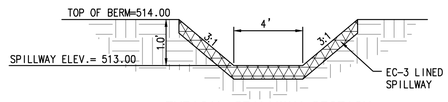
BIORETENTION 'A' DETAIL

NTS



TYPICAL GRAVEL DIAPHRAGM SECTION

NOT TO SCALE



TYPICAL SPILLWAY SECTION

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BIORETENTION BASIN 'A' DETAILS
CONSTRUCTION PLAN STATES

TIFFANY ESTATES

CENTER MAGISTERIAL DISTRICT FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

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SCALE H: AS NOTED V: AS NOTED

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 47 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\045-049-6642-D-CP-001-SWM DET.dwg

NOTES FOR CONCRETE USED IN CONSTRUCTION OF DAMS

1. UNLESS OTHERWISE SPECIFIED IN THE APPROVED SITE OR CONSTRUCTION PLAN, THE FOLLOWING APPLY TO ALL CONCRETE. MINIMUM STRENGTH IS 3,000 POUNDS. MINIMUM SLUMP IS 1" AND MAXIMUM SLUMP IS 3". CEMENT SHALL BE TYPE I; IF SOIL IS FOUND TO BE HIGH IN SOLUBLE SULFATES, TYPE V SHOULD BE USED AFTER CONSULTING WITH THE DESIGN ENGINEER (OR THE ENGINEER WHO IS TO CERTIFY THE STRUCTURE). EXPOSED CONCRETE WILL BE WATER CURED OR COVERED WITH CLEAR OR WHITE POLYETHYLENE FILM. ALL MATERIALS SHALL CONFORM TO APPROPRIATE ASTMs. FORMS SHALL BE CLEAR OF SOIL AND OTHER MATERIALS. CHAMFER STRIPS SHALL BE PLACED IN THE CORNERS OF THE FORMS AND AT THE TOPS OF WALL PLACEMENTS TO PRODUCE BEVELED EDGES ON PERMANENTLY EXPOSED CONCRETE SURFACES. EDGES OF CONSTRUCTION JOINTS SHALL NOT BE BEVELED EXCEPT WHERE INDICATED ON THE DRAWINGS. CONSOLIDATION OF ALL CONCRETE SHALL BE BY IMMERSION-TYPE VIBRATORS OPERATED IN A NEARLY VERTICAL POSITION. CONCRETE SHALL BE PLACED ACCORDING TO AMERICAN CONCRETE INSTITUTE (ACI) PROCEDURES FOR HOT AND COLD WEATHER CONCRETE.
2. UNLESS IT HAS BEEN SHOWN THAT THE ENTRAINED AIR CONTENT OF THE CONCRETE IS AT LEAST 4% BY VOLUME, AS DISCHARGED AT PLACEMENT, AN AIR ENTRAINING ADMIXTURE SHALL BE USED IN THE CONCRETE. THE ADMIXTURE SHALL CONFORM TO ASTM C 260; ANY AIRENTRAINING ADMIXTURE USED WITH TYPE F OR G CHEMICAL ADMIXTURE SHALL BE NEUTRALIZED VINSOL RESIN FORMULATION. ALL ADMIXTURES WILL BE USED AS SPECIFIED IN THE DESIGNS OR AS APPROVED BY THE DESIGN OR CERTIFYING ENGINEER. ANY ADMIXTURE, SUCH AS CALCIUM CHLORIDE, OR COMBINATION OF ADMIXTURES WHICH WILL INTRODUCE MORE THAN 0.1% CHLORIDE (TO CEMENT, BY WEIGHT) SHALL NOT BE USED IN CONCRETE IN WHICH ALUMINUM GALVANIZED METALWORK OR PRESTRESSING STEEL IS TO BE EMBEDDED.
3. NOTE REBAR SCHEDULE IN DRAWINGS. LUBRICATION OF FORMS IS REQUIRED UNLESS OTHERWISE SPECIFIED. FORMS SHALL BE REMOVED WITHIN 24 HOURS AFTER THE CONCRETE HAS HARDENED SUFFICIENTLY TO PREVENT DAMAGE BY CAREFUL FORM REMOVAL AND SPECIFIED REPAIR AND CURING WILL BE COMMENCED IMMEDIATELY THEREAFTER.
4. ALL MATERIALS TO BE WITHIN THE CONCRETE SHALL BE APPROPRIATE METAL REBAR, ELECTRICALLY WELDED WIRE FABRIC, MESH, TIES, METAL SUPPORTS, ETC. INTERIOR WOODEN BRACES ARE NOT ACCEPTABLE. BEFORE REINFORCEMENT IS EMBEDDED IN THE CONCRETE, THE SURFACES OF THE BARS, FABRIC AND SUPPORTS SHALL BE CLEANED OF HEAVY FLAKY RUST, LOOSE MILL SCALE, DIRT, GREASE OR OTHER FOREIGN SUBSTANCES WHICH ARE OBJECTIONABLE. HEAVY FLAKE RUST WHICH CAN BE REMOVED BY FIRM RUBBING WITH BURLAP, OR EQUIVALENT TREATMENT, IS CONSIDERED OBJECTIONABLE. PLASTIC FORM SPACERS ARE ACCEPTABLE. WHERE APPLICABLE, FIBER REINFORCEMENT IS ACCEPTABLE. EMBEDDED TIES FOR HOLDING FORMS SHALL REMAIN EMBEDDED AND EXCEPT WHERE F1 FINISH IS PERMITTED, SHALL TERMINATE NOT LESS THAN TWO DIAMETERS OR TWICE THE MINIMUM DIMENSION OF THE TIE, WHICHEVER IS GREATER, FROM THE FORMED SURFACES OF THE CONCRETE. RECESSES SHALL BE FILLED WITH APPROPRIATE MATERIAL.
5. ALL CONCRETE SHALL BE VIBRATED OR SUPER-PLASTICIZED IT SHALL NOT BE "WATERED DOWN" TO MAKE IT FLOW.
6. WHERE CONCRETE IS USED TO BED PIPE LARGER THAN 12 INCHES IN DIAMETER, IT SHALL BE VIBRATED OR SUPER-PLASTICIZED
7. POND RISERS SHALL BE PROPERLY SUPPORTED BY METAL OR CONCRETE BLOCKS PRIOR TO POURING THE BASE. AN ALTERNATIVE WOULD BE TO POUR THE BASE TO THE ELEVATION OF THE BOTTOM OF THE RISER, SET THE BOTTOM UNIT OF THE RISER IN PLACE AND THEN FINISH POURING THE BASE.
8. CONCRETE SURFACES LIKELY TO BE WALKED UPON, SUCH AS CHANNEL TYPE SPILLWAYS, SHALL HAVE A ROUGH SURFACE TO IMPROVE TRACTION.
9. CONCRETE SHALL BE DEPOSITED AS NEARLY AS PRACTICAL IN ITS FINAL POSITION AND SHALL NOT BE ALLOWED TO FLOW IN SUCH A MANNER THAT THE LATERAL MOVEMENT WILL CAUSE SEGREGATION OF THE COARSE AGGREGATE FROM THE CONCRETE MASS. METHODS AND EQUIPMENT EMPLOYED IN DEPOSITING CONCRETE IN FORMS SHALL MINIMIZE CLUSTERS OF COARSE AGGREGATE. CLUSTERS THAT OCCUR SHALL BE SCATTERED BEFORE THE CONCRETE IS VIBRATED. PLACING OF ADDITIONAL CONCRETE IN FORMS SHALL NOT BE DELAYED SO LONG THAT THE CONCRETE PLACED BEFORE THE DELAY IS NOT READILY PENETRATED BY VIBRATORS. IT IS ESPECIALLY IMPORTANT THAT ADEQUATE CONSOLIDATION BE ACHIEVED IN THE CONCRETE AT THE INTERFACE OF THE FRESH CONCRETE AND THE UNDERLYING CONCRETE. THE VIBRATOR SHALL REPEATEDLY PENETRATE AND THOROUGHLY RECONSOLIDATE THE UPPER PORTION OF THE UNDERLYING CONCRETE WHICH WAS PLACED BEFORE THE DELAY.
10. WHERE LIFT HOLES ARE PERMITTED IN CONCRETE PIPE, THEY SHALL BE FULLY GROUTED AND THE SURFACE OF THE GROUT ON THE INSIDE OF THE PIPE SHALL BE UNIFORM WITH THE INSIDE WALL OF THE PIPE. PIPE IN WHICH THE SMALLEST DIMENSION (DIAMETER IN ROUND PIPE) IS LESS THAN 36 INCHES SHALL NOT CONTAIN LIFT HOLES. LIFT HOLES ARE NOT PERMITTED IN POND BARRELS. WHERE PIPES ENTER RISERS, JUNCTION BOXES, MANHOLES, ETC., THE SPACE BETWEEN THE OUTSIDE WALL OF THE PIPE AND THE WALL OF THE OPENING SHALL BE FILLED WITH APPROPRIATE NON-SHRINKING CEMENT PASTE OR CEMENT MORTAR. WHERE THE OPENINGS ARE LARGE, CONCRETE BRICKS MAY ALSO BE USED. OTHER TYPES (CLAY, CINDERBLOCK) OF BRICK ARE NOTACCEPTABLE. ALL SURFACES OF THE BRICKS MUST BE COVERED WITH CEMENT. THE FINISHED SURFACES OF THE CEMENT MUST BE UNIFORM WITH THE INSIDE AND OUTSIDE WALLS OF THE STRUCTURE. THE SURFACES SHALL BE SMOOTH TO MINIMIZE ADVERSE EFFECTS OF FREEZING AND THAWING AND BRICKS SHALL NOT BE VISIBLE. O-RINGS SHALL BE PROPERLY LUBRICATED AND PROPERLY INSTALLED. ALL OTHER TYPES OF JOINTS SHALL BE PROPERLY SEALED. CONCRETE RISER SEGMENTS SHALL BE CONNECTED BY BOLTING FOUR GALVANIZED OR STAINLESS STEEL PLATES (6" X 18" X 1/4" MIN.), UNIFORMLY SPACED, TO EACH PAIR OF ADJOINING SEGMENTS.
11. THE BOTTOMS OF ALL RISERS, MANHOLES, JUNCTION BOXES, ETC. SHALL BE SHAPED IN ACCORDANCE WITH VDOT'S IS-1.

MAINTENANCE PLAN FOR STORMWATER DETENTION & RETENTION PONDS

1. THIS SWM FACILITIES ARE ONE LEVEL 1 WET POND; IT WILL STORE WATER DURING PERIODS OF HIGH INTENSITY RAINFALL. WITHIN SEVERAL HOURS MOST OF THE WATER WILL DRAIN OUT OF THE PONDS. WATER WILL REMAIN IN THE PERMANENT POOL OF THE WET POND. THE DEVELOPMENT OF THE SITE INCREASED THE AMOUNT OF RAINFALL WATER WHICH LEAVES THE SITE BECAUSE ABSORBENT SOIL WAS COVERED WITH IMPERVIOUS SURFACES SUCH AS BUILDINGS AND ROADS. THE PURPOSE OF THIS TEMPORARY STORAGE IS TO ENSURE THAT THE PEAK RATE/VOLUME OF FLOW TO THE CHANNEL BELOW THE SITE AREA WERE NOT INCREASED. SUCH INCREASES CAUSE FLOODING AND CHANNEL EROSION DOWNSTREAM FROM THE POND.
2. 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 SPILLWAY.
3. 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 VPI&SU). LIME AND FERTILIZER SHOULD BE APPLIED IN ACCORDANCE WITH RECOMMENDATIONS BASED ON THE TESTS.
4. REPLANTING AND OVERSEEDING. IF VEGETATION COVERS LESS THAN 40% OF THE SOIL SURFACE, LIME, FERTILIZE AND SEED IN ACCORDANCE WITH CURRENT RECOMMENDATIONS FOR NEW SEEDINGS. IF VEGETATION COVERS MOST THAN 40% BUT LESS THAN 70% OF THE SOIL SURFACE, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT RECOMMENDATIONS.
5. VEGETATION. MONITOR THE GROWTH OF WETLAND PLANTS, TREES, AND SHRUBS PLANTED, ESPECIALLY DURING DROUGHT CONDITIONS. IRRIGATE VEGETATION DURING DROUGHT CONDITIONS AS NECESSARY TO PRESERVE VEGETATION. REMOVE AND REPLACE ALL DEAD PLANTS.
6. REMOVING TRASH AND DEBRIS. TRASH, LITTER AND VEGETATION WILL BE REMOVED AS NEEDED 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.
7. REMOVING SEDIMENT. SOIL MATERIALS (INCLUDING CLAY,SILT, SAND AND GRAVEL) WILL BE REMOVED BEFORE THE RETENTION POOL OR THE BMP POOL LOSES 50% OF THE DESIGNED STORAGE CAPACITY. IF FOREBAYS ARE INCLUDED IN THE DESIGN, SEDIMENT SHOULD BE REMOVED BEFORE THE FOREBAY LOSES 50% OF THE DESIGN CAPACITY OF THE FOREBAY.
8. SEDIMENT DISPOSAL. SEDIMENT DISPOSAL SHOULD BE IN ACCORDANCE WITH CURRENT PROCEDURES FOR DISPOSAL OF SEDIMENT. WHERE DEEMED NECESSARY OR DESIRABLE, THE SEDIMENT WILL BE TESTED FOR APPROPRIATE POLLUTANTS BEFORE IT IS REMOVED FROM THE POND.
9. 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.
10. DEWATERING. WHEN NECESSARY, THE WET POND SHALL BE DRAINED BY A POND DRAIN BY OPENING THE GATE VALE. THE WATER WILL BE DISCHARGED INTO THE EXISTING POND OUTFALL. DEWATERING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.
11. MAINTENANCE INSPECTIONS. A REPRESENTATIVE OF THE OWNER(S) WILL INSPECT EACH STORMWATER MANAGEMENT STRUCTURE AFTER EACH SIGNIFICANT RAINFALL. ONCE EACH YEAR. A REPRESENTATIVE OF THE COUNTY 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(S). 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 SPOTSYLVANIA COUNTY PERSONNEL UPON REQUEST.
12. 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 THESE INSPECTIONS. THE RECORDS SHALL ALSO INCLUDE MAINTENANCE AND REPAIRS PERFORMED COPIES OF THESE RECORDS SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
13. THE SWM FACILITIES SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR APPROVAL BY THE COUNTY.

THE PURPOSE OF THESE PLANS IS TO PROVIDE THE BASIC INFORMATION REQUIRED TO CONTROL THE CONSTRUCTION OF THE COMBINATION PRINCIPAL & EMERGENCY SPILLWAYS.

GENERAL SPECIFICATIONS FOR SWM DAM AND FACILITY

1. AREAS UNDER THE EMBANKMENT AND ANY STRUCTURAL WORKS SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL, ROOTS OR OTHER OBJECTIONABLE MATERIAL. WOODY STEMMED SPECIES, PROPOSED OR EXISTING SHALL NOT BE PERMITTED WITHIN 25 FT OF EMBANKMENT FILL.
2. THE SUITABILITY AND ACCEPTABILITY OF ALL FILL MATERIAL WILL BE DETERMINED BY REGULAR PERIODIC SOIL ANALYSIS AND COMPACTION TESTS, WHICH SHALL BE MADE BY A QUALIFIED GEOTECHNICAL ENGINEER.
3. TESTS FOR SOIL ANALYSIS, MOISTURE CONTENT, AND COMPACTION ARE TO BE CONDUCTED IN ACCORDANCE WITH THE LATEST APPLICABLE ASTM STANDARDS AND SPECIFICATIONS.
4. THE EMBANKMENT MAY BE CONSTRUCTED AS A HOMOGENOUS EMBANKMENT DAM. FILL MATERIAL SHALL BE TAKEN FROM AN APPROVED, DESIGNATED BORROW AREA. IT SHALL BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6 INCHES, AND FROZEN OR OTHER OBJECTIONABLE MATERIALS. FILL MATERIAL FOR CENTER OF THE EMBANKMENT AND THE CUTOFF TRENCH SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION ML, CL, SC OR CC. CONSIDERATION MAY BE GIVEN TO THE USE OF OTHER MATERIALS IN THE EMBANKMENT BASED ON THE RECOMMENDATIONS OF A GEOTECHNICAL ENGINEER SUPERVISING THE DESIGN AND CONSTRUCTION.
5. THE MINIMUM REQUIRED DENSITY IS 95% MAXIMUM OF DRY DENSITY WITH A MOISTURE CONTENT WITHIN 2% OF THE OPTIMUM, UNLESS OTHERWISE SPECIFIED BY THE GEOTECHNICAL ENGINEER. EACH LAYER OF THE FILL SHALL BE COMPACTED AS NECESSARY TO OBTAIN MINIMUM DENSITY AND THE ENGINEER SHALL CERTIFY, AT THE TIME OF CONSTRUCTION, THAT EACH FILL LATER MEETS THE MINIMUM DENSITY REQUIREMENT. ALL COMPACTION IS TO BE DETERMINED BY EITHER STANDARD PROCTOR TEST (ASTM D698) OR THE MODIFIED PROCTOR TEST (ASTM D1557) AS DIRECTED BY THE GEOTECHNICAL ENGINEER BASED ON SITE AND SOIL CONDITIONS AND THE SIZE AND TYPE OF STRUCTURE BEING BUILT.
6. THE FILL SHALL BE CONSTRUCTED AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
7. THE EMBANKMENT SHALL BE CONSTRUCTED TO A MINIMUM ELEVATION 10% HIGHER THAN THE DESIGNED HEIGHT, OR BASED ON GEOTECHNICAL REPORT, TO ALLOW FOR SETTLEMENT WHEN MECHANICAL COMPACTORS ARE USED FOR CONSTRUCTION.
8. IF SUFFICIENT ACCEPTABLE MATERIAL IS NOT AVAILABLE ON THE SITE TO PROPERLY COMPLETE THE FILL, THE CONTRACTOR IS RESPONSIBLE FOR ACQUIRING ACCEPTABLE BORROW MATERIAL.
9. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED BEFORE ITS PLACEMENT. FILL MATERIAL SHALL BE PLACED IN LAYERS A MAXIMUM OF 8 INCHES THICK (BEFORE COMPACTION), WHICH SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF FILL. THE MOST PERMEABLE BORROW MATERIAL SHALL BE PLACED IN THE DOWNSTREAM PORTIONS OF THE EMBANKMENT. THE PRINCIPLE SPILLWAY MUST BE INSTALLED CONCURRENTLY WITH FILL PLACEMENT AND NOT EXCAVATED INTO THE EMBANKMENT.
10. CUTOFF TRENCH SHALL BE EXCAVATED INTO IMPERVIOUS MATERIAL ALONG OR PARALLEL TO THE CENTERLINE OF THE EMBANKMENT AS SHOWN ON THE PLANS. THE EQUIPMENT USED FOR EXCAVATION SHOULD GOVERN THE BOTTOM WIDTH OF THE TRENCH, WITH THE MINIMUM WIDTH BEING 4'. THE DEPTH SHALL BE AT LEAST 4' BELOW THE EXISTING GRADE OR AS SHOWN ON THE PLANS. THE SIDE SLOPES OF THE TRENCH SHALL BE 1H:1V OR FLATTER. THE BACKFILL SHALL BE COMPACTED ACCORDING TO NOTE 5.
11. THE SURFACE LAYER OF COMPACTED FILL SHALL BE SCARIFIED PRIOR TO PLACEMENT OF AT LEAST 6 INCHES OF TOPSOIL. THE TOPSOIL SHALL BE STABILIZED IN ACCORDANCE WITH THE VESCH, LATEST EDITION.

DAM CONSTRUCTION NOTES

1. STAKE OUT THE ENTIRE AREA TO BE COVERED BY THE DAM AND RELATED STRUCTURES.
2. REMOVE ALL TOPSOIL, ORGANIC MATTER AND STONES FROM THE AREA. INSTALL A COFFER DAM OR SOME OTHER APPROPRIATE STRUCTURE TO DIVERT RUNOFF AWAY FROM THE WORK AREA DURING CONSTRUCTION.
3. THE GEOTECHNICAL ENGINEER SHOULD PERFORM TEST PITS ALONG THE CENTERLINE OF THE EMBANKMENT DURING CONSTRUCTION TO EVALUATE THAT THE ACTUAL SUBSURFACE CONDITIONS ARE CONSISTENT WITH THE BORINGS AND PROVIDE RECOMMENDATIONS WITH RESPECT TO REQUIRED CUT-OFF TRENCH.
4. EXCAVATE FOR CUT-OFF TRENCH AND BEGIN FILLING. THE CUT-OFF TRENCH SHALL BE A MINIMUM 4' BELOW THE EXISTING GRADE.
5. INSTALL THE POND BARREL AND THE RISER. THE UPSTREAM 2/3 OF THE POND BARREL WILL BE BEDDED IN A CONCRETE CRADLE; THE CONCRETE MUST BE PLASTICIZED OR VIBRATED TO ENSURE THAT THERE WILL BE NO VOIDS. THE DOWNSTREAM 1/3 OF THE BARREL WILL BE SURROUNDED IN GRAVEL WRAPPED IN FILTER FABRIC. IF THE PLAN INCLUDES TOE DRAINS, THEY MAY BE CONNECTED TO THE GRAVEL BEDDING. FILL ADJACENT TO AND OVER THE BARREL ARE TO BE COMPACTED BY MANUALLY OPERATED EQUIPMENT (NOT PULLED BY OR MOUNTED ON TRACK-TYPE OR WHEEL-TYPE EQUIPMENT). TAMPERS MOUNTED ON BACKHOES ARE NOT ACCEPTABLE. AFTER THE DEPTH OF FILL OVER THE BARREL HAS REACHED A DEPTH OF AT LEAST 2 FEET, LARGE EQUIPMENT, BUT NOT VIBRATORY ROLLERS, MAY BE USED. VIBRATORY ROLLERS MAY BE USED AFTER THE DEPTH OF FILL OVER THE BARREL EXCEEDS 3 FEET.
6. PLACE FILL AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
7. SIDE SLOPES SHALL BE AS FLAT AS THOSE SHOWN ON THE APPROVED PLANS.
8. A SETTLING ALLOWANCE OF AT LEAST 10%, OR AS DICTATED BY THE GEOTECHNICAL ENGINEER, IS REQUIRED.
9. DURING THE BACKFILLING OPERATION, EQUIPMENT SHOULD NOT BE DRIVEN CLOSER THAN 4 FEET, AS MEASURED HORIZONTALLY, TO ANY PART OF A STRUCTURE. ALSO, EQUIPMENT SHOULD NEVER BE DRIVEN OVER ANY PART OF A STRUCTURE OR PIPE, UNLESS COMPACTED FILL HAS BEEN PLACED TO A DEPTH SPECIFIED BY THE STRUCTURAL LIVE LOAD CAPACITY OF THE STRUCTURE OR PIPE IN ORDER TO ADEQUATELY DISTRIBUTE THE LOAD. BACKFILL THAT IS BESIDE THE PIPE OR STRUCTURES SHALL BE OF THE SAME TYPE AND QUALITY OF THE ADJOINING FILL MATERIAL. THE FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED 4 INCHES IN THICKNESS (BEFORE COMPACTION) AND COMPACTED BY HAND TAMPERS, OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL SHALL COMPLETELY FILL ALL SPACES UNDER AND BESIDE THE PIPE AND STRUCTURES.

MAINTENANCE RESPONSIBILITY

THE MAINTENANCE RESPONSIBILITY SHALL BE ESTABLISHED IN THE REQUIRED DEED OF DEDICATION.

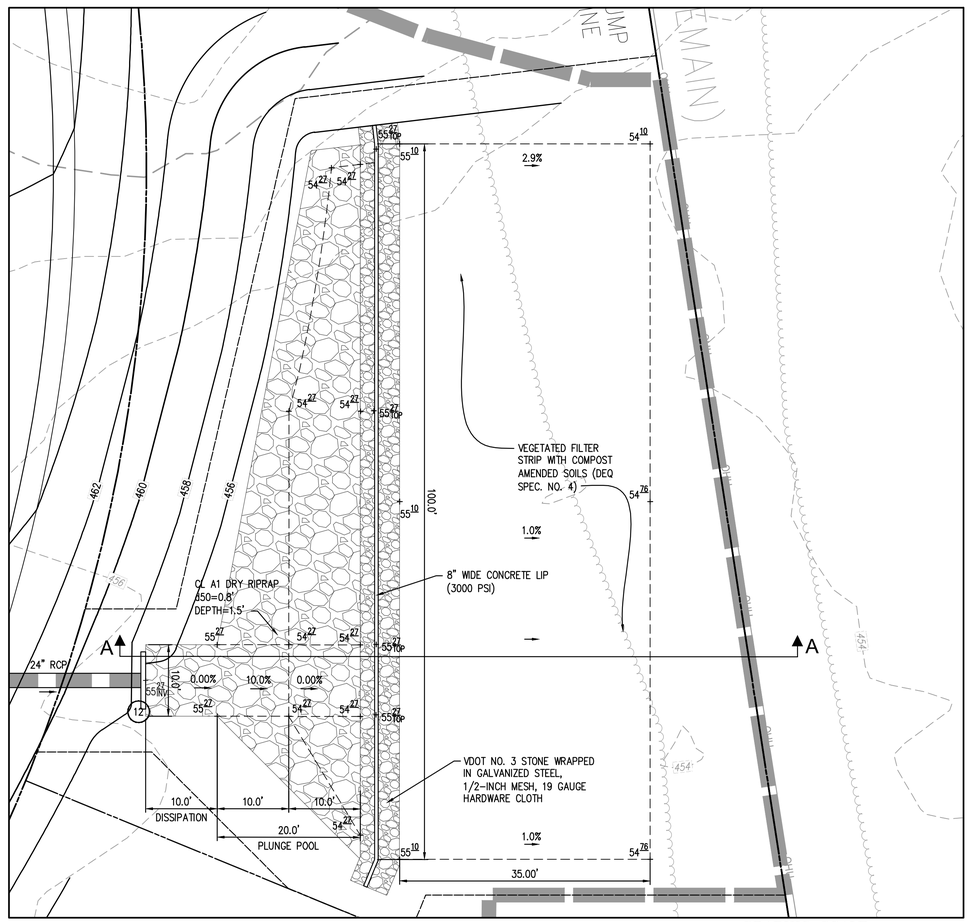
FIRST YEAR MAINTENANCE OPERATIONS

INITIAL INSPECTIONS
FOR THE FIRST SIX MONTHS FOLLOWING CONSTRUCTION, THE SITE SHOULD BE INSPECTED WITHIN 24 HOURS AFTER STORM EVENTS THAT EXCEED A 1/2-INCH OF RAINFALL.

PLANTING OF AQUATIC BENCHES
THE AQUATIC BENCHES SHOULD BE PLANTED WITH EMERGENT WETLAND SPECIES, FOLLOWING THE PLANTING RECOMMENDATIONS CONTAINED IN DEQ STORMWATER DESIGN SPECIFICATION NO. 13 (CONSTRUCTED WETLANDS).

SPOT RESEEDING
INSPECTORS SHOULD LOOK FOR BARE OR ERODING AREAS IN THE CONTRIBUTING DRAINAGE AREA OR AROUND THE POND BUFFER, AND MAKE SURE THEY ARE IMMEDIATELY STABILIZED WITH GRASS COVER.

WATERING
TREES PLANTED IN THE POND BUFFER NEED TO BE WATER DURING THE FIRST GROWING SEASON. IN GENERAL, CONSIDER WATERING EVERY 3 DAYS FOR FIRST MONTH, AND THEN WEEKLY DURING THE REMAINDER OF THE FIRST GROWING SEASON (APRIL-OCTOBER), DEPENDING ON RAINFALL.



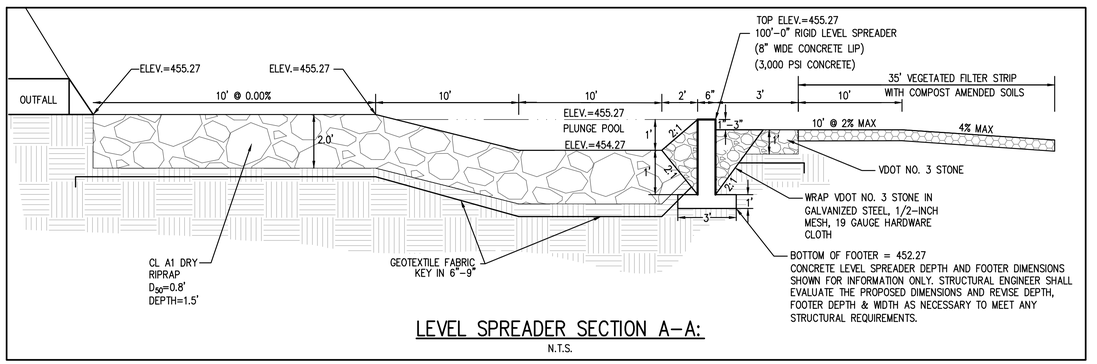
LEVEL SPREADER PLAN:

SCALE: 1"=10'

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.



LEVEL SPREADER SECTION A-A:

N.T.S.

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SWM NOTES & DETAILS
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS

02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED	WED	WED
DESIGN	DRAWN	CHKD

SCALE H: AS NOTED V: AS NOTED

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 48 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\045-049-6642-D-CP-001-SWM DET.dwg

8.1. Construction Sequence for Conserved Open Space Areas

The Conserved Open Space must be fully protected during the construction stage of development and kept outside the limits of disturbance on the Erosion and Sediment (E&S) Control Plan.

- No clearing, grading or heavy equipment access is allowed except temporary disturbances associated with incidental utility construction, restoration operations or management of nuisance vegetation.
- The perimeter of the Conserved Open Space shall be protected by super silt fence, chain link fence, orange safety fence, or other measures to prevent sediment discharge.
- The limits of disturbance should be clearly shown on all construction drawings and identified and protected in the field by acceptable signage, silt fence, snow fence or other protective barrier.
- Construction of the gravel diaphragm or engineered level spreader shall not commence until the contributing drainage area has been stabilized and perimeter E&S controls have been removed and cleaned out.
- Some light grading may be needed at the Filter Strip boundary; this should be done with tracked vehicles to prevent compaction.
- Stormwater should not be diverted into the Vegetated Filter Strip until the gravel diaphragm and/or level spreader are installed and stabilized.

8.2. Construction Sequence for Vegetated Filter Strips

Vegetated Filter Strips can be within the limits of disturbance during construction. The following procedures should be followed during construction:

- Before site work begins, Vegetated Filter Strip boundaries should be clearly marked.
- Only vehicular traffic used for Filter Strip construction should be allowed within 10 feet of the Filter Strip boundary (City of Portland, 2004).
- If existing topsoil is stripped during grading, it shall be stockpiled for later use.
- Construction runoff should be directed away from the proposed Filter Strip site, using perimeter silt fence, or, preferably, a diversion dike.
- Construction of the gravel diaphragm or engineered level spreader shall not commence until the contributing drainage area has been stabilized and perimeter E&S controls have been removed and cleaned out.
- Vegetated Filter Strips require light grading to achieve desired elevations and slopes. This should be done with tracked vehicles to prevent compaction. Topsoil and or compost amendments should be incorporated evenly across the filter strip area, stabilized with seed, and protected by biodegradable erosion control matting or blankets.
- Stormwater should not be diverted into the Filter Strip until the turf cover is dense and well established.

8.3. Construction Inspection

Construction inspection is critical to obtain adequate spot elevations, to ensure the gravel diaphragm or ELS is completely level, on the same contour, and constructed to the correct design elevation. As-built surveys should be required to ensure compliance with design standards. Inspectors should evaluate the performance of the Filter Strip after the first big storm to look for evidence of gullies, outflanking, undercutting or sparse vegetative cover. Spot repairs should be made, as needed.

9.1. Maintenance Agreements

Section 4 VAC 50-60-124 of the regulations specifies the circumstances under which a maintenance agreement must be executed between the owner and the local program. This section 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 Vegetated Filter Strips must be covered by a drainage easement to allow inspection and maintenance. If the filter area is a natural Conserved Open Space, it must be protected by a perpetual easement or deed restriction that assigns the responsible party to ensure that no future development, disturbance or clearing may occur within the area, except as stipulated in the vegetation maintenance plan.

If the Vegetated Filter Strip is located on a residential private lot, the existence and purpose of the Filter Strip shall be noted on the deed of record. Homeowners will need to be provided a simple document that explains the purpose of the Filter Strip and routine maintenance needs. A deed restriction or other mechanism enforceable by the qualifying local program must be in place to help ensure that Filter Strips are maintained and Conserved Open Space Areas are not converted or disturbed. The mechanism should, if possible, grant authority for local agencies to access the property for inspection or corrective action.

9.2. Maintenance Inspections

Annual inspections are used to trigger maintenance operations such as sediment removal, spot re-vegetation and level spreader repair. Ideally, inspections should be conducted in the non-growing season when it easier to see the flow path. Example maintenance inspection checklists for Sheet Flow to a Filter Strip or Conserved Open Space areas can be accessed in Appendix C of Chapter 9 of the Virginia Stormwater Management Handbook or at the Center for Watershed Protection's website at:

http://www.cwp.org/Resource_Library/Controlling_Runoff_and_Discharges/sm.htm
(scroll to Tool6: Plan Review, BMP Construction, and Maintenance Checklists)

Inspectors should check to ensure that:

- Flows through the Filter Strip do not short-circuit the overflow control section;
- Debris and sediment does not build up at the top of the Filter Strip;
- Foot or vehicular traffic does not compromise the gravel diaphragm;
- Scour and erosion do not occur within the Filter Strip;
- Sediments are cleaned out of Level Spreader forebays and flow splitters; and
- Vegetative density exceeds a 90% cover in the boundary zone or grass filter.

9.3. Ongoing Maintenance

Once established, Vegetated Filter Strips have minimal maintenance needs outside of the spring clean up, regular mowing, repair of check dams and other measures to maintain the hydraulic efficiency of the strip and a dense, healthy grass cover. Vegetated Filter Strips that consist of grass/turf cover should be mowed at least twice a year to prevent woody growth.

BIORETENTION CONSTRUCTION NOTES:

CONSTRUCTION RUNOFF:

BIORETENTION BASIN BMPS SHALL BE CONSTRUCTED AFTER THE SITE WORK IS COMPLETE AND STABILIZATION MEASURES HAVE BEEN IMPLEMENTED. IF THIS IS NOT POSSIBLE, STRICT IMPLEMENTATION OF E&S PROTECTIVE MEASURES MUST BE INSTALLED AND MAINTAINED IN ORDER TO PROTECT THE BIORETENTION FACILITY FROM PREMATURE CLOGGING AND FAILURE.

CONSTRUCTION SPECIFICATIONS:

THE CONSTRUCTION OF BIORETENTION BASINS SHALL BE IN ACCORDANCE WITH VADEQ STORMWATER DESIGN SPECIFICATION NO. 9 (BIORETENTION), AS WELL AS THE CRITERIA SET FORTH BELOW.

BIORETENTION CONSTRUCTION:

CONSTRUCTION STAGE E&S CONTROLS

MICRO-BIORETENTION AND SMALL-SCALE BIORETENTION AREAS SHOULD BE FULLY PROTECTED BY SILT FENCE OR CONSTRUCTION FENCING, PARTICULARLY IF THEY WILL RELY ON INFILTRATION (I.E., HAVE NO UNDERDRAINS). IDEALLY, BIORETENTION SHOULD REMAIN OUTSIDE THE LIMIT OF DISTURBANCE DURING CONSTRUCTION TO PREVENT SOIL COMPACTION BY HEAVY EQUIPMENT.

BIORETENTION INSTALLATION SEQUENCE

THE FOLLOWING IS A TYPICAL CONSTRUCTION SEQUENCE TO PROPERLY INSTALL A BIORETENTION BASIN. THE INSTALLATION OF A BIORETENTION BASIN WILL INCLUDE INTERMEDIATE INSPECTIONS AT CRITICAL STAGES OF CONSTRUCTION WITH INSPECTOR SIGN-OFF THAT THE PARTICULAR ELEMENTS OF THE BIORETENTION ARE CONSTRUCTED ACCORDING THE APPROVED PLANS AND SPECIFICATIONS. AS AN ALTERNATIVE, IF ALLOWED BY THE VSMP AUTHORITY, THE CONTRACTOR MAY RELY ON THE ENGINEER OF RECORD OR OTHER QUALIFIED INDIVIDUAL TO CONDUCT THE INTERMEDIATE INSPECTIONS AND CERTIFICATIONS OF COMPLIANCE. THE CONSTRUCTION SEQUENCE FOR MICRO-BIORETENTION IS MORE SIMPLIFIED. THESE STEPS MAY BE MODIFIED TO REFLECT DIFFERENT BIORETENTION APPLICATIONS OR EXPECTED SITE CONDITIONS:

1. CONSTRUCTION OF THE BIORETENTION AREA MAY ONLY BEGIN AFTER THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED WITH VEGETATION. IT MAY BE NECESSARY TO BLOCK CERTAIN CURB OR OTHER INLETS WHILE THE BIORETENTION AREA IS BEING CONSTRUCTED. THE PROPOSED SITE SHOULD BE CHECKED FOR EXISTING UTILITIES PRIOR TO ANY EXCAVATION.

2. THE DESIGNER AND THE INSTALLER SHOULD HAVE A PRECONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CONTRIBUTING DRAINAGE AREA AND THE ACTUAL INLET ELEVATIONS TO ENSURE THEY CONFORM TO ORIGINAL DESIGN. SINCE OTHER CONTRACTORS MAY BE RESPONSIBLE FOR CONSTRUCTING PORTIONS OF THE SITE, IT IS QUITE COMMON TO FIND SUBTLE DIFFERENCES IN SITE GRADING, DRAINAGE AND PAVING ELEVATIONS THAT CAN PRODUCE HYDRAULICALLY IMPORTANT DIFFERENCES FOR THE PROPOSED BIORETENTION AREA. THE DESIGNER SHOULD CLEARLY COMMUNICATE, IN WRITING, ANY PROJECT CHANGES DETERMINED DURING THE PRECONSTRUCTION MEETING TO THE INSTALLER AND THE PLAN REVIEW/INSPECTION AUTHORITY.

3. TEMPORARY E&S CONTROLS ARE NEEDED DURING CONSTRUCTION OF THE BIORETENTION AREA TO DIVERT STORMWATER AWAY FROM THE BIORETENTION AREA UNTIL IT IS COMPLETED. SPECIAL PROTECTION MEASURES SUCH AS EROSION CONTROL FABRICS MAY BE NEEDED TO PROTECT VULNERABLE SIDE SLOPES FROM EROSION DURING THE CONSTRUCTION PROCESS.

4. ANY PRE-TREATMENT CELLS SHOULD BE EXCAVATED FIRST AND THEN SEALED TO TRAP SEDIMENTS.

5. EXCAVATORS OR BACKHOES SHOULD WORK FROM THE SIDES TO EXCAVATE THE BIORETENTION AREA TO ITS APPROPRIATE DESIGN DEPTH AND DIMENSIONS. EXCAVATING EQUIPMENT SHOULD HAVE SCOOPS WITH ADEQUATE REACH SO THEY DO NOT HAVE TO SIT INSIDE THE FOOTPRINT OF THE BIORETENTION AREA. CONTRACTORS SHOULD USE A CELL CONSTRUCTION APPROACH IN LARGER BIORETENTION BASINS, WHEREBY THE BASIN IS SPLIT INTO 500 TO 1,000 SQ. FT. TEMPORARY CELLS WITH A 10-15 FOOT EARTH BRIDGE IN BETWEEN, SO THAT CELLS CAN BE EXCAVATED FROM THE SIDE.

6. IT MAY BE NECESSARY TO RIP THE BOTTOM SOILS TO A DEPTH OF 6 TO 12 INCHES TO PROMOTE GREATER INFILTRATION.

7. PLACE GEOTEXTILE FABRIC ON THE SIDES OF THE BIORETENTION AREA WITH A 6-INCH OVERLAP ON THE SIDES. PLACE THE APPROPRIATE DEPTH OF #57 STONE ON THE BOTTOM AND ADD APPROXIMATELY 3 INCHES OF CHOKER STONE/PEA GRAVEL AS A FILTER BETWEEN THE STONE STORAGE LAYER AND THE SOIL MEDIA LAYER.

8. OBTAIN SOIL THE MEDIA FROM A QUALIFIED VENDOR, AND STORE IT ON AN ADJACENT IMPERVIOUS AREA OR PLASTIC SHEETING. AFTER VERIFYING THAT THE MEDIA MEETS THE SPECIFICATIONS, APPLY THE MEDIA IN 12-INCH LIFTS UNTIL THE DESIRED TOP ELEVATION OF THE BIORETENTION AREA IS ACHIEVED. WAIT A FEW DAYS TO CHECK FOR SETTLEMENT, AND ADD ADDITIONAL MEDIA, AS NEEDED, TO ACHIEVE THE DESIGN ELEVATION.

9. PREPARE PLANTING HOLES FOR ANY TREES AND SHRUBS, INSTALL THE VEGETATION, AND WATER ACCORDINGLY. INSTALL ANY TEMPORARY IRRIGATION.

10. PLACE THE SURFACE COVER IN BOTH CELLS (MULCH, RIVER STONE OR TURF), DEPENDING ON THE DESIGN. IF COIR OR JUTE MATTING WILL BE USED IN LIEU OF MULCH, THE MATTING WILL NEED TO BE INSTALLED PRIOR TO PLANTING (STEP 9), AND HOLES OR SLITS WILL HAVE TO BE CUT IN THE MATTING TO INSTALL THE PLANTS.

11. INSTALL THE PLANT MATERIALS AS SHOWN IN THE LANDSCAPING PLAN, AND WATER THEM DURING WEEKS OF NO RAIN FOR THE FIRST TWO MONTHS.

CONSTRUCTION INSPECTION

INSPECTIONS DURING AND IMMEDIATELY AFTER CONSTRUCTION ARE NEEDED TO ENSURE THAT ALL THE ELEMENTS OF BIORETENTION BASINS ARE BUILT IN ACCORDANCE WITH THESE SPECIFICATIONS. USE A DETAILED INSPECTION CHECKLIST THAT REQUIRES SIGN-OFFS BY QUALIFIED INDIVIDUALS AT CRITICAL STAGES OF CONSTRUCTION AND TO ENSURE THAT THE CONTRACTOR'S INTERPRETATION OF THE PLAN IS CONSISTENT WITH THE DESIGNER'S INTENT. THE FOLLOWING IDENTIFIES THE CRITICAL STAGES OF CONSTRUCTION WHERE AN INTERMEDIATE INSPECTION AND SIGN-OFF BY A QUALIFIED INDIVIDUAL IS RECOMMENDED SINCE THE ITEMS CAN'T BE VERIFIED AFTER CONSTRUCTION IS COMPLETED. A CONSTRUCTION INSPECTION CHECKLIST THAT INCLUDES CERTIFICATIONS OF INSPECTION AT CRITICAL STAGES CAN BE FOUND IN VADEQ SWM DESIGN SPEC NO. 9. PHOTO DOCUMENTATION SHALL BE PROVIDED DURING THE INSTALLATION PROCESS.

THE FOLLOWING REPRESENTS ITEMS THAT ARE FREQUENTLY OVERLOOKED DURING CONSTRUCTION INSPECTION BUT REPRESENT IMPORTANT ELEMENTS FOR ENSURING THE SUCCESS OF THE BIORETENTION FACILITY DURING THE INITIAL BREAK-IN PERIOD.

- VERIFY THE PROPER COVERAGE AND DEPTH OF MULCH, VEGETATION, OR SOIL MATTING HAS BEEN ACHIEVED FOLLOWING CONSTRUCTION, BOTH ON THE FILTER BED AND THE SIDE-SLOPES.
- INSPECT THE PRE-TREATMENT FORBAYS AND FILTER STRIPS TO VERIFY THAT THEY ARE PROPERLY INSTALLED, STABILIZED, AND WORKING EFFECTIVELY BEFORE OPENING THE FACILITY TO RUNOFF.
- CHECK THAT OUTFALL PROTECTION/ENERGY DISSIPATION MEASURES AT CONCENTRATED INFLOW AND OUTFLOW POINTS ARE STABLE.

UPON FINAL ACCEPTANCE OF THE FACILITY, LOG THE PRACTICE'S GPS COORDINATES AND SUBMIT THEM FOR ENTRY INTO THE VSMP AUTHORITY'S BMP MAINTENANCE TRACKING DATABASE.

BIORETENTION AREA SOIL SPECIFICATIONS:

THE FILTER MEDIA MIX SHALL BE CERTIFIED BY THE SUPPLIER.

1. PLANTING SOIL

THE BIORETENTION AREAS SHALL CONTAIN A PLANTING SOIL MIXTURE OF 80%-90% SAND, 10%-20% SOIL FINES, AND 3%-5% SOIL FINES.

A MORE ORGANIC FILTER MEDIA IS RECOMMENDED WITHIN THE PLANTING HOLES FOR TREES, WITH A RATIO OF 50% SAND, 30% TOPSOIL AND 20% LEAF COMPOST (FULLY COMPOSTED, NOT PARTIALLY ROTTED LEAVES). TOPSOIL SHALL BE SANDY LOAM OR LOAMY SAND OF UNIFORM COMPOSITION, CONTAINING NO MORE THAN 5% CLAY, FREE OF STONES, STUMPS, ROOTS, OR SIMILAR OBJECTS GREATER THAN ON INCH, BRUSH, OR ANY OTHER MATERIAL OR SUBSTANCE WHICH MAY BE HARMFUL TO PLANT GROWTH, OR HINDRANCE TO PLANT GROWTH OR MAINTENANCE.

THE TOP SOIL SHALL BE FREE OF PLANTS OR PLANT PARTS OF BERMUDA GRASS, QUAK GRASS, JOHNSON GRASS, MUGWORT, NUTSEDGE, POISON IVY, AND CANADIAN THISTLE OR OTHERS AS SPECIFIED. IT SHALL NOT CONTAIN TOXIC SUBSTANCES HARMFUL TO PLANT GROWTH.

THE TOP SOIL SHALL BE TESTED AND MEET THE FOLLOWING CRITERIA:

PH RANGE:	5.0-7.0
ORGANIC MATTER:	GREATER THAN 1.5
MAGNESIUM (MG):	100+ UNITS
PHOSPHORUS (P2O5):	150+ UNITS
POTASSIUM (K2O):	120+ UNITS
SOLUBLE SALTS:	NOT TO EXCEED 900 PPM / 0.9 MMHOS / CM (SOIL) NOT TO EXCEED 3,000 PPM / 2.5 MMHOS / CM (ORGANIC MIX)

THE FOLLOWING TESTING FREQUENCIES SHALL APPLY TO THE ABOVE SOIL CONSTITUENTS:

PH, ORGANIC MATTER:

1 TEST PER 90 CUBIC YARDS, BUT NO MORE THAN 1 TEST PER BIORETENTION AREA

MAGNESIUM, PHOSPHORUS, POTASSIUM, SOLUBLE SALTS:

1 TEST PER 500 CUBIC YARDS, BUT NO LESS THAN 1 TEST PER BORROW SOURCE

ONE GRAIN SIZE ANALYSIS SHALL BE PERFORMED PER 90 CUBIC YARDS OF PLANTING SOIL, BUT NO LESS THAN 1 TEST PER BIORETENTION AREA. SOIL TESTS MUST BE VERIFIED BY A QUALIFIED PROFESSIONAL.

2. MULCH

A MULCH LAYER SHALL BE PROVIDED ON TOP OF THE PLANTING SOIL. AN ACCEPTABLE MULCH LAYER SHALL INCLUDE SHREDDED HARDWOOD OR OTHER SIMILAR PRODUCT. THE APPROVED MULCH PRODUCTS ALL MUST BE WELL AGED, UNIFORM IN COLOR, AND FREE OF FOREIGN MATERIAL INCLUDING PLANT MATERIAL. AN HERBACEOUS GROUND COVER MAY BE PLANTED IN LIEU OF A MULCH LAYER.

3. SAND

THE SAND SHALL CONSIST OF SILICA BASED COARSE AGGREGATE, ANGULAR OR ROUND IN SHAPE AND MEET THE MIXTURE GRAIN SIZE DISTRIBUTION BELOW. NO SUBSTITUTION OF ALTERNATE MATERIALS ARE ACCEPTED. MICA CAN MAKE UP NO MORE THAN 5% OF THE TOTAL SAND FRACTION. THE SAND FRACTION MAY ALSO CONTAIN A LIMITED AMOUNT OF PARTICLES > 2.0 MM AND < 9.5 MM PER THE TABLE BELOW, BUT THE OVERALL SAND FRACTION MUST MEET THE SPECIFICATION OF > 75% BEING COARSE OR VERY COARSE SAND.

SIEVE	SIZE	% PASSING
⅜ IN	9.50 MM	100
NO. 4	4.75 MM	95 TO 100
NO. 8	2.36 MM	80 TO 100
NO. 16	1.18 MM	45 TO 85
NO. 30	0.60 MM	15 TO 60
NO. 50	0.30 MM	3 TO 15
NO. 100	0.15 MM	0 TO 4

4. COMPACTION

SOIL SHALL BE PLACED IN 12-INCH LIFTS AND LIGHTLY COMPACTED (MINIMAL COMPACTIVE EFFORT) BY TAMPING OR ROLLED WITH A HAND-OPERATED LANDSCAPE ROLLER.

BIORETENTION AREA PLANTING SPECIFICATIONS

1. ROOT STOCK OF THE PLANT MATERIAL SHALL BE KEPT MOIST DURING TRANSPORT FROM THE SOURCE TO THE JOB SITE AND UNTIL PLANTED.

2. WALLS OF PLANTING PIT SHALL BE DUG SO THAT THEY ARE VERTICAL.

3. THE DIAMETER OF THE PLANTING PIT MUST BE A MINIMUM OF SIX INCHES (6") LARGER THAN THE DIAMETER OF THE BALL OF THE TREE.

4. THE PLANTING PIT SHALL BE DEEP ENOUGH TO ALLOW 1/8 OF THE OVERALL DIMENSION OF THE ROOT BALL TO BE ABOVE GRADE. LOOSE SOIL AT THE BOTTOM OF THE PIT SHALL BE TAMPED BY HAND.

5. THE APPROPRIATE AMOUNT OF FERTILIZER IS TO BE PLACED AT THE BOTTOM OF THE PIT (SEE BELOW FOR FERTILIZATION RATES).

6. THE PLANT SHALL BE REMOVED FROM THE CONTAINER AND PLACED IN THE PLANTING PIT BY LIFTING AND CARRYING THE PLANT BY ITS BALL (NEVER LIFT BY BRANCHES OR TRUNK).

7. SET THE PLANT STRAIGHT AND IN THE CENTER OF THE PIT SO THAT APPROXIMATELY 1/8 OF THE DIAMETER OF THE ROOT BALL IS ABOVE THE FINAL GRADE.

8. BACKFILL PLANTING PIT WITH EXISTING SOIL.

9. MAKE SURE PLANT REMAINS STRAIGHT DURING BACKFILLING PROCEDURE.

10. NEVER COVER THE TOP OF THE BALL WITH SOIL. MOUND SOIL AROUND THE EXPOSED BALL.

11. TREES SHALL BE BRACED BY USING 2" BY 2" WHITE OAK STAKES. STAKES SHALL BE PLACED PARALLEL TO WALKWAYS AND BUILDINGS. STAKES ARE TO BE EQUALLY SPACED ON THE OUTSIDE OF THE TREE BALL. UTILIZING HOSE AND WIRE THE TREE IS BRACED TO THE STAKES.

12. BECAUSE OF THE HIGH LEVELS OF NUTRIENTS IN STORMWATER RUNOFF TO BE TREATED, BIORETENTION BASIN PLANTS SHOULD NOT REQUIRE CHEMICAL FERTILIZATION.

Table 9.8, Suggested Annual Maintenance Activities for Bioretention

Maintenance Tasks	Frequency
• Mowing of grass filter strips and bioretention turf cover	At least 4 times a year
• Spot weeding, erosion repair, trash removal, and mulch raking	Twice during growing season
• Add reinforcement planting to maintain desired the vegetation density • Remove invasive plants using recommended control methods • Stabilize the contributing drainage area to prevent erosion	As needed
• Spring inspection and cleanup • Supplement mulch to maintain a 3 inch layer • Prune trees and shrubs	Annually
• Remove sediment in pre-treatment cells and inflow points	Once every 2 to 3 years
• Replace the mulch layer	Every 3 years

BIORETENTION MAINTENANCE & INSPECTIONS

MAINTENANCE AGREEMENTS

THE VIRGINIA STORMWATER MANAGEMENT REGULATIONS (4 VAC 50-60) SPECIFY THE CIRCUMSTANCES UNDER WHICH A MAINTENANCE AGREEMENT MUST BE EXECUTED BETWEEN THE OWNER AND THE VSMP 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 BIORETENTION PRACTICES MUST INCLUDE A LONG TERM MAINTENANCE AGREEMENTS CONSISTENT WITH THE PROVISIONS OF THE VSMP REGULATIONS, AND MUST INCLUDE THE RECOMMENDED MAINTENANCE TASKS AND A COPY OF AN ANNUAL INSPECTION CHECKLIST.
- WHEN MICRO-SCALE BIORETENTION 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 VSMP AUTHORITY MUST BE IN PLACE TO HELP ENSURE THAT RAIN GARDENS 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 VSMP AUTHORITY TO ACCESS THE PROPERTY FOR INSPECTION OR CORRECTIVE ACTION.

FIRST YEAR MAINTENANCE OPERATIONS

SUCCESSFUL ESTABLISHMENT OF BIORETENTION AREAS REQUIRES THAT THE FOLLOWING TASKS BE UNDERTAKEN IN THE FIRST YEAR FOLLOWING INSTALLATION:

1. INITIAL INSPECTIONS: FOR THE FIRST 6 MONTHS FOLLOWING CONSTRUCTION, THE SITE SHOULD BE INSPECTED AT LEAST TWCE AFTER STORM EVENTS THAT EXCEED 1/2 INCH OF RAINFALL.

2. 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.

3. FERTILIZATION: ONE-TIME, SPOT FERTILIZATION MAY BE NEEDED FOR INITIAL PLANTINGS.

4. 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.

5. REMOVE AND REPLACE DEAD PLANTS: SINCE UP TO 10% OF THE PLANT STOCK MAY DIE OFF IN THE FIRST YEAR, CONSTRUCTION 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.

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:

1. 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.

2. 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.

3. CHECK FOR ANY WINTER- OR SALT-KILLED VEGETATION, AND REPLACE IT WITH HARDIER SPECIES.

4. NOTE PRESENCE OF ACCUMULATED SAND, SEDIMENT AND TRASH IN THE PRE-TREATMENT CELL OR FILTER BEDS, AND REMOVE IT.

5. INSPECT BIORETENTION SIDE SLOPES AND GRASS FILTER STRIPS FOR EVIDENCE OF ANY RILL OR GULLY EROSION, AND REPAIR IT.

6. CHECK THE BIORETENTION BED FOR EVIDENCE OF MULCH FLOTATION, EXCESSIVE PONDING, DEAD PLANTS OR CONCENTRATED FLOWS, AND TAKE APPROPRIATE REMEDIAL ACTION.

7. CHECK INFLOW POINTS FOR CLOGGING, AND REMOVE ANY SEDIMENT.

8. LOOK FOR ANY BARE SOIL OR SEDIMENT SOURCES IN THE CONTRIBUTING DRAINAGE AREA, AND STABILIZE THEM IMMEDIATELY.

9. 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).

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, 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):

1. 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.

2. REMOVE ACCUMULATED SEDIMENT AND TILL 2 TO 3 INCHES OF SAND INTO THE UPPER 8 TO 12 INCHES OF SOIL.

3. INSTALL SAND WICKS FROM 3 INCHES BELOW THE SURFACE TO THE UNDERDRAIN LAYER. SAND WICKS CAN BE INSTALLED BY EXCAVATING OR AUGERING (USING A TREE AUGER OR SIMILAR 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.

4. LAST RESORT – REMOVE AND REPLACE SOME OR ALL OF THE SOIL MEDIA.

Bowman

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SWM NOTES & DETAILS

TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION	
WED	WED	WED
DESIGN	DRAWN	CHKD

SCALE H: N/A V: N/A

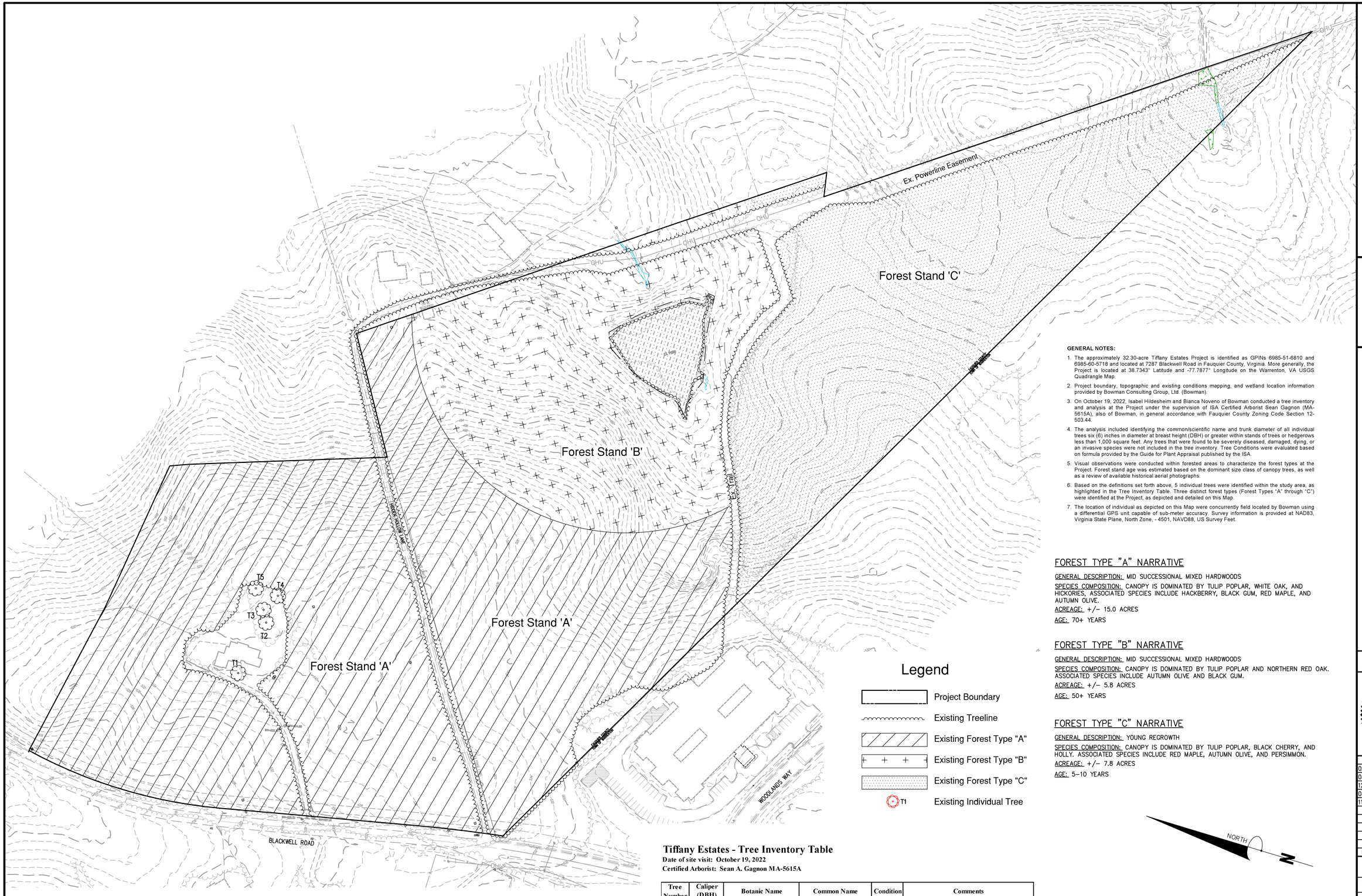
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 49 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\045-049-6642-D-CP-001-SWM DET.dwg



GENERAL NOTES:

1. The approximately 32.30-acre Tiffany Estates Project is identified as GPINs 6985-51-6810 and 6985-60-5718 and located at 7287 Blackwell Road in Fauquier County, Virginia. More generally, the Project is located at 38.7343° Latitude and -77.7877° Longitude on the Warrenton, VA USGS Quadrangle Map.
2. Project boundary, topographic and existing conditions mapping, and wetland location information provided by Bowman Consulting Group, Ltd. (Bowman).
3. On October 19, 2022, Isabel Hildesheim and Bianca Noveno of Bowman conducted a tree inventory and analysis at the Project under the supervision of ISA Certified Arborist Sean Gagnon (MA-5615A), also of Bowman, in general accordance with Fauquier County Zoning Code Section 12-503.44.
4. The analysis included identifying the common/scientific name and trunk diameter of all individual trees six (6) inches in diameter at breast height (DBH) or greater within stands of trees or hedgerows less than 1,000 square feet. Any trees that were found to be severely diseased, damaged, dying, or an invasive species were not included in the tree inventory. Tree Conditions were evaluated based on formula provided by the Guide for Plant Appraisal published by the ISA.
5. Visual observations were conducted within forested areas to characterize the forest types at the Project. Forest stand age was estimated based on the dominant size class of canopy trees, as well as a review of available historical aerial photographs.
6. Based on the definitions set forth above, 5 individual trees were identified within the study area, as highlighted in the Tree Inventory Table. Three distinct forest types (Forest Types "A" through "C") were identified at the Project, as depicted and detailed on this Map.
7. The location of individual as depicted on this Map were concurrently field located by Bowman using a differential GPS unit capable of sub-meter accuracy. Survey information is provided at NAD83, Virginia State Plane, North Zone, - 4501, NAVD88, US Survey Feet.

FOREST TYPE "A" NARRATIVE

GENERAL DESCRIPTION: MID SUCCESSIONAL MIXED HARDWOODS

SPECIES COMPOSITION: CANOPY IS DOMINATED BY TULIP POPLAR, WHITE OAK, AND HICKORIES, ASSOCIATED SPECIES INCLUDE HACKBERRY, BLACK GUM, RED MAPLE, AND AUTUMN OLIVE.

ACREAGE: +/- 15.0 ACRES

AGE: 70+ YEARS

FOREST TYPE "B" NARRATIVE

GENERAL DESCRIPTION: MID SUCCESSIONAL MIXED HARDWOODS

SPECIES COMPOSITION: CANOPY IS DOMINATED BY TULIP POPLAR AND NORTHERN RED OAK. ASSOCIATED SPECIES INCLUDE AUTUMN OLIVE AND BLACK GUM.

ACREAGE: +/- 5.8 ACRES

AGE: 50+ YEARS

FOREST TYPE "C" NARRATIVE

GENERAL DESCRIPTION: YOUNG REGROWTH

SPECIES COMPOSITION: CANOPY IS DOMINATED BY TULIP POPLAR, BLACK CHERRY, AND HOLLY. ASSOCIATED SPECIES INCLUDE RED MAPLE, AUTUMN OLIVE, AND PERSIMMON.

ACREAGE: +/- 7.8 ACRES

AGE: 5-10 YEARS

Legend

- Project Boundary
- Existing Treeline
- Existing Forest Type "A"
- Existing Forest Type "B"
- Existing Forest Type "C"
- T1 — Existing Individual Tree

NORTH

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

Tiffany Estates - Tree Inventory Table

Date of site visit: October 19, 2022
Certified Arborist: Sean A. Gagnon MA-5615A

Tree Number	Caliper (DBH)	Botanic Name	Common Name	Condition	Comments
1	32.5	*Quercus rubura*	Northern Red Oak	Poor	Crown damage
2	28.2	*Quercus alba*	White Oak	Fair	Minor crown damage
3	25.8	*Carya glabra*	Pignut Hickory	Good	
4	33.3	*Liriodendron tulipifera*	Tulip Poplar	Fair	Minor crown damage
5	31.3	*Liriodendron tulipifera*	Tulip Poplar	Fair	Minor crown damage

Bowman

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Bowman Consulting Group Ltd

TREE INVENTORY PLAN
TIFFANY ESTATES
CONSTRUCTION PLAN
FAUQUIER COUNTY, VIRGINIA
CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION	
WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=80' V:
JOB No. 6642-02-002
DATE : FEBRUARY 10, 2023
FILE No. 6642-D-CP-001
SHEET 50 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\050-6642-D-CP-001-TREEINV.dwg

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (7,243 SF)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (3,246 SF)

CONSERVATION AREA SIGN (TYP)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (18,239 SF)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (4,772 SF)

CONSERVATION AREA SIGN (TYP)

OPEN SPACE PARCEL 'C'

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (12,598 SF)

CONSERVATION AREA SIGN (TYP)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (48,531 SF)

CONSERVATION AREA SIGN (TYP)

CONSERVATION AREA SIGN (TYP)

OPEN SPACE PARCEL 'B'

LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 15
LOT 16
LOT 17
LOT 18
LOT 19
LOT 20
LOT 21
LOT 22

HIDDEN HOLLOW LANE

NICHOLAS MILL

NASH COURT

NICHOLAS MILL - SHEET 52

BLACKWELL ROAD

FAUQUIER COUNTY
TOWN OF WARRENTON

CONSERVATION AREA
DO NOT DISTURB BEYOND THIS POINT

SIGNS SHALL BE POSTED ON EXISTING TREES ALONG THE TREE PERSERVATION/CONSERVED OPEN SPACE EASEMENT EVERY ±300' OR AS GENERALLY SHOWN ON THE PLAN..

CONSERVATION AREA SIGN DETAIL

N.T.S.

LEGEND

- DENOTES LARGE DECIDUOUS TREE
- AQUATIC BENCH SEED MIX & PLUGS (±4,710 SF)
- LOW NATIVE GRASS SEED MIX (±32,446 SF)
- DENOTES TREE PRESERVATION EASEMENT
- CONSERVATION AREA SIGN
- DENOTES QUANTITY
- DENOTES TREE TYPE

NORTH

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

Bowman

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1300 Central Park Boulevard
Fredericksburg, Virginia 22401
Phone: (540) 371-0268
bowman.com
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LANDSCAPE PLAN

TIFFANY ESTATES

CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

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WILLIAM E. DUNCANSON JR
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SCALE H: 1"=50' V:

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 51 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\051-053-6642-D-CP-001-LSP.dwg

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (2,378 SF)

CONSERVATION AREA SIGN (TYP)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (3,812 SF)

CONSERVATION AREA SIGN (TYP)

OPEN SPACE PARCEL 'A'

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (1,938 SF)

CONSERVATION AREA SIGN (TYP)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (6,219 SF)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (18,760 SF)

OPEN SPACE PARCEL 'B'

LOT 14

LOT 13

LOT 12

LOT 11

LOT 10

LOT 9

LOT 8

LOT 7

LOT 17

NICOLAS WAY

NASH COURT

MATCHLINE - SHEET 51

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (11,188 SF)

CONSERVATION AREA SIGN (TYP)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (6,663 SF)

TREE PRESERVATION/ CONSERVED OPEN SPACE EASEMENT (22,165 SF)

CONSERVATION AREA SIGN (TYP)

TREE PRESERVATION/

FAUQUIER COUNTY
TOWN OF WARRENTON

OHU

19 AR ST

17 AR ST

4 AR ST

17 QC ST

EYE

LEGEND

- DENOTES LARGE DECIDUOUS TREE
- AQUATIC BENCH SEED MIX & PLUGS (±4,710 SF) SEE SHEET 53
- LOW NATIVE GRASS SEED MIX (±32,446 SF) SEE SHEET 53
- DENOTES TREE PRESERVATION EASEMENT
- CONSERVATION AREA SIGN
- 1 QR — DENOTES QUANTITY / DENOTES TREE TYPE

NORTH

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

CONSERVATION AREA

DO NOT DISTURB BEYOND THIS POINT

SIGNS SHALL BE POSTED ON EXISTING TREES ALONG THE TREE PERSERVATION/CONSERVED OPEN SPACE EASEMENT EVERY ±300' OR AS GENERALLY SHOWN ON THE PLAN..

CONSERVATION AREA SIGN DETAIL
N.T.S.

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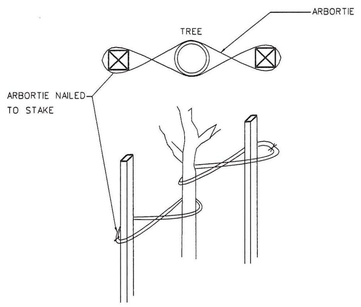
DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

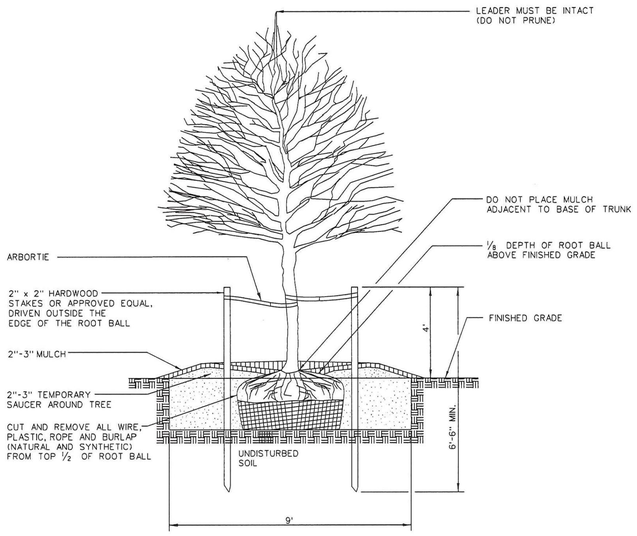
SHEET 52 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\051-053-6642-D-CP-001-LSP.dwg

DECIDUOUS TREE PLANTING



STAKING DETAIL



DECIDUOUS TREE PLANTING W/ STAKES

LSC PLANT MATERIAL SPECIFICATIONS AND PROCEDURES:

1. ALL PLANT MATERIAL SHALL CONFORM TO CURRENT AMERICAN ASSOCIATION OF NURSERYMEN'S STANDARDS AND TO HORTUS THIRD (1977 EDITION) FOR BOTANICAL AND COMMON NAMES.
2. BALLED AND BURLAPPED PLANTS SHALL BE DUG WITH FIRM NATURAL BALLS OF EARTH. BALL SIZES SHALL BE IN ACCORDANCE WITH A.A.N. SPECIFICATIONS. ALL CONTAINER GROWN STOCK SHALL BE WELL ROOTED AND ESTABLISHED IN THE CONTAINER IN WHICH IT IS SOLD. AN ESTABLISHED CONTAINER GROWN PLANT SHALL HAVE A ROOT SYSTEM DEVELOPED SUFFICIENTLY TO RETAIN ITS SHAPE WHEN REMOVED.
3. ALL PLANT MATERIAL SHALL BE NURSERY GROWN UNLESS OTHERWISE SPECIFIED. NO PRUNING SHALL BE DONE BEFORE PLANTING OR DURING THE PLANTING OPERATION EXCEPT FOR PRUNING OF BROKEN LIMBS DUE TO HANDLING.
4. ALL PLANT MATERIAL SHALL BE COVERED AND PROTECTED FROM EXCESSIVE DRYING DURING TRANSIT AND DURING ONSITE STORAGE. ROOTBALLS/ CONTAINERIZED PLANTS ARE TO BE THOROUGHLY WATERED DAILY IN THE MORNING. UNDER NO CIRCUMSTANCES ARE TREES TO BE STORED ONSITE FOR MORE THAN ONE WEEK.
5. ANTI-DESICCANTS SHALL BE APPLIED ON ALL MATERIAL DUG WHILE IN LEAF.
6. MULCH MATERIAL SHALL BE DOUBLE SHREDDED HARDWOOD MULCH. MATERIAL SHALL BE UNIFORM IN SIZE AND FREE OF FOREIGN MATTER.
7. PLANTING SOIL MIXTURE SHALL CONFORM TO THE REQUIREMENTS PROVIDED IN THE SPECIFICATIONS.
8. PLANTING PROCEDURES FOR TREES AND SHRUBS:
   - A. PLANTING SHALL OCCUR IN ACCORDANCE WITH ALL DETAILS.
   - B. REMOVE ALL TAGS, RIBBONS AND BINDING MATERIALS BEFORE PLANTING.
   - C. TREES AND SHRUBS SHALL BE PLACED IN THE PLANTING PIT, AND MANEUVERED BY LIFTING FROM THE BALL (NEVER FROM THE BRANCHES OR TRUNK). ALL PLANT MATERIAL SHALL BE PLACED IN A VERTICAL POSITION WITHIN THE PLANTING PIT WITH THE MOST DESIRABLE SIDE PLACED TOWARD THE PROMINENT VIEW (SIDEWALK, STREET, ETC.).
   - D. THE TREE OR SHRUB PIT SHALL BE BACKFILLED WITH A SOIL MIXTURE, AS PER #7 OF THESE SPECS. THE PIT SHALL BE FILLED HALFWAY, INITIALLY AND TAMPED FIRMLY. ALL ROPES AROUND THE ROOTBALL SHALL BE CUT, TAGS TO BE REMOVED (AND GIVEN TO THE CLIENT, AS REQUIRED), WIRE BASKETS ARE TO BE CUT/ REMOVED HALF OF THE DEPTH OF THE BALL, AND THE BURLAP OR BALL WRAP IS TO BE PULLED BACK ONE-THIRD ON ALL B & B PLANT MATERIAL. COMPLETE BACKFILLING THE PLANT PIT AND TAMP FIRMLY. BACKFILL SOILS SHALL NOT COVER THE TOP OF THE ROOTBALL. MULCH THE ROOTBALL AND SAUCER WITH A MINIMUM OF 3" SHREDDED HARDWOOD MULCH. TAPER THE MULCH TO THE BASE OF THE TRUNK. UNDER NO CIRCUMSTANCES IS THE TRUNK TO BE BURIED IN ANY DEPTH OF MULCH. THE CONTRACTOR SHALL BE REQUIRED TO RE-VISIT THE SITE AND FIX ANY DEFICIENTCIES NOTED IN THE POST-CONSTRUCTION CERTIFICATIONS PER THE ABOVE REFERENCED REQUIREMENT.

GENERAL STANDARDS:

1. ALL TREES TO BE PLANTED SHALL MEET THE SPECIFICATIONS OF THE AMERICAN LANDSCAPE AND NURSERY ASSOCIATION.
2. THE PLANTING TREES SHALL BE DONE IN ACCORDANCE WITH EITHER THE STANDARDIZED LANDSCAPE SPECIFICATIONS JOINTLY ADOPTED BY THE VIRGINIA NURSERYMEN'S ASSOCIATION, THE VIRGINIA SOCIETY OF LANDSCAPE DESIGNERS, AND THE VIRGINIA CHAPTER OF THE AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS, OR THE ROAD AND BRIDGE SPECIFICATIONS OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION. THE COUNTY SHALL MAINTAIN CURRENT COPIES OF THESE SPECIFICATIONS TO THE PUBLIC.
3. THE MINIMUM CALIPER OF ALL DECIDUOUS TREES PLANTED SHALL BE 2 1/2 INCH, AND THE MINIMUM HEIGHT OF ALL EVERGREEN TREES SHALL BE SIX (6) FEET.
4. THE OWNER, OR HIS AGENT, SHALL BE RESPONSIBLE FOR THE MAINTENANCE, REPAIR AND REPLACEMENT OF ALL REQUIRED LANDSCAPE MATERIALS, SCREENING AND BUFFERING AS MAY BE REQUIRED BY THE PROVISIONS OF ARTICLE 7, SECTION 600 OF THE FAUQUIER COUNTY ZONING ORDINANCE. ALL PLANT MATERIAL SHALL BE TENDED AND MAINTAINED IN A HEALTHY GROWING CONDITION, REPLACED WHEN NECESSARY AND KEPT FREE OF REFUSE AND DEBRIS. FENCES SHALL BE MAINTAINED IN GOOD REPAIR. OPENINGS WITHIN THE BARRIERS MAY BE REQUIRED BY THE ZONING ADMINISTRATOR FOR ACCESSIBILITY TO AN AREA FOR NECESSARY MAINTENANCE.

LSC PLANTING GENERAL NOTES:

1. THIS PLAN FOR PLANTING LOCATIONS ONLY.
2. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL PLANT MAINTENANCE, INCLUDING SHRUBS AND GROUNDCOVER, AND SHALL MAINTAIN AREA IN A WEED AND DEBRIS FREE CONDITION THROUGHOUT THE ONE YEAR GUARANTEE PERIOD.
3. CONTRACTOR SHALL LAY OUT AND CLEARLY STAKE ALL PROPOSED IMPROVEMENTS INCLUDED ON THIS PLAN.
4. CONTRACTOR IS RESPONSIBLE FOR CONTACTING MISS UTILITY PRIOR TO BEGINNING CONSTRUCTION FOR LOCATION OF ALL UTILITY LINES. TREES SHALL BE LOCATED A MINIMUM OF 4' FROM SEWER/WATER EASEMENTS. CONTRACTOR SHALL BE LIABLE FOR DAMAGE TO ANY AND ALL PUBLIC OR PRIVATE UTILITIES.
5. CONTRACTOR TO VERIFY PLANT LIST TOTALS WITH QUANTITIES SHOWN ON PLAN. LANDSCAPE ARCHITECT SHALL BE ALERTED BY CONTRACTOR OF ANY DISCREPANCIES PRIOR TO FINAL BID NEGOTIATION. UNIT PRICES FOR ALL MATERIAL SHALL BE SUPPLIED TO THE OWNER AT BIDDING TIME.
6. ALL MATERIALS SHALL BE SUBJECT TO APPROVAL BY THE LANDSCAPE ARCHITECT. OWNER SHALL RECEIVE TAG FROM EACH PLANT SPECIES AND A LIST OF PLANT SUPPLIERS. WHERE ANY REQUIREMENTS ARE OMITTED FROM THE PLANT LIST, THE PLANTS FURNISHED SHALL MEET THE NORMAL REQUIREMENTS FOR THE VARIETY PER THE AMERICAN STANDARD FOR NURSERY STOCK, LATEST EDITION, PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN (AAN). PLANTS SHALL BE PRUNED PRIOR TO DELIVERY ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT.
7. WHERE TREES ARE PLANTED IN ROWS, THEY SHALL BE UNIFORM IN SIZE AND SHAPE.
8. SIZES SPECIFIED IN THE PLANT LIST ARE MINIMUM SIZES TO WHICH THE PLANTS ARE TO BE JUDGED. FAILURE TO MEET MINIMUM SIZE ON ANY PLANT WILL RESULT IN REJECTION OF THAT PLANT.
9. ALL PLANTS SHALL BE FRESHLY DUG, SOUND, HEALTHY, VIGOROUS, WELL BRANCHED, FREE OF DISEASE, INSECT EGGS, AND LARVAE, AND SHALL HAVE ADEQUATE ROOT SYSTEMS.
10. NO EXISTING TREES SHALL BE REMOVED WITHOUT WRITTEN AUTHORIZATION FROM THE OWNER EXCEPT WHERE NOTED ON PLANS. NO GRUBBING SHALL OCCUR WITHIN EXISTING TREE AREAS.
11. TREES SHALL BE LOCATED A MINIMUM OF 4' FROM WALLS AND WALKS WITHIN THE PROJECT. IF CONFLICTS ARISE BETWEEN ACTUAL SIZE OF AREA AND PLANS, CONTRACTOR SHALL CONTACT LANDSCAPE ARCHITECT FOR RESOLUTION. FAILURE TO MAKE SUCH CONFLICTS KNOWN TO THE OWNER OR LANDSCAPE ARCHITECT WILL RESULT IN CONTRACTOR'S LIABILITY TO RELOCATE MATERIALS.
12. CONTRACTOR TO SLIGHTLY ADJUST PLANT LOCATIONS IN THE FIELD AS NECESSARY TO BE CLEAR OF DRAINAGE SWALES AND UTILITIES. FINISHED PLANTING BEDS SHALL BE GRADED SO AS TO NOT IMPEDE DRAINAGE.
13. TREE STAKING AND GUYING SHALL BE DONE PER DETAILS, IF NECESSARY. CONTRACTOR SHALL ENSURE THAT TREES REMAIN UPRIGHT FOR THE DURATION OF THE ONE YEAR GUARANTEE PERIOD. AT THE END OF ONE, YEAR, ALL RUBBER HOSE AND WIRE STAKES, AND ANY MISC. TAGS ARE REMOVED FROM THE TREES AND THE SITE (AS APPLICABLE).
14. MULCH IS TO BE DOUBLE SHREDDED HARDWOOD BARK FOR TREES AND SHRUBS.
15. SHADE TREES: HEIGHT SHALL BE MEASURED FROM THE CROWN OF THE ROOT BALL TO THE TOP OF MATURE GROWTH. SPREAD SHALL BE MEASURED TO THE END OF BRANCHING EQUALLY AROUND THE CROWN FROM THE ENTER OF THE TRUNK MEASUREMENTS ARE NOT TO INCLUDE ANY TERMINAL GROWTH.
16. ALL CONTRACTORS SHALL BE REQUIRED TO COMPLETELY REMOVE ALL TRASH DEBRIS AND EXCESS MATERIALS FROM THE WORK AREA AND THE PROPERTY (ESPECIALLY AT ALL CURB, GUTTERS AND SIDEWALKS) DAILY DURING INSTALLATION.
17. DEAD PLANTS ARE TO BE REMOVED FROM THE JOB BY THE CONTRACTOR WEEKLY. CONTRACTOR SHALL MAINTAIN AN UPDATED, COMPREHENSIVE LIST OF ALL DEAD MATERIALS REMOVED AND PRESENT A COPY OF THE LIST TO THE OWNER AT THE END OF EVERY MONTH DURING THE CONTRACT PERIOD.
18. CONTRACTOR SHALL GUARANTEE ALL LANDSCAPE IMPROVEMENTS, INCLUDING TREES, SHRUBS, VINES, ORNAMENTAL GRASSES, GROUND COVERS, BIENNIALS, PERENNIALS AND OTHER PLANTS FOR ONE FULL YEAR FROM THE POINT OF SUBSTANTIAL COMPLETION. CONTRACTOR MUST CONTACT THE OWNER AT LEAST 10 WORKING DAYS IN ADVANCE TO SCHEDULE ACCEPTANCE INSPECTION(S). CONTRACTOR MUST REPLACE ALL DEAD OR UNACCEPTABLE PLANTS DURING THE FOLLOWING RECOMMENDED PLANTING SEASON.
19. NO TREES SHALL BE PLANTED IN THE WATER AND SEWER EASEMENTS. NO PLANTINGS SHALL BE WITHIN 5 FEET OF A FIRE HYDRANT.

AQUATIC BENCH SEED MIX

SCIENTIFIC NAME	COMMON NAME	PERCENT OF MIX
Asclepias incarnate	Swamp Milkweed	5%
Carex comosa	Cosmos (Bristly) Sedge	3%
Carex crinata	Long Hair Sedge	4%
Carex lurida	Lurid (Shallow) Sedge	5%
Carex stricta	Tussock Sedge	5%
Carex vulpinoidea	Fox Sedge	10%
Cinna arendinacea	Wood Reedgrass	2%
Dulichium arendinaceum	Three Way Sedge	2%
Elymus virginicus	Virginia Wild Rye	15%
Eupatorium dubium	Joe Pye Weed	8%
Lobelia cardinalis	Cardinal Flower	5%
Mimulus ringens	Monkey Flower	4%
Onoclea sensibilis	Sensitive Fern	8%
Pontederia cordata	Pickerel Weed	5%
Sagittaria latifolia	Duck Potato (Arrowhead)	8%
Scirpus atrovirens	Green Bulrush	5%
Sparganium americanum	Eastern Bur Reed	6%
	TOTAL	**100%**
COVER CROP		
Avena sativa	Annual oats	

Plant any trees, shrubs, or potted plants prior to application of specified compost blanket. Apply a 3-inch blanket of specified compost prior to or during seed application. Compost shall be Soilmate® compost or an approved equal. The paperwork (shipping invoices), samples and U.S. Composting Council's Seal of Testing Assurances (STA) certifications for the product shall be submitted to and approved by the Engineer prior to purchase. 3Proposed equal products must be STA approved.

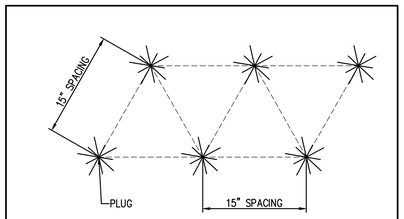
Broadcast or pump seed at $^1/_2$ lb/1000 ft^2 and certified weed-free annual oats (**Avena sativa**) at 1 lb/1000 ft^2 on top of applied 3-inch blanket of specified compost. Substitue winter wheat fo annual oats if seeding after October 1. Reseed and mulch all areas with less than 80% germination.

Custom ERNST native seed mix or approved equivalent. The paper work and certifications for all seed mixes shall be submitted and approved by the Engineer prior to installation.

LOW NATIVE GRASS SEED MIX

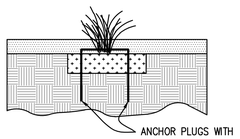
SCIENTIFIC NAME	COMMON NAME	PERCENT OF MIX
Agrostis Perennans	Autumn Bentgrass	9.10%
Festuca Rubra	Creeping Red Fescue	81.60%
Juncus tenuis	Path Rush, NC Ecotype	0.10%
Juncus tenuis	Path Rush, PA Ecotype	0.10%
Lolium multiflorum	Annual Ryegrass	9.10%
	TOTAL	**100%**

Grass seed mix or approved equal shall be applied at 3-5 pounds per 1,000 SF.



NOTE:
PLUG QUANTITIES MAY BE FIELD ADJUSTED BY THE CONTRACTOR WITH CITY APPROVAL TO ALIGN WITH QUANTITIES AVAILABLE PER FLAT AT THE TIME OF PURCHASE.

PLUG PLANTING DETAIL
(NTS)



PLUG ANCHOR DETAIL
(NTS)

AQUATIC BENCH PLUG SCHEDULE

AQUATIC BENCH PLUGS - 4,710 S.F. @ 15" O.C. = 3,537 PLUGS			
NO. OF PLUGS	**SCIENTIFIC NAME**	**COMMON NAME**	**SIZE**
393	*ANDROPOGON GERARDII*	BIG BLUESTEM	5" PLUG OR QT. CONTAINER
393	*ASCLEPIAS TUBEROSA*	BUTTERFLY WEED	5" PLUG OR QT. CONTAINER
393	*BAPTISTA AUSTRALIS*	FALSE INDIGO	5" PLUG OR QT. CONTAINER
393	*CHASMANTHIUM LATIFOLIUM*	RIVER OATS	5" PLUG OR QT. CONTAINER
393	*HELIOPSIS HELANTHOIDES*	SMOOTH OX EYE	5" PLUG OR QT. CONTAINER
393	*HIBISCUS MOSCHEUTOS*	SWAMP ROSE MALLOW	5" PLUG OR QT. CONTAINER
393	*JUNCUS EFFUSUS*	SOFT RUSH	5" PLUG OR QT. CONTAINER
393	*MONARDA FISTULOSA*	WILD BERGAMOT	5" PLUG OR QT. CONTAINER
393	*SORGHASTRUM NUTANS*	INDIAN GRASS	5" PLUG OR QT. CONTAINER

STREET TREE CALCULATIONS

BLACKWELL ROAD	
LINEAR FEET OF R.O.W.:	**925.96 LF**
STREET TREES REQUIRED (1 / 50 LF OF ROW):	19 TREES
STREET TREES PROVIDED	**19 TREES**
NICOLAS WAY	
LINEAR FEET OF R.O.W.:	**4759.21 LF**
STREET TREES REQUIRED (1 / 50 LF OF ROW):	95 TREES
STREET TREES PROVIDED	**95 TREES**
NOAH COURT	
LINEAR FEET OF R.O.W.:	**615.18 LF**
STREET TREES REQUIRED (1 / 50 LF OF ROW):	12 TREES
STREET TREES PROVIDED	**12 TREES**
NASH COURT	
LINEAR FEET OF R.O.W.:	**850.99 LF**
STREET TREES REQUIRED (1 / 50 LF OF ROW):	17 TREES
STREET TREES PROVIDED	**17 TREES**

PLANT SCHEDULE

QTY.	SYM.	SCIENTIFIC NAME	COMMON NAME	SIZE CALIPER	SIZE HEIGHT	CONDITION	20 YEAR CANOPY (SF)*	TOTAL 20 YEAR CANOPY (SF)
LARGE DECIDUOUS TREES								
95	AR	ACER RUBRUM	RED MAPLE	3"	12'-14'	B&B	350	33,250
48	QC	QUERCUS COCCINEA	SCARLET OAK	3"	12'-14'	B&B	325	15,600
143		**LARGE DECIDUOUS TREE TOTAL**						**48,850**

TREE COVER CALCULATIONS

DEVELOPMENT AREA:		**32.1783 AC.**	**1,401,688 SF**
EXCLUDED ACREAGE:			
PONDS		0.9133 AC.	39,785 SF
NON-WOODED WETLANDS		0.00 AC.	0 SF
ADJUSTED DEVELOPMENT AREA:		**31.2650 AC.**	**1,361,903 SF**
EXISTING ZONE:		R1	
TOTAL TREE COVER REQUIRED	**15%**	**4.6897 AC.**	**204,285 SF**
TOTAL 20-YEAR TREE COVER PROVIDED:	**15.97%**	**4.9940 AC.**	**217,537 SF**
BY PRESRVATION	12.39%	3.8725 AC.	168,687 SF
BY PLANTING	3.59%	1.1214 AC.	48,850 SF

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LANDSCAPE NOTES & DETAILS

TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

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WED DESIGN	WED DRAWN	WED CHKD

SCALE H: N/A V:

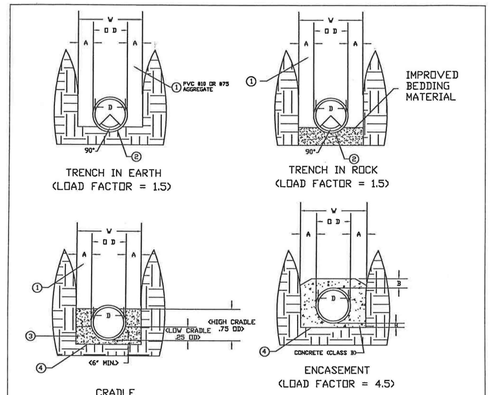
JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 53 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\051-053-6642-D-CP-001-LSP.dwg



CRADLE
CONCRETE (CLASS B)
LOW CRADLE (LOAD FACTOR=2.4)
HIGH CRADLE (LOAD FACTOR=3.4)
IMPROVED BEDDING MATERIAL
LOW CRADLE (LOAD FACTOR=1.5)
HIGH CRADLE (LOAD FACTOR=1.9

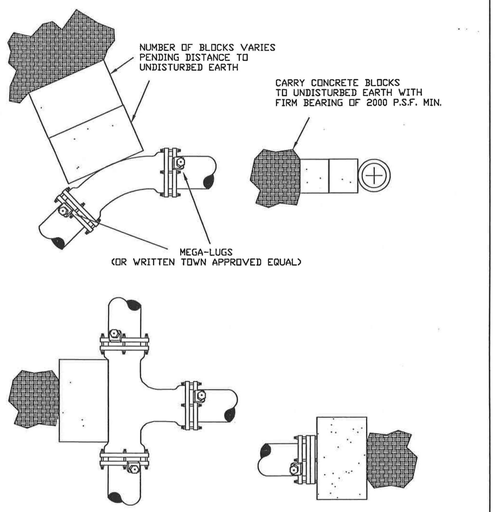
PIPE DIA. "D"	MAXIMUM "A"	MINIMUM "B"
6" TO 16"	8" ⑥	6"
18" TO 21"	10"	9"
24" TO 30"	12"	12"
33" TO 42"	15"	12"
48" & UP	18"	12"

MAXIMUM TRENCH WIDTH "W" TAKEN AT TOP OF PIPE

NOTES
① APPROVED BACK FILL TAMPED IN 6" LAYERS TO 1'-0" ABOVE PIPE.
② BOTTOM QUADRANT OF PIPE BEDDED FULL LENGTH OF BARREL.
③ IMPROVED BEDDING MATERIAL OR CONCRETE AS DIRECTED.
④ POUR CONCRETE AGAINST UNDISTURBED MATERIAL.
⑤ DETAILS SHOWN ARE FOR NORMAL SOIL CONDITIONS. A SPECIAL DESIGN WILL BE REQUIRED FOR UNUSUAL SOIL CONDITIONS.
⑥ MAXIMUM TRENCH WIDTH "W" FOR PIPES 10-INCH AND SMALLER SHALL BE 30-INCHES.

TOWN OF WARRENTON VIRGINIA	APPROVED: 1/20/05 DIRECTOR OF PUBLIC WORKS / UTILITIES	PIPE TRENCH BEDDING DETAIL	DRAWING NO: E-1

125



ALL BEARING SURFACES FOR CONCRETE BLOCKING SHALL BE UNDISTURBED EARTH WITH A MINIUM BEARING VALUE OF 2000 P.S.F. THE MINIMUM THICKNESS OF UNDISTURBED EARTH BEHIND BLOCKING SHALL BE 5 FEET.

BLOCKING SHOWN IS FOR MAXIUM STATIC PRESSURE OF 120 P.S.I. PLUS WATER HAMMER ALLOWANCE.

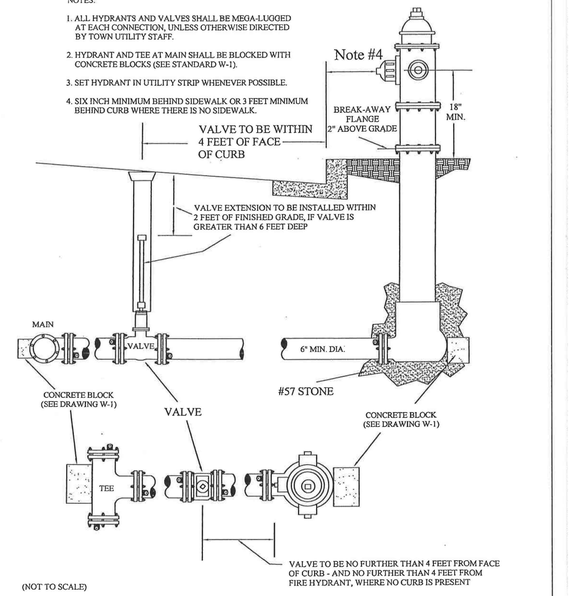
SPECIAL BLOCKING WILL BE DESIGNED FOR CONDITIONS OTHER THAN THOSE INDICATED.

TOWN OF WARRENTON VIRGINIA	APPROVED: 1/20/05 DIRECTOR OF PUBLIC WORKS / UTILITIES	CONCRETE BLOCKING FOR ALL BENDS, TEES, CAPS & PLUGS	DRAWING NO: W-1

137

NOTES:

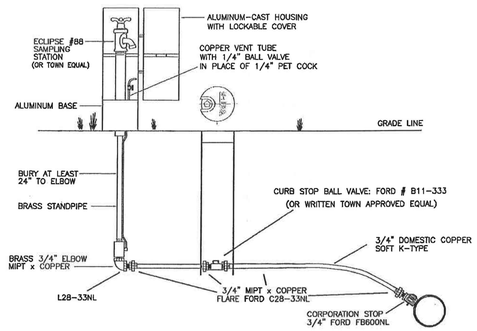
1. ALL HYDRANTS AND VALVES SHALL BE MEGA-LUGGED AT EACH CONNECTION, UNLESS OTHERWISE DIRECTED BY TOWN UTILITY STAFF.
2. HYDRANT AND TEE AT MAIN SHALL BE BLOCKED WITH CONCRETE BLOCKS (SEE STANDARD W-1).
3. SET HYDRANT IN UTILITY STRIP WHENEVER POSSIBLE.
4. SIX INCH MINIMUM BEHIND SIDEWALK OR 3 FEET MINIMUM BEHIND CURB WHERE THERE IS NO SIDEWALK.



(NOT TO SCALE)

TOWN OF WARRENTON VIRGINIA	APPROVED: 7/10/12 DIRECTOR OF PUBLIC WORKS / UTILITIES	FIRE HYDRANT SETTING	DRAWING NO: W-5

WATER SAMPLING STATION



Sampling Stations shall have unthreaded faucet nozzle.

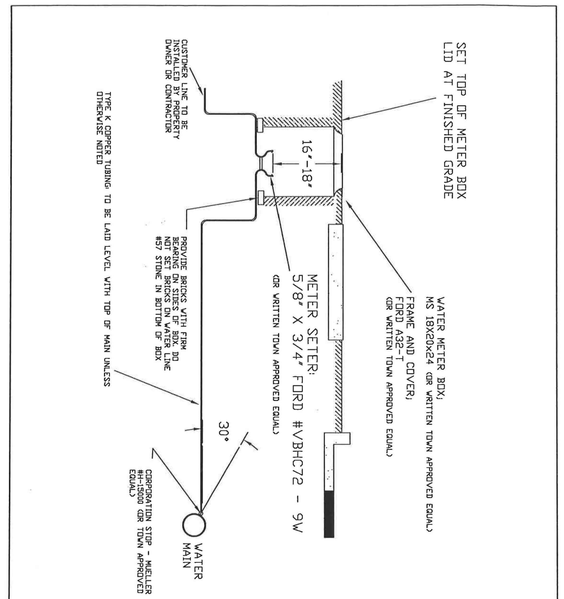
All stations shall be enclosed in a lockable, nonremovable, aluminum-cast housing, set within Town of Warrenton right-ofway.

When opened, the station shall require no key for operation, and the water will flow in an all brass waterway.

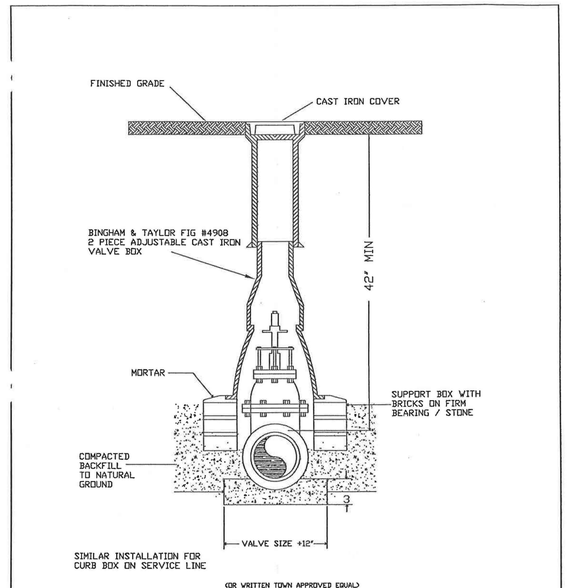
All working parts will also be of brass and be removable from above ground without excavating. Exterior piping shall be brass.

A copper vent tube will enable each station to be pumped free of standing water to prevent freezing and to minimize bacteria growth.

TOWN OF WARRENTON VIRGINIA	APPROVED: 11/8/16 DIRECTOR OF PUBLIC WORKS / UTILITIES	WATER SAMPLING STATION	DRAWING NO: W-23



TOWN OF WARRENTON VIRGINIA	APPROVED: 2/28/12 DIRECTOR OF PUBLIC WORKS / UTILITIES	WATER SERVICE CONNECTION 5/8" X 3/4"	DRAWING NO: W-9



TOWN OF WARRENTON VIRGINIA	APPROVED: 1/20/05 DIRECTOR OF PUBLIC WORKS / UTILITIES	VALVE BOX INSTALLATION	DRAWING NO: W-15

144

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Fredericksburg, Virginia 22401
Phone: (540) 371-0268
bowman.com
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WATER NOTES & DETAILS
TIFFANY ESTATES
CONSTRUCTION PLAN
CENTER MAGISTERIAL DISTRICT
FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

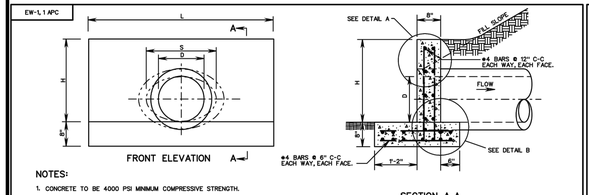
WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50' V: 1"=5'
JOB No. 6642-02-002
DATE : FEBRUARY 10, 2023
FILE No. 6642-D-CP-001
SHEET 54 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\054-056-6642-D-CP-001-DET.dwg

2016 ROAD & BRIDGE STANDARDS

EW-1, 1 APC



NOTES:

1. CONCRETE TO BE 4000 PSI MINIMUM COMPRESSIVE STRENGTH.
2. IF PIPE IS TO BE SKEWED THE OPENING WILL BE ADJUSTED TO ACCOMMODATE ANGLES UP TO 45°.
3. REINFORCING STEEL IN ACCORDANCE WITH ASTM A-615 (REINFORCING BARS).
4. PIPE OPENINGS IN PRECAST DRAINAGE UNITS SHALL NOT EXCEED 4 INCHES AT ANY GIVEN POINT BETWEEN THE PIPE AND THE PRECAST UNIT.
5. DIMENSIONS SHOWN ARE MINIMUM. ACTUAL MEASUREMENTS MAY VARY WITH MANUFACTURER'S TOLERANCE.
6. IN NO CASE SHALL TOP OF ENDWALL PROJECT ABOVE FILL SLOPE, DITCH SLOPE, OR SHOULDER.
7. HEADWALL TO BE BEVELED IN ALL AREAS EXCEPT WHERE A CONFLICT WITH INVERT OR WINGWALL OCCUR.
8. BEVEL EDGE IS REQUIRED ON THE HEADWALL AT THE INLET SLOPE, END OF THE CULVERT. HEADWALL AT OUTLET END MAY BE EITHER SQUARE EDGE OR BEVELED.
9. ¾" CHAMFER MAY BE PROVIDED ON ALL EDGES AT MANUFACTURER'S OPTION.

EW-1PC

ENDWALL FOR CIRCULAR PIPE

DIAMETER OF PIPE CULVERT						
D	12"	15"	18"	21" OR 24"	27" OR 30"	33" OR 36"
H	2'-0"	2'-3"	2'-6"	3'-2"	3'-10"	4'-4"
L	4'-0"	5'-0"	6'-0"	8'-0"	10'-0"	12'-0"
a	0'-1½"	0'-1⅝"	0'-2"	0'-2½"	0'-3¼"	0'-3⅝"
b	0'-1"	0'-1¼"	0'-1½"	0'-2"	0'-2½"	0'-3"

EW-1APC

ENDWALL FOR ELLIPTICAL PIPE

SIZE OF ELLIPTICAL PIPE CULVERT (SPAN x RISE)						
S x D	23" x 14"	30" x 19"	34" x 22"	38" x 24"	42" x 27"	45" x 29"	49" x 32"	53" x 34"
H	1'-10"	2'-4"	2'-7"	2'-9"	3'-1"	3'-3"	3'-6"	3'-8"
L	5'-5"	7'-2"	8'-6"	9'-2"	10'-2"	10'-11"	12'-1"	12'-11"
a	0'-2½"	0'-3¼"	0'-3⅞"	0'-4"	0'-4½"	0'-4⅞"	0'-5"	0'-5½"
b	0'-2"	0'-2½"	0'-2⅞"	0'-3"	0'-3⅜"	0'-3¾"	0'-4"	0'-4½"

VDOT ROAD AND BRIDGE STANDARDS — SHEET 1 OF 1 — 101.02 — REVISION DATE

PRECAST ENDWALL FOR PIPE CULVERTS
12" - 36" CIRCULAR AND 23" x 14" - 53" x 34" ELLIPTICAL PIPES

VIRGINIA DEPARTMENT OF TRANSPORTATION

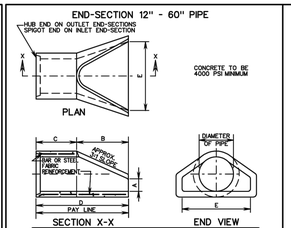
SPECIFICATION REFERENCE: 105, 302

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

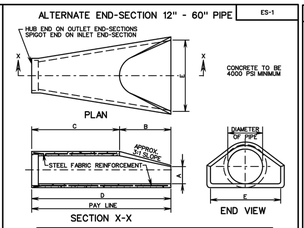
ES-1

END-SECTION 12" - 60" PIPE



END SECTION DIMENSIONS					
PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	2'-0"	4'-0"	2'-0"
15"	6"	2'-3"	1'-9"	4'-0"	2'-6"
18"	9"	2'-3"	1'-9"	4'-0"	3'-0"
21"	9¾"	2'-11"	2'-1"	5'-0"	3'-6"
24"	10¾"	3'-7"	2'-6"	6'-1"	4'-0"
27"	10¾"	4'-0"	2'-9"	6'-10½"	4'-6"
30"	1'-0"	4'-6"	1'-7½"	6'-10½"	5'-0"
33"	1'-1½"	4'-10½"	2'-3½"	7'-3½"	5'-6"
36"	1'-3"	5'-3"	2'-10½"	8'-1½"	6'-0"
42"	1'-6"	5'-3"	3'-1½"	8'-1½"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-9½"	8'-4½"	7'-6"
60"	2'-6"	5'-0"	3'-3"	8'-3"	8'-0"

ALTERNATE END-SECTION 12" - 60" PIPE



END SECTION DIMENSIONS					
PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	2'-0"	4'-0"	2'-0"
15"	6"	2'-3"	1'-9"	4'-0"	2'-6"
18"	9"	2'-3"	1'-9"	4'-0"	3'-0"
21"	9¾"	2'-11"	2'-1"	5'-0"	3'-6"
24"	10¾"	3'-7"	2'-6"	6'-1"	4'-0"
27"	10¾"	4'-0"	2'-9"	6'-10½"	4'-6"
30"	1'-0"	4'-6"	1'-7½"	6'-10½"	5'-0"
33"	1'-1½"	4'-10½"	2'-3½"	7'-3½"	5'-6"
36"	1'-3"	5'-3"	2'-10½"	8'-1½"	6'-0"
42"	1'-6"	5'-3"	3'-1½"	8'-1½"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-9½"	8'-4½"	7'-6"
60"	2'-6"	5'-0"	3'-3"	8'-3"	8'-0"

NOTES:
PIPE LENGTHS SHOWN ON PLANS ARE BASED ON END-SECTION DESIGN SHOWN ON THE LEFT. IF THE CONTRACTOR ELECTS TO USE THE ALTERNATE DESIGN SHOWN ON THE RIGHT, LENGTHS WILL BE REDUCED BY THE DIFFERENCE IN DIMENSION "D".

SPECIFICATION REFERENCE: 302

VDOT ROAD AND BRIDGE STANDARDS — SHEET 1 OF 1 — 102.01 — REVISION DATE

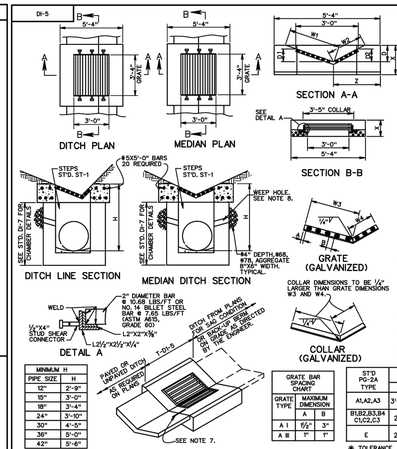
FLARED END SECTION
12" - 60" CONCRETE PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

DI-5



NOTES

1. DEPTH OF INLET D1 TO BE SHOWN ON PLANS.
2. THE "H" DIMENSION SHOWN ON THE STANDARDS AND SPECIFIED ON THE PLANS WILL BE MEASURED FROM THE INVERT OF THE OUTFALL PIPE TO THE TOP OF THE GRATE. THE "H" DIMENSION SHOWN IS GIVEN ONLY FOR ESTIMATING PURPOSES AND ACTUAL DIMENSIONS SHALL BE DETERMINED BY THE CONTRACTOR FROM FIELD CONDITIONS.
3. WHEN SPECIFIED ON THE PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD IS-1. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.
4. IN THE EVENT THE INVERT OF THE OUTFALL PIPE IS NOT SHAPED TO THE FLOW LINE OF THE OUTFALL, THE INVERT OF THE STRUCTURE SHALL BE SEALED WITH CEMENT MORTAR TO PREVENT STANDING OR PONDING OF WATER IN THE STRUCTURE. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SEALING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.
5. STEPS ARE TO BE PROVIDED WHEN H IS 4'-0" OR GREATER. FOR DETAILS SEE STANDARD ST-1.
6. CHAMBER MAY BE CAST IN PLACE, PRECAST, BRICK OR CONCRETE BLOCK. SEE DI-7 FOR DETAILS.
7. WHERE PAVED DITCHES ARE REQUIRED, JOINTS ARE TO BE DOWELLED WITH #4 X 9" SMOOTH RODS AT APPROXIMATELY 3'-0" C-C IN ALL AREAS ADJACENT TO BOTTOM, SIDES, OR TOP OF DITCH. SEE STANDARD PC-1 FOR DETAILS. EXPANSION JOINTS SHALL BE PROVIDED. SEE STD. SB-3, 4 FOR ALTERNATE DESIGN.
8. 3" DIAMETER WEEP HOLE TO BE LOCATED TO DRAIN SUBGRADE MATERIAL. WEEP HOLE WITH 12"X12" PLASTIC HANDI-AIRE CLOTH OR MESH OR GALVANIZED STEEL HARDWARE CLOTH OR MESH WITH PLASTIC MESH HARDWARE CLOTH ANCHORED FIRMLY TO THE OUTSIDE OF THE STRUCTURE.
9. ALL REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 2" AND BE CUT CLEAR OF ALL OPENINGS BY 2".
10. CAST-IN PLACE CONCRETE IS TO BE CLASS A3 (3500 PSI). PRECAST CONCRETE IS TO BE 4000 PSI.
11. PROVIDED SAFETY SLABS WHEN SPECIFIED ON THE PLANS.
12. D-1 IS TO BE UTILIZED IN LOCATIONS NOT NORMALLY SUBJECT TO TRAFFIC.

GRATE BAR SPACING CHART		
GRATE TYPE	MAXIMUM DIMENSION	
	A	B
A1	1⅛"	3"
A-R	1"	1"

STD PC-24 TYPE	COVER DIMENSIONS AND QUANTITIES								
	W1	W2	W3	W4	✱D	D1	D2	X	Z
A1,A2,A3	3'-0½"	2'-0⅝"	2'-0⅝"	1'-0⅜"	6"	4"	3"	14"	2'-2"
B1,B2,B3,B4 C1,C2,C3	2'-9"	2'-9"	1'-6⅞"	1'-6⅞"	8"	4½"	4½"	16"	2'-8"
E	2'-3"	2'-3"	1'-8⅛"	1'-8⅛"	12"	9"	9"	19"	2'-8"

✱ TOLERANCE ± ½"

VDOT ROAD AND BRIDGE STANDARDS — SHEET 1 OF 1 — 104.21 — REVISION DATE

STANDARD DITCH DROP INLET

VIRGINIA DEPARTMENT OF TRANSPORTATION

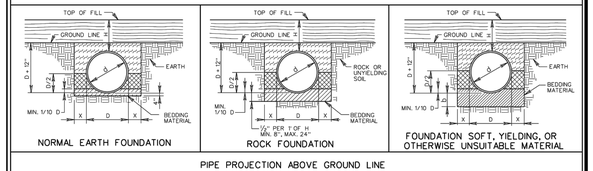
SPECIFICATION REFERENCE: 233, 302

2016 ROAD & BRIDGE STANDARDS

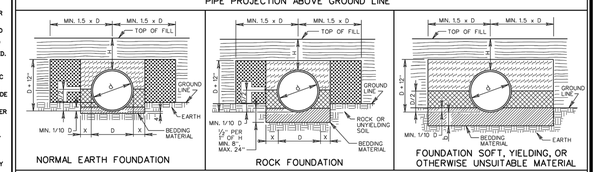
2016 ROAD & BRIDGE STANDARDS

PB-1

NO PROJECTION OF PIPE ABOVE GROUND LINE



PIPE PROJECTION ABOVE GROUND LINE



BEDDING MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

CLASS 7 BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

FOR PLASTIC PIPE 1 6" MINIMUM CLASS 1 BACKFILL MATERIAL PLACED DIRECTLY OVER PIPE AND 6" REGULAR BACKFILL MATERIAL. 2 CLASS 7 BACK FILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

EMBANKMENT

REGULAR BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

FOR ALL OTHER PIPE REGULAR BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

NOTES:

FOR GENERAL NOTES ON PIPE BEDDING, BACKFILLING OF PIPE CULVERTS AND STORM SEWERS GENERAL NOTES ON SHEET 107.00.

CRUSHED GLASS CONFORMING TO THE SIZE REQUIREMENTS FOR CRUSHER RUN AGGREGATE SIZE 25 AND 26 MAY BE USED IN PLACE OF CLASS 1 BACKFILL

VDOT ROAD AND BRIDGE STANDARDS — SHEET 1 OF 4 — 107.01 — REVISION DATE 07/19

INSTALL OF PIPE CULVERTS AND STORM SEWERS
CIRC. PIPE BEDDING AND BACKFILL - METHOD "A"

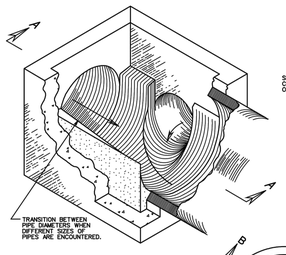
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 302, 303

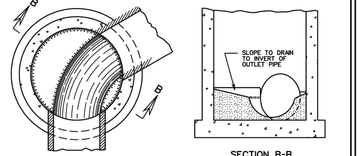
2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

IS-1



METHOD OF TREATMENT IN DROP INLETS



METHOD OF TREATMENT IN MANHOLES

NOTES:
SHAPING OF MANHOLE AND INLET INVERTS IN ACCORDANCE WITH THIS DRAWING IS TO APPLY TO THOSE STRUCTURES SPECIFIED ON PLANS OR WHERE INVERT OF PIPE IS ABOVE INVERT OF STRUCTURE.

MANHOLE OR DROP INLET IS TO BE FORMED AND CONSTRUCTED IN ACCORDANCE WITH APPLICABLE STANDARD OR SPECIAL DRAWING. THE INVERT SHAPING AS DETAILED HEREON IS TO CONSIST OF A PORTLAND CEMENT CONCRETE MIX CONFORMING TO CLASS A3 OR CLASS B1 EXCEPT THAT 2ø COARSE AGGREGATE MAY BE USED. THE USE OF BRICK, CONCRETE BLOCK, CONCRETE RUBBLE, BROKEN CONCRETE OR BROKEN CONCRETE BLOCK IN THE SURFACE SHALL BE LEFT SMOOTH BY MEANS OF HAND TROWELLING. NONE OF THE COARSE AGGREGATE SHALL REMAIN EXPOSED.

DETAILS OF INVERT SHAPING AS SHOWN HEREON ARE FOR EXAMPLE PURPOSES ONLY. EACH MANHOLE OR DROP INLET IS TO BE SHAPED INDIVIDUALLY TO BEST FIT THE PARTICULAR INLET AND OUTLET CONFIGURATION AND FLOW LINES.

VDOT ROAD AND BRIDGE STANDARDS — SHEET 1 OF 1 — 106.08 — REVISION DATE

STANDARD METHOD OF SHAPING MANHOLE & INLET INVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

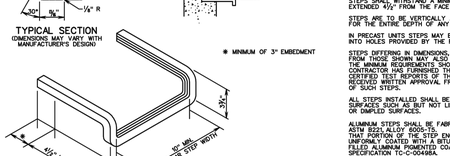
SPECIFICATION REFERENCE: 302

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

ST-1

NO. 6 GALVANIZED STEEL STEP



NOTES:
STEPS WILL BE REQUIRED IN ALL STRUCTURES WITH A DEPTH OF 4'-0" OR GREATER UNLESS OTHERWISE NOTED ON THE PLANS.

ALL STEPS SHALL PROTRUDE 4½" FROM INSIDE FACE OF STRUCTURE WALL.

MAXIMUM STEP SPACING TO BE 16" C-C.

STEPS SHALL WITHSTAND A MINIMUM FORCE OF 300 POUNDS WHEN EXTENDED 4½" FROM THE FACE OF THE SUPPORT.

STEPS ARE TO BE VERTICALLY ALIGNED AND UNIFORMALY SPACED FOR THE ENTIRE DEPTH OF ANY STRUCTURE.

IN PRECAST UNITS STEPS MAY BE CAST IN PLACE, MORTARED INTO HOLES PROVIDED BY THE FABRICATOR, OR DRIVEN.

STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THEY MEET THE MINIMUM REQUIREMENTS SHOWN HEREON AND THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS AND CERTIFIED TEST REPORTS OF THE PROPOSED SUBSTITUTE AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.

ALL STEPS INSTALLED SHALL BE PROVIDED WITH SLIP-RESISTANT SURFACES SUCH AS BUT NOT LIMITED TO, CORRUGATED KNURLED, OR UNPOLISHED SURFACES.

ALUMINUM STEPS SHALL BE FABRICATED IN ACCORDANCE WITH ASTM B221, ALLOY 6005-T5. THAT PORTION OF THE STEP ENCASED IN MASONRY SHALL BE UNIFORMLY COATED WITH A BITUMINOUS, SOLVENT - TYPE, ASBESTOS FILLED ALUMINUM PIGMENTED COATING CONFORMING TO FEDERAL SPECIFICATION TT-C-00498A.

SPECIFICATION REFERENCE

STANDARD STEP

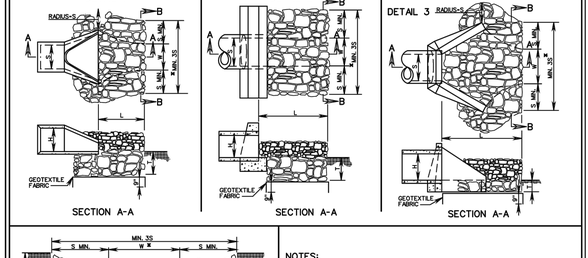
VIRGINIA DEPARTMENT OF TRANSPORTATION

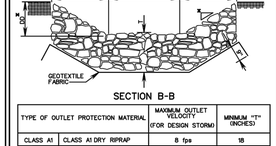
VDOT ROAD AND BRIDGE STANDARDS — REVISION DATE — SHEET 1 OF 1 — 106.09

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

EC-1





NOTES:

1. FOR MULTIPLE LINE INSTALLATIONS, DIMENSION S IS TO GOVERN THE PROTECTION OUTSIDE THE CHANNEL WIDTH (W).
2. ON ANY INSTALLATION REQUIRING CULVERT OUTLET PROTECTION WHERE NO ENDWALL OR ENDSECTION IS SPECIFIED ON THE PLANS, CONSTRUCTION IS TO BE IN ACCORDANCE WITH DETAIL 2 SHOWN ABOVE.
3. GEOTEXTILE FABRIC TO BE INSTALLED UNDER CLASS A1,A, AND I MATERIALS IN ACCORDANCE WITH THE SPECIFICATIONS.
4. S = DIAMETER OF CIRCULAR CULVERT OR SPAN FOR BOX, ELLIPTICAL OR ARCH CULVERT. H = DIAMETER OF CIRCULAR CULVERT OR RISE/HEIGHT FOR BOX, ELLIPTICAL OR ARCH CULVERT.
- USE TYPICAL SECTION SHOWN ON PLANS FOR SIDE SLOPE, BOTTOM WIDTH AND DEPTH OF CHANNEL OR MATCH EXISTING DITCH OR NATURAL GROUND.

TYPE OF OUTLET PROTECTION MATERIAL	MAXIMUM OUTLET VELOCITY (FOR DESIGN STORM)	MINIMUM "T" (INCHES)
CLASS A1 CLASS A1 DRY RIPRAP	8 fps	18
CLASS I CLASS I DRY RIPRAP	14 fps	24
CLASS II CLASS II DRY RIPRAP	19 fps	36

OUTLET PROTECTION MINIMUM LENGTH (L)	
TYPE A INSTALLATION	3H
TYPE B INSTALLATION	5H

SPECIFICATION REFERENCE: 204, 245, 303, 414

CULVERT OUTLET PROTECTION

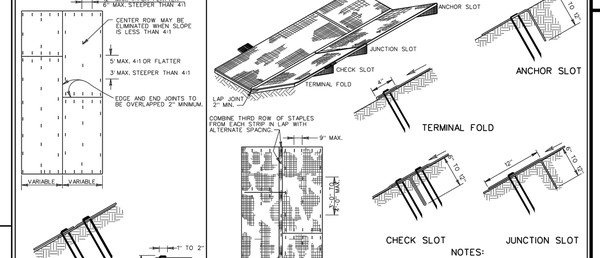
VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT ROAD AND BRIDGE STANDARDS — REVISION DATE — SHEET 1 OF 1 — 113.01

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

EC-2



NOTES:

1. APPROXIMATE 200 STAPLES REQUIRED PER 4' X 225 ROLL.
2. ANCHOR SLOTS, JUNCTION SLOTS AND CHECK SLOTS TO BE BURIED 6" TO 12" AND VARIABLE.
3. MAX. SPACING C-C CHECK SLOTS 100 SLOPE 4% OR LESS 50' SLOPE STEEPER THAN 4%.
4. STAPLES FORMED FROM NO. 8 STEEL WIRE 8" STAPLE MINIMUM LENGTH FOR SANDY SOIL 6" STAPLE MINIMUM LENGTH FOR OTHER SOIL.

GENERAL NOTES:

1. ROLLED EROSION CONTROL PRODUCT IS TO BE LOCATED AS INDICATED ON THE PLANS IN ACCORDANCE WITH THE DIMENSIONS SPECIFIED ON TYPICAL SECTION.
2. "T-TOP" STAPLES OR OTHER MANUFACTURER'S DESIGN APPROVED BY THE ENGINEER MAY BE SUBSTITUTED FOR THE STAPLES SHOWN.
3. WIDTH OF MATERIAL MAY VARY FROM MINIMUM DIMENSION BY INCREMENTS OF 4 OR 5 FEET.
4. FOR SOURCES OF APPROVED MATERIAL SEE VDOT'S APPROVED PRODUCTS LIST FOR EC-2 MATERIALS TYPES 1, 2, 3, OR 4.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

VDOT ROAD AND BRIDGE STANDARDS — SHEET 1 OF 1 — 113.02 — REVISION DATE 07/16

ROLLED EROSION CONTROL PRODUCT
PROTECTIVE COVERING INSTALLATION CRITERIA
(TEMPORARY USE)

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 244, 606

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

CD-2

NON-PERFORATED OUTLET PIPE

TYPE OF PIPE	CRUSHING STRENGTH			
	✱W.T. 4" NOM. DIAMETER	✱W.T.	6" NOM. DIAMETER	
SMOOTH WALL PVC	.103		0.153	
SMOOTH WALL PE		70 PSI ✱✱✱		70 PSI ✱✱✱

✱ WALL THICKNESS (MIN) - INCHES
✱✱✱ TESTED ACCORDING TO ASTM D-2412 AT 5% DEFLECTION.

GENERAL NOTES

1. TRENCH SHALL BE FILLED WITH AGGREGATE AND THROUGHLY HAND TAMPED TO INSURE COMPACTNESS.
2. OUTLET PIPE SHALL BEGIN AT THE EDGE OF THE TRAVEL LANE PAVEMENT AND SHALL BE PLACED ON A GRADE PARALLEL TO THE SHOULDER SLOPE 2' MIN. (3% DESIRABLE) GRADE.
3. ON CURB AND GUTTER SECTIONS, WHERE IT IS IMPOSSIBLE TO OTHERWISE PROVIDE OUTLETS FOR CROSSDRAINS, THEY ARE TO BE LOCATED SO AS TO DRAIN INTO DROP INLETS OR MANHOLES.
4. ON SUPERELEVATED SECTIONS, TRENCH IS TO BE UNDER ENTIRE PAVEMENT AREA WITH OUTLET PIPE ON LOW SIDE ONLY.
5. INVERT ELEVATION AT OUTLET END OF OUTLET PIPE TO BE A MINIMUM OF 1'-0" ABOVE INVERT ELEVATION OF RECEIVING DRAINAGE DITCH OR STRUCTURE.
6. ALL CONNECTIONS (ELBOWS, WYES, ETC.) WITHIN PAY LIMITS FOR OUTLET PIPE ARE TO BE OF THE SAME CRUSHING STRENGTH AS THE OUTLET PIPE.
7. OUTLET PIPE TO BE SECURELY CONNECTED TO EW-12OR OTHER DRAINAGE STRUCTURE.

SPECIFICATION REFERENCE: 232, 501, 701

STANDARD CROSSDRAIN
(AT GRADE SAGS AND BRIDGE APPROACHES)

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT ROAD AND BRIDGE STANDARDS — REVISION DATE 07/16 — SHEET 1 OF 1 — 108.05

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

CD-1

NON-PERFORATED OUTLET PIPE

TYPE OF PIPE	CRUSHING STRENGTH			
	✱W.T. 4" NOM. DIAMETER	✱W.T.	6" NOM. DIAMETER	
SMOOTH WALL PVC	.103		0.153	
SMOOTH WALL PE		70 PSI ✱✱✱		70 PSI ✱✱✱

✱ WALL THICKNESS (MIN) - INCHES
✱✱✱ TESTED ACCORDING TO ASTM D-2412 AT 5% DEFLECTION.

GENERAL NOTES

1. UNLESS SPECIFICALLY INDICATED, CROSSDRAIN WILL NOT BE LOCATED AT THIS POINT WHEN BOTH SUBBASE AND SUBGRADE ARE STABILIZED.
2. TRENCH SHALL BE FILLED WITH AGGREGATE AND THROUGHLY HAND TAMPED TO INSURE COMPACTNESS.
3. OUTLET PIPE SHALL BEGIN AT THE EDGE OF THE TRAVEL LANE PAVEMENT AND SHALL BE PLACED ON A GRADE PARALLEL TO THE SHOULDER SLOPE 2'S MIN. (3 % DESIRABLE) GRADE.
4. ON CURB AND GUTTER SECTIONS, WHERE IT IS IMPOSSIBLE TO OTHERWISE PROVIDE OUTLETS FOR CROSSDRAINS, THEY ARE TO BE LOCATED SO AS TO DRAIN INTO DROP INLETS OR MANHOLES.
5. ON SUPERELEVATED SECTIONS, TRENCH IS TO BE UNDER ENTIRE PAVEMENT AREA WITH OUTLET PIPE ON LOW SIDE ONLY.
6. INVERT ELEVATION AT OUTLET END OF OUTLET PIPE TO BE A MINIMUM OF 1'-0" ABOVE INVERT ELEVATION OF RECEIVING DRAINAGE DITCH OR STRUCTURE.
7. ALL CONNECTIONS (ELBOWS, WYES, ETC.) WITHIN PAY LIMITS FOR OUTLET PIPE ARE TO BE OF THE SAME CRUSHING STRENGTH AS THE OUTLET PIPE.
8. OUTLET PIPE TO BE SECURELY CONNECTED TO EW-12OR OTHER DRAINAGE STRUCTURE.

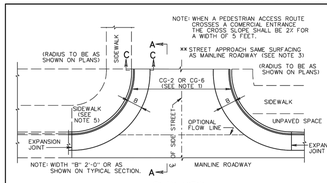
SPECIFICATION REFERENCE: 232, 501, 701

STANDARD CROSSDRAIN
(AT LOWER END OF CUTS)

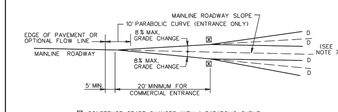
VIRGINIA DEPARTMENT OF TRANSPOR

2016 ROAD & BRIDGE STANDARDS

CG-11

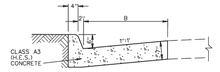


PLAN VIEW



⊠ CONSTRUCT GRADE CHANGES WITH A PARABOLIC CURVE.

SECTION A - A



SECTION C-C

GENERAL NOTES

1. WHEN USED IN CONJUNCTION WITH STANDARD CG-3, THE CG-2 THE CURB FACE ON THIS STANDARD IS TO BE ADJUSTED TO MATCH THE MOUNTABLE CURB CONFIGURATION.
2. SEE STANDARD CG-12 FOR CURB RAMP DESIGN TO BE USED WITH THIS STANDARD.
3. MAINLINE PAVEMENT SHALL BE CONSTRUCTED TO THE R/W LINE EXCEPT ANY SUBGRADE STABILIZATION REQUIRED FOR MAINLINE PAVEMENT WHICH CAN BE OMITTED IN THE ENTRANCE.)
4. RADIAL CURB OR COMBINATION CURB AND GUTTER SHALL NOT BE CONSTRUCTED BEYOND THE R/W LINE EXCEPT FOR REPLACEMENT PURPOSES.

ENTRANCE NOTES

5. WHEN THE ENTRANCE RADII CANNOT ACCOMMODATE THE TURNING REQUIREMENTS OF ANTICIPATED HEAVYY TRUCK TRAFFIC, THE DEPTH FOR SIDEWALK & CURB RAMPS WITHIN THE LIMITS OF THE RADII SHOULD BE INCREASED TO 7". (SEE CG-12)
6. PLANS ARE TO INDICATE WHEN CONSTRUCTION OF A FLOW LINE IS REQUIRED TO PROVIDE POSITIVE DRAINAGE ACROSS THE ENTRANCE.
7. THE DESIRABLE AND MAXIMUM ENTRANCE GRADE CHANGES "D" ARE LISTED IN THE ALLOWABLE ENTRANCE GRADE TABLE. THESE VALUES ARE NOT APPLICABLE TO STREET CONNECTIONS.

INTERSECTION NOTES

8. WHEN CG-11 IS USED FOR STREET CONNECTIONS, THE CONNECTION MUST BE DESIGNED IN ACCORDANCE WITH AASHTO POLICY AND THE APPLICABLE REQUIREMENTS OF THE VDOT ROAD DESIGN MANUAL, INCLUDING STOPPING SIGHT DISTANCE AND K VALUE REQUIREMENTS.
9. OPTIONAL FLOWLINE MAY REQUIRE WARPING OF A PORTION OF GUTTER TO PROVIDE POSITIVE DRAINAGE ACROSS THE INTERSECTION.

ALLOWABLE ENTRANCE GRADE CHANGES

ENTRANCE VOLUME		GRADE CHANGE "D"	
		DESIRABLE	MAXIMUM
HIGH	MORE THAN 1500 VPD	0 %	3 %
MEDIUM	500-1500 VPD	≤ 3 %	6 %
LOW	LESS THAN 500 VPD	≤ 6 %	8 %

NOTE: ALLOWABLE ENTRANCE GRADE TABLE IS NOT APPLICABLE TO STREET CONNECTIONS

SPECIFICATION REFERENCE	METHOD OF TREATMENT (CONNECTION FOR STREET INTERSECTIONS AND COMMERCIAL ENTRANCES) VIRGINIA DEPARTMENT OF TRANSPORTATION	VDOT ROAD AND BRIDGE STANDARDS
502		REVISION DATE 07/15 — SHEET 1 OF 1 — 203.04

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

PC-1

DIAMETER INCHES	AREA SQ. FT.	MAXIMUM HEIGHT OF COVER IN FEET				DIAMETER INCHES
		NONREINFORCED CONCRETE (STRENGTH) (SEE NOTE 4)	REINFORCED CONCRETE CLASS			
			III	IV	V	
12	0.8	14' (1800)	14'	19'	29'	12
15	1.2	14' (2125)	14'	19'	29'	15
18	1.8	14' (2400)	14'	20'	29'	18
21	2.4	13' (2700)	14'	20'	29'	21
24	3.1	13' (3000)	14'	20'	29'	24
27	4.0		14'	20'	29'	27
30	4.9		14'	20'	29'	30
33	5.9		14'	20'	29'	33
36	7.1		14'	20'	30'	36
42	9.6		14'	21'	30'	42
48	12.6		14'	21'	30'	48
54	15.9		14'	21'	30'	54
60	19.6		14'	21'	30'	60
66	23.8		14'	21'	30'	66
72	28.3		14'	21'	30'	72
78	33.2		14'	21'	30'	78
84	38.5		14'	21'	30'	84
90	44.4		14'	21'	30'	90
96	50.3		14'	21'	30'	96
102	56.7		14'	21'	30'	102
108	63.6		14'	21'	30'	108

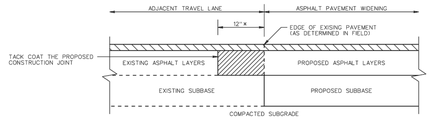
NOTES:

1. COVER HEIGHTS INDICATED IN TABLES ARE FOR FINISHED CONSTRUCTION. THE COVER HEIGHTS SHOWN ARE INTENDED TO MATCH THE COVER HEIGHTS BASED ON ALLOWABLE STRESS DESIGN. COVER HEIGHTS WERE NOT RE-CALCULATED USING LRFD.
2. TO PROTECT PIPE DURING CONSTRUCTION, MINIMUM HEIGHTS OF COVER PRIOR TO ALLOWING CONSTRUCTION TRAFFIC TO CROSS INSTALLATION ARE TO BE ½ DIAMETER OR 3'0" WHICHEVER IS GREATER. THE COVER SHALL EXTEND THE FULL LENGTH OF THE PIPE. THE APPROACH FILL RAMP IS TO EXTEND A MINIMUM OF ½(DIAMETER + 36") FROM THE END OF THE PIPE, OR TO THE INTERSECTION WITH A CUT.
3. STANDARD MINIMUM FINISHED HEIGHT OF COVER FOR ALL PIPES, EXCEPT THOSE UNDER ENTRANCES, SHALL BE 2'0" OR ½ DIAMETER, WHICHEVER IS GREATER. WHERE THE STANDARD MINIMUM COVER CANNOT BE ACHIEVED, AN ABSOLUTE MINIMUM FINISHED COVER HEIGHT OF 1'0" WILL BE ALLOWED ONLY IF ALL POSSIBLE MEANS TO OBTAIN THE STANDARD VALUE HAVE BEEN EXHAUSTED. THE MINIMUM FINISHED HEIGHT OF COVER FOR PIPES UNDER ENTRANCES IS 9".
4. CRUSHING STRENGTH (POUNDS PER LINEAR FOOT ULTIMATE STRENGTH) PER ASTM C76: 2000 LBS FOR CLASS II PIPE 3000 LBS FOR CLASS III PIPE 3000 LBS FOR CLASS IV PIPE 3750 LBS FOR CLASS V PIPE
5. FOR HEIGHT OF COVER GREATER THAN THAT SHOWN FOR CLASS V, A SPECIAL DESIGN CONCRETE PIPE IS REQUIRED.
6. NONREINFORCED PIPE TO BE USED ONLY UNDER ENTRANCES AND LOWER FUNCTIONAL CLASSIFICATION (LFC) ROADWAYS (SEE SHEET 17 OF 18).
7. SEE STANDARD PB-1 FOR PIPE BEDDING AND BACKFILL REQUIREMENTS.
8. PIPE WITH LESS THAN THE STANDARD MINIMUM COVER IS TO BE MINIMUM CLASS III REINFORCED.

VDOT ROAD AND BRIDGE STANDARDS	A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. CONCRETE PIPE HEIGHT OF COVER TABLE FOR HL-93 LIVE LOAD VIRGINIA DEPARTMENT OF TRANSPORTATION	SPECIFICATION REFERENCE
SHEET 1 OF 18 — REVISION DATE 11/15 — 107.05		302 232

2016 ROAD & BRIDGE STANDARDS
2016 ROAD & BRIDGE STANDARDS

WP-2



CONSTRUCTION JOINT DETAIL

REMOVE EXISTING ASPHALT LAYERS TO EXISTING SUBBASE AND REPLACE WITH PROPOSED ASPHALT WIDENING LAYERS

PROPOSED MINIMUM 1½ INCH THICK ASPHALT SURFACE COURSE (SEE NOTE 5)

× MINIMUM 12 INCHES, OR GREATER AS NECESSARY TO ABUT THE FULL THICKNESS OF EXISTING ASPHALT LAYERS AS DETERMINED BY CORES (SEE NOTE 3)

NOTES:

1. ASPHALT PAVEMENT WIDENING SHALL HAVE A PAVEMENT DESIGN IN ACCORDANCE WITH CURRENT VDOT PROCEDURES AND BE APPROVED BY THE ENGINEER.
2. THE PAVEMENT DESIGN FOR ASPHALT PAVEMENT WIDENING SHALL MEET OR EXCEED THE DEPTHS AND TYPES OF THE LAYERS OF EXISTING PAVEMENT. SUBSURFACE DRAINAGE OF THE EXISTING AND PROPOSED PAVEMENT SHALL BE ADDRESSED IN THE PAVEMENT DESIGN.
3. A MINIMUM OF THREE CORES SHALL BE TAKEN ALONG THE CENTER OF THE ADJACENT TRAVEL LANE TO DETERMINE THE TYPE AND THICKNESS OF EXISTING PAVEMENT LAYERS. THESE CORES SHALL BE SPACED NO MORE THAN 500 FEET APART.
4. THE ADJACENT TRAVEL LANE SHALL BE MILLED A MINIMUM DEPTH OF 1½ INCHES AND REPLACED WITH AN ASPHALT SURFACE COURSE TO MATCH THE PROPOSED PAVEMENT WIDENING SURFACE COURSE, UNLESS WAIVED BY THE ENGINEER.
5. THE ENGINEER MAY REQUIRE THE MILLING DEPTH OF THE EXISTING PAVEMENT TO BE ADJUSTED TO ACHIEVE AN ACCEPTABLE PAVEMENT CROSS-SLOPE AND EFFECTIVE SURFACE DRAINAGE.
6. EXISTING PAVEMENT MARKINGS AND MARKERS WITHIN THE PROJECT LIMITS SHALL BE RESTORED SUBJECT TO THE APPROVAL OF THE ENGINEER.
7. FINAL TRANSVERSE PAVEMENT TIE-IN SHALL CONFORM TO THE REQUIREMENTS OF SECTION 315 OF THE SPECIFICATIONS EXCEPT THAT ALL JOINTS AT TIE-IN LOCATIONS SHALL BE TESTED USING A 10 FOOT STRAIGHTEDGE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 315 OF THE SPECIFICATIONS.

VDOT ROAD AND BRIDGE STANDARDS	ASPHALT PAVEMENT WIDENING FOR WIDENING SUBJECT TO TRAFFIC VIRGINIA DEPARTMENT OF TRANSPORTATION	SPECIFICATION REFERENCE
SHEET 1 OF 1 — REVISION DATE — 303.02		315

2016 ROAD & BRIDGE STANDARDS

Bowman

Bowman Consulting Group Ltd
1300 Central Park Boulevard
Fredericksburg, Virginia 22401
Phone: (540) 371-0268
bowman.com
Bowman Consulting Group Ltd

VDOT DETAILS

TIFFANY ESTATES
CONSTRUCTION PLAN

FAUQUIER COUNTY, VIRGINIA

CENTER MAGISTERIAL DISTRICT

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM B. DUNCANSON JR.
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50' V: 1"=5'

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 55A OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\054-056-6642-D-CP-001-DET.dwg

FAUQUIER COUNTY BOND ESTIMATE REVIEW

Tiffany Estates
November 22, 2024

	Co. Quantity		Co. Unit Price		Co. Total
Site Works					
Mobilization	1.00	EA	$10,000.00		$10,000.00
Clearing and Grubbing					
Heavy		AC	$15,000		$0.00
Moderate	25.40	AC	$11,700		$297,180.00
Light		AC	$7,800		$0.00
HEAVY: Anything exceeding the Light and Moderate categories.					
MODERATE: In addition to Light category, grading up to 4 feet depth, removal of trees under 24 inch diameter, removal of medium size shrubs.					
LIGHT: Grading less than 2 feet in depth. Removal of vegetation, grass areas, and small shrubs, small trees less than 12 inches in diameter.					
Earthwork					
Site Grading: to include rough and fine grading	91650	SY	$1		$91,650.00
				Subtotal	**$398,830.00**
Erosion and Sediment Controls					
Construction Entrance	1	EA	$2,500		$2,500.00
Silt Fence	2095	LF	$5		$10,475.00
Super Silt Fence	4229	LF	$12		$50,748.00
Safety Fence (Orange Plastic)	7676	LF	$3		$23,028.00
Tree Protection	5011	LF	$3		$15,033.00
Diversion Dike	607	LF	$4		$2,428.00
Sediment Trap		EA	$2,000		$0.00
Sediment Basin		See Itemized Cost Below			
Excavation		CY	$20		$0.00
48" Riser Structure	11.50	LF	$1,000		$11,500.00
30" RCP Outfall	60.00	LF	$110		$6,600.00
Trash Rack	1.00	EA	$1,500		$1,500.00
30" EW-1	1.00	EA	$2,100		$2,100.00
Rip Rap	7.00	SY	$50		$350.00
Stream Diversion		Provide Itemized Cost			$0.00
Utility Stream Crossing		Provide Itemized Cost			$0.00
Paved Flume		SY	$70		$0.00
Outlet Protection - Concrete		EA	$300		$0.00
Outlet Protection - Grouted rip rap		EA	$350		$0.00
Outlet Protection - Non-grouted rip rap		EA	$200		$0.00
Storm Drain Inlet Protection	6	EA	$180		$1,080.00
Culvert Inlet Protection	16	EA	$300		$4,800.00
Rip Rap	201.00	SY	$50		$10,050.00
Grouted rip rap		SY	$70		$0.00
Check dams	30.00	EA	$200		$6,000.00
Temp. Level Spreader		EA	$1,500		$0.00
Permanent Seeding	95350	SY	$2		$190,700.00
Jute mesh	20314.00	SY	$2		$40,628.00
EC-1		SY	$6		$0.00
EC-2 (non-perm, ditch lining, egg, jute mesh)	656.00	SY	$8		$5,248.00
EC-3 (permanent ditch lining)	256.00	SY	$7		$1,792.00
Sodding		SY	$9		$0.00
Gabion Revetment		CY	$170		$0.00
Other					$0.00
Rip Rap					
Dry, Class I, 18"		SY	$50		$0.00
Dry, Class II,18"		SY	$50		$0.00
Grouted, Class I 18"		SY	$70		$0.00
Sodded Ditch					
Sodded Ditch (Includes lining)		SY	$10		$0.00
				Subtotal	**$386,560.00**
				E&S Maintenance (35%)	**$135,296.00**
				E&S Total	**$920,686.00**
SWM/BMP					
Non-Proprietary BMP (Engineer Estimate for all SWM)		Provide Itemized Cost			$0.00
Bioretention Basin	4262.00	SF	$18		$76,716.00
Level Spreader	1.00	EA	$1,500		$1,500.00
PG-5 Paved Ditch		SY	$60		$0.00
Grass Swale		Provide Itemized Cost			$0.00
Impermeable Pond Lining (Earthen, 12" Depth)	1255.00	SY	$10		$12,550.00
8" PVC	30.00	LF	$40		$1,200.00
12" RCP	16.00	LF	$50		$800.00
12" EW-1	1.00	EA	$900		$900.00
Excavation					
Cut & Work In-Place	5390.00	CY	$20		$107,800.00
Cut & Spoil Onsite		CY	$30		$0.00
Access Road		Provide Itemized Cost			$0.00
6" 21A	80.00	TON	$25		$2,000.00
2" SM 9.5A	27.00	TON	$90		$2,430.00
Aquatic Bench Plugs	3537	EA	$2		$7,074.00
Aquatic Bench Seed Mix	7.00	LB	$100		$700.00
FEMA Processing LOMR/CLOMR		EA	$7,600		$0.00
Gabion Revetment	36.00	CY	$170		$6,120.00
As-Built Certification	1.00	EA	$9,500		$9,500.00
				Subtotal	**$229,290.00**
Roadway/Parking Lot/Alleyways					
Shoulders Type I - Aggregate (SY*IN Depth)	11252.00	SY/Inch Depth	$3		$33,756.00
Subbase - Aggregate (21A/21B) (SY*IN Depth)	60833.00	SY/Inch Depth	$6		$364,998.00
Base Asphalt - BM-25.0 Base Course (SY*IN Depth)	30417.00	SY/Inch Depth	$7		$212,919.00
Surface Asphalt - SM-9.5A (SY*IN Depth)	15208.00	SY/Inch Depth	$20		$304,160.00
Road Stabilization (Stone)		Provide Itemized Cost			$0.00
Road Stabilization (Fabric)		Provide Itemized Cost			$0.00
Concrete Curb & Gutter (CG-6/CG-7)		LF	$25		$0.00
Head Curb (CG-2/CG3)		LF	$20		$0.00
Curb Ramp CG-12		EA	$650		$0.00
Sidewalk (Concrete)		SY	$50		$0.00
Driveway Culvert (15" Min. Size)	12.00	EA	$500		$6,000.00
Driveway Apron		EA	$1,500		$0.00
Guardrail		LF	$40		$0.00
Street Name Sign	4.00	EA	$500		$2,000.00
Traffic Control Sign (Stop, HC, Speed, Etc.)	34.00	EA	$200		$6,800.00
Striping 4" width (VDOT Type B)		LF	$2		$0.00
Concrete Wheel Stops		EA	$70		$0.00
Street Lighting		EA	$5,000		$0.00
Traffic Barricade		EA	$1,500		$0.00

Underdrains					
UD-1		LF	$16		$0.00
UD-2		LF	$18		$0.00
UD-3		LF	$19		$0.00
UD-4		LF	$21		$0.00
CD-1/2	309.00	LF	$21		$6,489.00
Complete Street Acceptance Package	1.00	EA	$8,000		$8,000.00
Video Inspection ROW Storm	684.00	LF	$10		$6,840.00
Other		Provide Itemized Cost			$0.00
				Subtotal	**$951,962.00**
Surveying					
Steel Pipe Property Corner Marker Included in Survey	25.00	LOT	$180		$4,500.00
				Subtotal	**$4,500.00**
Storm Drain Structures					
Drop Inlets					
Cast in Place - 48"					
DI-1 12"-24" Pipe		EA	$3,700		$0.00
DI-1A 12"-24" Pipe		EA	$5,600		$0.00
DI-2 12"-24" Pipe		EA	$7,000		$0.00
DI-2A 12"-24" Pipe		EA	$8,800		$0.00
Precast - 48"					
DI-1APC 12"-24" Pipe		EA	$3,000		$0.00
DI-1PC 12"-24" Pipe		EA	$3,000		$0.00
DI-2APC 12"-24" Pipe		EA	$5,200		$0.00
Curb Drop Inlets					
DI-3A 12"-30" Pipe		EA	$4,800		$0.00
DI-3AA 12"-30" Pipe 2'-6" Length		EA	$5,400		$0.00
DI-3B & DI-12 12"-30" Pipe					
Inlet Length					
4'		EA	$5,300		$0.00
6'		EA	$5,600		$0.00
8'		EA	$4,900		$0.00
10'		EA	$5,100		$0.00
12'		EA	$4,300		$0.00
16'		EA	$5,500		$0.00
20'		EA	$5,800		$0.00
DI-3BB 12"-30" Pipe					
Inlet Length					
4'		EA	$4,200		$0.00
6'		EA	$4,900		$0.00
8'		EA	$5,500		$0.00
10'		EA	$5,800		$0.00
12'		EA	$6,000		$0.00
16'		EA	$6,300		$0.00
20'		EA	$6,600		$0.00
DI-3C 12"-30" Pipe					
Inlet Length					
6'		EA	$4,000		$0.00
8'		EA	$4,600		$0.00
10'		EA	$4,900		$0.00
12'		EA	$5,200		$0.00
16'		EA	$5,800		$0.00
20'		EA	$6,400		$0.00
DI-3CC 12"-30" Pipe					
Inlet Length					
6'		EA	$4,800		$0.00
8'		EA	$5,300		$0.00
10'		EA	$5,700		$0.00
12'		EA	$6,000		$0.00
16'		EA	$6,800		$0.00
20'		EA	$7,500		$0.00
DI-3D 12"-30" Pipe					
Inlet Length					
2'-6' Length		EA	$3,700		$0.00
DI-3DD 12"-30" Pipe					
Inlet Length					
2'-6'		EA	$4,400		$0.00
DI-3E 12"-30" Pipe					
Inlet Length					
4'		EA	$4,100		$0.00
8'		EA	$4,800		$0.00
10'		EA	$4,800		$0.00
12'		EA	$4,900		$0.00
16'		EA	$6,100		$0.00
20'		EA	$6,700		$0.00
DI-3EE 12"-30" Pipe					
Inlet Length					
6'		EA	$7,600		$0.00
8'		EA	$7,900		$0.00
10'		EA	$8,000		$0.00
12'		EA	$8,200		$0.00
16'		EA	$8,500		$0.00
20'		EA	$8,800		$0.00
DI-3F 12"-30" Pipe					
Inlet Length					
6'		EA	$3,800		$0.00
8'		EA	$4,500		$0.00
10'		EA	$4,800		$0.00
12'		EA	$5,100		$0.00
16'		EA	$5,800		$0.00
20'		EA	$6,400		$0.00
DI-3FF 12"-30" Pipe					
Inlet Length					
6'		EA	$8,100		$0.00
8'		EA	$8,300		$0.00
10'		EA	$8,500		$0.00
12'		EA	$8,700		$0.00
16'		EA	$9,100		$0.00
20'		EA	$9,500		$0.00
DI-4A 36"-48" Pipe					
Inlet Length					
4'		EA	$4,900		$0.00
DI-4B 36"-48" Pipe					
Inlet Length					
6'		EA	$6,900		$0.00
8'		EA	$5,500		$0.00
10'		EA	$5,700		$0.00
12'		EA	$5,900		$0.00
16'		EA	$6,300		$0.00
20'		EA	$6,600		$0.00
DI-4BB 36"-48" Pipe					
Inlet Length					
6'		EA	$10,300		$0.00
8'		EA	$10,700		$0.00
10'		EA	$10,900		$0.00
12'		EA	$11,000		$0.00
16'		EA	$11,400		$0.00
20'		EA	$11,700		$0.00

DI-4C 36"-48" Pipe					
Inlet Length					
8'		EA	$5,700		$0.00
10'		EA	$5,800		$0.00
12'		EA	$6,000		$0.00
16'		EA	$6,400		$0.00
20'		EA	$6,700		$0.00
DI-4CC 36"-48" Pipe					
Inlet Length					
8'		EA	$13,400		$0.00
10'		EA	$13,700		$0.00
12'		EA	$14,100		$0.00
16'		EA	$14,800		$0.00
20'		EA	$15,400		$0.00
DI-4D 36"-48" Pipe					
Inlet Length					
4'		EA	$5,000		$0.00
DI-4DD 36"-48" Pipe					
Inlet Length					
4'		EA	$9,500		$0.00
DI-4E 36"-48" Pipe					
Inlet Length					
6'		EA	$5,300		$0.00
8'		EA	$5,700		$0.00
10'		EA	$5,900		$0.00
12'		EA	$6,300		$0.00
16'		EA	$7,000		$0.00
20'		EA	$7,700		$0.00
DI-4EE 36"-48" Pipe					
Inlet Length					
6'		EA	$9,200		$0.00
8'		EA	$9,500		$0.00
10'		EA	$9,900		$0.00
12'		EA	$10,200		$0.00
16'		EA	$10,900		$0.00
20'		EA	$11,500		$0.00
DI-4F 36"-48" Pipe					
Inlet Length					
8'		EA	$5,900		$0.00
10'		EA	$6,300		$0.00
12'		EA	$6,600		$0.00
16'		EA	$7,300		$0.00
20'		EA	$8,000		$0.00
DI-4FF 36"-48" Pipe					
Inlet Length					
8'		EA	$8,900		$0.00
10'		EA	$9,200		$0.00
12'		EA	$9,500		$0.00
16'		EA	$10,000		$0.00
20'		EA	$10,600		$0.00
DI-5	2.00	EA	$5,300		$10,600.00
DI-7	4.00	EA	$5,800		$23,200.00
YI-1		EA	$4,800		$0.00
YI-2		EA	$4,900		$0.00
Manhole (Up to 6' Depth)	3.00	EA	$3,000		$9,000.00
JB-1 (Concrete)		EA	$5,900		$0.00
Culverts					
Single Box Culverts					
4' x 4'		LF	$340		$0.00
5' x 5'		LF	$410		$0.00
6' x 6'		LF	$500		$0.00
8' x 8'		LF	$700		$0.00
10' x 10'		LF	$900		$0.00
Double Box Culverts					
4' x 4'		LF	$600		$0.00
5' x 5'		LF	$700		$0.00
6' x 6'		LF	$900		$0.00
8' x 8'		LF	$1,200		$0.00
10' x 10'		LF	$1,500		$0.00
Oversized Single Box Culvert					
12' x 6'		LF	$1,100		$0.00
12' x 8'		LF	$1,200		$0.00
12' x 10'		LF	$1,300		$0.00
12' x 12'		LF	$1,400		$0.00
Triple Box Culvert					
4' x 4'		LF	$900		$0.00
5' x 5'		LF	$1,000		$0.00
6' x 6'		LF	$1,300		$0.00
8' x 8'		LF	$1,700		$0.00
10' x 10'		LF	$2,500		$0.00
Pipes					
Concrete Pipe (RCP)					
12"		LF	$50		$0.00
15"	435.00	LF	$60		$26,100.00
18"	273.00	LF	$70		$19,110.00
21"		LF	$80		$0.00
24"	412.00	LF	$90		$37,080.00
27"		LF	$100		$0.00
30"		LF	$110		$0.00
33"		LF	$120		$0.00
36"		LF	$130		$0.00
42"		LF	$140		$0.00
48"		LF	$160		$0.00
54"		LF	$170		$0.00
60"		LF	$230		$0.00
66"		LF	$260		$0.00
72"		LF	$300		$0.00
Corrugated Metal Pipe (CMP)					
12"		LF	$30		$0.00
15"		LF	$40		$0.00
18"		LF	$50		$0.00
24"		LF	$60		$0.00
30"		LF	$70		$0.00
36"		LF	$90		$0.00
42"		LF	$100		$0.00
48"		LF	$120		$0.00
54"		LF	$130		$0.00
60"		LF	$150		$0.00

High Density Polyethylene (HDPE)					
12"		LF	$30		$0.00
15"		LF	$40		$0.00
18"		LF	$60		$0.00
24"		LF	$70		$0.00
30"		LF	$80		$0.00
36"		LF	$90		$0.00
42"		LF	$100		$0.00
48"		LF	$120		$0.00
60"		LF	$150		$0.00
End Walls					
12"		EA	$900		$0.00
15"		EA	$1,100		$0.00
18"		EA	$1,300		$0.00
21"		EA	$1,500		$0.00
24"	1.00	EA	$1,700		$1,700.00
27"		EA	$1,900		$0.00
30"		EA	$2,100		$0.00
33"		EA	$2,300		$0.00
37"		EA	$2,500		$0.00
42"		EA	$2,700		$0.00
48"		EA	$2,800		$0.00
54"		EA	$3,200		$0.00
60"		EA	$3,800		$0.00
66"		EA	$4,200		$0.00
72"		EA	$4,700		$0.00
Other		Provide Itemized Cost			$0.00
End Sections (ES-1)					
12"		EA	$530		$0.00
15"	1.00	EA	$550		$550.00
18"	5.00	EA	$600		$3,000.00
21"		EA	$650		$0.00
24"	6.00	EA	$750		$4,500.00
27"		EA	$1,100		$0.00
30"		EA	$1,200		$0.00
33"		EA	$1,800		$0.00
36"		EA	$1,900		$0.00
Other		Provide Itemized Cost			$0.00
End Sections (ES-2)					
15"		EA	$350		$0.00
18"		EA	$400		$0.00
24"		EA	$450		$0.00
30"		EA	$600		$0.00
36"		EA	$1,000		$0.00
42"		EA	$1,200		$0.00
48"		EA	$1,500		$0.00
Other		Provide Itemized Cost			$0.00
				Subtotal	**$134,840.00**
Landscaping					
Canopy Tree	143.00	EA	$450		$64,350.00
Understory Tree		EA	$400		$0.00
Shrubs		EA	$60		$0.00
Other		Provide Itemized Cost			$0.00
Fencing					
Chain Link Fence		LF	$16		$0.00
Board Fence (6' Privacy)		LF	$18		$0.00
Other		Provide Itemized Cost			$0.00
Tot Lots					
Tot Lots		Provide Itemized Cost			$0.00
Baseball/Softball Fields					
Baseball Field (to include infield, backstop, fencing, bleachers)		Provide Itemized Cost			$0.00
Softball In-field		Provide Itemized Cost			$0.00
Courts					
Multi-Use Court & Equipment		Provide Itemized Cost			$0.00
Tennis Courts (2)		Provide Itemized Cost			$0.00
Tennis Practice Court and Wall		Provide Itemized Cost			$0.00
Soccer Fields					
Seeded Field		Provide Itemized Cost			$0.00
Sodded Field		Provide Itemized Cost			$0.00
Swimming Pool					
Community		Provide Itemized Cost			$0.00
School (Olympic)		Provide Itemized Cost			$0.00
Trails					
Bituminous Trail 6' to 10' Wide		SY	$50		$0.00
Metal Ballard's		EA	$800		$0.00
Pedestrian Bridges		Provide Itemized Cost			$0.00
Other					
		Provide Itemized Cost			$0.00
				Subtotal	**$64,350.00**
				Total	**$2,305,628.00**
				10% Admin & Contingency	**$230,562.80**
				Grand total	**$2,536,190.80**
				SAY	**$2,536,191**

*For the purpose of determining Erosion and Sediment Control bond amounts, the line items of mobilization, and clearing and grubbing under Site Works shall be included along with the applicable line items under Erosion and Sediment Control.

Land Disturbing Permit Fee (Maximum $25,000) $25,000.00

Bowman

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Fredericksburg, Virginia 22401
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BOND ESTIMATE
TIFFANY ESTATES
CONSTRUCTION PLAN
CENTER MAGISTERIAL DISTRICT
FAUQUIER COUNTY, VIRGINIA

CONP-23-019202
COUNTY PROJECT NUMBER

COMMONWEALTH OF VIRGINIA
WILLIAM E. DUNCANSON JR
Lic. No.055205
11/22/24
PROFESSIONAL ENGINEER

PLAN STATUS	
02/10/23	MSR SUBMISSION
03/14/23	2nd MSR SUBMISSION
12/29/23	3rd MSR SUBMISSION
03/15/24	1st SUBMISSION
11/22/24	2nd SUBMISSION

DATE	DESCRIPTION

WED DESIGN	WED DRAWN	WED CHKD

SCALE H: 1"=50' V: 1"=5'

JOB No. 6642-02-002

DATE : FEBRUARY 10, 2023

FILE No. 6642-D-CP-001

SHEET 56 OF 58

Cad file name : P:\006642 - Tiffany Estates\006642-02-002 (ENG)\Engineering\Engineering Plans\6642-D-CP-001\056-6642-D-CP-001-BOND.dwg

SCE SOIL CONSULTANTS ENGINEERING
CONSULTING ENGINEERS · BUILDING OFFICIALS
CONSTRUCTION PROFESSIONALS · SOIL SCIENTISTS & GEOLOGISTS

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT

FOR:

TIFFANY ESTATES SWM POND AND BIORETENTION BASIN
7287 BLACKWELL ROAD AND TAX PIN: 6981-34-0470-000
HIDDEN HOLLOW LANE, WARRENTON,
FAUQUIER COUNTY, VIRGINIA 20187

SCE PROJECT NO: 23-0086V

APRIL 12th, 2023

PREPARED FOR: **Mr. Jeff Hughes**
Maronda Homes
13050 Ford Road
Catharpin, VA 20143

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APPENDICES:
SITE VICINITY MAP
SOIL MAP
TEST PIT LOCATION PLAN
LOG OF TEST PITS WITH KEY TO TERMS AND SYMBOLS
LABORATORY TEST RESULTS

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AUTHORIZATION

Mr. Jeff Hughes is planning to develop a Storm Water Management (SWM) Pond and Bioretention Basin at Tiffany Estates located along Hidden Hollow Lane in Warrenton, Fauquier County, Virginia 20187. The site sits on two properties. The address and Tax Parcel Identification Number for these properties are 7287 Blackwell Road and 6985-60-5718-000, respectively. Previously, Mr. Hughes from Maronda Homes, authorized Soil Consultants Engineering, LLC. (SCE) to perform a subsurface exploration and prepare a geotechnical engineering report for the proposed project. This report summarizes the results of the subsurface exploration and the geotechnical engineering study. It specifically addresses the following topics:

- Scope of services and procedures used during this investigation.
- Site description.
- Brief review of published geologic and soil mapping.
- Observed subsurface conditions, including soil stratigraphy, and depths to groundwater.
- Our evaluation of the effects of the observed subsurface conditions on the proposed construction.
- Recommendations for:
  - Earthwork Specifications
  - SWM Facilities
  - Site drainage

Mr. Jeff Hughes provided SCE with a copy of the Grading Plan, drafted by Bowman Consulting Group Ltd., plan dated February 10th, 2023. A portion of the plan has been reproduced as our "**Test Pit Location Plan**" enclosed in the appendix of this report.

SITE DESCRIPTION AND PROPOSED PROJECT

The address and Tax Parcel Identification Number for the proposed properties are 7287 Blackwell Road and 6985-60-5718-000, respectively. The site is located along Hidden Hollow Lane, Warrenton, Fauquier County, Virginia 20187. For the details, please refer to the appended "**Site Vicinity Map**."

The site is currently partially developed with existing abandoned buildings, overgrown road, wetlands, and extensive woodlands. The site slopes from north to south, with elevations ranging from 540 to 440 feet.

The project includes the construction of a Storm Water Management (SWM) Pond and Bioretention Basin.

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SOIL MAPPING AND GEOLOGY

According to the *"Virginia Division of Mineral Resources, 1993, Geologic Map of Virginia: Virginia Division of Mineral Resources,"* the site is mapped as the **Catoctin Formation – Metabasalt (Zc).**

The **Catoctin Formation – Metabasalt (Zc)** is described by the USGS as: fine-grained, grayish-green to dark-yellowish-green, schistose chlorite- and actinolite-bearing metabasalt. This unit is volcanoclastic rocks interbedded with basaltic flows.

According to the Natural Resource Conservation Service (NRCS), the soils on this site are mapped as the ***Middleburg loam (17B)***, the ***Myersville silt loam (40D)***, the ***Fauquier silt loam (45B)***, and the ***Fauquier silt loam (45C)***.

The ***Middleburg loam (17B)*** is a well-drained soil with slopes of 2 to 7 percent. The parent material is composed of alluvium and/or colluvium derived from igneous and metamorphic rock. A typical soil profile consists of loam from 0 to 9 inches, silty clay loam from 9 to 48 inches, and silt loam from 48 to 61 inches. The typical depth to restrictive features is more than 80 inches, and depth to water table is more than 80 inches.

The ***Myersville silt loam (40D)*** is a well-drained soil with slopes of 15 to 25 percent. The parent material is composed of residuum weathered from greenstone. A typical soil profile consists of silt loam from 0 to 8 inches, silty clay loam from 8 to 43 inches, silt loam from 43 to 55 inches, and bedrock from 55 to 71 inches. The typical depth to restrictive features is 40 to 60 inches to paralithic bedrock, and depth to water table is more than 80 inches.

The ***Fauquier silt loam (45B)*** is a well-drained soil with slopes of 2 to 7 percent. The parent material is composed of residuum weathered from greenstone. A typical soil profile consists of silt loam from 0 to 6 inches, clay from 6 to 36 inches, and silt loam from 36 to 60 inches. The typical depth to restrictive features is more than 80 inches, and depth to water table is more than 80 inches.

The ***Fauquier silt loam (45C)*** is a well-drained soil with slopes of 7 to 15 percent. The parent material is composed of residuum weathered from greenstone. A typical soil profile consists of silt loam from 0 to 6 inches, clay from 6 to 36 inches, and silt loam from 36 to 60 inches. The typical depth to restrictive features is more than 80 inches, and depth to water table is more than 80 inches.

The mean annual precipitation of these soils is about 34 to 46 inches, and the mean annual air temperature is 43 to 66 degrees Fahrenheit.

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SCOPE OF SERVICE

Soil Consultants personnel explored the subsurface conditions at the site by advancing six (6) test pits, (TP-1 to TP-6) total on the lot, with two (2) test pits (TP-1 and TP-2) within the footprint of the proposed bioretention basin, and four (4) test pits (TP-3 through TP-6) within the footprint of the proposed wet pond.

SCE personal selected the locations and the number of test pits based on a review of the site plan and estimated the location of the test pits in the field by using existing site features. The test pits were excavated by Venture 1, LLC using a John Deere 410E (TP-1 to TP-4) and John Deere 35D Excavator (TP-5 and TP-6).

A Soil Consultants geologist observed and visually identified the excavated soils per ASTM D-2488 procedures. The geologist prepared field logs that described the depth and identity of the observed materials, logged all recovered soil samples, and observed groundwater conditions.

SCE laboratory performed four (4) classification tests on representative soil samples in accordance with ASTM D-2487 and six (6) natural moisture tests in accordance with ASTM D-2216.

The approximate test pit locations are shown on a copy of the site plan entitled "**Test Pit Location Plan**," which is presented as an appendix of this report.

OBSERVED SUBSURFACE CONDITIONS

In TP-1, an approximately 6-inch organic surface layer was encountered. From 0.5 to 3.1 feet, a firm, brownish-red, Sandy SILT (ML), few organics was encountered. This layer was deemed natural. From 3.1 to 4.3 feet, a firm, brownish-red, Sandy Lean CLAY (CL), little gravel, few cobbles was encountered. From 4.3 to 5.6 feet, a medium dense to dense, brownish-yellow, Silty GRAVEL (GM) some sand, few cobbles was encountered. Bucket refusal on weathered bedrock was encountered at 5.6 feet. Soil bearing capacity was measured to be 1500 psf at 1.0, 2.0, 3.0, and 4.0 feet, 2000 psf at 5.0 feet, and 2500 psf at 5.6 feet.

In TP-2, an approximately 5-inch organic surface layer was encountered. From 0.4 to 2.9 feet, a firm, brownish-red, Sandy SILT (ML), few organics was encountered. This layer was deemed natural. From 2.9 to 5.5 feet, a medium dense, brownish-red, Clayey SAND (SC), little gravel was encountered. From 5.5 to 6.8 feet, a stiff to very stiff, yellowish-red, Sandy ELASTIC SILT (MH) was encountered. Bucket refusal on weathered bedrock was encountered at 6.8 feet. Soil bearing capacity was measured to be 1500 psf at 2.0 feet, 2000 psf at 4.0 and 6.0 feet, and 2500 psf at 6.8 feet.

In TP-3, an approximately 3-inch organic surface layer was encountered. From 0.2 to 1.9 feet, a firm, yellowish-brown, Sandy SILT (ML), trace organics, trace mica was encountered. This layer was deemed natural. From 1.9 to 4.2 feet, a firm to stiff, brownish-red, Lean CLAY (CL), trace mica, some sand was encountered. From 4.2 to 8.9 feet, a medium dense to dense, grayish-brown, Silty SAND (SM), few mica was encountered. Bucket refusal on weathered bedrock was encountered at 8.9 feet. Soil bearing capacity was measured to be 1500 psf at 2.0 and 4.0 feet, 2000 psf at 6.0 and 8.0 feet, and 2500 psf at 8.9 feet.

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In TP-4, an approximately 3-inch organic surface layer was encountered. From 0.2 to 2.1 feet, a firm, brownish-red, Sandy SILT (ML), trace organics was encountered. This layer was deemed natural. From 2.1 to 4.9 feet, a stiff, reddish-brown, Sandy SILT (ML), trace gravel was encountered. From 4.9 to 6.5 feet, a stiff, grayish-brown, Sandy SILT (ML), trace mica was encountered. Soil bearing capacity was measured to be 1500 psf at 2.0 feet, and 2000 psf at 4.0 and 6.0 feet.

In TP-5, an approximately 6-inch organic surface layer was encountered. From 0.5 to 1.5 feet, a firm, yellowish-brown, Lean CLAY (CL), trace organics was encountered. This layer was deemed natural. From 1.5 to 8.9 feet, a medium dense, yellowish-brown, Silty SAND (SM) with gravel was encountered. Soil bearing capacity was measured to be 1500 psf at 1.0 foot and 2000 psf at 3.0, 5.0, and 7.0 feet.

In TP-6, an approximately 6-inch organic surface layer was encountered. From 0.5 to 8 feet, a firm, yellowish-brown, Silty SILT (ML), few mica was encountered. This layer was deemed natural. Soil bearing capacity was measured to be 1500 psf at 2.0 feet and 2000 psf at 4.0, 6.0, and 8.0 feet.

Mottling, an indication of high seasonal water table, was not encountered during subsurface exploration. Groundwater was encountered in TP-5 at 7.9 feet at time of excavation and 3.0 feet at end of excavation, and in TP-6 at 8.0 feet at end of excavation.

Table of Soil Classification Results

Boring No.	Depth (feet)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Gravel %	Sand %	% <200 Sieve	Classification	Water Content (%)
TP-2	6.5	67	49	18	3.5	44.2	52.3	MH	31.5
TP-3	6.5	-	-	-	-	-	-	-	22.3
TP-3	8.0	37	NP	NP	0	63.7	36.3	SM	20.9
TP-4	4.5	46	32	14	13.5	21.7	64.8	ML	27.1
TP-5	7.5	35	NP	NP	15.8	57.8	26.4	SM	26.6
TP-6	7.8	-	-	-	-	-	-	-	41.6

EVALUATION

While the site may be developed as proposed, there are some conditions which merit special attention in engineering analysis, design, and construction.

Organic Soils and Surface Layer

An organic surface layer was encountered in all six (6) test pits to depths between 0.2 to 0.6 feet. An organic surface layer may be encountered in other areas of the site. Organic surface layers, the underlying soils (when containing organic matter), and any soft or excessively wet or disturbed soils are unsuitable as subgrade materials for building foundations, pavements, and slabs-on-grade, and for areas to receive compacted, controlled fill. Such unsuitable soils should be removed from all building and pavement areas, areas to receive fill.

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These near surface soils can become soft or excessively wet due to construction traffic, and wet weather, especially next to or within low-lying areas and swales. Near trees the depth of organic materials may be deeper than observed in the test pit locations.

Any undercutting below finished subgrades should be replaced with compacted, controlled fill. The amount of required undercutting depends to a large extent on the weather conditions and the time of the year during which the earthwork operations are done.

Extra undercutting due to soft or excessively wet soils will be required if earthwork is done during a wet period, and less undercutting will be required during a dry period.

Please note the information in our report and on our test pit logs may not be sufficient for earthwork take-off and estimates.

High Seasonal Water Table

Groundwater was encountered in TP-5 at 7.9 feet at time of excavation and 3.0 feet at end of excavation, and in TP-6 at 8.0 feet at end of excavation. Mottling, an indication of high seasonal water table, was not encountered during subsurface exploration. Groundwater and mottling may exist in other areas that were not explored. The site grading must ensure that surface water is carried away from any structure.

During construction, the groundwater must be maintained at least 2 feet below the bottom of an excavation. If water is allowed to enter an excavation, the bottom of the excavation can heave, and the sides of the excavation can become unstable.

If it becomes obvious that groundwater is within 2 feet of the bottom of an excavation, all construction activities must cease until the groundwater can be lowered accordingly.

The geotechnical engineer or the engineer's qualified representative shall observe the groundwater level before the resumption of construction activities. The contractor shall be responsible for the ways and means of dewatering.

Expansive Soils

SCE encountered expansive (i.e. shrink-swell) soils in TP-2 between 5.5 to 6.8 feet. Expansive soils may exist in areas that were not explored. Regarding such soils, Fauquier County has issued the following:

A. Expansive soil is defined by the International Building Code and the International Residential Code as:

"Soils meeting all four of the following provisions shall be considered expansive, except that tests to show compliance with Items 1, 2 and 3 shall not be required if the test prescribed in Item 4 is conducted:

1. Plasticity Index (PI) of 15 or greater determined in accordance with ASTM D 4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (0.75 µm), determined in accordance with ASTM D 422.

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3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422.
4. Expansion Index greater than 20, determined in accordance with ASTM D 4829."

B. Plastic Index Corrected

$$PI_{cor} = PI \times \frac{\text{(\% Passing No. 40 Sieve)}}{100}$$

C. Expansive Index Corrected

$$EI_{cor} = EI \times \frac{\text{(\% Passing No. 4 Sieve)}}{100}$$

D. Liquid Limit – The water content corresponding to the behavior change between the liquid and plastic state of silt or clay soil, determined in accordance with ASTM D 4318.

Policy

If the Plasticity Index of the soil is 20 or less (e.g. PI <= 20) and the Liquid Limit is 45 or less (e.g. LL <= 45), the Plasticity Index Corrected (PI_{cor}) or the Expansion Index Corrected (EI_{cor}) may be substituted in the definition of Expansive Soil.

In support of this policy, Fauquier County has defined unacceptably expansive soils beneath structures as those with Liquid Limits and Plasticity Indexes greater than 40 and 15, respectively.

Beneath roadways and pavements, unacceptably expansive soils are those with Liquid Limits and Plasticity Indexes equal to or greater than 40 and 15, respectively.

This includes not only PLASTIC CLAY (CH) soil and ELASTIC SILT (MH) but also some Lean CLAY (CL) and SILT (ML). By these definitions, some tested soil at this site is acceptable for use under pavements or structures.

If expansive soils are observed within 2 vertical feet of structure subgrade, they must be removed to a depth of at least 2 feet below the design subgrade and replaced with suitable compacted, engineered fill.

If expansive soils are observed at the design foundation bearing elevation, the footings for the proposed structures should extend through the expansive soils to bear on the underlying stiff or dense non-expansive soils. Alternatively, the foundations may rest on these expansive soils at a depth of at least 4 feet below the final exterior grades. This places the bearing elevation below the zone of normal seasonal moisture change.

If this alternative is selected, the foundation may be constructed at the under-cut depth or the undercut may be backfilled to design footing bearing elevation with lean concrete, so-called "flowable fill."

There must be at least 3 feet of non-expansive backfill between foundation walls and the expansive soils exposed in the sidewalls of the excavation. It is likely when the excavation below grade is completed, the foundations may be below the potential shrink / swell soils.

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Existing Fill

Uncontrolled/existing fill was not encountered during subsurface exploration. Existing fill may be found in unexplored areas of the site. Such unsuitable soils should be removed from all foundation, and pavement areas, and other areas to receive fill, including the required offsets.

Any undercutting below finished subgrades should be replaced with compacted, controlled fill, except foundations may rest on non-expansive soils with adequate bearing capacity when footings are extended to more than 4 feet (per County regulations) below exterior grade.

Use of On-Site Soils for Fill

Controlled, compacted soil fill should consist of material that is free from trash, organic materials, clay lumps, stones larger than 3 inches (except as noted below), and other deleterious material.

The fill should consist of Sandy SILT (ML) or more granular material (not including "clean sands or gravels," i.e. SP, SW, GP, or GW) with a Liquid Limit less than 40 and a Plastic Limit less than 15.

Some observed soils are not suitable for structural fills or wall backfill. Soil Consultants suggests that laboratory classification, moisture density relationship, and moisture content tests should be performed on potential fill materials before construction to verify their suitability.

Shallow Depth to Bedrock

Bucket refusal on weathered bedrock was encountered in TP-1, TP-2, and TP-3 at 5.6, 6.8, and 8.9 feet, respectively, below surface elevation. Groundwater tends to pond around foundations that are excavated into bedrock. The pit used for the foundation acts as a bowl due to the impermeability of the bedrock. Therefore, it will be essential to provide adequate, dependable drainage for this development.

Use of Rock Excavating Techniques

The backhoe could excavate to depths as shallow as 5.0 to 9.0 feet below the existing grades. While larger track-hoes will be able to excavate deeper, it is probable that rock excavation techniques will be required in some of the road and utility cuts. Standard blasting techniques may yield rock fragments that are too large for use as fill without being crushed.

In order to attain blast spoils that meet the criteria for fill or rock fill, the contractor may wish to consider a closer spaced blasting charge pattern and/or having a rock crusher on-site. Blasting shall not be performed within any proposed SWM facility.

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Stormwater Management (SWM) Facility

The storm water management concept is proposed to meet the county required storm water management goals via a Bioretention Basin, and via a Wet Pond in the vicinity of the existing pond, within the footprint of the newly proposed Wet Pond. Test pits TP-1 and TP-2 were excavated within the footprint of the proposed Bioretention Basin, and test pits TP-3 to TP-6 were excavated within the footprint of the Wet Pond. The Bioretention Basin has a designed bottom elevation of 507.50 feet, and a top (surface) elevation of 512.00 feet. The Wet Pond has a designed bottom elevation of 438.00 feet, a top-of-pond elevation of 442.20 feet, and a top of dam elevation of 448.00 and 470.00 at Nicolas Way. 1-Year WSE of 442.20, 10-Year WSE of 444.57, and 100-Year WSE of 445.99.

The soils observed below the ground surface were firm, Sandy SILT (ML), SILT (ML) and Lean CLAY (CL), over firm to stiff, Sandy SILT (ML), SILT (ML) and Sandy Lean CLAY (CL), sitting on top of medium dense to dense, Silty SAND (SM) and Silty GRAVEL (GM), and stiff to very stiff, Sandy ELASTIC SILT (MH).

Most of the bedding subgrade should be in Sandy SILT (ML) over Silty SAND (SM), Silty GRAVEL (GM) and Sandy SILT (ML). During construction, the SWM Facility subgrade soils shall be carefully examined. If any plastic, soft, loose, or wet soils are observed, these materials shall be removed and replaced with compacted controlled fill as directed by the geotechnical engineer or his qualified representative.

Details for a Bioretention Basin and Wet Pond design and construction are provided in the "**Geotechnical Requirements**" below.

SEISMIC CLASSIFICATION AND OSHA SOIL TYPE

It is SCE's opinion that the soil conditions at this site can be categorized as Site Class D per the ASCE/SEI Standard 7-16 and the 2018 International Building Code. This categorization is based on the near surface test pit results, general geologic information for the region, and the information contained in the ASCE/SEI Standard 7-16 and IBC 2018 codes. The onsite soils are classified as OSHA Type "B."

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GEOTECHNICAL REQUIREMENTS

TIFFANY ESTATES SWM POND AND BIORETENTION BASIN
7287 BLACKWELL ROAD AND TAX PIN: 6981-34-0470-000
HIDDEN HOLLOW LANE, WARRENTON
FAUQUIER COUNTY, VIRGINIA
APRIL 12TH, 2023
PROJECT NUMBER: 23-0086V

BY SOIL CONSULTANTS ENGINEERING, LLC.
9303 CENTER STREET, MANASSAS, VIRGINIA
PHONE NUMBER: 703-366-3000
FACSIMILIE NUMBER: 703-366-3400

The following recommendations pertain to the geotechnical aspects of the design and construction of a Storm Water Management (SWM) Pond and Bioretention Basin. The address and Tax Parcel Identification Number for these site properties are 7287 Blackwell Road and 6985-60-5718-000, respectively. The site is located along Hidden Hollow Lane, in Warrenton, Fauquier County, Virginia 20187.

1. Earthwork

a. Site Preparation

Before the start of any other construction, all unsuitable materials shall be removed from all subgrades including offsets as defined below.

Unsuitable material includes but is not limited to: uncontrolled fill; vegetation; topsoil; organic soils; soil mixed with excessive amounts of roots or other deleterious materials; soft, very wet, and loose soils; and any building remains, including foundations and slabs, existing utility lines, pavements, debris, septic tanks and drain fields and backfill soil. Holes formed by the removal of trees shall be cleaned and backfilled with compacted, controlled fill, as specified herein.

Offsets for structure areas shall be at least 10 feet or 5 feet plus the height of any required fill, whichever is greater, outside all pavement lines. For compacted, controlled fill within any slope, the cleared area shall include offsets of at least 10 feet beyond the toe of the slope.

Once the clearing and removal of unsuitable materials, as defined above, is complete, a geotechnical engineer or the engineer's qualified representative shall observe the subgrade of the excavation. The cleared pavement subgrades or areas to receive fill, shall be proof-rolled using a fully loaded dump truck with an axle weight of at least 10 tons.

The truck shall make at least two complete "passes" of all cleared areas in the presence of the geotechnical engineer or the engineer's qualified representative. If pumping or rutting is observed, the soft or wet material shall be removed down to firm subgrade and replaced with suitable fill.

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If high shrink-swell potential soil (soil with a Liquid Limit of 40 or greater or with a Plasticity Index of 15 or greater) is encountered within 2 vertical feet of the subgrade, it shall be undercut to a depth of at least 2 feet below the design subgrade elevation and replaced by compacted, controlled fill (**See d. Shrink Swell Soils** below).

If the soil at the subgrade of an excavation becomes wet, due to surface water or groundwater entering the excavation, the excavation shall be halted. Dewatering measures shall be applied to lower the groundwater or prevent surface water from entering the excavation. Excavation shall be resumed only after the geotechnical engineer or the engineer's qualified representative has confirmed that the groundwater level has been lowered at least 2 feet below the level of the planned excavation.

If softening of the subgrade occurs, or if water permeates the excavation, it will be necessary to remove all the soft and/or excessively wet soils, and replace them with compacted, controlled fill. If the soils in an undercut area are moist and pump under the load of heavy construction equipment, the geotechnical engineer shall be informed so that appropriate remedial action may be designed.

Utility trenches shall be sloped or shored in accordance with the current OSHA and VOSHA regulations.

b. Uncontrolled Fill

Uncontrolled/existing fill was not encountered during subsurface exploration. Existing fill may be encountered in other locations on site and must be removed before construction is continued. Existing fill soils can be highly variable, and some debris and organic matter was observed. We highly recommend that SCE be retained as the project geotechnical engineer for the project during construction, so we can verify our assumptions concerning any existing fill materials.

Additional soil testing and all necessary excavation and removal or relocation of existing fill should be completed. We recommend that any existing fill inside of the planned construction area to be removed and replaced with structural fill. The resulting excavations should be backfilled in accordance with the recommendations presented in the "**c. Structural Fill**" section of this report. Soil density tests should be performed to verify that the backfill materials have been placed in accordance with the recommendations of this report.

c. Structural Fill

Compacted, controlled fill shall consist of clean, non-plastic Sandy SILT (ML) or more granular soil (per ASTM D 2487) with a Liquid Limit less than 40 and Plasticity Index less than 15 (See **d. Shrink Swell Soils** below). The fill material shall not contain organics or roots, plastic clay or silt lumps, deleterious materials, or stones larger than 3 inches. It shall have a Maximum Dry Density, per ASTM D 698, and uncorrected for gravel, of not less than 105 pounds per cubic foot.

Fill shall be placed in layers of 6 to 8 inches and compacted to a density of not less than 95 percent of the Maximum Dry Density according to ASTM D 698. (Fill placed in VDOT rights-of-way shall be placed and compacted in accordance with VDOT specifications.)

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A qualified technician shall test the density of each layer of such fill. Additional fill shall be placed only after the test results show that the required compaction has been achieved. Compacted, controlled fill shall extend outside all building and pavement lines a distance of at least 10 feet or 5 feet plus the height of the fill, whichever is greater.

The sides of all excavations shall be sloped back or shall be supported according to County, State and Federal regulations.

d. Shrink-Swell Soils

SCE encountered expansive (i.e. shrink-swell) soils in TP-2 between 5.5 to 6.8 feet. Other locations that were not explored may also have potential shrink-swell soils. These soils are not suitable for subgrade.

Regarding such soils, Fauquier County has issued the following IBC/IRC regulations defining "expansive" soil. The policy became effective in January 2009. All geotechnical submissions shall be required to meet the guidelines stipulated below:

Definitions

A. Expansive soil is defined by the International Building Code and the International Residential Code as:

"Soils meeting all four of the following provisions shall be considered expansive, except that tests to show compliance with Items 1, 2 and 3 shall not be required if the test prescribed in Item 4 is conducted:

1. Plasticity Index (PI) of 15 or greater determined in accordance with ASTM D 4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (0.75 µm), determined in accordance with ASTM D 422.
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422.
4. Expansion Index greater than 20, determined in accordance with ASTM D 4829."

B. Plastic Index Corrected

$$PI_{cor} = PI \times \frac{\text{(\% Passing No. 40 Sieve)}}{100}$$

C. Expansive Index Corrected

$$EI_{cor} = EI \times \frac{\text{(\% Passing No. 4 Sieve)}}{100}$$

D. Liquid Limit – The water content corresponding to the behavior change between the liquid and plastic state of silt or clay soil, determined in accordance with ASTM D 4318.

Policy

If the Plasticity Index of the soil is 20 or less (e.g. PI <= 20) and the Liquid Limit is 45 or less (e.g. LL <= 45), the Plasticity Index Corrected (PI_{cor}) or the Expansion Index Corrected (EI_{cor}) may be substituted in the definition of Expansive Soil.

In support of this policy, Fauquier County has defined unacceptably expansive soils beneath structures as those with Liquid Limits (LL) and Plasticity Indexes (PI) greater than 40 and 15, respectively.

Beneath roadways and pavements, unacceptably expansive soils are those with Liquid Limits and Plasticity Indexes of 40 and 15, or greater, respectively. This includes not only highly PLASTIC CLAY (CH) soil and ELASTIC SILT (MH) but also some Lean CLAY (CL) and SILT (ML).

If expansive soils, as defined above, are observed within 2 vertical feet of slabs, pavements, sidewalks, or curbs and gutters, they must be removed to a depth of at least 2 feet below the design subgrade and replaced with suitable well-graded compacted, controlled fill.

If expansive soils are observed at the design bearing elevation, the proposed structures should extend through the expansive soils to bear on the underlying stiff or dense non-expansive soils.

Alternatively, foundations may rest on these expansive soils at a depth of at least 4 feet below the final exterior grades. This places the bearing elevation below the zone of normal seasonal moisture change.

If this alternative is selected the foundation may be constructed at the under-cut depth or the undercut may be back-filled to design footing bearing elevation with lean concrete, so- called "flowable fill."

e. Shallow Depth to Bedrock

Bucket refusal on highly weathered bedrock was encountered in TP-1, TP-2, and TP-3 at 5.6, 6.8, and 8.9 feet, respectively, below surface elevation. Groundwater tends to pool around foundations that are excavated into bedrock. The pit used for the foundation acts as a bowl due to the impermeability of the bedrock. Therefore, it will be essential to provide adequate, dependable drainage for this development.

f. Use of Rock Excavating Techniques

The backhoe could excavate to depths as shallow as 5.0 to 9.0 feet below the existing grades. While larger track-hoes will be able to excavate deeper, it is probable that rock excavation techniques will be required in some of the road and utility cuts. Standard blasting techniques may yield rock fragments that are too large for use as fill without being crushed.

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Policy

If the Plasticity Index of the soil is 20 or less (e.g. PI <= 20) and the Liquid Limit is 45 or less (e.g. LL <= 45), the Plasticity Index Corrected (PI_{cor}) or the Expansion Index Corrected (EI_{cor}) may be substituted in the definition of Expansive Soil.

In support of this policy, Fauquier County has defined unacceptably expansive soils beneath structures as those with Liquid Limits and Plasticity Indexes of 40 and 15, respectively. This includes not only highly PLASTIC CLAY (CH) soil and ELASTIC SILT (MH) but also some Lean CLAY (CL) and SILT (ML).

If expansive soils, as defined above, are observed within 2 vertical feet of slabs, pavements, sidewalks, or curbs and gutters, they must be removed to a depth of at least 2 feet below the design subgrade and replaced with suitable well-graded compacted, controlled fill.

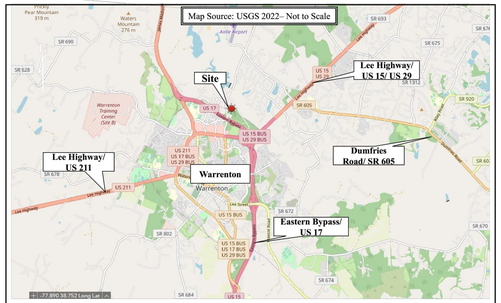
If expansive soils are observed at the design bearing elevation, the proposed structures should extend through the expansive soils to bear on the underlying stiff or dense non-expansive soils.

Alternatively, foundations may rest on these expansive soils at a depth of at least 4 feet below the final exterior grades. This places the bearing elevation below the zone of normal seasonal moisture change.

If this alternative is selected the foundation may be constructed at the under-cut depth or the undercut may be back-filled to design footing bearing elevation with lean concrete, so- called "flowable fill."

e. Shallow Depth to Bedrock

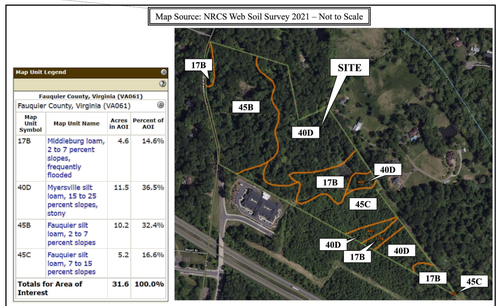
Bucket refusal on highly weathered bedrock was encountered in TP-1, TP-2, and TP-3 at 5.6, 6.8, and 8.9 feet, respectively, below surface elevation. Groundwater tends to pool around foundations that are excavated into bedrock. The pit used for the foundation acts as a



	REVISIONS

SITE VICINITY MAP
Tiffany Estates SWM Pond and Bioretention Basin
7287 Blackwell Road and Tax Pin: 6985-60-5718-000, Warrenton, VA 20187

LH	Not Drawn To Scale	04/12/2023
		23-0086V



Map Unit Legend

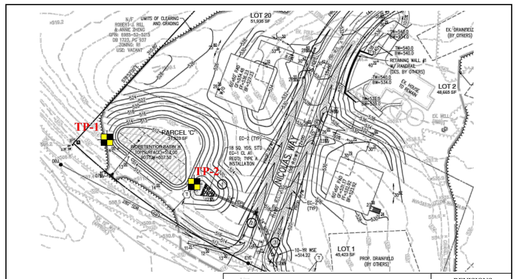
Fauquier County, Virginia (VA061)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
17B	Middleburg loam, 2 to 7 percent slopes, frequently flooded	4.6	14.6%
40D	Myersville silt loam, 15 to 25 percent slopes, stony	11.5	36.5%
45B	Fauquier silt loam, 2 to 7 percent slopes	10.2	32.4%
45C	Fauquier silt loam, 7 to 15 percent slopes	5.2	16.6%
Totals for Area of Interest		**31.6**	**100.0%**

	REVISIONS

SOIL SITE VICINITY MAP
Tiffany Estates SWM Pond and Bioretention Basin
7287 Blackwell Road and Tax Pin: 6985-60-5718-000, Warrenton, VA 20187

LH	Not Drawn To Scale	04/12/2023
		23-0086V


TP-1
TP-2
PARCEL 'C'
PROPOSED DRAINAGE & UTILITY EASEMENT
PARCEL 'B'
LOT 20
LOT 2
LOT 1
PROP. DRAINFIELD (BY OTHERS)
EX. DRAINFIELD (BY OTHERS)
EX. WELL (BY OTHERS)
RETAINING WALL (BY ENGINEER)
EX. SEPTIC (BY OTHERS)
EX. WELL
EX. SEPTIC
EX. DRAINFIELD
EX. WELL
EX. SEPTIC
EX. DRAINFIELD
EX. WELL
EX. SEPTIC
EX. DRAINFIELD

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8th, 2025
Agenda Title:	Crosswalk Discussion: Councilmen Kovalik request.
Requested Action:	Hold the discussion
Department / Agency Lead:	Town Council
Staff Lead:	Mr. Frank Cassidy

EXECUTIVE SUMMARY

Mr. Kovalik has requested a discussion on a crosswalk at Calhoun/ Lee St.

BACKGROUND

Councilmen Kovalik has requested a discussion of a crosswalk at Calhoun / Lee St.

SCHOOL BUS
PACIFICA

STAFF RECOMMENDATION

Hold the discussion.

Service Level/Collaborative Impact

This analysis has not been performed.

Policy Direction/Warrenton Plan 2040

This analysis has not been performed.

Fiscal Impact

This analysis has not been performed.

Legal Impact

This analysis has not been performed.

ATTACHMENTS

1.
2.

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Town Council Meeting Date:	July 8, 2025
Agenda Title:	ZOTA-25-1 – A Text Amendment to Remove Data Centers as a Permissible Use within the Industrial District
Requested Action:	Hold a Public Hearing
Department / Agency Lead:	Community Development
Staff Lead:	Heather Jenkins, Zoning Administrator

EXECUTIVE SUMMARY

On March 22, 2025, Town Council adopted a Resolution to initiate a text amendment to Articles 3, 9, and 12 of the Town of Warrenton Zoning Ordinance. This text amendment is for the purpose of removing Data Centers as a Permissible Use within the Industrial District, and therefore make Data Centers an impermissible Use within the Town of Warrenton.

On April 22, 2025, the Planning Commission held a work session to discuss the text amendment, and on May 20, 2025, held a public hearing to receive citizen comments. Upon closing the public hearing, the Planning Commission moved to recommend approval of the text amendment by a vote of four to approve, one to deny.

On June 10, 2025, Town Council held a work session to discuss the text amendment, after which the text amendment was scheduled for a July public hearing. Staff requests that Town Council hold a public hearing to discuss the text amendment and to consider public comments. Per Zoning Ordinance Section 11-3.9.9 *Town Council Review and Action*, the Town Council must act on the proposed text amendment within one year. The one-year deadline falls on Wednesday, March 11, 2026. An Ordinance to approve the text amendment has been included with this staff report as Attachment H – *Ordinance to Approve*.

BACKGROUND

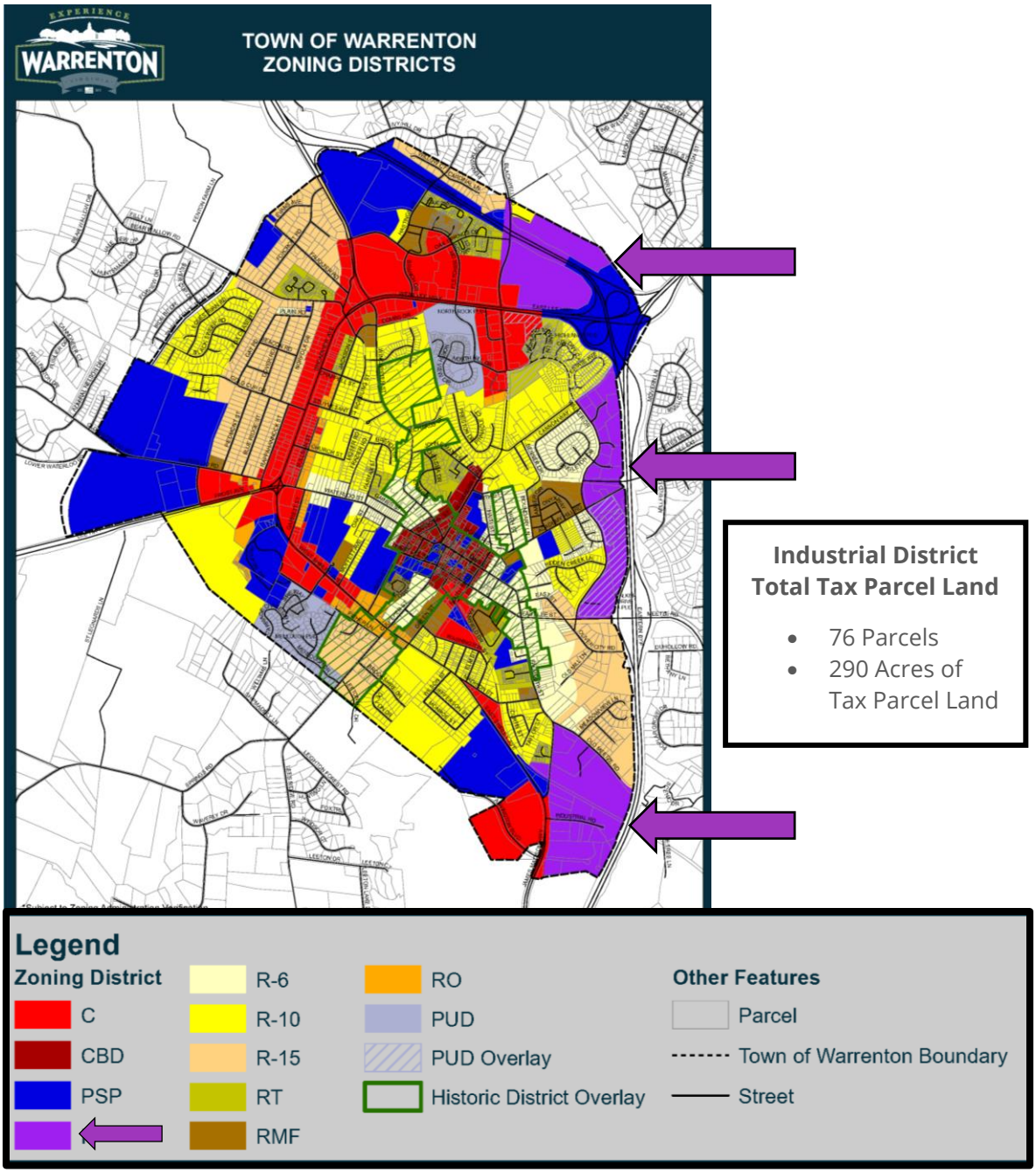
On August 10, 2021, Town Council adopted an Ordinance to add Data Centers as a Permissible Use within the Industrial District with the approval of a Special Use Permit by Town Council. This text amendment added Data Centers as an allowable use under Section 3-4.12.3 *Permissible Uses*, as defined in Article 12 *Definitions*, and subject to the standards listed in Section 9-26 *Data Centers*. A copy of the adopted text amendment is included with this staff report as Attachment A – *Ordinance to Adopt ZNG 2021-0321*. A brief timeline of the text amendment process for the previous Data Center text amendment is as follows:

Data Center Text Amendment (ZNG 2021-0321) Timeline:

- July 11, 2017 – Town Council initiates a Zoning Ordinance Text Amendment to research industrial areas and the possibility of adding data centers.
- The originally initiated Text Amendment was not pursued with the Planning Commission or Town Council.

- April 13, 2021 – Town Council initiates a Zoning Ordinance Text Amendment to allow data centers within the Industrial District with the approval of a Special Use Permit.
- May 25, 2021- Planning Commission holds a work session on the Text Amendment.
- June 15, 2021 – Planning Commission holds a public hearing on the Text Amendment.
- July 20, 2021 – Planning Commission holds a public hearing on the Text Amendment, and recommends approval 5-1.
- August 10, 2021 – Town Council holds a public hearing on the Text Amendment, and approves the Text Amendment 7-0.

Zoning Map - Industrial District Locations



Following approval of the initial text amendment on August 10, 2021, one Special Use Permit application for a Data Center was submitted for consideration by the Planning Commission and Town Council, application number SUP-22-3, located at 719 Blackwell Road (PIN 6984-69-2419-000). On February 14, 2023, Town Council approved this Special Use Permit application subject to the associated Conditions of Approval. The Special Use Permit SUP-22-3 and the associated Site Development Plan, case number SDP-23-6 approved on April 18, 2024, remains the sole approved Data Center Use within the Town. A copy of the resolution to approve SUP-22-3 is included with this staff report as Attachment B – *Resolution to Approve SUP-22-3*.

On March 22, 2025, Town Council adopted a Resolution to initiate a text amendment to Articles 3, 9, and 12 of the Town of Warrenton Zoning Ordinance. This Resolution includes the statement that a Data Center is a Use that does not further the health, safety and welfare of the public, nor does a Data Center Use promote public necessity or public convenience within the Town of Warrenton. A copy of this Resolution is included with this staff report as Attachment C – *Resolution to Initiate ZOTA-25-1*.

On April 22, 2025, the Planning Commission held a work session to discuss this text amendment. During the April 22, 2025, work session, Planning Commission members requested information on the possible impacts of data centers on communities. On May 20, 2025, the Planning Commission held a public hearing to discuss the text amendment and to hear comments from citizens. As a part of the May 20, 2025, public hearing, staff provided a copy of the *Data Centers in Virginia* report provided to the Governor and General Assembly of Virginia by the Joint Legislative Audit and Review Commission (JLARC), dated December 9, 2024. The JLARC report provides an in-depth analysis of the impact data centers can have on local communities, to include economic, fiscal, energy, natural and historic resource impacts, as well as potential impacts on residential areas adjacent to data centers. The JLARC report is included with this staff report as Attachment D – *JLARC Data Center Report*. A briefing of this report, as presented to the General Assembly and other bodies, is included with this staff report as Attachment E – *JLARC Data Center Presentation*, where this briefing summarizes the findings of the JLARC report.

Prior to the May 20, 2025, public hearing, citizen comments were received that expressed either support of the proposed text amendment or caution regarding removal of the Data Center use altogether. During the May 20, 2025, public hearing six citizens spoke in favor of the proposed text amendment to remove Data Centers as an allowable use in the Town. A copy of the May 20, 2025, meeting minutes is included with this staff report as Attachment F – *Planning Commission Public Hearing Meeting Minutes*. Upon closing the public hearing, the Planning Commission moved to recommend approval of the text amendment, by a vote of four to approve, one to deny.

STAFF RECOMMENDATION

Staff requests that the Town Council hold public hearing. A red-lined version of the proposed ordinance language has been included with this staff report as Attachment G – *Draft Text Amendment*; an Ordinance to approve the text amendment has been included with this staff report as Attachment H – *Ordinance to Approve*.

Per Zoning Ordinance Section 11-3.9.1 – *Authority for Change* – zoning ordinance text amendments are meant to *further the public necessity, convenience, general welfare, or good zoning practice*; Ordinance Section 11-3.9.13 – *Criteria for Consideration of Text Amendments* includes the two considerations of 1. *whether the proposed text amendment is consistent with the Comprehensive Plan* and 2. *whether the text amendment is consistent with the intent of [the] Zoning Ordinance*. Additionally, Section 11-3.9.13 directs Town Council

members to the fourteen (14) consideration criteria from Section 11-3.9.12 – *Criteria for Consideration of Zoning Map Amendments* – specifically, only those criteria that are *relevant to the text amendment.*

11-3.9.12 – *Criteria for Consideration of Zoning Map Amendments*

Note – Per 11-3.9.13 – Criteria for Consideration of Text Amendments, only those criteria that <u>are relevant to the specific text amendment</u> should be considered.

1. whether the rezoning request, if granted, would further the public interest, and whether it conforms with the goals, objectives, and policies of the Comprehensive Plan;
2. whether the rezoning is consistent with the town's Future Land Use Plan, as identified in the Comprehensive Plan, and established character of the area and land use patterns;
3. whether the rezoning is justified by changed or changing conditions;
4. whether the rezoning, if granted, would create an isolated district unrelated to adjacent districts;
5. whether utility, sewer and water, transportation, school, recreation, stormwater management and other facilities exist or can be provided to serve the uses that would be permitted on the property if it were rezoned;
6. whether the rezoning will be compatible with properties and uses in the vicinity and not have an adverse impact on these properties or their values;
7. whether there are adequate sites available elsewhere in the Town for the proposed use, or uses, in districts where such uses are already allowed;
8. whether the impact that the uses that would be permitted if the property were rezoned will have upon the volume of vehicular and pedestrian traffic and traffic safety in the vicinity and whether the proposed rezoning provides sufficient measures to mitigate such impacts;
9. whether a reasonable and viable economic use of the subject property exists under the current zoning;
10. whether the effect of the proposed rezoning on environmentally sensitive land or natural features, wildlife habitat, vegetation, water quality and air quality is compatible with the Town's Comprehensive Plan;
11. whether the proposed rezoning encourages economic development activities in areas designated by the Comprehensive Plan and provides desirable employment and enlarges the tax base;
12. whether the proposed rezoning considers the current and future requirements of the community as to land for various purposes, including housing and business, as determined by population and economic studies;
13. the effect of the proposed rezoning to provide moderate housing by enhancing opportunities for all qualified residents of the Town; and
14. the effect of the rezoning on natural, scenic, archaeological, or historic features of significant importance.

Service Level/Collaborative Impact

There are no known service level or collaborative impacts.

Policy Direction/Warrenton Plan 2040

The Zoning Ordinance currently allows for Data Centers as a Permissible Use within the Industrial District. Industrial Zoned parcels within the Town are located along the eastern boundary of the Town jurisdictional limits, adjacent to the Eastern Bypass and Route 17 Spur. The Comprehensive Plan, Future Land Use Map shows that Industrial Zoned properties are located within the New Town Mixed Use/New Town Character

District, Old Town Mixed Use/Old Town Character District, and Greenway and Wellness Mixed Use/Greenway and Makers District. The desired development for these character districts is described in the Comprehensive Plan, Town Warrenton 2040, in Goals L2, L3, and L5, predominantly as mixed-use and walkable.

While the New Town Character District, Goal L3, calls for the establishment of a major employer, a Data Center was not specifically listed in any of the Future Land Use or Character Districts. This issue was raised during the initial Zoning Ordinance Text Amendment public hearing process for *ZNG 2021-0321.* As such, Town Council asked staff to prepare a Text Amendment to remove Data Centers as a Permissible Use within the Industrial District.

Fiscal Impact

The potential fiscal impacts associated with data center development are highly individualized as to the circumstances of the locality and the proposed site-specific data center development conditions, so that a quantitative analysis is not feasible other than what has been provided as a part of the JLARC Data Center Report (Attachment D). Generalized fiscal impacts are summarized in the JLARC Data Center Report, and this report finds that the greatest amount of revenue generation from data centers to a locality comes during the initial construction phase, due both to the large number of construction-related jobs that are generated and the purchase of building materials, as well as secondary revenue generators such as hotel stays, food purchases, and other service-sector related transactions.

Legal Impact

Should a text amendment be approved to remove Data Centers as a Permissible Use within the Industrial District, the Data Center approved as a part of case number SUP-22-3 may become a non-conforming use, subject to the standards found in Zoning Ordinance Section 11-4 *Non-Conforming Uses and Structures*. A determination of non-conformity requires the concurrence of the Zoning Administrator and the Town Attorney; however, staff defers to the Town Attorney for any questions as to how this text amendment may or may not affect any existing Data Center approvals.

There are multiple court cases currently filed within the Circuit Court that may or may not be impacted by this proposed text amendment to remove Data Centers as a Permissible Use. Staff defers to the Town Attorney for all questions related to on-going litigation.

ATTACHMENTS

- Attachment A – *Ordinance to Adopt ZNG 2021-0321*
- Attachment B – *Resolution to Approve SUP-22-3*
- Attachment C – *Resolution to Initiate ZOTA-25-1*
- Attachment D – *JLARC Data Center Report*
- Attachment E – *JLARC Data Center Presentation*
- Attachment F – *Planning Commission Public Hearing Meeting Minutes*
- Attachment G – *Draft Text Amendment*
- Attachment H – *Ordinance to Approve*

ORDINANCE

AN ORDINANCE TO APPROVE A ZONING ORDINANCE TEXT AMENDMENT TO ARTICLES 3, 9 AND 12 TO ALLOW A DATA CENTER USE WITH THE APPROVAL OF A SPECIAL USE PERMIT

WHEREAS, the Town of Warrenton seeks to update Articles 3, 9 and 12 of the Zoning Ordinance to allow a Data Center with the approval of a special use permit; and

WHEREAS, in addition to allowing the Data Center use, supplemental standards and a definition are being added to Articles 9 and 12 respectively; and

WHEREAS, the text amendment seeks to require legislative action for a data center proposal in the Industrial District; and

WHEREAS, the Town Council of the Town of Warrenton feels a data center use is appropriate for the Town's Industrial District with the appropriate safeguards as proposed as part of the Supplemental Use Regulations; and

WHEREAS, the Town Council has determined that the health, safety, general welfare of the public and good zoning practice warrant this amendment; and

WHEREAS, the Town Council initiated this text amendment on April 13, 2021; and

WHEREAS, the Town of Warrenton Planning Commission held a work session on the proposed amendment on May 25, 2021; and

WHEREAS, the Town of Warrenton Planning Commission held a public hearing on the proposed amendment on June 22, 2021 where the applicant's representative spoke and the Commission deferred recommendation until the next scheduled Regular Meeting; and

WHEREAS, the Town of Warrenton Planning Commission discussed this text amendment as part of their Unfinished Business portion of the agenda on July 20, 2021 and recommended approval by a 5-1 vote; and

WHEREAS, on August 10, 2021, the Town of Warrenton Town Council held a public hearing and considered written and oral testimony on the proposed text amendment; now, therefore, be it

ORDAINED by the Town Council of the Town of Warrenton this 10th day of August 2021, That the Town Council hereby approves the following text amendment to Articles 3, 9 and 12 of the Zoning Ordinance:

_____

Town Clerk

Article 3 Zoning Districts and Map

Amended by Town Council: **March 11, 2008**
February 12, 2013
April 12, 2016
June 14, 2016
August 9, 2016
December 11, 2018
August 11, 2020
August 10, 2021

3-4.12 I Industrial District

3-4.12.1 Legislative Intent

It is the intent of this district to implement the Town's Comprehensive Plan by providing for a variety of light manufacturing, fabricating, processing, wholesale distributing, and warehousing uses appropriately located for access by highways and providing a controlled environment within which signing is limited, uses are to be conducted generally within completely enclosed buildings, and a moderate amount of landscaping is required. In order to preserve the land for industry, to reduce extraneous traffic, and avoid future conflicts between industry and other uses, business and service uses are limited primarily to those which will be useful to employees in the district and future residential uses are restricted.

3-4.12.2 **Permitted Uses** (by-right)

- Accessory buildings
- Active and Passive Recreation and Recreational Facilities
- Banks and savings and loan offices
- Broadcasting studios and offices
- Business and office supply establishments
- Cabinet, upholstery, and furniture shops
- Cafeteria or snack bar for employees
- Clinics, medical or dental
- Commercial uses constituting up to 15% of permitted site or building area
- Conference Centers
- Contractor's office and warehouse without outdoor storage
- Crematory
- Dwellings for resident watchmen and caretakers employed on the premises
- Employment service or agency

- Flex Office and Industrial uses
- Health and Fitness Facilities
- Institutional buildings
- Janitorial service establishment
- Laboratories, research, experimental or testing, but not testing explosives, rockets, or jet engines
- Light manufacturing uses which do not create danger to health and safety in surrounding areas and which do not create offensive noise, vibration, smoke, dust, lint, odor, heat, glare, or electrical impulse than that which is generally associated with light industries
- Mobile Food Vendors subject to Article 9-24
- Monument sales establishments with incidental processing to order but not including shaping of headstones
- Motion picture studio
- Nurseries and greenhouses
- Offices- business, professional, or administrative
- Off-street parking and loading subject to Article 7
- Open space subject to Article 9
- Printing, publishing, and engraving establishment; photographic processing; blueprinting; photocopying; and similar uses
- Private club, lodge, meeting hall, labor union, or fraternal organization or sorority
- Rental service establishment
- Retail or wholesale sales and service incidental to a permitted manufacturing, processing, storing, or distributing use
- Rug and carpet cleaning and storage with incidental sales of rugs and carpets
- Security service office or station
- Sign fabricating and painting
- Signs, subject to Article 6
- Studios
- Transmission and receiving towers of height not exceeding one hundred twenty-five (125) feet
- Utilities related to and necessary for service within the Town, including poles, wires, transformers, telephone booths, and the like for electrical power distribution or communication service, and underground pipelines or conduits for local electrical, gas, sewer, or water service, but not those facilities listed as requiring a special use permit
- Wholesale establishment, storage warehouse, or distribution center. furniture moving

3-4.12.3 Permissible Uses (by special use permit upon approval of the Town Council)

- Automobile body shop

- Automobile and truck repair and service
- Commercial Kennels
- Contractor's storage yard
- Data Center
- Farm equipment, motorcycle, boat and sport trailer sales and service
- Fuel, coal, oil distribution storage yards
- Lumber and building supply with undercover storage.
- Maintenance and equipment shops with screened outside storage
- Outdoor storage of any kind
- Plumbing and electrical supply with undercover storage
- Restaurant or cafeteria, drive-thru or otherwise
- Self-service mini-warehouse
- Temporary fair and show grounds
- Tire and battery sales and service, tire recapping and retreading
- Transmission and receiving towers of height greater than one hundred twenty-five (125) feet.
- Treatment plants, water storage tanks, major transmission lines or pipelines, pumping or regulator stations, communications towers, storage yards and substations, and cable television facilities and accessory buildings

3-4.12.4 Lot and Yard Regulations

Use	**Minimum** Lot Size (sq. ft.)	**Minimum** Lot Frontage (at front setback)	**Maximum** Lot Coverage (impervious surfaces and accessory buildings)
All principal manufacturing and processing uses in industrial parks	One (1) acre	100 ft.	75%
Other uses, including permitted retail and service establishments	10,000 square feet	100 ft.	75%

Minimum Setbacks

Use	Front	Side	Rear
All principal manufacturing and processing uses in industrial parks	Fifty (50) feet from the right-of-way of a local street having a right-of-way of fifty (50) feet or less. Sixty-five (65) feet from the right-of-way of a major thoroughfare or collector street having a right-of-way greater than fifty (50) feet. Forty (40) feet from the right-of-way of a service drive. Accessory buildings shall not be permitted forward of the setback line.	Twenty-five (25) feet on an interior lot or adjacent to any C or I district including accessory buildings or parking structures, ten (10) feet for parking lots. Fifty (50) feet adjacent to any R district including accessory buildings or parking structures, thirty (30) feet for parking lots.	Forty (40) feet on an interior lot or adjacent to any C or I district including accessory buildings or parking structures, ten (10) feet for parking lots. Sixty-five (65) feet adjacent to any R district including accessory buildings or parking structures, fifty (50) feet for parking lots.
Other uses, including permitted retail and service establishments	same	same	same

3-4.12.5 Building Regulations

Use	Maximum Height
All buildings	35 feet
Accessory buildings	Within 20 feet of any lot line shall not exceed 15 feet in height. All accessory buildings shall be less than the main building in height.

3-4.12.6 Special Regulations for Manufacturing and Commercial Buildings

3-4.12.6.1 Enclosed Buildings. All uses shall be conducted within a completely enclosed building of permanent and durable construction, with no open storage of raw, in process, or finished material and supplies or waste material. Finished or semi-finished products manufactured on the premises may be stored in the open if screened from the street or from a residence district by landscaping, fences, or walls.

3-4.12.6.2 Landscaping. In general, where approval of a site plan is required, the landscape plan shall be designed to promote harmonious

relationships with adjacent and nearby residential properties, developed or undeveloped, and to this end may provide effective screening along side and rear property lines by means of fences, walls, hedges, planting screen, or natural vegetation as outlined in Article 8, General Provisions for Landscaping.

3-4.12.6.3 Fencing. All fencing shall have a uniform and durable character and shall be properly maintained.

Article 9 Supplemental Use Regulations

Amended by Town Council: February 12, 2013
July 8, 2014
August 9, 2016
December 11, 2018
April 9, 2019
August 10, 2021

Contents (Sections)

9-1 Accessory Structures and Uses; Parcel Limitations
9-2 Additional Regulations Where a Grouping or More than One Use is Planned for a Tract
9-3 Affordable Dwelling Unit Provisions
9-4 Apartment Buildings, Special Regulations
9-5 Bed and Breakfast Facilities
9-6 Cluster Development Provisions
9-7 Home Occupations and Home Businesses
9-8 Lighting
9-9 Manufacturing Buildings, Special Regulations
9-10 Mobile Homes (Manufactured Homes)
9-11 Office and Other Business Buildings, Special Regulations
9-12 Open Space
9-13 Outdoor Display
9-14 Performance Standards for All Non-Residential Uses
9-15 Recycling Facilities
9-16 Residential Use Limitations
9-17 Steep Slopes
9-18 Telecommunications Facilities
9-19 Temporary Uses
9-20 Traditional Neighborhood Development Option (TND)
9-21 Utility Lots
9-22 Yard and Garage Sales
9-23 Massage Therapy, Establishment of Provisions for Therapists and Businesses
9-24 Mobile Food Vendors
9-25 RESERVED
9-26 Data Centers

Article 9 Supplemental Use Regulations

9-26 Data Centers

Data Centers, as defined in Article 12, are permissible in the Industrial (I) District, subject to the following requirements.

9-26.1 Additional Standards

A. Minimum Lot Size: 25 acres. Town Council may approve a data center on parcels less than 25 acres as part of the special use permit application.

B. The data center shall utilize recycled water or air chillers, in conjunction with using recycled water, for cooling purposes. Potable water shall not be used for cooling.

C. All electric service lines from the substation to the data center shall be placed underground.

D. Setbacks: Per Section 3-4.12.4 ("All principal manufacturing and processing uses in industrial parks").

1. Town Council may approve building heights greater than 35 feet during the review of the Special Use Permit. Buildings must be setback one (1) additional foot (horizontally) from the required setback line for each additional one (1) foot (vertically) greater than 35 feet. Building heights shall be in conformance with the Comprehensive Plan.

2. The data center building shall be setback a minimum of one-hundred (100) feet from property lines.

E. Parking: In accordance with "Assembly or Manufacturing Uses" per Section 7-7 of the Zoning Ordinance.

F. Building Facades:

1. Building facades shall include at least two of the following design elements:

a. Change in building height;
b. Building step-backs or recesses;
c. Fenestration (25% minimum);
d. Change in building material, pattern, texture, or color;
e. Use of accent materials.

G. Mechanical Equipment:

1. Mechanical equipment shall be completely screened through the use of walls, fences or evergreen vegetation so that no part of the mechanical equipment can be seen from adjoining properties or right-of-ways.

2. All generators shall be equipped with mufflers to reduce emissions and noise.

H. Security:

1. The facility shall provide access to Town and County emergency services staff at all times.

I. Landscaping:

1. In addition to the landscape planting requirements of Article 8 of the Zoning Ordinance, any portion of the data center (including equipment) visible from a park or adjoining/across the street from a residential district shall be screened by vegetation consisting of a double staggered row of evergreen trees planted 15 feet on center. A minimum 3 foot berm planted with a double staggered row of evergreen shrubs planted 10 feet on center may be used in place of the double staggered row of evergreen trees required above.

J. Substations:

1. Substations associated with the data center shall be screened from adjacent properties and right-of-ways through the use of opaque fencing in addition to evergreen trees and shrubs.

Article 12 Definitions

Amended by Town Council: February 12, 2013
June 14, 2016
August 9, 2016
December 11, 2018
April 9, 2019
September 10, 2019
October 13, 2020
August 10, 2021

Data Center: A facility containing one or more large-scale computer systems used for data storage and processing for off-site users. Typical supporting equipment includes back-up batteries and power generators, electric substations, cooling units, fire suppression systems, and enhanced security feature

February 14th, 2023
Town Council
Regular Meeting

RESOLUTION PURSUANT TO SECTION 11-3.10 OF THE ZONING ORDINANCE OF THE TOWN OF WARRENTON FOR APPROVAL OF APPLICATION FOR A SPECIAL USE PERMIT 22-03

WHEREAS, Warrenton, VA (Hereinafter "the Town") is a municipal corporation located within the County of Fauquier; and

WHEREAS, Amazon Data Services, Inc., ("the Applicant"), is the requesting a Special Use Permit approval on a parcel of land containing approximately 41.793 acres, identified as GPIN 6984-69-2419-000, located off Blackwell Road and Lee Highway in the Town of Warrenton and hereinafter referred to as the "Property"; and

WHEREAS, the Applicant has applied for a Special Use Permit pursuant to §3-4.12.3 of the Zoning Ordinance, to allow for approximately 220,200 square-foot data center to be located on the Property, hereinafter the "Special Use Permit"; and

WHEREAS, the Applicant requested waivers and modifications to increase the building height from 35 feet to 37 feet, increase the fence height from six feet to eight feet, and decrease the parking loading space requirement from 22 spaces to one space; and

WHEREAS, pursuant to §11-3 of the Zoning Ordinance upon petition of the Applicant for approval of the Special Use Permit, the Planning Commission upon advertisement and notice properly given pursuant to §15.2-2204 of the Virginia Code held a Public Hearing on November 15, 2022, November 22, 2022, and December 20, 2022; and

WHEREAS, the Town Council received and considered the recommendation of the Planning Commission for denial of the Special Use Permit; and

WHEREAS, the Town Council of the Town of Warrenton held a Public Hearing on January 10, 2023, upon notice properly and duly given; and

WHEREAS, the Town Council of the Town of Warrenton held open the Public Hearing on January 10, 2023 to February 14th, 2023, upon notice properly and duly given; and

WHEREAS, the Town Council has considered the issues and the Applicant addressed the applicable factors listed in §11-3.10.3 of the Zoning Ordinance for the Town of Warrenton; and

WHEREAS, the Town Council finds that the Application meets the criteria for approval in the Town of Warrenton Zoning Ordinance and that the Application is consistent with the Town of Warrenton's Comprehensive Plan based on the analysis in the staff report; and

WHEREAS, the Town Council, in consideration of all of the foregoing, is of the opinion that the application for the Special Use Permit be approved subject to certain conditions;

NOW, THEREFORE, BE IT RESOLVED that the Warrenton Town Council approves

SUP 22-03, subject to the attached Special Use Permit with Conditions of Approval dated February 14th, 2023, and all documents referenced in the Conditions of Approval, with requested waivers and modifications listed above.

ATTACHMENT:
Conditions of Approval

Votes:
Ayes: Ms. Heather Sutphin, Mr. Brett Hamby, Mr. James Hartman, Mr. John "Jay" Heroux
Nays: Mr. William Semple, Mr. David McGuire, Mr. Paul Mooney.
Absent from Vote:
Absent from Meeting:

For Information:
Community Development Director,
Town Attorney

ATTEST: _____
Town Recorder

Resolution

March 11, 2025
Town Council
Regular Meeting

A RESOLUTION TO INITIATE ZOTA-25-1, A ZONING ORDINANCE TEXT AMENDMENT TO ARTICLES 3, 9 AND 12 TO REMOVE DATA CENTERS AS A PERMISSIBLE USE WITHIN THE INDUSTRIAL ZONING DISTRICT

WHEREAS, Warrenton, VA (Hereinafter "the Town") is a municipal corporation located within the County of Fauquier; and

WHEREAS, the Warrenton Town Council (Hereinafter "Council") may, by ordinance, amend, supplement, or change the regulations of the Zoning Ordinance of the Town whenever the public necessity, convenience, general welfare or good zoning practice may require such an amendment; and

WHEREAS, such an amendment may be initiated by resolution of Council in accord with the procedures and requirements of Section 11-3.9 of the Zoning Ordinance; and

WHEREAS, on August 10, 2021, Council approved a Zoning Ordinance Text Amendment to Articles 3, 9 and 12, case number ZNG 2021-0321, to add Data Centers as a Permissible Use within the Industrial District with the approval of a Special Use Permit by Council; and

WHEREAS, Council now finds that a Data Center is a Use that does not further the health, safety and welfare of the public, nor does a Data Center Use promote public necessity or public convenience within the Town of Warrenton; and

WHEREAS, Council hereby directs staff to prepare a text amendment for consideration by the Planning Commission to remove Data Centers as a Permissible Use within the Industrial District, and therefore render Data Centers as an impermissible Use within the municipal boundaries of the Town of Warrenton; now, therefore, be it

RESOLVED, by the Warrenton Town Council this 11th day of March, 2025, that Council hereby initiates a text amendment to Articles 3, 9 and 12 to remove Data Centers as an allowable Use.

Votes:
Ayes:
Nays:
Absent from Vote:
Absent from Meeting:

For Information:
Community Development Director,
Town Attorney

ATTEST: _____
Town Recorder

Commonwealth of Virginia
December 9, 2024

Report to the Governor and the General Assembly of Virginia

Data Centers in Virginia

2024

COMMISSION DRAFT

JLARC
JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

Joint Legislative Audit and Review Commission

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Summary: Data Centers in Virginia

WHAT WE FOUND

Data centers provide positive economic benefits to Virginia's economy, mostly during their initial construction

Data centers provide positive benefits to Virginia's economy mostly because of the industry's substantial capital investment. The primary benefit comes from the initial construction of data centers. Most construction spending likely remains in the state economy because much of it goes to Virginia-based businesses providing construction materials and services.

Data centers employ fewer employees than some other industries, but data center jobs tend to be high paying. Several data center representatives indicated that a typical 250,000-square-foot data center may have approximately 50 full-time workers, about half of which are contract workers. Data center construction supports a substantially larger number of workers. Construction of an individual data center building usually takes about 12 to 18 months, and data center representatives indicated that, at the height of construction, approximately 1,500 workers are on site from various construction-related industries.

Overall, the data center industry is estimated to contribute 74,000 jobs, $5.5 billion in labor income, and $9.1 billion in GDP to Virginia's economy annually. Most of these economic benefits derive from the construction phase rather than data centers' ongoing operations. The economic benefits from the industry are concentrated in Northern Virginia, where most data centers are located, but other regions of the state also benefit because data centers are also located there, or they are home to businesses that provide materials for data center construction.

WHY WE DID THIS STUDY

In 2023, the Joint Legislative Audit and Review Commission directed staff to review the impacts of the data center industry in Virginia.

ABOUT DATA CENTERS

Data centers are specialized facilities that manage, process, and share large amounts of data. They enable the digital services that people rely on daily, including websites, electronic applications, and cloud-based platforms, such as email and media steaming. Northern Virginia is the largest data center market in the world, constituting 13 percent of all reported data center operational capacity globally and 25 percent of capacity in the Americas. Multiple factors have contributed to Northern Virginia's market prominence, including a strong fiber network, supply of reliable cheap energy, available land, proximity to major national customers, and the creation of a state data center tax incentive. The data center industry is growing rapidly in Virginia, both in established markets and newer ones. Significant new market growth is expected in counties outside of Northern Virginia and along the I-95 corridor to Central Virginia.

Data centers can generate substantial local tax revenues for localities that have them

Localities with data centers can collect substantial tax revenues from the industry, primarily from business personal property and real property (real estate) taxes. The amount of local data center revenue depends on several factors, such as the size of their data center market and local tax rates. Some localities have greatly reduced their business personal property tax rates for computer equipment to try to attract data centers, but this also reduces the revenue they can collect from the industry. For the

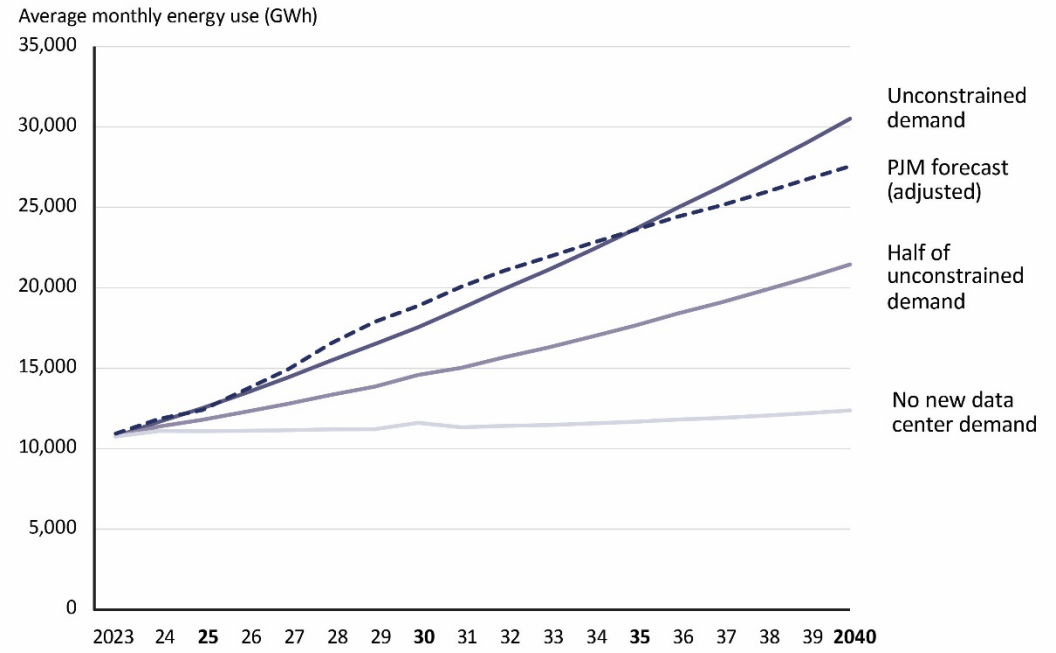
five localities with relatively mature data center markets, data center revenue ranged from less than 1 percent to 31 percent of total local revenue.

Localities in economically distressed areas of the state could benefit from data centers through increased local tax revenue, but these localities could have difficulty attracting the industry. Access to power and large, flat areas of land are key requirements for data centers, but are not available in some distressed areas, particularly in Southwest Virginia. Many distressed localities are also in rural areas that are away from data center customers and population centers, which makes it harder for them to attract the industry. However, these localities may be able to compete for data centers running certain artificial intelligence (AI) workloads, such as training. These localities could potentially become more attractive to the industry if they are able to proactively develop industrial sites suitable to data centers.

Data center industry is forecast to drive immense increase in energy demand

Modern data centers consume substantially more energy than other types of commercial or industrial operations. Consequently, the data center industry boom in Virginia has substantially driven up energy demand in the state, and demand is forecast to continue growing for the foreseeable future. The state's energy demand was essentially flat from 2006 to 2020 because, even though population increased, it was offset by energy efficiency improvements. However, an independent forecast commissioned by JLARC shows that unconstrained demand for power in Virginia would double within the next 10 years, with the data center industry being the main driver. JLARC's independent forecast largely matches the most recent forecast by PJM, which is the regional organization that coordinates generation and transmission operations for Virginia and several other eastern and midwestern states.

Data center demand would drive immense increase in energy needs in Virginia, based on JLARC's independent forecast and other forecasts

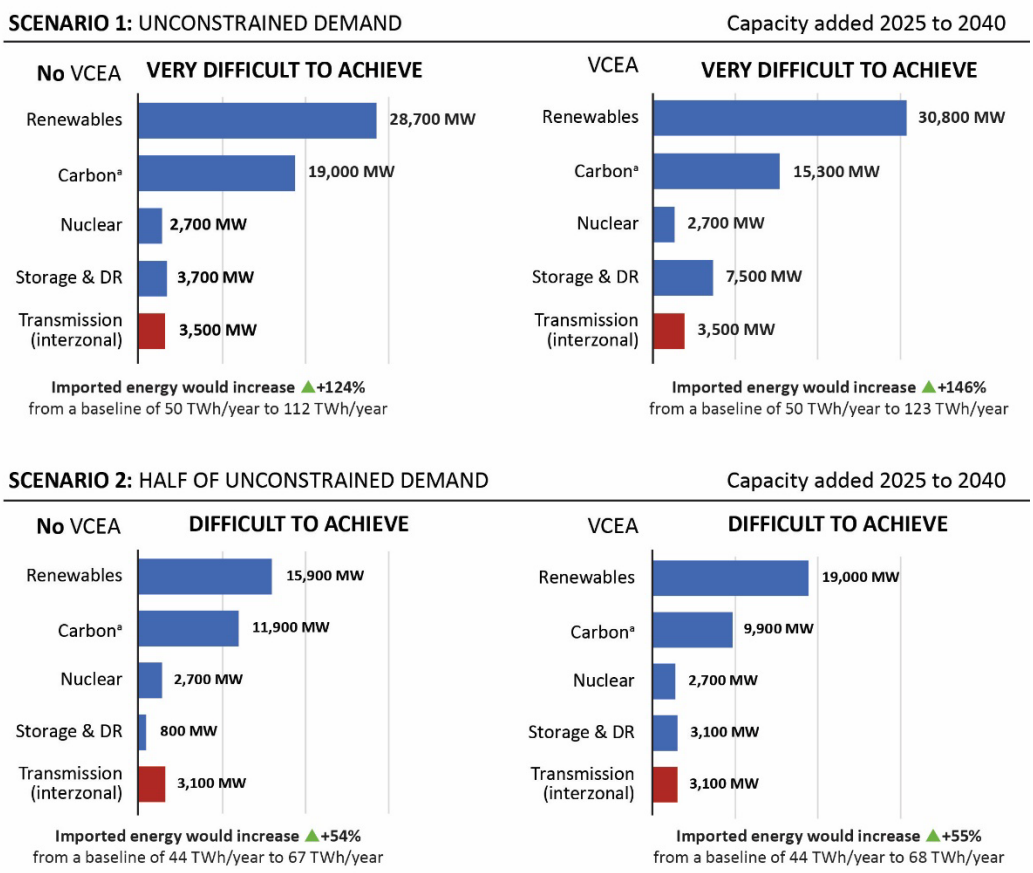


SOURCE: JLARC staff consultant analysis.
NOTE: A detailed note is provided for this figure in Chapter 3.

Building enough infrastructure for unconstrained data center demand will be very difficult and meeting half that demand is still difficult

An independent model of the energy grid commissioned by JLARC staff found that a substantial amount of new power generation and transmission infrastructure will be needed in Virginia to meet unconstrained energy demand or even half of unconstrained demand. Building enough infrastructure to meet unconstrained energy demand will be very difficult to achieve, with or without meeting the Virginia Clean Economy Act (VCEA) requirements (Scenario 1, figure). New solar facilities, wind generation, natural gas plants, and increased transmission capacity would all be required to meet unconstrained demand, and the number of projects needed would be very difficult to achieve. For example, new solar facilities would have to be added at twice the annual rate they were added in 2024, and the amount of new wind generation needed would exceed the potential capabilities of all offshore wind sites that have so far been secured for future development. Large natural gas plants would also need to be added at an equal or faster rate than the busiest build period for these facilities (2012 to 2018), depending on VCEA compliance.

Estimated generation mix needed to meet demand scenarios, with and without meeting VCEA requirements



SOURCE: E3 grid modeling analysis.
NOTE: A detailed note is provided for this figure in Chapter 3.
[a] Carbon includes natural gas, coal, and oil. Biomass facilities are counted as renewable resources, per the VCEA. However, starting in 2045, E3's grid model assumes natural gas plants would be converted to hydrogen fuel in each scenario when VCEA requirements are met.

Building enough infrastructure to meet half of unconstrained energy demand would also be difficult (Scenario 2 above). If VCEA requirements were not considered, the biggest challenge would be building new natural gas plants. New gas would need to be added at the rate of about one large 1,500 MW plant every two years for 15 consecutive years, equal to the busiest period of the last decade (2012 to 2018). If it is assumed that VCEA requirements would be met, the biggest challenges would be building enough wind, battery storage, and natural gas peaker plants. Wind generation needs would be the same as the unconstrained demand scenario. The amount of new battery storage would be several times the small amount currently in place in Virginia and a significant number of new natural gas peaker plants would have to be constructed. Both Scenarios 1 and 2 would rely on energy from as yet unproven nuclear technologies.

The state could encourage or require data centers to take actions to help address their energy impacts by promoting development of renewable energy generation, participating in demand response programs, and managing energy efficiency. However, these actions would have only a marginal impact on decreasing data center energy demand.

Existing electric utility requirements and processes help limit risks associated with system capacity and reliability

Data centers' projected energy demand increases have raised concerns about whether enough infrastructure can be built to keep pace. Currently, PJM attempts to protect regional grid reliability by requiring utilities to secure sufficient generation capacity plus a reserve margin, and the state requires utilities to develop plans that describe how generation capacity needs will be met. However, individual electric utility planning does not guarantee that the generation resources needed for the whole PJM region will be built because regional generation is not centrally planned. This is less of a concern with transmission because PJM and utility transmission owners centrally identify the impact large loads are expected to have, and how those loads can be brought on safely without causing transmission reliability problems.

If utilities are unable to build enough new infrastructure to keep pace with demand, one of the main ways they can protect grid reliability is by delaying the addition of new large load customers until there is adequate generation and transmission capacity. Utilities appear to be able to delay large load additions for transmission-related concerns, but it is less clear if they are allowed to delay adding new load because of generation concerns.

Data centers are currently paying their full cost of service, but growing energy demand is likely to increase other customers' costs

JLARC staff commissioned an independent study of electric utility cost recoveries under current rate structures to see if the data center industry is paying its share of current costs. The study found that current rates appropriately allocate costs to the customers responsible for incurring them, including data center customers.

However, data centers' increased energy demand will likely increase system costs for all customers, including non-data center customers, for several reasons. A large amount of new generation and transmission will need to be built that would not otherwise be built, creating fixed costs that utilities will need to recover. It will be difficult to supply enough energy to keep pace with growing data center demand, so energy prices are likely to increase for all customers. Finally, if utilities are more reliant on importing power, they may not always be able to secure lower-cost power and will be more susceptible to spikes in energy market prices. A typical residential customer of Dominion Energy could experience generation- and transmission-related costs increasing by an estimated $14 to $37 monthly in constant (or real) dollars by 2040 (independent of inflation). Establishing a separate data center customer class, changing cost allocations,

and adjusting utility rates more frequently could help insulate non-data center customers from statewide cost increases.

Data centers create additional financial risks to electric utilities and their customers

The data center industry presents additional financial risks to electric utilities and their customers because of the sheer size of the industry's energy demand. One risk is that utilities will build more generation and transmission infrastructure than is needed if forecast demand does not materialize, or several large data centers close. This could strand utilities with infrastructure costs that would have to be recouped from their existing customer base. Another risk is particular to electric co-ops, which are not-for-profit companies that are owned by their member customers. If a data center customer delayed, disputed, or failed to pay an energy generation bill and the co-op was unable to recoup these costs from the customer, they would ultimately have to be paid by all other co-op members. A large enough bill could potentially result in a co-op defaulting and going bankrupt.

Another risk relates to data center participation in the state's retail choice program, which allows data centers and other large load customers to purchase generation through third parties rather than through their incumbent electric utility. This also has the potential to shift generation costs to other customers if enough data centers "leave" their incumbent utility for retail choice.

Data center backup generators emit pollutants, but their use is minimal, and existing regulations largely curb adverse impacts

To ensure constant operations in the event of a power outage, nearly all data centers maintain diesel generators on-site for backup power. Diesel generators emit several harmful air pollutants, such as nitrogen oxides, carbon monoxide, and particulate matter. To limit potential emissions from backup generators, the Virginia Department of Environmental Quality (DEQ) permits limit when they can be run, how long they can be run, and the maximum annual emissions each permitted site is allowed. Nearly all current data centers use "Tier 2" diesel generators, which DEQ allows to run only in emergencies or as part of routine maintenance testing.

Data center generators are run mostly only for maintenance, and most data center operators interviewed by JLARC staff reported experiencing zero to two minor outages per site in the last two years, with nearly all outages being only a few hours long. Consequently, data centers' diesel generators are a relatively small contributor to regional air pollution—in Northern Virginia, they make up less than 4 percent of regional emissions of nitrogen oxides and 0.1 percent or less of carbon monoxide and particulate matter emissions. While they make up only a small part of regional emissions, DEQ is conducting further study to ensure no harmful impacts occur locally. If the study detects any local air quality impacts, DEQ has the authority to increase protections as needed.

Data center water use is currently sustainable, but use is growing and could be better managed

Data centers require industrial-scale cooling, which is sometimes dependent on water, to manage the heat generated by their computing equipment. Most data centers use about the same amount of water or less as an average large office building, although a few require substantially more, and some require less than a typical household. The amount of water a data center uses depends on its size, computing density, and type of cooling system.

Most data centers receive their water from local water utilities, which make withdrawals from Virginia's water sources (rivers, groundwater). DEQ regulates water withdrawals, including requiring permits for large-scale withdrawals, to protect future water availability and environmental sustainability. However, while DEQ is responsible for ensuring water sustainability, there is less oversight over how available water should be shared across various uses in a locality. Virginia as a whole is relatively water rich, but water is more limited for some localities that do not have access to large amounts of surface water and are in groundwater management areas.

Localities have allowed data centers to be built near neighborhoods, but some localities are taking steps to minimize residential impacts

The industrial scale of data centers makes them largely incompatible with residential uses. One-third of data centers are currently located near residential areas, and industry trends make future residential impacts more likely.

Inadequate local planning and zoning have allowed some data centers to be located near residential areas, which sometimes causes impacts on those residents. In some cases, this occurred because local zoning ordinances did not consider data centers to be an industrial use. In addition, some localities have zoned industrial areas next to residential areas, even though land use principles state that industrial uses and residential uses should not be zoned next to each other. Local elected officials have also granted data centers exceptions that led to adverse residential impacts, such as approving rezonings that would allow data centers next to sensitive locations.

In response to increased residential opposition, some localities have taken steps to minimize the residential impacts of data centers. The three Virginia localities with the largest data center markets have taken or are considering changes to zoning ordinances to better manage future data center development, and several localities considering their first data center projects are proactively implementing planning and zoning changes to promote appropriate industry development. The effectiveness of local efforts to minimize residential impacts ultimately depends on the decisions of local elected officials when considering more restrictive zoning ordinances or individual special permit or rezoning requests.

Data center noise near residential areas presents unique challenges, and some localities are unsure about their authority to address it

The constant nature of data center noise has sometimes been a problem when data centers are located near residential areas. Data centers emit low-frequency noise that is not loud enough to damage nearby residents' hearing and rarely loud enough to violate noise ordinances. However, some nearby residents report that the constant noise generated by some data centers affects their well-being. Although noise has been a problem for some data centers, a large majority of data centers do not generate noise complaints because of their location or design.

Localities traditionally use noise ordinances to address noise concerns, but those typically target excessively loud noise from short-term sources, such as parties and barking dogs, and carry a low maximum civil penalty of $500. Noise restrictions for data centers could be more effective if included in zoning ordinances instead, but some localities were uncertain whether they have the authority to establish these restrictions in such ordinances. Zoning ordinances that establish maximum allowable sound levels for both new and existing data centers would allow localities to better account for the low-frequency noise data centers emit, prescribe a better process for measuring potential noise violations, and impose more effective penalties for addressing any violations.

Some data center companies are conducting sound modeling studies *before* building data centers, but not all Virginia localities currently require this, and some were unsure whether they had the authority to do so.

Changes to the state's data center sales tax exemption could address some policy concerns related to the industry

Since 2010, Virginia has offered an exemption to the state's retail sales and use tax to attract large-scale data centers. The exemption allows data centers and their tenants to purchase computers and other equipment, such as servers, network infrastructure, cooling equipment, and generators, without paying sales tax. Because data centers are capital intensive, the exemption is valuable to the industry (providing $928 million in tax savings in FY23), and about 90 percent of the industry uses the exemption. Data center companies report the exemption is an important factor when deciding where to locate and expand, and most of the other states that Virginia competes with for new data center developments have similar exemptions.

Because the data center exemption is a valuable incentive and used by most of the industry, it could be used to incentivize data centers to take actions to address many of the issues discussed throughout this report. There are a range of changes that could be made to the exemption, depending on the General Assembly's policy objectives.

Extend the exemption to maintain industry growth — If the General Assembly wishes to maintain data center industry growth in Virginia and the associated economic and local tax revenue benefits, it could extend the exemption. The exemption is scheduled to expire in 2035, and data center representatives unanimously reported

that expiration of the exemption would negatively affect the state's ability to attract new data centers and keep existing ones. Data center companies typically consider the cost of ownership over a 15- to 20-year period when making location decisions, so to influence future site selection decisions, an extension would need to be in place well before 2035.

Allow the exemption to expire to reduce industry growth and associated energy impacts — If the General Assembly wishes to slow the data center industry's growth in Virginia because it determines that energy impacts, including increasing costs to residential and other customers, outweigh the industry's economic benefits, it could allow the exemption to expire in 2035. While the General Assembly could allow the exemption to expire only in certain regions, like Northern Virginia, that approach would be less effective in reducing overall growth in energy demand because significant growth is occurring in several counties outside of Northern Virginia and is expected to continue.

Change the exemption to balance industry growth and energy impacts — Rather than choosing between economic benefits or reduced energy impacts, the exemption could be changed to try to balance these competing impacts. The General Assembly could allow the full exemption to expire in 2035 (or end it before then) and apply a partial sales tax exemption until 2050. A partial exemption would also better align the economic benefits the state receives with the value of the exemption. Most economic benefits occur during construction, and switching to a partial exemption in 2035 would reduce the value of the exemption in later years when the economic impacts of current and planned data centers could be expected to slow. A partial exemption could also generate more tax revenue for the state.

Use the exemption to address other policy concerns related to the data center industry — If the General Assembly extends the exemption, even as a partial exemption, there are several additional options the General Assembly could implement to address concerns in specific policy areas. The exemption could be modified to address energy, natural resource, historic resource, and residential impacts.

WHAT WE RECOMMEND

This report includes multiple policy options for the General Assembly to consider depending on its policy goals for the data center industry in Virginia. The report also includes several recommendations. The following recommendations include only those highlighted in the report summary. The complete list of recommendations and options is available on page xi.

Legislative action

- Clarify that electric utilities have the authority to delay, but not deny, service to customers when the addition of customer load cannot be supported;

- Direct Dominion Energy to develop a plan for addressing the risk of infrastructure costs being stranded with existing customers, and file that plan with the State Corporation Commission;
- Expressly authorize local governments to require and consider water use estimates for proposed data center developments;
- Expressly authorize local governments to require sound modeling studies for proposed data center developments; and
- Expressly authorize local governments to establish and enforce maximum allowable sound levels for operational data center facilities using alternative low frequency metrics and zoning ordinances.

Executive action

- The Virginia Economic Development Partnership should clarify that grants under the Virginia Business Ready Sites Program can be used for potential data center sites.

Recommendations and Policy Options: Data Centers in Virginia

JLARC staff typically make recommendations to address findings during reviews. Staff also sometimes propose policy options rather than recommendations. The three most common reasons staff propose policy options rather than recommendations are: (1) the action proposed is a policy judgment best made by the General Assembly or other elected officials, (2) the evidence indicates that addressing a report finding is not necessarily required, but doing so could be beneficial, or (3) there are multiple ways in which a report finding could be addressed and there is insufficient evidence of a single best way to address the finding.

Recommendations

RECOMMENDATION 1

The Virginia Economic Development Partnership should clarify in site characterization and development guidelines that potential data center sites are eligible for grants under the Virginia Business Ready Sites Program. (Chapter 2)

RECOMMENDATION 2

The General Assembly may wish to consider amending the Code of Virginia to clarify that electric utilities have the authority to delay, but not deny, service to customers when the addition of customer load cannot be supported by the transmission system or available generation capacity. (Chapter 3)

RECOMMENDATION 3

The General Assembly may wish to consider amending the Code of Virginia to expand the Accelerated Renewable Buyers program, which allows large customers of energy utilities to claim credit for purchases of solar and wind *energy* to offset certain utility charges, to also allow customers to claim partial credit for purchases of *capacity* from battery energy storage systems based on the current PJM electric load carrying capacity rating. (Chapter 3)

RECOMMENDATION 4

The General Assembly may wish to consider amending the Code of Virginia to require that utilities establish a demand response program for large data center customers and to require that these customers participate in the program. (Chapter 3)

RECOMMENDATION 5

The General Assembly may wish to consider amending the Code of Virginia to direct Dominion Energy to develop a plan for addressing the risk of generation and transmission infrastructure costs being stranded with existing customers and file that plan with the State Corporation Commission as part of its biennial rate review filing or as a separate filing. (Chapter 4)

RECOMMENDATION 6

The General Assembly may wish to consider amending the Code of Virginia to expressly authorize local governments to (i) require proposed data center developments to submit water use estimates and (ii) consider water use when making rezoning and special use permit decisions related to data center development. (Chapter 5)

RECOMMENDATION 7

The General Assembly may wish to consider amending the Code of Virginia to expressly authorize local governments to require sound modeling studies for data center development projects prior to project approval. (Chapter 6)

RECOMMENDATION 8

The General Assembly may wish to consider amending the Code of Virginia to expressly authorize local governments to establish and enforce maximum allowable sound levels for data center facilities, including (i) using alternative low frequency noise metrics and (ii) setting noise rules and enforcement mechanisms in their zoning ordinances, separate from existing noise ordinances. (Chapter 6)

Policy Options to Consider

POLICY OPTION 1

The General Assembly could consider amending the Code of Virginia to require that, as a condition of receiving the sales tax exemption, data center companies meet and certify to an energy management standard, such as the International Organization for Standardization's 50001 standard for energy management. (Chapter 3)

POLICY OPTION 2

The General Assembly could consider amending the Code of Virginia to allow electric cooperatives to create for-profit subsidiary companies that could fulfill their legal obligation to provide energy services (retail sales) to customers with load capacity of over 90 MW. (Chapter 4)

POLICY OPTION 3

The General Assembly could consider amending the Code of Virginia to require that electric utilities establish caps on participation in retail choice that protect ratepayers from undue costs, and that such caps be approved by the State Corporation Commission through a formal case process. (Chapter 4)

POLICY OPTION 4

The General Assembly could amend the Code of Virginia to require that, as a condition of receiving the data center sales and use tax exemption, all new data center developments in the Northern Virginia Ozone Nonattainment Area use only Tier 4 generators, Tier 2 generators with selective catalytic reduction systems, or generators with equivalent or lower emission rates. (Chapter 5)

POLICY OPTION 5

The General Assembly could amend the Code of Virginia to require that, as a condition of receiving the sales and use tax exemption, data center companies meet and certify to an environmental management standard, such as the International Organization for Standardization's 14001 standard for Environmental Management Systems. (Chapter 5)

POLICY OPTION 6

The General Assembly could amend the Code of Virginia to require that, as a condition for receiving the sales and use tax exemption, data center companies conduct a Phase I historic resource study of a proposed development site, as well as a viewshed analysis when a proposed site is located within a certain distance of a registered historic site, and report the study findings to the appropriate locality prior to development. (Chapter 5)

POLICY OPTION 7

The General Assembly could amend the Code of Virginia to require that, as a condition for receiving the sales and use tax exemption, data center companies conduct a sound modeling study prior to the development of a proposed data center that is to be located within a certain distance of a residential development or area zoned for residential development and provide the study findings to the appropriate locality. (Chapter 6)

POLICY OPTION 8

The General Assembly could amend the Code of Virginia to extend the expiration date for the state's sales and use tax exemption for data centers from 2035 to 2050. (Chapter 7)

POLICY OPTION 9

The General Assembly could allow the sales and use tax exemption for data centers to expire in 2035. (Chapter 7)

POLICY OPTION 10

The General Assembly could amend the Code of Virginia to extend a partial sales and use tax exemption for data centers from 2035 to 2050. (Chapter 7)

1 Overview of the Data Center Industry

In 2023, the Joint Legislative Audit and Review Commission (JLARC) directed its staff to review the impacts of the data center industry in Virginia. Specifically, staff were directed to assess the impact of the industry on state and local revenue; Virginia's energy demand and supply; natural, historic, and cultural resources; and local residents. Staff were also directed to forecast future growth of the industry in Virginia and determine (i) how any economic benefits could be more widely distributed and (ii) if Virginia's data center tax exemption could be improved. (See Appendix A for the study resolution.)

To complete this study, JLARC staff conducted over 250 interviews with more than 150 different stakeholders, including local residents and stakeholder groups; data center companies and developers; state and local officials; electric and water utility companies; and subject-matter experts. Staff analyzed water usage and air quality and emissions data, as well as capital expenditure, employment, and tax benefit data from users of the data center tax exemption. Staff also reviewed state and local land use regulations and conducted case reviews of local data center-related zoning and permitting requests. (See Appendix B for more information on methods used for this study.)

JLARC staff contracted with two consultants as part of this study. Faculty from the Weldon Cooper Center for Public Service at the University of Virginia (Weldon Cooper Center) developed an economic impact analysis of Virginia's data center industry and an independent energy demand forecast for Virginia and its utilities. Consulting firm Energy + Environmental Economics (E3) modeled how data center growth was likely to affect future generation and transmission needs, carbon emissions, and utility costs, including how costs could be passed on to ratepayers. E3 also made additional refinements to the Weldon Cooper Center energy demand forecast.

Data centers are key hubs of the world's digital infrastructure

Data centers are specialized facilities that manage, process, and share large amounts of data. They enable the digital services that people rely on daily, including websites, electronic applications, and cloud-based platforms such as email and media streaming. These services are also critical to businesses and organizations, for example, allowing businesses to make secure transactions electronically or conduct complex computing tasks using artificial intelligence (AI). Given their essential role in daily life, business, and the economy, data centers have become a critical part of the world's digital infrastructure (sidebar).

Digital infrastructure encompasses the systems and technologies needed for the internet, online services, and other digital activities to function. This includes networks (e.g., fiber, switches), hardware (e.g., computers, servers), software (e.g., operating systems, applications), data centers, and the personnel who manage and maintain these components.

A typical, modern data center is a large industrial building filled with computing equipment, including servers, storage drives, and network hardware. Externally, these buildings often resemble warehouses or distribution centers. Data centers can vary greatly in size, ranging from smaller facilities with a few thousand square feet to large, multi-story buildings exceeding one million square feet. Data centers are often located on campuses alongside other facilities or other data centers operated by the same company. In addition, many data centers have physical security measures, such as floodlights, fencing, and access controls, to protect the facility and its data.

Megawatts are units used to measure power, equivalent to one million watts. Megawatts measure the amount of energy produced or consumed at any instant, rather than total over time. A different unit of measure is used to measure the amount of energy produced or consumed over a given time period. For example, megawatt-hours describe the number of megawatts produced or consumed during an hour.

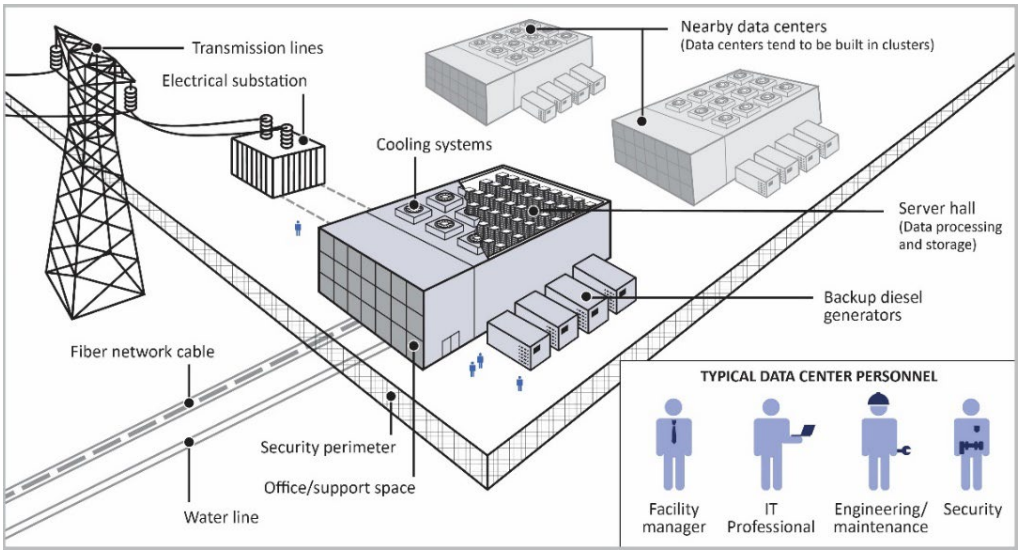
Data centers require large amounts of electricity to operate. This energy powers the computing equipment inside, as well as cooling equipment that prevents the computing equipment and building from overheating. The amount of electricity needed for a data center varies based on its size, the density and type of computing equipment, and the cooling system used. A small data center can require five to 20 megawatts of power, while a larger data center can require 100 or more megawatts (sidebar). Given the amount of electricity needed for operations, data centers often have power lines and substations connecting them directly to nearby high-voltage transmission lines. All data centers also have backup generators on-site to ensure continuity of operations if their primary power supply fails.

For context, **a Virginia town of 10,000 people uses approximately 10 megawatts**.

Data centers are operated and maintained by a skilled workforce, including technicians, electricians, and network engineers. Data centers also generally have security personnel.

Figure 1-1 illustrates the infrastructure, equipment, and personnel found in and around a typical, modern data center.

FIGURE 1-1
Common infrastructure, equipment, and personnel at a typical data center



SOURCE: JLARC staff.
NOTE: Illustrative example. Data centers may have different equipment, e.g., based on their cooling system.

There are various types of data centers, ranging from traditional enterprise and colocation facilities to newer hyperscale operations.

- Enterprise data centers are private facilities owned and operated by a single company, designed specifically to meet that company's IT and data storage needs. These are generally non-technology companies, such as banks, insurance firms, and credit card companies, that rely heavily on secure, in-house data processing and storage. Enterprise data centers are generally located on-site, such as within a corporate campus or integrated into a larger office building. Enterprise data centers are a shrinking segment of the data center market as companies increasingly rely on the cloud for their computing needs.
- Colocation data centers are facilities owned and operated by a company that leases physical space within their data center to other companies and organizations. These tenants, which include smaller technology companies, online retailers, and government agencies, house their computer equipment within their leased space and have their own staff who maintain and upgrade this equipment. Tenants rely on the data center owner to provide all other services such as power, cooling, and physical security. Colocation data centers generally serve multiple tenants—often upwards of 20 or more—which allows these companies to benefit from economies of scale.
- Hyperscale data centers are purpose-built facilities designed to serve the world's major technology companies (e.g., Amazon Web Services [AWS], Google, Meta, Microsoft), often known as "hyperscalers." These are the largest data centers with the largest operational capacity and power requirements (sidebar). Hyperscale data centers can either be owned and operated by the hyperscaler company or by a third-party that leases the facility to the hyperscaler. In some cases, the third party that owns the data center also provides services such as power, cooling, and security, while in others the hyperscaler manages all building operations. Hyperscale data centers are a growing segment of the data center market.

Operational capacity—also called "capacity"—refers to the amount of power a data center needs to operate. This includes all the power needed to run the computing equipment, cooling systems, and other building operations. Capacity is often used to describe the size of a data center. For the purposes of this chapter, capacity is measured in megawatts.

Data center industry is growing rapidly, driven by a combination of established and emerging trends

The data center industry spans markets around the world, clustering in locations that provide access to land, energy, and fiber, and are business friendly, politically stable, and at low risk from natural disasters. Many data center markets are located near key population, business, and government centers because they are close to their customers and end users. Being in proximity to customers reduces the time it takes for data to travel between the data center and the customer, ensuring fast processing, which can be critical for certain business operations, such as financial transactions (sidebar).

The time it takes for data to travel from one point to another, such as from a data center to the end user, is called "**latency.**" Low latency indicates data is traveling more quickly; high latency indicates there is a longer delay. Many factors affect latency, most notably the geographic distance between the data center and user. Some tasks—such as financial transactions—are more "latency sensitive" than others, meaning they require as low latency as possible.

It also reduces time for end users to access data, which, for example, reduces buffering times and increases picture quality when streaming media.

The data center industry is dominated by a few large participants. In the U.S., four hyperscaler companies—AWS, Google, Meta, and Microsoft—are responsible for much of the data center industry. These companies operate their own hyperscale data centers, lease other hyperscale data centers, and can also be customers within traditional colocation data centers.

Data center industry is growing rapidly worldwide

The data center industry is growing worldwide, with many data centers under construction or in development. Market reports and trade literature indicate the industry has grown significantly over the past decade, with an especially rapid growth rate in recent years, particularly in the Americas. For example, a 2024 report from the real estate firm Cushman & Wakefield estimates 44,600 megawatts of data center capacity is in development worldwide. More than half (55 percent) of this capacity is in the Americas region, 30 percent is in the Asia–Pacific region, and the remaining 15 percent is in the Europe, Middle East, and Africa (EMEA) region. When completed, this growth would double existing capacity across the EMEA markets and more than double existing capacity in the Americas and Asia–Pacific markets.

The industry is growing both in terms of the number of data centers under construction as well as the size and scale of those data centers. More data centers are being built, and many of the new data centers under construction are larger and have more operational capacity. For example, the capacity of a typical data center has increased from requiring only a few megawatts of power to more than 100 megawatts.

There has also been a recent shift toward companies building data center *campuses,* rather than individual data centers, to serve the needs of hyperscalers. Such campuses can be made up of multiple parcels of land and house several data centers owned by the same entity. Collectively, the operational capacity of these campuses can reach hundreds of megawatts, and in some cases, exceed one gigawatt (i.e., 1,000 megawatts). Companies are increasingly developing data center campuses, rather than individual facilities, to consolidate operations, improve efficiency, and more easily expand capacity in response to growing demand.

Industry expected to grow for foreseeable future, though factors could shift where growth occurs

The data center industry is expected to keep growing, driven by demand for digital services, such as e-commerce, media streaming, and cloud-based applications. This trend accelerated during the COVID-19 pandemic as more people and businesses relied on these services and is expected to continue. As the economy becomes increasingly digitized, more consumers use digital services, and the number of internet-

connected devices rises, the need for data storage, processing, and network capacity will continue to grow.

The recent emergence of AI is another significant driver of data center growth. AI applications, such as machine learning and data analytics, require immense computing power and storage to process large amounts of data. As businesses increasingly adopt AI tools and AI is integrated into commercial applications, the demand for data centers to support these technologies has surged and is expected to continue to grow.

AI also has the potential to reshape how and where the data center industry grows. For example, some AI workloads, such as large language model training, are not latency sensitive, allowing data centers housing these tasks to be located farther from established data center markets. Additionally, AI workloads are often much larger than typical data center demands, requiring larger facilities with more computing capacity and more power needs (sidebar).

Market constraints could also shift where the industry grows. Key factors, such as power availability, land price and availability, local opposition, and regulatory environments, are constraining the industry, especially in established markets. As these constraints grow, some markets may become less attractive for development, driving data center growth toward other locations.

AI workloads typically require more power than traditional data center tasks because they use more energy-intensive hardware. The servers conducting AI tasks often include graphics processing units (GPUs) alongside central processing units (CPUs), because GPUs are better suited to running large, simultaneous data processes required for AI applications. Since GPUs consume more power than CPUs, AI tasks are generally more energy demanding.

Northern Virginia has the largest data center market in the world, and the state's industry is growing

There are approximately 150 data center sites in Virginia, which collectively house around 340 data center buildings. These sites vary in size, ranging from a single 2,400-square-foot data center building to a campus of seven buildings that total more than 3 million square feet. In total, Virginia has over 63 million square feet of data center space on 7,200 acres of land (sidebar).

Virginia data center sites also vary in size in terms of operational capacity. The smallest sites require only about one megawatt of power, while some larger campuses are estimated to need 200 or more megawatts and are still growing. In total, Virginia data center sites use approximately 5,050 megawatts of power (sidebar). (This is based on the 2024 peak load forecast by Dominion Energy and Mecklenburg, Northern Virginia, and Rappahannock electric cooperatives in August 2023.)

For context, **Pocahontas State Park—the largest in Virginia—covers 7,600 acres.** The entire state park system spans a total of 75,900 acres.

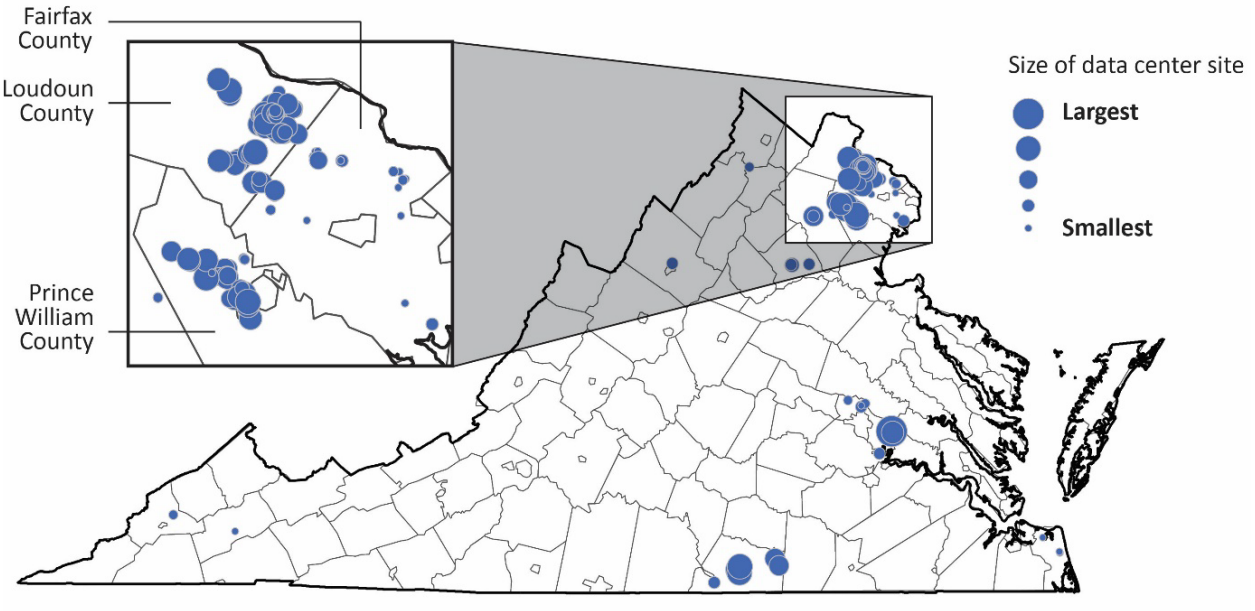
Data centers' power usage in Virginia—about 5,050 megawatts— is roughly **equivalent to the electricity needs of 2 million Virginia households** (about 60 percent of households in the state).

Virginia's data center industry is mostly concentrated in Northern Virginia, with other small clusters near Richmond and Mecklenburg

Data centers are located across the state, but 80 percent of Virginia's data center industry is concentrated in three Northern Virginia localities: Loudoun, Prince William, and Fairfax (Figure 1-2). Loudoun County alone accounts for approximately half of the state's data center industry in terms of number of sites, building square footage, and estimated energy usage. The eastern part of the county north of Dulles

International Airport has become known as "Data Center Alley" because of its high concentration of data centers. The remaining 20 percent of Virginia's data center sites are in 11 other localities, with the most notable clusters in the Richmond region and Mecklenburg County.

FIGURE 1-2
Most of Virginia's data center industry is concentrated in Northern Virginia

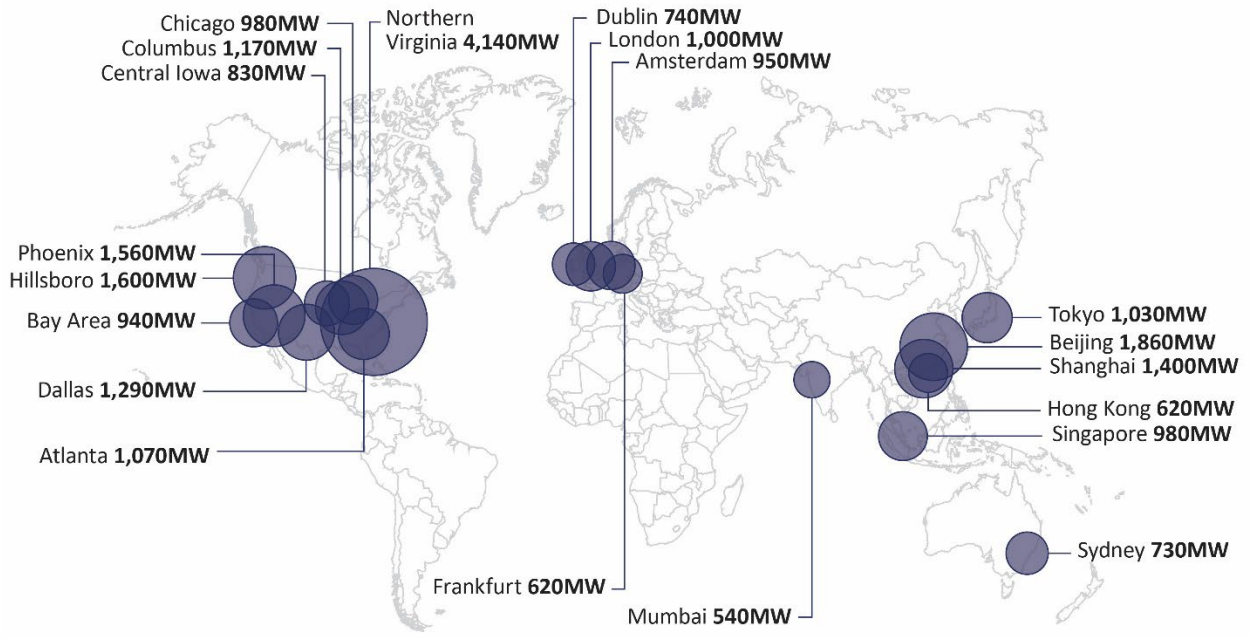


SOURCE: JLARC analysis of Virginia Department of Environmental Quality data and county property real estate records.
NOTE: Map shows one dot per data center site, which may include multiple data center buildings. Size of each site represented by size of dot, as measured by the maximum capacity (in terms of megawatts) the site is permitted to backup via diesel generators. This capacity is larger than the current operational capacity because it (i) accounts for the site's full build-out potential, which many sites have not yet reached, and (ii) includes allowances for redundancy. Data center operators report 0 to 25 percent of backup capacity is typically for redundancy.

Northern Virginia is the largest data center market in the world because of multiple factors

Northern Virginia has the highest concentration of data centers in the world and is recognized as the world's premier data center market. The exact size of the Northern Virginia data center market (in terms of the number of sites and energy demand) varies based on the sources used; however, every source indicates Northern Virginia is the global leader. According to data reported by Cushman & Wakefield, in terms of megawatts, the Northern Virginia market is more than twice the size of the next largest market in the world, Beijing, and nearly three times the size of the next largest market in the U.S., located in and around Hillsboro, Oregon (Figure 1-3). The Northern Virginia market constitutes 13 percent of all reported data center operational capacity globally and 25 percent of capacity in the Americas region.

FIGURE 1-3
Virginia has the most operational capacity of all global markets



SOURCE: JLARC analysis of Cushman & Wakefield 2024 Global Data Center Market Comparison.
NOTE: Reflects market size in terms of operational capacity as measured by megawatts. Shows 20 largest markets. "Northern Virginia" refers to an estimate of data center capacity in the traditional Northern Virginia market consisting of Fairfax, Loudoun, and Prince William counties and Manassas. The Cushman & Wakefield report also includes an estimated 560 megawatts of capacity in Culpeper and Fauquier counties and the Richmond metropolitan region.

Multiple factors have contributed to Northern Virginia's market prominence. The region's role in the early stages of the internet's development gave it a head start as a key data center hub. In the mid-20th century, early data processing companies contracting with government agencies and high-technology government labs were drawn to the region given its proximity to their federal government customers. The establishment of an internet exchange point in the 1990s further attracted major telecommunications and early internet companies to the region.

As the internet grew, a strong fiber network, supply of reliable cheap energy, and available land encouraged more data centers to locate in the region. Data centers were also drawn to the region given its proximity to major national customers, including most notably the federal government, government contractors, and technology firms that held an enormous amount of government and other data. With the rapid growth of the internet in the 2000s, it became advantageous for data centers to cluster near each other so they could share information more quickly. The high concentration of data centers also led to a burgeoning ecosystem of industry professionals, real estate developers, construction companies, and tradespeople with expertise in data centers, which continues to make the region attractive today.

The creation of a state data center tax incentive has also been a key factor in the industry's development in Northern Virginia, as well as the state more broadly. In 2010, Virginia adopted a sales and use tax exemption that exempted data centers from paying retail sales tax on computer and related equipment purchases, and the General Assembly has since expanded the exemption. (See Chapter 2 for more information about the sales and use tax exemption and its impact.)

Data center industry is growing rapidly in Virginia, both in established markets and newer ones

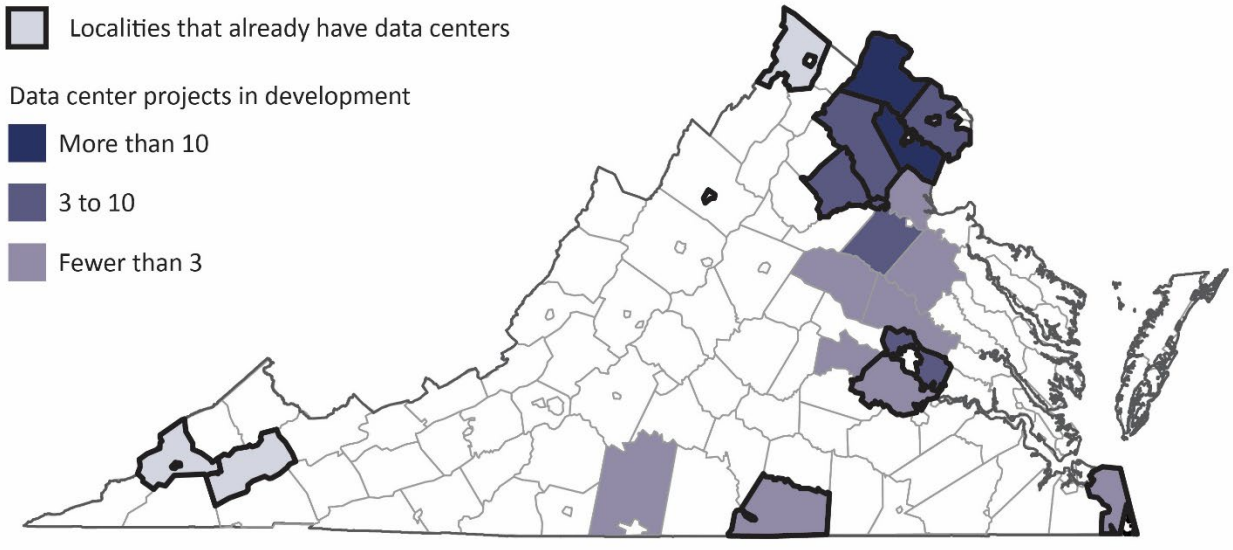
The data center industry is growing rapidly in Virginia. Since 2020, data center *space* in Virginia has more than doubled, with over a quarter of the state's existing data center square footage built in 2022 and 2023. Additional square footage has been built in 2024. A 2024 Cushman & Wakefield report underscores this trend, noting there is a record amount of data center *capacity* in development in the state. This includes 1,500 megawatts under construction and 2,900 megawatts in earlier stages of development. When this development is complete, it will nearly double the size of data center capacity in Virginia.

As of September 2024, there are at least 70 new known data center sites under active development across the state. These projects are at various stages of the development process, with more than half having received full local government approval and/or under construction. The remaining projects are at earlier stages, such as awaiting local rezoning or approval.

Much of the data center development is occurring in the established markets of Northern Virginia, the Richmond region, and Mecklenburg County. Within these existing markets, the majority of growth continues to be in Loudoun and Prince William counties, with Prince William County being the fastest-growing locality (Figure 1-4). The growth in these markets is driven by data center developers and companies building at new sites as well as expanding existing campuses.

The data center industry is also growing in new Virginia markets, most notably in counties outside of the established Northern Virginia market and along the I-95 corridor (Figure 1-4). For example, seven localities without any data centers have recently approved new campuses or have applications pending. According to stakeholders, data center development is moving into these new markets as land availability and local regulatory environments become more challenging in Northern Virginia. Additionally, AWS is leading development into localities along I-95 as part of its agreement with the state to invest $35 billion in data centers in new Virginia locations by 2040.

FIGURE 1-4
Data center industry still growing in established markets, but development starting to spread into new areas, such as along I-95



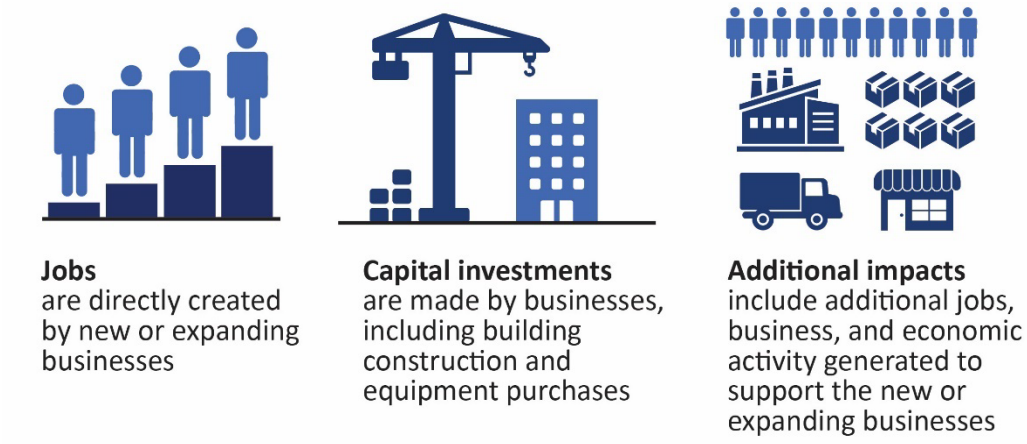
SOURCE: JLARC summary analysis as of September 2024.
NOTE: "In development" includes projects that are under construction, permitted, and/or have been approved through local rezoning or other approval processes (if applicable).

2 Economic and Fiscal Impacts

States strive to build and maintain a strong and diverse economy. A strong economy benefits the state by increasing the wealth of its citizens, helping its businesses succeed, and generating tax revenues to support state and local government operations. Tax revenues help pay for essential services like roads, schools, and public safety.

Virginia looks to improve its economy by attracting new businesses and having existing businesses expand their operations. Businesses benefit the economy directly by creating new jobs and making capital investments, such as constructing new buildings and purchasing vehicles and equipment. Business activities have many additional impacts that further economic growth, such as creating additional jobs at in-state suppliers and in the service industries that support the original business and its employees (Figure 2-1).

FIGURE 2-1
Businesses create jobs and capital investment and have additional impacts that benefit the state economy



SOURCE: JLARC staff analysis.

Data center industry provides positive economic benefits to state

State and local economic development agencies view data centers as an attractive industry. Data center companies are some of the largest and most well-resourced technology companies in the world. Though data centers directly employ relatively fewer employees than some industries, data center jobs tend to be higher paying, so jobs

have a higher economic impact. Data centers also meet other characteristics of a high impact industry: they are in a tradable industry sector and have a high employment multiplier (sidebar). Data centers—like manufacturers, steel producers, and transportation industries—are also capital intensive. Their facilities are enormous and require multibillion-dollar outlays for construction and equipment, which can provide substantial tax revenue for local governments and a comparatively smaller amount of tax revenue for the state (for the portion that is not tax-exempt).

The data center industry provides secondary economic benefits to the state as well. The clustering of data centers in a region, like Northern Virginia, can have "knock on" economic effects by indirectly attracting other related technology businesses, which help create a well-trained, regional IT workforce. This clustering of data centers, related businesses, and skilled workers can further improve the region's attractiveness to additional businesses in the technology sector and other sectors.

Tradeable sector includes businesses that compete or export goods and services outside of where they are located. They have larger economic impacts because they bring in new revenue from outside the state instead of simply reallocating existing economic activity.

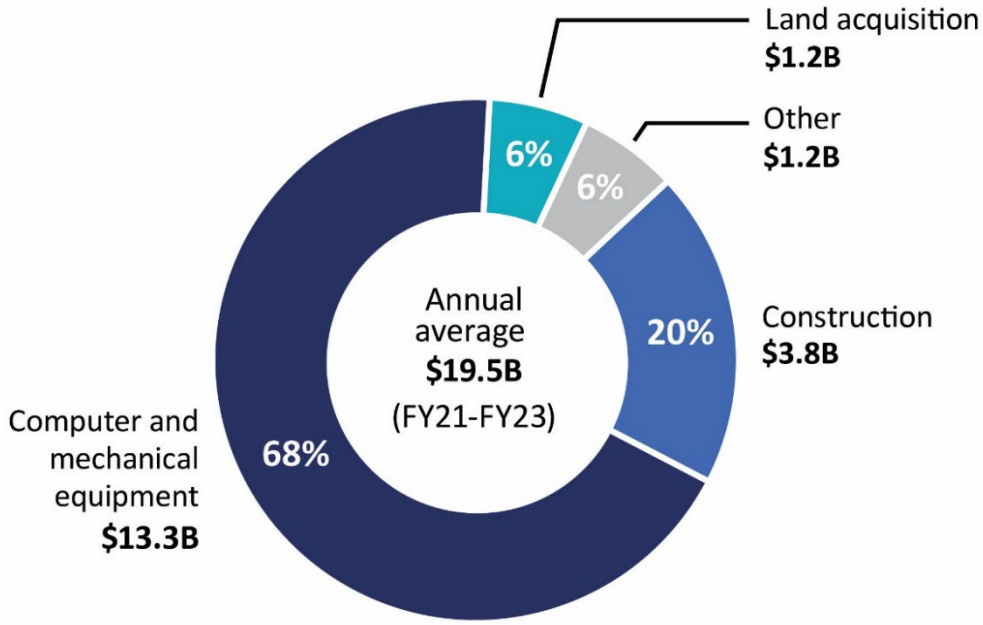
An **employment multiplier** is an estimate of the number of additional jobs created in the economy to support each job created directly by an industry.

Data center capital investment is substantial, although only a portion of it benefits Virginia's economy

Capital investment in Virginia data centers is substantial, exceeding $24 billion in FY23, and primarily consists of equipment purchases from Virginia-based and out-of-state companies. Data center investment represented 84 percent of the total capital investment across all economic development projects announced by the Virginia Economic Development Partnership (VEDP) between FY22 and FY24. However, like capital investments made by other industries, only a portion of data center capital investment benefits the Virginia economy. The primary benefit to Virginia's economy is related to data center construction, which comprises about 20 percent of total data center capital investment (Figure 2-2). Most construction spending likely remains in the state economy because much of it goes to Virginia-based businesses performing key construction services such as clearing and grading sites, erecting steel frames, installing high-voltage electrical equipment, installing industrial-scale cooling systems, and running miles of cable, conduit, and piping. Materials used in data center construction are often also sourced from Virginia businesses throughout the state.

The largest portion of data center capital investment is for IT and mechanical equipment (68 percent), and most of this spending occurs with out-of-state companies. Computer servers are the biggest equipment expense and, because there are no major computer server manufacturers in Virginia, are sourced from outside the state or the country. Some other equipment used in data centers is sourced in Virginia. For example, Virginia has suppliers of electrical and cooling equipment, raised-access floors and hot/cold aisle containment systems, and fiber infrastructure. These suppliers have recently located or expanded operations in Virginia because of the state's large data center market. Even so, a substantial amount of non-computer equipment still likely comes from out-of-state, such as the diesel generators data centers use for backup power.

FIGURE 2-2
Primary benefit of data center capital investment to Virginia's economy is from construction, which comprises 20 percent of data centers' capital investment



SOURCE: JLARC staff and Weldon Cooper Center analysis of data center capital investment between FY21 and FY23 reported to VEDP.

Data center industry supports relatively small operations workforce and sizable construction workforce, both with average or above average wages

Data centers typically employ a small number of workers for data center operations, relative to their facility size. For example, several data center representatives indicated that a typical 250,000-square-foot data center may have approximately 50 full-time workers (one employee per 5,000 square feet versus one employee per 650 square feet for some distribution centers). About half of these workers are likely direct employees of the data center company (or for colocation data centers, direct employees of the tenant). These workers include facility managers, engineers, data technicians, and facility maintenance staff. The other half are contract workers, including electricians, pipefitters, and security personnel who work full-time at the facility (sidebar).

Data center direct employees and contract workers accounted for, by JLARC staff estimates, over 8,000 full-time jobs in FY23. A data center may add new jobs each year as new facilities begin and expand operations. In FY23, data centers added more than 800 new full-time jobs.

Data center construction, however, supports a substantially larger number of workers than data center operations. Construction of an individual data center building usually

Data centers require constant ongoing maintenance of electrical and cooling systems. Data centers have hundreds of electrical and mechanical components that must be replaced as they break down over time. Additionally, these systems can also be upgraded or configurations changed as computer equipment is upgraded and replaced.

takes about 12 to 18 months, and it can take five or more years to fully build out a campus. Data center representatives indicated that, at the height of construction, approximately 1,500 workers are on site building a facility and installing electrical and cooling systems and include occupations such as

- site developers and surveyors,
- equipment operators for land clearing and leveling,
- workers to erect steel building frames and concrete walls,
- electricians installing cabling, equipment, and generators, and
- pipefitters and HVAC technicians installing piping and cooling equipment.

Both data center operations and construction workers earn average or above average wages, contributing to the economic benefit of the industry. On average, data center employees and contractors earn about $100,000 per year, varying based on job role and area of the state. Many construction-related jobs do not require a college degree but are also relatively high-paying. For example, the starting salary for electricians is approximately $24 per hour, and a "journeyman" (fully trained) electrician can make approximately $56 per hour. These wages translate to $50,000 and $116,000 in annual wages, respectively, but the actual annual wages are likely higher because these workers often work over 40 hours per week and can earn overtime pay.

The growth of Virginia's data center industry has contributed to the expansion of the state's trades and construction industry. A representative from a construction supplier and contractor indicated that the data center industry is the largest construction sector right now, and data center projects are about one-third to one-half of their current projects and nearly two-thirds of their backlog. A representative of an electrical workers union in Northern Virginia indicated that, because of demand from the growing data center industry, their apprenticeship program has grown from 300 apprentices per training course to 500 in the last several years and could grow larger. A benefit of this growth is that many workers are able to stay in-state and move to another data center construction job after a project is complete, rather than moving to another state to find work.

Data center industry has added thousands of jobs and several billion dollars to state's economy, mostly from construction

The data center industry benefits the Virginia economy because of the additional jobs and personal income created and the value it adds to the Virginia economy (i.e., Virginia gross domestic product or GDP). JLARC staff commissioned an independent economic impact analysis of the data center industry in Virginia (sidebar). The analysis estimated that the data center industry provides approximately 74,000 jobs, $5.5 billion in labor income, and $9.1 billion in Virginia GDP overall to the state economy annually, based on average spending by the industry between FY21 and FY23 (Table 2-1). These estimates are just over 1 percent of total statewide employment, income, and Virginia GDP during the last three years. Most of the economic benefits have been in

JLARC's independent economic impact analysis was performed by staff from the Weldon Cooper Center. The analysis was conducted using economic modeling software developed by IMPLAN. The model uses an industry standard methodology but does not account for the cost of some potential externalities, such as health and environmental costs associated with increased carbon emissions, that may be associated with the industry's large energy demands. See Appendix D for additional details.

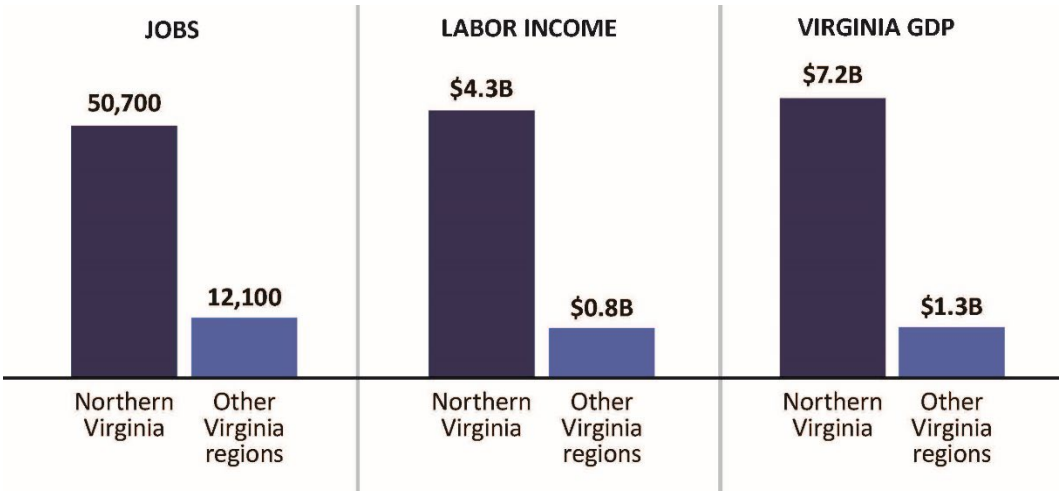
the Northern Virginia region, but other regions where data centers are located or under construction, or that have businesses that otherwise support the industry, also benefited (Figure 2-3).

TABLE 2-1
Data center industry has positive economic benefits on Virginia

	Annual average based on data center capital investment and related operation spending		
Economic impact	**Construction phase**	**Operations phase**	**Total impact**
Jobs	59,000 jobs *(35,000 direct)*	15,000 jobs *(4,400 direct)*	74,000 jobs *(39,400 direct)*
Labor income	$4.3 B *($2.6 B direct)*	$1.2 B *($0.4 B direct)*	$5.5 B *($3.1 B direct)*
Virginia GDP	$6.4 B *($3.3 B direct)*	$2.7 B *($1.1 B direct)*	$9.1 B *($4.4 B direct)*

SOURCE: Weldon Cooper Center economic impact analysis of the data center industry impacts, based on data center spending between FY21 and FY23 reported to VEDP, adjusted to account for non-exempt data centers. Numbers may not sum because of rounding.
NOTE: Direct operations jobs include only data center employees and exclude contractors that work full time at data centers. Total impact includes direct impacts plus indirect and induced impacts. Average data center economic impacts presented here likely underestimate the impacts in more recent years given the growth of the industry.

FIGURE 2-3
Economic impact from data centers is concentrated in Northern Virginia



SOURCE: Weldon Cooper Center economic analysis of the annual data center industry impacts, based on data center spending between FY21 and FY23 reported to VEDP, adjusted to account for non-exempt data centers.
NOTE: Totals for Northern Virginia and other Virginia regions do not sum to statewide totals shown in Table 2-1 because the analysis does not account for impacts from activity in Northern Virginia occurring in other Virginia regions and vice versa.

Much of the data center industry's economic benefits in Virginia derive from capital spending during the construction phase rather than spending during ongoing operations (Table 2-1). Annual average spending during the construction phase is estimated

to be more than three times annual operation spending, according to prior research. Data centers were estimated to contribute 59,000 jobs annually during the construction phase, accounting for 80 percent of total annual jobs resulting from data centers. This estimate includes 35,000 direct jobs, most of which were construction workers (28,000), although some were IT-related workers manufacturing and installing equipment (7,000). Another 24,000 jobs were estimated to be in supporting sectors, such as materials suppliers, and "induced jobs" in businesses that benefit from worker spending, such as restaurants and retail. The data center construction phase also accounted for most of the annual increase in total labor income (80 percent) and total Virginia GDP (70 percent) from data centers. Appendix D provides additional technical details on these and other analysis outcomes.

Because most of data centers' economic benefits are from construction, continued growth of the data center industry would be needed in Virginia to maintain the same level of economic impact. Current trends suggest continued growth is likely to happen, at least for the near future. Virginia's data center market is expected to double in the next few years based on the data center capacity currently under construction and in the early development stages.

Data centers generate substantial local tax revenues for localities that have them

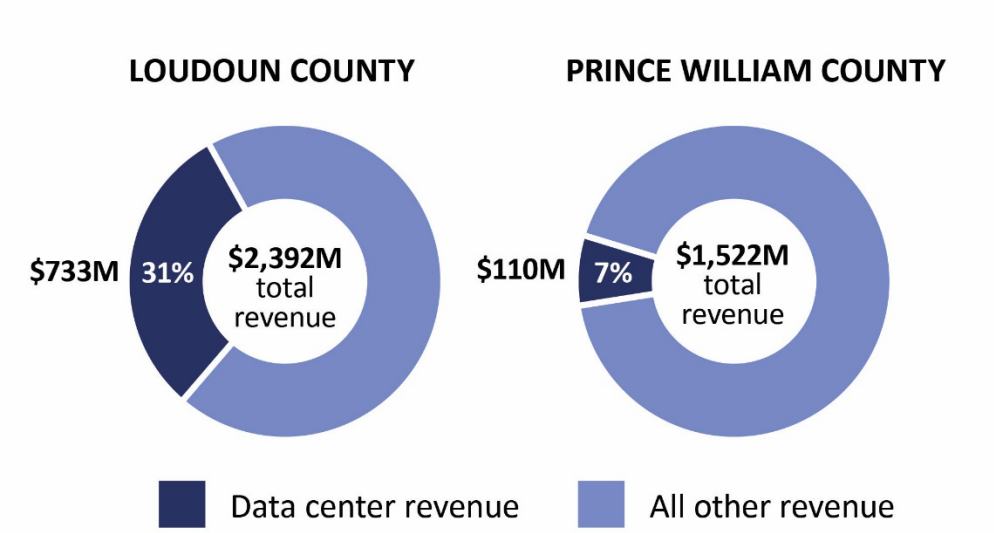
Business personal property taxes are levied by local governments on the value of property, such as furniture, fixtures, computer equipment, machinery, tools, and heavy equipment within their locality. State law allows a locality to tax certain classes of personal property at lower rates, including computer equipment for data processing.

Real property (or real estate) taxes are levied by a local government on land and improvements in their locality.

Local governments with data centers in their jurisdictions can collect substantial tax revenues from the industry. Data centers pay different types of local taxes, but the primary ones are business personal property and real property (real estate) taxes (sidebar). The business property tax, in particular, can generate substantial revenue. A single data center typically has business personal property valued in the millions, a large portion of which is computer equipment that is typically replaced every five years.

Although data center tax revenues can be substantial, the industry's share of local revenue varies. For the five localities with relatively mature data center markets (Loudoun, Prince William, Mecklenburg, Henrico, and Fairfax), data center revenue ranged from less than 1 percent to 31 percent of total local revenue. The amounts collected and percentage of local revenues vary substantially because of differences in the size and maturity of the data center markets, locality sizes and tax bases, and local tax rates and depreciation schedules. Loudoun and Prince William have the largest and most mature markets, and data center revenue accounted for 31 percent and 7 percent, respectively, of total local tax revenue (Figure 2-4). Loudoun collects substantially more revenue from data centers primarily because its data center market size is three times larger than Prince William's. Revenue estimates are not provided for all of these localities to protect taxpayer confidentiality.

FIGURE 2-4
Data center tax revenue can be substantial for local governments (FY23)



SOURCE: JLARC staff analysis of revenue collections from localities and the APA Local Government Comparative Report, FY23.

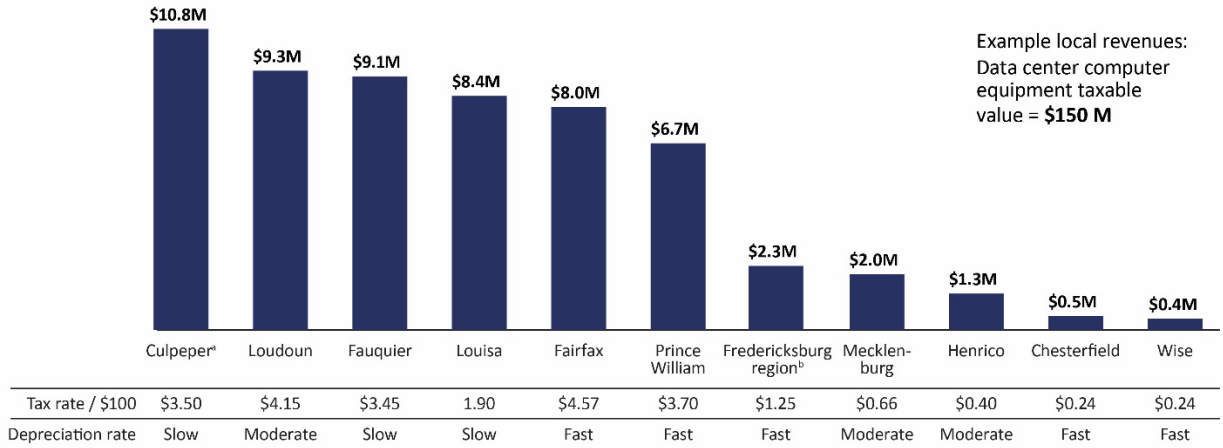
Tax rates also significantly affect the amount of revenue a locality can generate from data center developments. Some localities have greatly reduced their business personal property tax rates for computer equipment to try to attract the industry and, therefore, collect far less revenue than other localities with a higher tax rate would collect for a comparable project. For example, assuming a data center with $150 million in taxable computer equipment, counties could collect from $10.8 million to $0.4 million over a five-year period (after accounting for different tax rates and depreciation schedules) (Figure 2-5).

Even with the variation in tax revenue collections, local government staff from the five counties with the greatest data center presence indicated that data center revenue has benefited their locality. Local government staff indicated data center revenue has allowed their locality to

- lower real estate tax rates (Loudoun and Prince William),
- develop an affordable housing trust fund (Henrico County),
- establish revenue stabilization or reserve funds (Loudoun and Prince William), and
- construct new schools (Mecklenburg).

FIGURE 2-5

Some localities would collect far less revenue over a five-year period than others for the same data center development



	Culpeper[a]	Loudoun	Fauquier	Louisa	Fairfax	Prince William	Fredericksburg region[b]	Mecklen-burg	Henrico	Chesterfield	Wise
Tax rate / $100	$3.50	$4.15	$3.45	1.90	$4.57	$3.70	$1.25	$0.66	$0.40	$0.24	$0.24
Depreciation rate	Slow	Moderate	Slow	Slow	Fast	Fast	Fast	Moderate	Moderate	Fast	Fast

SOURCE: JLARC staff analysis of locality property tax rates and depreciation schedules for computer equipment.
NOTE: Tax rate is the business personal property tax rate in 2024 for computer equipment. Amounts exclude real property taxes. Amounts are based on a data center with $150 million in equipment. Data center equipment is typically replaced every five years, which resets the depreciation schedule used to calculate the decline in value of equipment each year after its purchase.
[a] Culpeper provides a local tax rebate for data centers that invest at least $10 million and hire at least 10 new employees in the Culpeper Technology Zone, and therefore may reduce this amount for qualifying data centers. [b] Fredericksburg Region includes the City of Fredericksburg, Caroline County, King George County, Spotsylvania County, and Stafford County.

In addition to the revenue the industry generates, local government staff reported that data centers are an attractive industry because they impose minimal direct costs on the provision of government services compared with other industries. Data centers employ relatively few employees in comparison with other industries like manufacturing and logistics. Industries with more employees place greater demand on local roads, school systems, and other services.

Localities in distressed areas have difficulty attracting data centers

Data center developments could benefit localities in economically distressed areas of the state through increased local revenue. However, localities in these areas face several challenges in attracting data centers. To be considered, a locality likely needs to have 230kV transmission lines (the preferred voltage for modern data center campuses) and large and flat properties close to those transmission lines. These requirements could prevent many counties in distressed areas, particularly in Southwest Virginia, from being considered.

Localities in economically distressed areas that are away from population centers can also only compete for certain types of data centers. They cannot compete for data centers that need to be close to customers or require low latency, such as cloud computing and colocation facilities. However, they may be able to compete for data centers

running artificial intelligence (AI) workloads, such as training models, which do not need to be near populated areas and may not require low latency. AI is expected to drive a lot of future industry growth and presents an opportunity for more remote localities.

The state could improve the competitiveness of localities in distressed areas by helping them identify, prepare, and market industrial sites that are attractive to the data center industry. Data center companies prefer to move fast once a site has been identified, so available land should have access to roads and other utilities (water, sewer) that allow construction to begin soon after selection. Company representatives said industrial sites that are shovel-ready could be particularly attractive. The primary reason Mecklenburg was successful in attracting Microsoft was because the county had already identified a site suitable for data center development when Microsoft was looking for potential Virginia locations.

The Virginia Business Ready Sites Program, which is administered by VEDP, can be used for this purpose. The program identifies and assesses the readiness of potential industrial sites and provides site characterization and development grants to local governments and regional authorities. The program is intended to develop sites to attract large employers, such as manufacturers, but it can be used to identify and develop sites for which data centers would be a "best use" and would generate a positive return on investment for the state. For example, a 150-acre site that has limited road and rail infrastructure but is located close to 230kV transmission lines might be best used as a data center instead of a manufacturing plant. To help localities in distressed areas compete for data centers, VEDP should clarify that potential data center sites can be included in VEDP's site listings and are eligible for Virginia Business Ready Sites Program grants.

RECOMMENDATION 1

The Virginia Economic Development Partnership should clarify in site characterization and development guidelines that potential data center sites are eligible for grants under the Virginia Business Ready Sites Program.

The state made changes to its data center sales tax exemption, discussed in the next section, several years ago to try to attract data centers to distressed areas of the state (sidebar). However, very few data centers have qualified for the exemption under the changes, so the changes alone may not be sufficient to overcome other challenges to attract data centers to these areas.

The 2020 General Assembly **lowered the eligibility requirements** for the data center exemption in distressed areas of the state to 10 jobs and capital investment of $75 million to encourage growth in these areas.

State's data center exemption encourages industry growth and has moderate economic benefits

Virginia, like other states, uses incentives and other strategies to try to attract specific industries that can create new economic activity. The goal of targeting specific industries is to establish industry clusters or ecosystems.

Since 2010, Virginia has offered a retail sales and use tax exemption to attract large-scale data centers. The exemption allows qualifying data centers and their tenants to purchase computers and other equipment without paying the state sales tax on the following items, namely

- computer equipment such as servers, mainframes, network infrastructure, and data storage hardware; and
- other equipment such as cabling, switches, cooling equipment, generators, monitoring systems, and similar items used to operate exempt equipment.

This report includes higher **estimates of the tax revenue impact of the data center exemption** than was reported in prior years. Data centers using the exemption are now required to report to the Virginia Economic Development Partnership their annual eligible exemption expenditures and tax benefits.

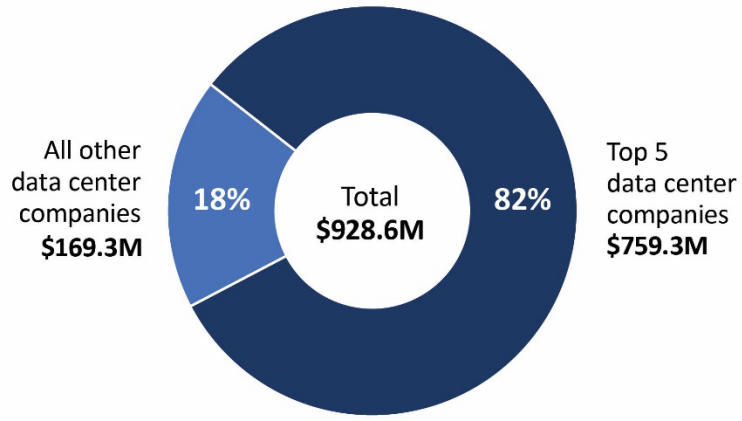
The statewide retail sales and use tax includes a 4.3 percent state share, a 1 percent local option share, and additional 0.7 percent to 1.7 percent regional share, depending on the region. In addition to collecting revenue from the local option, localities tax data center property in other ways, as described in this chapter.

Exemption provides qualifying data center companies with substantial tax reductions

Data center owners and their tenants, which can include a wide range of businesses in sectors like technology, health care, financial institutions, and retail, can claim the data center sales and use tax exemption if they meet eligibility requirements. To qualify, data centers must create a minimum of 50 jobs paying at least 150 percent of the prevailing annual average wage in the locality where the data center is located and make a $150 million capital investment. As noted above, the minimum thresholds are lower for distressed areas. Data centers and tenants reported saving $928.6 million in sales taxes in FY23 because of the exemption, including state, local, and regional portions of the tax (sidebar). The state portion of the exempted amount was an estimated $683 million, making it by far the state's largest economic development incentive, with the next closest incentive valued at $74 million.

Although approximately 30 data center companies (and their tenants, for colocation data centers) claim the exemption, most of the tax savings accrue to a small number of companies (Figure 2-6). Even so, the median savings for a data center company using the exemption was $5.4 million in FY23, and all but six companies saved $1 million or more.

FIGURE 2-6
Most of the tax savings from data center exemption go to only a few data center companies (FY23)



SOURCE: JLARC staff analysis of data center exemption information reported to VEDP.
NOTE: For colocation data centers, the tax savings is attributed to the data center owner rather than the individual tenant, because the data center owner is the "holder" of the MOU and the reporting entity.

Exemption likely affects data center location and expansion decisions

Data center companies consider several factors when determining where to locate, and state sales tax exemptions are regularly ranked among their top factors. The other top site selection factors are access to power, available land, workforce quality, customer needs, business-friendly regulatory climate, and utility and other costs. While it is impossible to precisely determine the exemption's importance in data centers' location decisions, representatives from data center companies indicated the exemption was a key consideration because it greatly reduces their costs.

Data center companies view the exemption as important because their industry is capital intensive, and the exemption provides substantial savings on those investments. If a typical modern 250,000-square-foot data center costs $250 million to $325 million to build and equip, the exemption would provide an initial benefit of about $9 million to $15.5 million in savings (depending on the locality). Companies also save on subsequent equipment purchases, usually made every five years when data centers replace and upgrade their computer equipment. For colocation data centers, the exemption is also important for meeting customer needs, because it provides savings to tenants who purchase their own equipment.

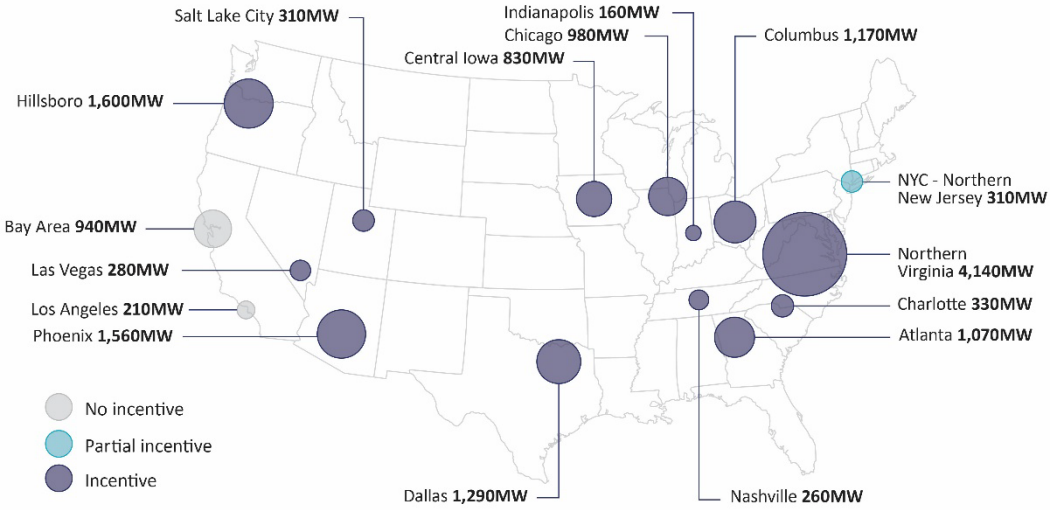
Virginia is competing for data centers with other states that have similar exemptions

Since the late 2000s, states have increased their efforts to attract data centers, primarily by adopting sales tax exemptions. In 2008, Virginia became the seventh state to adopt a sales tax exemption. (The initial exemption applied to very few localities and is no longer in effect, but a statewide exemption was adopted in 2010.) Today, the majority

of states either have a sales tax exemption for data centers (34) or do not have a sales tax (4). All states bordering Virginia provide a sales tax exemption to data centers. (See Appendix E for a map of states with a data center sales tax exemption.)

Virginia competes with other states for new data center developments, especially states that also have primary markets. Most other primary markets are located in states with exemptions, with the exceptions being markets in California and the New Jersey portion of the New York-northern New Jersey market (Figure 2-7). These two markets have a relatively small data center presence considering their proximity to major population centers, the California market's proximity to high tech firms in Silicon Valley, and the New Jersey market's proximity to the U.S. financial center in New York City.

FIGURE 2-7
All primary data center markets in the U.S. have exemptions, except for California and northern New Jersey markets, which are relatively small



SOURCE: JLARC staff analysis of Cushman & Wakefield 2024 Global Data Center Market Comparison.
NOTE: Oregon (Hillsboro market) does not have a sales tax (which has similar effect of the exemption). "Northern Virginia" refers to an estimate of data center capacity in the traditional Northern Virginia market consisting of Fairfax, Loudoun, and Prince William counties and Manassas. The Cushman & Wakefield report also includes an estimated 560 megawatts of capacity in Culpeper and Fauquier counties and the Richmond metropolitan region.

Data center exemption has moderate economic benefits and return in revenue to the state compared with other incentives

The data center exemption has moderate economic benefits and moderate return in revenue to the state compared with Virginia's other economic development incentives. (See *Data Center and Manufacturing Incentives,* JLARC, 2019.) It is rated as moderate because it is similar to the economic benefits and return in revenue for the average incentive (Table 2-2). Like most economic development incentives, the data center exemption does not pay for itself when considering just the state portion of the exemption cost and the state return in revenue.

TABLE 2-2
Data center exemption has moderate benefits compared with other incentives

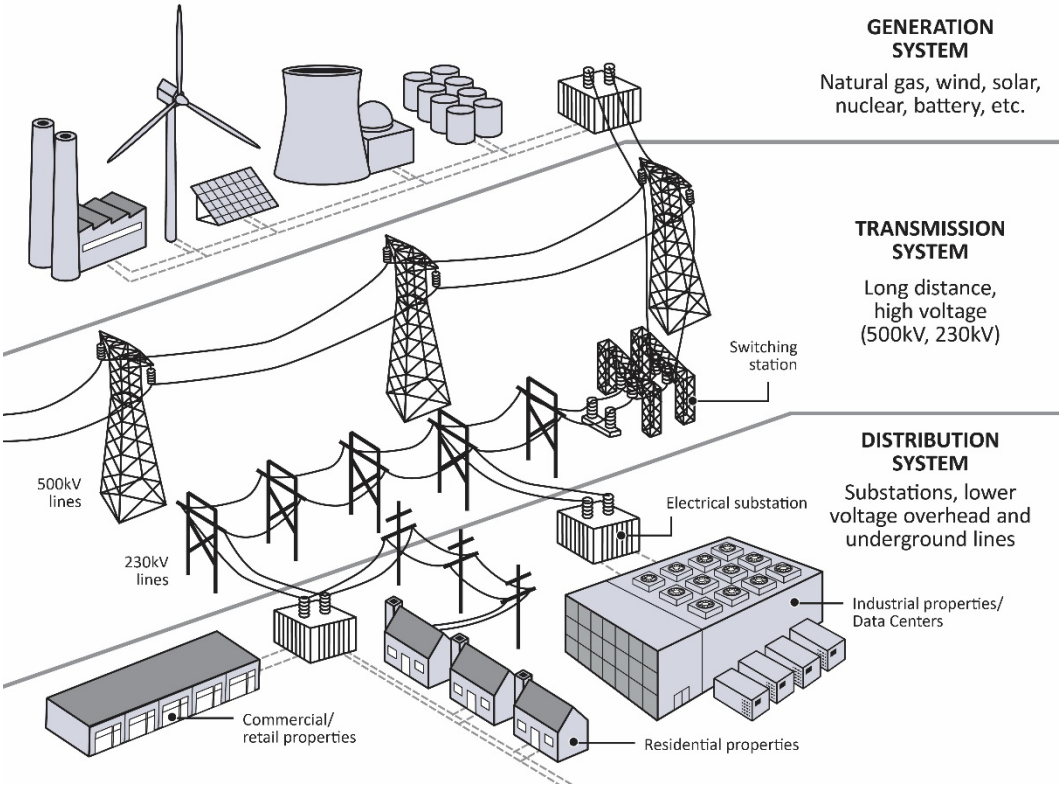
	Annual average	
	Data center exemption	**Average Virginia incentive**
Economic impact per $1 million spent on the exemption		
Jobs added	84 jobs	58 jobs
Income added	$6 M	$5 M
Virginia GDP increase	$10 M	$9 M
Impact on state revenue per $1 spent on the exemption		
Return in revenue per $1 spent	48¢	41¢

SOURCE: *Economic Development Incentives 2024*, JLARC 2024.

3 Energy Impacts

Virginia's power grid is part of the North American Eastern Interconnection, a massive energy infrastructure network that provides electricity to most states and several Canadian provinces east of the Rocky Mountains. The grid comprises three key interconnected systems: generation, transmission, and distribution (Figure 3-1). Power generation in Virginia has historically come from a few large carbon fuel and nuclear plants, but is increasingly coming from renewable sources like solar and wind. The transmission system moves power in bulk over long distances from where it is generated to the area where it is consumed. Power is then reduced to lower voltages and provided to homes, businesses, and other consumers through the distribution system.

FIGURE 3-1
Power grid is a complex network of generation, transmission, and distribution systems

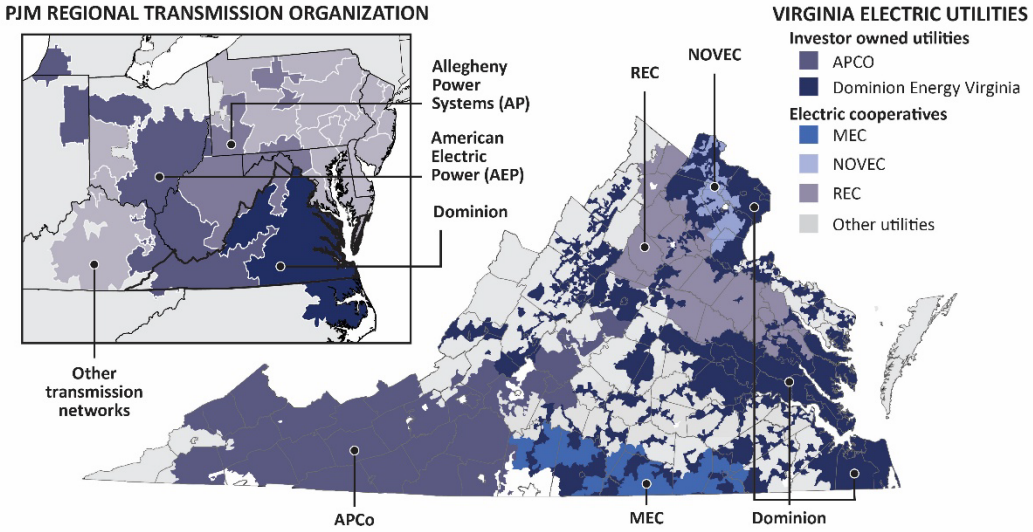


SOURCE: JLARC staff.

Within the eastern power grid, Virginia is part of the PJM regional transmission organization (Figure 3-2). PJM is a not-for-profit organization that coordinates generation and transmission operations and operates as a wholesale power market for its members, including utilities, independent power generators, and other energy companies. Within Virginia's section of PJM, the two main power utilities are Dominion and American Electric Power (AEP), which operate much of the generation and most of the transmission that serve the state. Dominion and AEP (under its subsidiary Appalachian Power Company, or APCO) are also the distribution utilities for much of the state. However, a significant portion of the state is served by 13 distribution cooperatives (the "co-ops"). Most co-ops purchase their power through another generation and transmission utility, the Old Dominion Electric Cooperative (ODEC), which operates or partially owns a few power plants, and contracts for additional power, in and outside of Virginia. The largest distribution co-op, the Northern Virginia Electric Cooperative (NOVEC), purchases its own generation and operates one power plant.

Virginia's power utilities are subject to state and federal laws and are regulated by the State Corporation Commission (SCC) and the Federal Energy Regulatory Commission (FERC). One of the SCC's key functions is to approve new generation and transmission projects. See Appendix F for more discussion of generation and transmission projects' potential impacts and how regulators and utilities try to minimize those impacts.

FIGURE 3-2
Virginia is part of PJM and relies on transmission and distribution utilities



SOURCE: PJM and SCC maps.
NOTE: MEC = Mecklenburg Electric Cooperative. REC = Rappahannock Electric Cooperative. Additional cooperatives that are not named above include A&N, BARC, Craig-Botetourt, Community, Central Virginia, Northern Neck, Powell Valley, Prince George, Southside, and Shenandoah Valley. There are also several small municipal power utilities, and the investor-owned Eastern Kentucky Power Company serves a small portion of Southwest Virginia.

Data center industry is driving immense increase in energy demand and will require enormous new infrastructure investments

Modern data centers consume substantially more energy than other types of commercial or industrial operations. For example, one of the smaller data centers recently constructed in Virginia can draw up to 18 MW of power (sidebar). This is roughly equivalent to a mid-sized automobile assembly plant, 60 large commercial office buildings, or 4,500 homes. The largest new data centers can draw from 100 to over 200 MW each, which is more than most industrial consumers. Some planned data center campuses are expected to consume well over 1,000 MW, once fully built out, which is more than the 950 MW generation capacity of the state's largest nuclear reactor.

Data center power demand is typically measured in megawatts (MW). A watt measures the amount of energy produced or consumed at any instant, and a megawatt is equal to 1 million watts. For example, a 100 MW data center can consume up to 100 MW of energy at a given point in time. Energy consumption over time is typically measured in kilowatt-hours (KWh) or megawatt-hours (MWh).

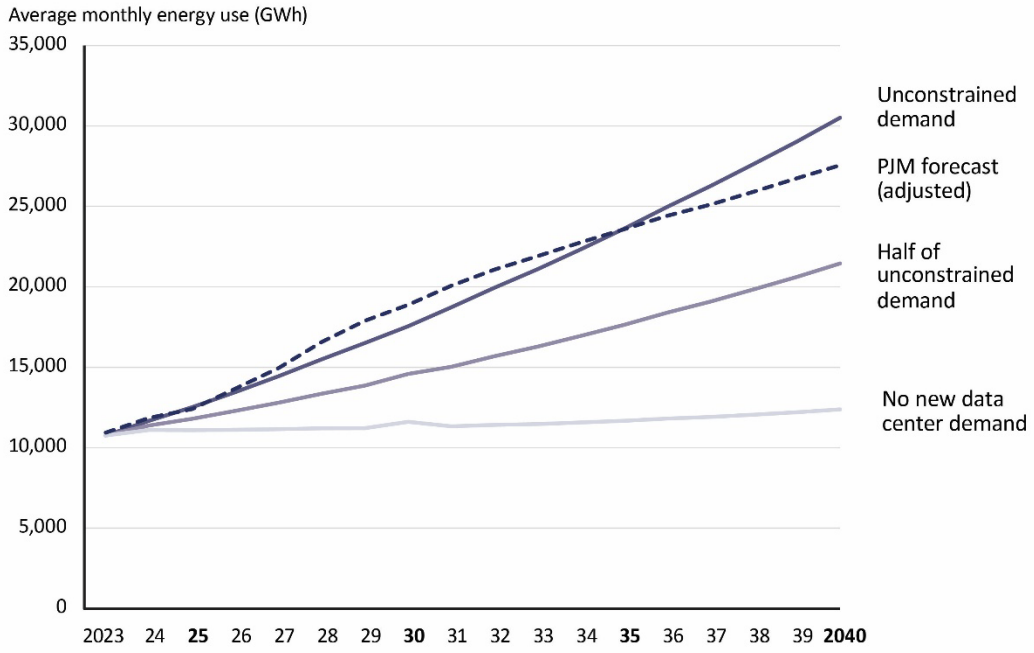
To evaluate the potential energy impacts of the data center industry, JLARC staff commissioned an independent forecast of *unconstrained* power demand growth in Virgina, based on historical data trends. The unconstrained forecast shows what demand would be before accounting for constraints like the ability to build enough energy infrastructure to meet demand. JLARC staff also commissioned an independent grid model to project what future generation and transmission infrastructure would be needed to meet (1) unconstrained demand and (2) half of unconstrained demand. The grid model also estimated infrastructure needs if there was no new data center demand, so that the effects of data center growth could be separated from other effects on the grid. The demand forecast was developed by staff from the Weldon Cooper Center for Public Service at the University of Virginia, and the grid model was developed by energy consultant Energy + Environmental Economics (E3). See Appendix B for additional details.

Data center industry is forecast to drive immense increase in energy demand

The data center industry boom in Virginia has substantially driven up energy demand, and demand is forecast to continue growing for the foreseeable future. The state's energy demand was essentially flat from 2006 to 2020 because, even though the population increased, improvements in energy efficiency offset that increase. However, by 2024, PJM forecast an unprecedented 5.5 percent year-over-year growth in the Dominion transmission zone, mainly because of increasing data center demand.

JLARC's independent forecast shows that unconstrained demand for power in Virginia is expected to double within the next 10 years, driven primarily by the data center industry's growth (Figure 3-3). Almost all of the demand growth is expected to occur in the Dominion transmission zone, which covers the Northern and Central Virginia regions, where most new data centers are being built. JLARC's forecast largely matched the most recent PJM forecast.

FIGURE 3-3
Data center demand would drive immense increase in energy demand in Virginia, based on JLARC's independent forecast and other forecasts



SOURCE: JLARC staff consultant analysis.
NOTE: Forecast is for Virginia. PJM forecast is the 2024 forecast for the Dominion transmission zone adjusted upward to account for APCO; this adjustment had no effect on the trendline shown and was done so that the forecasts could be more easily compared. JLARC's independent forecast was developed using actual, historical energy use and employed advanced statistical methods to project use going forward. While JLARC's forecast was checked against the data reported by utilities on future data center load requests, that data was not used to formulate the forecast.

The first five years of JLARC's unconstrained demand forecast are in line with the new data center load additions that are expected, based on existing utility service and data center construction agreements, data center projects that have been announced, and national energy research conducted by Lawrence Berkeley National Laboratory and the Electric Power Research Institute.

New generation and transmission infrastructure will need to be built to help address data center demand

JLARC's grid model found that a substantial amount of new generation and transmission infrastructure would need to be built in Virginia to meet unconstrained demand, or even half of unconstrained demand, and most of the new infrastructure needs would be attributable to the growing data center industry (Table 3-1). For each of the demand scenarios, the model considered the most feasible and economical approaches to meeting infrastructure needs with and without the requirements of the Virginia Clean Economy Act (VCEA). The modeling was done using industry standard approaches and tools for electric utility and state energy planning purposes. It is based

on current state and federal laws and regulations. Some costs, such as the social cost of carbon, were not explicitly included in the model.

VCEA was enacted in 2020 to drive investment in renewable resources and requires the phaseout of carbon-emitting generation in the state by 2050. (See Appendix G.) VCEA requires that an increasingly larger share of the energy sold by the investor-owned utilities, Dominion and APCO, to their retail customers come from renewable and in-state generation sources. While this results in slightly more generation being built in-state than would otherwise occur, it has little effect on new transmission infrastructure needs and could increase the amount of energy that is imported from out of state. VCEA's effects on renewable and in-state generation are not as pronounced as might be expected because the requirements for utilities to sell energy from these sources do not apply to the co-ops, and a majority of projected data center growth (~60 percent) is expected to occur in co-op service territories. See Appendix H for additional details on generation capacity and energy sources expected under each scenario.

TABLE 3-1
Addressing demand from data centers would require substantial investment in new in-state generation resources and transmission by 2040

			Change from 2025 to 2040			
			Scenario 1: Unconstrained demand		Scenario 2: Half unconstrained demand	
	Current system		No VCEA	VCEA	No VCEA	VCEA
Generation resources (in-state)	36,000 MW capacity	Net increase	+54,100 MW	+56,300 MW	+31,200 MW	+34,700 MW
		Data center share	*+35,600*	*+34,300*	*+12,800*	*+12,700*
Transmission (interzonal)	8,700 MW capacity	Net increase	+3,500 MW	+3,500 MW	+3,100 MW	+3,100 MW
		Data center share	*+3,500*	*+3,500*	*+3,100*	*+3,100*
Imported energy (net)	38 TWh annual energy [a]	Net increase	+62 TWh	+73 TWh	+24 TWh	+24 TWh
		Data center share	*+79*[b]	*+92*[b]	*+41*[b]	*+43*[b]

SOURCE: E3 grid modeling analysis. Current system capacity and energy are derived from Energy Exemplar PLEXOS database.
NOTE: Generation is in-state nameplate capacity that would need to be built, which can be significantly higher than the amount of energy produced by a resource over a year (e.g., Virginia solar facilities produce at around 25 percent of nameplate capacity). The model predicts new generation capacity would still be built even without data center growth, because the grid is expected to shift to cheaper renewable energy sources and building more in-state generation to reduce reliance on imports. Transmission shows only current and additional interzonal capacity needed for power exchange between the Dominion transmission zone and neighboring zones. It does not show transmission capacity or additions *within* the Dominion transmission zone.
[a] TWh=terawatt hours. TWh are used to measure large amounts of energy consumed over time. One TWh = 1,000,000 MWh.
[b] Data center share of imported energy is larger than the net increase because, without data center demand, imported energy would decline. For example, under Scenario 1 (no VCEA), energy imports would decrease −17 TWh from 2025 to 2040 without data center demand. +79 TWh data center share −17 TWh = net increase of +62 TWh.

Building enough infrastructure to meet growing data center demand will be difficult under both forecast scenarios

Historically, utilities and other PJM members have kept up with demand by building enough new generation resources and transmission to meet demand. Utilities have been able to do this because demand has increased slowly or been relatively flat over the past several decades, but the expected increase in demand from data centers will far outpace previous energy demand growth. If utilities are unable to build enough new generation and transmission to keep pace with forecast data center demand, there are two likely outcomes: (1) they will delay the retirement of older fossil fuel plants, and less economical plants, to the extent allowed by state and federal law, and (2) they will delay the addition of new large load customers, mainly data centers, until there is adequate transmission and generation capacity to serve them. On the demand side, data centers will seek out markets where demand can be met and pursue ways of contracting for and generating their own power. While it is possible that enough infrastructure could be built to meet growing data center demand in Virginia, it would be difficult to accomplish.

VCEA financially penalizes utilities that do not comply with renewables requirements by levying deficiency payments, but in practice, utilities may choose to pay those deficiency payments if it is more economical or feasible than securing new renewable generation. Statute directs any deficiency payments collected to be used in support of job training, energy efficiency, and renewable energy programs. The costs of deficiency payments are recovered from utility customers.

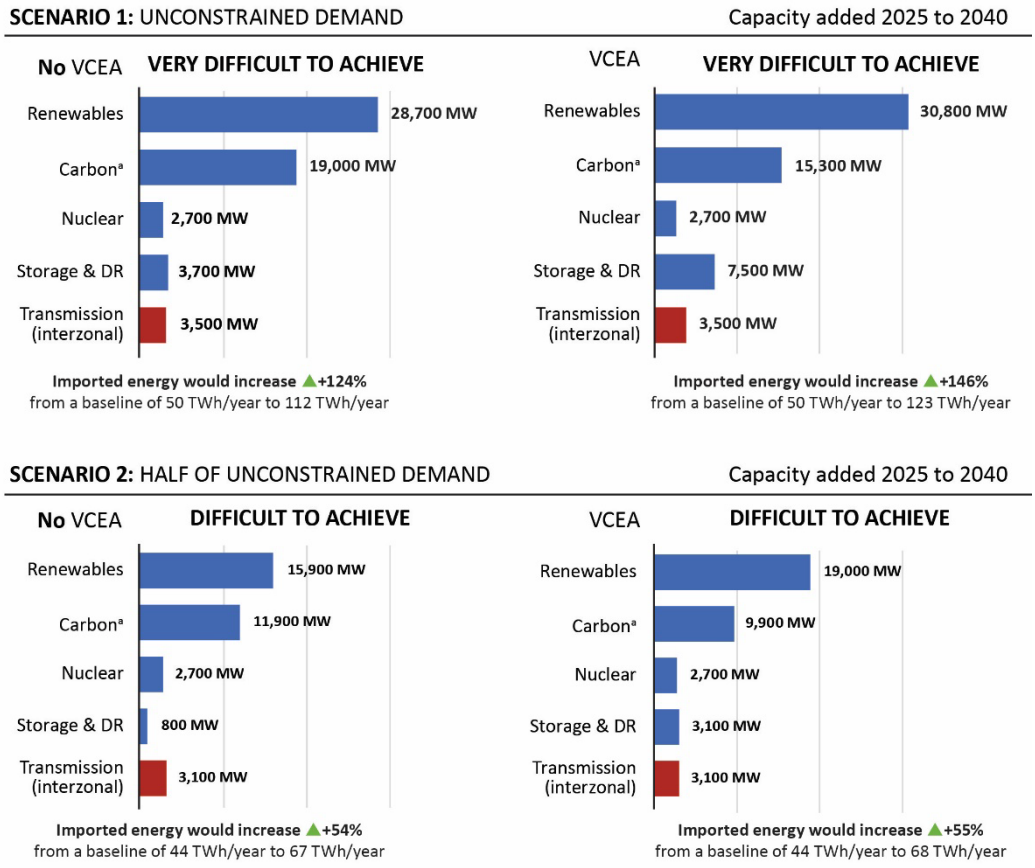
It could be especially challenging to meet demand while also fully meeting VCEA renewable requirements. Dominion's 2024 integrated resource plan indicates that it expects to meet VCEA renewable requirements for most, but not all, years between now and 2040 and expects to pay deficiency payments in some years (sidebar). In addition, in its previous 2023 plan, Dominion indicated it did not expect to meet VCEA requirements to retire carbon emitting assets that take effect in 2045. The previous plan stated: "Due to an increasing load forecast, and the need for dispatchable [i.e., easily scalable] generation, the [modeled planning scenarios] show additional natural gas-fired resources and preservation of existing carbon-emitting units beyond [the 2045] statutory retirement deadlines established in the VCEA." The revised 2024 plan does not comment on this and does not project out past 2040.

Building enough infrastructure to meet *unconstrained* energy demand will be very difficult, with or without meeting VCEA requirements (Scenario 1)

It will be very difficult to build new generation and transmission in Virginia fast enough to match unconstrained demand by 2040 (Scenario 1) and would require a massive and sustained build-out of new renewable, carbon, nuclear, and storage facilities (Figure 3-5). Build rates would have to greatly outpace what has been accomplished historically. Solar facilities would have to be added at about twice the annual rate they were added in 2024, and the amount of new wind generation needed (8,800 MW) would exceed the potential capabilities of all offshore wind sites that have so far been secured for future development (7,400 MW). New natural gas plants would have to be added at a rate of one large 1,500 MW plant almost every year (without meeting

VCEA requirements) or almost every 1.5 years (meeting VCEA requirements) for 15 consecutive years, which would be faster than the rate they were added during the busiest build period of the last decade in the state. Additional pipeline capacity may also need to be added to serve such a substantial increase in natural gas generation, which would create additional challenges. The unconstrained demand scenario would also require building more nuclear generation, presumably using new technologies.

FIGURE 3-4
Estimated generation mix needed to meet demand scenarios, with and without meeting VCEA requirements



SOURCE: E3 grid modeling analysis.
NOTE: The generation and transmission solutions generated by the model are tested to ensure they would produce a reliable system. Generation capacity is given in *nameplate* capacity, which can be significantly higher than the amount of power that can actually be expected after accounting for resource intermittency and downtime (firm capacity). The model predicts only interzonal transmission needed between PJM zones, but additional transmission would need to be built within the Dominion transmission zone. DR is demand response resources, which refer to customers who can reduce energy use during peak load events or add energy back on to the grid. The figure does not show what would need to be built if there were no new data center demand (Scenario 3). Under this scenario, the grid would be able to transition to a more renewable-based system with relatively less difficulty.
[a] Carbon includes natural gas, coal, and oil. Biomass facilities are counted as renewable resources, per the VCEA. However, starting in 2045, E3's grid model assumes natural gas plants would be converted to hydrogen fuel in each scenario when VCEA requirements are met.

To meet transmission needs, the state would have to increase interzonal capacity to the Dominion transmission zone by approximately 40 percent and construct additional transmission within the zone. Many of the new transmission lines would need to be built in densely populated regions of the state with limited options for siting new infrastructure. (Figure 3-4 shows only new interzonal transmission.)

In addition to building new in-state generation and transmission, the state would need to more than double the amount of energy imported from out of state. Consequently, Virginia would be reliant on additional generation being built at a rapid pace in other states in the PJM region and would need these other states to build sufficient generation capacity to serve Virginia's needs as well as their own.

Building enough infrastructure to meet only *half of unconstrained* energy demand will be difficult (Scenario 2)

It would likely still be difficult to build enough new generation and transmission to meet half of unconstrained demand by 2040 (Scenario 2). Meeting demand would also require a sustained build-out of new renewable, carbon, nuclear, and storage facilities. Solar facilities would have to be added at a rate of 650 to 700 MW per year, which is substantial but lower than the 1,000 MW expected to be added in 2024. New nuclear generation would also be needed.

If VCEA requirements are not considered, the biggest challenge would be building new natural gas plants. New gas would need to be added at the rate of about one large 1,500 MW plant every two years for 15 consecutive years, which would be about the same rate Dominion added these types of plants during its busiest period of the last decade (2012 to 2018).

If it is assumed VCEA requirements are met, the biggest challenges would be building enough wind, battery storage, and natural gas "peaker" plants (sidebar). Wind generation needs would exceed the potential capabilities of all secured offshore wind sites in Virginia. The amount of new battery storage needed would be several times the small amount of existing battery storage in Virginia, but would be equivalent to what has already been installed in Texas and about half of California's installed capacity. A significant number of new natural gas "peaker" plants would also be needed to help balance intermittent generation from renewables.

Transmission needs would remain substantial under the half of unconstrained demand scenarios, especially in and around the Northern Virginia region, and building enough transmission capacity within a 15-year timeframe could be even more difficult than building enough generation. The amount of energy the state would need to import would increase by over 50 percent.

"Peaker" plants are 50 MW to 150 MW facilities used intermittently to supplement other types of generation when there is not sufficient energy to meet demand. Historically, they have mostly operated at times when cooling and heating needs are the highest among households. However, as more solar and wind generation is incorporated into the grid, they can be used to provide energy when these renewables are not producing (alongside battery storage).

New infrastructure projects face several challenges that make a rapid increase in construction difficult to achieve

Under the most favorable circumstances, it takes five or more years to develop and build new generation facilities, limiting how fast they can be added to the grid. New generation projects face several challenges that could keep them from being built, including community opposition (especially to solar and natural gas projects), long lead times to procure equipment, workforce constraints, and state and federal laws that limit what new carbon-emitting generation facilities can be built. PJM data shows that only a small percentage of projects that submit applications are ever actually built (sidebar).

PJM must study and approve the addition of most new utility-scale generation to the grid. PJM's approval process became overwhelmed by small-scale renewable projects in 2022, which led to a two-year pause in approvals while PJM reformed its process. This pause may have affected the number of projects that have been built in recent years, but project success rates were already low before the pause (29 percent in 2018).

A significant portion of new generation would need to come from solar projects, which could face challenges acquiring enough land. Generally, a solar facility in Virginia needs five to 10 acres to produce one MW of power. Assuming an average need of 7.5 acres per MW, and the scenarios modeled above, JLARC staff estimated that Virginia will have about 57,000 acres of land devoted to utility-scale solar by 2025, and new projects could require from 73,000 to 165,000 additional acres by 2040, depending on the demand scenario. Utilities and independent generators could face significant challenges in acquiring and gaining local approval for this much additional land, given the resistance solar projects have already encountered in some Virginia communities.

Small modular nuclear reactors have been identified as a potential future generation source. However, none have been successfully built in the United States, only a few exist worldwide, and this technology has not yet been proven to be a viable utility generation source. They also have high up-front costs that pose a barrier to their commercial viability, and some communities may oppose them being built nearby. Other promising, emerging technologies that have not yet proven to be commercially viable at a utility scale are hydrogen generation, long duration battery storage, and floating offshore wind.

Utilities also face challenges completing the many major transmission projects that will be needed to connect generation to data center markets, including the numerous new and dispersed renewable generation facilities that are expected to be built. For example, PJM's goal is to have $3.5 billion in Virginia transmission projects that were proposed in December 2023 for Virginia, mostly to serve data center demand, to be in service by June 2027. This 3.5-year timeline is possibly unrealistic considering that major new transmission projects often take five to seven years to complete.

Demand growth raises concerns about system capacity and reliability, but existing utility requirements and processes limit risks

Federal Energy Regulatory Commission (FERC) oversees the nation's electrical grid.

North American Electrical Reliability Corporation (NERC) sets reliability standards for the grid.

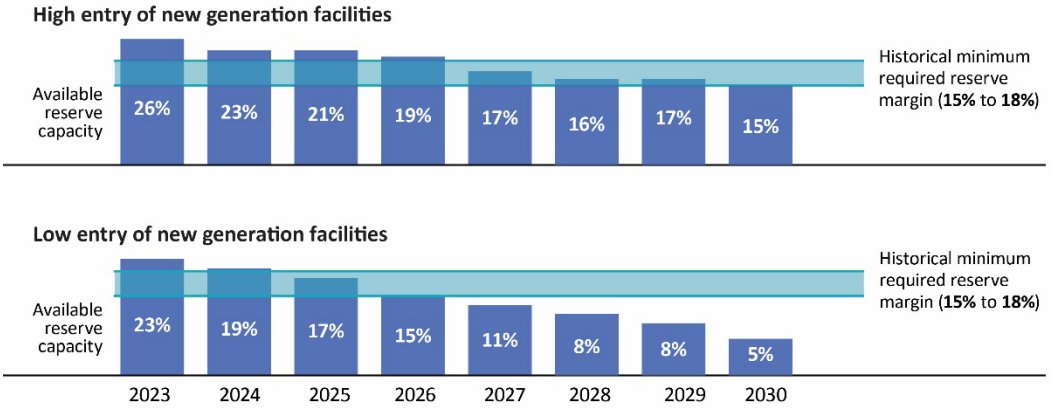
Electrical utilities in Virginia have an obligation to serve any customer within their service territory, but they are not required to provide service immediately upon request. Their foremost responsibility is to ensure the reliability of the power grid before adding any new, large customers like data centers. Federal and international bodies oversee transmission organizations and utilities and set reliability standards that PJM and Virginia utilities must follow (sidebar). The state also sets its own requirements for utilities, which the SCC is responsible for enforcing. These requirements and processes are intended to identify future reliability problems and ensure they are resolved before the grid is affected.

Generation capacity concerns are partially addressed through PJM requirements and utility planning processes, but risks remain

PJM protects grid reliability by requiring utilities to secure enough generation capacity to meet the next three years of projected customer demand, plus a reserve margin to account for peak load (i.e., high energy use) events like hot summer days. The regional PJM grid appears to have sufficient generation capacity to meet current demand without causing any system reliability concerns. However, PJM estimates the grid could run out of needed reserve capacity by 2030, even under optimistic assumptions for adding new generation (Figure 3-5). If utilities are not able to secure enough capacity to meet projected demand, they would have to delay adding new load or shed existing load to meet capacity requirements and maintain system reliability.

Although PJM sets minimum capacity requirements for utilities, there is some uncertainty in whether regional generation will be sufficient because it is not centrally planned. PJM does not plan for and identify specific generation projects that are needed (like it does for transmission), cannot direct new generation to be built, does not own or operate any generation sources (like a utility), and cannot stop a utility or independent operator from retiring an existing generation facility (although it can offer "reliability must run" payments to keep a facility open in the short term). Virginia cannot address these structural issues because PJM is federally regulated, not state regulated. PJM is aware of generation capacity concerns and is working to try and address them.

FIGURE 3-5
PJM projects available generating capacity could decline below reserve levels within a few years



SOURCE: JLARC staff analysis of PJM data and reports.
NOTE: PJM's reserve capacity projections were prepared in February 2023, using its 2023 demand forecast. PJM has since revised its demand forecast upward and in August projected a potential 1,663 MW shortfall in total capacity by 2029/2030.

At the state level, utilities protect grid reliability by planning to meet their own generation needs and PJM capacity requirements. Dominion and APCO—Virginia's two investor-owned utilities—are required to develop integrated resource plans that describe how they will meet capacity needs and submit them to SCC as part of a litigated proceeding. SCC holds public hearings to review the plans and gain perspectives from the utility, SCC staff, and other stakeholders, such as environmental groups and business interests. Despite disagreements over utility plans (sidebar), this process ensures the state's largest utilities plan to meet future generation needs and that these plans are scrutinized by regulators and stakeholders. Virginia co-ops also plan for their future generation needs, although the process is not as formal or subject to the same scrutiny. Most co-ops plan to purchase energy for data center customers from the PJM market rather than building generation to serve data center energy needs.

Individual utility planning does not guarantee that the generation resources needed for the whole PJM region will be built, which contributes to uncertainty about the sufficiency of future capacity. Both investor-owned utilities and co-ops plan to fulfill some future share of their energy demand with energy imported from elsewhere in the PJM market and, as discussed above, there is some uncertainty in whether regional generation will be sufficient to meet that demand. Growing demand from the data center industry in other states, such as the growing Chicago and Ohio markets, could limit how much energy is available to be imported by Virginia utilities.

Stakeholders sometimes contest whether the integrated resource plans developed by utilities provide the best generation solutions for meeting future demand, or whether proposals conform to state law. For example, SCC staff recommended that Dominion's most recent 2023 plan be denied over VCEA compliance concerns, and the plan was not approved by the Commission..

Transmission reliability concerns appear to be effectively addressed through existing PJM and utility planning processes

PJM and utility transmission owners centrally identify the impacts large loads are expected to have, and how those loads can be brought on safely without causing transmission reliability problems. At the project level, transmission owners like Dominion are required to study how the addition of a proposed data center (or any other large load) would affect the transmission system. These interconnection studies determine if the existing transmission system is sufficient to handle the load or if upgrades are needed to avoid violations of national reliability standards, such as excessive voltage incidents or outages. At the system level, both PJM and transmission owners must review the expected cumulative impact of demand growth on the transmission system, from proposed data centers and all other sources, and identify needed improvements (sidebar). Utilities cannot add new large loads to the grid, including from data centers, until identified transmission improvements are made. For example, if a new transmission line is needed for proposed data centers in Northern Virginia, utilities cannot add new data center loads until that line is operational.

PJM evaluates the overall transmission system through its annual Regional Transmission Expansion Plan (RTEP). Under the RTEP process, both PJM and transmission owners assess the potential impacts of expected changes in demand and generation to see if and where standards violations or other reliability concerns could occur. They then solicit or propose system improvements, such as new transmission substations and lines, to address identified problems.

Transmission planning processes appear to be working properly to protect reliability. In 2022, Dominion paused adding new data center loads in Loudoun County for three months as it worked to resolve regional transmission constraints. Since then, Dominion has incrementally added new data center loads in Loudoun to ensure new additions do not compromise the reliability of the transmission system. The utility expects the constraints that limit new load additions will not be fully resolved until 2025. Similarly, in July 2024, Dominion sent a letter to customers informing them that future large load additions to any part of the Dominion transmission zone are expected to take 12 to 36 months longer than they have previously taken so that the utility can appropriately plan for and connect the "record pace" of new load requests to the transmission system.

State could clarify that utilities can delay the addition of new, large loads if necessary to protect grid reliability

If utilities are unable to build enough new infrastructure to keep pace with energy demand, one of the main ways they can protect grid reliability is by delaying the addition of new large load customers until there is adequate generation and transmission capacity. Utilities appear to have the authority to delay large load additions for transmission-related concerns because this has already been done without legal objections. It is less clear if utilities are allowed to delay adding new load because of generation concerns. For example, representatives from one co-op utility indicated they did not believe they had the authority to provide less load than requested or delay new load additions for capacity, costs, or other reasons. The state could explicitly give utilities the authority to delay additions of new large loads if it is necessary to maintain grid reliability and avoid exceeding available generation or transmission capacity constraints.

RECOMMENDATION 2

The General Assembly may wish to consider amending the Code of Virginia to clarify that electric utilities have the authority to delay, but not deny, service to customers when the addition of customer load cannot be supported by the transmission system or available generation capacity.

Some stakeholders have asserted that the state should have a process for determining *whether* demand from large load data center customers should be met, not just *how* it should be met. In theory, the state could require evaluation of large load requests and allow requests to be denied through the existing SCC case process. However, this would be a shift in the historical U.S. electric utility paradigm and could be subject to legal challenges.

State could encourage or require data centers to take actions to help address their energy impacts, but actions would have marginal impact on demand

Virginia's growing data center industry is projected to greatly increase energy demand and will require construction of new generation and transmission infrastructure beyond what would have otherwise been built. Although regulators and utilities have requirements and processes in place to manage risks to grid reliability, new infrastructure projects can put VCEA renewable energy goals at risk, affect local communities and natural and historic resources (Appendix F), and affect customers' utility rates (Chapter 4). Data center companies could help address their energy impacts by

- promoting development of renewable energy generation,
- participating in demand response programs, and
- managing energy efficiency.

Many data center companies are already taking some of these steps, and the state could encourage or require further action. Data center companies are also exploring options for generating their own power, but it is unclear if this would address their impacts on the main power grid (Appendix I).

While these actions could have a marginal effect on data centers' energy impacts, they will not substantially reduce their energy demand or the challenges posed by growing demand.

Data centers could adopt more effective strategies for promoting renewable energy, but these would not lower their energy demand

Data center companies—including the four hyperscaler companies that account for a vast majority of the industry in Virginia—have carbon neutral policy goals that encourage investment in new, renewable generation. Some companies also directly invest

in renewable energy projects in the PJM region and the development of new technologies, like small modular nuclear reactors. The scale of industry efforts is not easily quantifiable, so it is uncertain how much these efforts could help offset the industry's growing demand in Virginia.

Virginia's data center industry could be encouraged to further support investment in renewable energy and a reliable, decarbonized grid within the PJM region. The state already partially encourages this through VCEA's Accelerated Renewable Buyers program. Under the program, large customers with loads over 25 MW, which includes most data centers, can get credit for their purchases of renewable wind and solar energy made in the PJM region. Those credits go to offset what a utility charges customers for the utility's renewable generation projects, providing a financial incentive to participate. The program could be expanded to include utility-scale battery energy storage systems. Battery storage is needed because it can store and provide energy during periods when intermittent solar and wind generation is not producing power. Although battery storage systems do not count as net new generation, providing a financial incentive to invest in these resources is beneficial because of their importance in balancing loads from renewables. Any credit for using battery storage should be a partial credit per MW, based on capacity provided rather than energy consumed, and account for electric load carrying capacity (ELCC). ELCC is essentially a measure of the system energy contributions a given type of resource provides, and PJM assigns and regularly revises ELCC ratings. Currently four-hour battery storage has an ELCC rating of 59 percent for 2025/20026, meaning that a partial credit of 59 percent could be allowed for each MW of capacity purchased from battery storage resources.

RECOMMENDATION 3

The General Assembly may wish to consider amending the Code of Virginia to expand the Accelerated Renewable Buyers program, which allows large customers of energy utilities to claim credit for purchases of solar and wind *energy* to offset certain utility charges, to also allow customers to claim partial credit for purchases of *capacity* from battery energy storage systems based on the current PJM electric load carrying capacity rating.

The program could be further expanded in the future to include other renewable or non-carbon energy sources, such as hydrogen generation and small modular reactors. This could help bring more generation resources online to serve growing data center demand but would not reduce energy demand.

Demand response programs could have a more meaningful impact on energy consumption

Under demand response programs, utility customers agree to reduce their power use or send power back to the grid during peak load events. This reduces the need for

additional generation and transmission to meet peak loads, and customers benefit by not getting billed higher peak load energy prices. Demand response programs are an effective way to reduce the need for new generation and transmission. As data centers become an increasingly large share of Virginia's base energy load, their participation in demand response programs could reduce the need for new infrastructure.

Data center companies in Virginia do not currently participate in demand response programs. Company representatives indicated that they have little flexibility to decrease energy use during peak load events because energy use is driven by computing activity, and computing activity is driven by customer and end user demand. From a business perspective, data center companies have strong incentives to keep facilities fully operational to meet their customer and end-user computing needs, and these typically outweigh financial incentives offered by voluntary utility demand response programs.

Despite limitations, there appear to be several viable ways that data center companies could participate in demand response programs. These include options for reducing demand during peak load events and adding energy to the grid during such events to offset a portion of their demand. Companies could

- shift some computing activity to other facilities outside of the region during peak load events,
- make operational adjustments that temporarily reduce energy use within the facility, such as small temperature adjustments for short periods, or
- install more environmentally friendly backup generators that are permitted to operate in non-emergency situations (sidebar), which could range from all generators at a facility to a subset of the generators used, or
- host battery storage systems that could serve as both a general utility and a demand response resource.

Most data centers backup generation' comes from Tier 2 diesel generators, which cannot and should not be used as a demand response resource because of their emissions (nitrogen oxides, carbon monoxide, and particulate matter). Natural gas and Tier 4 diesel generators have lower emissions and can be used for demand response under state and federal law. Backup generation is discussed more in Chapter 5.

JLARC's consultant modeled the energy impact if data centers participated in demand response programs by using battery storage or backup generators to reduce or offset the equivalent of 10 percent of their load in a peak load emergency. The model found data centers could provide 2,000 to 2,400 MW of capacity value to the grid, which would slightly reduce the need for new in-state generation and transmission. A key consideration is that these demand response capabilities would have to be in place before new generation is added to have maximum effect.

Without state direction, most data center companies appear unlikely to participate in demand response programs. The state should not require a specific demand response method because different approaches may be more or less feasible for different companies. Instead, the state could direct utilities to implement a demand response program for large data center customers, such as any customer over 25 MW, and require these customers to participate in the program. This requirement could be phased in

gradually to give companies time to work with utilities on demand response solutions and participation levels (e.g., MW or percent of load a customer will commit) that are feasible for all parties. The requirement could be initially limited to investor-owned utilities and later expanded to include co-ops.

RECOMMENDATION 4

The General Assembly may wish to consider amending the Code of Virginia to require that utilities establish a demand response program for large data center customers and to require that these customers participate in the program.

Improving data center efficiency makes better use of energy but is likely to have only a marginal impact on demand

Data centers can improve energy efficiency in two primary ways. First, they can use newer and more efficient computer chips; computing activity ultimately drives almost all energy use in a data center. Second, they can improve the efficiency of their building systems, especially the cooling systems that account for most of the remaining energy use.

To promote energy efficiency, the state could encourage data center companies to meet an energy management standard, such as the International Organization for Standardization's (ISO) 50001. ISO 50001 requires organizations to set improvement goals, continually measure and evaluate outcomes, and revise policies to better achieve energy goals. An energy management standard can be fairly applied to all companies regardless of their business model. It is also preferable to requiring green building standards, such as Leadership in Energy and Environmental Design (LEED) building standards. Building standards could be required for new construction but may be unreasonable to retroactively apply to existing facilities.

The state could encourage data centers to adopt an energy management standard by making the state's sales and use tax exemption contingent on adoption. Many data center companies already set energy efficiency goals and policies, and a well-designed state incentive would complement these efforts and encourage other companies to adopt similar goals and policies.

POLICY OPTION 1

The General Assembly could consider amending the Code of Virginia to require that, as a condition of receiving the sales tax exemption, data center companies meet and certify to an energy management standard, such as the International Organization for Standardization's 50001 standard for energy management.

Recent legislation proposed requiring data centers to meet a specific Power Usage Effectiveness (PUE) ratio. The efficiency of cooling and other building systems in data centers is commonly measured using a PUE ratio. However, PUE does not indicate a

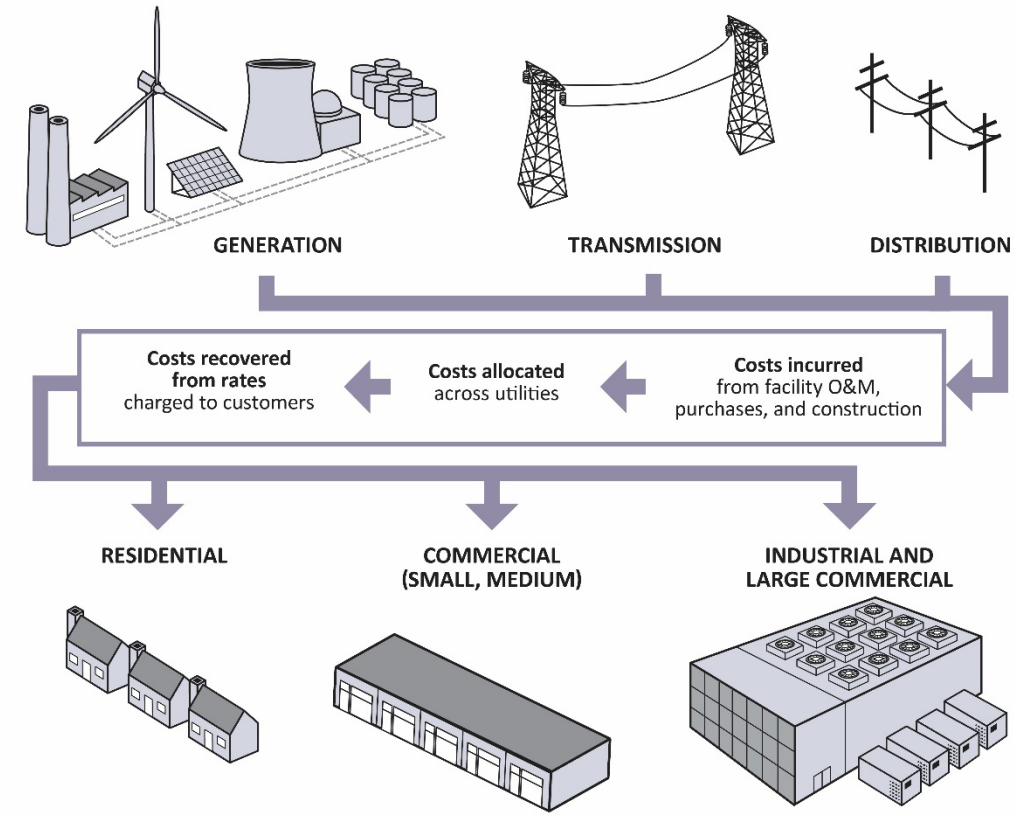
data center's overall energy efficiency; it measures only the efficiency of cooling and other building systems that support facility operations. The data center industry has a strong market incentive to be energy efficient because energy is one of their largest operating costs. Requiring a specific and narrow requirement, like meeting a specific PUE ratio, could have unintended consequences, and could not be as widely applied as the ISO 5001. (See Appendix J for additional information on PUE.)

Energy efficiency in general is an important goal for the data center industry, but efficiency improvements are unlikely to reduce the industry's overall energy demand. Currently, the data center industry is growing fast, demand for energy exceeds the available supply, and companies want to maximize the value of their multimillion-dollar assets. Consequently, any energy saved from efficiency gains is likely to be used to perform more computing activity. One company representative noted "at the end of the day, a 200 MW data center is going to be a 200 MW data center."

4 Energy Costs

Utilities incur costs to build, operate, and maintain the energy grid and provide power to customers. These costs are ultimately recouped through rates charged to customers (Figure 4-1). The main principle underlying utility rates is that the rates charged to different types of customers should recover costs that are approximately equal to the costs of serving those customers.

FIGURE 4-1
Utilities recover costs through rates charged to customers



SOURCE: JLARC staff analysis.

Utilities group their customers into classes of similar users, based on their cost of service. While the exact customer classes vary slightly among utilities, they generally fall into three groupings:

- residential customers,
- small to medium commercial customers, and

- industrial and other large commercial customers.

Within each customer class, customers are charged three categories of rates: generation, transmission, and distribution rates. Each rate is intended to recover costs related to that part of the system. For example, generation rates recover costs associated with operating power plants, constructing new plants, purchasing energy, and securing generation capacity from third parties. Transmission rates recover the cost of building and maintaining transmission lines. Distribution rates recover costs of building and maintaining substations, street-level powerlines, and other infrastructure needed to serve end-use customers. Utility rates sometimes include "riders" or "rate adjustment clauses" specifically intended to capture the cost of new infrastructure (e.g., a generation plant) or a specific initiative (e.g., grid modernization). Some costs can also be directly assigned to customers.

The State Corporation Commission (SCC) regularly reviews and approves utility rates to ensure they are reasonable. For example, the SCC reviews Dominion's rates every one to two years, depending on the rate type. SCC reviews consider if a utility is over- or under-collecting costs by customer class and whether any changes are needed to address any allocation issues. In making its determinations, the SCC examines cost of service studies and other information presented by the utility and sometimes performs its own independent analysis. SCC's responsibilities are established in state law.

Data centers are currently paying full cost of service

JLARC's cost recovery study was performed by energy consultant E3. See Appendix B for additional details.

JLARC staff commissioned an independent study of utility cost recoveries under current rate structures to see if the data center industry is paying for its current costs (sidebar). The study focused on rates charged by Dominion, the Northern Virginia Electric Cooperative, and the Mecklenburg Electric Cooperative (the co-ops) because most existing data centers are located in their service territories. The study found that current rates appropriately allocate costs to the classes and customers responsible for incurring them, including data center customers. For example, the consultant's independently derived cost allocations for Dominion closely match the ones that the utility uses to set its rates, with only a few small differences for residential and large customer rates (Table 4-1). This finding is corroborated by SCC reviews of utility cost recoveries, especially its biennial reviews of Dominion's rates.

Utilities try to ensure data center customers pay the costs they incur in several ways. Dominion groups data centers into the same class with similar industrial and large commercial customers, charges rates based on energy and system use, and ensures recovery of costs associated with any new distribution infrastructure for data centers through contractually required minimum payments. Co-ops essentially treat data centers as their own customer class, charge rates based on energy and system use, and directly assign distribution costs for data centers to each specific customer. Co-ops take additional steps to separate the energy sources they use for data centers from the sources they use to serve the rest of co-op customers.

TABLE 4-1
Consultant's independent cost allocations closely match allocations Dominion uses to set customer rates

	Generation-related costs		Transmission-related costs	
Customer class	Independent consultant allocation	Dominion allocation	Independent consultant allocation	Dominion allocation
Residential	40%	41%	53%	55%
GS-1 (small non-residential)	5%	5%	5%	5%
GS-2 (intermediate)	14%	14%	12%	12%
GS-3 (large, secondary voltage)	15%	15%	12%	11%
GS-4 (large, primary voltage, includes most data centers)	26%	26%	18%	16%
Total	100%	100%	100%	100%

SOURCE: E3 analysis and Dominion rate schedules. Numbers may not sum because of rounding.
NOTE: GS = General Service. Table does not show churches or outdoor lighting customer classes because <1%.

Growing energy demand from data centers is likely to increase other customers' costs

Utility rates recover the cost of operating and maintaining the current system and any new infrastructure that must be built. Even though current rate structures appropriately allocate costs across customers, data centers' increased demand will likely increase system costs for all customers, including non-data center customers. This is because current utility rate structures are not designed to account for sudden, large cost increases from the construction of new infrastructure to serve a relatively small number of very large customers.

JLARC's consultant modeled the potential cost impacts of data center demand resulting from increased infrastructure needs. The model estimated costs under the two demand growth scenarios from Chapter 3: (1) unconstrained demand and (2) half of unconstrained demand, both with and without VCEA compliance. For this exercise, the model focused on cost and rate impacts in the Dominion transmission zone where most data centers are expected to be located (sidebar).

Dominion transmission zone includes the Northern, Central, and Tidewater regions of Virginia. These regions include Dominion's *distribution* service territory and the *distribution* territories of most of the state's electric cooperatives. See Chapter 3 for a map of the zone.

Generation and transmission costs are expected to increase from growing data center demand and will likely affect non-data center customers

Utility costs are likely to increase from the fixed costs of new infrastructure that will need to be built to address data center demand and the increase in prices as energy supply becomes constrained. Costs for the Dominion transmission zone could increase by an estimated $16 to $18 billion by 2040 under the unconstrained demand scenario, depending on if VCEA requirements are met. Costs could increase by $8.5 to $10 billion under the half of unconstrained demand scenario. In both scenarios,

most of the projected cost increases are attributable to growing data center demand. Costs do not reflect the full up-front capital costs of building new generation and transmission infrastructure, because these costs are amortized and collected from customers over a period of 20 to 40 years. Instead, they reflect the share of capital costs that would need to be recovered from customers each year, plus operating costs and energy purchases.

Building enough generation and transmission infrastructure to meet data center energy demand would be difficult because it requires constructing enormous amounts of new infrastructure. In addition, unconstrained demand scenarios would require building infrastructure faster than has been historically possible. See Chapter 3 for additional details.

Because generation and transmission costs are passed on to customers based on their actual usage, a substantial share of these costs would be recovered from the growing data center industry. However, a share of cost increases would be borne by other customers in three ways. First, a large amount of new generation and transmission would need to be built that would not otherwise be built, creating fixed costs that utilities would recover over the next several decades. A portion of these costs would be paid by non-data center customers. Second, because it would be difficult to provide enough energy supply to keep pace with growing data center demand, energy prices would increase for all customers (sidebar). Third, if utilities are more reliant on importing power to meet demand, they may not always be able to secure lower-cost power and would be more susceptible to spikes in energy market prices. These higher overall costs are likely to affect all customers, proportional to their energy use.

Distribution cost increases are likely to be assigned mostly to data centers and not other customers

Data center loads are typically so large that they are not served from the regular distribution system and are instead connected directly to transmission lines from a substation that serves one or a few data center customers. Consequently, the main distribution costs that data centers incur are for building and maintaining these substations.

Utility rate structures appear to effectively insulate other customers from paying for distribution costs associated with data centers. Dominion recovers data center distribution costs by charging them its standard industrial and large commercial customer class rates, but it also contractually requires data centers to make minimum payments that fully recover the cost of the distribution substations built to serve them. In addition, Dominion charges data center customers directly for any "surplus" equipment (e.g., redundant connections requested by the customer). Co-ops require data centers to directly pay all costs associated with new substations as they are constructed.

There is one way that growing demand from data centers could indirectly increase distribution costs for other customers. As data center demand grows, some transmission lines could be upgraded to higher voltages to meet demand. For example, an existing 115kV transmission line could be upgraded to a 230kV line. This can require distribution-side upgrades to *all* existing substations connecting to the high voltage line, including those that serve and are paid for by non-data center customers. The cost impacts of potential substation upgrades are uncertain because they cannot easily be modeled across the system.

Residential customers could experience cost increases that current utility and regulatory rate reviews cannot fully address

Utilities recover costs, including any future cost increases, through rates charged to customers. Rates are regularly reviewed by utilities, the SCC, and the Federal Energy Regulatory Commission (FERC) to ensure costs are being properly assigned to customers (sidebar). Rate reviews ensure that system costs are being allocated in a way that best reflects which customers are responsible for incurring costs. For example, in 2019, Dominion received FERC approval to revise how transmission costs are allocated to utilities within its transmission zone, which effectively assigned a greater share of costs to large customers and reduced residential transmission costs by about 10 percent. While current rate structures will assign a larger portion of costs to data centers over time, rates are not designed to isolate other customers from cost increases driven by the expected system-transforming increase in data center demand.

Utilities regularly review their rates as required by state and federal laws.

SCC reviews and approves changes to generation, transmission, and distribution rates charged by utilities serving Virginia customers, such as Dominion and the co-ops.

FERC reviews and approves changes to how transmission costs are allocated to PJM and how transmission operators allocate cost to utilities.

Residential rates are likely to increase because of costs associated with growing data center demand

JLARC's consultant modeled how residential rates for Dominion customers might be affected by growing demand, assuming utilities and regulators use current practices to regularly reallocate costs. Dominion was chosen because of its large size and concentration of data centers. Residential rate changes were a key focus because they show how Virginia households could be affected and are indicative of how other customers, such as businesses, might be impacted.

Using the consultant's analysis, JLARC staff estimated that a typical residential customer with monthly consumption of 1,000 kWh could experience generation- and transmission-related costs increasing by an estimated combined total of $33 per month by 2040 under the unconstrained demand scenario. Factoring in VCEA requirements would increase monthly costs by four more dollars. However, building enough infrastructure to meet unconstrained demand would be very difficult. Under the half of unconstrained demand scenario, which is still difficult to achieve, the total cost is estimated to increase by around $14 per month (Table 4-2), whether or not VCEA compliance is assumed.

The rate changes shown here represent the share of generation and transmission rate increases that could be attributed to growing data center demand. Dominion's total residential bill projections, from its integrated resource plan, show much larger overall increases than the numbers reported here. Dominion's projections apply to the whole residential customer bill and include several costs that are not captured in JLARC's analysis, such as distribution costs and the cost of some additional transmission and generation projects that may not be solely attributable to data centers.

Dominion's residential bill projections are also in nominal dollars that have been adjusted upward using an inflation assumption, whereas JLARC's are held in constant (or real) 2024 dollars to show the real growth of costs that consumers will experience, independent of inflation. Dominion used a demand forecast that is similar to JLARC's unconstrained demand forecast and substantially higher than the half of unconstrained demand forecast.

TABLE 4-2
Generation- and transmission-related costs for residential customers would increase by 2040 because of data center demand (Dominion example)

	Projected increase in generation & transmission charges (not including distribution charges & some transmission costs; 2024 constant dollars)	
	2030	2040
Typical monthly residential generation and transmission charges (2023)	**$90**	**$90**
Scenario 1: Unconstrained demand		
- VCEA (very difficult to achieve)	+$23	+$37
- No VCEA (very difficult to achieve)	+$22	+$33
Scenario 2: Half unconstrained demand		
VCEA (difficult to achieve)	+$7	+$14
No VCEA (difficult to achieve)	+$6	+$14

SOURCE: JLARC staff analysis of E3 model results and Dominion 2024 integrated resource plan.
NOTE: Typical monthly residential charges are the sum of the amount billed to Dominion residential customers assuming typical use of 1,000 kWh. Does not include potential increases in distribution and several other charges that customers typically pay for. Does not capture the cost of the many intrazonal transmission projects that would be needed or generation projects that are not attributable to data center demand.

Utilities could help insulate customers from systemwide cost increases with new data center customer class and rate-setting approaches

Historically, adding new customers to the energy grid, even large load customers like manufacturers, has not increased costs for other customers because additions have been gradual, and the existing system has had enough capacity to serve them. However, addressing the needs of the fast-growing data center industry, even if only half of unconstrained demand is met, would require increasing generation capacity by 80-to-90 percent and transmission capacity 36 percent by 2040. Current utility rate structures are not designed to account for sudden, large cost increases from new infrastructure construction to serve a relatively small number of very large customers. New approaches would be needed to isolate residential and other customers from cost increases.

Establishing a separate data center customer class is a first step utilities could take to help insulate residential and other customers from the energy cost impacts of the industry. Utilities already have the authority to create separate rate classes with SCC approval. Creating a separate data center customer class would allow costs to be more

closely allocated to data centers and provide utilities with more flexibility over how to charge rates. Co-ops essentially treat data centers as their own customer class already, so this change would only affect Dominion, which groups data centers with other industrial and large commercial customers. The General Assembly could require Dominion to establish a separate data center customer class, although historically the legislature has not set such detailed requirements in statute.

Establishing a separate data center customer class alone would not fully insulate other customers from cost impacts. Utilities, with SCC approval, would also need to establish new cost allocation methodologies that assign a greater share of generation and transmission fixed costs to the new data center customer class. For example, they could design rate structures that *directly* assign some fixed generation or transmission costs to a new data center customer class, or an increased share of those costs to the new class.

Rates may also need to be adjusted more frequently to insulate other customers from data center-driven costs. Currently, rate adjustments occur only every one to two years and can over or underestimate actual cost growth. For example, under Dominion's current biennial rate review, generation costs are reallocated and rates are adjusted every two years, based on forecast energy demand. While forecasts expect data center demand to increase, accurately forecasting the industry's rapid growth is challenging because of the many factors that can affect demand in a given year. Consequently, new rates may not fully account for shifts in how costs are being incurred across customer classes in the years in between biennial reviews. For example, if the company allocates 55 percent of costs to residential customers, but rapidly growing data center demand results in residential customers only being responsible for 52 percent of costs during the biennium, the costs recovered from residential customers could be higher than the costs they incur. This could also potentially work in the other direction, with residential customers being undercharged if costs are under-allocated based on forecasts.

Utility cost allocation and rate design are complex and highly technical, and the practicality and legality of any changes require detailed analysis to be fully understood. For this reason, utilities and SCC are in the best position to address future cost concerns through cost allocation and rate design changes. SCC is proactively looking into cost concerns from the data center industry and has scheduled a technical conference for December 2024 to explore the effects of the increasing number of data centers and other large-load customers on Virginia's utilities, ratepayers, and power grid. The conference will provide participants an opportunity to identify ways to address the cost concerns noted here and throughout this chapter.

Even if new customer classes and rate-setting methodologies are established, it may not be possible to isolate any customers from the cost impacts of higher energy prices (discussed above). In addition, energy prices in Virginia could still be affected by data center demand even if data center growth is slowed in the state, because industry growth could shift to other states in the PJM region, increasing energy prices throughout the region.

Data center growth creates additional financial risks to utilities and their customers

The growth of the data center industry presents several additional, but so far unrealized, financial risks to utilities and their customers. These risks largely result from the sheer size of the data center industry's energy demand relative to all other customers. These risks exist with the current size of the data center industry and will increase as the industry grows. Utilities have several mechanisms they use to manage financial risks from large data center customers, from planning processes to contracts, but these may not always be sufficient to mitigate the risks posed by the industry.

Data center demand could drive generation and transmission infrastructure to be overbuilt, stranding costs with existing customers

One of the main risks posed by the data center industry's rapid growth is that utilities will build more energy infrastructure than is needed if forecast demand does not materialize as expected, or one or more large data centers close. Overbuilding could strand utilities with infrastructure costs that would have to be recouped from their broader customer base. This would drive up costs for all customers, including residential and other non-data center customers. The overbuilding risk is mostly associated with generation and transmission, not distribution (sidebar). It is also more of a concern for Dominion than the co-ops, because Dominion builds generation to meet all customer needs and is responsible for transmission, whereas co-ops *purchase* most energy for their data center customers and are not directly responsible for transmission.

Distribution could be overbuilt but is less of a risk because most of these costs are fully recovered from data centers directly or through contractual minimum payment requirements.

Generation could be overbuilt if a substantial portion of the expected data center demand does not materialize, or if there is a decrease in that demand overtime. As a result, non-data center customers would pay a larger share of the fixed costs for this new generation. While it does not currently appear likely that supply will exceed demand, there is some risk because much of the data center industry is concentrated in a small number of companies. Therefore, business decisions at one company could have a substantial effect on overall demand. For example, if one of the major hyperscaler companies decided not to pursue development of new artificial intelligence (AI) products or has a line of AI products that fail to be commercially viable, then energy demand from that company could decrease substantially.

On the transmission side, there are three types of transmission lines to consider: (1) "backbone" lines that bring power into a region, (2) regional lines that move power to distribution points within the region, and (3) short extension lines that move power from main lines to serve a single distribution point, including extension lines that might be built to serve one or a few data center customers. Because transmission lines serve specific regions and distribution points, they are more at risk of being overbuilt if regional or individual customer demand does not materialize or decreases over time.

Utilities attempt to avoid overbuilding transmission and otherwise ensure costs are recovered. Dominion indicated it tries to avoid overbuilding by making transmission upgrades only as needed to meet the metered load expected from customers. For example, even if data center customers in an area have requested 2,000 MW of capacity, Dominion will only build new transmission to serve 1,000 MW if that is the forecasted metered load. One co-op utility indicated that it contractually requires data center customers to reimburse the utility for any penalties from transmission providers that may be incurred if a data center project is canceled. However, while utility actions reduce the risk of transmission costs being stranded with other customers, they do not eliminate this risk. For example, transmission costs can take up to several decades to recoup, and if a data center ceases operation before then, or it never uses the amount of energy it expected to, costs will be recovered from other customers.

Utilities could take additional steps to reduce the risk of generation and transmission costs being stranded with customers.

- Utilities could obtain contractual agreements from data centers customers to provide minimum payments that ensure the costs of major generation and transmission buildouts are not stranded with other customers. For example, AEP Ohio has proposed requiring any data center with over 25 MW of capacity to pay for at least 85 percent of the energy they expect to need, even if they use less, for at least 12 years.
- Utilities could directly assign some or all costs of smaller projects, such as transmission line extensions, to the customers or customer class for whom the line is primarily being built to serve. For example, if a two-mile transmission extension is primarily being built to serve a data center development, some or all of the project's costs could be assigned to that customer.

The state should direct Dominion to develop a plan for addressing the risk of generation and transmission infrastructure costs being stranded with existing customers. (Dominion is currently the only transmission-owning utility in the state expected to experience rapid demand growth.) The plan could adopt one or more of the approaches described above, or other approaches the utility identifies as more practical and effective. The plan could be included as part of Dominion's biennial rate review filing with SCC, or as a separate filing.

RECOMMENDATION 5

The General Assembly may wish to consider amending the Code of Virginia to direct Dominion Energy to develop a plan for addressing the risk of generation and transmission infrastructure costs being stranded with existing customers and file that plan with the State Corporation Commission as part of its biennial rate review filing or as a separate filing.

Data centers pose particular cost and financial solvency risks to electric co-ops and their customers

Virginia's electric co-ops are not-for-profit companies that are essentially owned by their member customers. Their main purpose is to provide members with reliable power at low costs. Co-ops are much smaller than the state's investor-owned, for-profit utilities—Dominion and APCO—and do not have the same financial resources or reserves as these companies.

An increasing share of data center growth is expected to occur in co-op service territories, and co-ops are statutorily obligated to serve these customers. Based on the half of unconstrained demand forecast, the industry could account for 80 percent or more of annual energy sales in three Virginia co-ops by 2030. This growth creates unique challenges for the co-ops, which must find ways to insulate themselves and other customers from the cost and financial solvency risks associated with taking on a small number of extremely large data center customers.

The main risk co-ops identified is that a data center could potentially delay, dispute, or fail to pay its energy generation bill. Co-ops purchase energy from PJM energy markets and then sell that energy to their data center customers. A weekly data center energy bill can be extremely large under normal circumstances and can be magnified by price spikes from peak load events. For example, one co-op estimated the weekly energy bill for 4,000 MW of power at data center sites expected to soon be built in its service territory could be $20 to $40 million and could range upward of $100 million under the energy price spikes that were seen in a major winter storm in 2022. PJM bills weekly, and if one or more data center customers dispute or otherwise do not pay on time, a co-op would have to cover its energy costs until they can be recouped. If the co-op was unable to recoup costs from one or more of its data center customers, the costs would ultimately have to be paid by all other co-op members, and a large enough bill could result in the co-op defaulting and going bankrupt.

Some co-ops said they were sufficiently addressing risks through their contracts with data centers, as allowed under current state law. Namely, these co-ops said the contracts allowed them to:

- perform credit checks when establishing service,
- require more frequent weekly payments for energy use, which aligns with PJM's weekly billing cycle, so they do not have to float co-op funds to pay data center bills,
- require upfront payment of deposits and pledges of collateral based on what the co-op expects it would need to cover unpaid data center bills until further action, such as terminating service, can be taken, and
- terminate service for failure to pay.

Other co-ops said they did not believe that the existing contractual and legal tools available were sufficient to fully cover all potential financial risks, especially considering

data centers could soon account for the vast majority of their energy costs. They noted that current termination of service notification and dispute time periods could allow unpaid bills to continue increasing for several weeks (sidebar). They also said it can be challenging to get data center companies to agree to some contractual terms, such as committing to large collateral obligations designed to cover a large peak load event. These contractual and legal issues could be addressed at the SCC technical conference in December.

State law allows utilities to **terminate service after 10 days** of advance notice. However, customers can dispute billing issues that might lead to service termination, and co-ops indicated that **dispute resolution can take as long as 30 to 60 days**.

One co-op indicated that, even with additional contractual protections, they were still at risk if a data center company failed to meet its contractual obligations, such as if the company itself were unable to provide agreed upon payments. To address this, the co-op attempted to get SCC approval to create for-profit subsidiary companies to serve data center customers. Under this arrangement, if a data center did not pay its bills, only the subsidiary company would be affected, and the business continuity of the co-op would be assured. The SCC acknowledged the risks the co-op had identified, but did not grant the request because it did not believe it had the legal authority to allow a co-op to serve customers through a separate for-profit legal entity, among other factors. The General Assembly could amend the Code of Virginia to expressly allow co-ops to create for-profit subsidiaries to serve data centers and other large load customers. The customer size could be set at 90 MW to match the statutory threshold that already exists for the retail choice program (discussed in the next section).

POLICY OPTION 2

The General Assembly could consider amending the Code of Virginia to allow electric cooperatives to create for-profit subsidiary companies that could fulfill their legal obligation to provide energy services (retail sales) to customers with load capacity of over 90 MW.

Data center company participation in retail choice program could shift generation costs to other customers

In Virginia, most customers are obligated to purchase generation through their incumbent utility. For example, a customer in Dominion's service territory must purchase power from Dominion. The one major exception is that large load customers, including most data centers, are allowed to participate in retail choice, which allows them to purchase energy through a provider of their choice (sidebar). The goal of the program is to encourage competition and lower energy prices for industrial and other large commercial customers.

The current retail choice program was established in 2007 when Virginia's energy sector became re-regulated. Under the program, a qualifying customer can enter into an agreement to receive power from a third-party competitive service provider, which can purchase energy from the PJM market or enter into power purchase agreements with independent generators in or outside of Virginia to provide power to the customer.

Customers qualify for retail choice if they (a) exceed 5 MW and account for less than 1 percent of the utility's peak load, or (b) exceed 90 MW. The restriction that a customer cannot account more than 1 percent of the utility's load was intended to prevent customers from leaving the utility for retail choice if it could have negative cost impacts on the utility's remaining customers. The 90 MW exception was reportedly added to allow one particular industrial customer to participate in the program. At that time,

very few customers exceeded the 90 MW threshold. Today, many existing data centers, and virtually all planned future ones, exceed 90 MW and are eligible to participate in retail choice.

Now that data centers make up a substantial and growing share of energy use in the state, retail choice creates two financial risks to utilities and their customers.

- Utilities are required to build or secure enough generation to meet all customer demands. If a customer leaves the utility for retail choice, the fixed cost of any recently built generation is divided among the remaining customers. For example, the costs of constructing Dominion's recent Brunswick and Greensville power stations are paid for by all of its customers. If a substantial portion of data centers leave for retail choice, a greater share of those fixed costs will be allocated to remaining customers. The risk for this potential dynamic will be compounded in upcoming years because a lot of new generation is planned to be built to serve growing data center demand.
- Utilities also indicated that, because they are legally obligated to serve any customer in their territory as a provider of last resort, they must plan for the capacity needs of current and future customers. If utilities plan and build infrastructure to serve future data center customers, and some of those customers at some point leave for retail choice, the utility will incur costs for customers who are no longer actively paying generation bills.

It is difficult to model the cost impacts of data center customers shifting to retail choice, because it is unclear how many might pursue this option. However, utilities report that only a small number of data center customers are currently participating in retail choice, so there is the potential for many more to enter the program, especially as the industry grows. Dominion estimated that if all currently eligible customers chose to participate in retail choice, including non-data center customers, the cost-shift to other customers could exceed $600 million annually (a $150 per year cost impact for a typical residential customer). That figure is likely to grow substantially as data centers make up an increasing share of the customer base.

JLARC staff identified several ways the state could manage the financial risks of retail choice to residential and other customers. The General Assembly could direct utilities to determine an overall cap on retail choice participation for their customers, such as a total amount of the utility's customer load that could be obtained through retail choice, and require the SCC to review and approve the caps. This would provide an avenue for utilities and customers to present their cases and give SCC authority to decide what is appropriate. Other alternatives to this approach include requiring exit fees for customers leaving for retail choice or directing utilities to continue directly charging them for fixed generation costs (i.e., making these "non-bypassable" charges). In addition, the General Assembly should leave in place the existing legal requirement that any customer participating in retail choice must notify the utility five years before returning (sidebar). Requiring advance notice of at least several years is important so

Before returning to their incumbent utility, **a retail choice customer must provide advance written notice of five years.** However, statute allows the customer to return earlier by seeking an exemption from the SCC if its energy supplier "has failed to perform, or has anticipatorily breached its duty to perform, or otherwise is about to fail to perform," and the customer is unable to obtain service at reasonable rates from an alternative supplier.

that utilities can appropriately plan for system needs, secure needed capacity, and protect other customers from rate fluctuations.

POLICY OPTION 3

The General Assembly could consider amending the Code of Virginia to require that electric utilities establish caps on participation in retail choice that protect ratepayers from undue costs, and that such caps be approved by the State Corporation Commission through a formal case process.

Data center companies could soon have access to utility market-based pricing options that largely achieve the same goal as retail choice without shifting costs to other customers. Currently, co-ops already provide all their data center customers with market-based energy prices. Dominion has also established a small market-based rates pilot program and recently filed an application with the SCC to make the program permanent and widely available to customers. Market-based rates provide customers with potentially lower energy pricing that is similar to what they could expect to obtain through retail choice, but they remain a utility generation customer and therefore continue to help pay for fixed generation costs (instead of having these costs passed on to other customers).

5 Natural and Historic Resource Impacts

Virginia has abundant natural and historic resources, which provide economic, environmental, cultural, and educational benefits to the state. The value of these resources has long been recognized by the federal, state, and local governments. Governments have established regulatory systems intended to protect these resources and reduce the impacts that land development and other human activity have on them. The extent of natural and historic resource protections varies by resource type, with some regulatory systems providing stronger protection than others (Table 5-1). Natural and historic resource protections apply to data center operations and developments just as they apply to other commercial and industrial operations and developments (sidebar).

Data center energy demand, and its related impacts on Virginia's natural and historic resources, is discussed in Chapter 3 and related appendixes.

TABLE 5-1
Federal, state, and local regulations protect natural and historic resources from commercial and industrial operations and developments, such as data centers

	Regulatory protections			
	Federal	**State**	**Local**	**Brief overview**
Air resources				
Pollutant emissions*	●	●	○	Federal and state governments regulate harmful emissions and concentrations
Water resources				
Water withdrawals*	○	●	○	State sets and enforces water withdrawal limits and conditions
Wastewater discharges*	●	●	○	Federal and state governments regulate harmful discharge contents
Stormwater runoff*	●	●	◑	Federal, state, and some local governments regulate runoff rate and quality
Wetland and stream disturbances*	●	●	◑	Federal, state, and some local governments require impact mitigation
Land resources				
Conservation	◑	◑	◑	All government levels set aside lands for conservation, but few regulations, outside voluntary programs, protect private lands
Electronic waste				
Disposal	◑	◑	◑	No regulations require reuse or recycling, but some disposal limitations exist
Historic resources				
Preservation	◑	◑	◑	Federal, state, and some local governments regulate impacts in specific circumstances

SOURCE: JLARC staff summary of federal, state, and local regulations, staff interviews, reports, and websites.
NOTE: ● = stronger mandatory protections, ◑ = partial mandatory protections, ○ = no mandatory protections. * indicates that permits are required for potentially sizeable impacts. The responsibility or authority for a given government level to regulate impacts varies by resource.

Data center backup generators emit pollutants, but their use is minimal, and existing regulations largely curb adverse impacts

To ensure constant operations in the event of a power outage, data centers maintain on-site backup power. Data centers report that providing uninterrupted operations is extremely important to their customers, which can include banks and hospitals, who expect no outages or downtime. In Virginia, nearly all data centers use diesel generators for backup power (Figure 5-1). On average, each data center site has 54 permitted generators, but the number and electrical capacity of these generators vary widely depending on the number of data center buildings at a site, overall power and redundancy needs, and the sizes of generators used (typically one to three megawatts per unit). In total, the industry has approximately 8,000 permitted generators throughout the state.

FIGURE 5-1
Data centers rely on diesel generators for power in the event of an outage

SOURCE: JLARC photo of diesel generators at a data center in Virginia.

Diesel generators emit several harmful pollutants, so their commercial use is regulated by state and federal agencies. The main emissions are nitrogen oxides, carbon monoxide, and particulate matter. When highly concentrated in the air, these emissions can have adverse effects on public health and the environment. Exposure to high concentrations of diesel generator emissions can affect human cardiovascular, respiratory, and central nervous systems. Nitrogen oxides, which diesel generators emit in much larger quantities than other pollutants, can contribute to ground-level ozone pollution (including smog) and acid rain.

The federal Clean Air Act requires the U.S. Environmental Protection Agency to set **National Ambient Air Quality Standards**. These standards identify safe concentration thresholds for six pollutants—including ozone (which nitrogen oxides may form), carbon monoxide, and particulate matter—based on scientific evidence.

To prevent harmful concentrations, Virginia's Department of Environmental Quality (DEQ) is required by federal and state law to regulate sizeable emissions of these pollutants and enforce National Ambient Air Quality Standards (sidebar). DEQ requires

diesel generators used by data centers to be permitted, primarily because of their nitrogen oxides emissions (sidebar). Moreover, DEQ monitors air quality and creates plans to maintain or attain National Ambient Air Quality Standards across the state. For instance, Northern Virginia has historically struggled to meet the standard for ozone, to which nitrogen oxides can contribute, so DEQ has stricter policies for nitrogen oxides emissions in that region.

DEQ permits are required for any new development that may annually emit over 40 tons of nitrogen oxides, 100 tons of carbon monoxide, or 10–25 tons of particulate matter, depending on the particulate matter size. Data centers using diesel generators usually meet the criterion for nitrogen oxides, but not for the other pollutants.

Data center backup generators are rarely run for prolonged periods, and emissions are unlikely to adversely affect regional air quality

Data center operators aim to have backup generator capacity for days-long outages, but in practice, the generators are rarely run for prolonged periods. Most operators reported experiencing zero to two minor outages per site in the last two years, with nearly all outages being between one and five hours long. Otherwise, generators are typically run only for limited amounts of time as part of routine maintenance (sidebar). For example, in 2023, the industry's actual emissions were only 7 percent of what permits allowed, with most emissions coming from maintenance testing.

Data center operators indicated that **maintenance testing** typically involves a short (10–30 minute) monthly test and one long (one- to four-hour) annual test. Testing of generators is staggered across a site on an individual or group basis.

On a regional level, data center emissions from diesel generators have grown substantially in recent years, but they remain a relatively small contributor to regional air pollution. Since 2015, nitrogen oxides emissions from data center diesel generators have more than doubled, carbon monoxide emissions have tripled, and particulate matter emissions are five times larger. However, these emissions make up a small part of overall emissions in the region. Based on National Emissions Inventory data, in Northern Virginia, where most data centers are concentrated, data center emissions make up less than 4 percent of regional nitrogen oxides emissions and 0.1 percent or less of regional carbon monoxide and particulate matter emissions. Overall, air quality in Northern Virginia has improved during the same time that the industry has grown, as reductions in car and other emissions have been greater than data center emission growth.

While emissions from data centers' diesel generators make up a small part of *regional* emissions, understanding whether they have adverse *local* impacts is more difficult. Because the data center industry's large clusters of diesel generators are unique, local air quality impacts are harder to assess. Diesel generators' intermittent use makes their impacts difficult to model, and no other type of development uses nearly as many generators on one site as a data center development. Additionally, air quality monitoring occurs regionally and does not effectively capture localized effects. While DEQ staff believe that data centers' intermittent use and low emissions levels are unlikely to cause adverse impacts, the agency has recently launched a three-year study that will directly monitor data center generator emissions in Northern Virginia to more fully understand their air quality impacts. If the study detects any local air quality impacts, DEQ has the authority to increase protections as needed.

Federal and state regulations limit potential emissions from backup generators, even under worst-case scenarios

The U.S. Environmental Protection Agency has established **generator tiers** based on emission rates, or the amount of a pollutant emitted by a source over a given amount of time. Data centers could use generators that are considered Tier 2 or Tier 4.

DEQ permits limit when data center generators can be run, how long they can be run, and the maximum annual emissions each permitted site is allowed. Nearly all current data centers use "Tier 2" diesel generators, which are only permitted to run in emergencies or as part of routine maintenance testing (sidebar). This restriction prevents data centers from running their generators for any other reason. Permits are issued per data center site, rather than per building or generator, and cap the total emissions allowed per site. For example, a data center campus would not be allowed to run its generators indefinitely, even in an emergency, because it would likely reach its emissions limits within a few days. Because outages are rare, data centers do not often approach their emission limits. (For information on data center generator fuel choice, see Appendix K.)

In the event of a prolonged outage that affects one or more Northern Virginia counties, any affected data centers could reach their emission maximum within a few days and potentially affect regional air quality. For example, under a worst-case scenario where all data centers in Northern Virginia reach their maximum allowed emissions, data centers would emit over 9,000 tons of nitrogen oxides in the region. That is equal to about half of what has typically been emitted annually in Northern Virginia by all sources. Such a large-scale outage could potentially result in violation of air quality standards and contribute to regional air quality issues. However, the extent of any impact would depend on weather patterns and contributions from other emissions. Such large-scale outages are rare, and air quality levels would return to normal after the event is over.

General Assembly could incentivize use of generators with lower emission rates to reduce risk of local and regional impacts during prolonged power outages

To reduce the risk of air quality impacts from data centers during a prolonged outage, the state could incentivize the industry to adopt technologies that reduce potentially harmful emissions. "Tier 4" diesel generators are designed to emit significantly less nitrogen oxides and particulate matter than the "Tier 2" generators most data centers use. Alternatively, Tier 2 generators can be equipped with selective catalytic reduction systems (SCRs). Both technologies can significantly reduce emissions of nitrogen oxides and particulate matter—reportedly by up to 90 percent—over long run times. Some newer data centers in Virginia use SCRs on their generators, and only one uses Tier 4 generators.

Without state incentives, data center companies are unlikely to change their backup power choices. Tier 4 generators and SCRs are more costly, and data center companies have expressed concerns about the extra complexity and the current availability of Tier 4 generators to meet campuswide and statewide backup power needs. The state

could encourage adoption of these technologies by requiring new data centers in the Northern Virginia Ozone Nonattainment Area to use Tier 4 or SCR-equipped Tier 2 generators to be eligible for the state's sales and use tax exemption (sidebar). This requirement could be phased in over time to account for data centers that have already ordered generators or otherwise made investments that would not comply with this requirement.

The Northern Virginia Ozone Nonattainment Area includes Arlington, Fairfax, Loudoun, and Prince William counties and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park.

POLICY OPTION 4

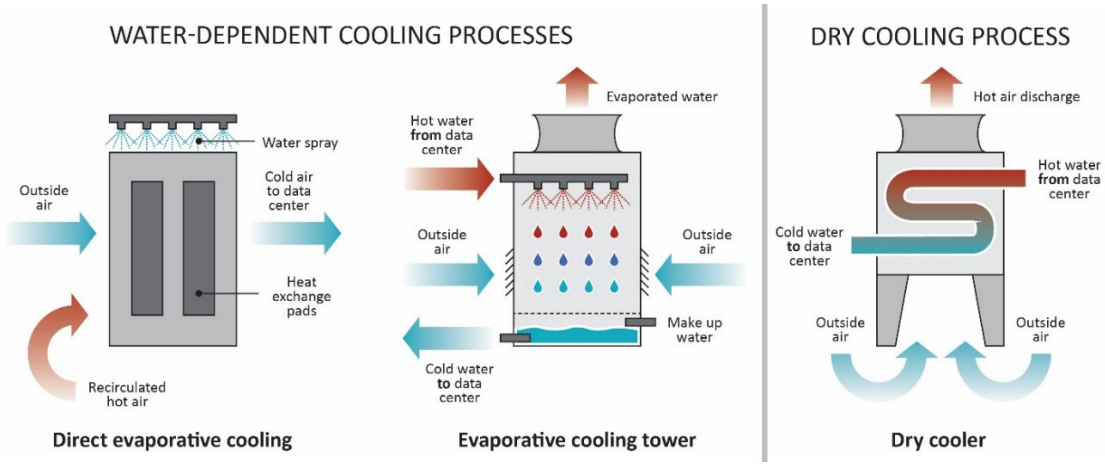
The General Assembly could amend the Code of Virginia to require that, as a condition of receiving the data center sales and use tax exemption, all new data center developments in the Northern Virginia Ozone Nonattainment Area use only Tier 4 generators, Tier 2 generators with selective catalytic reduction systems, or generators with equivalent or lower emission rates.

Data center water use is currently sustainable, but use is growing and could be better managed

Data center water use varies depending on the data center's size, computing density, and type of cooling system. Data centers require industrial-scale cooling to manage the heat generated by their computing equipment. Some cooling systems use water evaporation, and these systems typically require regular water refills to operate (Figure 5-2). Other cooling systems recirculate all or most of their water, similar to a radiator, and use relatively little water. Some data centers use a combination of cooling processes, including processes that do not require any water.

FIGURE 5-2

Evaporative cooling processes require more water than dry cooling processes



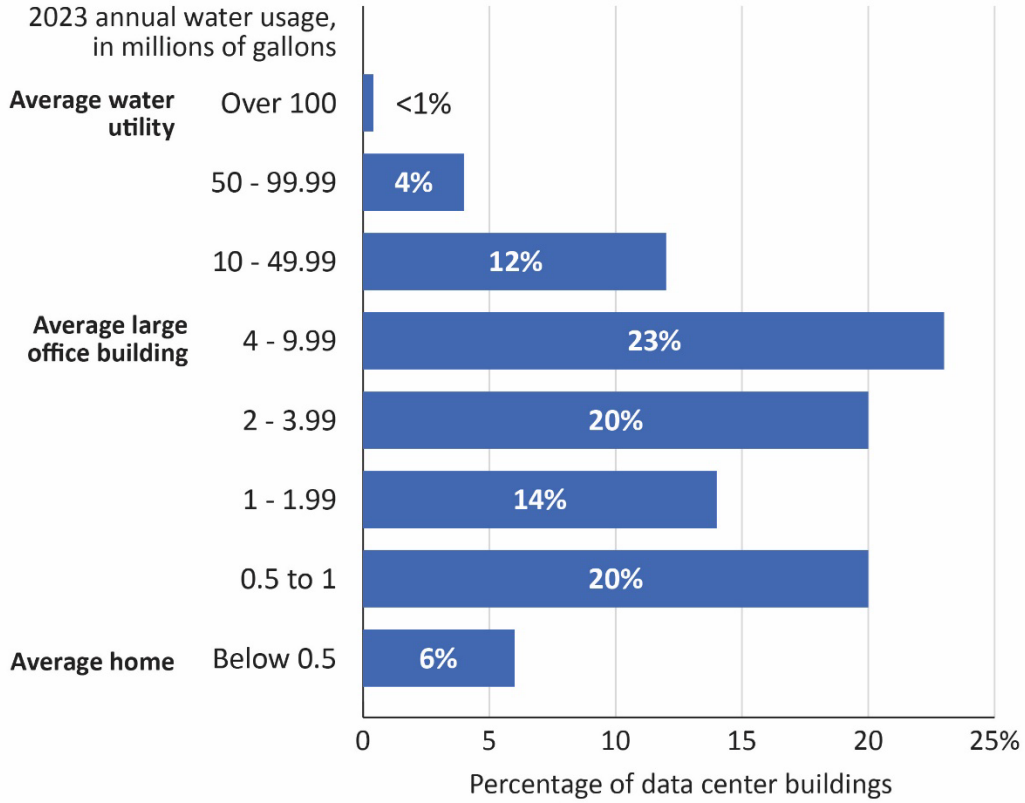
SOURCE: JLARC synthesis of interviews, government reports, and research literature.
NOTE: Depicted examples are generalizations and do not include all data center cooling processes and equipment.

While some data centers use substantial amounts of water, most use similar or less than other large commercial and industrial water users

For comparison, **the state's largest industrial water user in 2023** used about 36.5 billion gallons of water annually.

Based on available data, most data centers use about the same amount of water (or less) as an average large office building (6.7 million gallons per year), although a few require substantially more, and some require less than a typical household (Figure 5-3). In 2023, 11 data center buildings each used over 50 million gallons, including one building that used 243 million gallons (10 percent of the industry's total use) (sidebar).

FIGURE 5-3
Annual data center building water use varied widely, but most used the same amount of water as an average large office building or less (2023)



SOURCE: JLARC staff analysis of data provided by water utilities serving Fairfax, Henrico, Loudoun, Mecklenburg, and Prince William counties and the Town of Wise. Average uses are based on federal and state water use statistics.
NOTE: Data was not available for all data centers in Virginia but was for the large majority. Water use is on a per building, not per campus, basis. Annual usage for some data center buildings is approximate because of data constraints.

Reclaimed water is wastewater that is treated, often to a non-potable standard, and re-used, such as for irrigation and industrial purposes. It reduces the need for additional water withdrawals, diverts wastewater from entering water sources, and reduces demand on potable water systems.

Cumulatively, data centers use a small share of statewide water withdrawals and a moderate share of some region's water withdrawals. In 2023, the data center industry used an estimated 2.1 billion gallons of water, with just over a third coming from reclaimed water instead of new withdrawals (sidebar). Data center water use accounted for less than 0.5 percent of total state withdrawals.

The industry's impact was also limited regionally. Most data centers are served by water utilities, and industry use made up from 2 to 21 percent of water use, after excluding reclaimed water use, at the six water utilities JLARC staff reviewed. Data centers were typically one of these water utilities' larger customers, but a data center was the single largest customer for only two utilities.

State regulates water withdrawals to ensure future water availability and to protect water ecology

To protect future water availability and environmental sustainability, DEQ regulates withdrawals from Virginia's water sources, including requiring permits for large-scale withdrawals (sidebar). Withdrawals can reduce the amount of water that is available for future use if it is withdrawn faster than it is naturally replaced. Additionally, they may affect aquatic flora and fauna, such as by reducing available habitat. Most data centers receive their water from local water utilities, which make the withdrawals. In these cases, DEQ ensures that data centers' water use is sustainable through permitting the utility's withdrawals. Only two data centers have their own DEQ withdrawal permits, and any data centers that do make their own withdrawals are subject to the same regulations as water utilities.

Withdrawal permits are required for withdrawals above 10,000 gallons per day from non-tidal surface waters, two million gallons per day from tidal surface waters, and 300,000 gallons per month from groundwaters in a groundwater management area. There are some exceptions for users that pre-date these regulations. Withdrawals that do not require permits may still require annual reporting.

To determine appropriate water withdrawal allowances, DEQ performs scientific modeling that evaluates water withdrawal impacts on future water availability and aquatic flora and fauna in that water source. Permits specify withdrawal limits and set other conditions, such as requiring the permit holder to limit withdrawals during droughts. If a requested withdrawal amount would exceed sustainable levels, DEQ would issue a permit only for a sustainable amount or add conditions to the permit that ensure sustainability. Permits must be renewed at least every 15 years, at which time DEQ reruns the water model with updated water source condition data. If growing data center demand prompted a water utility to seek a larger withdrawal than their permit currently allows, the requested permit withdrawal allowance increase would also have to be modeled by DEQ.

Data center water needs are likely to increase as the industry grows, and state and local governments could help ensure limited water resources are used effectively

While DEQ is responsible for ensuring that permitted water withdrawals are sustainable for the water source, there is less oversight over how available water should be shared across various uses. While the state as a whole is relatively water rich, water is a limited resource for some Virginia localities, such as those that do not have access to major rivers or other surface waters and are in groundwater management areas. Additionally, when local water use demand exceeds current permit or infrastructure thresholds, utilities may need to expend significant resources to meet the additional demand (sidebar). Therefore, localities should fully consider their allocation of available water. For instance, when reviewing a potential new development that may use a

Some **water utilities that serve or will soon serve data centers** have recently expanded their permits and/or infrastructure. For instance, five have requested new or larger withdrawal permits, though these expansions are not fully attributable to data centers. Water utility staff shared that data centers pay their fair share for any additional infrastructure they require.

large amount of water, a locality should consider whether the project could affect the locality's ability to meet future residential demand or pursue other types of economic development.

State could clarify localities' authority to request potential water use information from proposed developments

While any large water user has the potential to affect local water availability, water use information may be particularly helpful for zoning decisions for data center developments. Data centers can use a relatively large range of water amounts compared with other land uses. Some companies will continue to build data centers that use water for cooling, and potentially larger amounts of water as cooling needs increase. While others are moving away from water, the industry's net water use is expected to increase. In addition, because the industry is growing rapidly and typically grows in clusters, data center water use in a given locality can grow suddenly.

Localities have general statutory authority to consider water resources in their land use planning, but state law is not clear on localities' ability to require a proposed data center development to provide a water use estimate or to consider water use in their rezoning and special use permit decisions. (Rezonings and special use permits are discussed more in Chapter 6.) In interviews, local planning staff, government attorneys, and a local elected official conveyed different understandings of the law or reported being uncertain whether a locality could consider water use estimates when evaluating data center development projects. This information could be helpful for assessing a development's potential impacts, but data center developers can be reluctant to share this information because of proprietary concerns. State law should clarify localities' authority to require this information from data center developers and consider water usage in their rezoning and special use permit decisions. This clarification could potentially be extended to other development types, such as other developments with the potential to use large amounts of water.

RECOMMENDATION 6

The General Assembly may wish to consider amending the Code of Virginia to expressly authorize local governments to (i) require proposed data center developments to submit water use estimates and (ii) consider water use when making rezoning and special use permit decisions related to data center development.

Additionally, if local planning officials have this information, they should consult with their local water utility—prior to approving data center developments—on the impact these developments could have on the utility or future water availability. In some data center approvals, this information was not shared between parties. Doing so could help to ensure water use impacts are fully understood prior to approving the development.

Increasing use of reclaimed water may help reduce impacts on water resources

Some utilities offer reclaimed water systems for their customers, and using reclaimed water instead of potable water for cooling, including evaporative cooling, is generally a best practice for data centers. Reclaimed water can reduce a development's impact on water resources because it does not require additional water withdrawals and can decrease wastewater discharges. DEQ currently permits only two water utilities, including Loudoun Water, to provide reclaimed water for evaporative cooling uses.

Reclaimed systems may not be viable or available in all localities, but utilities that serve data centers should consider the option. Smaller utilities may not create enough wastewater for a reclaimed system that could sustain data center operations. Moreover, financial considerations may also limit reclaimed water use, as reclaimed systems have high capital costs. However, because of the potential benefits for water availability, utilities that serve data centers—and other large water customers—should consider the viability of using reclaimed water systems, as well as potential opportunities for data center companies to help with upfront costs.

Some stakeholders, including a data center company and several water utilities, indicated that Virginia's reclaimed water system regulations for evaporative cooling use are difficult to meet or confusing. DEQ indicated that regulatory changes, such as explicitly listing minimum standards for reclaim water use in data center evaporative cooling processes or reducing some treatment and monitoring conditions, could potentially address concerns while maintaining necessary safeguards but would require further review. DEQ is already scheduled to conclude an internal review of these regulations by September 2026 as part of its quadrennial review process, but DEQ could start this review now so that any eventual changes could be implemented a year earlier. Any potential changes DEQ identifies would need to be implemented through the standard regulatory process—including a Notice of Intended Regulatory Action and public comment period.

Data center construction has similar land and water impacts to other large developments, and state and local regulation mitigate most effects

The development of land for industrial, commercial, or residential uses, particularly "greenfield" developments, can affect Virginia's land and water resources (sidebar). Depending on the characteristics of the site being developed, the construction process may change land characteristics and uses, modify stormwater runoff patterns, and/or disturb wetlands and other waterways (Table 5-2). Such impacts can degrade air and water quality, destroy wildlife habitat, and increase flooding and erosion risks.

A development's ability to mitigate its potential impacts depends on the site, development type, and the resource. A development can mitigate overall potential impacts on these resources in three ways:

"Greenfield" development occurs on land that has not previously been developed. In contrast, redevelopment occurs on the site of a former development. A redevelopment is less likely to impact land and water resources, as any potential impacts likely already occurred during the previous development.

State-managed databases, such as the Department of Conservation and Recreation's **Natural Heritage database**, identify on-site resources that may be impacted by development.

- **avoiding** direct impacts to the maximum extent practicable, such as not constructing a building on forested land,
- **minimizing** impacts to the maximum extent practicable, such as using a retaining wall to minimize impacts to an adjacent waterway, or
- **compensating** for any impacts that do occur, such as offsetting impacts to a wetland by restoring or constructing that same type of resource elsewhere.

TABLE 5-2
Constructing new developments can result in loss of undeveloped and agricultural lands, create stormwater runoff risks, and potentially disturb wetlands

	Land resource loss	Stormwater changes	Wetland disturbances
Development action	Undeveloped and agricultural lands may be developed for industrial, commercial, residential, or other uses.	Impervious surfaces may be created to support buildings and ancillary developments.	Wetlands (including streams and other waterways) may be drained, filled, or encroached upon to maximize developable area.
Potential impact	Forests, agricultural lands, and other green spaces are lost.	Less rainwater is absorbed into the ground, increasing stormwater runoff.	Wetland areas are destroyed, diverted, or otherwise disturbed.
Effect without mitigation	Air, water, and soil quality degradation, loss of habitat, and lower agricultural production occur.	Increased flooding and erosion, water pollution, and slower groundwater recharge, occur.	Water source degradation, loss of habitat, and increased flooding and erosion occur.
Effect with mitigation	Losses are avoided, minimized, or offset by preserving, creating, or restoring lands elsewhere. [a]	Predevelopment runoff rate and quality are maintained, minimizing adverse impacts.	Disturbances are avoided, minimized, or offset by funding or implementing wetland creation or restoration. [a]

SOURCE: JLARC synthesis of interviews, government reports, and other information.
NOTE: [a] Offsetting impacts can be difficult and require significant time and space, particularly for replacing lost undeveloped and agricultural lands.

Some regions have seen substantial data center growth, but their construction impacts are similar to other large developments

Data center development has construction impacts that are similar to other large-scale developments' impacts. While comprehensive information on data centers' impacts to natural resources is not tracked, the vast majority of their development is greenfield development—although some redevelopment is also occurring.

The development pressures from data centers on undeveloped and agricultural lands statewide are not more than other fast-growing developments in Virginia. For example, the total land area of currently operating data centers is equal to about 1.4 percent of the farmland lost in Virginia between 2017 and 2022. According to land conservation experts, the current primary threat to undeveloped and agricultural lands is solar energy developments.

On a regional level, however, the share of undeveloped and agricultural land development in Northern Virginia attributable to data centers has been substantial. JLARC staff estimated that the data center industry accounted for between 20 and 30 percent of land development in Loudoun and Prince William counties from 2013 to 2021, and the amount of data center development has already increased 50 percent since then. However, these are some of Virginia's fastest-growing counties, which means that some portion of land developed for data centers likely would have been developed for other uses, such as housing, mixed-use commercial space, or distribution centers.

Data center developments have similar impacts on stormwater and wetlands as other large-scale developments, such as warehouses or shopping centers. The magnitude and significance of impacts depend on site characteristics as much as the development itself (sidebar). Therefore, impacts may be the same whether a site is developed for a data center or another land use.

Magnitude of impact depends on the change to the environment, not the development itself. For example, a small greenfield development may create more impervious surface than a large redevelopment.

Impact significance depends on the resource that is affected. For example, a given amount of water pollution may have a larger effect in a small river than a big river.

State and federal regulations require mitigation of stormwater and wetlands impacts, but land conservation is at local discretion

Federal and state regulations require stormwater management and wetland permits for sizeable impacts, regardless of development type. Stormwater permits for individual developments are usually administered by DEQ or the locality, and wetland permits are typically jointly issued by the U.S. Army Corps of Engineers and DEQ. Most data center developments require a stormwater permit because of their size, but only those that affect a wetland or other waterway require a wetland permit (which is the same for all types of development).

Stormwater management permits require developments to manage their stormwater runoff to meet water quality and quantity requirements to minimize impacts. For instance, a development would be required to install a stormwater management system, such as an on-site stormwater pond, to slow and filter its runoff. Data centers create a relatively large amount of impervious surface, and stormwater permits require management that is proportional to the addition of impervious surface and land cover changes. Some impacts may still occur even if all permit requirements are met, such as less water being absorbed into the ground or water source temperature increases, but these same impacts can occur from any developments that create large impervious surfaces or change land cover, such as a warehouse or shopping center.

Wetland permits require developments to avoid and minimize impacts to wetlands and other waterways to the maximum extent practicable and to compensate for any remaining significant impacts. Because data centers require large building footprints, they may be relatively less able to avoid or minimize impacts. However, any significant impacts that do occur require proportionate compensation, which ensures losses are replaced to the extent possible through the preservation, restoration, or creation of that resource elsewhere.

In Virginia, federal and state regulations do not require mitigation of impacts to undeveloped and agricultural lands. Localities have full discretion through their zoning laws

to determine how lands that are not protected from development can be used. While localities can require, negotiate, or accept offers to conserve a portion of the existing natural landscape as part of a development, data center developments generally use most of land that is practicable and allowed to be developed. Because undeveloped and agricultural lands are difficult to replace, the primary mitigation method to protect them is to avoid or minimize development on these lands. The state could consider imposing land use restrictions to prevent or minimize the land impacts from data center development, but this would be a profound change in the state's involvement in local land use decisions, and, currently, there does not appear to be a basis for distinguishing data centers from other large developments in considering such restrictions.

State could require data centers to meet environmental management standard to receive tax exemption

Even though federal and state regulations already limit most negative natural resource impacts of data centers, the state could encourage them to meet an environmental management standard because of their large and growing presence. Environmental management standards, such as the International Organization for Standardization's (ISO) 14001 standard, require companies to proactively review and reduce their impacts to natural resources (sidebar).

The ISO 14001 standard for Environmental Management Systems is one of the most used environmental management frameworks in the world. The U.S. Environmental Protection Agency believes it helps organizations to systematically identify and reduce their environmental impacts.

Environmental management standards do not set required minimum standards but involve continuous improvement in operational sustainability. Required minimum standards may not be viable for all data center companies and may not be wholistically sustainable (sidebar). Environmental management standards call for companies to evaluate all of their environmental impacts and set and pursue sustainability goals. This process is repeated every few years and encourages a wholistic approach to sustainability. For instance, ISO 14001 seeks to promote organizational improvement in air emissions, water use, water discharge, waste generation, and energy consumption—all of which have been raised as concerns about data centers. (For more information on data center water discharges and waste generation, see Appendix K. For more information on data center energy impacts, see Chapter 3.)

Required minimum standards for specific resources could have unintended consequences, including: 1) not being viable for all data center companies, who have different operational systems and preferences, 2) not ultimately improving sustainability, such as water restrictions leading to more energy-intensive cooling, or 3) not being adaptable as the data center industry evolves, such as if new technologies shift the industry's environmental impacts.

The state could encourage adoption of an environmental management standard by making the state's sales and use tax exemption for both new and existing data centers contingent on adoption. Many data center companies already set sustainability goals and policies, and a well-designed state requirement would encourage other companies to adopt similar goals and policies. At least four other states—Arizona, Illinois, Iowa, and Washington—require data centers to meet a sustainability standard as a condition of their state data center tax incentive program.

POLICY OPTION 5

The General Assembly could amend the Code of Virginia to require that, as a condition of receiving the sales and use tax exemption, data center companies meet and certify to an environmental management standard, such as the International Organization for Standardization's 14001 standard for Environmental Management Systems.

Data center impacts on historic resources are similar to other developments, but current protections could be strengthened

Developments have the potential to negatively affect historic resources, both during and after construction. Historic resources can include sites (e.g., battlefields and cemeteries), structures (e.g., buildings), and objects (e.g., artifacts) (Figure 5-4). Impacts can vary substantially depending on the type of development being proposed, the significance of the historic resources affected, and how those resources will be affected. In many cases, a development will not adversely affect historic resources because there is nothing historically significant on the development site or located nearby.

FIGURE 5-4
Virginia has a wide range of historic resources

SOURCE: Image courtesy of the Virginia Department of Historic Resources (cropped by JLARC).

Data center developments can affect historic resources in the same ways as other large developments

Some data center developments have affected state historic resources. For instance, two data center developments have relocated or damaged cemeteries, and several have been located on historic sites, including a turn of the 19th-century residential site, a historic African American horse showground, and part of a Civil War battlefield. Additionally, several approved but not yet built data center developments have raised concerns of viewshed impacts on historic battlefields around the Northern Virginia region. Like with other development types, the total number and extent of data centers' impacts on historic resources are unknown as not all of these resources—or impacts to them—have been identified and catalogued.

Preservation experts consider data centers' impacts and risk of impact to be similar to those of other large-scale developments. Data centers have less flexibility than some other developments, like housing, to avoid building on parts of the property where resources might be located. Data center developments also require extensive grading, which can destroy buried structures and objects, and tall data center buildings are more likely to have viewshed impacts on nearby resources. However, other large-scale developments, like warehouses and shopping centers, can have the same impact. The rapid growth of data center development increases the likelihood that historic resources will be disturbed by these developments, but the same is true of other commercial and residential construction growth.

Pre-development studies help promote mitigation of impacts to historic resources

Before site development begins, sites can be studied to identify any potentially significant historic resources and determine mitigation strategies if impacts were to occur. Developers can hire experts or third parties to perform "Phase I" historic resource studies, which could include background research, physical inspection, and remote sensing, to identify historic resources that may be affected by a new development. If a Phase I study finds historic resources, Phase II historic resource studies can determine their significance and, if needed, develop mitigation approaches (sidebar). When needed, Phase III historic resource studies involve carrying out mitigation approaches, such as excavating and relocating a resource or documenting a resource. Once historic resources have been identified, developers can additionally perform viewshed analyses to determine whether a new development would be visible to these resources, potentially affecting their significance.

Various methods may be used to **mitigate impacts to historic resources**. For instance, developments may avoid or minimize impacts by moving building locations or lowering building heights. If historic resources cannot be avoided, they may be excavated and relocated, studied and documented before their destruction, and/or commemorated with signage. The appropriate strategy can depend on the resource, development type, and the site.

Phase I historic resource studies and viewshed analyses are relatively inexpensive predevelopment tools. Some data center companies reported that they conduct Phase I studies for some or all of their data center developments, and several have conducted and shared viewshed analyses as part of the local zoning approval process. Studies can ultimately save developers time and money by preventing delays or the need for design changes from unexpected discoveries after developments have been approved.

Few legal or regulatory protections exist to protect historic resources, but pre-development studies could be more strongly encouraged

While there are many layers of federal, state, and local protections for natural resources, fewer protections exist for historic resources. For private developments, federal regulations require that historic resource impacts need to be considered—studied and potentially mitigated—only if a wetland or other federal permit is required. State law only requires additional Virginia Department of Historic Resources (DHR) oversight of private developments when human remains need to be removed.

Local regulation of historic resources varies by jurisdiction, depending on local capabilities and priorities. All localities have the authority to restrict development around

historic resources through their zoning ordinances, but some are better able to identify these resources than others. For instance, Loudoun requires Phase I historic resource studies for all non-residential developments and has a county archeologist who evaluates study results and makes recommendations to planning staff if additional action is needed. Most localities do not require pre-development studies and do not have an archeologist on staff. Moreover, when development and historic resource preservation goals conflict, it is up to local elected officials to make zoning decisions.

To ensure that potential impacts to historic resources are identified, the state could encourage Phase I historic resource studies for all new data center developments, as well as viewshed analyses for new developments within a certain distance of a registered historic site. To do this, the state could make eligibility for the sales and use tax exemption contingent on this work being performed for any new data center developments. For example, the state could require that, for any data center that begins construction in 2026 or later, the data center company perform a Phase I study (along with a viewshed analysis, if applicable) before the facility is constructed in order to be eligible for the exemption. Data center developers would pay for the study and report findings to localities, which would determine if any further action is required.

POLICY OPTION 6

The General Assembly could amend the Code of Virginia to require that, as a condition for receiving the sales and use tax exemption, data center companies conduct a Phase I historic resource study of a proposed development site, as well as a viewshed analysis when a proposed site is located within a certain distance of a registered historic site, and report the study findings to the appropriate locality prior to development.

Some localities may not currently have the time, expertise, or resources to review the Phase I historic resource study submissions. DHR could offer grants for localities to hire consultants or have staff available for consultation, but this would require additional funding or staff to implement. Alternatively, localities would have the option to require data centers to pay for a consultant hired by the locality to perform the review.

Some historic resource preservation experts stated that, while they would appreciate greater protections around historic resources, establishing mitigation requirements at the state level may not allow for site-specific characteristics or local preferences. For instance, prohibiting data center development near historic resources statewide, as was proposed during the 2024 legislative session, may be broader than needed—as impacts do not occur every time a development is on or near a historic resource—or could prove too restrictive given the abundance of historic resources in Virginia.

6 Local Residential Impacts

Local governments are responsible for managing land development in their jurisdictions for different residential, commercial, agricultural, and industrial uses. Localities manage development through planning and zoning to ensure developments conform with state and local laws and are grouped with appropriate types of development.

On the planning side, state law requires localities to create and update long-term comprehensive plans to support "coordinated" and "harmonious" development. These plans provide a strategic vision for development in the county but, while important for guiding local decisions, do not set any legal boundaries.

On the zoning side, localities pass zoning ordinances that set legal restrictions on development. Zoning ordinances establish conceptual *zones* (e.g., rural residential, light industrial), which have their own sets of rules and requirements for new development. For each zone, the ordinance lists *uses* that are allowed. Uses can allow different types of business operations (e.g., data center, brewery), different types of residential construction (e.g., townhouse, single-family house), and other distinct uses. Additionally, zoning ordinances can impose minimum requirements on specific uses or zones, such as maximum heights or mandatory setbacks from property lines.

Within a zone, a use can be allowed by right, allowed by special permit, or prohibited. If a use is prohibited in a zone, then a developer can seek to have the parcel rezoned to allow the use.

- **By right** uses are allowed within a zone without any special approval by the locality. For example, if data center development is a by-right use, a developer can build a data center in the zone without seeking special approval from the locality. Localities cannot require data center developers to do anything not already established in the zoning ordinance. For example, a locality could not require a by-right data center to be set back farther from nearby property lines than the ordinance already dictates.
- **Special permit** uses are allowed if approved by the locality's elected officials, e.g., a county's board of supervisors (unless they delegate this authority to the local board of zoning appeals), often following a public hearing. As part of the special permit process, the locality can make approval conditional on additional restrictions to mitigate negative impacts, such as bigger property line setbacks or lower building heights.

- **Rezoning** changes the conceptual zone a parcel falls under and therefore its allowed uses. Rezoning requests require a public hearing and approval from elected officials. Like with special permits, the locality can consider the developer's willingness to conform to additional restrictions or actions as a condition of rezoning approval.

Growing number of data centers are being built close to residential areas, causing residential impacts

This chapter focuses on data centers' impacts on residential areas. While minimizing impacts on **other sensitive uses** such as schools and parks is important, concerns of negative impacts in Virginia have primarily come from residential areas.

Land use planning principles state that neighboring property uses should be compatible with one another. These principles generally dictate that industrial uses should be far from residential and other sensitive uses because they are often incompatible (sidebar). Residential neighborhoods are generally expected to be safe, quiet, and pleasant places to live, whereas industrial facilities are often large, unsightly, and potentially noisy. For example, Loudoun County ordinances state that "industrial uses […] are incompatible with residential uses due to the prevalence of outdoor storage and emissions of noise, odor, and vibrations."

Data centers are industrial facilities that are largely incompatible with residential uses

The industrial scale of data centers makes them largely incompatible with residential uses. A modern data center site includes one or more large, industrial buildings, similar in size and appearance to a new distribution center or a manufacturing facility, which is an abrupt contrast to a residential home.

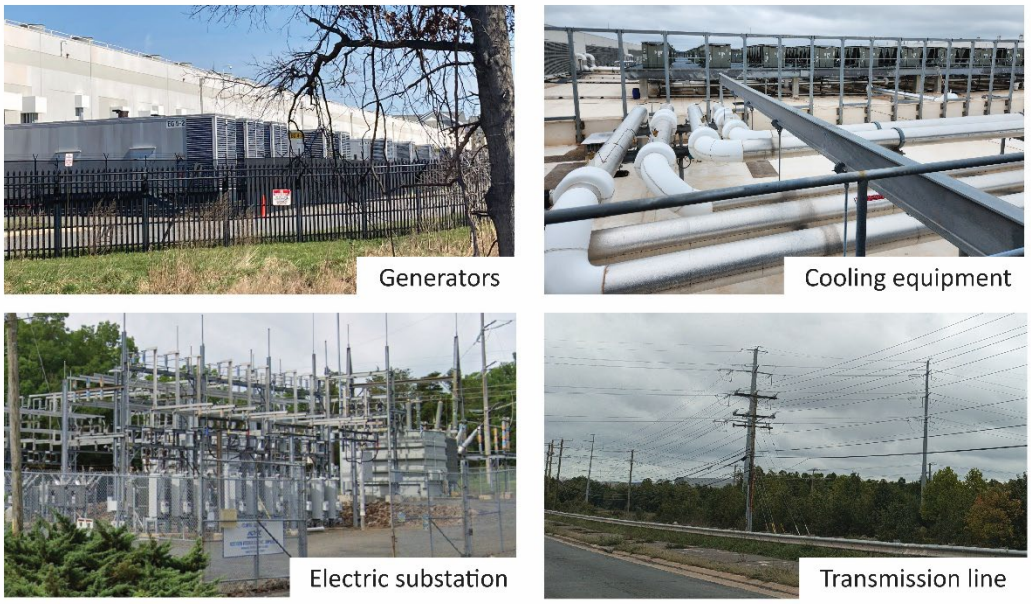
Resident descriptions of nearby data centers include:

— "a giant monolith in the wrong place"

— "a prison"

Other components of data center sites are also industrial in character and unsightly to residents who live close by (sidebar) (Figure 6-1). Trailer-sized generators (a median of 35 per site) are often lined up beside the data center building or housed in large generator sheds. Industrial-scale cooling equipment, such as chillers or water towers, often sit on the roof or outside the main building. Many data center sites are encompassed by security fences and deploy bright security lighting. Data centers also require industrial-scale electrical infrastructure. Sites will often include one or more electrical substations on or adjacent to the site, and some require above ground transmission lines extending from nearby main lines.

FIGURE 6-1
Data center buildings and sites have industrial characteristics and infrastructure



SOURCE: JLARC staff photos and Google Earth.

Homeowners in residential areas close to data centers frequently express concern that having industrial sites nearby will decrease their property values. While it is certainly possible that nearby data centers have affected the resale value of homes, there is not yet evidence of this relationship. In interviews with representatives of neighborhoods opposed to nearby data centers and other informed individuals (sidebar), almost none observed a decline in property value or speed of home sales. One commonly cited explanation was that the tight housing market in Northern Virginia decreases buyers' selectiveness and so proximity to data centers has not yet had a noticeable effect on property values.

To assess data centers' impacts on property value, JLARC interviewed representatives of neighborhoods opposed to data centers proposed or recently constructed nearby, local stakeholder groups, county assessor's offices, and a local real estate agent association.

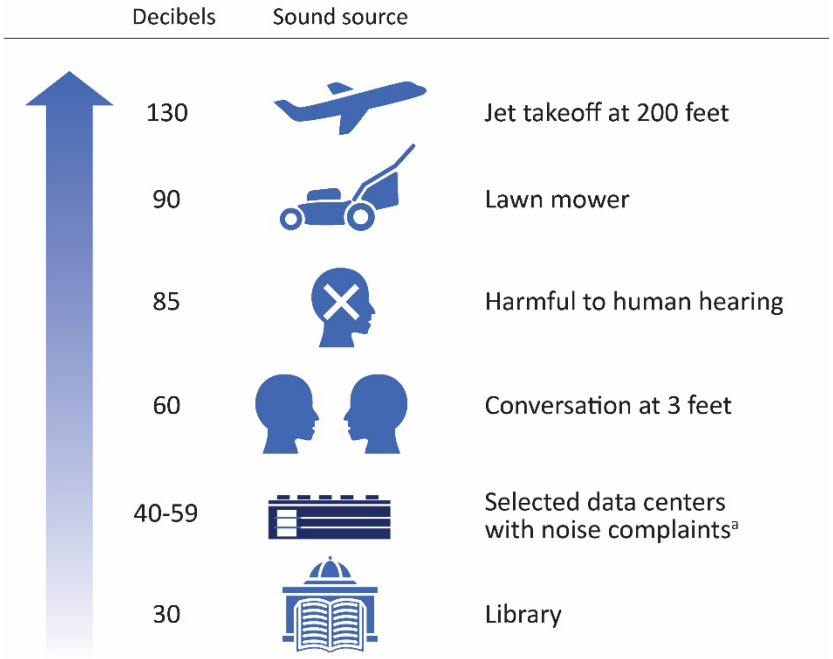
Some nearby residents report that constant noise from data centers impacts their well-being

The constant nature of data center noise has been a reported problem when data centers are located near residential areas. Whether data center noise can be heard past the facility's property line depends on its design and its type of cooling system, which can cause noise. In addition, local geography and surrounding buildings can affect how sound travels.

While some data centers have been noisy enough to cause complaints, the noise is not loud enough to damage nearby residents' hearing and rarely loud enough to violate noise ordinances (Figure 6-2). Data center noise that has prompted resident complaints ranges from an estimated 40 to 59 decibels (per JLARC's review of noise measurements of selected data centers that have prompted complaints by residents). This

sound level is typically below the 55 or 60 decibel limit that Loudoun, Prince William, and Fairfax allow in their ordinances for residential areas. Rather than the volume of the noise, it's data centers' constant noise that some residents consider problematic. Data center noise is described as a constant "drone" or "hum," similar to house air conditioning systems but magnified to an industrial scale. The noise can sometimes be heard both in and outside of nearby residences.

FIGURE 6-2
Data center sound is noticeable but quieter than many common sounds



SOURCE: JLARC review of Occupational Safety and Health Administration, U.S. Centers for Disease Control and Prevention, and Federal Aviation Administration websites, and analysis of complaint data from Fairfax and Loudoun.
NOTE: The units are A-weighted decibels. [a] Encompasses measurements at locations where local staff recently measured data center noise using A-weighted decibels. Measurements are a response to complaints, so they are not representative of all data centers. Measurements indicate total sound, not the isolated amount from data centers.

Residents who have reported that data center noise is a problem have indicated that it has adversely affected their well-being. JLARC staff spoke with residents who live near data centers that have been the subject of noise complaints to learn how the noise affects them. Some residents described physical symptoms such as migraines from the facilities' constant noise. Others said that they experience health problems caused by disrupted sleep, and some residents described an inability to concentrate on tasks. A common theme was poorer quality of life, with some residents avoiding their decks and yards because the sound is louder outdoors.

Data centers are not required to reduce their noise if they are not violating local ordinances, which has made it difficult to address noise concerns. Some neighborhoods have attempted to address concerns through the county and engagement with data

center companies. Residents of the Great Oak neighborhood in Prince William reported noise to county police from a nearby data center in May 2022, and as of October 2024, the issue had not been fully addressed by the data center owner to all residents' satisfaction. Residents of the Brook Haven neighborhood in Loudoun contacted the county in 2021 about noise concerns, and the data center completed an attempted solution in November 2023. In both cases, residents observed reductions in noise from the nearby facilities but emphasized it took time and repeated communications from residents to prompt action.

Data center construction sites can be especially disruptive to nearby residential areas

Because of data centers' size and scale, their construction takes a long time and is disruptive to residential areas. Construction activities typically include clearing trees, grading land, laying foundations, erecting buildings, and installing equipment. While these activities are not unique to data centers, the impacts on residents are especially large because of the projects' scope. Each building takes about 12 to 18 months to construct, and with the industry moving toward developing data center campuses, work on additional buildings often begins as soon as one is completed. Therefore, a large site could take as long as seven years to fully complete. This work requires thousands of workers on site and substantial truck deliveries of materials.

Some residents report they have been negatively affected by data centers' construction. Their concerns include loud construction noises and vehicle traffic. For example, one neighborhood's main access road was damaged by frequent use of heavy vehicles, which reportedly sometimes blocked school buses and emergency vehicles.

One-third of data centers are near residential areas, and industry trends make future residential impacts more likely

The majority of data centers are appropriately located in industrial or commercial areas and are not close to residential uses. Over 60 percent are more than 500 feet from residential-zoned properties (as measured from property line to property line, meaning the actual facility and residences are even farther apart) (sidebar). The farther away a data center is from residential areas, the less likely it is to affect nearby residents.

Analysis of the proximity of data center properties to residential zoning used data from eight localities that account for nearly all (93 percent) data centers in Virginia. (See Appendix B.)

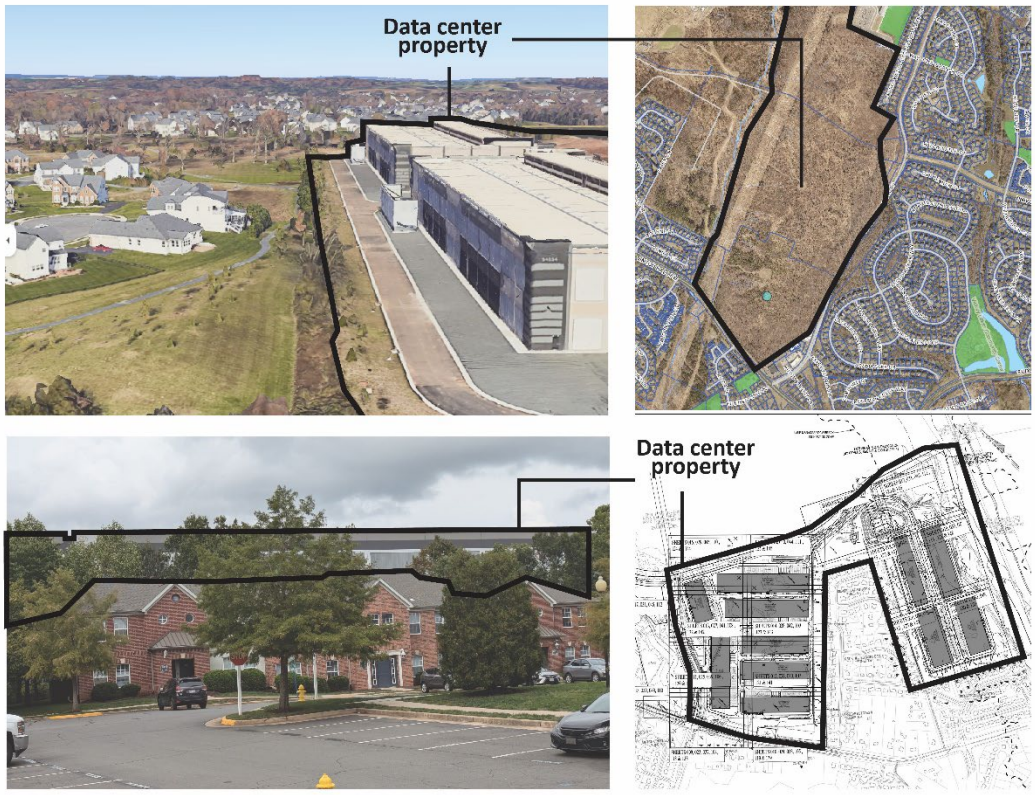
A minority of data centers have generated noise complaints. At least 15 data centers (10 percent of operational data center sites) appear to have generated noise that nearby residents regard as problematic, according to resident groups and government records.

However, the number of data centers being built near residential areas is increasing. Almost one-third (29 percent) of operational data center properties in Virginia are within 200 feet of residentially zoned properties. Currently, there are several data centers being constructed adjacent to single-family homes, townhouses, and apartment complexes. Several recently approved data centers in Loudoun and Prince William will be built on land adjacent to neighborhoods, including at least two proposed

developments where the property also abuts an elementary school (Figure 6-3). Other counties—such as Fairfax, Stafford, and Henrico—have also received proposals for data centers close to residential areas.

Trends in real estate availability and facility design increase the likelihood of future residential impacts. As the industry's footprint in Northern Virginia grows, the amount of land ideal for data center development is decreasing, and developers are more likely to consider locations closer to residential and other sensitive areas. Additionally, the typical data center building is becoming taller, larger, and more power-intensive, which has the potential to make their industrial characteristics more pronounced and, depending on the design, could generate more noise.

FIGURE 6-3
Some recently built or approved data centers are close to residential areas



SOURCE: JLARC site visits, Google Earth, and locality websites.
NOTE: In order, the pictures depict: (1) existing data center from the Loudoun Meadows neighborhood of Loudoun, (2) land approved for Devlin Technology Park in Prince William, (3) an existing data center next to the Regency neighborhood in Prince William, and (4) a proposed site plan for property that was rezoned to allow data centers around the Amberleigh Station neighborhood in Prince William.

Localities have allowed data centers near neighborhoods, sometimes without sufficient mitigation of impacts

Appropriate local planning and zoning decisions can reduce the risk of data center developments affecting residents. Localities need to proactively update their planning and zoning to manage data center development, because the industry is rapidly changing. As recently as 10 years ago, data centers were much smaller facilities that were similar in size and appearance to commercial office buildings. Local ordinances that continue to treat data centers as non-industrial commercial uses, which are often allowed next to residential areas, are outdated and can affect residents.

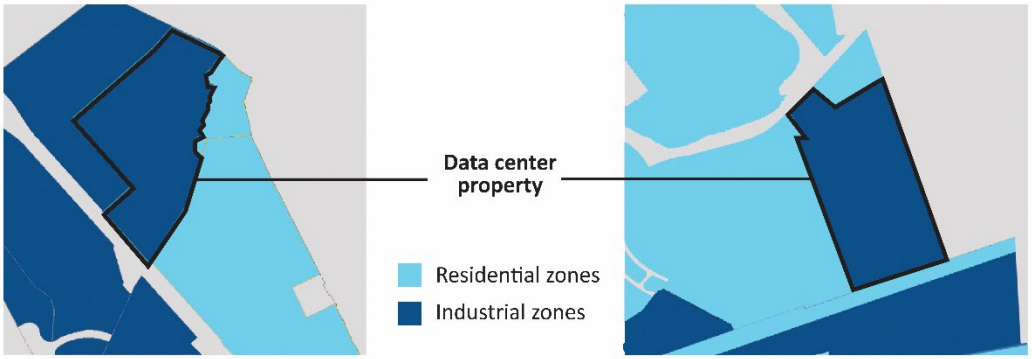
Localities need to consider which areas are appropriate for data center development, classify data centers as industrial uses in zoning ordinances, ensure data centers are not too close to residential zones, and include requirements to mitigate any potential negative impacts from data centers, such as building setbacks and height restrictions. In addition, local elected officials should adequately consider potential residential impacts when considering special permit and rezoning requests.

Inadequate planning and zoning have allowed data centers near residential areas

Data centers have sometimes been built too close to residential and other sensitive areas because local zoning ordinances did not consider them to be an industrial use. For example, until 2021, Fairfax considered a data center to be a telecommunications facility, which allowed data centers to be built in areas zoned for residential and office uses. Loudoun originally treated data centers as an office use and continues to allow by-right data center development in areas zoned for office uses in some parts of the county.

In addition, some localities have zoned industrial areas next to residential areas on their zoning maps, even though land use principles state that industrial uses are ideally separated from residential uses by buffers, such as commercial zones. For example, the Great Oak neighborhood in Prince William and the Bren Mar neighborhood in Fairfax are directly adjacent to industrial zones (Figure 6-4). This has allowed data center development by right despite being close to residences. The likelihood of residences being close to data centers has also increased because of some local decisions to rezone land to residential despite being in primarily industrial areas. If zoning maps are not reviewed and updated, more data centers are likely to be built closer to residential areas.

FIGURE 6-4
Some industrial zones border residential zones, allowing by right data centers too close to residential zones



SOURCE: JLARC review of Prince William and Fairfax geographical informational systems and planning staff reports.
NOTE: The first picture depicts an existing data center near the Great Oak neighborhood of Prince William. The second picture identifies a planned data center near the Bren Mar neighborhood of Fairfax County. Grey coloring indicates a zone that is (1) neither residential nor industrial or (2) within another locality. "Zones" refers to the official zoning classification in local ordinances.

Zoning ordinances often include requirements intended to mitigate negative impacts from businesses, but these requirements are not always sufficient. Required building height limits and property line setbacks are fundamental ways to reduce a development's impacts. For example, the property on the right side of Figure 6-4 was zoned industrial and is only subject to a setback of at least 40 feet (although the developer is voluntarily planning a larger setback). This zoning would have allowed a new data center to be built close to the property lines of two adjacent townhouse complexes. Landscaping and architectural requirements are other ways to mitigate data center impacts, but their value is limited. Newly planted trees take decades to grow, and the size and proximity of a nearby data center matters more to residents than its architecture.

Some localities' elected officials have granted data centers exceptions to requirements designed to reduce residential impacts

Local officials in Virginia have sometimes approved data center requests to build in locations that prompt resident opposition or are likely to cause impacts. These elected officials are responsible for reviewing applications for special permits and rezonings and ensuring they are compatible with the locality's long-term comprehensive plan (or amending the long-term plan). While there is no objective way to assess if officials made the "right" decision in approving a given project, there are cases where elected officials' decisions have led to impacts on residents or contradicted development strategies laid out in long-term plans. For example,

- Elected officials have approved property rezonings that allow data centers next to sensitive locations. Prince William approved rezoning from mixed residential to industrial for the Devlin Technology Park (second in Figure 6-3), which is adjacent to a school and about 80 feet from residential zoning.

- Elected officials have approved data center requests in areas that are not suitable, according to the locality's long-term comprehensive plan. In Loudoun, the board of supervisors approved the True North development even though staff recommended denial because the county's "transitional" long-term plan classification for the site does not support data centers (sidebar).
- Elected officials have exempted individual data centers from local requirements intended to mitigate negative impacts on residents. For example, Loudoun's board of supervisors allowed Aligned Energy's Relocation Drive project to exceed the zone's maximum height and square footage, despite staff recommending against the exemption because of nearby residential areas.

Local planning staff can recommend denial for several reasons. Sometimes staff may recommend denial because they believe more information from the developer is needed before a decision should be made. Other times staff may recommend denial because the proposed use is not compatible with the proposed site or there are not sufficient mitigations planned to adequately protect nearby residents.

Some localities have taken steps to minimize residential impacts, though success of these efforts rests with elected officials

Residents' opposition to data centers has grown in recent years, especially in Loudoun and Prince William. While data center projects rarely generated citizen opposition in the past, it is now more common for individuals and organized groups to speak against data center proposals at local planning commission and board of supervisors meetings. Some grassroots groups have been created to fight specific proposals for new data centers, joined by existing organizations such as regional environmental groups. These local groups often also advocate for more government restrictions on allowable locations for data centers.

Opposition to data center proposals has also emerged outside of the main Northern Virginia markets. For example, local groups contested recent proposals in Henrico County and the Town of Warrenton. However, some locations such as Mecklenburg have not encountered significant resident opposition.

Several Virginia localities are making or considering zoning ordinance changes to reduce the risk of residential impacts

Most of the Virginia localities with sizable data center markets have taken or are considering steps to better manage future data center development. Since 2019, elected officials in the three localities with the most data centers (Loudoun, Prince William, and Fairfax) have taken some steps to address residential concerns (Appendix L). For example,

- All three localities have increased the requirements for data centers to improve their appearance or reduce their visibility, for example, increasing setback requirements, requiring specific design standards for the building façade, or screening external mechanical equipment.

- Loudoun and Fairfax have reduced the number of zones allowing data centers by right.
- All three localities have taken steps to address noise, such as requiring sound studies for new projects, requiring proactive sound measuring for existing data centers, and eliminating a partial exemption in the local noise ordinance for nighttime noise from businesses (including data centers).
- All three localities recently initiated studies of their data center policies to better manage development. Fairfax's study concluded with elected officials amending their ordinances in fall 2024. Loudoun and Prince William are reviewing potential changes to their long-term comprehensive plans as part of their studies and tentatively plan to vote on study proposals in 2025.

In several of the Virginia localities that are considering or expecting their first data center projects, elected officials have proactively implemented planning and zoning changes to promote appropriate industry development. The goals of these changes are to avoid the types of residential impacts that have occurred in established data center markets. For example, in 2023, Stafford County added data center principles to its comprehensive plan, prohibited data centers in several commercial and light industrial zones, and established industry-specific standards. Culpeper County also coordinated amending its comprehensive plan and zoning ordinance relevant to data centers. Culpeper allows data centers in multiple industrial zones but provides tax incentives to encourage development in a newly designated Technology Zone with more stringent design requirements.

Localities generally have adequate expertise to make data center decisions

For the most part, local government staff possess sufficient expertise to support review and approval of data center projects. Data centers are one of many types of development that local planning, permitting, and other staff evaluate. Evaluating whether a data center project is in an allowable location, has appropriate setbacks and building height, or is proposing effective landscape screening is similar to evaluating other large commercial or industrial developments. The one exception is noise, a topic where staff from several localities would like more expertise. For example, planning staff from a locality with data center experience are uncertain whether their recently revised ordinances are the right way to prevent data center noise impacts.

Data center applications can be challenging, however, for smaller counties with less experience with the industry, given the complexity, size, and scale of data center projects. These localities have addressed challenges by reaching out to staff in other localities with more industry experience and by contracting for tasks where their expertise may be lacking, such as assessing economic impacts. For some functions, such as reviews of stormwater management plans, the Department of Environmental Quality

may perform the review instead of the locality. Larger counties have sometimes used consultants as well, such as Prince William for a noise study.

Effectiveness of local efforts to minimize residential impacts ultimately depends on elected officials

The effectiveness of local efforts to minimize the residential impacts from data center development ultimately depends on elected officials. Local staff can propose well-designed zoning ordinance changes and provide sound advice on whether a special permit or rezoning request should be approved based on local development standards and the locality's comprehensive plan, but elected officials make the final decisions. As described above, elected officials in Fairfax, Loudoun, and Prince William have recently taken actions to minimize residential impacts of data centers, and several localities considering data center projects are taking actions proactively. While these actions do not guarantee elected officials will always make the "right" decisions to address impacts, they do indicate that elected officials are actively responding to residents' concerns.

State intervention does not appear warranted, but localities should consider using key practices in data center ordinances and decisions

Land use decisions are traditionally a local responsibility in Virginia, because they directly affect local residents. Land use decisions are also very site specific, and local governments are better positioned than the state to evaluate what is appropriate for a given site.

Nature of data center impacts does not appear to merit state intervention, and localities appear to be taking needed actions

Although some stakeholders have advocated for greater state involvement in land use decisions, there is not currently a compelling reason for a state role in setting local requirements for data centers or intervening in local approval decisions. State intervention should only be considered if local policies are causing significant threats to residents' health and safety or other significant harm, but that is not the case with data centers.

Furthermore, only a minority of data centers in Virginia have been reported to impose negative impacts on residents. While some localities have allowed data centers to be built in areas incompatible with residential uses, those localities now appear to be taking actions to avoid future impacts by reviewing and changing local zoning ordinances. Other localities that have not experienced negative impacts on residents yet appear to be taking proactive action to minimize impacts.

Localities should implement several practices to minimize residential impacts

Localities should implement several practices to protect residents and ensure data center development proceeds appropriately and with minimal impacts. Namely, localities should:

- classify data centers as an industrial use in their zoning ordinances;
- review the locations of zones allowing data centers by right, and adjust the zoning map if needed, considering proximity to residential areas;
- ensure that minimum requirements in the zoning ordinance adequately mitigate negative impacts on residential or other sensitive areas (e.g., setbacks, building heights), and add requirements specific to data centers as needed;
- identify optimal areas for data center development in the locality, including locations that are suitable from the county's perspective (e.g., far from residential areas) as well as the industry's perspective (e.g., large parcels, access to transmission);
- reduce the likelihood of noisy data centers (including through limiting allowable locations and requiring sound modeling) and prohibit the constant low-frequency noise of data centers from reaching residential areas; and
- require commitments from data centers making zoning requests to sufficiently mitigate negative impacts on any nearby residential areas.

Localities can take steps to mitigate data center noise, but some are unsure of authority to do so

Although only a few data centers have caused impacts to residential areas, noise is reported to be one of the most disruptive problems for residents, and data center noise concerns can be difficult to resolve. Noise impacts can be reduced by siting data centers away from residential areas and by modeling data centers' potential noise impact before they are built. Localities also need to be able to address noise that occurs after data centers are operational.

Noise concerns can be reduced by modeling data center sound impacts before a data center is built

In addition to having zoning ordinances that prevent data centers from being located close to residential areas, localities should require sound modeling for data centers proposed close to residential areas. Sound modeling predicts the sound a facility will generate once operational and provides an opportunity for building designers to assess the need for, and effectiveness of, sound reduction strategies. Localities could review study results to determine if any further action, such as sound barrier construction, should be required before approving a development project.

Sound modeling studies can also be used to establish the baseline level of noise already occurring around the proposed data center site, which can later be used to determine whether a data center has contributed to noise in the area. Many data center companies are now doing sound modeling studies for all or some of their projects, and companies explained that sound modeling prior to construction is worthwhile because reducing noise after a building is operational can be difficult and expensive.

Some localities were unsure whether Virginia law allows them to require sound modeling studies. Given this uncertainty, the Code of Virginia should be amended to clarify that local governments have the authority to require sound modeling studies by data center developers and to review and consider the results in their land use decisions.

RECOMMENDATION 7

The General Assembly may wish to consider amending the Code of Virginia to expressly authorize local governments to require sound modeling studies for data center development projects prior to project approval.

The state could incentivize sound modeling by making eligibility for the sales and use tax exemption contingent on this work being performed for any new data center developments proposed near residential areas. For example, the General Assembly could amend the law to require any data center company with a data center that is proposed to be constructed in 2026 or later near a residential area or area zoned for residential development perform a sound modeling study and provide the results to the appropriate locality in order to qualify for the exemption.

POLICY OPTION 7

The General Assembly could amend the Code of Virginia to require that, as a condition for receiving the sales and use tax exemption, data center companies conduct a sound modeling study prior to the development of a proposed data center that is to be located within a certain distance of a residential development or area zoned for residential development and provide the study findings to the appropriate locality.

Localities also need the ability to address noise issues that occur once a data center is operational

Localities also need to be able to address data centers' noise once they are operational, but local ordinances have been largely ineffective at addressing data center noise concerns. Most local noise limits are defined using "A-weighted" decibels (sidebar). This metric is designed to target excessively loud noise from sources such as parties and barking dogs. The lower frequency noise data centers emit is not fully captured in "A-weighted" decibels. Therefore, data center noise rarely exceeds the allowable limits set in ordinances, despite the constancy of the sound being problematic for residents. To effectively address data center sounds that cause resident complaints, localities could

"Decibels" are a pure unit of measurement of sound's volume. When measuring sound, different modifications can be used to account for various frequencies. For example, "A-weighted" decibels prioritize frequencies perceived loudest by humans and therefore reduce particularly low frequencies. "C-weighted" decibel measurements account more for low frequencies.

develop a supplemental noise limit defined using a metric that better accounts for low frequency sounds, such as "C-weighted" decibels.

Another challenge is that most localities address excessive noise in *noise ordinances*, and state law limits civil penalties for noise ordinance violations to $500 after the first offense. Stakeholders have expressed concern that this small penalty is not sufficient to affect the behavior of the large companies that own data centers. Addressing noise limits through localities' *zoning ordinances* would allow localities to better address data center noise. For example, the zoning ordinance could prescribe a process for measuring potential noise violations and penalties for not addressing them.

Some localities were unsure whether state law allows them to (i) establish maximum sound levels in alternative low frequency sound metrics and (ii) set noise rules and enforcement mechanisms in their zoning ordinances. The state should clarify that local governments have the authority to use these approaches to address data center noise.

RECOMMENDATION 8

The General Assembly may wish to consider amending the Code of Virginia to expressly authorize local governments to establish and enforce maximum allowable sound levels for data center facilities, including (i) using alternative low frequency noise metrics and (ii) setting noise rules and enforcement mechanisms in their zoning ordinances, separate from existing noise ordinances.

7 Potential Changes to Data Center Sales Tax Exemption to Address Policy Concerns

Virginia's data center retail sales and use tax exemption is a valuable incentive to data centers (providing $928 million in savings in FY23), and about 90 percent of the industry (as measured by megawatts of power) uses the exemption. The General Assembly could therefore use the exemption to incentivize the industry to take actions that help address many of the concerns discussed throughout this report.

If consideration is given to amending the exemption, two factors should be considered. The exemption was adopted primarily to attract data centers to Virginia for economic development purposes, so any changes to advance other policy goals could make it a less effective economic development tool. The exemption is also consistent with tax policy principles that generally exempt businesses' production-related inputs (in this case computer and related equipment) and therefore provides equitable tax treatment with other capital-intensive industries that have business input exemptions.

Exemption changes could encourage continued data center growth, reduced energy demand, or a balance of these priorities

The data center industry provides positive economic benefits to Virginia (Chapter 2). However, a primary concern about the growing industry is the immense increase in energy demand it will require (Chapter 3), which could increase costs to other customers (Chapter 4). The state could consider changes to the exemption to maintain data center industry growth, reduce energy demand by reducing industry growth, or attempt to balance these two competing priorities.

Extending the exemption could help Virginia maintain industry growth and associated economic and local tax revenue benefits

The data center industry provides moderate economic benefits to Virginia and can provide localities that have them with substantial tax revenues. While economic benefits are concentrated in Northern Virginia, other regions of the state also benefit. For example, data center construction benefits equipment manufacturers and material suppliers in Tidewater, Southwest, and Southside Virginia. While historically only a few localities have benefited from data center tax revenues, the industry is rapidly growing. Data center projects are under development in at least 15 localities, most of which did not previously have data centers. Therefore, from an economic development perspective, the state may want to continue attracting the industry and maintain Virginia's position as a top global data center market.

The state's data center sales tax exemption is scheduled to expire in 2035, and data center representatives unanimously reported that expiration of the exemption would have a negative impact on the state's ability to attract new data centers and keep existing ones. Some companies indicated the expiration date could start to affect site selection and expansion decisions made in the next few years, because companies typically consider the costs of data center ownership over a 15- to 20-year period when making location decisions. Companies indicated that, without the exemption, the total cost of data center ownership and operation would significantly increase. Virginia is currently competing for new data center development with several other primary U.S. markets, almost all of which have data center exemptions. Without an exemption, data center representatives indicated any new development in Virginia would be limited to only what is "absolutely necessary," and development would likely shift to other markets.

To help Virginia remain competitive, the state could extend the exemption's expiration date. To influence future site selection decisions, an extension would need to be in place well before 2035. A reasonable new expiration year would be 2050, which would match the special extension that has already been created for companies that meet certain additional criteria (sidebar). The exemption should continue to have an expiration date, because this is considered an effective practice to ensure periodic scrutiny of its need and effectiveness.

The 2023 General Assembly passed **a special data center sales tax exemption extension to 2040 or 2050** for companies that create 1,000 or 2,500 jobs (100 of which must meet above average wage requirements) and make a capital investment of at least $35 billion or $100 billion, respectively. So far, this extension applies to only one data center company, but several others may be interested in qualifying for this extension.

POLICY OPTION 8

The General Assembly could amend the Code of Virginia to extend the expiration date for the state's sales and use tax exemption for data centers from 2035 to 2050.

Extending the expiration date for the exemption, without making any other changes to it, would not address one structural issue with the exemption. Most of the economic benefits of the exemption occur during data center construction, but the exemption provides companies with substantial tax benefits in subsequent years after economic benefits have declined.

Allowing the exemption to expire could help reduce industry growth and associated energy demand

Virginia's utilities have historically been able to keep up with energy demand, but even if data center energy use grows at only half the forecasted rate, the state will need to make enormous investments in energy infrastructure. While data centers will incur much of the cost of new infrastructure investments, energy rates for all users are likely to increase. Growing energy demand could also make it more difficult for the state to meet goals set forth in the Virginia Clean Economy Act.

If the General Assembly wishes to slow down the data center industry's growth in Virginia because it determines that energy concerns outweigh the industry's economic benefits, it could allow the sales tax exemption to expire in 2035. While it is difficult to gauge the exact effect this would have, it is likely industry growth would slow and

could eventually stop or even contract. If the industry contracts, it would reduce the need for future generation and transmission infrastructure but would actually increase energy costs paid by other ratepayers, who would have to share a larger portion of current systemwide costs. While the state could allow the exemption to expire only in certain localities or regions, like Northern Virginia, that approach would be less effective in reducing overall growth in energy demand. Industry growth is occurring in several counties outside of the Northern Virginia region and is expected to continue, so allowing the exemption to expire in Northern Virgina while extending it elsewhere would not address the energy impacts where much of the future industry growth is likely to occur (sidebar).

Outside of the Northern Virginia planning district, data center projects are currently under development in the counties of Caroline, Chesterfield, Culpeper, Fauquier, Hanover, Henrico, Louisa, Mecklenburg, Pittsylvania, Powhatan, Spotsylvania, and Stafford. Dominion Energy expects the Stafford area to "become another super large market" like Loudoun and Prince William counties.

If the General Assembly allowed the exemption to expire in 2035, it would need to determine how to treat the large subset of data centers that will likely qualify for the special 2040 or 2050 extension. This extension currently pertains only to Amazon Web Services, but other companies may be interested in developing agreements to use the extension. Disallowing Amazon Web Services from using the extension would likely affect its custom performance grant agreement with the state to develop multiple data center facilities throughout Virginia, which was negotiated under the assumption the company would receive the extension, and could be subject to legal challenges.

POLICY OPTION 9

The General Assembly could allow the sales and use tax exemption for data centers to expire in 2035.

Exemption could be changed to balance industry growth with energy impacts

By either extending the exemption or allowing it to expire, the state would be choosing either economic benefits or reduced energy impacts. An alternative approach is to try and balance these competing objectives. The state could do this by allowing the *full* exemption to expire in 2035 (or ending it before then) and applying a *partial* tax exemption to 2050.

The size of a partial exemption could depend on whether the state wants to emphasize economic benefits or reduced energy impacts. For example, under the current exemption, qualifying companies are exempt from paying the full 4.3 percent state share of the retail sales and use tax and local and regional portions (sidebar). Focusing on the state share, a partial exemption could require qualifying companies to pay a 1 percent sales tax, which would keep much of the exemption's value intact and would likely remain somewhat effective at promoting industry growth (but would do less to reduce energy use). Alternatively, qualifying companies could be required to pay a higher 3 percent sales tax, which would likely be less effective at promoting industry growth and so would reduce future energy use more. By choosing a higher partial tax rate, the state could risk losing some of its existing data centers, particularly in Northern

The statewide retail sales and use tax includes a 4.3 percent state share, a 1 percent local option share, and an additional 0.7 percent to 1.7 percent regional share, depending on the region.

Virginia, although this risk may be diminished by the region's many attributes that make it so attractive to the industry.

The state would need to determine if the partial exemption would apply to data centers that qualify for the existing special 2040 or 2050 extension. This extension currently pertains only to Amazon Web Services, but other companies may be interested in developing agreements to use the extension. To be most effective at addressing energy impacts, and to maintain a level playing field for competitors, the same or a similar partial exemption could also be applied to these data centers.

POLICY OPTION 10

The General Assembly could amend the Code of Virginia to extend a partial sales and use tax exemption for data centers from 2035 to 2050.

A partial exemption would also better align the economic benefits the state receives with the exemption's value. Most economic benefits occur during construction, and switching to a partial exemption in 2035 would reduce the value of the exemption in later years when the economic impacts of current and planned data centers could be expected to slow. A partial exemption would also generate more revenue for the state. For example, a 1 percent partial sales tax would have generated approximately $160 million in state tax revenue in FY23.

Exemption changes could address other policy concerns related to the data center industry

Virginia's sales tax exemption currently requires...

50 new jobs located at the data center, associated with operations or maintenance.

Jobs pay at least 150% of the prevailing annual average wage of the locality where the data center is located.

$150 million in capital investment.

Requirements are lower for data centers in economically distressed localities (10 jobs and $75 million capital investment).

If the decision is made to extend the exemption, this report provides several options the General Assembly could enact to modify it and address concerns in specific policy areas (Table 7-1). These policy options would add new requirements, in addition to the existing requirements, for data centers to be eligible to receive the exemption (sidebar). These options could be phased in gradually to give data center companies enough time to implement them, and the General Assembly could decide to enact some but not others.

The General Assembly will need to determine its primary policy goals for the industry to determine whether to add new requirements to the exemption. If some or all of these policy options were adopted, it would likely make the exemption harder to use and more complex to administer. Alternatively, the General Assembly could pass legislation *requiring* the industry to take these actions, regardless of whether they qualify for the exemption, but this approach could lead to some data centers choosing to either shut down or operate in violation of the law.

The policy options in Table 7-1 would require changes to the Memoranda of Understanding (MOUs) all data center companies are required to enter into with the Virginia Economic Development Partnership (VEDP) to receive the exemption. Current law allows all of a company's data centers in a specific locality to collectively qualify for

the exemption. Therefore, the company reports data to VEDP for all of its data centers in each locality where it operates rather than by each individual data center. Policy options that apply only to new data centers might require changing MOUs to apply to each individual data center or to have addenda to the MOUs that identify the individual eligible data centers. VEDP would need to determine exactly how MOUs would need to be restructured.

VEDP would also need to determine the evidence data center companies would need to provide to qualify for the exemption, which would likely add to the complexity of administering the exemption. For example, companies could be required to provide appropriate documentation before a new data center becomes operational to qualify for the exemption. Alternatively, companies could be allowed to self-certify under the condition that documentation must be provided if requested by VEDP or Virginia Tax. VEDP would need to develop guidelines for how to implement any new compliance requirements and set forth new terms in the MOUs.

TABLE 7-1
General Assembly could modify the sales tax exemption to address energy, natural resource, historic resource, and residential impacts

Change	Issue Addressed	Policy option
Options that could apply to *all* Virginia data center operations		
Implement ISO-50001 Energy Management standard or equivalent	Energy impacts and costs	1
Implement ISO-14001 Environmental Management Systems standard or equivalent	Natural resource impacts	5
Options that could apply to *new* data centers built after a certain date		
No Tier 2 diesel generators in Northern Virginia Ozone Non-Attainment area without SCR systems	Natural resource impacts	4
Phase 1 historic resources study required, viewshed study required if near registered historic site	Historic resource impacts	6
Sound modeling (noise) study required	Residential impacts	8

SOURCE: JLARC staff analysis.
NOTE: ISO = International Organization for Standardization. SCR = Selective Catalytic Reduction systems that reduce emissions of nitrogen oxides, a major contributor to smog-forming ozone, and other harmful emissions.

Appendix A: Study resolution

Resolution of the Joint Legislative Audit and Review Commission directing staff to review data centers

Authorized by the Commission on December 11, 2023

WHEREAS, there has been substantial growth in the data center industry in Virginia, particularly Northern Virginia which has the largest concentration of data centers in the world, Southern Virginia, the Greater Fredericksburg region, and the Greater Richmond region; and

WHEREAS, growth in the data center industry is expected to continue with increasing demand from deployment of advanced and innovative technologies used by individuals, business of all sizes across all industries, government agencies, and other organizations that require the digital infrastructure that data centers provide; and

WHEREAS, data centers can bring economic benefits to localities because they can create significant economic activity during construction, they can increase property tax revenue for local governments without placing high demands on government services like schools, and the clustering of data centers can make a region more attractive to other high tech businesses and help support ecosystems of vendors, service providers, and suppliers; and

WHEREAS, concerns exist over data centers because they require large amounts of energy, which can affect the broader energy market; they may have impacts on natural, historical, and cultural resources; and some citizens have expressed opposition to having data centers located near residential areas due to concerns over issues such as noise and the adverse visual impact: and

WHEREAS, the data center sales tax exemption is Virginia's largest economic development incentive, and JLARC conducted an in-depth review of the exemption in 2019; now, therefore, be it

RESOLVED by the Joint Legislative Audit and Review Commission that staff be directed to review the overall impacts of the data center industry in Virginia and state and local policies regarding the industry. In conducting its study staff shall (i) research recent and expected trends in factors impacting data center industry growth and forecast future growth of Virginia's data center industry, taking into account how various factors may affect these projections; (ii) assess impacts of the data center industry on Virginia's natural resources, as well as historic and cultural resources, and identify potential technologies that could reduce their impacts on these resources; (iii) assess the impacts of the data center industry on current and forecasted energy demand and supply in Virginia, including how data centers will likely affect future energy infrastructure needs, energy rates paid by customer classes and whether cost allocation methods ensure no single customer class is unreasonably subsidized by other customer classes, and the state's ability to transition from fossil fuels to renewable energy sources; (iv) estimate the impact of the data center industry on local revenue and assess how local tax policies may affect data centers; (v) identify how data centers may impact local residents, including concerns such as noise pollution, decreasing property values, and

the adverse visual impact; (vi) identify considerations around the construction and siting of data centers, and review how zoning and regulatory restrictions and requirements can affect data center deployment; (vii) identify guidance and assistance state agencies could provide to local governments for use in making decisions about the location and expansion of data centers; (viii) assess whether more geographically diverse data center industry growth would provide greater economic benefits to the Commonwealth, and if so, identify obstacles to attracting data centers to other areas, particularly economically distressed or rural regions of the state, and policy changes that could increase geographic diversity, such as changes in electricity policy, tax policy, and broadband infrastructure policy; (ix) compare Virginia's competitiveness in attracting data centers with other states; and (x) determine if Virginia's data center tax exemption could be improved, including whether the exemption could be better targeted, the level of benefit is appropriate given the cost, or other changes should be considered.

JLARC may make recommendations as necessary and may review other issues as warranted.

All agencies of the Commonwealth, including the Virginia Department of Energy, the Virginia Department of Environmental Quality, the State Corporation Commission, the Virginia Economic Development Partnership Authority, the Virginia Department of Taxation, and Virginia local governments shall provide assistance, information, and data to JLARC for this study, upon request. JLARC may use consultants as necessary to complete the study. JLARC staff shall have access to all information in the possession of agencies pursuant to § 30-59 and § 30-69 of the Code of Virginia. No provision of the Code of Virginia shall be interpreted as limiting or restricting the access of JLARC staff to information pursuant to its statutory authority.

Appendix B: Research activities and methods

Key research activities performed by JLARC staff for this study included:

- structured interviews with local residents and stakeholder groups, data center companies and developers, state and local officials, electric and water utility companies, and subject-matter experts;
- contracts with consultants to produce an independent energy demand forecast for Virginia and its utilities, and model how future data center growth in Virginia is likely to impact energy supply, demand, emissions, and cost;
- site visits to data centers and nearby communities;
- development of inventories of (i) operational and (ii) planned data centers;
- economic impact analysis of the data center industry (see Appendix D);
- data collection and analysis, including on data center water usage, emissions, capital expenditures, employment and tax benefits amongst users of the data center tax exemption, and data center proximity to residential areas;
- review of state and local laws, ordinances, reports, and policies relevant to energy, natural and historic resources, land use, and noise;
- review of research literature relevant to data centers, energy, natural and historic resources, and noise; and
- review of other documents, literature, and media sources.

Structured interviews

Structured interviews were a key research method for this report. JLARC staff conducted over 250 interviews with 165 different stakeholders.

Residents and stakeholder groups

JLARC staff conducted interviews with nearly 20 local residents and resident stakeholder groups, such as neighborhood associations, including those in Fairfax, Fauquier, Henrico, Loudoun, and Prince William counties. These interviews focused on the impact of data centers on local residents and communities, such as viewshed and noise issues.

JLARC staff also conducted roughly 20 interviews with state and regional stakeholders groups, including those that represent data center companies, electric cooperatives, construction tradespeople, land conversation and preservation, battlefield preservation, sustainability and the environment, and local and tribal interests. Staff interviewed the American Battlefield Trust, Clean Virginia, Cultural Heritage Partners, Data Center Coalition, Friends of the Rappahannock, Northern Virginia Technology Council, Preservation Virginia, Sierra Club, Southern Environmental Law Center, Virginia Association of Counties, Virginia Association of Soil and Water Conservation Districts, Virginia Chapter of the American Planning Association, Virginia Clinicians for Climate Action, Council of Virginia Archaeologists, Virginia Data Center Reform Coalition, Virginia Farm Bureau Federation, and Virginia, and Maryland & Delaware Association of Electric Cooperatives. Staff also interviewed

representatives of the Pamunkey tribe. These interviews covered a range of topics related to the impact of data centers.

Data center companies and developers

JLARC staff conducted nearly 40 interviews with 12 data center companies and developers. These companies operate colocation and hyperscale data centers in Virginia and include industry leaders. These interviews covered a range of topics, including their data center operations in Virginia, the economic impact of data centers, data center site selection, energy issues and sustainability, and the impact of data centers on natural and historic resources, local planning, and community impacts.

State agency staff

JLARC staff conducted more than 30 interviews with state agency staff, including staff from the Virginia Department of Environmental Quality (DEQ), State Corporation Commission, Virginia Economic Development Partnership, Virginia Department of Taxation, Virginia Department of Conservation and Recreation, Virginia Department of Historic Resources, Virginia Department of Forestry, Virginia Department of Agriculture and Consumer Services, Virginia Department of Energy, Virginia Department of Housing and Community Development, and Virginia Department of General Services. These interviews covered a range of topics related to the impact of data centers, including energy issues, issues related to natural and historic resources, and economic development.

Local government staff

JLARC staff conducted more than 50 interviews with local government staff and elected officials in Caroline, Chesterfield, Culpeper, Fairfax, Fauquier, Frederick, Henrico, Loudoun, Mecklenburg, Prince William, Stafford, and Wise counties, and the town of Warrenton. These interviews covered a range of topics, including planning and zoning, economic development, environmental services, public works, historic resources, and local tax and revenue impacts.

Federal government staff

JLARC staff conducted interviews with staff at the U.S. Army Corps of Engineers, U.S. Department of Agriculture, and U.S. Environmental Protection Agency. These interviews generally focused on the impact of data centers on natural resources.

Electric companies and cooperatives in Virginia and Virginia's regional transmission organization

JLARC staff conducted more than 20 interviews with electric companies and cooperatives in Virginia, including Dominion Energy, Appalachian Power Company, and the Central Virginia, Mecklenburg, Old Dominion, Northern Virginia, and Rappahannock electric cooperatives. These interviews focused on the impact of data centers on energy demand, supply, and rates. Interviews with Dominion Energy also focused on energy transmission and generation issues.

JLARC staff also interviewed the PJM regional transmission organization, which serves Virginia. These interviews focused on energy transmission and generation in the region, as well as the impact of data centers on energy demand and supply.

Water utilities

JLARC staff conducted 15 interviews with local water utilities, including those in Caroline, Fairfax, Fauquier, Henrico, Loudoun, Mecklenburg, Prince William, Stafford, and Wise counties. These interviews focused on the impact of data centers on water utilities, planning, and availability.

Subject-matter experts

JLARC staff conducted more than 25 interviews with subject-matter experts across a range of topics related to data centers. These experts included researchers at the Cooling Technologies Research Center at Purdue University, Lawrence Berkeley National Laboratory, National Renewable Energy Laboratory, Occoquan Watershed Monitoring Laboratory, and Rutgers Noise Technical Assistance Center; experts at engineering, law, and real estate firms with experience working with data centers; and leading data center construction materials and equipment manufacturers, such as a steel fabricator and generator manufacturer.

Contracts with consultants

JLARC contracted with faculty from the Weldon Cooper Center for Public Service at the University of Virginia (Weldon Cooper Center) to develop an independent energy demand forecast for Virginia and its utilities. JLARC also contracted with consulting firm Energy + Environmental Economics (E3) to model how data center growth in Virginia is likely to affect future generation and transmission needs and whether the associated costs of system changes could be passed on to residential ratepayers. E3's work was divided into two projects: (1) grid modeling and (2) cost of service and rate impacts.

Additionally, JLARC contracted with Terance Rephann and Joao Ferreira, regional economists at the Weldon Cooper Center, to assist in the economic impact analysis. The methods used for the economic impact analysis are described in Appendix D.

Weldon Cooper Center energy demand forecast

WCC was contracted to develop an independent energy demand forecast for Virginia that accounts for the expected growth of the data center industry. WCC collected data on historical retail energy sales for Dominion Energy, Appalachian Power Company (APCO), and utilities serving the rest of Virginia. WCC collected additional data on retail energy sales to *data center* customers for the utilities that currently serve most of the Virginia data center industry: Dominion, Northern Virginia Electric Cooperative (NOVEC), and Mecklenburg Electric Cooperative (MEC). WCC also collected data on metered load forecasts for data center customers in the Rappahannock Electric Cooperative (REC). REC does not currently have any operational data center customers, but a substantial number of new, large data center campuses are planned to be built in REC's distribution service territory.

Using historical energy sales data, WCC applied advanced statistical methods to develop an *unconstrained energy demand* forecast for Virgina. The unconstrained demand forecast shows what demand would be before accounting for constraints like the ability to build enough energy infrastructure to meet demand. WCC also developed a forecast for *half of unconstrained demand* to provide a lower-growth scenario for analysis purposes. Finally, WCC developed a *no new data center demand* forecast so that the effects of the industry on energy demand could be isolated for analysis purposes. WCC's forecast

made several projections, including baseload demand growth from all non-data center customers, demand growth from data center customers, and demand growth from electric vehicles. Additional details on the data and statistical methods used to develop the forecast are detailed in WCC's final report to JLARC staff.

WCC's forecasts cover the period from 2025 to 2050 because VCEA requires carbon emitting generation owned by Dominion and APCO to be retired by 2045 and for the utilities to have all energy from non-carbon emitting sources by 2045 (Dominion) or 2050 (APCO). However, because forecasts become more speculative the farther out they go, this report shows energy demand forecasts up to 2040. The energy demand forecasts for later years are detailed in WCC's final report to JLARC staff.

One of the limitations of the WCC forecasts is that historical data does not fully capture some of the trends that are likely to drive future data center growth, such as how artificial intelligence (AI) will be developed and deployed. However, the unconstrained demand forecast is within the bounds of what can be expected in the next five-plus years based on the electric service and construction agreements that utilities report having in place with data center customers. It is important to note that because forecasts were developed using actual, historical energy sales, they are not subject to distortion by speculative capacity requests from developers or data center companies.

Energy + Environmental Economics grid modeling (project 1)

E3 developed a model of the regional PJM generation and transmission grid. E3 then converted the WCC *energy* demand forecasts into *peak load* demand forecasts that estimate the highest overall power demand that would be placed on the grid each year, under different scenarios. The peak load forecast considered daily and seasonal energy use trends and weather patterns. E3 then modeled three main demand scenarios. For each of the demand scenarios, the model considered the most feasible and economical approaches to meeting infrastructure needs with and without the requirements of the Virginia Clean Economy Act (VCEA).

- Scenario 1: unconstrained demand, with and without VCEA. E3 also modeled variations where unconstrained demand and VCEA requirements could be met by using high levels of nuclear and renewable generation or by better regional coordination across PJM.
- Scenario 2: half of unconstrained demand, with and without VCEA.
- Scenario 3: no new data center demand, with and without VCEA.

E3's modeling used industry standard approaches and tools used for electric utility and state energy planning purposes. The model applied constraints on the amounts of infrastructure that could be built by 2030 using historical build rates, relaxed those constraints for 2035, and removed most constraints for 2040 and following years. Modeling was based on state and federal laws and regulations in place in 2024. For VCEA scenarios, the model followed the "letter of the law" and assumed that certain requirements—such as the Renewable Portfolio Standards and associated Renewable Energy Certificate requirements for investor-owned utilities—would not apply to electric cooperatives. This assumption has a significant impact because a majority of future data center growth is expected to occur in the electric cooperatives' distribution service territories. Societal costs, such as the social cost of carbon, were not explicitly included in the model. Additional details on the exact methods and assumptions used to develop the model are detailed in E3's final report to JLARC staff.

For each scenario, the model predicted the mix of generation and transmission capacity that would be needed to meet demand, the resulting mix of generation energy sources (including energy imports), and their associated emissions. Outcomes were developed for the Dominion transmission zone, Virginia, and the PJM region. The model also predicted system costs for the Dominion transmission zone, where most data center growth is expected to occur. Each scenario outcome was tested to ensure that the system being built would be functional and meet industry standard reliability requirements.

E3's grid modeling covers the period from 2025 to 2050 because VCEA requires all carbon emitting generation owned by Dominion and APCO to be retired by 2045 and for the utilities to have all energy from non-carbon emitting sources by 2045 (Dominion) or 2050 (APCO). However, because energy demand forecasts and generation options become more speculative in further out years, this report only shows model results up to 2040. The model's results for later years are detailed in E3's final report to JLARC staff.

Energy + Environmental Economics cost of service and rate impact analysis (project 2)

For the cost-of-service analysis, E3 examined how costs were being incurred and allocated to different customer classes under the rate structures in place at Dominion Energy, NOVEC, and MEC. The purpose of this analysis was to determine if the current rate structures were wholly recovering costs from the customers who are incurring those costs. E3's cost-of-service analysis was done using industry standard approaches and tools for electric utility planning purposes. Additional details on the exact methods and assumptions used in this analysis are detailed in E3's final report to JLARC staff.

For the rate impacts analysis, E3 focused on how changing demand could affect generation and transmission costs for residential ratepayers in Dominion's distribution service territory. Dominion was chosen because of its large size and concentration of data centers. Residential rate changes were a key focus because they show how Virginia households could be affected by growing data center demand and are indicative of how other customers, such as businesses, might be affected.

E3's analysis of rate impacts followed three steps. First, E3 estimated total costs that would be attributable to the Dominion transmission zone, under the different energy demand scenarios discussed above, using its grid model. Second, for the Dominion distribution service territory, E3 estimated how costs would be allocated to residential customers, assuming that the company regularly reallocated costs to its different customer classes using current state- and federally approved allocation methodologies. Third, E3 translated these costs into the incremental cost per kilowatt-hour that would be passed on to residential ratepayers.

E3's rate impact analysis was limited to generation and transmission cost increases that could be attributed to growing data center demand. The analysis captures the cost of transmission needed to increase capacity into the Dominion transmission zone (interzonal transmission) and to interconnect with new generation sources. A significant portion of potential future transmission costs, associated with transmission projects *within* the Dominion transmission zone (intrazonal transmission), were not captured because these projects and their costs cannot easily be predicted. The analysis did not consider potential changes to distribution rates because most increases in distribution costs from the data center industry are effectively allocated to and recovered from these customers. E3's analysis also did not consider how Dominion's allowable profit margin would factor into rate impacts.

JLARC staff converted E3's rate impact data to show how a typical residential customer, using 1,000 kilowatt-hours of energy per month, could be affected. JLARC staff's conversion included an adjustment to account for Dominion's allowable profit margin but did not incorporate several other costs that affect the total residential bill. Consequently, Dominion's total residential bill projections, from its integrated resource plan, show much larger overall increases than the numbers presented in this report. Dominion's projections apply to the whole residential bill and include several costs that are not captured in JLARC's analysis, such as distribution costs and the cost of some additional transmission and generation projects that may not be solely attributable to data centers. Dominion's residential bill projections are also in nominal dollars that have been adjusted upward using an inflation assumption whereas JLARC's are held in constant (or real) 2024 dollars to show the real growth of costs that consumers will experience, independent of inflation. The demand forecast that Dominion uses in its rate projections is similar to the WCC unconstrained demand forecast but substantially higher than the half of unconstrained demand forecast.

Site visits

JLARC staff conducted site visits to two operational data centers in Virginia, including one in Loudoun and one in Henrico. Staff conducted these site visits to better understand how data centers are designed and operated. For example, staff observed the data halls, power and cooling systems, and backup generators, and listened to noise levels throughout the facilities. Staff also spoke with a variety of personnel at the data centers, including facility operations managers and operational and maintenance staff.

Additionally, JLARC conducted multiple site visits to observe areas with data center development and neighborhoods with nearby data centers. Two of these site visits were led by stakeholder groups with extensive participation in local zoning processes and studies of data centers. JLARC visited eight neighborhoods close to operational data centers or data centers in various stages of development. At all but one of those locations, JLARC staff spoke with residents about their perspectives on the data centers. Additionally, JLARC visited a commonly used trail adjacent to a data center and visited land within Manassas National Battlefield next to property rezoned for a data center.

Data center inventories

JLARC staff developed an inventory of the operational data centers in Virginia. This inventory was used to map the presence of the industry in Virginia. The inventory was based on data provided by DEQ listing data center sites with active air emissions permits (which all Virginia data centers have for their diesel generators). This data was as of August 2024. Staff used the address field in this data to search county real estate assessment records, using these records to (i) confirm the address was associated with a data center and (ii) identify the size of the site (in terms of acres), the number of buildings on the site, when they were built, and their size (in terms of square feet). In a few instances, county records did not list the size of the building. In these instances, JLARC staff estimated the size of the building(s) on the site based on the total capacity (megawatts) of the generators permitted by DEQ.

Staff cross-referenced this information where possible, using publicly available information from data center company websites, the Existing and Proposed Data Centers map developed by the Piedmont

Environmental Council, and other websites that track the data center industry, such as Datacenter-Hawk. From this cross-referencing, JLARC staff identified a few sites that appeared to be data centers but were not associated with a DEQ permit. In these instances, JLARC staff estimated the capacity of the site (megawatts) based on the size of the building(s) listed on the site's real estate assessment record.

JLARC staff also developed a list of data center sites currently under construction, planned, or proposed in Virginia. This information was used to assess where data center growth is expected to occur in the state. To develop this inventory, staff monitored media articles announcing new and proposed data center development, such as those published by Data Center Dynamics and local news outlets. Staff also identified information about proposed data center sites by reviewing local data center-related zoning and permitting requests.

Data collection and analysis

Local data center tax revenue

JLARC staff calculated the proportion of local revenue that comes from data centers by collecting data center tax revenue from localities and comparing it to their total local revenue reported in the Auditor of Public Accounts' Comparative Report of Local Government Revenues and Expenditures for FY23.

Data center generator permit, emissions, and violations data

DEQ provided JLARC staff air permit data for Virginia data centers (who were identified by DEQ), including data center permitted generator numbers and energy capacities, maximum allowed annual emissions, and actual emissions from 2015–2023. Additionally, JLARC staff used DEQ annual point source emission data, enforcement action data (including notices or violations and any charges assessed), and National Emissions Inventory data for Northern Virginia in 2017 and 2020.

JLARC staff created summary statistics of data center permit information (such as generator numbers and maximum allowed emission) and actual emissions and examined trends across time, regions, and localities. Using a map generated through JLARC's data center inventory, JLARC staff also examined clusters of data centers and cumulative local emissions from data centers.

To understand how data center emissions compare to other industries and contribute to overall emissions, JLARC staff compared data center emission and violation data to that of other Virginia air permit holder groups from 2015–2023. Additionally, JLARC staff estimated the current and potential portion of Northern Virginia air emissions resulting from data centers using 2020 National Emissions Inventory data.

Data center water use

JLARC staff received 2023 data center water usage information from water utilities serving Fairfax, Henrico, Loudoun, Mecklenburg, and Prince William counties as well as the town of Wise. Usage was typically reported for anonymous, individual data center buildings. However, one utility shared combined data for all of their data centers buildings, and one shared all water meter data for data center companies but did not combine use by building. (Some data centers have multiple water lines.) Reclaim

water use amounts were identified in the data. Two utilities shared annual usage data; three shared monthly usage data; and one shared daily usage data. Five utilities were able to share some amount of information related to data center water use trends since 2019 or later. All utilities shared their total annual customer base water usage for 2023.

JLARC staff used this data to calculate individual and cumulative data center water usage amounts, including the portion of a local utility's water that goes to data centers. JLARC also examined data center water usage seasonal trends and trends in recent years. JLARC analyzed data center water usage relative to other industries and water users in Virginia based on DEQ's 2023 Annual Water Resources reports; non-agricultural, non-public utility withdrawal data shared by DEQ; and the U.S. Energy Information Administration's 2012 Commercial Buildings Energy Consumption Survey water use statistics.

Land conversion due to data centers

JLARC estimates of land conversion due to data centers are based on data center development land area summary statistics calculated in JLARC's data center inventory. These land area amounts were compared to statewide and locality natural land losses recorded in the U.S. Department of Agriculture's 2022 Census of Agriculture state-level data and the federal Multi-Resolution Land Characteristics Consortium's National Land Cover Database Enhanced Visualization and Analysis tool.

Proximity of data centers to residential zones

JLARC staff analyzed the distance between operational Virginia data center sites and residential zoning. This analysis was limited to eight localities that account for the vast majority (93 percent) of data center sites in the state. JLARC measured the distance between each operational data center site and the nearest residential zoning using the interactive maps on localities' websites. This measurement indicates the distance between property lines, but the distance between data center buildings and homes is greater because data center buildings tend to be located away from the property line. JLARC staff captured the smallest distance to residential zoning across the multiple parcels that comprise a single data center site. JLARC focused on residential zoning because the zoning classification reflects uses of a property permissible under current local ordinances. However, this approach sometimes *overstates* the distance between a data center site and residences in situations where land is zoned residential but contains no homes. The reverse is also true; this approach sometimes *understates* the distance between data center sites and residences in situations where land contains homes but is not zoned residential. JLARC summarized the proportion of data center sites very close to residential zoning (defined as within 200 feet, which is approximately half the length of a football field) and somewhat close to residential zoning (defined as within 500 feet, which is approximately 1 ½ times the length of a football field) (Table B-1).

JLARC also analyzed the change over time in the proportion of data center sites near residential zoning. For each data center site in the analysis, JLARC identified whether the site existed in 2015 using annual DEQ data about air emission permits, which Virginia data center sites have for their diesel generators. For the group of data center sites with any generators reported to DEQ in 2015, JLARC calculated the proportion within 200 and 500 feet of residential zoning. JLARC then compared those

proportions to the proportions of all data center sites within those specified distances to examine whether data center proximity to residential zoning has increased over time.

TABLE B-1
Proportion of data center sites near residential zoning varies by Virginia locality

	Proportion of data center sites within specified distance of residential zoning		Total data
Locality	**200 feet**	**500 feet**	**center sites**
Loudoun	24%	34%	71
Prince William	21%	21%	24
Fairfax	55%	70%	20
Henrico	38%	38%	8
Chesterfield, Culpeper, Fauquier, Virginia Beach [a]	25%	38%	8
Total	29%	37%	131

SOURCE: JLARC analysis of localities' interactive map websites and JLARC inventory of operational data centers.
NOTE: Six data center sites were excluded from the analysis because data on proximity to residential zoning was not available or reliable.
[a] These four localities are combined because the number of data center sites in each locality is very small.

Document and research literature review

JLARC staff reviewed numerous documents and literature pertaining to data centers, such as:

- Virginia state laws, regulations, and policies relevant to energy, natural and historic resources, land use, and noise;
- studies, reports, data, and other information on data center market size and forecasting data center industry growth;
- reports, presentations, and regulatory filings from Dominion Energy, electric cooperatives, and the PJM regional transmission organization, including those related to energy load, load forecasts, and transmission, generation, and distribution projects;
- research literature and stakeholder reports on natural and historic resources; data center backup power and cooling technologies; and data center, other land use, and technology impacts on natural and historic resources;
- federal, state, and local government reports, assessments, webpages, and other documents on natural and historic resources, data center, other land use, and technology impacts on these resources, land use best practices;
- local comprehensive plans, ordinances, and policies relevant to land use and noise;
- local government presentations and reports relating to data centers including documents prepared by staff, consultants, and workgroups;
- summaries of local approaches to data center regulation and recommended practices;
- documents and journal articles describing the science of sound waves, sound modeling processes, ways to reduce sound levels, and government approaches to regulating sound; and
- local, national, and international news media coverage of the data center industry.

Review of local ordinances and specific data center requests

JLARC staff conducted an in-depth examination of the way nine localities in Virginia govern data centers. The review included localities with the most existing data centers in Virginia (Loudoun, Prince William, Fairfax, Henrico, Mecklenburg), as well as several localities that have recently approved their first data centers (Caroline, Fauquier, Stafford, Warrenton). JLARC staff searched for ordinances specific to data centers, as well as other ordinances applicable to data centers due to their location or use category. The review focused on local rules regarding density (e.g., height, lot coverage), architecture (e.g., building materials), site layout (e.g., building setbacks), landscaping, and equipment screening. When specific to data centers, local rules related to environmental, water use or cooling systems, and electricity infrastructure were also identified.

Additionally, JLARC reviewed staff reports for 19 specific data center requests to local elected officials. These reports provided elected officials with information about requests for rezonings, special permits, and exceptions to local ordinances. JLARC staff reviewed reports from Caroline, Fairfax Henrico, Loudoun, and Prince William counties and the town of Warrenton. The purpose of reviewing these staff reports included learning about the types of potential positive and negative impacts from data centers, the types of conditions beyond minimum requirements that developers committed to, the standards against which local staff evaluated data centers, the frequency of data center development that was not by right, and the alignment between staff recommendations and the decision of elected officials.

Appendix C: Agency responses

As part of an extensive validation process, the state agencies and other entities that are subject to a JLARC assessment are given the opportunity to comment on an exposure draft of the report. JLARC staff sent relevant portions of the exposure draft to the State Corporation Commission (SCC), Virginia Economic Development Partnership (VEDP), Virginia Department of Environmental Quality, Virginia Department of Historic Resources, Dominion Energy, Northern Virginia Electric Cooperative, and Rappahannock Electric Cooperative.

Appropriate corrections resulting from technical and substantive comments are incorporated in this version of the report. This appendix includes response letters from the SCC and VEDP.

JEHMAL T. HUDSON
COMMISSIONER

SAMUEL T. TOWELL
COMMISSIONER

KELSEY A. BAGOT
COMMISSIONER

COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

BERNARD LOGAN
CLERK OF THE COMMISSION
P.O. BOX 1197
RICHMOND, VIRGINIA 23218-1197

November 22, 2024

Mr. Hal E. Greer, Director
Joint Legislative Audit and Review Commission (JLARC)
919 East Main Street, Suite 2101
Richmond, VA 23219

Dear Mr. Greer:

The State Corporation Commission appreciates the opportunity to review the draft of relevant portions[1] of the JLARC report, *Data Centers in Virginia* provided to Staff on November 13, 2024. The Commission Staff provided its high level feedback to JLARC Staff during a meeting held on Friday, November 22, 2024.

Please let us know if we may be of further assistance.

Respectfully submitted,

Jehmal T. Hudson
Chairman, State Corporation Commission

[1] Sections 3 and 4, and Appendices F, G, I, and J.

VEDP Virginia Economic Development Partnership

November 21, 2024

Mr. Hal E. Greer, Director
Joint Legislative Audit & Review Commission
919 East Main Street, Suite 2101
Richmond, VA 23219

Re: VEDP response to the draft JLARC report, *Data Centers in Virginia*

Dear Mr. Greer:

Thank you for providing an opportunity for us to review relevant sections of chapters 1, 2 and 7 of the Joint Legislative Audit & Review Commission's (JLARC's) draft report, *Data Centers in Virginia*.

The content we reviewed provides a helpful overview of the data center industry and its importance to the Commonwealth. As the report highlights, data centers are key hubs of the world's digital infrastructure, and their concentration in Virginia has helped establish the Commonwealth as a global tech hub. We particularly appreciate your meticulous survey of the data center industry's presence in Virginia, which accounts for over 63 million square feet of data center space across 150 sites and directly employs more than 8,000 people, in addition to supporting tens of thousands of additional jobs.

Since your last comprehensive review of the industry in 2019, the geographic distribution of data centers across Virginia has changed considerably. Although many of the legacy assets are still concentrated in Northern Virginia, the industry has become an important opportunity for the entire Commonwealth. This expansion, particularly into rural areas, has been facilitated by technologies such as Artificial Intelligence, which are less constrained by latency requirements compared to other applications. Reflecting this trend, seven localities that previously lacked data centers have either approved new campuses or have pending applications, including several rural and "distressed" areas. VEDP's current project pipeline suggests that the spread of data centers across more localities is expected to continue, provided that Virginia continues to offer a competitive sales and use tax exemption.

Your report also demonstrates the significant and far-reaching impact of the data center industry. Notably, the analysis estimates that the data center industry supports an impressive 74,000 jobs, $5.5 billion in labor income, and $9.1 billion in Virginia GDP overall to the state economy annually. In particular, we appreciate that your report shines a spotlight on the significant knock-on effects of the industry that extend to virtually every corner of the Commonwealth.

VEDP strongly agrees with the report's finding that the sales and use tax exemption has been an important part of the industry's growth and continues to drive site selection and expansion

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VEDP.org

decisions. VEDP has responsibility for administering, in cooperation with the Department of Taxation, this important program on behalf of the Commonwealth and is pleased to see that new data collected by VEDP is serving to strengthen transparency. Your analysis adeptly leverages this data to demonstrate the significant state and local tax revenues generated by the industry.

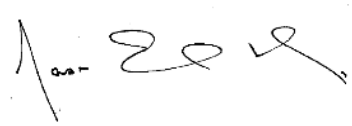
This valuable report comes at a critical juncture for the data center industry. Coming on the heels of significant growth in recent years, the industry is expected to see continued, strong growth driven by demand for digital services and the emergence of new technologies, like Artificial Intelligence. These trends raise important questions about the implications of this growth.

Your report underlines various considerations that legislators will need to balance as they think about the future of the state's support for the data center industry. You correctly point out that sustaining the growth of the industry and its critical contribution to Virginia's economy will require action on the current 2035 sunset of the data center sales and use tax exemption. Allowing the existing exemption to sunset would result in development shifting to competing markets, and those effects are likely already beginning to be felt given the long timeframes the industry uses to analyze their investments.

Nonetheless, VEDP recognizes that balancing competing interests may prompt legislators to seek out a new paradigm for support that navigates a challenging middle ground. The report is helpful in providing a number of different policy options for them to consider. In the context of thinking about these different options, we strongly agree with the report's warning that saddling an incentive program with competing policy priorities is not sound economic development practice. Furthermore, VEDP would caution against any action that could constitute a legal or moral failure to deliver on commitments to companies that have chosen to invest in Virginia and have entered into performance agreements or memoranda of understanding with the Commonwealth. This could expose the Commonwealth to legal risks and seriously undermine our credibility with prospective investors in the future.

As always, we appreciate the professionalism and engagement of JLARC staff during the project and compliment your team on its insightful analysis and reporting.

Sincerely,



Jason El Koubi
President & CEO

Appendix D: Economic impact modeling of the data center industry

Weldon Cooper Center staff conducted economic impact analyses of Virginia's data center industry using IMPLAN (IMpact analysis for PLANning) software. IMPLAN has been used in many economic impact studies and is one of the most common tools used in economic impact analysis. Models here were built using 2022 IMPLAN Pro data released in November 2023 that utilizes a 546-sector IMPLAN sector scheme (IMPLAN® model. n.d.). Tables were customized for Virginia and two of its regions using the software.

Input-output analysis using the model produces industry-specific multipliers that indicate how economic activity in one sector of the economy affects the overall state or regional economy. For this study, we were interested in how changes in the data center industry affect the state and regional economy. Outcome variables examined include total employment, state GDP, and labor income.

For estimating the impact of the industry net of the state data center exemption, the opportunity cost of state funds was accounted for by increasing government spending, equivalent to the exemption amount.

Analysis included customization of IMPLAN sector for data centers to better reflect nature of the industry

Tracking the size and growth of the data center industry is challenging because of the absence of a specific industrial classification in government statistics. Data center activity often appears merged with the primary business operations of their parent firms, making their identification difficult[i].

The North American Industrial Classification System (NAICS) code 518210—Data Processing, Hosting, and Related Services—is typically used as a proxy for data centers, but this approach introduces what is usually referred to as "aggregation bias," as this category encompasses various unrelated activities that have a far higher representation in the sector than only data centers. For instance, an analysis of Virginia's 2016 employment data for that sector (518210) reveals that only 15 percent of the total employment in the sector was data center employment, with other data centers, cloud computing, and cybersecurity-related support services making up perhaps 2–5 percent more. Indeed, most employment in this sector involves other IT services, such as document scanning and software development, particularly in federal IT contracting in Northern Virginia. (See *Data Centers and Manufacturing Incentives*, JLARC 2019).

Data center employment is also dispersed across other industries. An examination showed that only 41 percent of data center jobs were classified under data processing, hosting, and related services. Significant portions were found in sectors like "wired telecommunications carriers" (30 percent), "telecommunications resellers" (10 percent), and "all other telecommunications carriers" (4 percent). This analysis excluded many enterprise data centers and colocated firms, whose employment is often reported under other business functions, further complicating efforts to track the industry accurately.

The IMPLAN sector for data centers that corresponds to the 518210 NAICS code for data centers is "436 - Data processing, hosting, and related services." However, using this sector introduces significant bias, as data centers represent only a small portion of its total activity. More importantly, the

expenditure patterns of this IMPLAN sector do not reflect the specific characteristics of data center operations. Because of this, there is a substantial mismatch between the commodity demand and value-added characteristics of the IMPLAN sector 436 and what we know of data center expenditure patterns. For instance, in 2020, IMPLAN data showed that less than 1 percent of gross output is spent on "electricity transmission and distribution" (0.68 percent) and water, sewage, and other systems (0.02 percent) even though data center industry reports estimate that electricity alone accounts for 40 percent of data center operating expenditures[ii]. Data center representatives also estimated energy accounts for about 40 percent of their operating costs during structured interviews. Similarly, employee compensation is overestimated in the IMPLAN model, accounting for 24 percent of output compared with 15 percent in industry-specific studies. This may lead to an inflation of induced economic impacts by overstating the income distributed to households.

In income distribution, little is known about other aspects of data center value added that are important for estimating activity impact, such as profit generation, distribution, and taxes paid. Indeed, data centers have the potential to contribute to local economies through tax payments, which are then reinvested via local government spending. However, IMPLAN's tax estimation methodology is quite generic and may not accurately reflect county- and state-level tax structures and exemptions. Therefore, modeling alternative tax scenarios with more realistic assumptions can help better estimate the local economic impacts of data centers.

The reliance on conventional and standardized IMPLAN sectors, particularly when key inputs are significantly misrepresented, leads to biased results in economic impact studies. Best practices in economic analysis suggest customizing expenditure patterns to more accurately reflect the unique characteristics of data center operations. Therefore, the expenditure patterns for IMPLAN sector 436 regarding electricity were increased to 40 percent and employee compensation was reduced to 15 percent. Sensitivity analysis was performed to see how changing these percentages affected results. For operational impacts, for example, customizing the IMPLAN sector to include 40 percent of electricity consumption lowers the employment multiplier for data center operations approximately 20 percent.

Analysis includes two modeling phases

This analysis was split into two phases, the construction phase (capital spending for initial development of the data center) and the operations phase (ongoing) to help policymakers better understand the industry's short-term and long-term impacts. The construction phase corresponds to the initial years of data center development and what must be put in place before a data center "works." The operations phase accounts for the impact of all the expenditures after the data center opens independent of whether they are considered capital or operational expenditures in their budget.

Construction phase

Information collected by VEDP from data centers using the exemption was used to determine amounts of capital spending by data centers to include in the analysis (Table D-1). The percentages of spending by capital spending category are consistent with other research[iii].

TABLE D-1
Initial capital spending of data centers using the exemption (by year)

Year	Land acquisition	Building and site improvements	Exempt equipment or software	Other
2021	$865 M	$3,927 M	$14,333 M	$940 M
2022	1,030	2,264	9,614	1,615
2023	1,689	5,309	16,009	1,002
Total	**$3,585 M**	**$11,501 M**	**$39,957 M**	**$3,557 M**
%	6.1%	19.6%	68.2%	6.1%

SOURCE: VEDP.

The VEDP data includes only data centers that benefited from the tax exemption. These data centers correspond to 92 percent of the data center activity in Virginia, according to DEQ records and JLARC staff analysis of locality real estate records to obtain data center square footage. Statewide, 8 percent of data centers were not included in those numbers. By region, it is estimated that only 5.45 percent of the data centers in Northern Virginia are nonexempt (94.55 percent are exempt) and 21 percent in other regions of Virginia are nonexempt. Capital spending was increased to account for the nonexempt data centers, and this new amount was assumed to be the direct impact of the industry (Table D-2).

TABLE D-2
Initial capital spending of data centers using the exemption (by region)

Year	Land acquisition	Building and site improvements	Exempt equipment or software	Other
Northern Virginia	$3,316 M	$10,638 M	$36,955 M	$3,290 M
Other regions	632	2,027	7,041	627
Virginia total	**$3,948 M**	**$12,664 M**	**$43,997 M**	**$3,917 M**

SOURCE: Weldon Cooper Center.

However, not all of this spending impacts Virginia's economy, and a critical assumption of economic impact analysis is the share of capital expenditures that are generated locally. Land acquisition is not traditionally included in impact models since this represents a monetary flow or transfer of funds that will not necessarily translate into a shock in local production. The acquisition of computer and related IT equipment is not necessarily done locally, so it should be assumed that part of this equipment comes from outside the region. This is even more true as we examine smaller geographical areas that might not include the entities associated with wholesale, transportation, and production of this type of equipment. Only building and site improvements (construction) should be included as local production. To estimate the indirect impacts, the model included 100 percent of the building and site improvements as construction (specifically IMPLAN industry sector "51 – construction of new manufacturing structures") and 25 percent of the exempt equipment and software expenditures.

The assumptions described above were used to generate indirect and induced impacts of data center capital investment in Virginia, according to average annual capital investment between FY21 and FY23

(Table D-3). Impact estimates were also produced for Northern Virginia and other regions of the state. Analysis of the results indicates that most of the impacts are construction-related (for example 80 percent of the direct employment is construction-related) rather than from manufacturing and installation of IT equipment.

TABLE D-3
Impacts of initial capital investment in Virginia and by region, annual average FY21–FY23

Impact	Employment	Labor income	Virginia GDP	Total output
Statewide				
Direct	35,110	$2,646.6 M	$3,342.1 M	$7,887.7 M
Indirect	9,945	843.8	1,504.2	2,806.8
Induced	13,992	791.9	1,570.9	2,596.8
Total	**59,047**	**$4,282.4 M**	**$6,417.2 M**	**$13,291.3 M**
Northern Virginia				
Direct	27,703	$2,368.5 M	$2,957.6 M	$6,625.6 M
Indirect	5,577	585.4	1,30.1	1,733.3
Induced	7,510	490.3	963.7	1,488.2
Total	**40,790**	**$3,444.2 M**	**$4,951.4 M**	**$9,847.0 M**
Other regions of the state				
Direct	5,761	$406.5 M	$517.0 M	$1,262.5 M
Indirect	1,584	116.6	212.5	418.0
Induced	2,106	107.3	219.6	373.4
Total	**9,451**	**$630.4 M**	**$949.2 M**	**$2,053.9 M**

SOURCE: Weldon Cooper Center economic impact analysis using IMPLAN.

The statewide results do not match the sum of the results for Northern Virginia and other regions of Virginia because, for the sake of simplicity, a multi-regional input-output model was not used. Data center investment in other regions of the state affects Northern Virginia, and vice versa, but they are not accounted for because the model accounts for the impacts in one region only.

Operation phase

As explained above, to accurately describe the impacts of the ongoing operation, the model was customized to include a better perspective of energy and labor costs. For this analysis, the model assumed that 40 percent of operational expenditures are associated with electricity consumption, and that 15 percent of the industry spending was direct labor costs.

Several adjustments were made to VEDP employment information collected from data centers. The employment information VEDP collected from data centers was used to estimate data center direct employment, statewide, in Northern Virginia, and in other Virginia regions. This number was adjusted in several ways. First, the employment number was reduced by half because the VEDP information on employment tends to boost the number of jobs as data centers can account for the jobs associated with contractors or the employees of contractors in addition to data center employees. In input-output

terminology, this is an indirect impact of the industry. Several data center representatives stated that 50 percent of their jobs were associated with third-party hiring and the other 50 percent with direct jobs. Because the jobs reported by VEDP were all full time (or full-time equivalents), a factor was applied to transform these jobs to full-time and part-time employment as required by the model. Like for capital spending, employment was increased to account for the nonexempt data centers. This new amount was assumed to be the direct impact of the industry (Table D-4).

TABLE D-4
Model was adjusted to incorporate data center operating characteristics

Region	Employment	Labor income	Total output
Northern Virginia	3,426	$357.4 M	$2,382.7 M
Other regions of Virginia	947	62.0	413.1
Virginia statewide	**4,373**	**$419.4 M**	**$2,795.8 M**

SOURCE: Weldon Cooper.

The results obtained for the impacts of ongoing operation for Virginia are far less than the impacts of capital spending (Table D-5). For example, total employment impacts from a year of data center operations are estimated to be 14,817 jobs compared with total employment impacts of 59,047 jobs for a year of initial capital spending.

TABLE D-5
Impacts of data center operations in Virginia and by region, annual average FY21–FY23

Impact	Employment	Labor income	Virginia GDP	Total output
Statewide				
Direct	4,373	$419.4 M	$1,051.1 M	$2,795.8 M
Indirect	6,615	552.2	1,217.8	2,188.1
Induced	3,830	216.8	430.2	711.1
Total	**14,817**	**$1,188.4 M**	**$2,699.0 M**	**$5,695.0 M**
Northern Virginia				
Direct	3,426	$357.4 M	$956.2 M	$2,382.8 M
Indirect	4,333	441.8	963.9	1,552.5
Induced	1,966	128.4	252.5	389.9
Total	**9,725**	**$927.6 M**	**$2,172.5 M**	**$4,325.1 M**
Other regions of the state				
Direct	947	$62.0 M	$116.5 M	$413.1 M
Indirect	1,106	78.3	185.6	356.9
Induced	556	28.3	58.0	98.6
Total	**2,609**	**$168.6 M**	**$360.0 M**	**$868.5 M**

SOURCE: Weldon Cooper Center economic impact analysis using IMPLAN.

Data center industry impact

Mostly because of the impact associated with initial capital expenditures, data centers in Virginia generate 73,864 jobs per year, corresponding to almost $5,471 million of labor income, $9,166 million of Virginia GDP, and an increase in output of $18,986 million (Table D-6).

TABLE D-6
Summary of initial capital spending and operations impact statewide, annual average FY21–FY23

Impact	Employment	Labor income	Virginia GDP	Total output
Direct	39,483	$3,066 M	$4,393 M	$10,684 M
Indirect	16,560	1,396	2,722	4,995
Induced	17,822	1,009	2,001	3,308
Total	**73,864**	**$5,471 M**	**$9,116 M**	**$18,986 M**

SOURCE: Weldon Cooper Center economic impact analysis using IMPLAN.

Another aspect is that the state government could also opt to spend the exemption money on alternative sources. The alternative scenario was modeled to estimate impacts if the state would use the annual average exemption amount between FY21 and FY23 ($573 million per year) in alternative expenditures (Table D-7). These impacts were used to determine the impact of the industry accounting for the cost of the exemption. Accounting for this alternative use of the exemption amount (or opportunity cost), reduces additional jobs by about 5,000 (to 69,000 additional jobs on net) and reduces additional income and Virginia GDP by $0.4 billion and $0.5 billion, respectively, which are a small fraction of their total impacts (Table D-6).

TABLE D-7
Impacts to the state if the exemption amount was used instead for alternative government expenditures, annual average FY21–FY23

Impact	Employment	Labor income	Virginia GDP	Total output
Direct	3,534	$277.4 M	$359.1 M	$448.0 M
Indirect	403	27.7	48.3	88.5
Induced	1,197	67.8	134.5	222.4
	5,134	**$372.9 M**	**$542.0 M**	**$758.9 M**

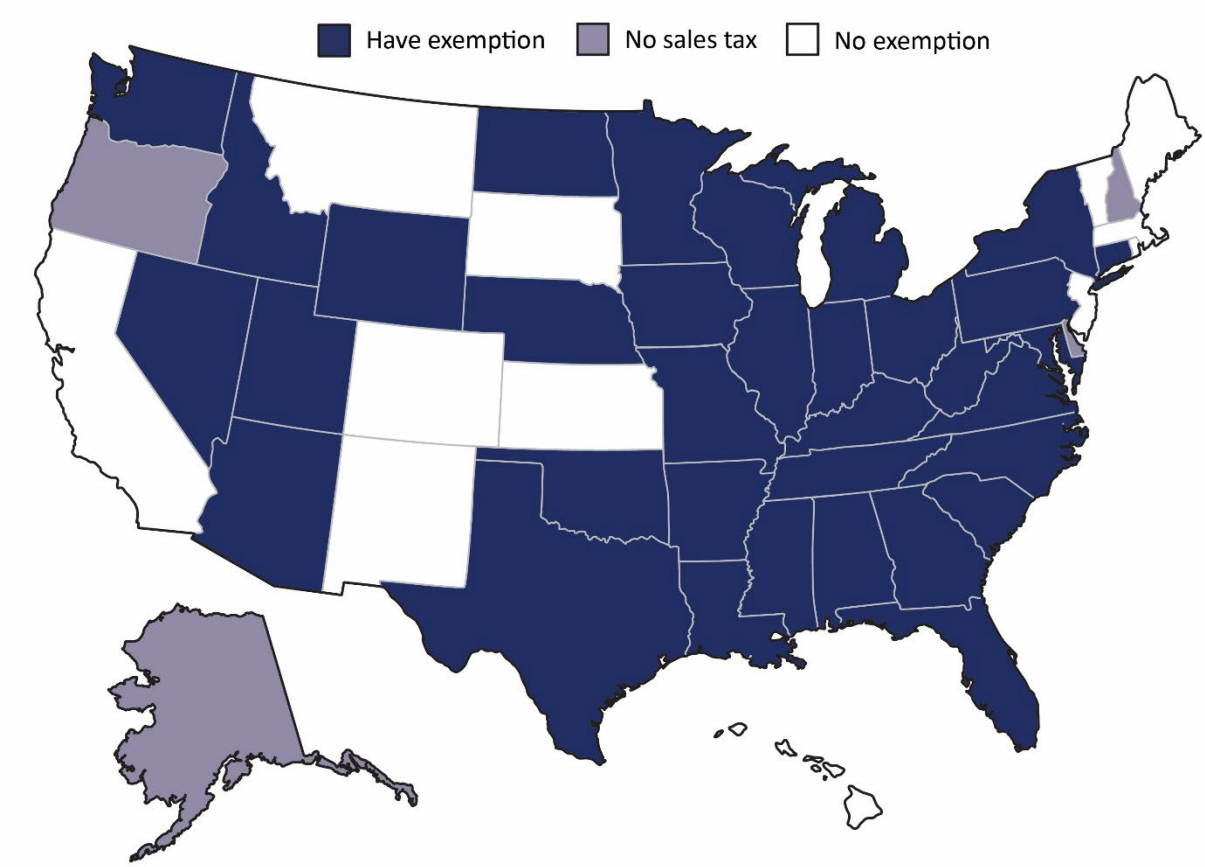
SOURCE: Weldon Cooper Center economic impact analysis using IMPLAN.

[i] Byrne, David, Carol Corrado, and Daniel E. Sichel. 2018. The rise of cloud computing: Minding your p's, q's and k's. NBER Working Paper 25188.
[ii] Day, Tim and Nam D. Pham. 2017. *Data centers: Jobs and opportunities in communities nationwide*. U.S. Chamber of Commerce Technology Engagement Center.
[iii] Day, Tim and Nam D. Pham. 2017. *Data centers: Jobs and opportunities in communities nationwide*. U.S. Chamber of Commerce Technology Engagement Center.

Appendix E: States with data center sales tax exemptions

Most states either have a sales tax exemption for data centers (34) or do not have a sales tax (Figure E-1). All states bordering Virginia provide a sales tax exemption to data centers.

FIGURE E-1
Nearly all states offer a sales tax exemption for data centers (2024)



SOURCE: State Tax Notes and JLARC staff review of state websites.

Appendix F: Energy infrastructure project impacts and regulation

Construction of new generation and transmission infrastructure can affect the communities and environments where they are built. The extent of any impacts will vary substantially for generation and transmission projects. State and local governments regulate these projects, through review and approval processes. Regulatory processes seek to minimize negative impacts but do not necessarily avoid them altogether. Utilities can implement several grid enhancing technologies to help reduce the need for major new generation and transmission projects, but this does not eliminate the need for new projects.

Construction of new generation and transmission infrastructure can have environmental impacts and is often opposed by local communities

On the generation side, a significant portion of new generation is expected to be solar, and solar facilities have large land demands that can have widespread impacts. For example, a modest 100 MW solar facility would require about 5,000 to 1,000 acres of land in Viriginia. (The rule of thumb is that 5 to 10 acres of solar can generate up to 1 MW of power.) Because of the large land demands, most solar facilities are built in rural areas. Constructing solar facilities typically involves clearing forest land or converting agricultural land to this use, which can have several environmental impacts from habitat loss to affecting stormwater runoff.

Some communities in rural Virginia have been increasingly opposed to new solar facilities, with several counties placing restrictions on solar development or outright denying projects. Community opponents site environmental concerns, impacts on local agriculture, and the effects of solar facilities' industrial appearance on the rural character of their counties. Opponents also often assert that solar facilities do not offer significant economic or other benefits to their communities.

The extent to which a solar project affects the environment and generates community opposition depends on the project. For example, a project that involves clearing 5,000 acres of forest land with multiple streams would have a more substantial environmental impact than a project that is installed on 2,000 acres of fallow pastureland. Similarly, a development located near a residential area or that is visible from the surrounding area could generate more community opposition than one that is hidden from view.

On the transmission side, new transmission lines can fragment forest habitats, create water quality risks at stream and wetland crossings, and reduce scenic quality of nearby historic and recreational resources. Communities are sometimes opposed to new or expanded transmission lines for these reasons. Communities also sometimes oppose new transmission lines because of their undesirable appearance, effect on the use of private properties that are under or adjacent to the lines, effect on the value of nearby properties, and health concerns.

Similar to the generation side, the potential environmental and community impacts of a transmission project can vary greatly from one project to the next. Generally, a "green field" project that involves acquisition of new right-of-way and construction of transmission lines where none currently exist is going to have the highest impact. A project where new lines are built in or adjacent to an existing

transmission line will be less impactful, and a project where an existing line is "wrecked and rebuilt" would be the least impactful.

State and local regulation is intended to minimize the impacts of new generation and transmission projects on communities and the environment

Construction of major new generation and transmission facilities is regulated by the state to minimize impacts. Many of these projects are approved by the SCC through a formal case process to determine if a Certificate of Public Convenience and Necessity (CPCN) should be granted. The SCC considers several factors before approving a project and granting a CPCN. These factors include the potential impacts of the project on property owners, the environment, and cultural and historic resources (Table F-1). While these impacts may not be completely avoided, the process encourages the selection of projects and options that best minimize impacts without placing large cost burdens on ratepayers.

Smaller renewable generation projects (<150 MW) can be reviewed and approved by the Department of Environmental Quality through a separate "Permit by Rule" process. While this is not a litigated case process like an SCC approval, projects are reviewed to ensure they conform with the state's requirements.

Localities have some authority over generation projects and transmission and distribution substations but minimal authority over transmission lines. Generation facilities and substations are subject to the same types of local zoning processes as other land uses. Local zoning ordinances specify which zoning districts allow them, whether they require a special permit from elected officials, and whether any design standards (such as landscaping) apply. Additionally, state law requires local reviews of certain entities—including substations—before development to evaluate their alignment with the local comprehensive plan. For transmission lines, CPCN approval deems the transmission line to be in compliance with local comprehensive plans and ordinances. In effect, this means localities do not have any direct authority over most transmission line project approvals or routes. (Although localities can play a role in approving 138 kilovolt transmission lines, which exist in a few parts of the state.)

Solar and similar projects are required to attempt to coordinate an agreement with their host locality. State law requires applicants for solar or energy storage projects to notify localities of their intent to develop and to meet with the locality to negotiate a "siting agreement." This siting agreement can include conditions such as mitigating negative impacts, and if created, must receive a public hearing. However, there is no requirement for this process to culminate in a siting agreement. Failure to achieve a siting agreement does not prevent a developer from initiating the usual local zoning processes for new developments.

Localities do not have approval authority over transmission line projects but can participate in SCC cases either as respondents or public witnesses. As a public witness, a locality can submit written comments, or local representatives can provide comments in person at commission hearings. As a respondent, a locality becomes a participant in the case and can take several additional actions, such as filing for discovery (e.g., to obtain copies of utility analysis or documents supporting the application for a project), filing briefs, providing expert witnesses, and participating in cross examination of

witnesses (e.g., utility staff). No matter which approach is followed, the SCC is required to hear and weigh all evidence equally.

TABLE F-1
Criteria that the SCC must evaluate before approving a project and granting a CPCN

Criteria that must be met

- Is not against the public interest [a]
- Will have no material adverse affect on system reliability
- Will have no material adverse affect on rates
- For transmission projects,
    a. the line is needed, [b]
    b. proposed method of installation is justified, [b]
    c. will avoid or minimize adverse impact on (a) scenic assets, (b) historic and cultural resources, (c) the environment, and (d) human health and safety, and
    d. why existing rights-of-way cannot adequately serve the need (presumably only applies when an expanded or new right-of-way acquisition is being requested as part of the project)

Criteria that must be considered

- Environmental impacts
- Human health and safety impacts
- Historical and cultural resource impacts
- Economic impacts, including job creation
- Improvement to service reliability
- Environmental justice considerations

Criteria that are considered, if requested

- Conformance with local comprehensive plans (locality must request) [c]
- Costs, economic benefits, and effect on construction timeline of undergrounding transmission lines (locality must request)

SOURCE: The Code of Virginia § 2.2-235, § 56-265.2, § 56-580, and § 56-46.1.
NOTE: SCC regulations provide additional information on what must be submitted to meet requirements and details what must be provided for transmission projects. SCC guidance also includes a planning and design attachment that provides detailed guidelines to applicants on how to ensure facilities protect natural and historic resources. SCC guidance provides additional information on when a transmission project requires a CPCN, based on specific characteristics. SCC guidance notes that certain transmission projects, such as reconductoring, do not require a CPCN.
[a] This is a general criterion that can be interpreted as the cumulation of all the other criteria weighed against each other. The Code declares some projects meet this goal—such as small renewable generation projects and projects in VCEA—and so do not require SCC to make a determination.
[b] Based on applicant's load flow modeling, contingency analysis, and presented reliability needs.
[c] Localities are explicitly granted right to present evidence that shows existing corridors, as designated in the comprehensive plan, can serve the identified need.

Localities also have three additional authorities under Code. First, localities can request that the SCC consider the costs, economic benefits, and effects on construction timelines of undergrounding transmission lines. Second, localities can establish transmission corridors in their comprehensive plans and provide evidence that new lines should be within those corridors, but it appears this latter

authority has been rarely (if ever) used. Third, localities can establish special tax districts that pay for the additional costs of undergrounding transmission lines, although it appears this authority has never been used.

Some stakeholders have said that local governments should have more authority to determine transmission routes and, especially, when transmission lines should be buried underground. While this would make transmission projects more responsive to local needs, undergrounding transmission lines is substantially more expensive and those added costs are currently spread across all utility ratepayers. Any changes to give localities more authority to require undergrounding of transmission lines would need to be accompanied by a change in how costs are allocated to prevent local government decisions from affecting rates paid by customers who do not benefit from undergrounding projects.

Utilities can use grid enhancing technologies to help reduce the need for new generation and transmission infrastructure

Utilities use grid enhancing technologies (GETs), such as reconductoring existing transmission lines, to increase capacity of the transmission system and more effectively use existing generation. For example, Dominion reports that it uses advanced conductors for all its 230 kV reconductor and new build projects, which can increase line capacity by 50 percent. Dominion reported adding or replacing 800 miles of line with advanced conductors as of the end of 2023. Dominion also reports deploying and piloting several other GETs to improve system stability and efficiency. Utilities have an economic incentive to deploy GETs so that they can provide enough transmission capacity to serve fast-growing demand.

SCC staff indicated that, before approving a new transmission line project, they consider whether a quicker and lower-cost approach, such as reconductoring, could be used instead. Staff make this determination by looking at the project proposal, the state need, and whether reconductoring will address the need. SCC staff carry out their own power flow studies and verify thermal issues, voltage issues, and generator deliverability (if applicable).

Appendix G: Virginia Clean Economy Act

The Virginia Clean Economy Act (VCEA) was enacted in 2020 and was intended to drive investment in renewable resources and phase out carbon-emitting generation in the state by 2050. VCEA was passed when energy demand in Virginia was projected to remain relatively flat. Now that demand is growing, largely because of data centers, it will be more challenging to meet these goals than originally contemplated.

The main way VCEA intends to decarbonize generation is by requiring an increasing share of energy sold by Dominion and APCO to come from renewable sources. The share of generation from renewables—the Renewable Portfolio Standard (RPS) requirement—increases each year until it reaches 100 percent (Table G-1). The utilities can meet the RPS requirement by directly building and claiming credit for new renewable generation facilities (mainly solar and wind) and entering into power purchasing agreements with third parties that operate renewable facilities. Utilities receive Renewable Energy Certificates (RECs) for energy from these sources, which are then credited toward their RPS requirement. Utilities can also purchase RECs from the PJM market and use purchased RECs to offset energy produced through carbon generation. Starting in 2025, 75 percent of Dominion's RECs must be from in-state generation sources. VCEA financially penalizes utilities that do not comply with in-state renewables requirements by levying deficiency payments, but in practice utilities may choose to pay those deficiency payments if it is more economical or feasible than securing new renewable generation. The cost of deficiency payments is recovered from utility customers. VCEA sets aside nuclear power as a third category of generation, which in effect can be used to reduce the total amount of renewable energy required.

TABLE G-1

VCEA requires growing share of energy sold in Virginia to come from renewable generation sources, with full decarbonization by 2050

	Percentage of total power sold required to come from renewables (excluding nuclear)	
	Dominion	APCO
2021 (year one)	14%	6%
2025	26	14
2030	41	30
2035	59	45
2040	79	65
2045	100	80
2050	-	100%

SOURCE: The Code of Virginia § 56-585.5.

NOTE: Percentages are the RPS program requirements for selected years; statute sets a percentage for every year. Nuclear power is excluded from the RPS calculation. For example, if one-third of Dominion power is nuclear, then the RPS percentage applies only to the remaining two-thirds of power that is not nuclear. Renewable energy is credited toward meeting RPS requirements through the purchase and retirement of Renewable Energy Certificates (RECs). RECs can be used to offset carbon emissions.

The VCEA's RPS requirements, and their associated REC requirements, do not apply to electric co-operatives (co-ops). This has significant implications because a majority of future energy demand growth is expected to occur in the co-ops' service territories, where many new data center campuses are expected to be built. (This is based on JLARC's consultant forecasts, and is corroborated with utility forecasts, utility construction and service agreements, and JLARC staff review of data center projects that are actively under development). Unlike Dominion and APCO, state law allows co-ops to secure energy to meet their growing demand from non-renewable and out-of-state generation sources.

VCEA directs the Virginia Air Pollution Control Board to develop regulations to gradually reduce carbon emissions. VCEA states the board "may establish, implement, and manage an auction program" or "utilize an existing multistate trading system" to achieve this purpose. Initially the state entered into the Regional Greenhouse Gas Initiative (RGGI) to reduce carbon emissions. The state has since withdrawn from RGGI, although the legality of that withdrawal is being challenged in court. A recent state circuit court decision ruled that the regulatory actions the state took to remove Virginia from RGGI were unlawful, but this decision could be appealed to a higher court.

Finally, VCEA requires carbon-emitting generation in Virginia owned by Dominion and APCO to be retired by 2045. However, VCEA allows these utilities to continue operating carbon-emitting generation plants in Virginia past 2045 if taking the plant off-line "would threaten the reliability or security of electric service to customers." Utility decisions to keep plants operating past 2045 must be approved by the SCC.

VCEA also has a presumption against the SCC approving new carbon-emitting generation plants, which applies to investor-owned utilities and co-ops. However, new carbon-emitting plants can be built if the SCC determines they are needed to address threats to the reliability or security of electric service to the utility's customers.

Appendix H: Grid modeling generation capacity and energy source results

JLARC staff commissioned Energy + Environmental Economics (E3) to develop an independent grid model and project the future generation and transmission infrastructure that would be needed to meet three different demand scenarios. For each of the demand scenarios, the model considered the most feasible and economical approaches to meeting infrastructure needs with and without the requirements of the Virginia Clean Economy Act (VCEA).

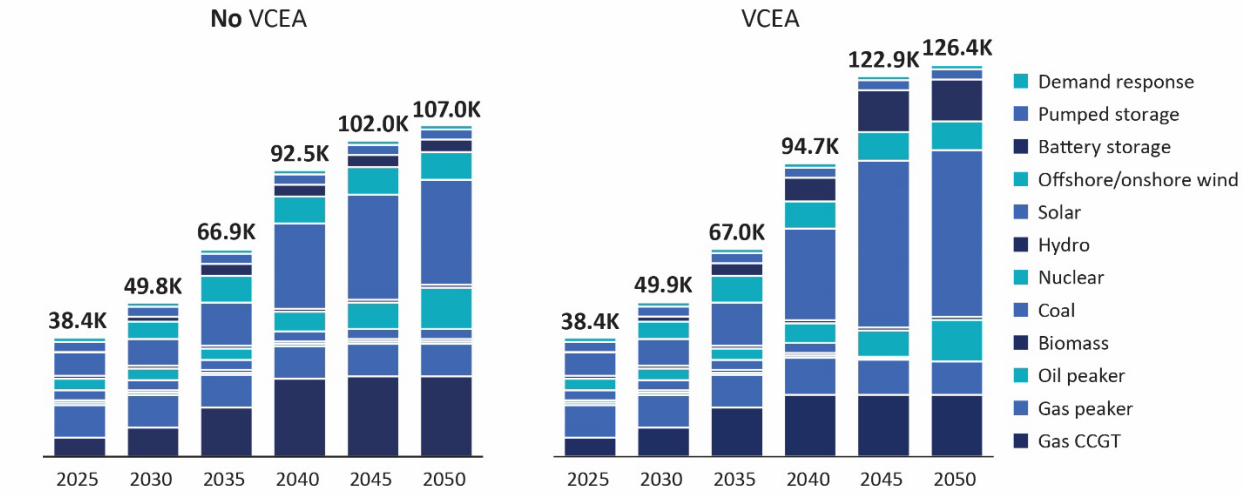
- Scenario 1: unconstrained demand, with and without VCEA. E3 also modeled variations where unconstrained demand and VCEA requirements could be met by using high levels of nuclear and renewable generation or by better regional coordination across PJM (not shown in this report).
- Scenario 2: half of unconstrained demand, with and without VCEA.
- Scenario 3: no new data center demand, with and without VCEA.

This appendix provides E3's grid modeling Virginia-level results for the (a) in-state generation capacity that would be needed to meet each demand scenario, by type of generation source and (b) the amount of energy that would be used from each type of generation source. Generation capacity is given in megawatts (MW) of nameplate capacity that would be needed, which can be significantly higher than the firm amount of capacity available from a resource. For example, Virginia solar facilities produce at around 25 percent of nameplate capacity. Generation energy is given in annual tera-watt hours (TWh) of energy used. E3's grid model assumes natural gas plants would be converted to hydrogen fuel in each scenario when VCEA compliance is assumed, starting in 2045. The model assumes that new nuclear generation will not be available until 2035. For additional discussion of E3's grid modelling methodology, see Appendix B.

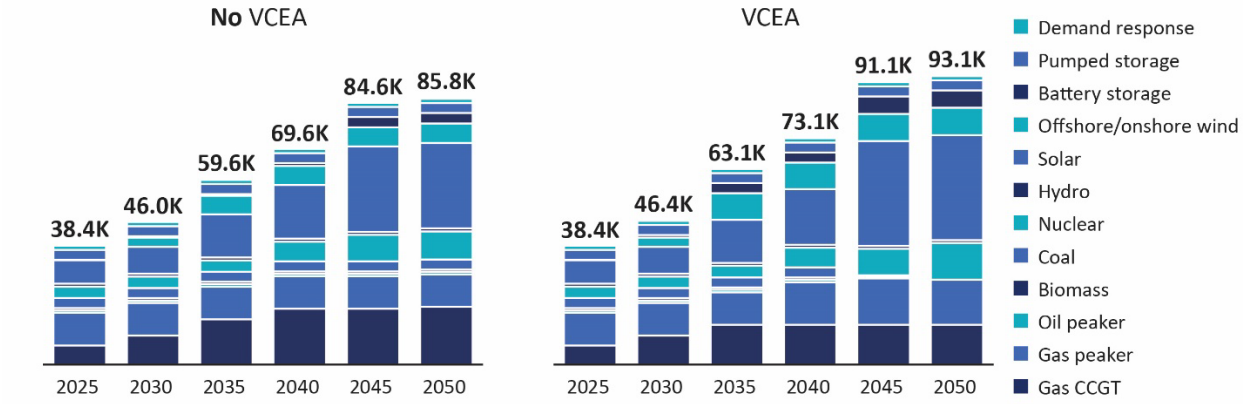
Results begin on next page.

FIGURE H-1
Generation capacity required 2025 to 2050

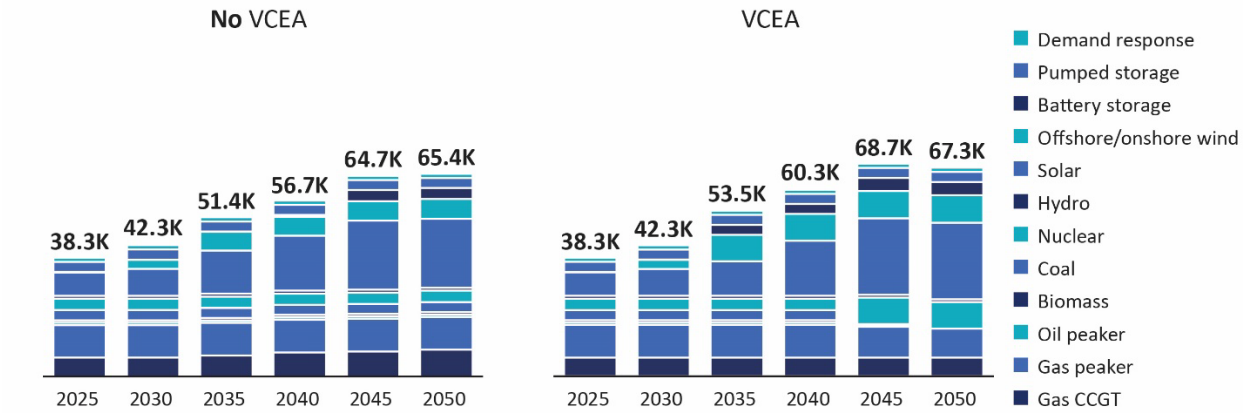
SCENARIO 1: UNCONSTRAINED DEMAND (IN MW)



SCENARIO 2: HALF OF UNCONSTRAINED DEMAND (IN MW)



SCENARIO 3: NO NEW DATA CENTER DEMAND (IN MW)



SOURCE: E3 grid modeling analysis.
NOTE: Capacity shown is nameplate capacity.

TABLE H-1
Generation capacity required 2025 to 2050, Scenario 1: Unconstrained demand (MW)

No VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	6,141	9,391	15,891	25,149	25,937	25,937
Gas Peaker	10,499	10,499	10,499	10,499	10,499	10,499
Oil Peaker	813	813	813	813	813	813
Biomass	765	765	765	765	765	765
Coal	3,230	3,230	3,230	3,230	3,230	3,230
Nuclear	3,708	3,708	3,708	6,388	8,532	13,356
Hydro	929	929	929	929	929	929
Solar	7,596	8,673	13,939	27,503	33,880	33,880
Offshore/onshore Wind	-	5,580	8,656	8,756	8,856	8,956
Battery Storage	116	1,608	3,835	3,835	4,008	4,008
Pumped Storage	3,241	3,241	3,241	3,241	3,241	3,241
Demand Response	1,354	1,354	1,354	1,354	1,354	1,354
Total	**38,393**	**49,792**	**66,861**	**92,462**	**102,043**	**106,967**

VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	6,141	9,391	15,891	19,945	19,945	19,945
Gas Peaker	10,499	10,499	10,499	11,976	11,342	10,863
Oil Peaker	813	813	813	813	316	-
Biomass	765	765	765	765	15	-
Coal	3,230	3,230	3,230	3,230	630	-
Nuclear	3,708	3,708	3,708	6,388	8,532	13,356
Hydro	929	929	929	929	929	929
Solar	7,596	8,673	13,939	29,622	53,880	53,880
Offshore/onshore Wind	-	5,580	8,656	8,756	9,216	9,316
Battery Storage	116	1,667	4,014	7,645	13,511	13,511
Pumped Storage	3,241	3,241	3,241	3,241	3,241	3,241
Demand Response	1,354	1,354	1,354	1,354	1,354	1,354
Total	**38,393**	**49,851**	**67,040**	**94,665**	**122,911**	**126,394**

SOURCE: E3 grid modeling analysis.
NOTE: Capacity shown is nameplate capacity.

TABLE H-2
Generation capacity required 2025 to 2050, Scenario 2: Half of unconstrained demand (MW)

No VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	6,141	9,391	14,626	18,021	18,021	18,605
Gas Peaker	10,499	10,499	10,499	10,499	10,499	10,499
Oil Peaker	813	813	813	813	813	813
Biomass	765	765	765	765	765	765
Coal	3,230	3,230	3,230	3,230	3,230	3,230
Nuclear	3,708	3,708	3,708	6,388	8,532	9,119
Hydro	929	929	929	929	929	929
Solar	7,596	8,673	13,939	17,340	27,589	27,589
Offshore/onshore Wind	-	2,940	6,016	6,116	6,216	6,316
Battery Storage	116	494	494	892	3,375	3,375
Pumped Storage	3,241	3,241	3,241	3,241	3,241	3,241
Demand Response	1,354	1,354	1,354	1,354	1,354	1,354
Total	**38,393**	**46,038**	**59,615**	**69,589**	**84,565**	**85,835**

VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	6,141	9,391	12,856	12,856	12,856	12,856
Gas Peaker	10,499	10,499	10,499	13,709	15,013	14,534
Oil Peaker	813	813	813	813	316	-
Biomass	765	765	765	765	15	-
Coal	3,230	3,230	3,230	3,230	630	-
Nuclear	3,708	3,708	3,708	6,388	8,532	11,854
Hydro	929	929	929	929	929	929
Solar	7,596	8,673	13,939	17,883	33,880	33,880
Offshore/onshore Wind	-	2,940	8,576	8,676	8,776	8,876
Battery Storage	116	878	3,216	3,231	5,590	5,590
Pumped Storage	3,241	3,241	3,241	3,241	3,241	3,241
Demand Response	1,354	1,354	1,354	1,354	1,354	1,354
Total	**38,393**	**46,422**	**63,126**	**73,075**	**91,132**	**93,114**

SOURCE: E3 grid modeling analysis.
NOTE: Capacity shown is nameplate capacity.

TABLE H-3
Generation capacity required 2025 to 2050, Scenario 3: No new data center demand (MW)

No VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	6,042	6,042	6,759	7,728	8,016	8,642
Gas Peaker	10,499	10,499	10,499	10,499	10,499	10,499
Oil Peaker	813	813	813	813	813	813
Biomass	765	765	765	765	765	765
Coal	3,230	3,230	3,230	3,230	3,230	3,230
Nuclear	3,708	3,708	3,708	3,708	3,708	3,708
Hydro	929	929	929	929	929	929
Solar	7,596	8,673	13,939	17,733	22,340	22,340
Offshore/onshore Wind	-	2,940	6,016	6,116	6,216	6,316
Battery Storage	116	116	116	609	3,583	3,583
Pumped Storage	3,241	3,241	3,241	3,241	3,241	3,241
Demand Response	1,354	1,354	1,354	1,354	1,354	1,354
Total	**38,293**	**42,310**	**51,369**	**56,725**	**64,695**	**65,421**

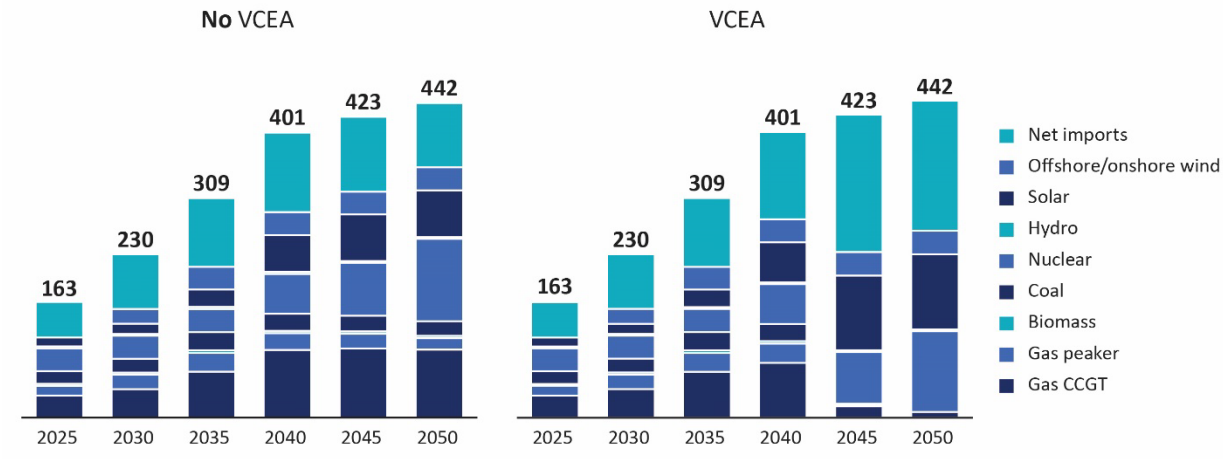
VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	6,042	6,042	6,042	6,042	6,042	6,042
Gas Peaker	10,499	10,499	10,499	10,499	9,865	9,386
Oil Peaker	813	813	813	813	316	-
Biomass	765	765	765	765	15	-
Coal	3,230	3,230	3,230	3,230	630	-
Nuclear	3,708	3,708	3,708	3,708	8,532	8,532
Hydro	929	929	929	929	929	929
Solar	7,596	8,673	11,092	17,783	24,669	24,669
Offshore/onshore Wind	-	2,940	8,576	8,676	8,776	8,876
Battery Storage	116	116	3,216	3,216	4,313	4,313
Pumped Storage	3,241	3,241	3,241	3,241	3,241	3,241
Demand Response	1,354	1,354	1,354	1,354	1,354	1,354
Total	**38,293**	**42,310**	**53,465**	**60,256**	**68,682**	**67,341**

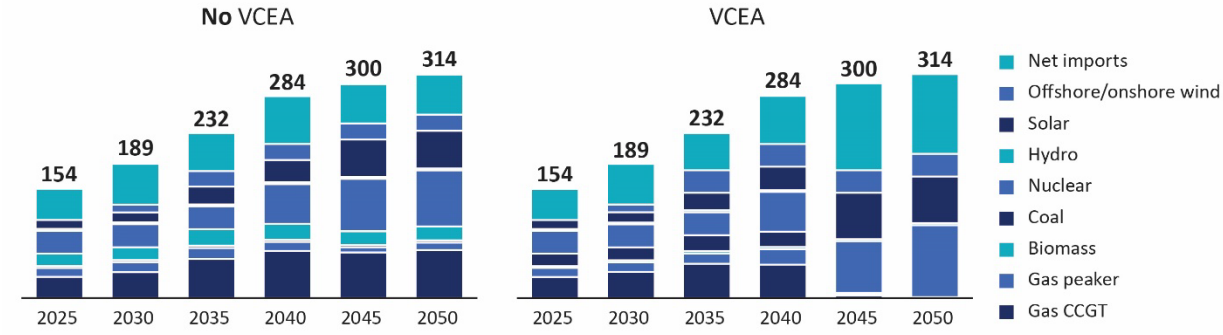
SOURCE: E3 grid modeling analysis.
NOTE: Capacity shown is nameplate capacity.

FIGURE H-2
Energy sources 2025 to 2050

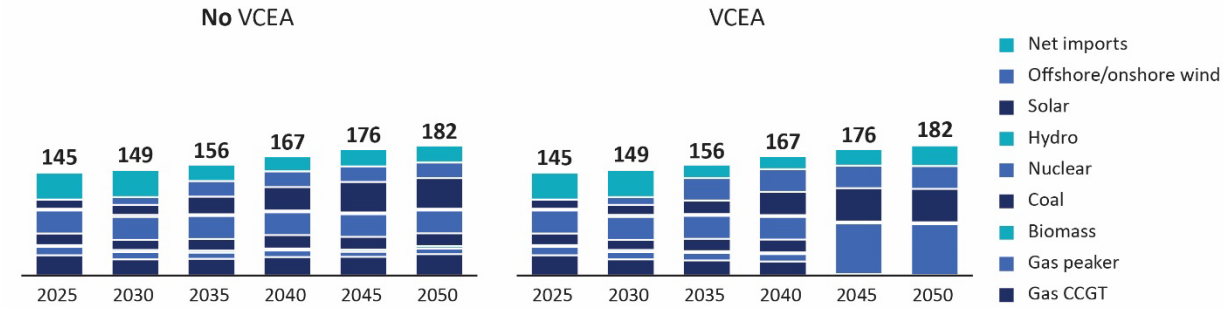
SCENARIO 1: UNCONSTRAINED DEMAND (IN TWH)



SCENARIO 2: HALF OF UNCONSTRAINED DEMAND (IN TWH)



SCENARIO 3: NO NEW DATA CENTER DEMAND (IN TWH)



SOURCE: E3 grid modeling analysis.

TABLE H-4
Energy sources 2025 to 2050, Scenario 1: Unconstrained demand (TWh)

No VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	31	40	65	96	98	96
Gas Peaker	14	20	27	23	21	16
Oil Peaker	-	-	-	-	-	-
Biomass	3	3	3	3	3	3
Coal	18	19	26	24	22	21
Nuclear	32	32	32	56	74	116
Hydro	3	3	3	3	3	3
Solar	13	14	25	52	66	66
Offshore/Onshore Wind	-	21	32	32	32	33
Battery Storage	(0)	(0)	(0)	(0)	(1)	(1)
Pumped Storage	(0)	(0)	(0)	(0)	(0)	(0)
DR	0	0	0	0	0	0
Net Imports	50	77	97	112	105	90
Total	**163**	**230**	**309**	**401**	**423**	**442**

VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	31	40	65	77	16	8
Gas Peaker	14	20	27	27	1	-
Oil Peaker	-	-	-	-	-	-
Biomass	3	3	3	3	0	-
Coal	18	19	26	24	2	-
Nuclear	32	32	32	56	73	114
Hydro	3	3	3	3	3	3
Solar	13	14	25	57	105	106
Offshore/Onshore Wind	-	21	32	32	33	33
Battery Storage	(0)	(0)	(0)	(1)	(2)	(1)
Pumped Storage	(0)	(0)	(0)	(1)	(3)	(3)
DR	0	0	0	0	0	0
Net Imports	50	77	97	123	194	183
Total	**163**	**230**	**309**	**401**	**423**	**442**

SOURCE: E3 grid modeling analysis.

TABLE H-5
Energy sources 2025 to 2050, Scenario 2: Half of unconstrained demand (TWh)

No VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	30	37	55	66	64	67
Gas Peaker	13	14	15	13	7	11
Oil Peaker	-	-	-	-	-	-
Biomass	3	3	3	3	3	3
Coal	17	18	23	22	19	20
Nuclear	32	32	32	56	74	79
Hydro	3	3	3	3	3	3
Solar	13	14	25	32	53	53
Offshore/Onshore Wind	-	11	22	22	23	23
Battery Storage	(0)	(0)	(0)	(0)	(1)	(1)
Pumped Storage	(0)	(0)	(0)	(0)	(1)	(1)
DR	0	0	0	0	0	0
Net Imports	44	57	54	67	56	56
Total	**154**	**189**	**232**	**284**	**300**	**314**

VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	30	37	48	47	4	2
Gas Peaker	13	14	15	22	1	-
Oil Peaker	-	-	-	-	-	-
Biomass	3	3	3	3	0	-
Coal	17	18	23	22	3	-
Nuclear	32	32	32	56	73	101
Hydro	3	3	3	3	3	3
Solar	13	14	25	33	66	66
Offshore/Onshore Wind	-	11	32	32	32	32
Battery Storage	(0)	(0)	(0)	(0)	(1)	(1)
Pumped Storage	(0)	(0)	(0)	(0)	(1)	(1)
DR	0	0	0	0	0	0
Net Imports	44	58	53	68	123	112
Total	**154**	**189**	**232**	**284**	**300**	**314**

SOURCE: E3 grid modeling analysis.

TABLE H-6
Energy sources 2025 to 2050, Scenario 3: No new data center demand (TWh)

No VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	29	23	23	26	26	30
Gas Peaker	11	10	9	10	7	8
Oil Peaker	-	-	-	-	-	-
Biomass	3	3	3	3	3	3
Coal	16	14	16	19	18	18
Nuclear	32	32	32	32	32	32
Hydro	3	3	3	3	3	3
Solar	13	14	25	33	43	43
Offshore/Onshore Wind	-	11	22	22	22	22
Battery Storage	-	(0)	(0)	(0)	(1)	(1)
Pumped Storage	(0)	(0)	(0)	(0)	(1)	(1)
DR	0	0	0	0	0	0
Net Imports	38	38	23	21	24	24
Total	**145**	**149**	**156**	**167**	**176**	**182**

VCEA

Resource	2025	2030	2035	2040	2045	2050
Gas CCGT	29	23	21	20	0	0
Gas Peaker	11	10	11	10	0	0
Oil Peaker	-	-	-	-	-	-
Biomass	3	3	3	3	0	-
Coal	16	14	17	18	2	-
Nuclear	32	32	32	32	71	72
Hydro	3	3	3	3	3	3
Solar	13	14	19	33	47	47
Offshore/Onshore Wind	-	11	32	32	32	32
Battery Storage	-	(0)	(0)	(0)	(1)	(1)
Pumped Storage	(0)	(0)	(0)	(0)	(1)	(1)
DR	0	0	0	0	0	0
Net Imports	38	38	19	19	23	29
Total	**145**	**149**	**156**	**167**	**176**	**182**

SOURCE: E3 grid modeling analysis.

Appendix I: Data center on-site generation

Instead of relying on utilities, many data center companies are looking at ways to generate their own power using on-site power generation. On-site generation can take a variety of forms, including utility-owned generation on or adjacent to a data center site, "behind the meter" generation that is owned by the data center, or a "microgrid" where the site operates its own generation and may not be connected to the larger grid. Of the current technologies available, only natural gas appears viable for on-site generation, and it can be deployed only close to pipeline infrastructure that has sufficient capacity to serve generation needs. Other technologies, such as small modular nuclear reactors, are being actively pursued by the industry as a potential future power source, but most stakeholders believe these will not realistically be available until 2035.

On-site generation is most likely to be used at new data center sites, where they can be incorporated into the site design. It appears unlikely existing sites, especially those that are fully built out, could be switched to on-site generation because of space constraints and financial considerations. Additionally, data center companies may have regulatory and public relation challenges trying to place some technologies, such as nuclear reactors, in suburban localities like Loudoun and Prince William.

On-site generation could help solve data center companies' power problems, but they may not substantially reduce generation and transmission infrastructure needs. Several data center companies indicated that they were pursuing on-site generation as a primary power source but planned to rely on the main grid for backup. Because electric utilities have an obligation to serve all customers in their service territory, they would still need to build the infrastructure necessary to provide power to these sites, even if they are only serving in a backup capacity.

On-site generation could also shift new infrastructure costs to other customers, because infrastructure costs are recaptured through utility billings, and a data center using a on-site generation would not be regularly billed for services. It is possible that utilities could reach agreements with data center companies to provide reduced or non-firm levels of service if only serving in a backup capacity, which would reduce the need for additional utility infrastructure and cost impacts on other customers. However, it is not clear whether data centers would enter into such agreements. State law could be changed to address the potential issue of stranded costs from data centers that use on-site generation, but as of today, this is not occurring and only one data center site in Virginia appears to actively rely on on-site generation for a substantial share of its energy needs.

Appendix J: Power usage effectiveness (PUE) ratios

The efficiency of cooling and other building systems in data centers is commonly measured using a Power Usage Effectiveness (PUE) ratio. For example, a PUE of 1.3 indicates that 1.0 of energy is used for computing activity, and 0.3 is used for all other building systems. A PUE of 1.0 would indicate perfect efficiency, where all energy is used for computing activity, and none is used for any other purpose. Importantly, PUE does not measure how energy efficient a data center's computing is, because energy used for computing is always set equal to 1.0. Consequently, a lower PUE does not indicate if a data center is energy efficient as a whole. PUE only measures the efficiency of cooling and other building systems that support facility operations.

The data center industry has a strong market incentive to be energy efficient because energy is one of data centers' largest operating costs. Data centers regularly upgrade their computing equipment to take advantage of newer, more powerful and energy efficient computer chips. Computer chips' performance per watt has improved annually for decades. Data centers have also made big efficiency gains with their building systems. As recently as 10 years ago, PUEs of 1.9 or above were common across smaller enterprise and colocation data centers. With the consolidation of the industry into large hyperscale facilities, large companies now report fleetwide average PUEs of 1.1 to 1.4. However, some companies may continue to have less efficient building systems because there are also strong market incentives to avoid changes that could disrupt operations, such as installing more efficient cooling systems.

At least one European country, Germany, has passed legislation requiring data centers to achieve lower PUE in the near future (1.2 to 1.3, depending on when the data center was constructed), and similar legislation has been proposed in Virginia. A PUE requirement could have two unintended consequences: (1) it could encourage more water use by the industry, because water-dependent cooling uses less energy, and could make it harder for companies that use dry cooling systems to comply, and (2) companies that operate colocation data centers may be less able to comply because they do not control operational decisions that can affect PUE calculations, such as how much computing space tenants use. A PUE requirement for existing data centers would also create fairness issues, because companies that have chosen to use cooling systems that are more water efficient but less energy efficient may be unable to comply with the requirement, solely based on the type of cooling they chose before a PUE requirement was established.

Appendix K: Additional natural resource considerations

Additional concerns about data center operations' impacts on natural resources, including their wastewater discharges, disposal of electronic waste, and diesel fuel carbon footprint, have also been raised. While significant adverse impacts to Virginia's natural resources may not occur from these, an environmental management standard, such as ISO 14001, could encourage data centers to reduce their impacts where possible. (See Chapter 5 for more information on environmental management standards.)

Because of existing regulations, data center wastewater discharges do not appear to pose ecological harms

Data centers that use water in their cooling systems typically discharge only a small portion of it, but when discharges do occur, the discharges may contain relatively large concentrations of salts, other dissolved solids, and chemical additives. Some stakeholders expressed concern that data centers and/or wastewater treatment plants do not filter out the salts and any other chemicals before discharging the water to a Virginia surface water source, contributing to the degradation of water quality.

Federal and state wastewater regulations appear to protect against these risks. DEQ requires permits for wastewater discharges from utilities and other large dischargers. These permits set limitations on the contents of discharges and require water quality monitoring to ensure that discharges do not degrade water sources. Some data centers have their own discharge permits, but most send their discharges to a wastewater utility. In either case, the permit holder must ensure any wastewater is appropriately treated before discharging it into a water source. If a wastewater utility is not capable of adequately treating discharge from a data center customer, the utility can require the data center to pretreat its discharges.

Some stakeholders were concerned that existing wastewater regulations were not sufficient to protect water resources, but any potential shortcomings would be true for other development types, so data center-specific standards are not necessary. However, a certification to ISO 14001, which requires companies to meet all environmental regulations, may encourage additional voluntary commitments from data centers to reduce any wastewater impacts.

Electronic waste faces little regulation, but existing practices divert some servers from landfills

Data centers are packed full of thousands of servers, and these servers are replaced every three to five years. Servers can contain rare and toxic materials. The process to procure these materials for use in servers can be environmentally harmful, as can improper disposal of the toxic materials. The reuse or recycling of servers and server parts can minimize environmental impacts.

Data centers, like other businesses, are not required by federal or state law to reuse or recycle electronic waste, but existing practices divert some servers from Virginia landfills. Many data center companies have sustainability goals related to electronic waste, including reusing, recycling, or donating old servers or old server parts. Additionally, not all local waste management services and landfills in Virginia

accept commercial waste and/or electronic waste, which would force data centers to seek other alternatives to dispose of their old servers.

Requiring data centers to meet an environmental management standard, such as ISO 14001, would require data centers to consider any environmental impacts caused by their waste generation. This could complement existing practices and discourage disposal of data center servers in Virginia landfills, if, and where, it does occur.

Few data centers currently use diesel fuel alternatives because of supply limitations

Use of diesel fuel—the fuel commonly found in data centers' backup generators—leads to greenhouse gas emissions. Data center operators are interested in expanding the data center industry's use of alternative fuels, such as hydrotreated vegetable oil (HVO), to lower data centers' carbon footprints. These alternatives can be used in most existing diesel generators. However, while these fuel alternatives are available for and used by data centers in Europe and California, the East Coast does not have a supply chain for these fuels. This makes it more expensive and logistically challenging for Virginia data centers to use these fuel alternatives.

Some data center companies are making efforts to expand the use of alternative fuels. For instance, some have requested DEQ permit approval to use HVO in their generators—as DEQ approval of fuel choice is needed as part of emission regulations—and the industry has reached out to the Virginia Economic Development Partnership about exploring ways to attract the fuel alternative industry to Virginia to increase local availability. While a requirement to use a fuel alternative may not currently be feasible, an ISO 14001 requirement could further encourage industry efforts to review and seek opportunities to limit their carbon footprints where possible.

Appendix L: Data center planning and zoning changes in Fairfax, Loudoun, and Prince William

In recent years, the three Virginia localities with the most data centers have revised their approaches to regulating the industry and initiated studies to consider additional changes. Sites in Loudoun, Prince William, and Fairfax account for 80 percent of data centers in the state. Since 2019, all three localities have adopted changes to their ordinances or other policies relating to data centers. For example, all three localities added minimum requirements for data centers to their zoning ordinances. Additionally, all three localities began official studies of their data center policies, with Loudoun and Prince William planning votes in 2026 by their boards of supervisors in response to study findings. Table L-1 summarizes key changes by Fairfax, Loudoun, and Prince William related to data center planning and zoning processes since 2019.

TABLE L-1
Fairfax, Loudoun, and Prince William have updated data center policies since 2019

Locality	Planning and zoning actions
Fairfax	**Comprehensive zoning update with changes specific to data centers (effective 7/1/2021)** • Recognized data centers as distinct use instead of being considered a type of telecommunications facility • Prohibited data centers in residential and certain commercial zones; requires special permit in certain commercial and industrial zones if exceeds specified size • Established county's first design standard specific to data centers: requiring enclosure of equipment in certain zones **Data center study (initiated 5/9/23)** • Process included public meetings and stakeholder interviews • Produced two staff reports and a consultant report **Zoning changes (effective 9/11/24)** Board of Supervisors considered study's recommendations and implemented several rules to better manage data center development • Prohibited data centers in additional zone; converted several zones from allowing data centers by right to allowing by special permit; expanded requirement for special permit if exceeding specified size to another industrial zone • Required 200 feet between data center building and residential property; required 300 feet (or a building) between equipment and residential property • Required 1 mile between data center and Metro station • Required sound studies at two stages of new projects • Required several architectural standards (e.g., façade differentiation) of by right development, with more flexibility but the same goals for special permit developments
Loudoun	**Rewrite of comprehensive plan (adopted 6/20/2019)** Items for priority future action included performance standards for data centers **Series of meetings about data center policies by legislative committee (2022)** Initiated to review county staff research and develop process for considering changes to data center policies **Comprehensive zoning update includes changes specific to data centers (effective 12/13/2023)** [a] Goal to align zoning ordinances relevant to data centers with comprehensive plan

- Converted two zones from allowing data centers by right to allowing by special permit; permitted data center in an additional industrial zone
- Expanded applicability of data center standards (e.g., façade architecture, screening of mechanical equipment) from four zones to all locations
- Created standards for data centers regardless of location including windows, main entrance features, loading bay location, and proactive sound measuring
- Created standards for data centers adjacent to residential areas including separation of mechanical equipment, minimum 200-foot setback between buildings and property border, parking setbacks, time limits on generator testing, and acoustical barriers around mechanical equipment

Study of potential changes to comprehensive plan and zoning ordinances for data centers and substations (initiated 2/6/2024)

- First phase focusing on appropriate locations for data centers per the comprehensive plan and zoning ordinance, expected to conclude early 2025
- Second phase to focus on policies and zoning ordinances to implement data center standards (e.g., aesthetics, natural resources), expected to conclude 2026

Prince William

Additional standards required in data center overlay district (adopted 6/18/2019)

- Created requirements for data centers in the data center overlay district, including for building façade and fence design, screening mechanical equipment and substations near residential areas and certain roads, and buffer yards of data centers near residential areas
- To encourage data center development in the overlay, increased density allowed by right within the overlay
- Adjusted borders of data center overlay on map

Comprehensive review of data center overlay (initiated 3/2/2021)

- Scope included zoning ordinance, comprehensive plan, and other formal county policies
- Products included reports by county's economic development office and two consultants regarding data center industry trends, appropriate land in Prince William, and recommended standards for development
- Process included public meetings and stakeholder interviews

Data center ordinance advisory workgroup (created 2/28/2023)

Responsible for continuing review of county's data center policies. Draft timeline includes Board of Supervisors vote on noise ordinance amendments in spring 2025 and vote on policy changes relevant to other topics later in 2025.

Expanded noise ordinance applicability to data centers (adopted 2/28/2023)

- Limited exemption for nighttime cooling systems to residential homes
- Originally planned to sunset in a year but extended to provide time to "assess the noise impacts associated with data centers"

SOURCE: JLARC review of local ordinances, review of planning and zoning department documents, and interviews with local staff.
NOTE: Table describes significant changes since 2019 and is not a summary of current ordinances. Table focuses on planning and zoning processes and excludes changes to economic development and tax policy. Table excludes requirements limited to particular projects (e.g., rezoning commitments). "Special permit" is used for consistency, but the terminology for this process depends on the locality.
[a] Updates do not apply to certain parts of the county, which are administered under an older zoning ordinance.

JLARC
JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

December 9, 2024

Data Centers in Virginia

Study resolution

- Directs JLARC to review the impacts of data centers in Virginia and state and local policies regarding data centers
  - Projected growth of the data center industry in Virginia
  - Impact on energy consumption and infrastructure and customer costs
  - Impact on residents and natural and historic resources
  - State and local regulation of siting and construction
  - Impact on economy and tax revenues
  - State policies and incentives for data centers

Commission resolution (December 11, 2023)

Primary research activities

- Over 300 interviews, including data center companies, utilities, local governments, state agencies, Virginia residents, and other stakeholders and experts
- Reviews of reports, state and local regulations, and other relevant documentation
- Analyses of data related to the size and distribution of data centers, environmental impacts, and economic and revenue impacts
- Forecast of future energy demand and modeling of energy infrastructure needs, costs, and rate impacts (Completed with assistance of consultants)

In brief

- Data centers provide economic benefits and can generate substantial local tax revenues for localities that have them.
- Data center industry is driving immense increase in energy demand, and building enough new generation and transmission infrastructure to address demand will be difficult.
- Data centers are currently paying full cost of service, but growing energy demand will likely increase costs for other customers and create additional financial risks for utilities.

In brief

- Data center backup generators emit pollutants, but their use is minimal, and existing regulations largely curb adverse impacts.
- Data center water use is currently sustainable, and state ensures future sustainability through regulation.
- Increasing number of data centers are being built close to residential areas and can negatively impact residents; some localities have taken steps to address this concern, but noise impacts can be difficult to resolve.

In brief

- Virginia's sales tax exemption for data centers could be (1) extended to maintain data center growth and economic benefits, (2) allowed to expire to slow growth and reduce energy impacts, or (3) modified to balance these priorities.
- Sales tax exemption could also be changed to address policy concerns related to energy efficiency, natural and historic resources, and local residential impacts, but changes could make the exemption a less effective economic development tool.

In this presentation

Background

Economic and Fiscal Impacts

Energy Impacts

Energy Costs

Natural and Historic Resource Impacts

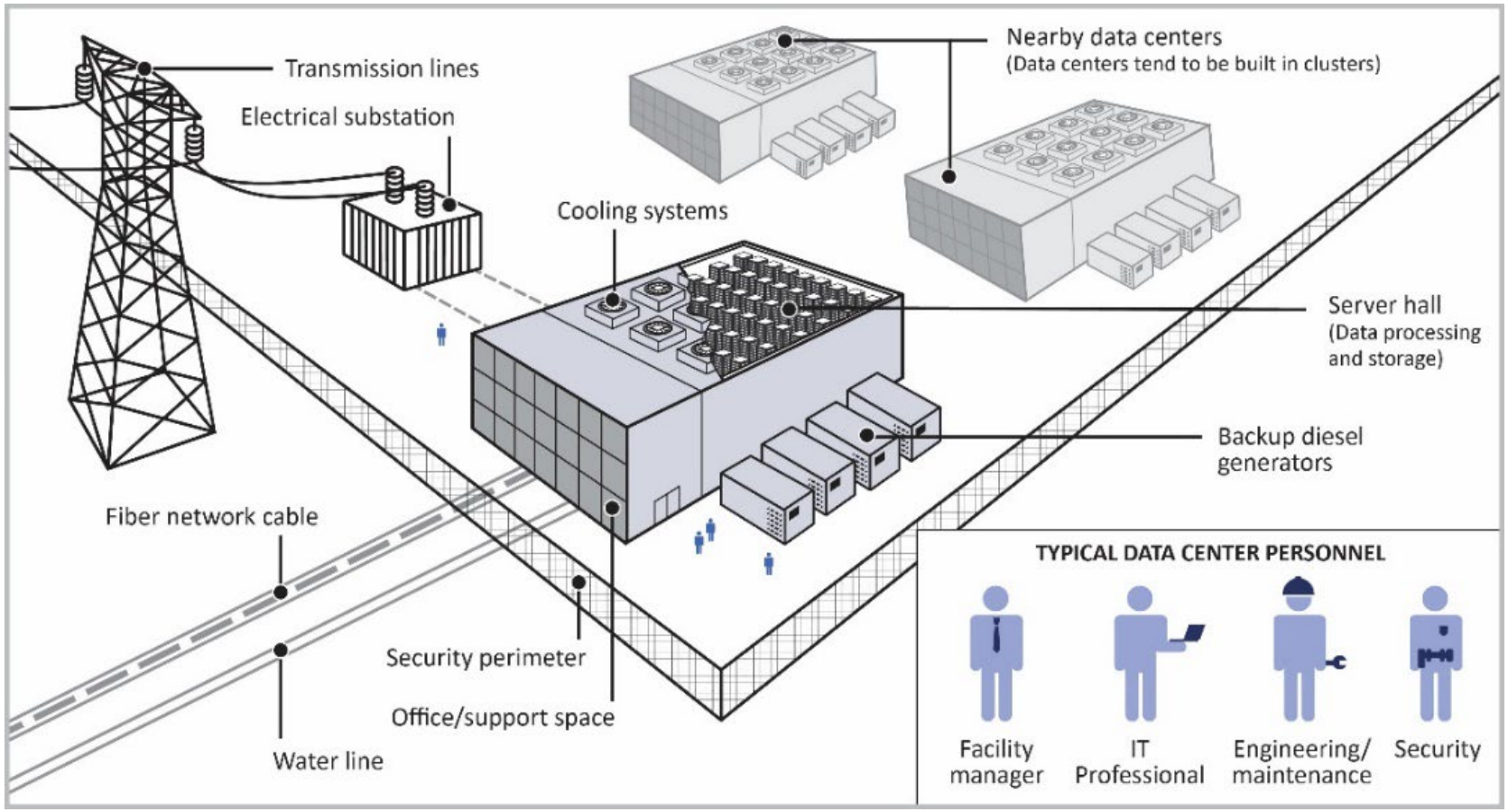
Local Residential Impacts

Using Data Center Exemption to Address Policy Concerns

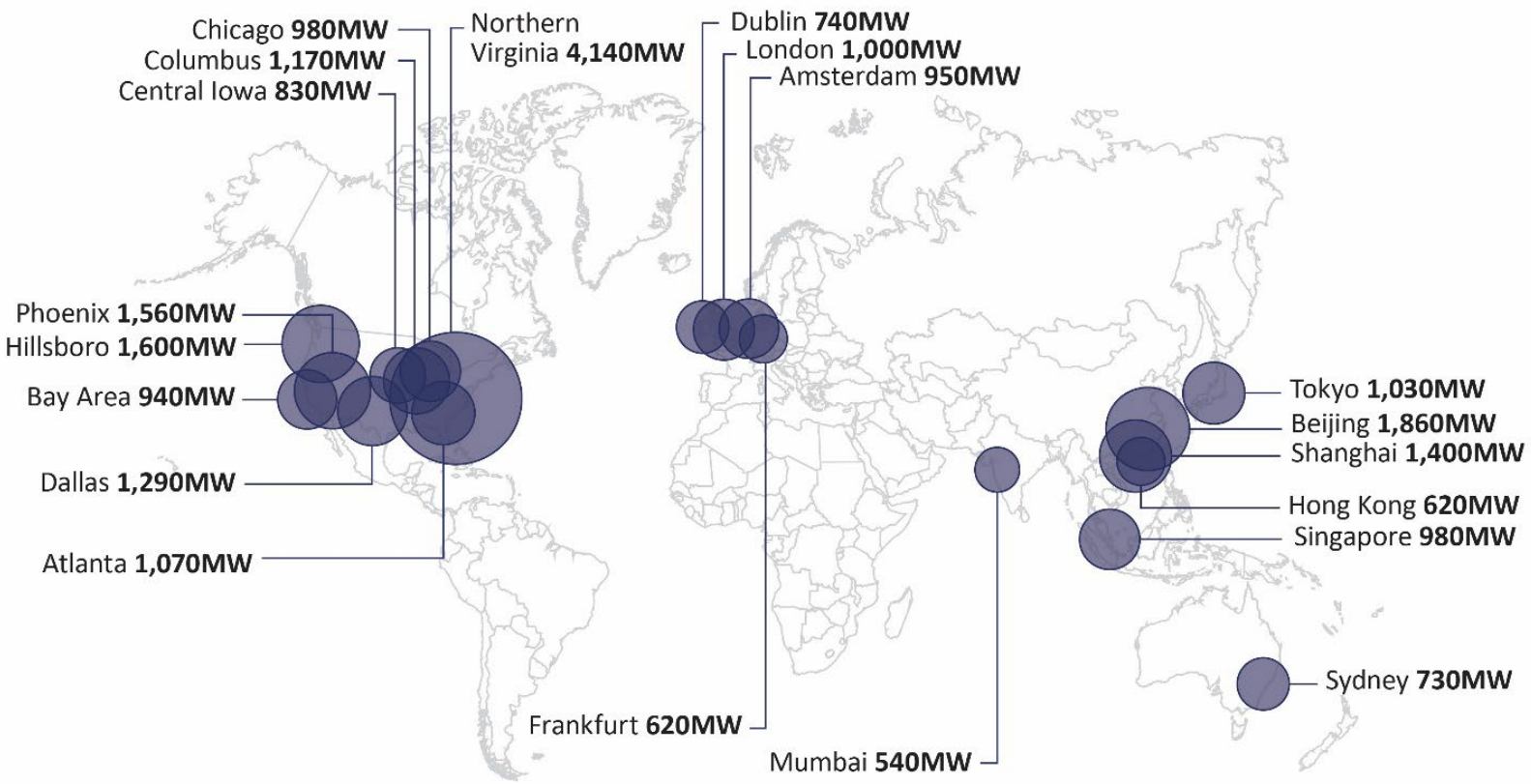
Data centers are key hubs of world's digital infrastructure

- Enable modern digital services and economy
  - Internet, cloud services (business, personal), media streaming, apps, financial transactions
- Industry is growing rapidly, driven by a combination of established and emerging trends
  - Existing uses accelerated by COVID-19 pandemic
  - Emergence of artificial intelligence
- Dominated by a few large companies
  - Amazon Web Services, Google, Meta, Microsoft

Modern data centers are large industrial buildings, increasingly located together on “campuses”

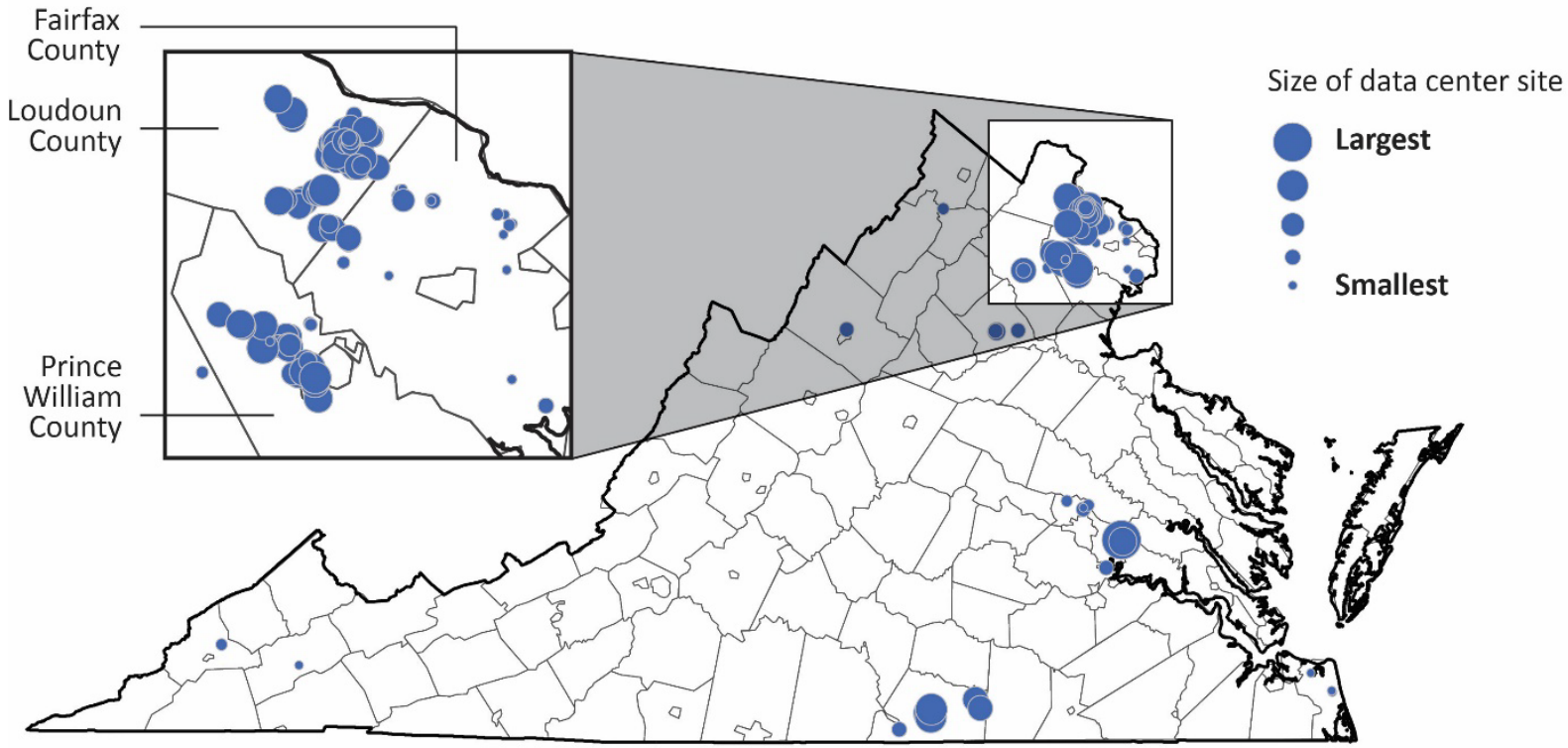


Northern Virginia is the largest data center market in the world



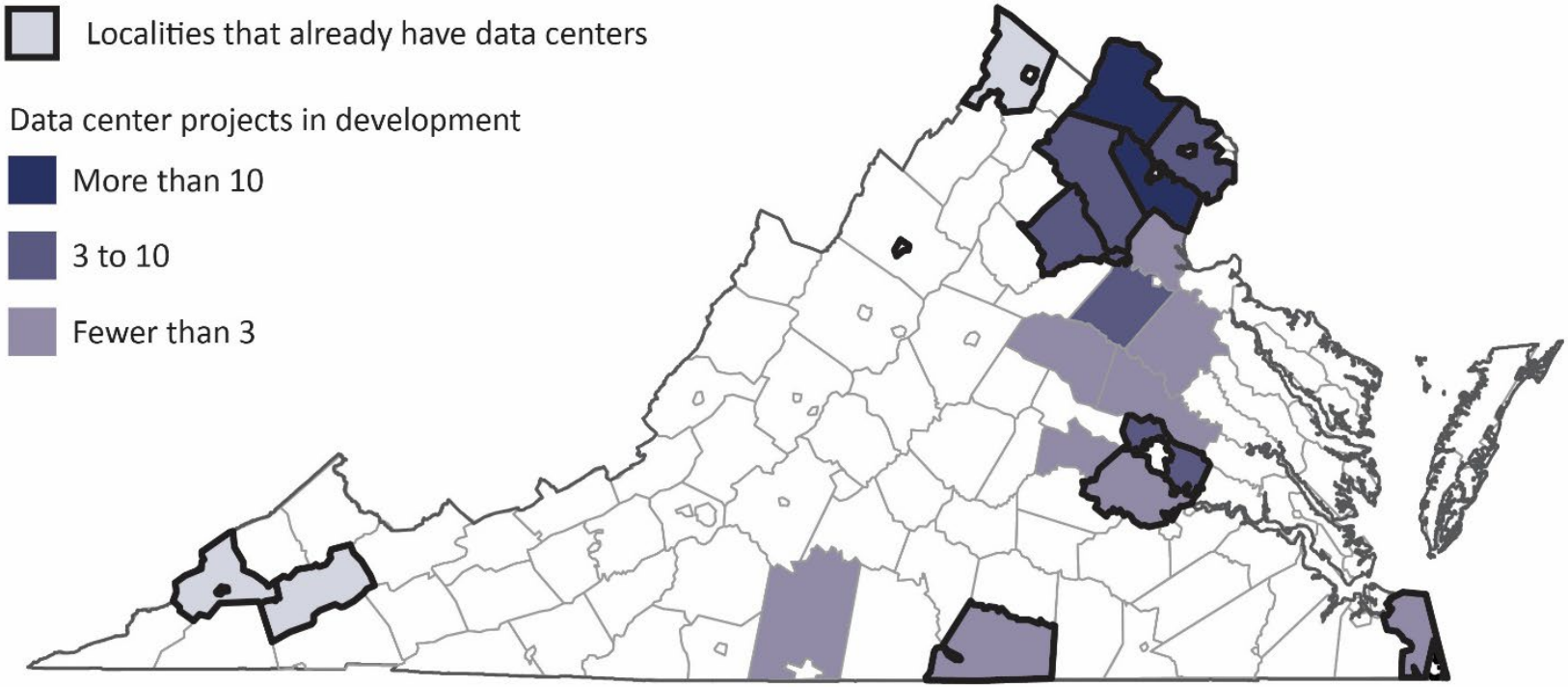
JLARC analysis of Cushman & Wakefield 2024 Global Data Center Market Comparison

Most of Virginia's data center industry concentrated in Northern Virginia



Data center size is measured using operational capacity, given in megawatts of power.

Virginia's data center industry is starting to expand into new localities, mostly along I-95 corridor



In this presentation

Background

Economic and Fiscal Impacts

Energy Impacts

Energy Costs

Natural and Historic Resource Impacts

Local Residential Impacts

Using Data Center Exemption to Address Policy Concerns

Finding

Data centers provide economic benefits, mostly during their initial construction.

Data center industry has economic benefits, with most benefits occurring during construction

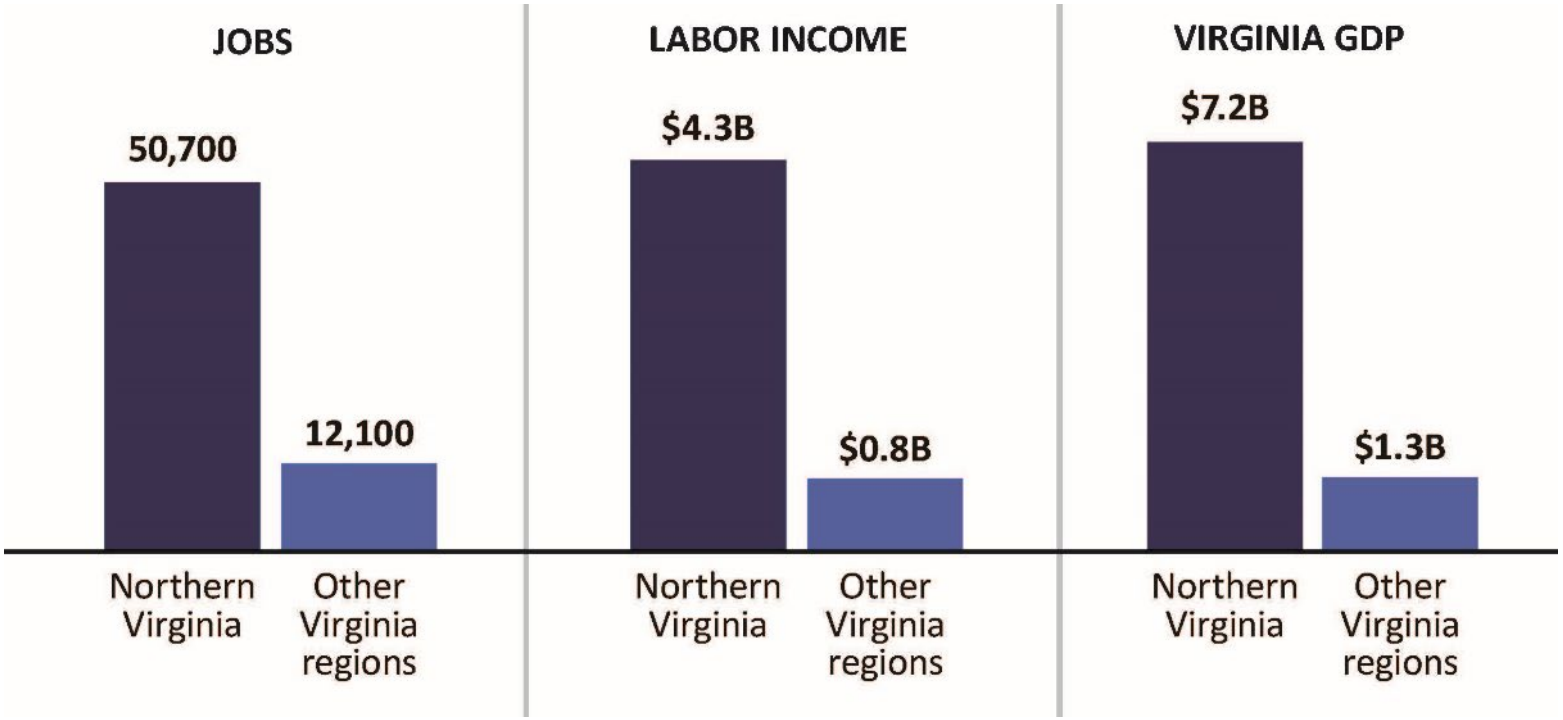
Economic impact	Annual average*		
	Construction	Operations	Total impact
Jobs	59,000 jobs	15,000 jobs	74,000 jobs
Labor income	$4.3B	$1.2B	$5.5B
Virginia GDP	$6.4B	$2.7B	$9.1B

*Direct and indirect economic effects, based on capital investment and related operation spending

Data center industry creates jobs and is a significant source of capital investment in Virginia

- During construction, a data center site can employ up to 1,500 workers, including skilled construction and trades
- During operations, typically employ small number of workers relative to facility size (~50)
  - Facilities, engineers, IT, trades, security
  - Most jobs are relatively high-paying
- Significant source of capital investment ($24B in FY23)
  - ~20% for construction, much of which stays in-state
  - Most computer & equipment investment to out-of-state companies

Economic impact is concentrated in Northern Virginia



Totals for Northern Virginia and other Virginia regions do not sum to statewide totals shown in previous slide because the regional method of analysis does not account for impacts from activity in Northern Virginia occurring in other Virginia regions and vice versa.

Finding

Data centers can generate substantial local tax revenues for localities that have them.

Localities with data centers can collect substantial tax revenues from the industry

- Local tax revenues primarily from business personal property and real property (real estate) taxes
- Amount of local revenue depends on several factors, such as size of data center market and local tax rates
  - Some localities have greatly reduced rates to try and attract data centers, which greatly reduces potential revenue
- For localities with relatively mature data center markets, revenues ranged from <1% to 31% of total revenues
  - Loudoun $733M (31%), Prince William $110M (7%)*

*Cannot report totals for counties with small number of data centers to protect taxpayer confidentiality

Localities in economically distressed areas could have difficulty attracting the industry

- To attract data centers, a locality must have access to transmission lines and large, flat areas of land
- Localities that are close to data center customers and population centers have historically had an advantage
  - Rural localities may be better able to compete for new data centers running artificial intelligence (AI) workloads
- Localities are more attractive if they have "shovel-ready" industrial sites suitable for data centers
  - VEDP's Virginia Business Ready Sites Program provides grants for site development

VEDP = Virginia Economic Development Partnership

Recommendation

VEDP should clarify that potential data center sites are eligible for grants under the Virginia Business Ready Sites Program.

In this presentation

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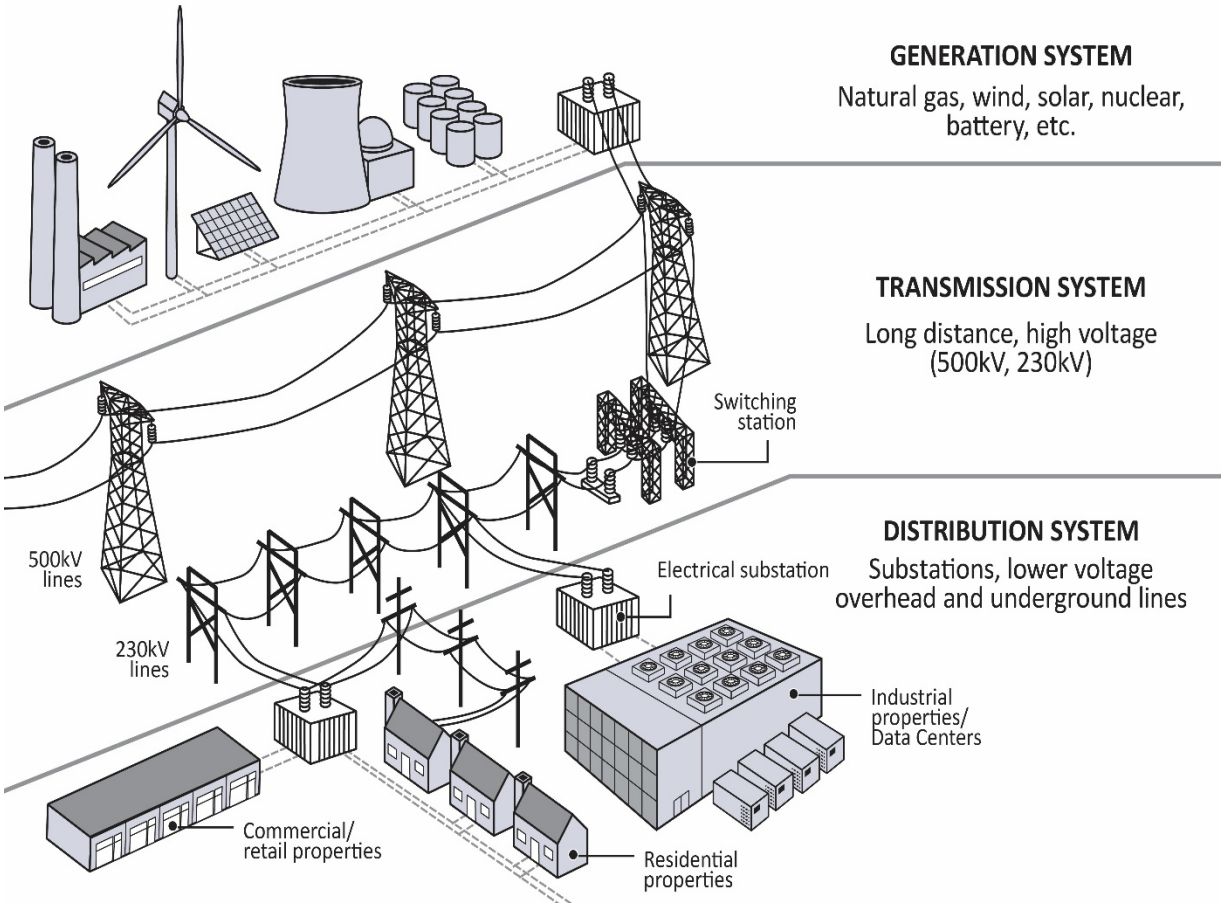
Using Data Center Exemption to Address Policy Concerns

Modern data centers use substantially more energy than other commercial or industrial operations

- Small 18 MW data center power capacity is roughly equivalent to a mid-sized automobile assembly plant, 60 large commercial office buildings, or 4,500 homes
- Largest new data centers draw from 100 to over 200 MW, more than most industrial consumers
- Planned data center campuses are expected to consume well over 1,000 MW
  - More than the 950 MW generation capacity of Virginia's largest nuclear reactor

MW = megawatts of power used in an instant, which is the common metric for measuring data center size

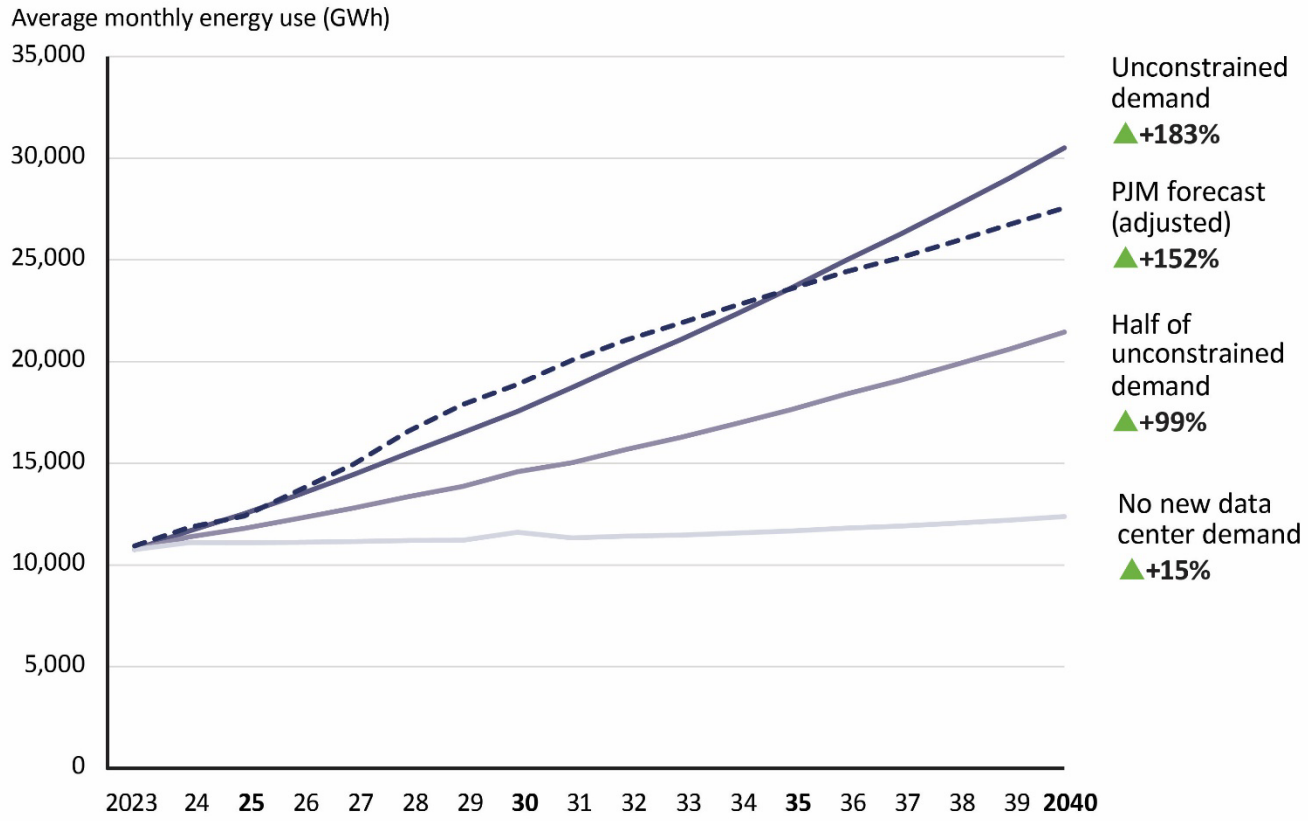
Energy comes from a complex grid composed of generation, transmission, and distribution systems



Finding

Data center industry is driving immense increase in energy demand, and building enough new generation and transmission infrastructure to address demand will be difficult.

Data center industry is forecast to drive immense increase in Virginia's energy demand



PJM is the regional organization responsible for coordinating generation and transmission for Virginia and several other eastern and midwestern states

New generation and transmission infrastructure will need to be built to help address energy demand

- New generation infrastructure needed includes
  - Renewable solar and wind facilities
  - Natural gas plants
  - Nuclear plants
  - Battery storage and “demand response” resources
- New transmission needed includes
  - “Interzonal” lines to bring power into and across Virginia
  - “Intrazonal” lines to disperse power to local distribution points
  - Transmission substations

Addressing energy demand would require substantially increasing current system capacity and energy imports

	Change from 2025 to 2040	
	Scenario 1: Unconstrained demand	Scenario 2: Half unconstrained demand
Generation (in-state)	+150%	+90%
Transmission (Interzonal)*	+40%	+35%
Imported energy (net)	+150%	+55%

Scenarios shown assume that Virginia Clean Economy Act (VCEA) renewable requirements are met.
*Transmission capacity is only interzonal lines to and from the Dominion transmission zone, where most data centers are located and most growth is expected to occur.

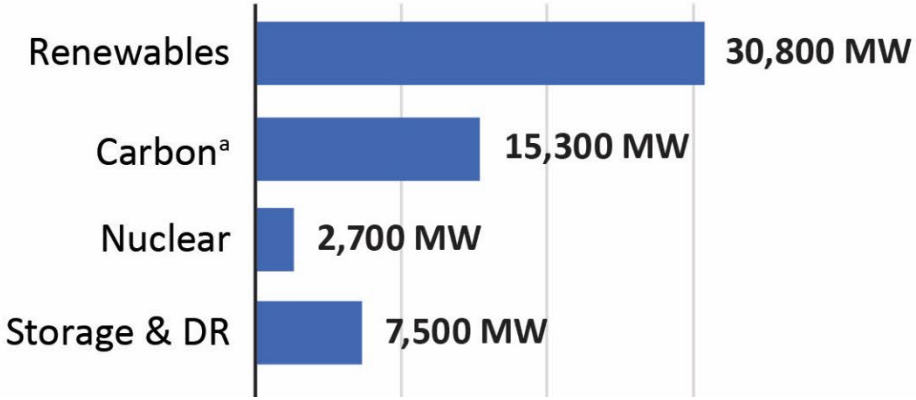
Building enough infrastructure to meet growing data center demand will be difficult

- Scenario 1: Unconstrained demand very difficult to achieve
  - Solar added each year at 2x rate added in 2024
  - Large natural gas plant added almost every 1.5 years
  - Wind capacity exceeding all secured offshore capabilities
  - New nuclear plants using technologies not yet proven viable
- Scenario 2: Half of constrained demand difficult to achieve
  - Less new solar and natural gas, similar wind and nuclear
- Both scenarios would require many new transmission lines, especially in and around Northern Virginia, and could require new gas pipeline capacity

Breakdown of generation capacity that would need to be added (2025 to 2040)

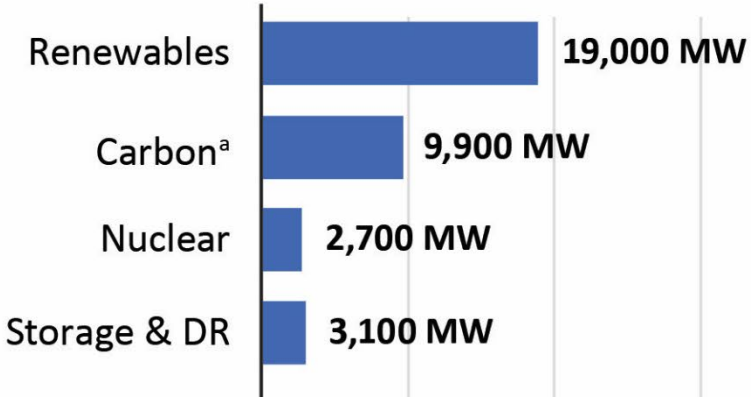
SCENARIO 1: UNCONSTRAINED DEMAND

VERY DIFFICULT TO ACHIEVE



SCENARIO 2: HALF OF UNCONSTRAINED DEMAND

DIFFICULT TO ACHIEVE



Scenarios shown assume that Virginia Clean Economy Act (VCEA) renewable requirements are met.
[a] Carbon generation is from natural gas baseload and peaker plants. However, starting in 2045 (not shown), grid model assumes natural gas plants would be converted to hydrogen fuel.

Finding

Demand growth raises concerns about system capacity and reliability, but existing utility requirements and processes limit risks.

Demand growth raises grid reliability concerns, and utilities are responsible for ensuring reliability

- Unprecedented pace of energy demand growth raises concerns
  - Availability of sufficient generation capacity
  - Ability of transmission system to reliably deliver power
- Utilities have obligation to serve new data center customers, but **foremost responsibility is to ensure grid reliability**
- Regulated by federal agency and international standards

The Federal Energy Regulatory Commission (FERC) oversees the nation's electrical grid.
The North American Electrical Reliability Corporation (NERC) sets reliability standards for the grid.

Regulatory requirements and planning reduce reliability risks from growing energy demand

- **Transmission** reliability concerns appear to be effectively addressed through existing planning processes
- **Generation** capacity concerns partially addressed through existing requirements, but some risk remains
  - Addition of new generation to regional grid not centrally planned
  - Demand could increase faster than new generation is added, regional *reserve* capacity projected to be insufficient by 2030
  - Issue must be addressed at federal & regional level
- Delaying addition of new data centers, as needed, would address risks

Recommendation

The General Assembly may wish to consider clarifying that electric utilities have the authority to delay, but not deny, service to customers when the addition of customer load cannot be supported by the transmission system or available generation capacity.

Finding

State could encourage or require data centers to take actions to help address their energy impacts, but actions would have small effect on demand.

Data centers could take actions to help address energy impacts

- Data centers could invest more in renewable and other energy generation to help meet generation needs
  - Would not lower energy demand
  - Unclear if on-site generation would substantially reduce need for new grid infrastructure
- Participation in demand response programs could offset some energy demand and reduce infrastructure needs
- Improving data center efficiency (e.g., PUE) makes better use of energy but has marginal impact on total energy use

PUE = Power Usage Effectiveness ratio, which measures efficiency of cooling and other building systems, but not computing activity that makes up most data center energy use

Recommendation

The General Assembly may wish to consider expanding Virginia's statutory Accelerated Renewable Buyers program, which effectively encourages large utility customers to invest in solar and wind projects, to include battery storage.

The General Assembly may wish to consider requiring utilities to establish demand response programs for large data center customers and requiring that these customers participate in those programs.

Policy option

The General Assembly could consider requiring that, as a condition of receiving the sales tax exemption, data center companies meet and certify to an energy management standard.

Virginia's sales tax exemption for data centers is discussed in more detail in the last section of this presentation.

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Finding

Data centers are currently paying full cost of service, but growing energy demand is likely to increase costs for other customers.

Data centers are currently paying full cost of service

- Independent review of utility rate structures and cost allocations found costs incurred by data centers are currently being fully recovered from them
- **Generation and transmission** costs are either passed through to individual data center customers or allocated to customer classes that largely consist of data centers
- **Distribution** costs are directly charged to data center customers or collected through contractually obligated minimum payments

Review of current rates focused on three utilities that currently have large data centers: Dominion Energy, Mecklenburg Electric Cooperative (MEC), and Northern Virginia Electric Cooperative (NOVEC)

Growing data center energy demand is likely to increase costs, including for other customers

- Generation and transmission costs could increase $10B to $18B by 2040, mostly because of data center demand
- Portion of “fixed costs” associated with new infrastructure would be billed to non-data center customers
- It would be difficult to provide enough energy supply to keep pace with growing demand, so energy prices would increase for all customers
- Utilities would need to import more power and could be more susceptible to spikes in energy market prices

Cost increases are for the unconstrained and half of unconstrained demand scenarios, assuming that Virginia Clean Economy Act (VCEA) renewable requirements are met.

Example: projected increase in generation and transmission charges for residential customer

Typical monthly residential generation and transmission charges (Dominion Energy)

	2023	2030	2040
Scenario 1: Unconstrained demand	$90	+$23	+$37
Scenario 2: Half unconstrained demand	$90	+$7	+$14

Typical monthly residential charges are the sum of the amount billed to Dominion Energy residential customers assuming typical use of 1,000 kWh. Dominion Energy is Virginia's largest electric utility and is responsible for providing generation and transmission to much of the state, including areas where most of the state's data center industry is concentrated. Charges shown assume that Virginia Clean Economy Act (VCEA) renewable requirements are met. Constant 2024 dollars.

Utilities, under SCC regulation, could help insulate customers from systemwide cost increases

- Utility rates not designed to account for rapid cost increases to serve a small number of very large customers
- Utilities could help insulate non-data center customers by
  - Creating a separate data center customer class
  - Adopting new cost allocation methods
  - Adjusting rates more frequently
- Utility cost allocation and rate design are highly technical; practicality & legality of changes require detailed analysis
- SCC is in best position to address and has scheduled a technical conference on cost concerns for December 2024

SCC = Virginia State Corporation Commission, which regulates state electric utilities

Finding

Data center growth creates additional financial risks to utilities and their customers.

Data center growth creates additional financial risks to utilities due to sheer size of energy use

- Data center demand could drive infrastructure to be overbuilt, stranding costs with existing customers
- Data centers pose particular risks to electric co-ops
  - Could account for 80 percent or more of energy sales for some co-ops by 2030
  - Delayed or disputed payments from a single large customer could create substantial financial liabilities
- Data center company participation in retail choice program could shift generation costs to other customers

Electric cooperatives (co-ops) are not-for-profit electric utilities.
Retail choice is a statutorily established program that allows large electric customers to purchase energy through third-parties instead of their incumbent utility.

Recommendation

The General Assembly may wish to consider directing Dominion Energy to develop a plan for addressing the risk of generation and transmission infrastructure costs being stranded with existing customers and file it with the SCC.

Dominion Energy is Virginia's largest electric utility and is responsible for providing generation and transmission to much of the state, including areas where most of the state's data center industry is concentrated.

Policy options

The General Assembly could consider amending the Code of Virginia to allow electric cooperatives to create for-profit subsidiary companies to provide energy services to customers with load capacity of over 90 MW.

The General Assembly could consider amending the Code of Virginia to require that electric utilities establish caps on participation in retail choice, and that such caps be approved by the SCC.

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Using Data Center Exemption to Address Policy Concerns

Study examined data center industry impacts on natural and historic resources

- Impacts examined include
  - **Air emissions from backup generators**
  - **Water use**
  - Water quality
  - Land conservation
  - Electronic waste
  - Historic resource preservation
- Regulations are in place to help protect these resources

Water quality (stormwater runoff, protection of streams and wetlands, wastewater discharge), land conservation, electronic waste disposal, and historic resource preservation are discussed in the full JLARC report but are not included in this presentation.

Finding

Data center backup generators emit pollutants, but their use is minimal, and existing regulations largely curb adverse impacts.

Data centers rely on large number of diesel generators for backup power (average 54 per site)

- Emit several harmful air pollutants, such as nitrogen oxides, carbon monoxide, and particulate matter
- Regulated by DEQ using state and national standards
  - All backup generators permitted and monitored by DEQ
  - Limits use and allowable emissions to protect air quality
- Backup generators rarely run for prolonged periods
  - Routine maintenance (10-30 minutes per month)
  - Few actual power outages (operators reported 0 to 2 outages at their facilities in last two years, lasting from 1 to 5 hours)

DEQ = Virginia Department of Environmental Quality

Backup generator emissions unlikely to harm regional air quality; localized effects under study

- Backup generators <4% of regional nitrogen oxides emissions and 0.1% of carbon monoxide and particulate matter
  - Emissions only 7 percent of what permits allowed (2023)
  - Regional air quality has improved while industry has grown
- A “worst-case” prolonged, large-scale *regional* outage could contribute to temporary air quality issues
  - Such outages are rare, and air quality would return to normal after the event
- To identify any *localized* concerns, DEQ launched study to monitor data center generator emissions in Northern Virginia

Policy option

The General Assembly could consider requiring that, as a condition of receiving the sales tax exemption, all new data center developments in the Northern Virginia Ozone Nonattainment Area use only Tier 4 generators, Tier 2 generators with selective catalytic reduction systems, or generators with equivalent or lower emission rates.

Virginia's sales tax exemption for data centers is discussed in more detail in the last section of this presentation.

Finding

Data center water use is currently sustainable, and state ensures future sustainability through regulation.

Most data centers use the same amount of water (or less) as an average large office building

- Most data centers (83 percent) used the same amount of water as, or less than, an average large office building (2023)
- Water use varies depending on cooling system
- Data center water use accounted for
  - 2% to 21% of total water use at six water utilities
  - <0.5% of total state withdrawals

State regulates sustainability of water withdrawals, but some localities should consider local impacts

- DEQ regulates water withdrawals and requires permits for large scale withdrawals (surface, groundwater)
  - DEQ models withdrawal impacts on water availability, flora, and fauna when permits are issued and renewed
- Virginia is relatively water rich, but some localities have limited water resources (e.g., lack direct access to surface waters or are in groundwater management areas)
- Localities should consider whether data center projects could affect ability to meet future residential demand or pursue other development opportunities

Recommendation

The General Assembly may wish to consider expressly authorizing local governments to (i) require proposed data center developments to submit water use estimates and (ii) consider water use when making rezoning and special use permit decisions related to data center development

Policy option

The General Assembly could consider requiring that, as a condition of receiving the sales tax exemption, data center companies meet and certify to an environmental management standard.

Virginia's sales tax exemption for data centers is discussed in more detail in the last section of this presentation.

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Using Data Center Exemption to Address Policy Concerns

Local governments are responsible for managing land development in their jurisdictions

- Establish zoning ordinances for residential, commercial, and industrial development
- Approve development projects and exceptions or changes to zoning
  - By-right (staff)
  - Special permit (elected officials)
  - Rezoning (elected officials)

Finding

Growing number of data centers are being built close to residential areas, impacting nearby residents, and some localities have taken steps to minimize impacts.

Data centers are industrial facilities that are largely incompatible with residential uses

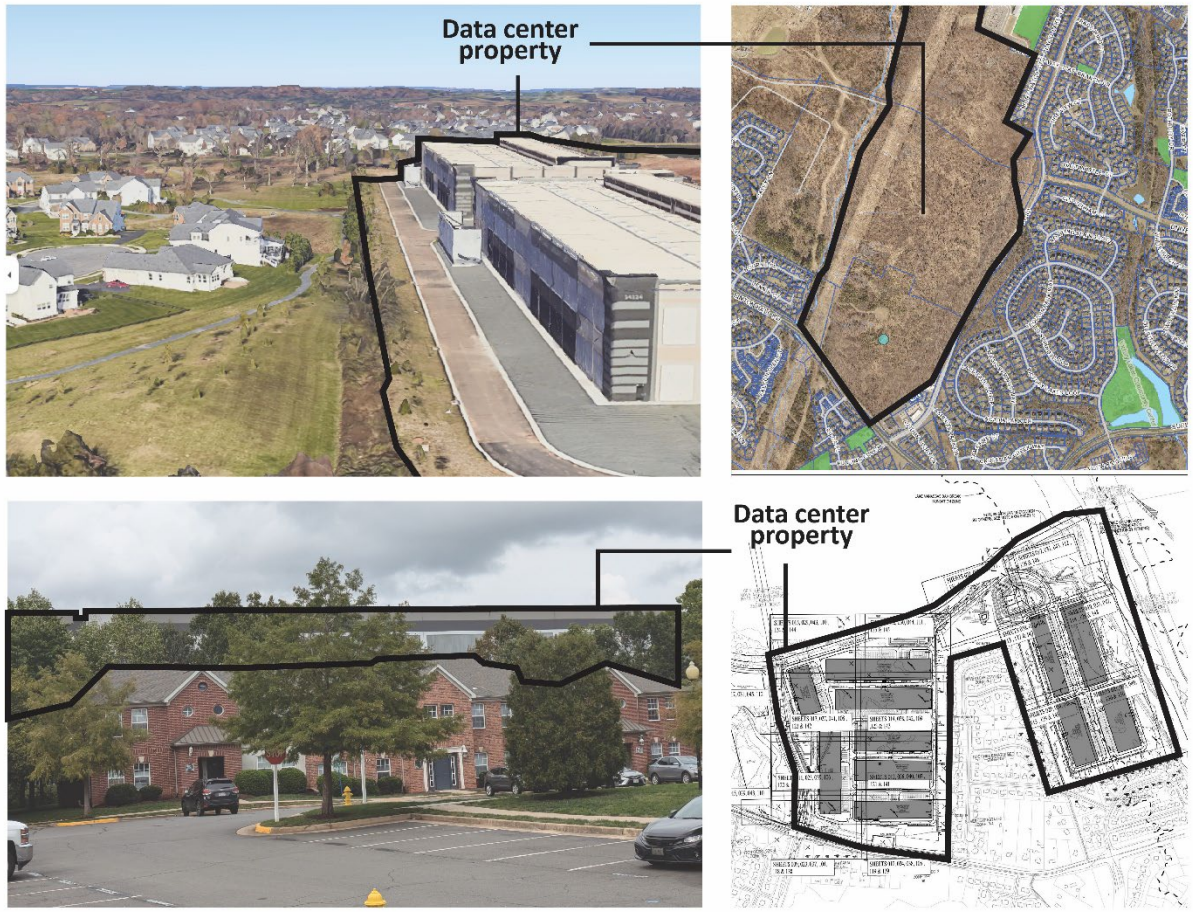
Generators

Cooling equipment

Electric substation

Transmission line

One-third of data centers are near residential areas, and industry trends make future impacts more likely



Some localities have allowed data centers near neighborhoods but are now taking steps to minimize future impacts

- Some localities have allowed data centers next to residential areas because of
  - Inadequate planning and zoning
  - Elected officials changing or granting exceptions to zoning requirements designed to reduce residential impacts
- Several Virginia localities have made or are considering zoning ordinance changes to reduce risk of residential impacts
- Effectiveness ultimately depends on elected officials

Localities should implement several practices to minimize residential impacts

- Classify data centers as industrial use
- Revise zoning maps to prevent by-right data centers next to residential
- Ensure sufficient minimum requirements for data center developments are sufficient (setbacks, building heights)
- Designate optimal locations for data center development (away from residential, close to transmission)
- Require pre-development sound modeling and revise ordinances to better prevent and address noise conflicts

Finding

In a few cases, noise from data centers has negatively affected nearby residents, and noise impacts can be difficult to resolve.

Noise has been an issue for a minority of data centers but can negatively affect nearby residents

- Only some data centers audible past property line, and noise has only been a problem when close to residential
  - Noise is typically a low-frequency “drone” or “hum” and is not loud enough to damage hearing
- In a few cases, noise has been significant enough to affect well-being of nearby residents
- Resolution has been difficult because noise ordinances are ineffective at addressing complaints
- Localities can take steps to mitigate data center noise, but some are unsure of their authority to do so

Recommendation

The General Assembly may wish to consider expressly authorizing local governments to require sound modeling studies for data center projects prior to approval.

The General Assembly may wish to consider authorizing local governments to establish and enforce maximum allowable sound levels for data center facilities, including (i) using alternative low frequency noise metrics and (ii) setting noise rules and enforcement mechanisms in their zoning ordinances, separate from existing noise ordinances.

Policy option

The General Assembly could consider requiring that, as a condition of receiving the sales tax exemption, data center companies conduct a sound modeling study prior to the development of a proposed data center that is to be located within a certain distance of a residential area.

Virginia's sales tax exemption for data centers is discussed in more detail in the last section of this presentation.

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Using Data Center Exemption to Address Policy Concerns

Since 2010, Virginia has offered a sales tax exemption to attract large-scale data centers

- Qualifying data centers and tenants can purchase computers and other equipment without paying sales tax
- Exemption considered valuable by the industry
  - Provided $928.6M savings in FY23 (by far Virginia's largest economic development incentive)
  - Used by 90% of industry (as measured in MW of power)
  - Industry indicates exemption is a key factor in location and expansion decisions
- Main policy lever state has for addressing concerns about data center industry

Findings

Exemption could be (1) extended to maintain data center growth and economic benefits, (2) allowed to expire to slow growth and reduce energy impacts, or (3) modified to balance these priorities.

Policy Options

General Assembly could change data center sales tax exemption in one of the following ways

- **Maintain industry growth and economic benefits** by extending exemption expiration date from 2035 to 2050
- **Slow industry growth and reduce future energy impacts** by allowing exemption to expire in 2035 (current statutory date)
- **Balance competing priorities** by extending a *partial* exemption from 2035 to 2050

Note: If a change is made, the General Assembly would need to determine how to treat the large subset of data centers that qualify for the special 2040 or 2050 extension. Extension currently pertains only to Amazon Web Services, but other companies may be interested in qualifying.

Findings

Exemption could be changed to address policy concerns related to energy efficiency, natural and historic resources, and local residential impacts, but changes could make the exemption a less effective economic development tool.

Policy Options

General Assembly could make eligibility for data center tax exemption contingent upon one or more of the following:

- Adopting energy and/or environmental management standards (*all* data centers)
- Using lower emission generators (*new* data centers in Northern Virginia)
- Conducting Phase 1 historic resource and viewshed studies (*new* data centers)
- Conducting sound modeling studies to identify potential noise issues (*new* data centers)

SCR = Selective Catalytic Reduction system

JLARC staff for this report

Kimberly Sarte, Associate Director

Mark Gribbin, Project Leader

Sarah Berday-Sacks

Kate Hopkins

Ellen Miller

Scarlett Saunders

Consulting support provided for this report

Energy + Environmental Economics -- grid modeling and rate analysis

Weldon Cooper Center for Public Service -- energy demand modeling and economic impact analysis

PLANNING COMMISSION REGULAR MEETING

21 Main Street

Tuesday, May 20, 2025, at 7:00 PM

MINUTES

A REGULAR MEETING OF THE PLANNING COMMISSION OF THE TOWN OF WARRENTON, VIRGINIA, WAS HELD ON MAY 20, 2025, at 7:00 PM

Regular Meeting

PRESENT — Mr. Ryan Stewart, Chair; Mr. Terry Lasher, Vice Chair; Ms. Darine Barbour, Secretary; Mr. Steve Ainsworth; Mr. James Lawrence; Mr. Rob Walton, Community Development Director; Heather Jenkins, Zoning Administrator; Patrick Corish, Associate Town Attorney

ABSENT — N/A

The minutes laid out will be a brief recap of the agenda items. Please see recorded video for more in-depth information.

CALL TO ORDER AND ESTABLISHMENT OF A QUORUM.

The meeting opened at 7:00 PM by Chair Stewart and declared a quorum present.

ADOPTION OF MINUTES

Commissioner Lawrence moved to approve the January 21, 2025 and April 22, 2025, with the correction of a misspelling of "work session." The motion was seconded by Commissioner Ainsworth. The motion passed 5-0.

PUBLIC HEARING.

1. Zoning Ordinance Text Amendment - ZOTA-25-1 – A Text Amendment to Remove Data Centers as a Permissible Use within the Industrial District. On March 22, 2025, Town Council adopted a Resolution to initiate a text amendment to Articles 3, 9, and 12 of the Town of Warrenton Zoning Ordinance. This text amendment is for the purpose of removing Data Centers as a Permissible Use within the Industrial District, and therefore make Data Centers an impermissible Use within the Town of Warrenton.

Ms. Heather Jenkins, Zoning Administrator, gave an overview of the March 11, 2025, Town Council initiated text amendment and the Planning Commission's work session from April 22, 2025.

Chair Stewart opened the floor up to questions of staff.

Commissioner Lawrence inquired the Zoning Ordinance Legislative Intent sections at the beginning of each District. Staff explained that the consideration is whether the proposed text amendment falls within the guidelines of the legislative intent of the Industrial District of the Zoning Ordinance and Plan Warrenton 2040.

Chair Stewart then opened the Public Hearing at 7:15 PM.

Ali Zarabi – 344 Richards Drive, Warrenton

Ken Alm – 194 Culpeper Street, Warrenton

David Gibson – 5485 Foxview Drive, Calverton

John McAuliffe – Chilton House, Culpeper Street, Warrenton

Denise Schaffer – 6080 Whipperwill Drive, Warrenton

Cindy Burbank – Barn Owl Court, Warrenton

Chair Stewart closed the Public Hearing at 7:33 PM

Commissioner Lawrence discussed that data centers were not contemplated in the comprehensive plan. Plan Warrenton 2040 took a lot of pride in being citizen driven. Data centers were not part of that discussion. Since its adoption in 2021, the community has been vocal about removing data centers as an approved use in Town. He stated he feels a personal responsibility to representative democracy to honor the wishes of the community.

Commissioner Ainsworth discussed the Planning Commission not serving as a rubber stamp for Town Council but to properly vet land use decisions. Data centers was discussed as a possible use in the Industrial District, which by-right allows for wholesale, distribution centers of similar structure size and form that are similar to data centers. The land is surrounded by car dealerships and strip malls. Stated he believes it is not very different from other allowable uses and is an integral part of utility infrastructure. He raised concerns about one group of elected officials finding the use to be reasonable with the strict requirements under a Special Use Permit process, which requires vetting through the Planning Commission and Town Council. At this time he does not see a driving force to remove the use from the Zoning Ordinance.

Secretary Barbour spoke to there is only being one parcel available for another data center and asked if this was a use they would want to contemplate based on the required time, expense, and staff resources for one potential applicant. She stated she is not interested in being part of that type of legislative application and the citizens have spoken that they do not want data centers. Secretary Barbour continued that she wants to protect Warrenton' unique character and listen to the citizens. She believes the Planning Commission is looking at the proposal and asking questions, not rubber stamping a Town Council initiation, by looking at studies and doing their research before making a recommendation. She takes pride in the Planning Commission's due diligence and hopes the community understands they have thought about the citizens no matter what decision is recommended.

Vice Chair Lasher thanked Commissioner Ainsworth, Commissioner Lawrence, and Secretary Barbour for all raising great points. However, from his standpoint he relies on Plan Warrenton 2040, which tried to bring all the viewpoints in the community into one guiding document and he does not see where data centers fit within it. He agreed the Town needs economic development opportunities to achieve a workable community. He found that when one decision takes up a large chunk that limits the Town's ability to have a workable community then it impacts having a livable community. He clarified his previously comments regarding cost and revenues by stating he was inferring the costs associated with

staff and decision makers time to revisit over and over. Wants a constructive dialogue and commends the community for coming out.

Chair Stewart stated that he stands by the original Planning Commission's recommendation for the original text amendment; however, believes that everyone has learned a lot since that time. A lot has been learned about the impact of data centers from a land use perspective and the impacts on communities, public processes, and the way residents relate to their Town. He stated he also was in agreement with Commissioner Lawrence about the previous comments about Plan Warrenton and the Character Districts. He went on to review the development of the Urban Development Areas to state he understands the intent that was developed behind all those guidelines. There is no defined area for data centers on a large scale, industrial facility like seen in Loudoun or Prince William counties. The road map of the comprehensive plan does not include the intent to have data centers. From a practical standpoint, data centers are limited to only a few sites in town and don't see how they match the intent or character in their current form. However, Chair Stewart did believe there may be opportunities for smaller scale data center footprints. If allowed for a computer warehouse that looked like a single family home that does not require any additional utilities or demand on the water system, then it might work as viable infill development for a diversity of uses in the Industrial District. However, the Town does not have anything on the books to promote this. As the Zoning Ordinance is being updated, this may be something the community might want to look at. The staff draft of the proposed Zoning Text Amendment appears to meet the intent of the Commission and the Town Council leading him to support it.

Chair Stewart concluded the Planning Commission discussion and asked for a motion.

Commissioner Lawrence moved to recommend to Town Council to approve ZOTA 20-01 to amend Articles 3, 9, and 12 with the Staff's draft to remove data center uses from the Industrial District of the Zoning Ordinance.

Secretary Barbour seconded the motion.

There was no further discussion.

The motion passed 4-1 (Ainsworth against).

NEW BUSINESS.

Planning Commission Bylaws Update which had been reviewed over the course of several months was brought forward for adoption.

Secretary Barbour requested consistency with the wording of "Chair" over "Chairman."

Chair Stewart said he would prefer gender neutral wording of "Chair" over "Chairman."

Chair Stewart asked for a motion with this administrative modification.

Commissioner Lawrence moved to adopt the updated Planning Commission Bylaws as amended. Commissioner Ainsworth seconded the motion. The Planning Commission approved the updated Bylaws 5-0.

COMMENTS FROM THE COMMISSION.

Secretary Barbour thanked staff and reminded everyone that next month is Juneteeth on June 14th. Asked to help get the word out to come celebrate.

Chair Stewart thanked staff for their hard work on the data center issue. It has been a long road for everyone involved. Also thanked the public for voicing their concerns on the issue.

COMMENTS FROM THE STAFF.

Ms. Heather Jenkins reviewed two land use applications that have been submitted, including a legislative waiver for street connectivity and a Special Use Permit for Home Depot for covered storage.

Director Walton advised there is nothing for the agenda next week.

Chair Stewart and the Planning Commission advised staff to cancel the Work Session the following week.

ADJOURN.

Commissioner Lawrence moved to adjourn the meeting; Commissioner Ainsworth seconded the motion. With no further business, the Chair Stewart adjourned at 7: 55 PM.

I hereby certify that this is a true and exact record of actions taken by the Planning Commission of the Town of Warrenton on May 20, 2025.

_____

Darine Barbour, Secretary
Planning Commission

DRAFT

DRAFT

Article 3 Zoning Districts and Map

Amended by Town Council: March 11, 2008
February 12, 2013
April 12, 2016
June 14, 2016
August 9, 2016
December 11, 2018
August 11, 2020
August 10, 2021
April 12, 2022
September 13, 2022
July 8, 2025

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3-1 Zoning Districts Established
3-1.1 Base Districts
3-1.2 Overlay Districts

3-2 Zoning Map
3-3 Zoning District Boundaries
3-4 Requirements for Base Zoning Districts
3-4.1 R-15 Residential District
3-4.2 R-10 Residential District
3-4.3 R-6 Residential District
3-4.4 RT Residential Townhouse District
3-4.5 RMF Residential Multifamily District
3-4.6 R-40 Residential District
3-4.7 R-E Residential District
3-4.8 RO Residential Office District
3-4.9 PSP Public-Semi-Public Institutional District
3-4.10 C Commercial District
3-4.11 CBD Central Business District
3-4.12 I Industrial District

3-5 Requirements for Overlay Zoning Districts
3-5.1 FPD - Floodplain District
3-5.2 PUD - Planned Unit Development District
3-5.3 HD - Historic District

Updated July 8, 2025

3-4.12 I Industrial District

3-4.12.3 Permissible Uses (by special use permit upon approval of the Town Council)

- Automobile body shop
- Automobile and truck repair and service
- Commercial Kennels
- Contractor's storage yard
- ~~Data Center~~
- Farm equipment, motorcycle, boat and sport trailer sales and service
- Fuel, coal, oil distribution storage yards
- Lumber and building supply with undercover storage.
- Maintenance and equipment shops with screened outside storage
- Outdoor storage of any kind
- Plumbing and electrical supply with undercover storage
- Restaurant or cafeteria, drive-thru or otherwise
- Self-service mini-warehouse
- Temporary fair and show grounds
- Tire and battery sales and service, tire recapping and retreading
- Transmission and receiving towers of height greater than one hundred twenty-five (125) feet.
- Treatment plants, water storage tanks, major transmission lines or pipelines, pumping or regulator stations, communications towers, storage yards and substations, and cable television facilities and accessory buildings

Article 9 Supplemental Use Regulations

Amended by Town Council: **February 12, 2013**
July 8, 2014
August 9, 2016
December 11, 2018
April 9, 2019
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9-6 Cluster Development Provisions
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9-8 Lighting
9-9 Manufacturing Buildings, Special Regulations
9-10 Mobile Homes (Manufactured Homes)
9-11 Office and Other Business Buildings, Special Regulations
9-12 Open Space
9-13 Outdoor Display
9-14 Performance Standards for All Non-Residential Uses
9-15 Recycling Facilities
9-16 Residential Use Limitations
9-17 Steep Slopes
9-18 Telecommunications Facilities
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9-24 Mobile Food Vendors
9-25 Mixed-Use Development Option
~~9-26 Data Centers~~

~~**9-26 Data Centers**~~

~~Data Centers, as defined in Article 12, are permissible in the Industrial (I) District, subject to the following requirements.~~

~~9-26.1 Additional Standards~~

~~A. Minimum Lot Size: 25 acres. Town Council may approve a data center on parcels less than 25 acres as part of the special use permit application.~~

~~B. The data center shall utilize recycled water or air chillers, in conjunction with using recycled water, for cooling purposes. Potable water shall not be used for cooling.~~

~~C. All electric service lines from the substation to the data center shall be placed underground.~~

~~D. Setbacks: Per Section 3-4.12.4 ("All principal manufacturing and processing uses in industrial parks").~~

~~1. Town Council may approve building heights greater than 35 feet during the review of the Special Use Permit. Buildings must be setback one (1) additional foot (horizontally) from the required setback line for each additional one (1) foot (vertically) greater than 35 feet. Building heights shall be in conformance with the Comprehensive Plan.~~

~~2. The data center building shall be setback a minimum of one-hundred (100) feet from property lines.~~

~~E. Parking: In accordance with "Assembly or Manufacturing Uses" per Section 7-7 of the Zoning Ordinance.~~

~~F. Building Facades:~~

~~1. Building facades shall include at least two of the following design elements:~~

~~a. Change in building height;~~
~~b. Building step-backs or recesses;~~
~~c. Fenestration (25% minimum);~~
~~d. Change in building material, pattern, texture, or color;~~
~~e. Use of accent materials.~~

~~G. Mechanical Equipment:~~

~~1. Mechanical equipment shall be completely screened through the use of walls, fences or evergreen vegetation so that no part of the mechanical equipment can be seen from adjoining properties or right-of-ways.~~

~~2. All generators shall be equipped with mufflers to reduce emissions and noise.~~

~~H. Security:~~

~~1. The facility shall provide access to Town and County emergency services staff at all times.~~

~~I. Landscaping:~~

~~1. In addition to the landscape planting requirements of Article 8 of the Zoning Ordinance, any portion of the data center (including equipment) visible from a park or adjoining/across the street from a residential district shall be screened by vegetation consisting of a double staggered row of evergreen trees planted 15 feet on center. A minimum 3-foot berm planted with a double staggered row of evergreen shrubs planted 10 feet on center may be used in place of the double staggered row of evergreen trees required above.~~

~~J. Substations:~~

~~1. Substations associated with the data center shall be screened from adjacent properties and right-of-ways through the use of opaque fencing in addition to evergreen trees and shrubs.~~

Article 12 Definitions

Amended by Town Council: **February 12, 2013**
June 14, 2016
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For the purpose of this Ordinance, certain words and terms are used in a limited or special sense as defined herein. Words used in the present tense include the future; the singular number includes plural and the plural singular; the word "structure" includes "building"; the word "used" includes arranges, designed, constructed, altered, converted, rented, leased, or intended to be used; and the word "shall" is mandatory and directory.

Any word, term or phrase used in this ordinance not defined below shall have the meaning ascribed to the word in the most recent edition of Webster's Unabridged Dictionary, unless in the opinion of the Zoning Administrator, established customs or practices of the Town of Warrenton justify a different or additional meaning.

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | R | S | T | U | V | W | Y | Z

~~**Data Center:** A facility containing one or more large-scale computer systems used for data storage and processing for off-site users. Typical supporting equipment includes back-up batteries and power generators, electric substations, cooling units, fire suppression systems, and enhanced security features.~~

ORDINANCE

July 8, 2025
Town Council
Public Hearing

AN ORDINANCE TO APPROVE ZOTA-25-1 A ZONING ORDINANCE TEXT AMENDMENT TO ARTICLES 3, 9 AND 12 TO REMOVE DATA CENTERS AS A PERMISSIBLE USE WITHIN THE INDUSTRIAL ZONING DISTRICT

WHEREAS, Warrenton, VA (Hereinafter "the Town") is a municipal corporation located within the County of Fauquier; and

WHEREAS, the Warrenton Town Council (Hereinafter "Council") may, by ordinance, amend, supplement, or change the regulations of the Zoning Ordinance of the Town whenever the public necessity, convenience, general welfare or good zoning practice may require such an amendment; and

WHEREAS, such an amendment may be initiated by resolution of Council in accord with the procedures and requirements of Section 11-3.9 of the Zoning Ordinance; and

WHEREAS, on August 10, 2021, Council approved a Zoning Ordinance Text Amendment to Articles 3, 9 and 12, case number ZNG 2021-0321, to add Data Centers as a Permissible Use within the Industrial District with the approval of a Special Use Permit by Council; and

WHEREAS, Council now finds that a Data Center is a Use that does not further the health, safety and welfare of the public, nor does a Data Center Use promote public necessity or public convenience within the Town of Warrenton; and

WHEREAS, the Warrenton Planning Commission held a public hearing on this matter on May 20, 2025, and issued a recommendation to approve the proposed text amendment by a vote of four to approve, one to deny; and

WHEREAS, on July 8, 2025, the Warrenton Town Council conducted a public hearing on this matter and considered oral and written testimony; and

WHEREAS, the Warrenton Town Council finds that per the Code of Virginia §15.2-2286(A)(7) this text amendment is in the best interest of public necessity, convenience, general welfare, and good zoning practice; now, therefore, be it

ORDAINED, by the Warrenton Town Council this 8th day of July 2025, that the Town Council hereby adopts the following text amendment to Articles 3, 9 and 12 of the Town of Warrenton Zoning Ordinance as set forth herein.

ORDINANCE

Votes:
Ayes:
Nays:
Absent from Vote:
Absent from Meeting:

For Information:
Community Development Director,
Town Attorney

ATTEST: _____
Town Recorder

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Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Heather Sutphin, Ward 1
William Semple, Ward 2
Brett Hamby, Ward 3
James Hartman, Ward 4 Vice Mayor
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8th, 2024
Agenda Title:	Local Board of Building Code Appeals Members- Advertisement Request
Requested Action:	Allow advertisement for a new member of the LBBCA.
Department / Agency Lead:	Community Development
Staff Lead:	Hunter Digges, Building Official

EXECUTIVE SUMMARY

The Local Board of Building Code Officials (LBBCA) is a quasi-judicial board providing a first-tier due process right of adjudication of decisions of local government building or fire officials. Virginia's System of building codes establishes the process of enforcement by the officials through either the Virginia Uniform Statewide Building Code, the Virginia Statewide Fire Prevention Code, or the Virginia Property Maintenance Code.

The LBBCA typically meets annually at an organizational meeting and as- needed to hear appeals of the decisions of the building officials.

Staff have identified the need to appoint one member to the LBBCA to fill a vacancy previously held by a property manager. In keeping with the composition of the board, staff recommend appointing a new member with a similar professional background.

BACKGROUND

Historically, the LBBCA members have been appointed by the Council. Appeals to the LBBCA are not numerous and are a rarity in Town.

Historically, the members of the Fauquier County LBBCA have volunteered to be appointed to the Town's LBBCA and serve their community. It is common for the members to be appointed to multiple boards due to the level of expertise needed for these roles and the infrequency of necessary action by them.

STAFF RECOMMENDATION

Staff recommends that the Town Council allow advertisement to seek candidates for appointment to the LBBCA.

Service Level/Collaborative Impact

Appointment of Local Board of Building Code Appeals members allows Town citizens and contractors the ability to appeal any determination made by a code official or the local building departments application of

the Uniform Statewide Building Code, the Virginia Statewide Fire Prevention Code, and the Virginia Property Maintenance Code. The term of each member would be for four years.

Policy Direction/Warrenton Plan 2040

The Local Board of Building Code Appeals (LBBCA) is tasked with hearing appeals of the determinations made by the Building Official. Enforcement of State Building Codes is for the health, safety, and welfare of the citizens and businesses of the Town of Warrenton contained within the built environment and property maintenance.

Fiscal Impact

No additional fiscal impact is expected.

Legal Impact

The purpose of the LBBCA is to hear appeals of determinations made by the Building Official. This in turn may involve the Town Attorney for representation. The lack of a LBBCA would impact the Building Officials ability to enforce the building codes of the Town and impact the Citizen's ability to appeal the decisions made.

ATTACHMENTS

1. Section 119 of the Uniform Statewide Building Code

SECTION 119
APPEALS

119.1 Establishment of appeals board.

In accordance with § 36-105 of the Code of Virginia, there shall be established within each *local building department* a *local board of building code appeals* (LBBCA). Whenever a county or a municipality does not have such a LBBCA, the *local governing body* shall enter into an agreement with the *local governing body* of another county or municipality or with some other agency, or a state agency *approved* by DHCD for such appeals resulting therefrom. Fees may be levied by the *local governing body* in order to defray the cost of such appeals. In addition, as an authorization in this code, separate LBBCAs may be established to hear appeals of different enforcement areas such as electrical, plumbing or mechanical requirements. Each such LBBCA shall comply with the requirements of this section. The *locality* is responsible for maintaining a duly constituted LBBCA prepared to hear appeals within the time limits established in this section. The LBBCA shall meet as necessary to assure a duly constituted board, appoint officers as necessary, and receive such training on the code as may be appropriate or necessary from staff of the *locality*.

119.2 Membership of board.

The LBBCA shall consist of at least five members appointed by the *locality* for a specific term of office established by written policy. Alternate members may be appointed to serve in the absence of any regular members and as such, shall have the full power and authority of the regular members. Regular and alternate members may be reappointed. Written records of current membership, including a record of the current chairman and secretary shall be maintained in the office of the *locality*. In order to provide continuity, the terms of the members may be of different length so that less than half will expire in any 1-year period.

119.3 Officers and qualifications of members.

The LBBCA shall annually select one of its regular members to serve as chairman. When the chairman is not present at an appeal hearing, the members present shall select an acting chairman. The *locality* or the chief executive officer of the *locality* shall appoint a secretary to the LBBCA to maintain a detailed record of all proceedings. Members of the LBBCA shall be selected by the *locality* on the basis of their ability to render fair and competent decisions regarding application of the USBC and shall, to the extent possible, represent different occupational or professional fields relating to the *construction* industry. At least one member should be an experienced builder; at least one member should be an RDP, and at least one member should be an experienced property manager. Employees or officials of the *locality* shall not serve as members of the LBBCA.

119.4 Conduct of members.

No member shall hear an appeal in which that member has a conflict of interest in accordance with the State and Local Government Conflict of Interests Act (§ 2.2-3100 et seq. of the Code of Virginia). Members shall not discuss the substance of an appeal with any other party or their representatives prior to any hearings.

119.5 Right of appeal; filing of appeal application.

Any person aggrieved by the *local building department's* application of the USBC or the refusal to grant a modification to the provisions of the USBC may appeal to the LBBCA. The applicant shall submit a written request for appeal to the LBBCA within 30 calendar days of the receipt of the decision being appealed. The application shall contain the name and address of the *owner* of the *building* or *structure* and in addition, the name and address of the person appealing, when the applicant is not the *owner*. A copy of the *building official's* decision shall be submitted along with the application for appeal and maintained as part of the record. The application shall be marked by the LBBCA to indicate the date received. Failure to submit an application for appeal within the time limit established by this section shall constitute acceptance of a *building official's* decision.

Note: To the extent that a decision of a *building official* pertains to amusement devices there may be a right of appeal under the VADR.

119.6 Meetings and postponements.

The LBBCA shall meet within 30 calendar days after the date of receipt of the application for appeal, except that a period of up to 45 calendar days shall be permitted where the LBBCA has regularly scheduled monthly meetings. A longer time period shall be permitted if agreed to by all the parties involved in the appeal. Notice indicating the time and place of the hearing shall be sent to the parties in writing to the addresses listed on the application if requested or by electronic means at least 14 calendar days prior to the date of the hearing unless a lesser time period is agreed to by all the parties involved in the appeal. When a quorum of the LBBCA is not present at a hearing to hear an appeal, any party involved in the appeal shall have the right to request a postponement of the hearing. The LBBCA shall reschedule the appeal within 30 calendar days of the postponement, except that a longer time period shall be permitted if agreed to by all the parties involved in the appeal.

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119.7 Hearings and decision.

All hearings before the LBBCA shall be open meetings and the appellant, the appellant's representative, the *locality's* representative and any person whose interests are affected by the *building official's* decision in question shall be given an opportunity to be heard. The chairman shall have the power and duty to direct the hearing, rule upon the acceptance of evidence and oversee the record of all proceedings. The LBBCA shall have the power to uphold, reverse or modify the decision of the official by a concurring vote of a majority of those present. Decisions of the LBBCA shall be final if no further appeal is made. The decision of the LBBCA shall be explained in writing, signed by the chairman and retained as part of the record of the appeal. Copies of the written decision shall be sent to all parties by certified mail. In addition, the written decision shall contain the following wording:

"Any person who was a party to the appeal may appeal to the *State Review Board* by submitting an application to such Board within 21 calendar days upon receipt by certified mail of this decision. Application forms are available from the Office of the State Review Board, 600 East Main Street, Richmond, Virginia 23219, (804) 371-7150."

119.8 Appeals to the State Review Board.

After final determination by the LBBCA in an appeal, any person who was a party to the appeal may further appeal to the *State Review Board*. In accordance with Section 36-114 of the Code of Virginia, the *State Review Board* shall have the power and duty to hear all appeals from decisions arising under the application of the USBC and to render its decision on any such appeal, which decision shall be final if no appeal is made therefrom. In accordance with § 36-98.2 of the Code of Virginia for state-owned buildings and *structures*, appeals by an involved state agency from the decision of the *building official* for state-owned buildings or *structures* shall be made directly to the *State Review Board*. The application for appeal shall be made to the *State Review Board* within 21 calendar days of the receipt of the decision to be appealed. Failure to submit an application within that time limit shall constitute an acceptance of the *building official's* decision. For appeals from a LBBCA, a copy of the *building official's* decision and the written decision of the LBBCA shall be submitted with the application for appeal to the *State Review Board*. Upon request by the office of the *State Review Board*, the LBBCA shall submit a copy of all pertinent information from the record of the appeal. In the case of appeals involving stateowned *buildings* or *structures*, the involved state agency shall submit a copy of the *building official's* decision and other relevant information with the application for appeal to the *State Review Board*. Procedures of the *State Review Board* are in accordance with Article 2 (§ 36-108 et seq.) of Chapter 6 of Title 36 of the Code of Virginia.

119.9 Hearings and decision.

All hearings before the *State Review Board* shall be open meetings and the chair shall have the power and duty to direct the hearing, rule upon the acceptance of evidence and oversee the record of all proceedings. The *State Review Board* shall have the power to uphold, reverse or modify the decision of the LBBCA by a concurring vote of a majority of those present. Proceedings of the Review Board shall be governed by the provisions of the Administrative Process Act (2.2-4000 et seq.), except that an informal conference pursuant to 2.2-4019 shall not be required. Decisions of the *State Review Board* shall be final if no further appeal is made. The decision of the *State Review Board* shall be explained in writing, signed by the chair and retained as part of the record of the appeal. Copies of the written decision shall be sent to all parties by certified mail. In addition, the written decision shall contain the following wording: "As provided by Rule 2A:2 of the Supreme Court of Virginia, you have thirty (30) days from the date of service (the date you actually received this decision or the date it was mailed to you, whichever occurred first) within which to appeal this decision by filing a Notice of Appeal with the Secretary of the Review Board. In the event that this decision is served on you by mail, three (3) days are added to that period."

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Michele O'Halloran, Ward 4
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Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8, 2025
Agenda Title:	DCR CFPF Grant Funding – Master Drainage Plan
Requested Action:	Authorize Town Manager to sign DCR grant agreement
Department / Agency Lead:	Finance & Procurement
Staff Lead:	Brooke Campbell, Budget Manager

EXECUTIVE SUMMARY

The Community Flood Preparedness Fund (CFPF) provides support for localities across Virginia to reduce the impacts of flooding. The fund prioritizes projects that are in concert with local, state and federal floodplain management standards, local resilience plans, and the Virginia Coastal Resilience Plan. The fund's goal is to empower communities to complete vulnerability assessments, and development action-oriented approaches to bolster flood preparedness and increase resilience.

BACKGROUND

The Town has applied for and been approved to receive CFPF funding from the Department of Conservation and Recreation (DCR) for the Master Drainage Plan project (SM-004). DCR has agreed to reimburse the Town for 50% of the project costs up to $420,508. Today's resolution is to authorize the Town Manager to sign the grant agreement upon receipt from DCR. There will be a subsequent resolution to appropriate the grant funding once the agreement is finalized.

STAFF RECOMMENDATION

Staff recommends that the Council adopt the following resolution to authorize the Town Manager to accept the CFPF funds:

1. A resolution authorizing the Town Manager to sign Virginia Department of Conservation and Recreation grant agreement to accept funding in the amount of $420,508 to fund the Master Drainage Plan

ATTACHMENTS

Stefanie K. Taillon
Secretary of Natural and Historic Resources

Matthew S. Wells
Director

Andrew W. Smith
Chief Deputy Director

Frank N. Stovall
Deputy Direc
for Operation

Item b.

Darryl Glover
Deputy Director for Dam Safety, Floodplain Management and Soil and Water Conservation

Laura Ellis
Deputy Director for Administration and Finance

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

July 2, 2025

Kerry Wharton
21 Main Street
Warrenton, Virginia 20186

Re: **Community Flood Preparedness Fund (CFPF)**
CY2025 Round 5 Grant Application: Grant Number: CFPF-25-05-69
Application Category: Study
Community Name: Town of Warrenton, CID: 510057
Primary Contact: Kerry Wharton
Primary Contact Email Address: kwharton@warrentonva.gov
Requested Grant Amount: $420,508.04
Approved Grant Amount: $420,508.00

Dear Kerry Wharton:

This letter is to advise you that the Department of Conservation and Recreation (DCR) received your request to fund a(n) Town of Warrenton's Stormwater Master Drainage Plan Phase 1 application. If the application category listed above is different from the initial application, a change was necessary based on DCR's assessment of the project or activity. A change in application category may have resulted in the recalculation in the CFPF and match percentages represented above.

DCR, in consultation with the Secretary of Natural and Historic Resources and the Chief Resilience Officer of the Commonwealth of Virginia, has reviewed you application and your request for funding is approved. The total approved funding is as follows:

- Approved CFPF Approved Amount: $420,508.00
- Approved Match Amount: $420,508.00
- Approved Total Project Cost: $841,016.00

In the coming weeks, you will receive an award package and grant agreement from Virginia Resources Authority (VRA) that will include an Award Letter detailing any changes in award amounts and conditions related to the award. Grant specific conditions, if any, will be incorporated into your award document and are as follows:

- Please resubmit the Authorization to Request Funding document signed by the CEO or governing body of your organization.

The above condition(s) must be completed and returned to DCR within 30 days of receipt of this letter. If more than 30 days is needed to fulfil these condition(s), please notify DCR.

Your Grant Agreement will include all requirements related to this award including information on how to receive reimbursement, submit reports, and requirements for final deliverables for completed projects or activities. This package must be signed and returned to VRA within 90 days of receipt or funds will be rescinded.

Should you have any questions, please feel free to contact me at Jake.Shaw@dcr.virginia.gov.

Sincerely,

Jacob Shaw

Jake Shaw
Grants Manager,
Dam Safety and Floodplain Management

cc: Darryl M. Glover, Deputy Director, DCR
Angela Davis, Division Director, DCR
Tony Leone, VRA

July 8, 2025
Town Council
Regular Meeting
RES-25-07-02

A RESOLUTION AUTHORIZING THE TOWN MANAGER TO SIGN VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION GRANT AGREEMENT TO ACCEPT FUNDING IN THE AMOUNT OF $420,508 TO FUND THE MASTER DRAINAGE PLAN

WHEREAS, the Viginia Department of Conservation and Recreation (DCR) funds the Virginia Community Flood Preparedness Fund (CFPF) Grant to provide support for localities to reduce the impacts of flooding and to empower communities to complete vulnerability assessments, and development action-oriented approaches to bolster flood preparedness and increase resilience.

WHEREAS, the Master Drainage Plan project is part of the FY 2026-2031 Capital Improvement Plan adopted by the Town Council on June 10, 2025

WHEAREAS, the Town has been approved by the Department of Conservation and Recreation to receive $420,508 of reimbursable grant revenue funds for the implementation of the Master Drainage Plan to address drainage concerns; and

NOW, THEREFORE, BE IT RESOLVED, that the Warrenton Town Council Hereby directs the Town Manager to sign the agreement upon receipt for grant number CFPF-25-05-69 to accept the reimbursable grant funding.

Votes:
Ayes:
Nays:
Absent from Meeting:

For Information:
Budget Manager

ATTEST: _____
Town Recorder

Office of the Town Manager
Frank Cassidy

STAFF REPORT

Warrenton Town Council
Carter Nevill, Mayor
Roy Francis, Ward 1
William Semple, Ward 2
Larry Kovalik, Ward 3
Michele O'Halloran, Ward 4
Eric Gagnon, Ward 5
Paul Mooney, At Large
David McGuire, At Large

Council Meeting Date:	July 8, 2025
Agenda Title:	Financial Advisor Presentation
Requested Action:	Consider adoption of the Resolution of the Town Council of the Town of Warrenton, Virginia Declaring Its Intention to Reimburse Itself from the Proceeds of One or More Tax-exempt Financings for Certain Expenditures Made and/or to be Made in Connections with Town Capital Projects
Department / Agency Lead:	Finance & Procurement
Staff Lead:	Stephanie Miller, Director of Finance & Procurement

EXECUTIVE SUMMARY

The Fiscal Year 2026 Adopted Budget includes projected debt funding for General Fund and Water and Sewer capital projects and General Fund capital asset replacements. The Town has almost fully drawn down the 2022 bond that was issued for Water and Sewer capital projects. It is anticipated that the Town will need to issue debt in Fall 2025 to provide adequate funding for the planned projects.

BACKGROUND

Davenport & Company, LLC serves as the Town's municipal financial advisor. Staff has provided Davenport with the Town's Adopted 2026 – 2031 Capital Improvement Program. This document outlines the six-year plan for our capital needs, including General and Water and Sewer capital projects and capital asset replacements.

Kyle Laux, Senior Vice President, will provide an overview of a proposed Plan of Finance, which includes a dual-track process for issuing debt in Fall 2025. This will consist of a solicitation for bank loans and an application to the Virginia Resources Authority (VRA) pooled financing program. The solicitation will be structured to allow for different financing options that provide varying terms in alignment with the underlying assets.

Mr. Laux will also discuss the potential benefits of obtaining a credit rating so that the Council may determine if they wish to proceed with that process at this time.

In anticipation of a debt issuance later this year, bond counsel has drafted a proposed reimbursement resolution. This allows the Town to reimburse itself from future bond proceeds for capital expenditures incurred 60 days prior to the debt issuance.

STAFF RECOMMENDATION

Staff recommends approval of the reimbursement resolution to offer flexibility in claiming reimbursement from future bond proceeds for capital expenditures incurred 60 days prior to the date of issuance.

Service Level/Collaborative Impact

The adoption of the reimbursement resolution enables the Town to fund ongoing capital projects from a future debt issuance.

Policy Direction/Warrenton Plan 2040

Some of the many goals of Warrenton Plan 2040 that are supported by the Town's 2026-2031 CIP include:

- CF-4: Ensure healthy, safe, adequate water and wastewater services.
- CF-5: To provide a fiscally responsible infrastructure that maintains a high quality of life for residents, supports current businesses, and attracts new employers with a stable tax structure.
- P-2: The Town of Warrenton's Parks, Open Space and Environment serve as key elements to the Town's public health infrastructure.
- T-1: Improve multi-modal capacity and safety that encourages trips by walking, bicycling, and transit.
- T-2: Enhance the traveling experience by creating great streets.
- T-3: Promote livability in the Town by creating great places where residents and visitors feel welcome and safe.
- T-4: Provide an equitable and connected Multi-Modal Network.

Fiscal Impact

The adoption of the reimbursement resolution will provide the Town with flexibility to reimburse capital expenditures incurred prior to the date of debt issuance.

Legal Impact

The adoption of the reimbursement resolution does not obligate the Town to issue debt. It provides flexibility to reimburse Town funds from future debt proceeds, if subsequently issued.

ATTACHMENTS

1. Resolution of the Town Council of the Town of Warrenton, Virginia Declaring Its Intention to Reimburse Itself from the Proceeds of One or More Tax-Exempt Financings for Certain Expenditures Made And/Or to Be Made in Connection with Town Capital Projects

July 8, 2025
Town Council
Regular Meeting
Res. No.

RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF WARRENTON, VIRGINIA DECLARING ITS INTENTION TO REIMBURSE ITSELF FROM THE PROCEEDS OF ONE OR MORE TAX-EXEMPT FINANCINGS FOR CERTAIN EXPENDITURES MADE AND/OR TO BE MADE IN CONNECTION WITH TOWN CAPITAL PROJECTS

WHEREAS, the Town of Warrenton, Virginia **(the "Town")** is a political subdivision organized and existing under the laws of the Commonwealth of Virginia; and

WHEREAS, the Town has paid, beginning no earlier than sixty days prior to adoption of this resolution, and will pay, on and after the date hereof, certain expenditures **(the "Expenditures")** in connection with Town general fund and utility projects identified in the Town's capital improvement plan and/or capital items identified in the Town's fiscal year 2026 budget **(the "Projects")**; and

WHEREAS, the Town Council of the Town **(the "Council")** has determined that those moneys previously advanced no earlier than sixty days prior to the date of this resolution and to be advanced on and after the date hereof to pay the Expenditures are available only for a temporary period and it is necessary to reimburse the Town for the Expenditures from the proceeds of one or more issues of tax-exempt notes, bonds or similar obligations **(together, the "Bonds")**; and

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COUNCIL OF THE TOWN OF WARRENTON, VIRGINIA, AS FOLLOWS:

Section 1. The Council hereby declares the Council's intent to reimburse the Town with the proceeds of the Bonds for Expenditures with respect to the Projects made on and after sixty days prior to the date of adoption of this resolution. The Town reasonably expects on the date hereof that it will reimburse itself for the Expenditures with the proceeds of the Bonds.

Section 2. Each Expenditure was and will be either (a) of a type properly chargeable to a capital account under general federal income tax principles (determined in each case as of the date of the Expenditures), (b) a cost of issuance with respect to the Bonds, (c) a nonrecurring item that is not customarily payable from current revenues, or (d) a grant to a party that is not related to or an agent of the Town so long as such grant does not impose any obligation or condition (directly or indirectly) to repay any amount to or for the benefit of the Town.

Section 3. The maximum principal amount of the Bonds expected to be issued for the Projects is $21,700,000.

Section 4. The Town will make a reimbursement allocation, which is a written allocation by the Town that evidences the Town's use of proceeds of the Bonds to reimburse an Expenditure, no later than 18 months after the later of the date on which the Expenditure is paid or the Projects are placed in service or abandoned, but in no event more than three years after the date on which the Expenditure is paid. The Town recognizes that exceptions are available for certain "preliminary expenditures," costs of issuance, certain de minimis amounts, expenditures by "small issuers" (based on the year of issuance and not the year of expenditure) and expenditures for construction projects of at least 5 years.

Section 5. This resolution shall take effect immediately upon its passage.

The Town Recorder of the Town Council of the Town of Warrenton, Virginia hereby certifies that the above-referenced resolution was adopted by a majority vote of the Town Council at a regular meeting of the Town Council, duly called and held on July 8, 2025, during an open meeting, as follows:

Votes:
Ayes:
Nays:
Absent from Vote:
Absent from Meeting:

For Information:
Finance & Procurement Director
Town Attorney

ATTEST: _____
Town Recorder