CITY OF CHARLES TOWN

PLANNING COMMISSION
AGENDA • MARCH 27, 2023

Committee Meeting **CITY HALL** **7:00 PM**
101 E Washington Street, Charles Town, WV 25414

1. CALL TO ORDER

2. APPROVAL OF MINUTES

3. UNFINISHED BUSINESS

4. NEW BUSINESS

4.1 : SLD2022-04 Hillside Sketch Plan & Waiver - Public Hearing
1. Staff Report.pdf
2. Plan Application.pdf
3. Waiver Application.pdf
4. Plans.pdf

4.2 : WAV2023-01 Norborne Glebe Waiver Request - Public Hearing
1. Staff Report.pdf
2. Application.pdf

4.3 : SLD2023-01 Flowing Springs Subdivision - Public Hearing
1. Staff Report.pdf
2. Application.PDF
3. Plans.pdf

4.4 : SLD2022-01 Stone Spring Subdivision - PC Workshop Discussion
1. Staff Report.pdf
2._Application.pdf
3._Cond._of_Annexation.pdf
4._Plans.pdf
5._Traffic_Study.pdf
6._Nov_15_2021_TIS_Revision_WVDOH_Approval.pdf
7._Stormwater_Management.pdf

4.5 : SLD2022-05 Huyett Rd Storage Facility - PC Workshop Discussion
1. Staff Report.pdf
2. Application.pdf
3. Plans.pdf
4. Stormwater Management.pdf

4.6 : BR - Norborne Glebe Phase 14B Bond Reduction - PC Technical Review
1. Staff Report.pdf
2.Kimley-Horn Review.pdf
3. Performance Bond Reduction.pdf
4. Land Disturbance Bond Reduction.pdf

5.Bond information.pdf

4.7 : SLD2023-02 Westover Holdings Land Development - PC Technical Review

1. Staff Report.pdf
2. Application.pdf
3. Recorded Merger Deed.pdf
4. Plans.pdf

4.8 : SLD2023-03 Ali Hadavand Casino - PC Technical Review

1. Staff Report.pdf
2. Application.pdf
3. Narrative.pdf
4. Plans.pdf

4.9 : Election of Officers:
-Chair
-Co-Chair
-Secretary

5. ADJOURNMENT

6. NOTICE: The Public May View the Meeting Live by Clicking on the Event Link at:

https://www.charlestownwv.us/government/agendas-and-minutes/

Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

SLD2022-04 Hillside Sketch Plan & Waiver - Public Hearing

ATTACHMENTS:

- 1. Staff Report.pdf
- 2. Plan Application.pdf
- 3. Waiver Application.pdf
- 4. Plans.pdf

Sketch Plan Report

SLD2022-04/200185, 200406

Date: For the March 27th, 2023 Planning Commission meeting

Applicant: Christopher Consultants Ltd.

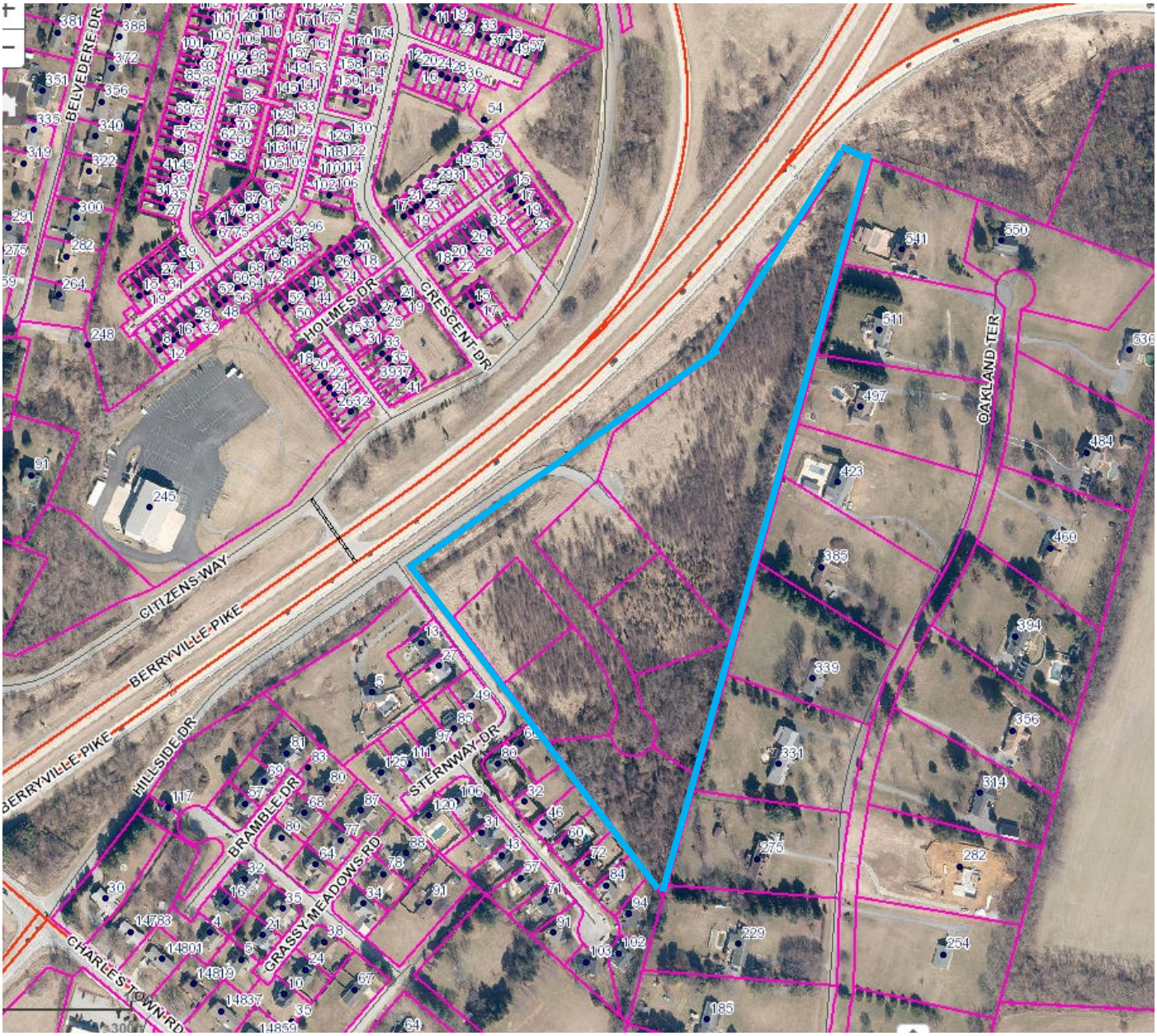
Property Owner: Hillside Investments LLC.

Report by: James Newman, City Planner, Zoning/Subdivision Administrator.

Proposal: Major Subdivision and Land Development, waiver for electric meter location.

Property Location: Located on Hillside Drive. Property roughly outlined in **blue** below.

Current Zoning: Residential Medium-High Density (R-15).



PROJECT OVERVIEW
The development of 13.71 acres into 128 townhouses.

SKETCH PLAN COMPLETENESS
The sketch plan was deemed complete by the Planning Commission on February 27th, 2023.

ZONING REVIEW
The properties are zoned residential Medium-High Density (R-15).

Density
Maximum density is 15 units per acre. Proposed density is 13.2 units an acre.

Open Space
10% of the property must be open space. Open Space is partly defined in Code as land "*intended for the use and enjoyment of the residents living within the development*." Proposed active open space is a playground. 10% of the site is listed as being open space. In a townhouse Development, open space for the Subdivision/Land Development must at least equal 30 percent of the Net Buildable Land Area of the Subdivision/Land Development. 30% of the net buildable area is 126,802 sq. ft. 10% of the site is 42,267 sq. ft. The plans only describe meeting the 10% requirement.

Additionally, section 1333.17 requires that some open space be dedicated to the City, or a fee-in-lieu-of be paid. No land has been proposed to be dedicated to the City, nor has any fee been proposed or paid.

Parking
Required parking for townhomes is 1.8 spaces per unit, which would total 230 spaces. Applicant is proposing 276 spaces.

Street Connections
The City's Engineering firm, Kimley-Horn, had no comments about street connections or road design. Both Hillside and Sternway Drives are shown as local roads on the *2040 Comprehensive Plan*.

Interior sidewalks connections between are shown. Proposed sidewalks within the development would connect to existing sidewalks on Sternway Drive. There is no existing sidewalk along Hillside Drive, and no sidewalks are proposed along the current extent of Hillside Drive.

Landscaping
Street trees are required for every 50 feet of street frontage. Up to 10 % of these trees may be planted in open space rather than along the street.

The site is wooded. Preservation of existing trees may grant credits, as outlined in table 1333.16:

Table 1333.16 – Tree Credits.

Tree Category	Tree Credit
Existing Tree 1" to 6" Diameter Breast Height (DBH)	1 tree unit per tree retained
Existing Tree 7" to 19" DBH	2 tree units per tree retained
Existing Tree > 20" DBH	3 tree units per tree retained
New or Replacement Tree, Large Species (At maturity more than 40 feet tall)	1 tree unit per tree planted

Buffers

Opaque screening of at least 6 ft. in height is required between townhomes and single family detached dwelling units. Opaque screening shall consist of a wall, fence, landscaped earth berm, planted vegetation, existing vegetation, or a combination thereof and shall be intended to prevent visibility and reduce noise.

Buffers are **required** to be shown on a sketch plan. No such buffer is shown on the proposed sketch plan; however, there is an existing tree line between the single-family dwelling units on Oakland Terrace and the proposed development, and the site itself is wooded.

Stormwater

Stormwater control facilities are not required to be shown on a sketch plan; they are required on a preliminary and final plan. The City's Engineering firm, Kimley-Horn, had no comments at this stage about stormwater control facilities.

Utilities

A waiver has been requested for the location of electric meters. More analysis occurs in this report under *Townhouse Development Standards, Section K*.

In regards to water and sewer connections, the Charles Town Utility Board has reviewed the plans, and made a routine request for additional information, such as water and sewer line profiles, additional pipe design details, and technical review criteria, such as requiring a 10 ft. separation between water and sewage pipes.

TOWNHOUSE DEVELOPMENT STANDARDS

Section 1333.20 of the Subdivision and Land Development Ordinance lays out XX use standards which apply to townhome developments:

(A) ***Density****. The overall density in a townhouse project shall not exceed the Maximum Density specified in the Charles Town Zoning Ordinance for the Zoning District in which it is located except when designed and developed as a Planned Unit Development under provisions set forth in the Charles Town Zoning Ordinance. Density shall be calculated using the Net Buildable Land Area (as such term is defined in the Zoning Ordinance) of the Lot.*

This criterion is **met**. Overall proposed density does not exceed the zoning district maximum.

(B) ***Land Area****. The Net Buildable Land Area (as such term is defined in the Zoning Ordinance) of a townhouse Development shall equal at least 3,500 square feet for each dwelling unit. Each dwelling unit shall have a minimum lot size of 2,000 square feet. The difference between the Net Buildable Land Area and the total area of the dwelling unit Lots shall be allocated to open space common area*.

This criterion is **not met**. The net buildable land area is calculated by subtracting areas where building is prohibited or subject to significant restrictions from the gross lot area. The calculation is based on subtracting the land devoted to sensitive areas such as wetland, sinkholes, and floodplains, public rights-of-way, and stormwater management areas. Setback requirements are <u>not</u> part of this calculation.

Per the applicant, the overall size of the site is 13.71 acres/597,208 sq. ft. Following the removal of public and private rights-of-way dedication, the net buildable area is 9.7 acres/422,673 sq. ft. As there are 128 proposed townhomes, the total land area for each dwelling unit is 3,028 sq. ft. per dwelling unit, which does not meet the 3,500 sq. ft. threshold requirement.

(C) ***Tract Frontage****. Each townhouse development shall have at least 50 foot of street frontage. This does not apply to single or multiple contiguous townhouses on an existing platted street. For a townhouse development on a pipestem lot, the minimum pipestem width shall be the right-of-way width as required per Table 1333.02.*

This criterion is **met**. Each section of townhomes meets this requirement.

(D) ***Townhouse Lot Width****. The minimum townhouse lot width shall be in accordance with the minimum lot with specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located. Each Lot on the end of a row of townhouses shall have an additional width necessary to accommodate the required side yard.*

This criterion is **met**. The minimum lot width requirement in R-15 zoning is 18 ft.

(E) ***Length of Townhouse Row****. There shall be not be more than ten (10) nor less than three (3) contiguously connected townhouse units.*

This criterion is **met**.

(F) ***Yards****. The following minimum Setback requirements shall apply:*

1. ***Front Yard****. Each townhouse shall have a minimum front yard Setback that is in accordance with the minimum front yard setback specified in the Charles Town Zoning Ordinance for the Zoning District in*

which the townhouse is located. Townhouses, however, may be arranged to face onto a common open space. In such instances, such a space shall not be less than fifty (50) feet in width and shall be arranged to permit access for emergency vehicles.

With such an arrangement, the front yard requirement may be reduced by ten (10) feet. If the townhouses have rear loaded garages or parking, the setback can be reduced from the required setback distance to zero (0) feet, or any distance in between, provided that no steps or stoops shall be allowed within the right of way or upon sidewalk, unless the sidewalk has a clear walking path of five (5) feet from the closest edge of the steps or stoop to the edge of curb. This reduced setback shall supersede the Zoning Ordinance requirements.

*2. **Side Yard**. Each townhouse shall have a minimum side yard Setback that is in accordance with the minimum side yard setback specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located. When the yard adjoining the corner Lot along the rear lot line fronts the side Street of the corner Lot, the width of the corner Lot shall be increased to provide a minimum side yard Setback equal to the adjoining front yards.*

*3. **Rear Yard**. Each townhouse shall have a minimum rear yard Setback that is in accordance with the minimum rear yard setback specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located. However, access to the rear yard for purposes of maintenance and fire protection shall be accommodated by a private access drive or a minimum ten (10) foot property service easement, which shall be perpetually recorded with each dwelling unit property.*

An accessory Building shall be located only in a rear yard and shall occupy not over twenty-five (25) percent of the rear yard area and shall be located not less than five (5) from any Alley or rear service Street Line. Enclosing of the rear yard space is permitted pursuant to the fencing requirements specified under Article 1323 (H) of the Charles Town Zoning Ordinance.

These setback criteria are **met**. The proposed development meets the setback requirements, which are:
Front: 25 ft.
Sides: 10 ft., or 0 ft. for a shared party-wall.
Rear: 20 ft.

*(G) **Access Drives and Off-Street Parking**. Off-street parking space shall be provided at the rate of 1.8 spaces per dwelling unit. In a Subdivision/Land Development of townhouse Lots, it will not be necessary that off-street parking be provided on a specific Lot so long as the required number of parking spaces are provided in the Subdivision/Land Development for the number of Lots to be served; provided that, no parking area shall be more than 200 feet from the dwelling unit it serves.*

This criterion is **met**. Each unit features a driveway, and parking is available on both sides of the proposed roads.

(H) ***Townhouse garages*** *may be attached to or detached from the townhouse unit and may be accessed from either the front or rear yard. When detached the garage structure must be consistent and compatible with the architecture and materials of the respective townhouse unit.*

This criterion is **met**.

(I) Townhouses abutting each other shall have complimentary but not identical ***facades****.*

This criterion will be enforced during the building permit process. No architectural plans have been provided for staff review yet.

(J) No more than two abutting townhouses shall have a ***common roof line****.*

This criterion will be enforced during the building permit process. No architectural plans have been provided for staff review yet.

(K) All ***electric meters*** *shall be located in the rear of dwelling units, except where a waiver may be granted by the Planning Commission.*

The applicant has requested a waiver from this standard, which staff supports. Placing the meters in the rear of the units can make it difficult for electric company personnel to access the meters. The electric utility for this project, Potomac Edison, provides two main reasons why the waiver location must not be in the rear:

1. **Quality of service**. The installation of meters in the rear would result in additional wire wrapping, which can lead to additional tension on wires. This tension can cause equipment failure. Increased wire length can also cause delays in voltage reaching the house, leading to flickering and other issues.

2. **Safety**: Placing the meters in the rear of the property requires service technicians to have to enter private areas in the rear of properties, which may or may not be fenced, and to have to cross property lines. Placing meters in the front provides ease of access and does not require technicians to cross multiple properties.

(L) When townhouse Lots do not front on a Public Street, they shall front on private roads, parking lots or access Easements. The length and extent of private roads, parking lots or access Easements providing access to Lots shall be minimized, and Public Streets shall be provided in larger Subdivisions/Land Developments when substantial distances are involved.

Private roads, parking lots, and access Easements shall be no more than 500 feet from a Public Street, as measured along the centerline of the access Road. Private roads, parking lots, and access Easements may be located up to 800 feet from a public Road where enhanced circulation is provided with two connection points to the Public Street. The average daily trip for private roads, parking lots, or access Easements shall not exceed 250 VPD. Townhouse Developments that include the use of private roads,

parking lots and access Easements shall conform to the West Virginia Code Chapter 36B, Uniform Common Interest Ownership Act, as specified under Section 1333.21 of this Ordinance.

This criterion is **unclear**. The applicant must provide additional information stating the length of each road. No traffic impact analysis has been provided. Per Kimley-Horn, the most recent version of the Trip Generation Manual by the Institute of Transportation Engineers states that this use would classify this as *Multifamily Housing (Low-Rise - 220)*, which generates the following trips:

Weekday Daily – 7.32 trips per/DU
AM Peak Hour – 0.56 trips/DU
PM Peak Hour – 0.67 trips/DU
Saturday Daily – 8.14 trips/DU

For 128 townhomes, that equates to:

Weekday Daily – 937 trips
AM Peak Hour – 72 trips per hour
PM Peak Hour – 86 trips per hour
Saturday Daily – 1,042 trips

Townhouse Developments that include the use of private roads, parking lots and access Easements shall conform to the West Virginia Code Chapter 36B, Uniform Common Interest Ownership Act, as specified under Section 1333.21 of this Ordinance (Homeowners Association).

(M) ***Site Coverage****. The minimum townhouse lot width shall be in accordance with the minimum lot with specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located.*

This criterion is **met**. Minimum lot size is 2,000 sq. ft.

(N) Adequate provision shall be made for ***storage of collection and refuse*** *where applicants desire a centralized collection point(s) in lieu of curb-side trash pick-up. This area shall be screened and the dumpsters placed on a concrete pad pursuant to Article 1333.23(L) of this Ordinance.*

The plan does not show any centralized dumpster or waste collection facilities or pads. This criteria would only apply if such facilities were proposed.

(O) ***Permeable areas*** *of the site shall be planted with ground cover, shrubs, and trees as required by this Ordinance.*

This information is **not required** in a sketch plan. The applicant must provide this information on a landscaping sheet during the preliminary plan phase. **Buffer areas**, including landscape buffers, **must be shown**.

(P) ***Required Open Space****.*

1. The difference between the Net Buildable Land Area of a townhouse Development and the total area of the dwelling unit Lots shall be allocated to open space common area as specified in Section 1333.20(B) above.

2. In the event that the Planning Commission, by waiver, permits dwelling unit Lots of less than the 2,000 square foot minimum specified in Section 1333.20(B), compensating open space must be established and provided within the project site equal to the aggregate area by which such Lots are under the 2,000 square foot minimum.

3. In a townhouse Development, open space for the Subdivision/Land Development must at least equal 30 percent of the Net Buildable Land Area of the Subdivision/Land Development.

The plan describes that only 10% of the site is open space, which is the required minimum in R-15. 30% of the net buildable area is 126,802 sq. ft. 10% of the site is 42,267 sq. ft.

(Q) ***Maintenance of Common Areas****. All common areas and facilities including, but not limited to, recreational facilities, off-street parking and common open space shall be maintained in a satisfactory manner without expense to the general taxpayers of the City. In order to insure the maintenance of and the payment of taxes on the commonly held non-public property, a mandatory homeowners association shall be created and a declaration regarding the same shall be recorded to the satisfaction of the Planning Commission in the Office of the Clerk of Jefferson County.*

Neither the plan nor application mention a Homeowners Association.

WAIVER

The applicant, based on dialogue with electricity provider Potomac Edison Company, is also requesting a waiver from Subdivision Section 1333.20 K, which requires that "*All electric meters shall be located in the rear of dwelling units, except where a waiver may be granted by the Planning Commission*." This item was previously addressed under *Townhouse Development Standards, Section K.*

RECOMMENDATION

The Planning Commission should **approve** the electric meter **waiver request**, as the requirement is not supported by electric utility providers operating in the City and can cause service issues for the persons dwelling in the townhouses.

The Planning Commission should **table** action on the **sketch plan** application, to give the applicant time to address concerns of the public and the Planning Commission, as well as to provide missing information. The Commission may table the application for up to 45 days to obtain additional information. The next Planning Commission meeting is May 22nd.

CHARLES TOWN, WEST VIRGINIA
Department of Community Development

Division of Planning and Zoning

101 East Washington Street, P.O. Box 14
Charles Town, West Virginia 25414

File Number: _____
Staff Initials: _____
Fees Paid: _____

Phone: (304) 725-2311 □

Fax (304) 725-1014

https://goo.gl/KGzDMZ

Sketch Plan Review Checklist
Amended 2017 Subdivsion Ordinance

(please check one) ___✓___ **Major S/LD Application** or
_____ **Zoning Use Permit, Special Exception Use, or Sketch Plan (requirements found in the Supplemental Regulations of the Zoning Ordinance)**

Project Name: _____

Property Owner Information					
Property Owner:	Hillside Investment LLC				
Mailing Address:	175 John J Thomas Way				
City:	Charles Town	State:	WV	Zip Code:	25414
Phone Number:	304)283-2601	Email:			
Signature:				Date:	6-2-22
Applicant's Registered Engineer or Surveyor or Design Consultant					
Name:	Christopher Consultants Ltd - Attn. Sylke Knuppel				
Mailing Address:	4601 Forbes Boulevard # 140				
City:	Lanham	State:	MD	Zip Code:	20706
Phone Number:	240) 296-1574	Email:	sylkeknuppel@ccl-eng.com		
Physical Property Details					
Physical Address:					
City:	Charles Town	State:	WV	Zip Code:	25414
Tax District:		Map No:	9	Parcel No:	67
Parcel Size:	13.71 Acres	Deed Book:	691	Page No:	432

Zoning of Subject Property			Is the Project to Be:	Is Property In:
Urban Reserve (UR)	Residential Medium-High Density (R-15)	Neighborhood Commercial (NC)	Planned Unit Development (PUD)	Historic Overlay District (HOD)
General Commercial (GC)	Old Town Residential (OT-R)			Floodplain Overlay District (FOD)
Old Town Mixed Use Commercial (OT-MUC)	Neighborhood Residential (NR)			

City Use Only	1st Review	2nd Review	3rd Review	4th Review
Submittal Date				
Zoning Administrator				
City Planner				
GIS/Addressing				
Return Date				

Sketch Plan Application No._____

SKETCH PLAN APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
ARTICLE 1332, SUBDIVISION AND LAND DEVELOPMENT APPLICATION & APPROVAL REQUIREMENTS

To assist the Subdivision Administrator in the review of a Sketch Plan Application, the Applicant must utilize this form to supply the City with the information prescribed under Section 1332.03 of the Charles Town S/LD Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's Sketch Plan Application as required by Ordinance Section 1332.03. Applicant is responsible to ensure the standards of Ordinance Section 1332.04, Sketch Plan Requirements, are met and provided herein is a checklist of the Sketch Plan requirements.

1. DATE _____5/26, 2022

2. APPLICATION TYPE*

☐ Zoning Use Permit, Special Exception Use and Sketch Plan requirements found in the Supplemental Regulations of the Zoning Ordinance

- Submit Three (3) 11" x 17" copies of the Sketch Plan shall be submitted and in Adobe PDF format

☑ Major S/LD Development

- Submit Three (3) 18" x 24" copies of the Sketch Plan shall be submitted and in Adobe PDF format

*There are two types of Sketch Plan submissions:

1. For Zoning Use Permit, Special Exception Use and Sketch Plan requirements found in the Supplemental Regulations of the Zoning Ordinance. Submission standards are found in Section 1332.04(D).
2. For a Sketch Plan for a Major S/LD application, submission standards are found in Section 1332.04(E)

3. APPLICANT'S NAME* Christopher Consultants Ltd - Attn. Sylke Knuppel

Address: 4601 Forbes Boulevard # 140, Lanham, MD 20706

Telephone Number (240) 296-1574 Fax Number ( )

Email Address sylkeknuppel@ccl-eng.com

4. PROPERTY OWNER'S NAME Hillside Investment LLC

Address: 175 John J Thomas Way, Charles Town, WV 25414

Telephone Number (304)283-2601 Fax Number ( )

Email Address

5. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address:

Tax Map # and Parcel: Tax Map#: 9 Parcel#: 67

Deed Book and Page #: Deed Book: 691 Page#: 432

Property Area in Square Feet or Acres: 13.71 Acres

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

The project proposes a Subdivision, Parcel 67, Lots 2A and 2B, and consists of 126 Townhouse lots. The acreage to be developed is approximately 13.71 acres. Each townhouse unit is three(3) stories, 20' x 40', and 2,400 SF.

7. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

The property is located south of Berryville Pike and is accessible from Hillside Drive. They are currently vacant and are designated as General Commercial in the City of Charles Town Zoning Map. The property is in Neighborhood Residential (NR) Zone.

*Applicants Include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

8. ARE THERE ANY ANTICIPATED WAIVERS OR VARIANCES? IF YES, PROVIDE DETAILS.

n/a

9. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

☑ No

10. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date

11. INTERESTED PARTY ADDRESSES, FOR PUBLIC NOTICE (including across street) (Interested parties are defined as adjacent properties within 100 feet).

Owner	# and Street	City, State, Zip

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1332.02 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant

_____ Date 6-2-22

Signature of Property Owner (If different than Applicant)

_____ Date _____

Please submit an original completed Application and specified number of Site Plan copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments:_____

_____

_____

_____

_____

_____

Conditions of Approval (Attach Additional Comments As Needed)

Instructions

1. This checklist is provided as a quick reference guide only. The Consultant/Developer is responsible for reading the regulations and fully complying with all the requirements. All references to the Subdivision Ordinance and Zoning Ordinance are cited for informational purposes only.

2. The checklist shall be completed by the Engineer/Surveyor or Design Consultant and attached to the Sketch Plan review submission.

Requried Submittal Information

_____ 1 Check for Applciation Fees

_____ 1 Completed Application and Checklist (Signed by owner)

_____ 3 Sets of Sketch Plans and Adobe PDF Format

	Ordinance Requirements: *(See instructions on page 2)*	Engineer /Surveyor	1st Review	2nd Review	3rd Review	4th Review	Review Key	
							✓	Ok
							O	Incomplete
							N/A	Not Applicable
							X	Unacceptable
Sub-Section	**SUBDIVISION ORDINANCE Section 1332.04, Sketch Plan Requirements**							
A	**THERE ARE TWO TYPES OF SKETCH PLAN SUBMISSIONS:** **Sections in Red and Blue are depict the different types.**							
A1 and D	For: **• Zoning Use Permit** **• Special Exception Use** **• Sketch Plan requirements found in the Supplemental Regulations of the Zoning Ordinance** The following information shall be provided for Sketch Plan review:							
D1	Three (3) 11" x 17" copies of the Sketch Plan shall be submitted and in Adobe PDF format.							
D2	The Sketch Plan shall be drawn to a 1"=50' scale							
D2	The Sketch Plan must illustrate the following elements in such a way that the Subdivision Administrator or authorized designee can determine if the proposed Subdivision or Land Development meets the criteria of this Ordinance, **as applicable:**							
D2a	Existing conditions, including boundary lines of the property							
D2b	A land use plan, showing the location, arrangement and approximate boundaries of all proposed land uses							
D2c	Vicinity map, north arrow, scale (written and graphic) and date							
D2d	Name of proposed project or other identifying title and date plan was prepared. Name and address of the Engineer, Surveyor, Architect, Landscape Architect, Land Planner or Property Owner who prepared the plan							
D2e	Current zoning and total area of the property							
D2f	Maximum and proposed density							
D2g	Available utilities							
D2h	All existing sanitary sewer facilities and combined sewer facilities							
D2i	Depict location or statement of proposed water and sewer supply and other utility improvements							
D2j	Existing covenants							
D2k	General layout of any proposed number of Lots, average Lot sizes and any proposed commercial uses, including any associated parking. Include proposed height of structures							
D2l	Statement of total acreage of the tract being subdivided or developed							
D2m	Location of proposed Street layout, including connections to adjoining streets or vacant lots							
D2n	The location of sidewalks, trails and crosswalks							
D2o	Proposed open space and/or recreation areas, including notes on the plan describing the proposed use, activity area and/or improvement							
D2p	Any other information requested by the Subdivision Administrator in order for the Subdivision Administrator to make an accurate determination.							
A2 and E	For a **Major S/LD Application**. The following information shall be provided for Sketch Plan review:							
E1	Three (3) 18" x 24" copies of the Sketch Plan shall be submitted and in Adobe PDF format.	✓						
E2	The Sketch Plan shall be drawn to a 1"=50' scale	✓						
E2	The Sketch Plan must illustrate the following elements in such a way that the Subdivision Administrator or authorized designee can determine if the proposed Subdivision or Land Development meets the criteria of this Ordinance:							
E2a	Existing conditions, including boundary lines of the property	✓						
E2b	A land use plan, showing the location, arrangement and approximate boundaries of all proposed land uses	✓						

	Ordinance Requirements: (See instructions on page 2)	Engineer /Surveyor	1st Review	2nd Review	3rd Review	4th Review	Review Key	
							✓	Ok
							O	Incomplete
							N/A	Not Applicable
							X	Unacceptable
E2c	Vicinity Map, North arrow, scale (written and graphic) and date	✓						
E2d	Names of the abutting owners, adjoining lot lines and structures on abutting lots within 100 feet of the property	✓						
E2e	Title of the proposed project; the date, month and year the plan was prepared or revised; the name of the applicant(s), owner(s), and contract owner(s) and the name and address of the Engineer, Surveyor, Architect, Landscape Architect, or Land Planner who prepared the plan, including firm name	✓						
E2f	Current zoning and total area of the property	✓						
E2g	Maximum and proposed density based on the Net Buildable Land Area	✓						
E2h	Available utilities	✓						
E2i	All existing sanitary sewer facilities and combined sewer facilities	✓						
E2j	Depict location or statement of proposed water and sewer supply and other utility improvements	✓						
E2k	Existing covenants	N/A						
E2l	General layout of any proposed number of Lots, average Lot sizes and any proposed commercial uses, including any associated parking. Include proposed height of structures	✓						
E2m	Statement of total acreage of the tract being subdivided or developed, including the Net Buildable Land Area	✓						
E2n	The approximate acreage in common open space, in each use and housing type and in roads, streets or rights-of-way for the total development	✓						
E2o	The proposed number of dwelling units of each type in each in the total development	✓						
E2p	Location of proposed Street layout, including connections to adjoining streets or vacant lots	✓						
E2q	The location of sidewalks, trails and crosswalks, as may be applicable	✓						
E2r	Proposed open space and/or recreation areas, including notes on the plan describing the proposed use, activity area and/or improvement. The amount, approximate boundaries and location of common open space, with the percentage of the total acreage of the site to be placed in common open space	✓						
E2s	The location of environmental sensitive land to be included in common open space	N/A						
E2t	Notes indicating any modifications, waivers, variances, special exceptions and/or conditional uses that are required	N/A						
E2u	The location and extent of proposed buffers	✓						
E2v	The proposed location, arrangement, and right-of-way widths of roads and streets, including roads and streets providing access to adjoining parcels. The location and arrangement of street entrances, driveways and parking areas	✓						
E2w	Calculations describing all proposed bonus factors with the location of and specifications for bonus improvements, when proposed	N/A						
E2x	Any other information requested by the Subdivision Administrator in order for the Subdivision Administrator to make an accurate determination	N/A						
Sub-Section	**SUBDIVISION ORDINANCE Section 1333.01, General Site Planning and Design Specifications**							
D1d	There is **no** requirement that a Sketch Plan or Preliminary Plat show phasing.							

Waiver Application No._____

WAIVER APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
SECTION 1331.12, (V) REQUIREMENTS

To assist staff in the review of a waiver application to the Planning Commission (PC), the applicant must supply all of the information contained in this application form. This application must be signed by all owners of the real estate which is the subject of the application. The owners may designate one or more professional agents to represent them in the application process using the spaces provided on this form.

Incomplete applications will be subject to scheduling delay. Applicants are encouraged to meet with staff prior to filing. A public hearing will be scheduled within 45 days of the receipt of a completed application.

Approval of a waiver by the Planning Commission does not relieve the applicant from other requirements including, but not limited to, signs(s), building, zoning and use permits or site plans.

As part of this application, the following <u>must be provided</u>:

1. $150.00 Application Fee.
2. A Completed Application.
3. As applicable, supporting documents included, but not limited to site plan or depiction of the requested Waiver.

It is the applicant's responsibility to make a good-faith effort to provide the Subdivision Administrator, as applicable, with a current list containing the accurate names and mailing addresses of all interested parties. For purposes of this provision, "interested parties" shall mean Landowners of Adjacent Property. The applicant shall provide the addresses in order to comply with Section 1331.12.B of the Subdivision Ordinance

Legal Notices

The following shall occur at least 15 days prior to the Public Hearing: notice of the hearing shall be advertised by the Planning Commission as a Class I legal advertisement in the local newspaper, posting of a sign upon the property, and letters to adjacent and confronting land owners within 100 feet of the subject property.

Definition of a Waiver

Adjustments that may be made to the requirements of this Ordinance to unusual site conditions in order to achieve a better design. Waivers may not be used to circumvent the process requirements of this Ordinance.

The Charles Town Subdivision Ordinance

To grant a Waiver as permitted in the Subdivision Ordinance, the Planning Commission makes findings as specified in Section 1331.12(B)(2).

In order to issue a Waiver, the Commission must make the following written findings regarding the Waiver sought and all of the following can be met:

A waiver request may be granted by the Planning Commission only when it shall be determined that:

1. That the design of the project will provide public benefit such as a reduction in City maintenance cost, greater open space, parkland consistent with the City parks plan, or benefits of a similar nature;
2. The waiver, if granted, will not adversely affect the public health, safety or welfare, or the rights of adjacent property owners or residents;
3. That the waiver, if granted, will be in keeping with the intent and purpose of this Ordinance; and
4. That the waiver, if granted, will result in a project of better quality and/or character.

Note:

Additional exhibits may be required by the Subdivision Administrator or Planning Commission such as a lot location survey or site plan showing existing and proposed Structures, easements, watercourses, curb cuts and description of the uses of adjacent property that are necessary to describe existing or proposed conditions.

1. DATE Febuary 10, 2023

2. APPLICANT'S NAME* Christopher Consultants now IMEG - Attn. Sylke Knuppel, PE

Address: 4601 Forbes Boulevard # 140, Lanham, MD 20706

Telephone Number (240) 296-1574 Fax Number ( )

Email Address sylke.s.knuppel@imegcorp.com

3. PROPERTY OWNER'S NAME Hillside Investment LLC

Address: 175 John J Thomas Way, Charles Town, WV 25414

Telephone Number (304)283-2601 Fax Number ( )

Email Address jthomas@jeffersonasphalt.net

4. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address:

Tax Map # and Parcel: Tax Map#: 9 Parcel#: 67

Deed Book and Page #: Deed Book: 691 Page#: 432

Property Area in Square Feet or Acres: 13.71 Acres

5. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

The property area consists of 13.71 acres that is currently partially wooded with some open spaces. This property has been rezoned to Residential Medium-High Density (R-15), which permits residential townhome uses.

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

The project is Hillside Subdivision, Parcel 67, Lots 2A and 2B, and consists of 128 Townhouses. The acreage to be developed is approximately 13.71 acres at the terminus of Hillside Drive in the City of Charles Town.

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

7. DESCRIPTION OF ANY PROPOSED WORK TO BE DONE TO THE PROPERTY:

The development will include to have off-site street parking, roads and sidewalks, storm drain, stormwater management facilities, public water and sewer, landscape and lighting, and playground amenity.

8. DESCRIPTION OF THE WAIVER REQUEST:

A wavier is being request to SLDO-CTWV, Section 1333.20 Townhouse Standards to allow for the electric meters to be located in the front of the townhome units in the Hillside Development.

9. LIST THE APPLICABLE SECTION(S) OF THE SUBDIVISION ORDINANCE FROM WHICH THE WAIVER IS REQUESTED:

SLDO-CTWV, Section 1333.20 Townhouse Standards

10. JUSTIFICATION FOR THE REQUEST:

A) Explain how the design of the project will provide public benefit such as a reduction in City maintenance costs, greater open space, parkland consistent with the City Parks Plan or benefits of a similar nature;

See attached wavier statement of justification.

B) Explain how the waiver, if granted, will not adversely affect the public health, safety, welfare or the rights of adjacent property owners or residents;

See attached wavier statement of justification.

C) Explain how the waiver, if granted, will be in keeping with the intent and purpose of this Ordinance; and;

See attached wavier statement of justification.

D) Explain how the waiver, if granted, will result in a project of better quality and/or character.

See attached wavier statement of justification.

11. INTERESTED PARTY ADDRESSES, FOR PUBLIC NOTICE (including across street) (Interested parties are defined as adjacent properties within 100 feet).

Owner	# and Street	City, State, Zip
See attached adjoining parcel	summary	

12. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date
N/A			

13. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

_____

_____

_____

_____

_____

☑ No

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1331.12 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant

Sylke Knuppel, PE Digitally signed by Sylke Knuppel, PE DN: C=US, E=sylkeknuppel@ccl-eng.com, CN="Sylke Knuppel, PE" Date: 2023.02.10 14:15:10-05'00' Date 02/10/2023

Signature of Property Owner (If different than Applicant)

Date 2/10/2023

Please submit an original completed Application and specified number of Site Plan copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments/Conditions:_____

Adjoining Parcels

Wiley & Penny Grimes
541 Oakland Terrace
Charles Town WV 25414

Paul & Robin Cenate
511 Oakland Terrace
Charles Town WV 25414

Sterling & Cathy Hawkins
497 Oakland Terrace
Charles Town WV 25414

Travis & Shelley Grenier
423 Oakland Terrace
Charles Town WV 25414

Kay Spitzer
385 Oakland Terrace
Charles Town WV 25414

Marc & Lisa Matthews
339 Oakland Terrace
Charles Town WV 25414

Barbara & John McMillan
339 Oakland Terrace
Charles Town WV 25414

Glenn & Susan Hipsley
275 Oakland Terrace
Charles Town WV 25414

John Walters
229 Oakland Terrace
Charles Town WV 25414

Anthony & Betheny Troxel
94 Edaw Court
Charles Town WV 25414

William & Nancy Clark
84 Edaw Court
Charles Town WV 25414

Peter & Leigh Owen
49 Steinway Drive
Charles Town WV 25414

Justin & Rebecca Ubert
60 Edaw Court
Charles Town WV 25414

Robert & Laurie Delaney
46 Edaw Court
Charles Town WV 25414

Susan Potter
32 Edaw Court
Charles Town WV 25414

Charles & Margaret Mayah
66 Steinway Drive
Charles Town WV 25414

Gary Smith
27 Steinway Drive
Charles Town WV 25414

Robert & Kesha Glenn
13 Steinway Drive
Charles Town WV 25414

February 10, 2023

Mr. James Newman
City Planner, Zoning/Subdivision Administrator, AICP
City of Charles Town
101 E Washington Street
Charles Town, West Virginia 25414

RE: Wavier Statement of Justification – Hillside Sketch Plan
Project #22063

Dear Mr. Newman:

On behalf of Hillside Investment LLC (Applicant) this application is for approval of Sketch Plan Major Subdivision and Land for the Residential Medium-High Density (R-15) for the Hillside Subdivision.

The Hillside Subdivision is located within the City of Charles Town in Jefferson County, West Virginia. The property area consists of 13.71 acres that is currently partially wooded with some open spaces. The proposed development is to construct 128 townhomes with a minimum lot size of 2,000 sq.ft. Access to the site will be through Hillside Drive by connecting at the current terminus of Hillside Drive. There are internal private roads proposed for internal circulation and access to the townhomes. Properties in the general vicinity of the subject property are a mix of high, mid, and low density residential zoning.

The Applicant met with City Staff to discuss the rezoning of the property for residential development. The Planning Commission approved the property rezoning to Residential Medium-High Density (R-15) from Neighborhood Commercial (NC).

A waiver is being requested to Section 1333.20 Townhouse Standards to allow the electric meters to be located in the front of the townhome units within the Hillside community, as required by the local utility provide Potomac Edison. Attached please find a letter from Potomac Edison stating as much.

In accordance with Section 1331.12 of the Subdivision Ordinance, a waiver request must be deemed to meet the four following criteria:

1. **That the design of the project will provide public benefit such as a reduction in City maintenance cost, greater open space, parkland consistent with the City parks plan, or benefits of a similar nature.**

The proposed project is neutral in this matter. There will be no additional maintenance cost to the City because no new open space or park space is created. The proposal will provide more on-lot open space

for homeowners and avoiding utility easements that would be required behind each home for meter installation. The rear of these units will be utilized for outdoor amenity improvements such as decks and patios by most homeowners which would conflict with any easements in the rear of these units and likely prohibit those improvements by homeowners.

2. The Waiver, if granted, will not adversely affect the public health safety or welfare, or the rights of adjacent property owners or residents.

The proposed project is neutral in this matter. There will be no adverse effect on the public health, safety, welfare, or rights of adjacent property owners or residents. By locating the meters in front of the units, access to the meters and maintenance of the meters will be improved and likely safer for the utility provider employees.

3. That the Waiver, if granted, will be in keeping with the intent and purpose of this Ordinance.

The rear of these units will be utilized for outdoor amenity improvements such as decks and patios by most homeowners which would conflict with any easements in the rear of these units and likely prohibit those improvements by homeowners. Fences, if installed by homeowners would limit access. The intent of the Ordinance is to allow for a waiver where rear access is not feasible for access and safety of the workers.

4. That the Waiver, if granted, will result in a project of better quality and/or character.

Due to the denial of placement of the meters to the rear of the buildings by the electric company, a Waiver request is unavoidable. Similar to other recent townhome projects, the electric provider will not install meters in the rear of the units. If granted the waiver will provide and allow for the development of the townhomes associated with the Hillside development.

Sincerely,

IMEG Corp.
Sylke S. Knuppel, PE
Project Executive
sylke.s.knuppel@imegcorp.com

SSK/ll

PotomacEdison
A FirstEnergy Company

901 Wilson Street
Martinsburg, WV 25401

August 9, 2022

RECEIVED
JAN 30 2023
BY:

Sylke Knuppel
Christopher Consultants
4035 Ridge Top Road, Suite 601
Fairfax, VA 22030

Re: Meters on rear of structures

Dear Ms. Knupple:

This letter is to inform you that the Potomac Edison Company, a First Energy Company is denying your request to install electric meters on the rear of townhomes being built in Charles Town, WV. After review with management, Potomac Edison continues to stand with its practice of requiring electric service to be taken on the fronts or nearest corning to the electric facilities available. Listed are a few reasons for this practice in the past and going forward into the future.

All electric facilities are placed on the front property corners as needed within the subdivisions being developed. Installing electric meters on the rear of structures would result in the electric service wire wrapping around the structure to get to the meter socket. The added number of sweeps in this run would increase the pulling tension on the wire and cause possible premature failure. This practice would also increase service lengths which would increase the chance of voltage flicker for those residences.

Safety of Potomac Edison workers is also a very real concern if meters were installed on the rear of structures. Many homeowners seeking a bit of privacy tend to install fencing which creates access issues for the metering employees as well as linepersons if there is trouble with a meter socket. Fencing is also used to keep dogs and other animals inside the perimeter of the rear yard which highly increases the chances of meter reading folks being bitten.

There are other reasons why the practice of taking electric service on the rear of structures is not a good practice, but safety, reliability and construction constraints are among the leading reasons.

If you have any questions or comments concerning this matter, please feel free to contact me at jsmit21@firstenergycorp.com or by telephone at 304-267-3244.

Sincerely,

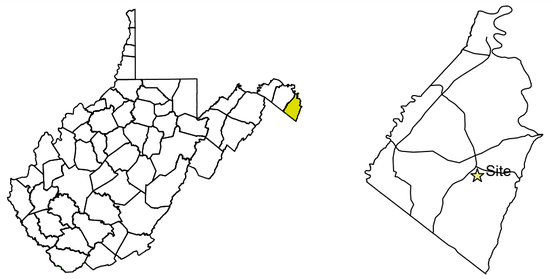
John A. Smith
Distribution Technician IV
Martinsburg Service Center

HILLSIDE

SKETCH PLAN
MAJOR SLD 2022-TBD

CHARLES TOWN CORP. DISTRICT (3) - MAP 9 - PARCEL 67, LOTS 2A & 2B
DEED BOOK 691 - PAGE 432
CITY OF CHARLES TOWN, WEST VIRGINIA
ZONED RESIDENTIAL MEDIUM-HIGH DENSITY (R-15)

GENERAL LOCATION



JEFFERSON COUNTY CHARLES TOWN

NOT TO SCALE

Plan Revisions	
Date	Comment
1/13/23	Resubmission

christopher consultants | now IMEG
4601 Forbes Blvd. Suite 140
Lanham, MD 20706 P 240.296.1574
engineering • surveying • land planning

STATE & LOCAL PERMITS

AGENCY	PERMIT #/APPROVAL DATE

CALL "MISS UTILITY"

MISS UTILITY OF WEST VIRGINIA (MUWV) AT 811 OR 1-800-245-4848, 48 HOURS PRIOR TO THE START OF WORK. EXCAVATORS MUST NOTIFY ALL PUBLIC UTILITY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATING OR BLASTING AND HAVE THOSE FACILITIES LOCATED BY THE UTILITY COMPANIES PRIOR TO COMMENCING EXCAVATION. THE EXCAVATOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL COUNTY REQUIREMENTS, WEST VIRGINIA CODE AND REGULATIONS.

UTILITY NOTICE (AS NEEDED)

Contractors shall notify all public utility 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. Names and telephone numbers of the operators of underground utility lines appear below. These numbers shall also be used to serve in an emergency condition.

Water:	Charles Town Utility Board 832 S. George Street Charles Town, WV 25414 (304) 725-2316
Sewer:	Charles Town Utility Board 832 S. George Street Charles Town, WV 25414 (304) 725-2316
Power:	Potomac Edison P.O.Box 3615 Akron, OH 44309 (800) 686-0011
Phone:	Frontier Communications 1108 N. Mildred Street Ranson, WV 25438 (304) 728-8500
Soil Conservation:	Eastern Panhandle Conservation District 151 Aikens Center, Suite 2 Martinsburg, WV 25404 (304) 263-4376

VICINITY MAP

SCALE: 1" = 600'

SHEET INDEX:

SK-1 - SKETCH PLAN COVER SHEET
SK-2 - SKETCH PLAN NOTES
SK-3 - SKETCH PLAN NOTES AND LEGEND
SK-4 - SKETCH PLAN
SK-5 - SKETCH PLAN

"This Sketch Plan was approved by the City of Charles Town, on the _____ day of _____ , 20_____ , subject to any conditions specified hereon.

This plan is vested and valid for one (1) year with the possibility of a one (1) year extension per Section 1332.03(C)(2)(F)(5) of the City of Charles Town Subdivision and Land development Ordinance.

All expenses incurred with respect to improvements for all utility services, paving, grading, landscaping, curbs, gutters, sidewalks, road lighting, road signs, flood protection devices, drainage structures and all other improvements that may be required shall be the responsibility of the subdivider and not the City.

Secretary of the Planning Commision _____ Date _____

"The developer, in signing this plat/plan, agrees to abide by all conditions, terms and specifications provided heron; and to complete all the improvements required by the Preliminary Plat and Plan or site plan."

HILLSIDE INVESTMENT LLC
175 JOHN J THOMAS WAY
CHARLES TOWN, WEST VIRGINIA 25414

6-2-23
Date

"The Engineer and/or Surveyor, in signing this plat/plan, attests to the best of his or her knowledge, is plan is complete and accurate."

CHRIS LEMON
CHRISTOPHER CONSULTANTS LLC

1/27/2023
Date

DEVELOPER
APPLICANT/OWNER
HILLSIDE INVESTMENT LLC
175 JOHN J THOMAS WAY
CHARLES TOWN, WEST VIRGINIA 25414
(304) 283-2601

SKETCH PLAN - COVER SHEET
HILLSIDE
691/432 MAP 9 PARCEL 67
LOTS 2A (RESIDUE) & 2B
JEFFERSON COUNTY, WV

CHRISTOPHER H. LEMON
REGISTERED
6/13/2024
23092
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

PROJECT: 22063.001.00
DRAWING NO: 111667
SCALE: AS SHOWN
DATE: JANUARY 18, 2023
DESIGN: SSK/DHL
DRAWN: PJS/DHL
CHECKED: SSK
SHEET No.
SK-1

\\cclpfs01\Production\Projects\22063\00100\111697 Concept Sketch\C100-Sketch Plan.dwg

GENERAL NOTES

1. Methods and materials used in the construction of the improvements herein shall conform to current Jefferson County Construction Standards and Specifications and/or current WVDOH Standards and Specifications.

2. The Engineer shall not have control over or charge of and shall not be responsible for construction means, methods, techniques, sequences or procedures nor for safety precautions and programs in connection with work shown on these plans. The Engineer is not 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, subcontractor, or their agents or employees, or any other person performing portions of the work.

3. The Contractor, Owner or Developer shall be responsible for securing any third party inspection/testing service to insure construction compliance with these plans and specifications. It is Christopher Consultants recommendation that a third party inspection/testing service be employed to ensure that project is completed and materials installed meet the details and specifications in these plans.

4. The location of existing utilities shown in these plans are taken from existing records and available asbuilt data. It shall be the contractors responsibility to verify the exact horizontal and vertical location of all existing utilities as needed prior to construction. The contractor shall be responsible for the digging of all test holes that may be required, whether recommended or not by these plans, to determine the exact location and elevation of existing utilities. If any conflicts arising from this existing utility verification or if during the course of construction, any object of an unusual nature is encountered, the contractor shall cease work in that area and immediately notify Christopher Consultants at (240) 296-1574 and/or the proper authority. Christopher Consultants any engineer associated with these plans shall not be responsible or liable for any construction cost that may be associated with the installation or reinstallation any utility or other improvements if not notified of any discrepancies between actual field conditions and the approved plan.

5. The approval of these plans in no way relieve the developer, the contractor, or their agents of any legal responsibility which may be required by the code of West Virginia or any other ordinance enacted by Jefferson County nor does it guarantee the issuance of any required permit by Jefferson County, WVDOH or any other Agency.

6. An approved set of plans and all applicable permits must be available at the construction site at all times during construction. A representative of the developer must be available at all times.

7. The contractor shall provide adequate means of cleaning mud from trucks and/or other equipment prior to entering public streets, and it is the contractors responsibility to clean streets, allay dust, and to take whatever measures are necessary to insure that public streets are maintained in a clean, mud and dust free condition at all times.

8. The developer will be responsible for any damage to the existing streets and utilities which occurs as a result of his construction project within or contiguous to the existing right-of-way.

9. Warning signs, markers, barricades or flagmen should be in accordance with the State and Federal Manual on Uniform Traffic Control Devices (MUTCD).

10. All unsuitable material shall be removed from the construction limits of the site plan before placing embankment.

11. All pavement sections shown on these approved plans are based on a minimum CBR value of 6 and are for preliminary design only. Final pavement design shall be based upon actual field tested CBR values. The Contractor or Developer shall be responsible for field tests per WVDOH standards to obtain actual CBR values for final design. Final pavement designs will be approved by WVDOH and/or the Owner/Developer, which ever applicable, prior to installation.

12. All springs shall be capped and piped to the nearest storm sewer manholes or curb inlet. The pipe shall be minimum 6" diameter.

13. When grading is proposed within easements of utilities, letters of permission from all involved companies must be provided to Jefferson County & Charles Town Utility Board (CTUB) prior to issuance of grading and/or site development permits.

14. a. Notification shall be given to the Charles Town Utility Board two weeks prior to construction so they can arrange to have a project representative during construction. The District would like to be in the pre-construction project meetings with the contractor.

    b. Notification shall be given to the Charles Town Utility Board prior to construction of water lines. Information should also be obtained from the appropriate authority concerning permits, cut sheets, and connections to existing lines.

15. The Developer and/or Contractor shall be responsible to supply all utility companies with copies of the approved plans and advise them that all grading shall conform to the approved plans, and further that the utility companies shall be responsible for honoring these plans and the finished grades in the installation of their utility lines.

16. All utilities to be located underground.

17. 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.

18. The developer will be responsible for the relocation of any utilities which is required as a result of his project. The relocation should be done prior to construction.

19. All parking lot/street light and dry utility design shall be performed and provided separately by others. All dry utility and or lighting information shown hereon is as specified by others and is included for informational purposes only, as directed by the Owner, Developer and/or public agency requirements. Christopher Consultants has not performed the lighting and/or dry utility design and does not warrant and is not responsible for the degree and/or adequacy of illumination on this project or the adequacy of the dry utility to service the site.

20. All sanitary sewers, water mains and appurtenances shall be constructed in accordance with the current standards and specifications of the Charles Town Utility Board.

21. All stormwater piping and structures shown on these plans are only accurate to the inlet or manhole locations as shown hereon. Detail design of stormwater structures were not provided to Christopher Consultants. Actual pipe alignments will be based upon developed structural shop drawings as provided by the manufacturer. Contractor shall make adjustments to pipe alignments base on provided shop drawings. Christopher Consultants will not be held responsible or liable for any discrepancies or changes caused by the structural design. Contractor may submit shop drawings to Christopher Consultants for review and approval at contractor's expense. Shop drawings will be reviewed for compliance with design plans. The Owner or Developer will be responsible for any redesign as a result of structural shop drawing design.

22. 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 Jefferson County, prior to pavement construction. If a geotechnical report has been prepared, it should supersede the requirements in this note.

23. Refer to Geotechnical Engineer for methods, materials and details for construction of all earthwork activities.

24. Any retaining wall 2 ft. or greater in height shall require the issuance of a separate building permit.

25. Construction debris shall be containerized. No less than one litter receptacle shall be provided at the construction site.

26. Christopher Consultants, Ltd. (CCL) issued this plan set based on project criteria dictated by the client and municipal codes. This plan set is not considered complete or appropriate for construction until ALL necessary agencies have given approval AND this plan set is signed and sealed by a licensed professional. Any work, planning, scheduling, material purchases and/or construction prior to approvals and licensed/professional sealing will be performed at the risk of the personnel authorizing work. GE shall be held harmless from any costs, time delay and/or material changes incurred on work started before this plan set receives approvals and seals.

27. There is no 100-yr floodplain associated with the property according to the FEMA flood map Community-Panel #54037C0139E, Effective Date 12/18/2009.

28. No known wetlands have been identified on the subject property.

28. Other developments are actively seeking approval of the waiver for the electric meter location.

WVDOH Notes

WV1. All work, construction methods and materials shall conform with the West Virginia Division of Highways "STANDARD SPECIFICATIONS ROADS AND BRIDGES Adopted January 1, 2017" and Supplemental Specifications dated January 1, 2018. All work on this project shall also conform with The Soil Conservation Service Erosion and Sediment Control Regulations and any other state, federal, or local regulations applicable. In the event of conflict between any of these standards, specifications, or plans, the most stringent shall govern.

WV2. All construction shall comply with the latest U.S. Department of Labor Occupational Safety & Health Administration.

WV3. When working on WVDOH right-of-way, all traffic control, whether permanent or temporary, shall be in accordance with "Manual on Temporary Traffic Control for Streets and highways" 2006 Edition as published by WVDOH.

WV4. Design features relating to construction or to regulation, control and safety of traffic may be subject to change as deemed necessary by WVDOH.

WV5. Prior to initiation of work, Contractor shall be responsible for acquiring all necessary WVDOH land use permits for any work on WVDOH right-of-way.

WV6. If required by the local WVDOH Residency Office, a preconstruction conference must be arranged and held by the engineer and/or developer with the attendance of the contractor, various County agencies, utility companies and WVDOH prior to initiation of work.

WV7. Contractor shall notify the local WVDOH Residency Office when work is to begin or cease for any undetermined length of time. WVDOH will also require 48 hours notice for any inspection. Please contact the Burlington, WV field office at 304-289-3521.

WV8. The Contractor will be responsible for maintaining adequate access to the project from the adjacent public roadway through construction and maintenance of a construction entrance in accordance with the Soil Conservation Service Erosion & Sediment Control Handbook. Furthermore, access to other properties affected by this project shall be maintained through construction.

WV9. Contractor shall ensure adequate drainage is achieved and maintained on the site during and at the end of construction.

WV10. All water and sewer lines within existing or proposed WVDOH right-of-way are to have minimum 36" cover and, when possible, to be installed under roadway drainage facilities.

WV11. Any unusual subsurface conditions encountered during the course of construction shall be immediately brought to the attention of the engineer and WVDOH. Work shall cease in that vicinity until an adequate design can be determined by the engineer and approved by WVDOH.

WV12. All undercut areas and borrow material shall be inspected and approved by WVDOH Inspector prior to placement of fill.

WV13. All roadway fill, base, subsurface material and backfill of utility/storm sewer trenches shall be compacted in 6" lifts to 98% of theoretical maximum density as determined by AASHTO T-99 Method A, within plus or minus 2% of optimum moisture for the full width of any dedicated street right-of-way. At the direction of WVDOH Inspector density tests performed by a qualified independent agency shall be conducted as required in the WVDOH Road and Bridge Specifications. A copy of all tests shall be submitted to WVDOH prior to final WVDOH approval.

WV14. WVDOH Standard CD and UD underdrains shall be installed where indicated on these plans and further where determined necessary by WVDOH Inspector.

WV15. The installation of any entrances and mailboxes within any dedicated street right-of-way shall meet WVDOH minimum design standards and is the developer's responsibility.

WV16. If required by the local WVDOH Residency Office, copies of all invoices for materials within any dedicated street right-of-way must be provided to the WVDOH Inspector prior to acceptance of work. Unit and total prices may be obscured.

WV17. Prior to acceptance by WVDOH of any streets, any required street signage and/or pavement markings must be installed by the developer.

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Lanham, MD 20706 P 240.296.1574
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SKETCH PLAN - NOTES
HILLSIDE
691/432 MAP 9 PARCEL 67
LOTS 2A (RESIDUE) & 2B
JEFFERSON COUNTY, WV

CHRISTOPHER H. LEMON
REGISTERED
6/13/2024
23092
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

PROJECT: 22063.001.00
DRAWING NO: 111667
SCALE: AS SHOWN
DATE: JANUARY 18, 2023
DESIGN: SSK/DHL
DRAWN: PJS/DHL
CHECKED: SSK
SHEET No.
SK-2

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PROJECT NARRATIVE

The project is Hillside Subdivision, Parcel 67, Lots 2A and 2B, and consists of 128 Townhouses. The acreage to be developed is approximately 13.71 acres at the terminus of Hillside Drive in the City of Charles Town. Each townhouse unit is three (3) stories, with a minimum 2,000 SF lot. This property has been rezoned to Residential Medium-High Density (R-15), which permits residential townhome uses. The Sketch Plan applies Residential Medium-High Density (R-15) District Bulk and Area Regulations (Table 1322.07) for the townhome lot layout with variations as noted below.

DEVELOPMENT STANDARD

HILLSIDE				
DEVELOPMENT STANDARDS	**sf**	**acres**		
PROPERTY AREA	597,208	13.71		
PUBLIC ROW DEDICATION (HILLSIDE DRIVE)	14,978	0.34		
PRIVATE STREET A	56,883	1.31		
PRIVATE STREET B	11,252	0.26		
PRIVATE STREET C	32,675	0.75		
PRIVATE STREET D	22,114	0.51		
SWM AREA	36,633	0.84		
NET BUILDABLE LAND AREA [1]	422,673	9.70		
DATA TABLE FOR THE NEIGHBORHOOD COMMERCIAL (R-15) DISTRICT				
SEC. 1322.08 BULK & AREA REGULATIONS			**REQUIRED/ ALLOWED**	**PROPOSED**
TOWNHOME LOTS				
Dwelling Units			N/A	128
Minimum Lot Size (sf)				
Interior Lots			2,000	2000
End Lots			2,000	3000
Minimum Lot Width (ft)			18	20
BUILDING SETBACKS (Min. ft)				
Front Yard[2]			25	25
Side Yard[3]			10	10
Rear Yard			20	20
Maximum Lot Coverage (%)	MAX		60	60
Required Open Space (%)	MIN		10	10
Maximum Stories	MAX		3 stories	3 stories
Maximum Building Height (ft)			35	35
SEC. 1333.20.G OFF-STREET PARKING REQUIREMENTS		**RATE**	**REQUIRED**	**PROPOSED**
SINGLE FAMILY (Per du)		1.8	230	
Off-Street Parking Spaces				256
Additional Street Parking				20
Total Parking Spaces			**230**	**276**
NOTES				
[1] When calculating the density of a development it shall be calculated from the Net Buildable Land Area of all parts of the development in the same Zoning District.				
[2] Frontyard setback shall be measured from the face of the curb.				
[3] No Side Yard shall be required adjoining any Lot line that coincides with party-wall in an attached Dwelling or other Use.				
[4] Corner Lots. A Setback area at least equal to the minimum Front Yard Setback shall be provided along all portions of a Corner Lot abutting any public Street. Except where the applicant is granted an exception under the following provisions for a Front Yard Setback exception with respect to one or more property lines abutting a public Street. The Yard and property line directly opposite (behind) the front facade of the main Building (as reasonably determined by the Zoning Administrator) shall be the designated Rear Yard and rear line, respectively;				
Waivers Requests				
1333.2	Electric meter waiver to allow for the electric meters to be located in the front of the house units			

LEGEND

- 260 — EX. INDEX CONTOUR MAJOR
- 258 — EX. INT. CONTOUR MINOR
- EX. PROPERTY LINE
- EX. ADJACENT PROPERTY LINE
- EX. ROAD CENTERLINE
- X — EX. FENCE
- EX. GUARDRAIL
- EX. STORM PIPE
- W — EX. WATERLINE
- EX. SANITARY SEWER
- EX. STORM DITCH

- PROPOSED PROPERTY LINE
- PROPOSED PROPERTY SETBACK
- PROPOSED RIGHT-OF-WAY BOUNDARY
- PROPOSED ROAD CENTERLINE
- PROPOSED BUILDING OUTLINE
- TRANSITION / REVERSE — PROPOSED CURB & GUTTER
- PROPOSED PARKING LINE
- PROPOSED RETAINING WALL
- PROPOSED STORM PIPE
- PROPOSED WATERLINE
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY FORCE MAIN PIPE
- 12 — PROPOSED PARKING COUNT
- PROPOSED STORM MANHOLE
- PROPOSED STORM INLET STRUCTURE
- PROPOSED STORM CURB INLET STRUCTURE
- STREET LIGHT
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED WATER VALVE
- PROPOSED WATER FITTINGS
- PROPOSED STORMWATER FACILITY
- ACCESSIBLE CURB RAMP

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SKETCH PLAN - NOTES & LEGEND
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CHRISTOPHER H. LEMON
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PROFESSIONAL ENGINEER

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SHEET No.
SK-3

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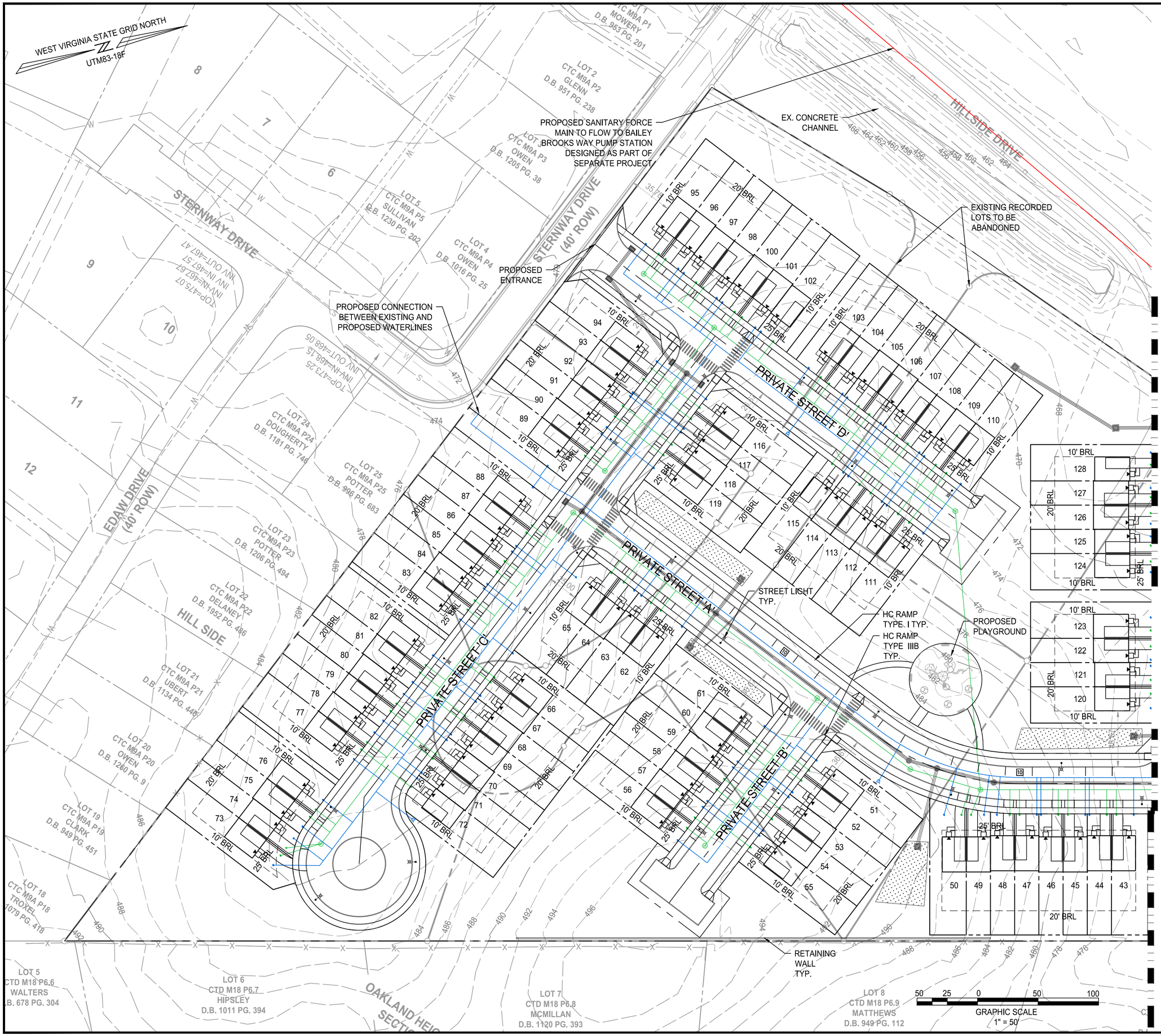

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SKETCH PLAN
HILLSIDE
691/432 MAP 9 PARCEL 67
LOTS 2A (RESIDUE) & 2B
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DRAWING NO:	111667
SCALE:	AS SHOWN
DATE:	JANUARY 18, 2023
DESIGN:	SSK/DHL
DRAWN:	PJS/DHL
CHECKED:	SSK
SHEET No.	SK-4

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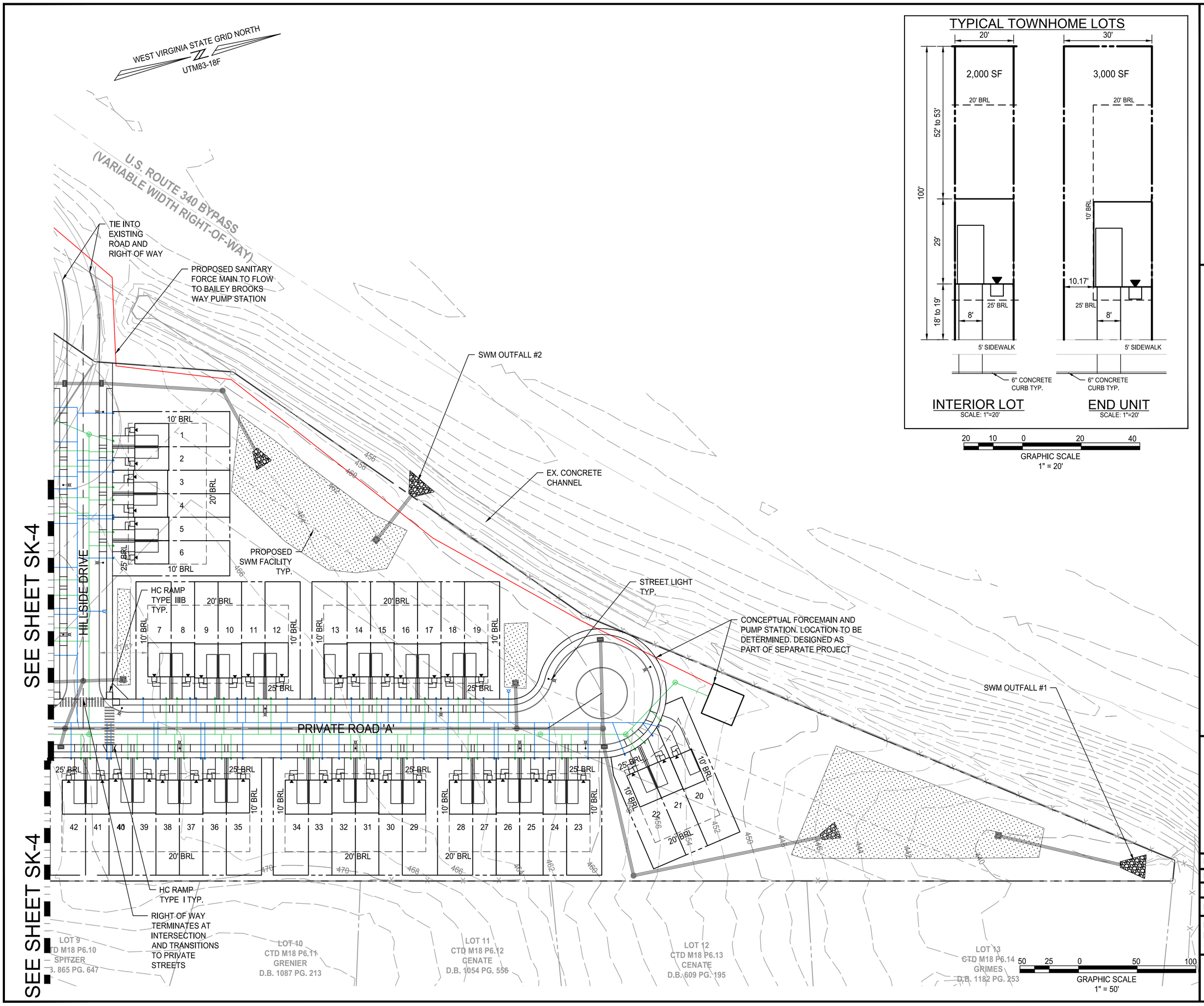

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SKETCH PLAN
HILLSIDE
691/432 MAP 9 PARCEL 67
LOTS 2A (RESIDUE) & 2B
JEFFERSON COUNTY, WV

CHRISTOPHER H. LEMON
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DRAWN: PJS/DHL
CHECKED: SSK
SHEET No.
SK-5

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Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

WAV2023-01 Norborne Glebe Waiver Request - Public Hearing

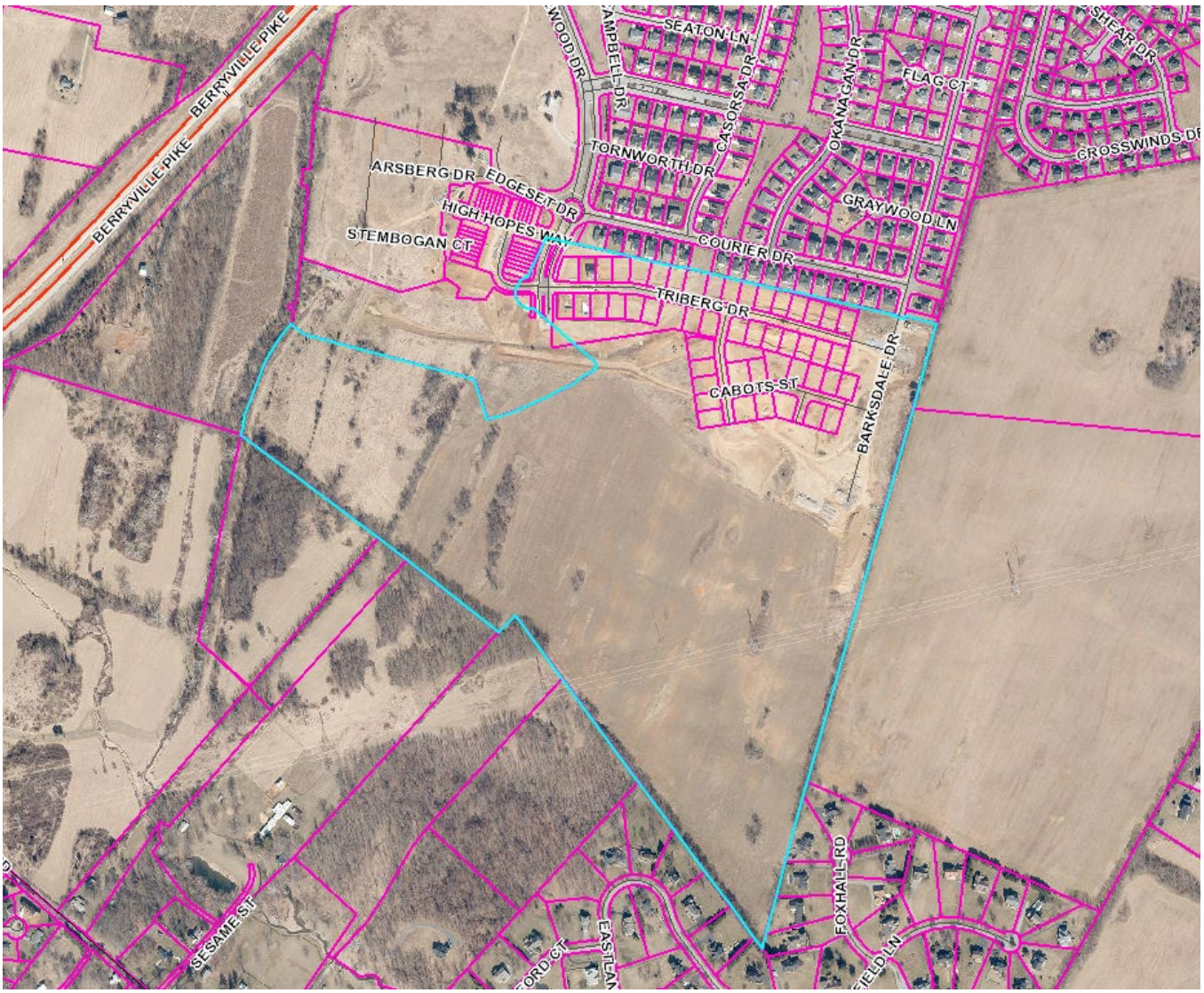
ATTACHMENTS:

- 1. Staff Report.pdf
- 2. Application.pdf

Waiver Request

Waiver2023-01/200405

Date: For the March 27th, 2023 Planning Commission meeting
Applicant: Greenway Engineering
Property Owner: Arcadia Land Inc.
Report by: James Newman, City Planner, Zoning/Subdivision Administrator.
Proposal: Waiver for phases 10B, 11, 12, 13, 15, and 16 of the Norborne-Glebe housing development
Property Location: TD: 03 / Map: 12 / Pcl: 215, located on Barksdale Drive. Parcel is outlined in **blue** below.
Current Zoning: Neighborhood Residential (NR).



CODE REQUIREMENTS

Driveway standards are provided by Section 1333.07 of the Subdivision and Land Ordinance:

Driveways may be used to provide a place and access for vehicular movement only between a parking area for a single residential unit of occupancy or agricultural use (farm) and a Street, Alley, or Access Drive. Driveways may be used for off-street parking. Driveways shall conform to the following:

(A) Residential Driveway entrances shall be provided from any roadway to all single-family residences in accordance with Standard Detail DE-1 or Standard Detail DE-2 (depending upon the curb and gutter requirements).

(B) There shall be no more than one (1) vehicular entrance per individual Lot on a Public Street, unless the entrances are separated by a minimum of 150 feet.

(C) No Driveway shall be constructed closer than 40 feet to the nearest street intersection.

(D) Driveways shall not be located less than five (5) feet from an adjoining property unless used as a shared Driveway between the two abutting properties.

(E) Driveway grades shall not exceed three percent (3%) from the edge of the intersecting street pavement to the property line, nor exceed ten percent (10%) from the property line to the garage, carport, or other off-street parking space.

(F) The maximum slope of embankments adjacent to Driveways shall not exceed 1V:3H unless a retaining wall is used to insure that the earth is stabilized.

(G) Driveways shall be constructed at least 12 feet in width and of at least six (6) inches of compacted stone for a distance of at least twelve (12) feet beyond the right-of-way line.

REQUEST

Applicant is requesting a waiver from subsection C above, which requires that "*No Driveway shall be constructed closer than 40 feet to the nearest street intersection*", *and that this would apply to all 'T' intersections.*

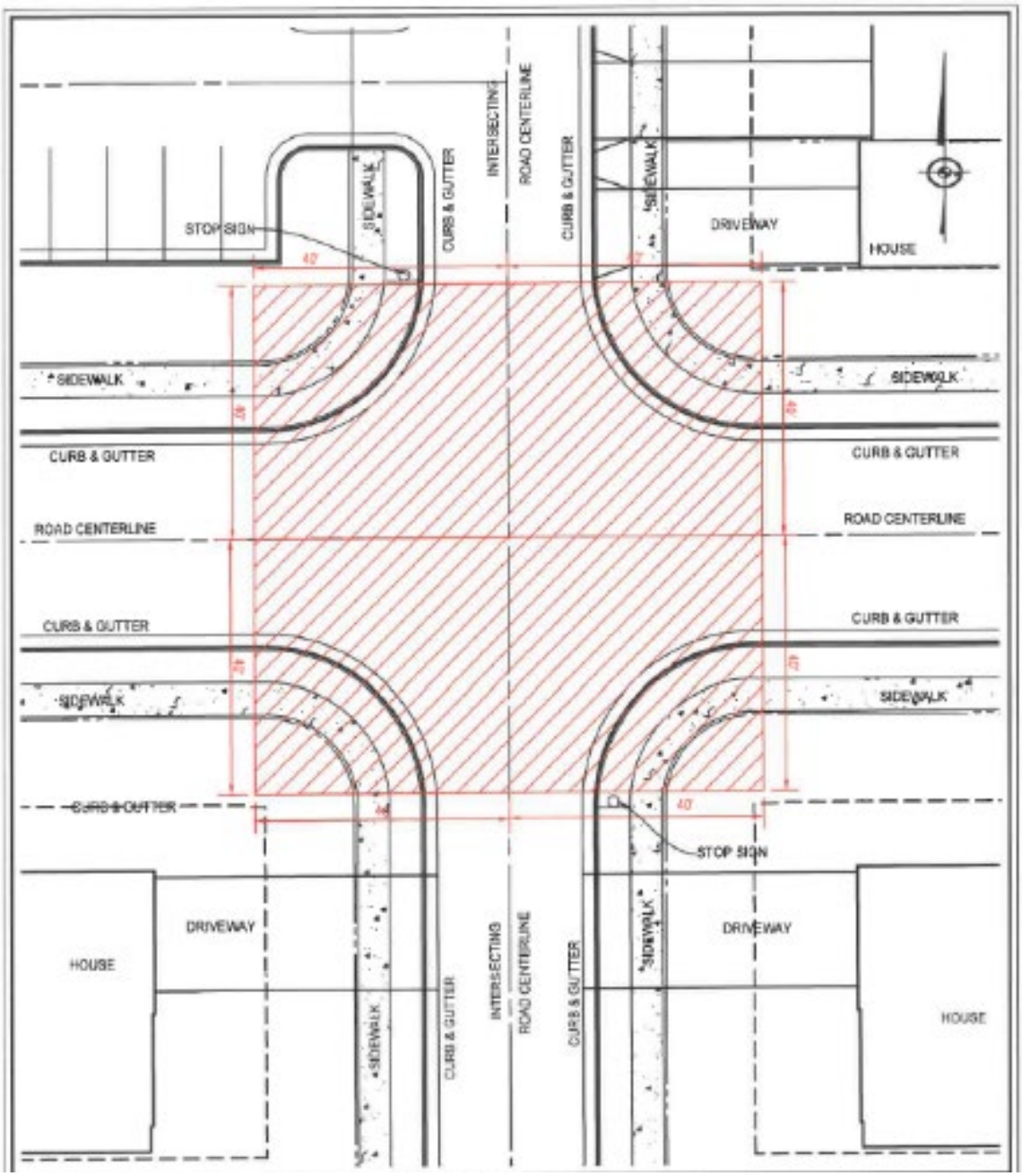
1. Previous phases of development were approved without needing waivers from this requirement.
2. Granting of the waiver would permit future site development to adhere to an established design pattern. Would maintain the aesthetic design of the development at-large.
3. Proposed intersection and driveway locations do not impede line-of-sight nor do they create a hazardous environment, due to the slow posted speed and residential character of the areas to be developed.
4. No negative impact to the community from the existing pattern of development which does not adhere to this Code requirement.
5. Traffic flow and congestion are eased by permitting the waiver. Driveway users will expect flowing traffic and will hold for traffic to pass.

PHASES

This request would apply to phases 10B, 11, 12, 13, 15, and 16, shown below:

STAFF INTERPRETATION

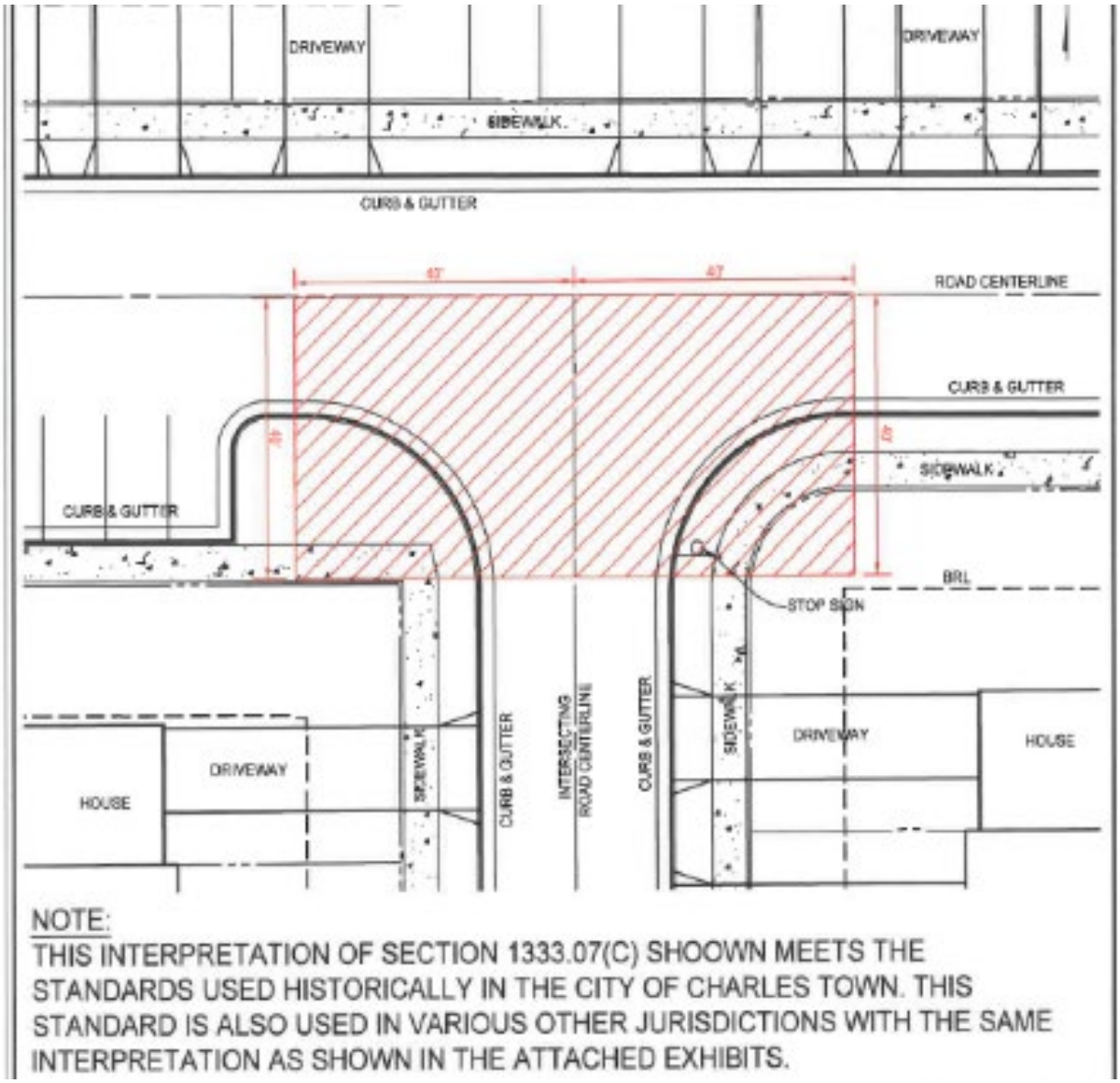
The text states "*No Driveway shall be constructed closer than 40 feet to the nearest street intersection.*" The image below shows a 40ft box around the center of a road intersection. No driveways/curb cuts would be permitted within 40 feet of the center of the intersection under the current interpretation.



APPLICANT INTERPRETATION

We functionally don't believe a through road not in a stopped condition is considered an intersection. Traffic flow increases and allows for ease of flow without stops at these branch intersections. Driveway users will expect flowing traffic and will hold for traffic to pass. Allowing the driveway spacing across from these branch intersections does not have any impact on the safety of the traffic in the subdivision.

Each of these 'T' intersections will be designed with stop signs at the branch leg at a minimum to minimize conflicts and to allow the driver the understanding that the road the driveway is on is acting as a 'through road' as would be typical in the subdivision. We believe this allows for the safest method for traffic safety and we respectfully request approval of this waiver request.



NOTE:
THIS INTERPRETATION OF SECTION 1333.07(C) SHOOWN MEETS THE STANDARDS USED HISTORICALLY IN THE CITY OF CHARLES TOWN. THIS STANDARD IS ALSO USED IN VARIOUS OTHER JURISDICTIONS WITH THE SAME INTERPRETATION AS SHOWN IN THE ATTACHED EXHIBITS.

WAIVER CRITERIA

Section 1331.12.B covers waivers, and states:

1. *Adjustments that may be made to the requirements of this Ordinance to unusual site conditions in order to achieve a better design. Waivers may not be used to circumvent the process requirements of this Ordinance. The Planning Commission shall have the authority to grant a waiver to allow a modification, change, or an alternative solution to a requirement of this Ordinance. Please note that economic hardship along is not sufficient reason to grant an exception from the requirements.*

2. *Waivers from the minimum standards in this Ordinance may be granted by the Planning Commission only when the Planning Commission finds that granting a waiver will be consistent with all of the following criteria and the exception is the minimum necessary to afford relief:*

   a. That the design of the project will provide public benefit such as a reduction in City maintenance cost, greater open space, parkland consistent with the City parks plan, or benefits of a similar nature;

   b. The waiver, if granted, will not adversely affect the public health, safety or welfare, or the rights of adjacent property owners or residents;

   c. That the waiver, if granted, will be in keeping with the intent and purpose of this Ordinance; and

   d. That the waiver, if granted, will result in a project of better quality and/or character. No process or procedural waivers will be granted

CRITERIA REVIEW

While the request does not meet the 'unusual site conditions' under subsection 1 above, it is fairly debatable as to whether or not it meets the requirements of subsection 2, outline here:

a. That the design of the project will provide public benefit such as a reduction in City maintenance cost, greater open space, parkland consistent with the City parks plan, or benefits of a similar nature;

The waiver would continue a pattern of development used in nine other previously approved phases of development within this master planned community, and as such would provide for an aesthetically pleasing community.

b. The waiver, if granted, will not adversely affect the public health, safety or welfare, or the rights of adjacent property owners or residents;

The rest of the Norborne Glebe community has been designed with driveways closer than 40 ft. to an intersection, and there has been no crisis or significant rise in accidents.

c. That the waiver, if granted, will be in keeping with the intent and purpose of this Ordinance;

The purpose of the Ordinance is to regulate physical development of land for the improvement of the health, safety, comfort, morals, and general public welfare of our citizens. The applicant's waiver request does not appear to lead to undue harm, and their interpretation has already come to fruition in the previously approved phases of development.

d. That the waiver, if granted, will result in a project of better quality and/or character. No process or procedural waivers will be granted

If granted, the waiver would permit a style of development which is already in place in phases already built.

CONCLUSION

The proposed waiver would grant the applicant the ability to develop the rest of their project in a way similar to what has already been built. No undue harm should arise from granting the waiver. Staff recommends **approval.**

Waiver Application No._____

Norborne Glebe - All Phases

RECEIVED
FEB 10 2023
BY:_____

WAIVER APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
SECTION 1331.12, (V) REQUIREMENTS

To assist staff in the review of a waiver application to the Planning Commission (PC), the applicant must supply all of the information contained in this application form. This application must be signed by all owners of the real estate which is the subject of the application. The owners may designate one or more professional agents to represent them in the application process using the spaces provided on this form.

Incomplete applications will be subject to scheduling delay. Applicants are encouraged to meet with staff prior to filing. A public hearing will be scheduled within 45 days of the receipt of a completed application.

Approval of a waiver by the Planning Commission does not relieve the applicant from other requirements including, but not limited to, signs(s), building, zoning and use permits or site plans.

As part of this application, the following must be provided:

1. $150.00 Application Fee.
2. A Completed Application.
3. As applicable, supporting documents included, but not limited to site plan or depiction of the requested Waiver.

It is the applicant's responsibility to make a good-faith effort to provide the Subdivision Administrator, as applicable, with a current list containing the accurate names and mailing addresses of all interested parties. For purposes of this provision, "interested parties" shall mean Landowners of Adjacent Property. The applicant shall provide the addresses in order to comply with Section 1331.12.B of the Subdivision Ordinance

Legal Notices

The following shall occur at least 15 days prior to the Public Hearing: notice of the hearing shall be advertised by the Planning Commission as a Class I legal advertisement in the local newspaper, posting of a sign upon the property, and letters to adjacent and confronting land owners within 100 feet of the subject property.

Definition of a Waiver

Adjustments that may be made to the requirements of this Ordinance to unusual site conditions in order to achieve a better design. Waivers may not be used to circumvent the process requirements of this Ordinance.

The Charles Town Subdivision Ordinance

To grant a Waiver as permitted in the Subdivision Ordinance, the Planning Commission makes findings as specified in Section 1331.12(B)(2).

In order to issue a Waiver, the Commission must make the following written findings regarding the Waiver sought and all of the following can be met:

A waiver request may be granted by the Planning Commission only when it shall be determined that:

1. That the design of the project will provide public benefit such as a reduction in City maintenance cost, greater open space, parkland consistent with the City parks plan, or benefits of a similar nature;
2. The waiver, if granted, will not adversely affect the public health, safety or welfare, or the rights of adjacent property owners or residents;
3. That the waiver, if granted, will be in keeping with the intent and purpose of this Ordinance; and
4. That the waiver, if granted, will result in a project of better quality and/or character.

Note:

Additional exhibits may be required by the Subdivision Administrator or Planning Commission such as a lot location survey or site plan showing existing and proposed Structures, easements, watercourses, curb cuts and description of the uses of adjacent property that are necessary to describe existing or proposed conditions.

1. DATE February 7, 20 23

2. APPLICANT'S NAME* Dan Murphy c/o Greenway Engineering

Address: 151 Windy Hill Ln Winchester, VA 22602

Telephone Number (540) 662-4185 Fax Number ( )

Email Address dmurphy@greenwayeng.com

3. PROPERTY OWNER'S NAME Arcadia Land, Inc

Address: 108 N George St, 2nd Floor, Charles Town, WV 25414

Telephone Number (443) 286-2786 Fax Number ( )

Email Address gendler@arcadiacompanies.com

4. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address: Solistice Way

Tax Map # and Parcel: 03 12021500000000

Deed Book and Page #: Deed Book 1173 Page 85

Property Area in Square Feet or Acres:

5. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

Vacant Land, Single Family, and Townhouse subdivision

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

Single Family and Townhouse subdivision

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

7. DESCRIPTION OF ANY PROPOSED WORK TO BE DONE TO THE PROPERTY:

Further Development of the site into Single Family and Townhouses

8. DESCRIPTION OF THE WAIVER REQUEST:

To waive the 40' driveway requirement for units across from proposed intersections, as shown in the included exhibits.

9. LIST THE APPLICABLE SECTION(S) OF THE SUBDIVISION ORDINANCE FROM WHICH THE WAIVER IS REQUESTED:

Part 13, Articles 1331-1336, of the Charles Town Code- Section 1333.07, Driveway Standards (C)

(C) No Driveway shall be constructed closer than 40 fee to the nearest street intersection

10. JUSTIFICATION FOR THE REQUEST:

A) Explain how the design of the project will provide public benefit such as a reduction in City maintenance costs, greater open space, parkland consistent with the City Parks Plan or benefits of a similar nature;

The design of the project will provide public benefit in being consistent with the existing sections of Norborne Glebe. This subdivision was developed with a specific amount of lots, previously approved with the concept plan, and the adjacent park was dedicated to the City for public benefit.

B) Explain how the waiver, if granted, will not adversely affect the public health, safety, welfare or the rights of adjacent property owners or residents;

The driveway spacing will not affect the public health, safety, or welfare of any adjacent owners or residents. The spacing is proposed as is existing in the current phases of Norborne Glebe and also other subdivisions within the City and has no adverse impacts upon any owners.

C) Explain how the waiver, if granted, will be in keeping with the intent and purpose of this Ordinance; and;

The waiver maintains the current design standards used in the previously approved almost 400 lots of the Norborne Glebe subdivision and other subdivisions within the City. This meets the intent of the ordinance and neighboring communities.

D) Explain how the waiver, if granted, will result in a project of better quality and/or character.

This waiver will allow the client to continue the aestetics of the subdivision currently being constructed within Norborne Glebe and also adjacent subdivisions. This uniform aestetic provides for a better quality neighborhood, as Norborne Glebe is currently a high quality neighborhood in the City.

11. INTERESTED PARTY ADDRESSES, FOR PUBLIC NOTICE (including across street) (Interested parties are defined as adjacent properties within 100 feet).

Owner	# and Street	City, State, Zip
No adjacent owners affected		

12. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date
SLD-2013-14	Norborne Glebe Ph 4	Approved	1/14/2014
SLD-2017-05	Norborne Glebe Ph 7-8	Approved	9/25/2018
SLD-2016-01	Norborne Glebe Ph 6	Approved	9/25/2018
SLD-2017-04	Norborne Glebe Ph 14A	Approved, Revised	10/13/2022
SLD-2021-02	Norborne Glebe Ph 14B	Approved, Revised	10/13/2022
SLD-2021-05	Norborne Gl Ph 9&10A	Approved	10/13/2022
SLD-2022-03	Norborne Glebe Ph 15	Approval Pending	

13. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

_____

_____

_____

_____

_____

☑ No

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1331.12 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant

Date 2/8/2023

Signature of Property Owner (If different than Applicant)

_____ Date _____

Please submit an original completed Application and specified number of Site Plan copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments/Conditions:_____

_____

_____

_____

_____

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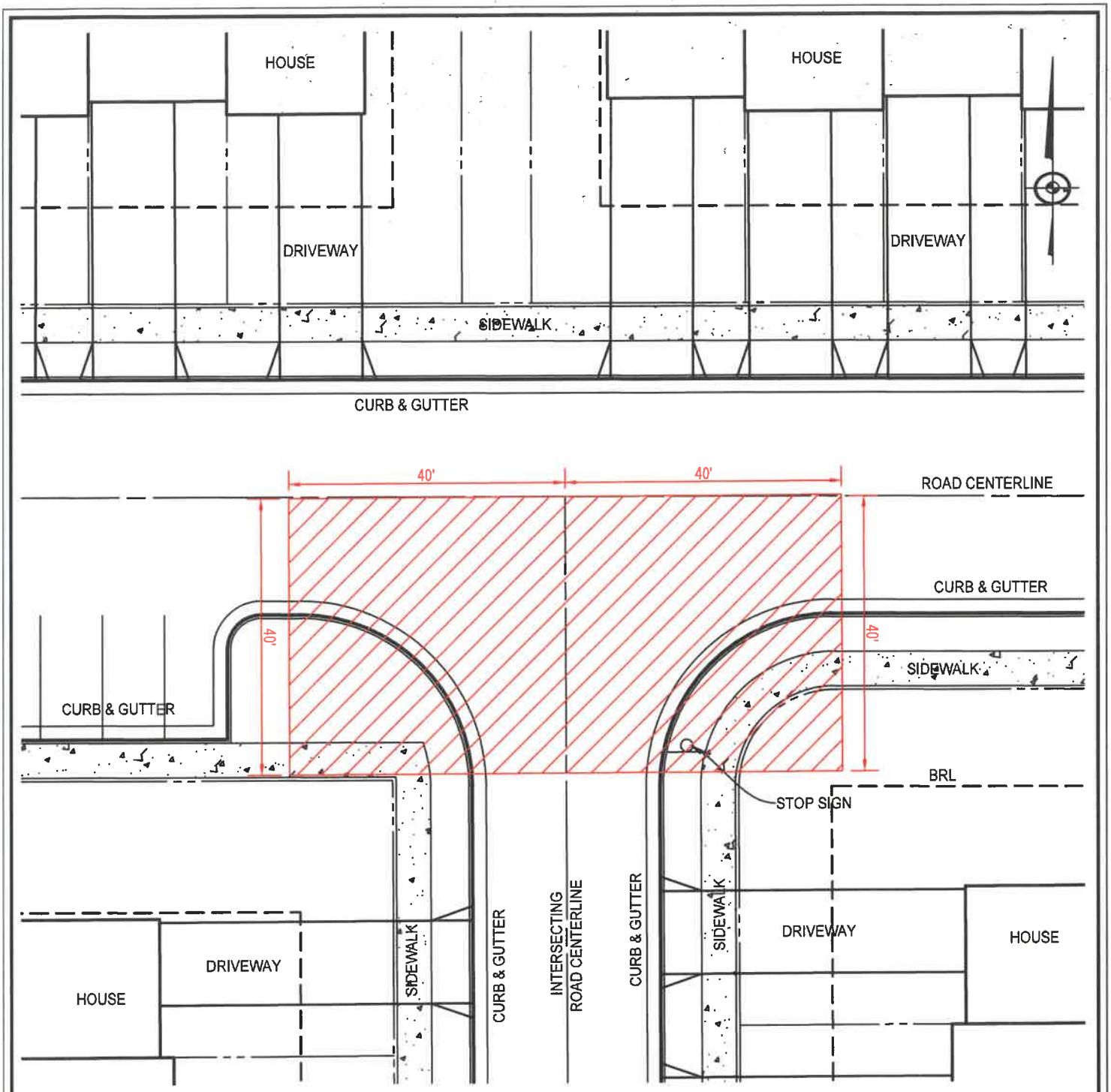

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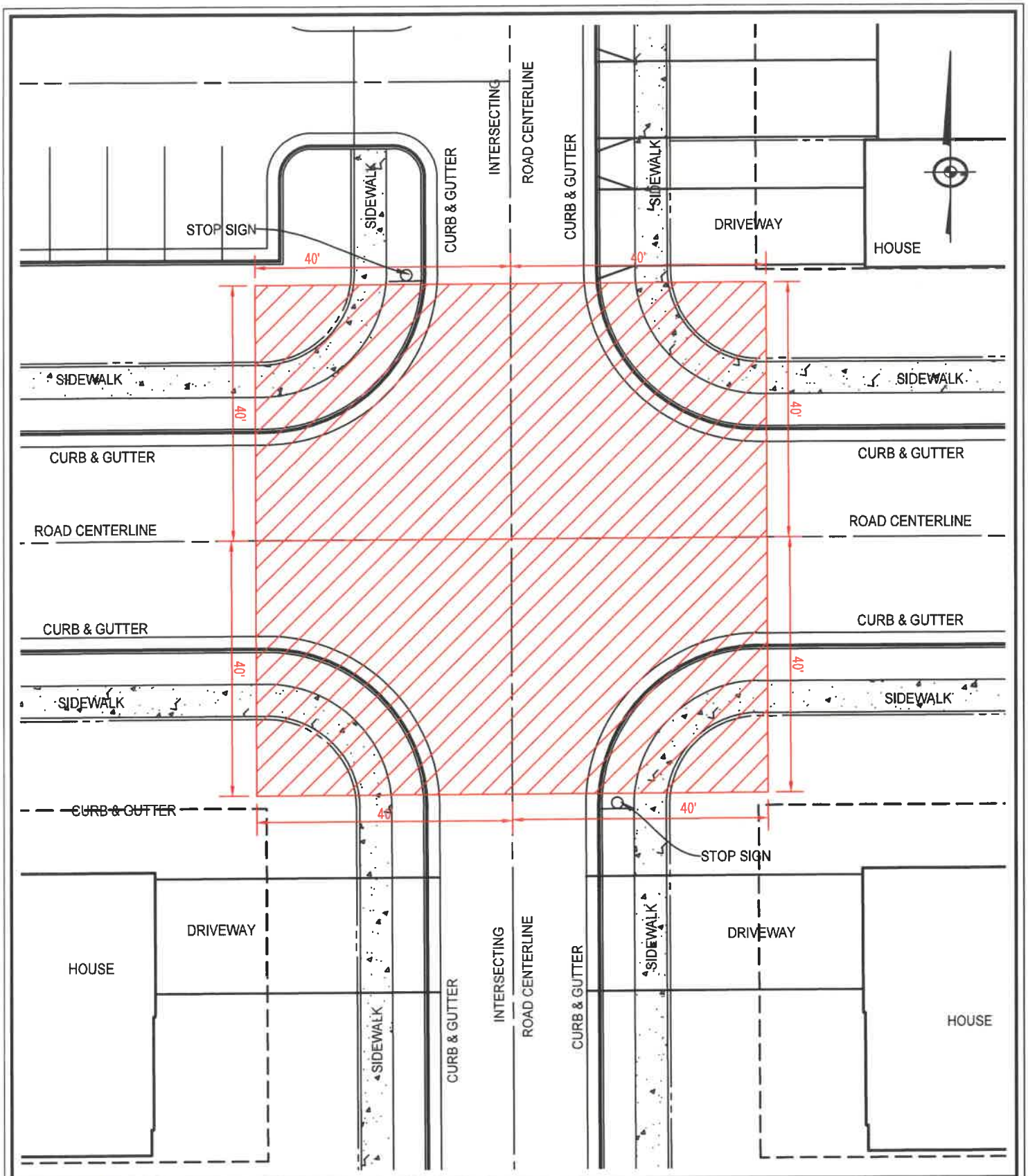
www.greenwayeng.com
PROUDLY SERVING VIRGINIA & WEST VIRGINIA
OFFICES IN WINCHESTER & ASHBURN, VA & MARTINSBURG, WV

DRIVEWAY SPACING EXHIBIT

NORBORNE GLEBE

CITY OF CHARLES TOWN, WEST VIRGINIA

DATE:	12/12/2022
SCALE:	1"=20'
DESIGNED BY:	DEM
FILE NO.	4542A
SHEET	1 OF 2



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PROUDLY SERVING VIRGINIA & WEST VIRGINIA
OFFICES IN: WINCHESTER & ASHBURN, VA & MARTINSBURG, WV

DRIVEWAY SPACING EXHIBIT
NORBORNE GLEBE

CITY OF CHARLES TOWN, WEST VIRGINIA

DATE:	12/12/2022
SCALE:	1"=20'
DESIGNED BY:	DEM
FILE NO.	4542A
SHEET	2 OF 2

GREENWAY ENGINEERING
704 Foxcroft Avenue
Martinsburg, WV 25401

RECEIVED
FEB 10 2023
BY:_____

February 8, 2023

James Newman
City Planner, Zoning/Subdivision Administrator, AICP
City of Charles Town Planning Dept
101 E. Washington Street
Charles Town, WV 25414

Re: Waiver request for Norborne Glebe Subdivision - Reference Sec. 1333.07

Dear James,
This letter is to request and substantiate the grant of a waiver to allow driveways to be constructed closer than 40 feet to intersections across from a "T" intersection in all of the remaining sections of the Norborne Glebe Subdivision. Specifically, the variance is requested to the following section of the Code:

Subdivision and Land Development Ordinance of the City of Charles Town, WV
Part 13, Articles 1331-1336, of the Charles Town Code- Section 1333.07, Driveway Standards (C) No Driveway shall be constructed closer than 40 feet to the nearest street intersection.
Townhouse sections will have driveways within 40 feet of nearest street intersection.

The reason for the proposed encroachment is to follow the visual harmony of the design within the neighborhood and to allow for overall enhancement of aesthetics. This variance request does not impede sight lines and does not create a hazard for drivers or pedestrians. The street intersections are residential neighborhood with low travel speed zones and not major thoroughfare roads. Therefore, speed will be kept to a minimum to allow for greater ease of use for those utilizing those driveways close to these intersections. Lastly, it would improve the functionality and traffic flow by reducing congestion in other areas of the streets which would also increase access for emergency vehicles.

We functionally don't believe a through road not in a stopped condition is considered an intersection. Traffic flow increases and allows for ease of flow without stops at these branch intersections. Driveway users will expect flowing traffic and will hold for traffic to pass. Allowing the driveway spacing across from these branch intersections does not have any impact on the safety of the traffic in the subdivision. Each of these "T" intersections will be designed with stop signs at the branch leg at a minimum to minimize conflicts and to allow the driver the understanding that the road the driveway is on is acting as a "through road" as would be typical in the subdivision. We believe this allows for the safest method for traffic safety and we respectfully request approval of this waiver request.

We appreciate your time in consideration of this waiver request. Please contact us with any questions or need for additional information.

Sincerely,

Randy Kepler, PE
Director of Engineering

cc. Arcadia Land. Inc.
H2 Land Co.

Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

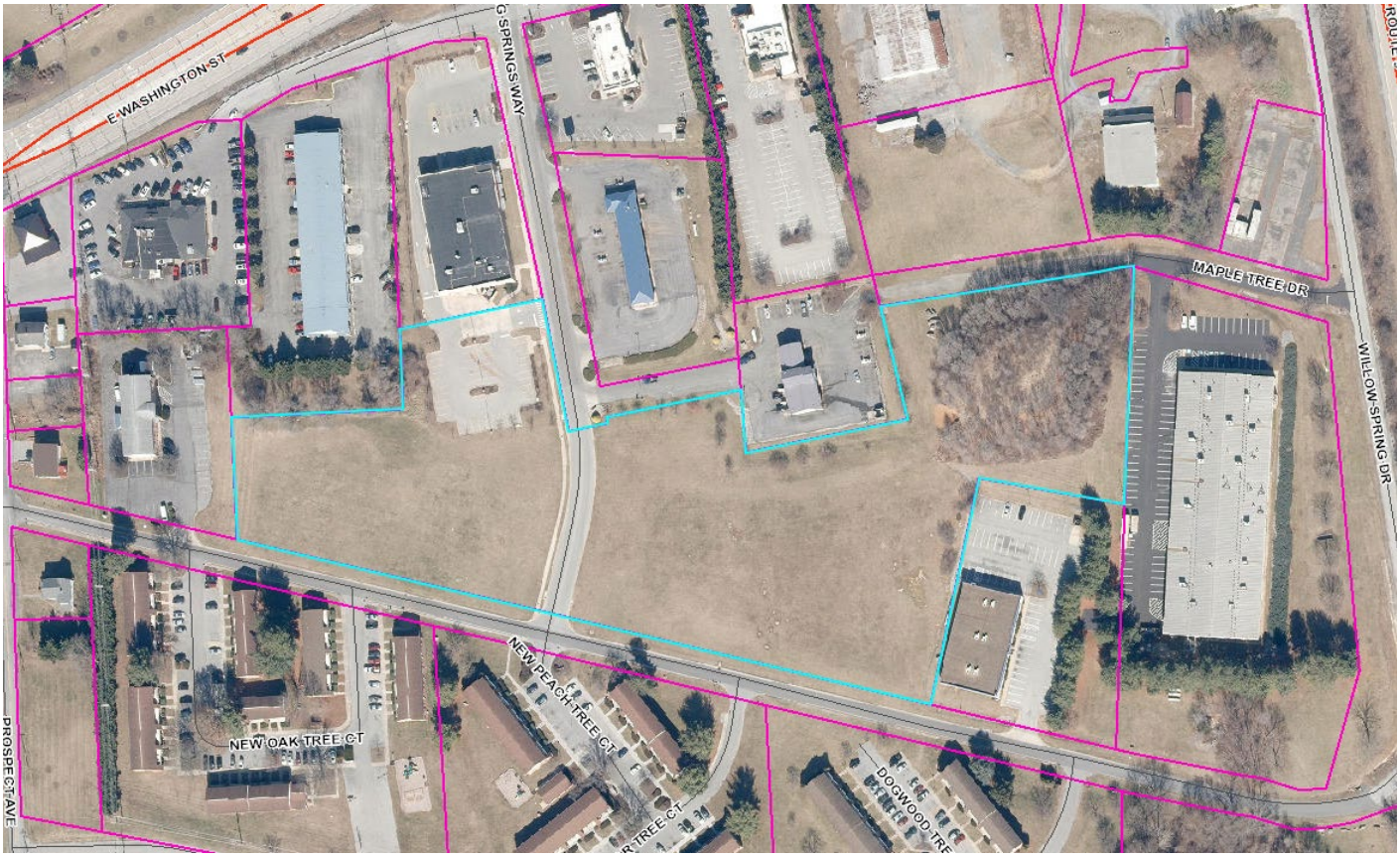
SLD2023-01 Flowing Springs Subdivision - Public Hearing

ATTACHMENTS:

- 1. Staff Report.pdf
- 2. Application.PDF
- 3. Plans.pdf

Sketch Plan Review
SLD2023-01/200401

Date: For the March 27th, 2023 Planning Commission meeting
Applicant: First Charles Town Group, Inc.
Property Owner: First Charles Town Group, Inc.
Report by: James Newman, City Planner, Zoning/Subdivision Administrator.
Proposal: Subdivision of one parcel into two
Property Location: TD 03 / Map: 15 / Pcl: 0009.0002, located on Flowing Springs Way, and Maple Tree Drive.
Current Zoning: General Commercial (GC).



PROJECT OVERVIEW

The subdivision of one 6.5 acre parcel into two separate parcels: lot 1, comprised of 1.7230 acres, and Lot 2 (residue tract) comprised of 4.8666 acres.

PLANNING COMMISSION

The sketch plan was deemed complete by the Planning Commission at their February 27th meeting.

SKETCH AND FINAL PLAN

Because this parcel has been subdivided before, this subdivision must be considered a major subdivision, per Subdivision Ordinance Section 1332.02.A.1.A.

Section 1332.01 of the Subdivision Ordinance allows for a major subdivision to be reviewed as a sketch plan, and then to proceed to the final plan and plat if the applicant desires. The applicant has submitted plans which conform the requirements for a final plan/plat. If the sketch plan is approved, staff will administratively review and approve the final plans.

ZONING REVIEW

The property is zoned General Commercial. There is no minimum lot size. The proposed setbacks conform to the Zoning ordinance requirements.

The proposed use of Tract A (the smaller, western-side parcel) property is listed in the application as 'apartment building, but no development plan has been submitted. There is no listed use for Tract B (the larger, eastern-side tract). Only the subdivision of the property is under review.

Due to there being no proposed plan of development, there are no applicable requirements for open space, parking, lighting, or other Code requirements governing land development. Such requirements come into effect when development is proposed.

Table 1322.10, GC District Bulk and Area Regulations

Maximum Density	No Requirement
Minimum Lot Size	No Requirement
Minimum Lot Width	No Requirement
Minimum Front Yard Setback	40 feet
Minimum Side Yard Setback	10 feet (25 feet where adjoining a residential district)
Minimum Rear Yard Setback	30 feet
Maximum Lot Coverage	90 percent
Minimum Required Open Space	No Requirement
Maximum Building Height	55 feet[1]
Maximum Stories	5 stories[1]

[1] Hotels shall have a maximum height of 78 feet and maximum number of six (6) stories.

CONCLUSION

The proposed major subdivision of one parcel into two parcels is in conformance with City Code requirements, and should be **approved**. Development of the property is subject to further public hearing and Planning Commission review.

S/LD Application No._____

SUBDIVISION AND LAND DEVELOPMENT APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
ARTICLE 1332, SUBDIVISION AND LAND DEVELOPMENT APPLICATION & APPROVAL REQUIREMENTS

To assist the Subdivision Administrator in the review of a Subdivision and Land Development (S/LD) Application, the Applicant must utilize this form to supply the City with the information prescribed under Section 1332.03 of the Charles Town Subdivision Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's S/LD Application as required by Ordinance Section 1332.03.

1. DATE January 3, 2023

2. APPLICATION TYPE

- ☑ Minor Subdivision | Final S/LD Plan
- ☐ Major Subdivision Development*
  - Preliminary S/LD Plan and Final Plat
- ☐ Major Land Development**
  - Preliminary S/LD Plan
- ☐ Major Subdivision and Land Development***
  - Preliminary S/LD Plan and Final Plat

*Conventional Subdivision – A Preliminary Plan and Plat Approval and a Final Plan and Plat Approval is required.

**No Division/Merger of Land – A Preliminary Plan and Plat Approval is required for the submission of a building or multiple buildings on one lot where there is no subdivision of land (commonly referred to as a site plan).

***A Preliminary Plan and Plat Approval and a Final Plan and Plat Approval is required for the submission of a building or multiple buildings that will require the merger, adjustment or subdivision of land.

3. APPLICANT'S NAME* First Charles Town Group, Inc.

Address: P. O. Box 183, Charles Town, WV 25414

Telephone Number 304 725-8250 Fax Number 304 725-8989

Email Address maria@fctwv.com

4. PROPERTY OWNER'S NAME same as applicant listed above

Address: _____

Telephone Number ( ) _____ Fax Number ( ) _____

Email Address _____

5. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address: N/A - vacant

Tax Map # and Parcel: TM 15; Parcel 9.2

Deed Book and Page #: DB 953, Page 563

Property Area in Square Feet or Acres: Tract A 1.72 acres; Tract B 4.86 acres

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

Separating property into 2 parcels that are currently divided by Flowing Springs Way.

Proposed use of Tract A is an Apartment Building by a different Developer. Proposed use of Tract B is undetermined at this time.

7. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

vacant land

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

8. ARE THERE ANY ANTICIPATED WAIVERS OR VARIANCES? IF YES, PROVIDE DETAILS.

No

9. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date

See Attached Email from Mr. Chakmakian

10. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

☑ No

11. PLAN/PLAT SUBMISSION TO OTHER AGENCIES (Documentation of all required approvals must be attached to this Application or submitted prior to Preliminary S/LD Application approval)

Agency (Specify others as applicable)	Submittal Date	Approval/Permit Issued	Date of Approval/Issuance
City of Charles Town			
City of Charles Town Utility Board	N/A		
Jefferson County Planning and Zoning Department			
Jefferson County Addressing Office	N/A		
Jefferson County Board of Education			
WV Department of Environmental Protection	N/A		
WV Department of Transportation, Division of Highways			
WV State Historic Preservation Office	N/A		
WV Office of Environmental Health Services			
U.S. Army Corps of Engineers	N/A		

12. FEE CALCULATION (Per Fee Schedule) _____

_____

_____

_____

AMOUNT PAID $_____

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1332.03 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant First Charles Town Group, Inc.

By: Mark G. Wade Sec/Treas Date Feb 6, 2023

Signature of Property Owner (If different than Applicant)

_____ Date _____

Please submit an original completed Application and specified number of Plan/Plat (Three (3) copies at 24" x 36", Adobe PDF format, and Five (5) copies at 11" x 17") copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments/Conditions:_____

Kim Coomler

From: Peter Chakmakian <peter@chakmakianlawwv.com>
Sent: Thursday, December 22, 2022 12:17 PM
To: Kim Coomler
Cc: 'Richard Klein'; 'maria@fctwv.com'
Subject: [EXTERNAL] RE: First Charles Town Group Subdivision
Attachments: 20221222121453385.pdf

Importance: High

This is in response to your request that we furnish "History of the Parcel" to be subdivided. The larger tract from which the subject parcel is a part was originally acquired in 1981. Since then, there have been numerous out sales and developments. They are as follows, not necessarily in chronological order:

Tax Map/Parcel	Identification
9.4	Originally Howard Johnson, now Mountain View Restaurant
9.15	Office Building
9.5	Originally Sportsman Motor Lodge
9.17	Originally Pizza Hut, now Walgreen Drug Store
9.18	Originally Hardee's, now Burger King Restaurant
9.19 and 9.25	340 Wash and Lube Car Wash
9.24	Ruby Tuesday Restaurant
9.27	Formerly Merchant Noland Chevrolet, now a vacant building
9.26	A vacant lot
9.13	Kingdom Hall Church and Elite Excursions
9.12	A vacant lot
9.16	Office Building
9.23	Office Building
9.8	52 Unit Apartment Project
9.9	40 Unit Apartment Project
9.14	40 Unit Apartment Project

9.22 Storm Water Storage Pond

All of these came out of the original Hassan Tract. The piece that is subject to subdivision, is Parcel 9.2, 6.88 Acres and will be divided in two by Flowing Springs Way. This tract of land has been subdivided and developed many times, either in commercial use or multi-family apartments. I am attaching a portion of the tax map so that you can better understand what I am providing.

Peter L. Chakmakian

From: Kim Coomler <kim.coomler@thinkalphafirst.com>
Sent: Tuesday, December 20, 2022 4:13 PM
To: Peter Chakmakian <peter@chakmakianlawwv.com>
Cc: 'Richard Klein' <richard.klein@thinkalphafirst.com>
Subject: First Charles Town Group Subdivision

Hello Peter, we need your assistance in filling out Section 9 "History of Parcel" of the attached subdivision application. Please let us know if you have any questions. Maria gave us some information but we need additional information specific to previous applications as requested on the form. Please fill in and email back to us. Thank you, Kim

From: Maria Weese <maria@fctwv.com>
Sent: Tuesday, December 20, 2022 3:21 PM
To: Kim Coomler <kim.coomler@thinkalphafirst.com>
Subject: Re: [EXTERNAL] Re: First Charles Town Group Subdivision

I think we purchesed it in the early 80's it was vacant land that years ago had been an orchard.
For a short time we opened a Family Fun Park and that portion was a driving range.

That's about all I know...

On Tue, Dec 20, 2022 at 3:02 PM Kim Coomler <kim.coomler@thinkalphafirst.com> wrote:

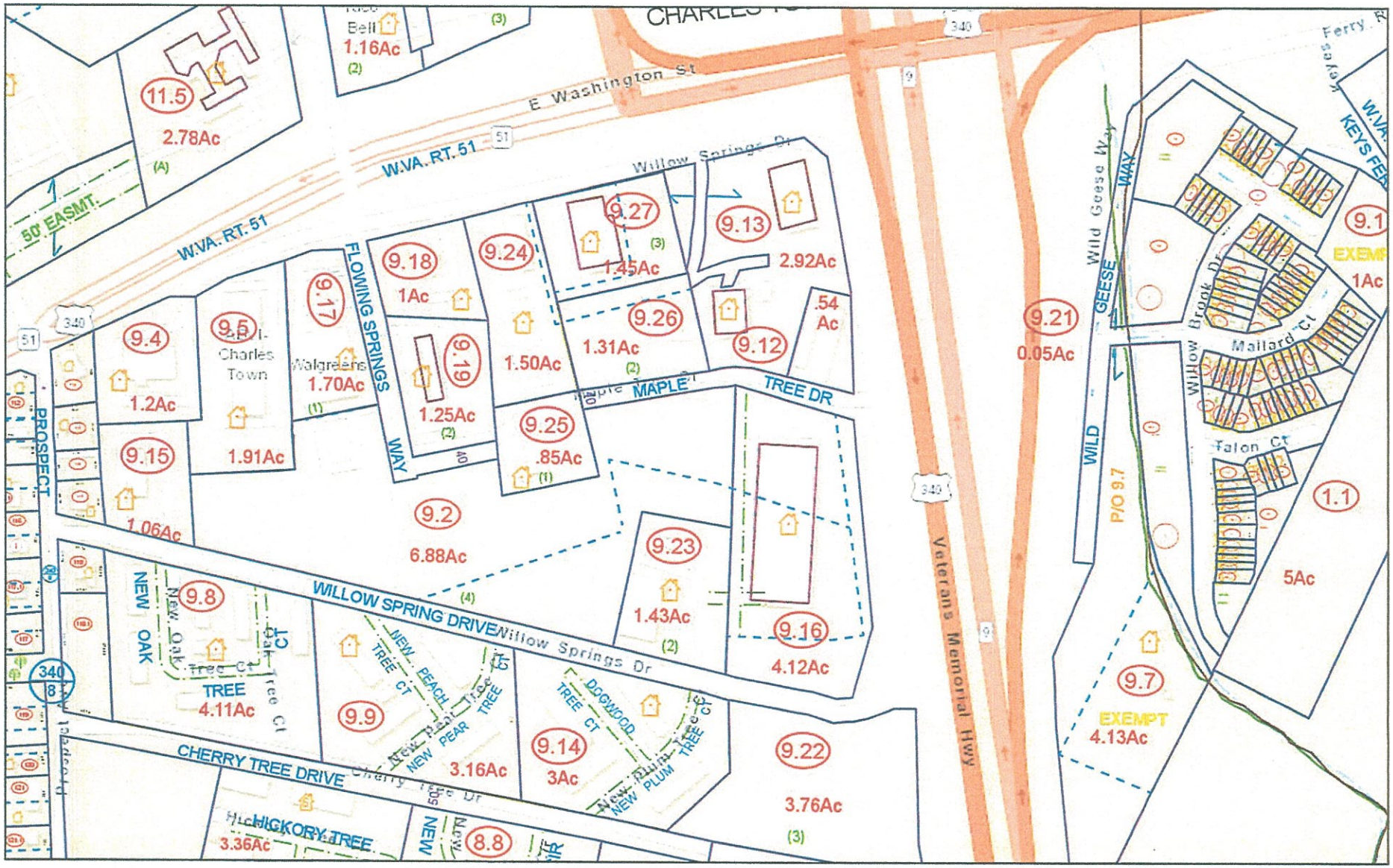
Thank Maria, still need your help with no. 9 titled Parcel History as we do not know what the history of the property is, such as any previously approved application, etc. as stated. Thanks again, Kim

From: Maria Weese <maria@fctwv.com>
Sent: Tuesday, December 20, 2022 2:56 PM
To: Kim Coomler <kim.coomler@thinkalphafirst.com>
Subject: [EXTERNAL] Re: First Charles Town Group Subdivision

Hi Kim,

I have filled out what I can...Hope this helps.

Viewer Map



December 20, 2022

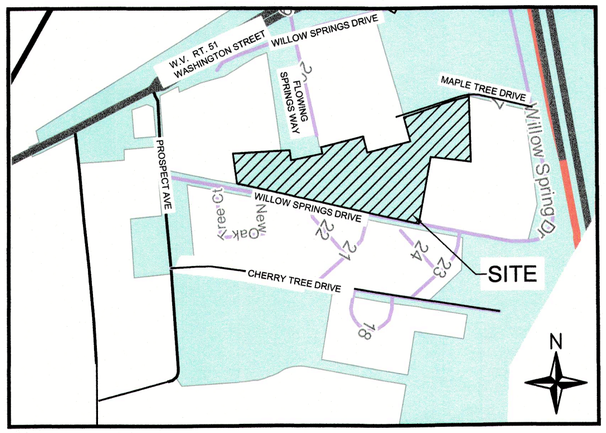
1:4,514

0 162.5 325 650 ft

0 45 90 180 m

County of Loudoun, VITA, Esri, HERE, Garmin, INCREMENT P, Intermap, NGA, USGS

Me
Copyright 2014



VICINITY MAP SCALE 1" = 500'

NOTES:

1. THIS PLAT WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND MAY BE SUBJECT TO RECORDED OR UNRECORDED RIGHT-OF-WAYS, EASEMENTS, RESTRICTIONS OR EXEMPTIONS NOT SHOWN HEREON.
2. THIS PROPERTY IS NOT IN AN AREA DESIGNATED AS A SPECIAL FLOOD AREA, AS SHOWN ON FEMA MAP # 54037C0137E, EFFECTIVE DATE 12/18/2009, .
3. THERE ARE NO WETLANDS LOCATED ON THIS PROPERTY PER THE NATIONAL WETLAND INVENTORY.
4. THE PARENT TRACT CREATED ON PLAT DATED FEB. 2004, AND APPROVED MAY 14TH, 2004 (PLAT BOOK 20, PAGES 92-92C) BY THE JEFFERSON COUNTY DEPARTMENT OF PLANNING, ZONING, AND ENGINEERING, ALONG WITH A MERGER PLAT (PLAT BOOK 25 PAGE 338) ALTERING THE PROPERTY SIZE WHICH WAS APPROVED BY THE CITY PLANNER ON 4/24/2012, BOTH OF WHICH PREDATE THE ADOPTION OF THE CHARLES TOWN SUBDIVISION ORDINANCE ENACTED IN JUNE 2012.
5. THE PARENT PROPERTY IS ZONED: GENERAL COMMERCIAL.
6. THE SETBACKS ARE AS FOLLOWS:
   FRONT: 40' MIN. SIDE: 10' MIN. (OR 25' WHEN ADJOINING RESIDENTIAL) REAR: 30' MIN.
7. MAX BUILDING HEIGHT = 55'; MAX STORIES= 5; MAX COVERAGE 90%
8. PUBLIC WATER AND SANITARY SEWER ARE AVAILABLE FOR THESE PROPERTIES AND WILL BE PROVIDED BY CITY OF CHARLES TOWN UTILITY BOARD.
9. A BLANKET EASEMENT IS GRANTED TO THE APPROPRIATE PUBLIC UTILITIES IN ALL ROAD RIGHT-OF-WAY FOR CONSTRUCTION AND MAINTENANCE OF WATER AND SEWER LINES.
10. ALL RESIDENTIAL AND NON-RESIDENTIAL BUILDING LOTS SHALL HAVE A STABILIZED CONSTRUCTION ENTRANCE INSTALLED PRIOR TO BEGINNING CONSTRUCTION ON THE LOT.
11. FOR DRIVEWAYS THAT REQUIRE A CULVERT FOR DITCH DRAINAGE, THE MINIMUM CULVERT SIZE SHALL BE 15" IN DIAMETER.
12. FLOWING SPRING WAY IS AN EXISTING CITY STREET, THEREFORE A WEST VIRGINIA DOH PERMIT IS NOT NEEDED.
13. BUILDINGS SHOWN HEREON ARE PER AERIAL IMAGERY, AND ARE SHOWN FOR REFERENCE ONLY.

CURVE TABLE

CURVE	LENGTH	RADIUS	DELTA	CHORD LENGTH	CHORD BEARING
C1	107.90	262.95	23°30'38"	107.14	S00°30'08"W
C2	45.66	284.96	9°10'50"	45.61	N81°33'44"E
C3	128.41	312.94	23°30'39"	127.51	N00°30'08"E

LEGEND

T.M.	TAX MAP NUMBER		TELEPHONE MANHOLE
PAR.	PARCEL NUMBER		WATER VALVE
D.B.	DEED BOOK		WATER METER
PG.	PAGE NUMBER		FIRE HYDRANT
N/F	NOW OR FORMERLY		SANITARY SEWER MANHOLE
P.O.B.	POINT OF BEGINNING		WATER LINE (AS PAINTED IN FIELD)
EX.	EXSISTING		PROPERTY LINE
	5/8" REBAR WITH CAP FOUND		ADJOINER LINE
	5/8"X30" REBAR WITH ORANGE CAP SET		UNDERGROUND ELECTRIC LINE (AS PAINTED IN FIELD)
	POINT		TELEPHONE LINE (AS PAINTED IN FIELD)
	5/8" REBAR FOUND		BUILDING OUTLINE
IPF	IRON PIPE FOUND		
C.I.	CURB INLET		

AREA TABLE

EXISTING PARCEL	± 6.8799 ACRES
PARCEL A	± 1.7230 ACRES
PARCEL B	± 4.8666 ACRES
RIGHT OF WAY	± 0.2903 ACRES

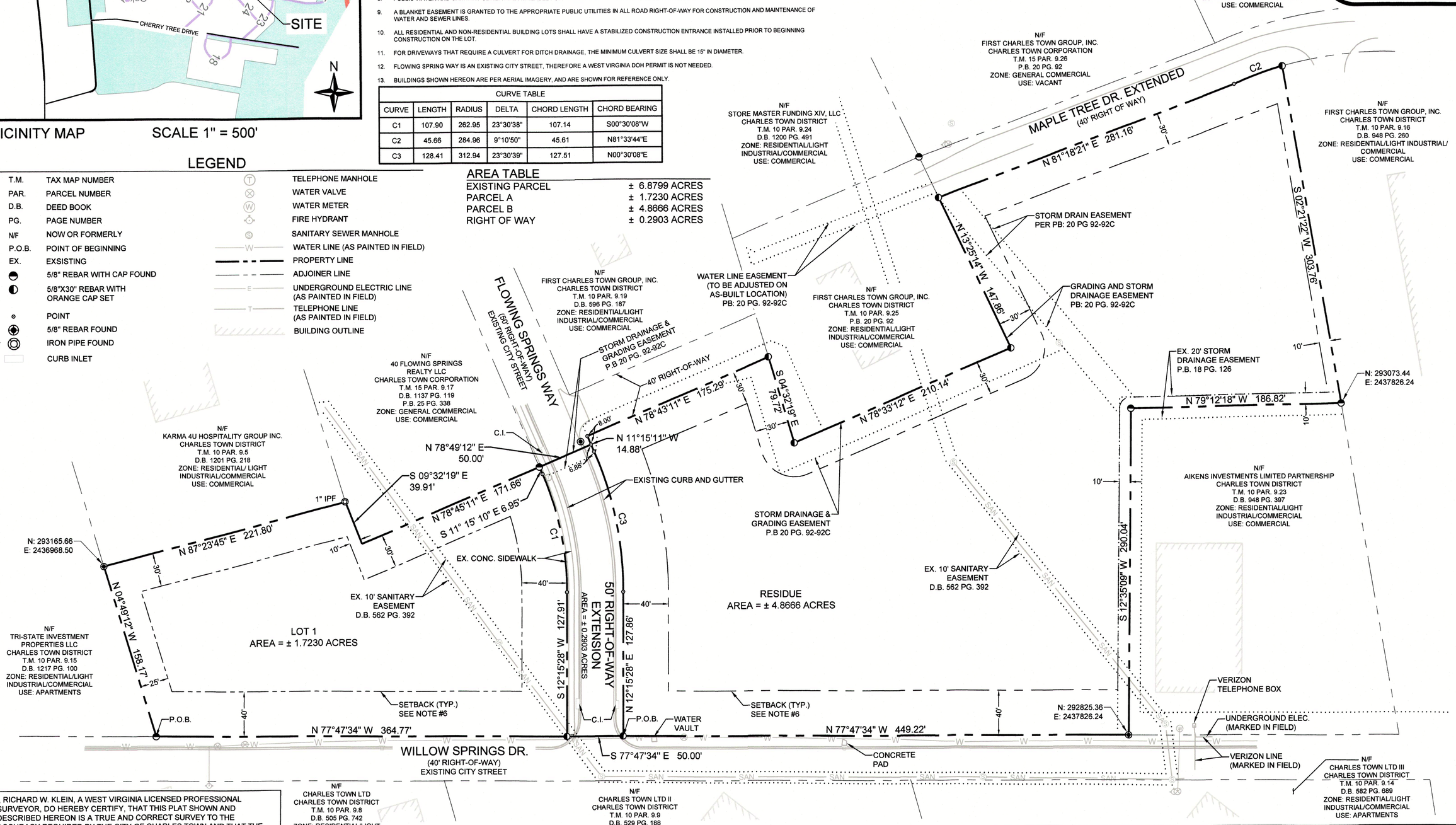
0 30 60 120 Feet
1"= 60'
NAD83 WVSP NORTH (4701)

CITY OF CHARLES TOWN, LIST OF WAIVERS

ORDINANCE	SECTION OF ORDINANCE	DESCRIPTION OF WAIVER OR VARIANCE	DATE GRANTED
NONE REQUESTED			

COVENANTS AND RESTRICTIONS
D.B. 956 PG. 614, 3RD ARTICLE - GROUP AGREES THAT NEITHER HE NOR HIS SUCCESSORS OR ASSIGNS WILL OPERATE, NOR ALLOW THE OPERATION OF, A FULL SERVICE, CASUAL AMERICAN-THEME TYPE RESTAURANT SERVING ALCOHOLIC BEVERAGES UNLESS SUCH RESTAURANT IS PART OF A HOTEL OR MOTEL OPERATION, PROVIDED SUCH HOTEL OR MOTEL OPERATES THE RESTAURANT INDEPENDENTLY FROM ANY NATIONAL OR REGIONAL RESTAURANT CHAIN ON THE GROUP TRACT FOR AS LONG AS THE THE AFG TRACT IS OPERATED AS A RESTAURANT.

Alpha ARCHITECTS ENGINEERS
ALPHA ASSOCIATES, INC.
535 W. KING STREET
MARTINSBURG, WV 25401
PHONE: 304-264-0051
TOLLFREE: 877-264-0051
www.thinkALPHAfirst.com



I, RICHARD W. KLEIN, A WEST VIRGINIA LICENSED PROFESSIONAL SURVEYOR, DO HEREBY CERTIFY, THAT THIS PLAT SHOWN AND DESCRIBED HEREON IS A TRUE AND CORRECT SURVEY TO THE ACCURACY REQUIRED BY THE CITY OF CHARLES TOWN AND THAT THE MONUMENTS HAVE BEEN PLACED AS SHOWN HEREON.

RICHARD W. KLEIN LICENSED No. 1427 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

2/24/23

RICHARD W. KLEIN, P.S. 1427 DATE:

CITY FINAL PLAT NO. _____

THIS PLAT WAS APPROVED FOR RECORDATION BY THE CITY OF CHARLES TOWN, ON THE _____ DAY OF _____, 2023, SUBJECT TO ANY CONDITIONS SPECIFIED HEREON.

ALL EXPENSES INCURRED WITH RESPECT TO IMPROVEMENTS FOR ALL UTILITY SERVICES, PAVING, GRADING, LANDSCAPING, CURBS, GUTTERS, SIDEWALKS, ROAD LIGHTING, ROAD SIGNS, FLOOD PROTECTION DEVICES, DRAINAGE STRUCTURES, AND ALL OTHER IMPROVEMENTS THAT MAY BE REQUIRED SHALL BE THE RESPONSIBILITY OF THE SUBDIVIDER AND NOT THE CITY.

SECRETARY OF THE PLANNING COMMISSION DATE:

ACCEPTANCE STATEMENT:

THE DEVELOPER, IN SIGNING THIS PLAT, AGREES TO ABIDE BY ALL CONDITIONS, TERMS AND SPECIFICATIONS PROVIDED HEREON.

OWNER DATE:

SKETCH PLAN OF SUBDIVISION

FOR

FIRST CHARLES TOWN GROUP, INC.

CHARLES TOWN CORPORATION
T.M. 15 PAR. 9.2 D.B. 953 PG. 563
JEFFERSON COUNTY, WEST VIRGINIA

OWNER/DEVELOPER:
FIRST CHARLES TOWN GROUP, INC.

ADDRESS:
PO BOX 183,
CHARLES TOWN, WV 25414

PHONE:
304-725-8250

ATTN:
MARIA V. WEESE

PROJ. NO.:	2210118.00
DATE:	1/30/2023
REVISED:	2/24/2023

SHEET NO.:

1 OF 1

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z:\projects\2022_jobs\2210118\00\drawings\survey\current\22118 xv-base.dwg 2/24/2023

Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

SLD2022-01 Stone Spring Subdivision - PC Workshop Discussion

ATTACHMENTS:

- 1. Staff Report.pdf
- 2._Application.pdf
- 3._Cond._of_Annexation.pdf
- 4._Plans.pdf
- 5._Traffic_Study.pdf
- 6._Nov_15_2021_TIS_Revision_WVDOH_Approval.pdf
- 7._Stormwater_Management.pdf

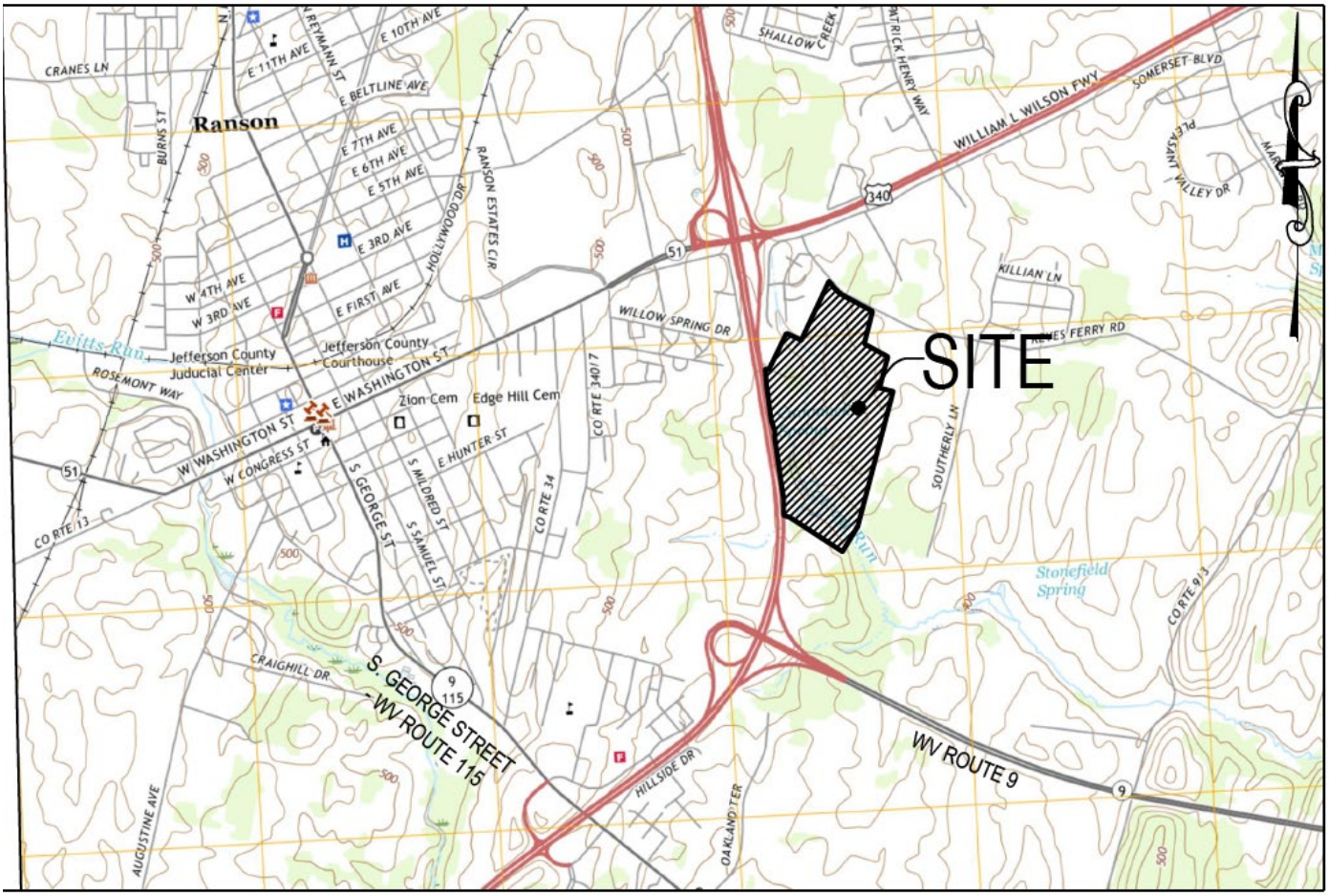
Preliminary Plan Report

SLD2022-01/200164

Date: For the March 27th, 2023 Planning Commission meeting
Applicant: Stanley Martin Homes LLC
Property Owner: Springfield Partners LLC
Report by: James Newman, City Planner, Zoning/Subdivision Administrator.
Proposal: Major Subdivision and Land Development
Property Location: Adjacent to Berryville Pike and Keyes Ferry Road (see outline below).
Current Zoning: Neighborhood Residential.

VICINITY MAP

SCALE:1"=2,000'



PROJECT OVERVIEW

The development of 98.85 acres into 77 townhomes, 248 single-family detached homes, and 3 commercial sites.

SKETCH PLAN

The sketch plan was approved by the Planning Commission on May 23, 2022. The preliminary plan is generally in conformance with the sketch plan, and has improved internal-road connectivity as compared to the sketch plan.

ZONING REVIEW

The property is zoned Neighborhood Residential.

Development Standards

The following standards from Section 1322.08.B.3. apply:

Code	Required, based on site	Provided
50% of total area must be residential	2,152,948 sq. ft.	2,099,263 sq. ft.
10% of total area must be neighborhood commercial	430,590 sq. ft.	255,975 sq. ft.
10% of total area must be open space	430,590 sq. ft.	479,381 sq. ft., plus over 707k sq. ft. of park dedication.

The Conditions of Annexation specify that a maximum of 325 residential units can be developed on site, hence the inability of the plan to meet the minimum required amount. The Conditions of Annexation require that only a minimum of 5 acres be devoted to neighborhood commercial sues, which the plan meets but which does not meet the Code required minimum. The plan also meets and exceeds the minimum open space requirements.

When there is a conflict between the Zoning Ordinance and Conditions of Annexation, Section 1321.05.F states "*Nothing in this Ordinance shall be deemed or construed to void, nullify, abrogate, modify, limit or otherwise adversely affect any right vested under applicable law at the time of enactment of this Ordinance, whether such right arose under a subdivision or land development plan or plat, proffer, condition of annexation, or development agreement proposed by a Person and accepted or approved by the City or any of its departments or commissions or any other source.*"

This preliminary plan, while not meeting all requirements of Section 1322.08.B.3., does adhere to the requirements of the Conditions of Annexation and can be approved.

Density

Maximum density for this site is 24.9 units per acre. Proposed density is 4.7 units an acre.

Open Space

10% of the site must be open space. Open Space is partly defined in Code as land "*intended for the use and enjoyment of the residents living within the development*." Open space and

common areas are predominately located in the western section of the development, and separates the townhomes from the single-family detached homes.

Park Land

Applicants must make a payment of $500 per unit or a land dedication to the City for parkland. The applicant has set aside 16.24 acres to '*Stream Valley Park dedication*'.

Parking

Required parking for townhomes is 1.8 spaces per unit, which for this development requires 139 spaces. Applicant is proposing 154 spaces, for 2 spaces for each townhouse. Single-family detached homes are required to have 2 parking spaces per dwelling unit.

Subdivision Ordinance Section 1333.07.C requires that driveways be no closer than 40 feet to an intersection. There are several lots which do **not meet** this requirement.

Lot Size

No lot in Neighborhood Residential Zoning can exceed 2 acres in size. This criterion is **met**.

Landscaping

Street trees are required for every 50 feet of street frontage. Up to 10 % of these trees may be planted in open space rather than along the street. The plans meet the requirements of the landscaping ordinance.

The site is farmland with some tree coverage. Preservation of existing trees may grant credits, as outlined in table 1333.16:

Table 1333.16 – Tree Credits.

Tree Category	Tree Credit
Existing Tree 1" to 6" Diameter Breast Height (DBH)	1 tree unit per tree retained
Existing Tree 7" to 19" DBH	2 tree units per tree retained
Existing Tree > 20" DBH	3 tree units per tree retained
New or Replacement Tree, Large Species (At maturity more than 40 feet tall)	1 tree unit per tree planted

Buffers

Per Subdivision Ordinance Section 1333.15, for new developments and news uses in existing developments, an opaque buffer and screen of a minimum height of 6ft is required between adjoining residential and non-residential uses.

No such buffer is shown between the commercial sites and home sites; this requirement can be enforced when the commercial sites are developed.

6ft. tall opaque screening is also required between single-family detached and townhouse dwelling units, but **no** such **buffer is shown**.

Stormwater
The applicant submitted plans on January 30, 2023 and sent revised plans on March 17, 202. These revised plans are still under review by the outside engineering firm Kimley-Horn.

Utilities
No waiver has been requested or granted for the location of electric utilities.

TOWNHOUSE DEVELOPMENT STANDARDS
Section 1333.20 of the Subdivision and Land Development Ordinance lays out XX use standards which apply to townhome developments:

*(A) **Density**. The overall density in a townhouse project shall not exceed the Maximum Density specified in the Charles Town Zoning Ordinance for the Zoning District in which it is located except when designed and developed as a Planned Unit Development under provisions set forth in the Charles Town Zoning Ordinance. Density shall be calculated using the Net Buildable Land Area (as such term is defined in the Zoning Ordinance) of the Lot.*

This criterion is **met**. Overall proposed density does not exceed the zoning district maximum.

*(B) **Land Area**. The Net Buildable Land Area (as such term is defined in the Zoning Ordinance) of a townhouse Development shall equal at least 3,500 square feet for each dwelling unit. Each dwelling unit shall have a minimum lot size of 2,000 square feet. The difference between the Net Buildable Land Area and the total area of the dwelling unit Lots shall be allocated to open space common area*.

This criterion is **met**.

*(C) **Tract Frontage**. Each townhouse development shall have at least 50 foot of street frontage. This does not apply to single or multiple contiguous townhouses on an existing platted street. For a townhouse development on a pipestem lot, the minimum pipestem width shall be the right-of-way width as required per Table 1333.02.*

This criterion is **met**. Each section of townhomes meets this requirement.

(D) ***Townhouse Lot Width****. The minimum townhouse lot width shall be in accordance with the minimum lot with specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located. Each Lot on the end of a row of townhouses shall have an additional width necessary to accommodate the required side yard.*

This criterion is **met**. The minimum lot width requirement in NR zoning is 18 ft.

(E) ***Length of Townhouse Row****. There shall be not be more than ten (10) nor less than three (3) contiguously connected townhouse units.*

This criterion is **met**.

(F) ***Yards****. The following minimum Setback requirements shall apply:*

1. ***Front Yard****. Each townhouse shall have a minimum front yard Setback that is in accordance with the minimum front yard setback specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located. Townhouses, however, may be arranged to face onto a common open space. In such instances, such a space shall not be less than fifty (50) feet in width and shall be arranged to permit access for emergency vehicles.*

With such an arrangement, the front yard requirement may be reduced by ten (10) feet. If the townhouses have rear loaded garages or parking, the setback can be reduced from the required setback distance to zero (0) feet, or any distance in between, provided that no steps or stoops shall be allowed within the right of way or upon sidewalk, unless the sidewalk has a clear walking path of five (5) feet from the closest edge of the steps or stoop to the edge of curb. This reduced setback shall supersede the Zoning Ordinance requirements.

2. ***Side Yard****. Each townhouse shall have a minimum side yard Setback that is in accordance with the minimum side yard setback specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located. When the yard adjoining the corner Lot along the rear lot line fronts the side Street of the corner Lot, the width of the corner Lot shall be increased to provide a minimum side yard Setback equal to the adjoining front yards.*

3. ***Rear Yard****. Each townhouse shall have a minimum rear yard Setback that is in accordance with the minimum rear yard setback specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located. However, access to the rear yard for purposes of maintenance and fire protection shall be accommodated by a private access drive or a minimum ten (10) foot property service easement, which shall be perpetually recorded with each dwelling unit property.*

An accessory Building shall be located only in a rear yard and shall occupy not over twenty-five (25) percent of the rear yard area and shall be located not less than five (5) from any Alley or rear service Street Line. Enclosing of the rear yard space is permitted pursuant to the fencing requirements specified under Article 1323 (H) of the Charles Town Zoning Ordinance.

These setback criteria are **met**. The proposed development meets the setback requirements, which are:

Front: 25 ft.
Sides: 25 ft., or 0 ft. for a shared party-wall.
Rear: 20 ft.

(G) ***Access Drives and Off-Street Parking****. Off-street parking space shall be provided at the rate of 1.8 spaces per dwelling unit. In a Subdivision/Land Development of townhouse Lots, it will not be necessary that off-street parking be provided on a specific Lot so long as the required number of parking spaces are provided in the Subdivision/Land Development for the number of Lots to be served; provided that, no parking area shall be more than 200 feet from the dwelling unit it serves.*

This criterion is **met**. Each unit features a driveway, and parking is available on both sides of the proposed roads.

(H) ***Townhouse garages*** *may be attached to or detached from the townhouse unit and may be accessed from either the front or rear yard. When detached the garage structure must be consistent and compatible with the architecture and materials of the respective townhouse unit.*

This criterion is **met**.

(I) Townhouses abutting each other shall have complimentary but not identical ***facades****.*

This criterion will be enforced during the building permit process. No architectural plans have been provided for staff review yet.

(J) No more than two abutting townhouses shall have a ***common roof line****.*

This criterion will be enforced during the building permit process. No architectural plans have been provided for staff review yet.

(K) All ***electric meters*** *shall be located in the rear of dwelling units, except where a waiver may be granted by the Planning Commission.*

The applicant has not requested a waiver from this standard.

(L) When townhouse Lots do not front on a Public Street, they shall front on private roads, parking lots or access Easements. The length and extent of private roads, parking lots or access Easements providing access to Lots shall be minimized, and Public Streets shall be provided in larger Subdivisions/Land Developments when substantial distances are involved.

Private roads, parking lots, and access Easements shall be no more than 500 feet from a Public Street, as measured along the centerline of the access Road. Private roads, parking lots, and access Easements may be located up to 800 feet from a public Road where enhanced circulation is provided with two connection points to the Public Street. The average daily trip for private roads, parking lots, or access Easements shall not exceed 250 VPD. Townhouse Developments that include the use of private roads, parking lots and access Easements shall conform to the West Virginia Code Chapter 36B, Uniform Common Interest Ownership Act, as specified under Section 1333.21 of this Ordinance.

This criterion is **not met.** The traffic impact analysis provided is for a 'Fritts Farm Project' of 255 single-family detached homes and 56 townhomes, which is different from the total proposed for this project.

Townhouse Developments that include the use of private roads, parking lots and access Easements shall conform to the West Virginia Code Chapter 36B, Uniform Common Interest Ownership Act, as specified under Section 1333.21 of this Ordinance (Homeowners Association).

(M) ***Site Coverage****. The minimum townhouse lot width shall be in accordance with the minimum lot with specified in the Charles Town Zoning Ordinance for the Zoning District in which the townhouse is located.*

This criterion is **met**. Minimum lot size is 2,000 sq. ft.

(N) Adequate provision shall be made for ***storage of collection and refuse*** *where applicants desire a centralized collection point(s) in lieu of curb-side trash pick-up. This area shall be screened and the dumpsters placed on a concrete pad pursuant to Article 1333.23(L) of this Ordinance.*

The plan does not show any centralized dumpster or waste collection facilities or pads. This criteria would only apply if such facilities were proposed.

(O) ***Permeable areas*** *of the site shall be planted with ground cover, shrubs, and trees as required by this Ordinance.*

This information is being reviewed by Kimley-Horn as part of their stormwater review. Open space is generally planted with grass.

(P) ***Required Open Space****.*

1. The difference between the Net Buildable Land Area of a townhouse Development and the total area of the dwelling unit Lots shall be allocated to open space common area as specified in Section 1333.20(B) above.

2. In the event that the Planning Commission, by waiver, permits dwelling unit Lots of less than the 2,000 square foot minimum specified in Section 1333.20(B), compensating open space must be established and provided within the project site equal to the aggregate area by which such Lots are under the 2,000 square foot minimum.

3. In a townhouse Development, open space for the Subdivision/Land Development must at least equal 30 percent of the Net Buildable Land Area of the Subdivision/Land Development.

This criterion has been **met**.

(Q) ***Maintenance of Common Areas****. All common areas and facilities including, but not limited to, recreational facilities, off-street parking and common open space shall be maintained in a satisfactory manner without expense to the general taxpayers of the City. In order to insure the maintenance of and the payment of taxes on the commonly held non-public property, a mandatory homeowners association shall be created and a declaration regarding the same shall be recorded to the satisfaction of the Planning Commission in the Office of the Clerk of Jefferson County.*

Neither the plan nor application mention a Homeowners Association.

RECOMMENDATION

The preliminary plat and plan is generally **in conformance with the approved sketch plan**. Issues surrounding this preliminary plan include adequate landscaping buffers between townhomes and single-family lots; buffers between commercial and residential uses; driveways within 40 feet of an intersection; discrepancies between the traffic impact analysis and plans, and the need to address any further comments from staff based on the revised March 17, 2023 plans.

Approval by the Planning Commission is not a public hearing, and is for the benefit of the Planning Commission to ensure the Preliminary Plat and Plan is in substantial compliance with the sketch plan.

Based on the outstanding issues, the Planning Commission should vote to **table** making a decision on the preliminary plat and plan until their meeting on April 24th. Decision which are tabled may be tabled for up to 45 days.

S/LD Application No._____

SUBDIVISION AND LAND DEVELOPMENT APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
ARTICLE 1332, SUBDIVISION AND LAND DEVELOPMENT APPLICATION & APPROVAL REQUIREMENTS

To assist the Subdivision Administrator in the review of a Subdivision and Land Development (S/LD) Application, the Applicant must utilize this form to supply the City with the information prescribed under Section 1332.03 of the Charles Town Subdivision Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's S/LD Application as required by Ordinance Section 1332.03.

1. DATE January 30, 2023

2. APPLICATION TYPE

☐ Minor Subdivision | Final S/LD Plan

☐ Major Subdivision Development*
- Preliminary S/LD Plan and Final Plat

☐ Major Land Development**
- Preliminary S/LD Plan

☒ Major Subdivision and Land Development***
- Preliminary S/LD Plan and Final Plat

*Conventional Subdivision – A Preliminary Plan and Plat Approval and a Final Plan and Plat Approval is required.

**No Division/Merger of Land – A Preliminary Plan and Plat Approval is required for the submission of a building or multiple buildings on one lot where there is no subdivision of land (commonly referred to as a site plan).

***A Preliminary Plan and Plat Approval and a Final Plan and Plat Approval is required for the submission of a building or multiple buildings that will require the merger, adjustment or subdivision of land.

3. APPLICANT'S NAME* Stanley Martin Homes, LLC

Address: 14200 Park Meadow Drive, Ste. 100N, Chantilly, VA 20151

Telephone Number (703) 636-9232 Fax Number ( )

Email Address webersj@stanleymartin.com

4. PROPERTY OWNER'S NAME Springfield Partners, LLC

Address: 59 Franklin Street, Annapolis, MD 21401

Telephone Number (301) 758-4541 Fax Number ( )

Email Address tbaum@conduitstpartners.com

5. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address: 412 Keyes Ferry Rd., Charles Town, WV 25414

Tax Map # and Parcel: TM 15 Parcel 1

Deed Book and Page #: DB 451 PG 745

Property Area in Square Feet or Acres: 98.88 Acres

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

The proposed site improvements for Stone Springs Subdivision include the construction of 248 Single Family Detached units, 77 Townhouse units, 3 Commercial lots, drive aisles and parking areas with associated drainage structures, SWM facilities and public utilities.

7. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

The site is currently a working Farm and the current zoning is Neighborhood Residential.

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

8. ARE THERE ANY ANTICIPATED WAIVERS OR VARIANCES? IF YES, PROVIDE DETAILS.

There are no granted or anticipated waivers/variances at this time.

9. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date
SLD-2022-01-SP	Sketch plan	Approved	May 23, 2022
2022-003	Conditions of Annexation Repeal and Replace	Approved	Feb. 7, 2022

10. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

☒ No

11. PLAN/PLAT SUBMISSION TO OTHER AGENCIES (Documentation of all required approvals must be attached to this Application or submitted prior to Preliminary S/LD Application approval)

Agency (Specify others as applicable)	Submittal Date	Approval/Permit Issued	Date of Approval/Issuance
City of Charles Town	01/30/2023		
City of Charles Town Utility Board	01/30/2023		
Jefferson County Planning and Zoning Department	01/30/2023		
Jefferson County Addressing Office	10/17/2022	Approval	10/17/2022
Jefferson County Board of Education	N/A		
WV Department of Environmental Protection	01/23/2023	Pending - WVR111983	
WV Department of Transportation, Division of Highways	12/23/2022	Pending	
WV State Historic Preservation Office	N/A		
WV Office of Environmental Health Services	01/23/2023	Pending	
U.S. Army Corps of Engineers	N/A		

12. FEE CALCULATION (Per Fee Schedule) $200 filing fee plus $50 building

325 buildings X $50 = 16,250

Filing Fee = $200

AMOUNT PAID $ 16,450.00

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1332.03 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant

FFB0E476F7D8420... Date 1/30/2023 | 4:29 PM EST

Signature of Property Owner (If different than Applicant)

Date 01/24/2023

Please submit an original completed Application and specified number of Plan/Plat (Three (3) copies at 24" x 36", Adobe PDF format, and Five (5) copies at 11" x 17") copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments/Conditions:_____

City Council
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

Meeting: 02/07/22 07:00 PM
Department: City Council
Category: Agreement
Initiator: Daryl Hennessy

AGENDA ITEM (ID # 5366)

Fritts Farm Conditions of Annexation - Repeal and Replace

A negotiating committee consisting of Mayor Trainor and Councilors Twyford, George, and Hynes, met with the property owners of Fritts Farm and their prospective buyer/builder, to negotiate new terms regarding the development of this nearly 100 acre parcel of land located at 412 Keyes Ferry Road. Attached are a proposed resolution that replaces the Conditions of Annexation approved by Council in 2008 and the latest, preliminary concept plan for the site. Final approval of the concept plan will require review by the Planning Commission for consistency with the new development terms and the City's other subdivision and land development standards.

Proposed Motion. Move to repeal the 2008 Conditions of Annexation approved by Council for the Fritts Farm project and replace with the new Conditions of Annexation contained in the attached resolution.

ATTACHMENTS:

- Fritts Farm - Amended Conditions of Annexation (v2.0) (PDF)
- Fritts Concept Plan E (January 6, 2022) (PDF)

City of Charles Town

101 East Washington Street, P.O. Box 14, Charles Town, WV 25414
Phone: (304) 725-2311 ♦ Web: www.charlestownwv.us

RESOLUTION

Resolution to Repeal and Replace the Conditions of Annexation for the Fritts Property

WHEREAS, in 2008, J. Russell Fritts, Inc. presented a petition to annex property into the City of Charles Town (City) that was subsequently referred to the Finance Committee (Committee) and the Planning Commission (Commission) for review, analysis, and recommendation; and

WHEREAS, the Committee and Commission recommended, and the Charles Town City Council (Council) approved via Resolution 2008-06 on March 17, 2008, the annexation of such land into the City with several conditions including a zoning designation of Neighborhood Residential; and

WHEREAS, the petitioners agreed that any conditions of annexation imposed by Council at that time would bind the owners of the property, their successors, and assigns; and

WHEREAS, nearly fourteen years after that initial agreement was made, the subject property remains undeveloped and the current family owners, working with a new developer, have requested that Council consider amendments to the original agreement that reflect the City's current growth plans and existing economic conditions; and

WHEREAS, Council appointed a negotiating team (Negotiating Team) on August 16, 2021, including representatives from the City's current Finance Committee, Planning Commission, and Council, to work with the current owners to determine if amendments should be recommended to the full Council for further consideration; and

WHEREAS, after several productive discussions with the current property owners and prospective developer of the Fritts Property that was annexed with conditions into the City pursuant to Resolution 2008-006 (Resolution), the Negotiating Team recommends repealing the conditions of annexation imposed by the Resolution and replacing with new terms and conditions.

NOW, THEREFORE BE IT RESOLVED Council agrees to the following new terms and conditions with respect to the development of the Fritts Property:

1. the development shall be subject to the City's current Neighborhood Residential zoning standards, except that the portion of land planned for commercial use shall be satisfied if at least five acres of land are set aside for neighborhood commercial uses; and
2. on land set aside for neighborhood commercial uses, mixed-use construction including first floor commercial and upper level residential uses shall be permitted and considered, subject to all other limitations, including height, in a Neighborhood Residential zoning district; and

Attachment: Fritts Farm - Amended Conditions of Annexation (v2.0) (5366 : Fritts Farm Conditions of Annexation - Repeal and Replace)

3. notwithstanding any residential units contained in a mixed-use commercial structure, the total number of residential units proposed for the site may not exceed 325 units; and
4. the final concept plan approved by the Planning Commission must include a road connection to the Langlet property located to the southeast of the Fritts property; and
5. each new unit of residential development on the site, except for those contained in a mixed-use structure, shall be subject to a voluntary financial proffer of $2,448 per unit that may be used by the City to fund any of its future capital needs; and
6. the financial proffer is subject to adjustment by the City every five years, starting from the Planning Commission's approval of the final preliminary plat drawings for the initial phase. The City will provide the owner/developer with a written 60-day advanced notice of the financial proffer increase with supporting documentation to justify the fee increase. Council will consider force majeure before increasing the fee; and
7. the owner/developer will pay $50,000 to the City after the Planning Commission has conceptually approved the development's preliminary plat, which will be used to fund a feasibility study aimed at improving pedestrian connectivity for residents of the City's 4th Ward to the Downtown; and
8. parkland proposed for dedication to the City will include vehicular access and parking improvements for visitors to this City park; and
9. in addition to other parkland dedication required by the City's ordinances, the owner/developer agrees to include a neighborhood park of at least 0.5 acres near the center of the development that will include adequate playground equipment for its residents; and

NOW, THEREFORE BE IT FURTHER RESOLVED, the Planning Commission shall review the owner/developers' preliminary plan for development dated January 6, 2022 for consistency with the Neighborhood Zoning district standards and other conditions outlined in this resolution, make adjustments with the owner/developer as agreed, and perform all other routine duties as outlined in the City's Subdivision and Land Development Ordinance related to this project; and

NOW, THEREFORE BE IT FURTHER RESOLVED, Council and the property owner agree that the terms and conditions contained in this resolution shall bind the current owner, their successor, and assigns.

Adopted the _____day of February 2022.

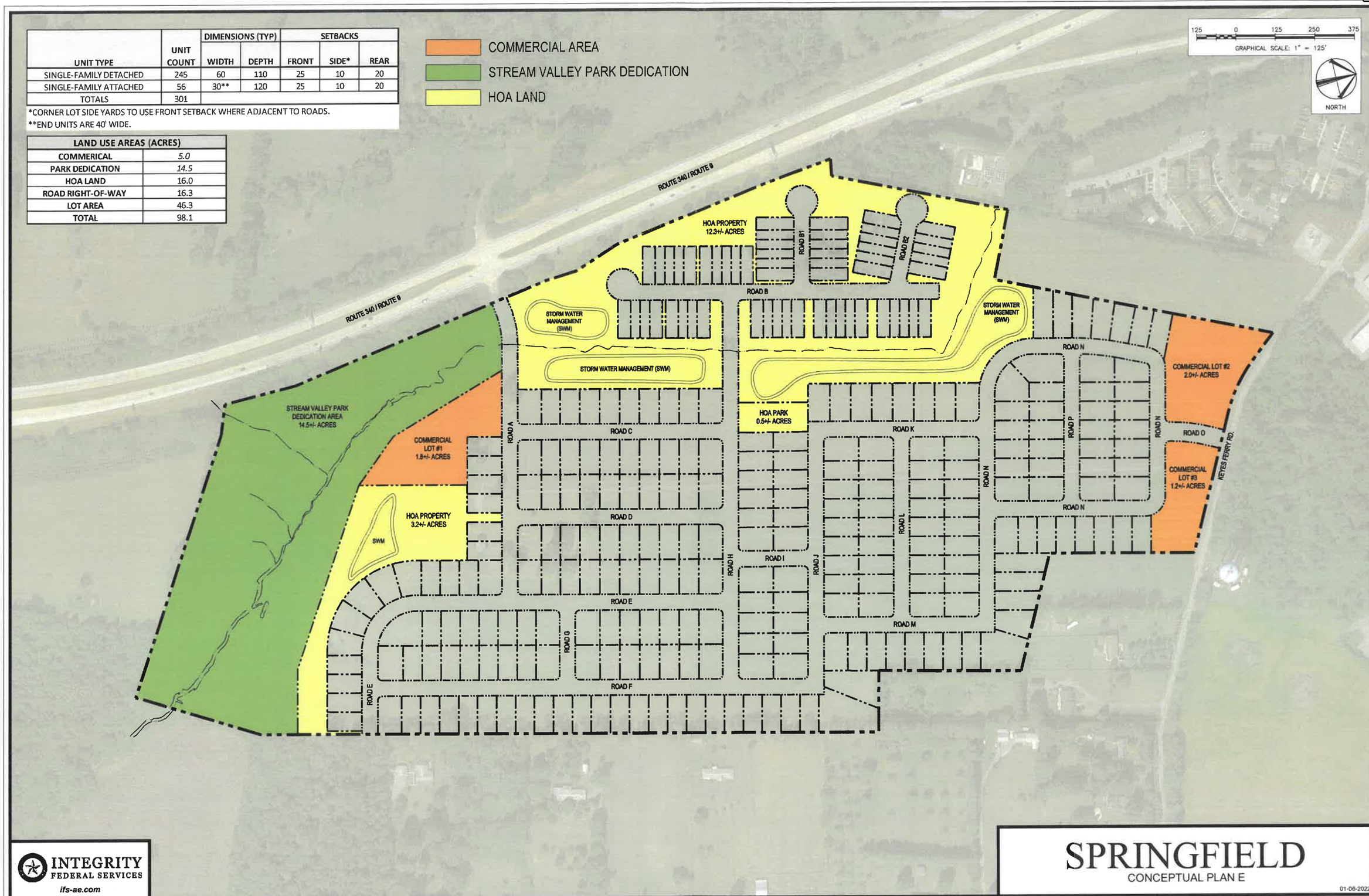
_____	_____
Robert M. Trainor	Daryl Hennessy
Mayor	City Manager/Clerk

Attachment: Fritts Farm - Amended Conditions of Annexation (v2.0) (5366 : Fritts Farm Conditions of Annexation - Repeal and Replace)

UNIT TYPE	UNIT COUNT	DIMENSIONS (TYP)		SETBACKS		
		WIDTH	DEPTH	FRONT	SIDE*	REAR
SINGLE-FAMILY DETACHED	245	60	110	25	10	20
SINGLE-FAMILY ATTACHED	56	30**	120	25	10	20
TOTALS	301					

*CORNER LOT SIDE YARDS TO USE FRONT SETBACK WHERE ADJACENT TO ROADS.
**END UNITS ARE 40' WIDE.

LAND USE AREAS (ACRES)	
COMMERICAL	*5.0*
PARK DEDICATION	*14.5*
HOA LAND	16.0
ROAD RIGHT-OF-WAY	16.3
LOT AREA	46.3
TOTAL	98.1



Attachment: Fritts Concept Plan E (January 6, 2022) (5366 : Fritts Farm Conditions of Annexation - Repeal and Replace)

PRELIMINARY SUBDIVISION / LAND DEVELOPMENT PLAT
STONE SPRING SUBDIVISION

CITY OF CHARLES TOWN
JEFFERSON COUNTY, WEST VIRGINIA
TAX MAP 15, PARCEL 01; D.B. 451, PG. 745

OWNER/APPLICANT
STANLEY MARTIN HOMES, LLC
14200 PARK MEADOW DRIVE, SUITE 100N
CHANTILLY, VA 20151

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 • Phone: 304-725-8456
Martinsburg, WV 25401 • www.ifs-ae.com

CIVIL LEGEND:

EXISTING | PROPOSED

- BOUNDARY/RIGHT-OF-WAY LINE
- ADJACENT BOUNDARY LINE
- CONCRETE MONUMENT/IRON REBAR (EX. VDH, EX. CC, IPF, RBF; CC-TBS, TBS)
- EASEMENT LINE
- ROAD CENTERLINE
- HEADER CURB
- CURB & GUTTER (CURB, TRANS., REVERSE CURB)
- EDGE OF PAVEMENT
- EDGE OF CONCRETE
- EDGE OF GRAVEL
- SIDEWALK
- GUARDRAIL
- BOARD FENCE
- CHAIN LINK FENCE
- WIRE FENCE
- BUILDINGS (TO BE REMOVED, TO REMAIN)
- RETAINING WALL
- MISCELLANEOUS SIGNS
- MAIL BOX
- SITE LIGHT WITH POLE
- BUILDING MOUNTED LIGHT
- UTILITY POLE
- UTILITY POLE GUY WIRE
- OVERHEAD UTILITY LINE
- UNDERGROUND UTILITY LINE
- OVERHEAD COMMUNICATIONS LINE
- UNDERGROUND COMMUNICATIONS LINE
- UNDERGROUND GAS LINE
- SANITARY SEWER MAIN (8" PVC SAN. SEW.)
- SANITARY SEWER FORCE MAIN
- SANITARY SEWER MANHOLE
- SANITARY SEWER CLEAN-OUT
- STORM SEWER LINE (15" HDPE)
- STORM SEWER MANHOLE
- STORM SEWER DROP INLET
- STORM SEWER CURB INLET
- STORM SEWER RIP-RAP
- STORM SEWER END SECTION
- WATER MAIN (8" W/M)
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- INDEX CONTOUR LINE (590)
- INTERMEDIATE CONTOUR LINE (592)
- SPOT ELEVATIONS (543.6; +45 GS, +45 TC, +45 INV)
- TREES/SHRUBS
- DRIP LINE OF TREES
- LIMITS OF CONSTRUCTION
- SOIL BOUNDARY (HbB, HgC)

Know what's **below.** **Call** before you dig.

CONDITIONS OF ANNEXATION NOTES:

1. THE DEVELOPMENT SHALL BE SUBJECT TO THE CITY'S CURRENT NEIGHBORHOOD RESIDENTIAL ZONING STANDARDS, EXCEPT THAT THE PORTION OF LAND PLANNED FOR COMMERCIAL USE SHALL BE SATISFIED IF AT LEAST FIVE ACRES OF LAND ARE SET ASIDE FOR NEIGHBORHOOD COMMERCIAL USES.
2. ON LAND SET ASIDE FOR NEIGHBORHOOD COMMERCIAL USES, MIXED-USE CONSTRUCTION INCLUDING FIRST FLOOR COMMERCIAL AND UPPER LEVEL RESIDENTIAL USES SHALL BE PERMITTED AND CONSIDERED, SUBJECT TO ALL OTHER LIMITATIONS, INCLUDING HEIGHT, IN A NEIGHBORHOOD RESIDENTIAL ZONING DISTRICT.
3. NOTWITHSTANDING ANY RESIDENTIAL UNITS CONTAINED IN A MIXED-USE COMMERCIAL STRUCTURE, THE TOTAL NUMBER OF RESIDENTIAL UNITS PROPOSED FOR THE SITE MAY NOT EXCEED 325 UNITS.
4. THE FINAL CONCEPT PLAN APPROVED BY THE PLANNING COMMISSION MUST INCLUDE A ROAD CONNECTION TO THE LANGLET PROPERTY LOCATED TO THE SOUTHEAST OF THE FRITTS PROPERTY.
5. EACH NEW UNIT OF RESIDENTIAL DEVELOPMENT ON THE SITE, EXCEPT FOR THOSE CONTAINED IN A MIXED-USE STRUCTURE, SHALL BE SUBJECT TO A VOLUNTARY FINANCIAL PROFFER OF $2,448 PER UNIT THAT MAY BE USED BY THE CITY TO FUND ANY OF ITS FUTURE CAPITAL NEEDS.
6. THE FINANCIAL PROFFER IS SUBJECT TO ADJUSTMENT BY THE CITY EVERY FIVE YEARS, STARTING FROM THE PLANNING COMMISSION'S APPROVAL OF THE FINAL PRELIMINARY PLAT DRAWINGS FOR THE INITIAL PHASE. THE CITY WILL PROVIDE THE OWNER/DEVELOPER WITH A WRITTEN 60-DAY ADVANCED NOTICE OF THE FINANCIAL PROFFER INCREASE WITH SUPPORTING DOCUMENTATION TO JUSTIFY THE FEE INCREASE. COUNCIL WILL CONSIDER FORCE MAJEURE BEFORE INCREASING THE FEE.
7. THE OWNER/DEVELOPER WILL PAY $50,000 TO THE CITY AFTER THE PLANNING COMMISSION HAS CONCEPTUALLY APPROVED THE DEVELOPMENT'S PRELIMINARY PLAT, WHICH WILL BE USED TO FUND A FEASIBILITY STUDY AIMED AT IMPROVING PEDESTRIAN CONNECTIVITY FOR RESIDENTS OF THE CITY'S 4TH WARD TO THE DOWNTOWN.
8. PARKLAND PROPOSED FOR DEDICATION TO THE CITY WILL INCLUDE VEHICULAR ACCESS AND PARKING IMPROVEMENTS FOR VISITORS TO THIS CITY PARK.
9. IN ADDITION TO OTHER PARKLAND DEDICATION REQUIRED BY THE CITY'S ORDINANCES, THE OWNER/DEVELOPER AGREES TO INCLUDE A NEIGHBORHOOD PARK OF AT LEAST 0.5 ACRES NEAR THE CENTER OF THE DEVELOPMENT THAT WILL INCLUDE ADEQUATE PLAYGROUND EQUIPMENT FOR ITS RESIDENTS.

Sheet List Table

Sheet Number	Sheet Title
01	COVER SHEET
02	GENERAL NOTES
03	GENERAL DETAILS
04	GENERAL DETAILS
05	EXISTING CONDITIONS & DEMOLITION PLAN
06	OVERALL SITE PLAN
07	EROSION & SEDIMENT CONTROL NARRATIVE
08	EROSION & SEDIMENT CONTROL PLAN - PHASE I
09	EROSION & SEDIMENT CONTROL PLAN - PHASE I
10	EROSION & SEDIMENT CONTROL PLAN - PHASE I
11	EROSION & SEDIMENT CONTROL PLAN - PHASE I
12	EROSION & SEDIMENT CONTROL PLAN - PHASE I
13	EROSION & SEDIMENT CONTROL PLAN - PHASE I
14	EROSION & SEDIMENT CONTROL PLAN - PHASE II
15	EROSION & SEDIMENT CONTROL PLAN - PHASE II
16	EROSION & SEDIMENT CONTROL PLAN - PHASE II
17	EROSION & SEDIMENT CONTROL PLAN - PHASE II
18	EROSION & SEDIMENT CONTROL PLAN - PHASE II
19	EROSION & SEDIMENT CONTROL PLAN - PHASE II
20	EROSION & SEDIMENT CONTROL NOTES & DETAILS
21	EROSION & SEDIMENT CONTROL DETAILS
22	EROSION & SEDIMENT CONTROL DETAILS
23	EROSION & SEDIMENT CONTROL COMPUTATIONS
24	PRELIMINARY PLAT
25	PRELIMINARY PLAT
26	PRELIMINARY PLAT
27	PRELIMINARY PLAT
28	PRELIMINARY PLAT
29	PRELIMINARY PLAT
30	PRELIMINARY PLAT COMPUTATIONS
31	SITE LAYOUT & UTILITY PLAN
32	SITE LAYOUT & UTILITY PLAN
33	SITE LAYOUT & UTILITY PLAN
34	SITE LAYOUT & UTILITY PLAN
35	SITE LAYOUT & UTILITY PLAN
36	SITE LAYOUT & UTILITY PLAN
37	GRADING & DRAINAGE PLAN
38	GRADING & DRAINAGE PLAN
39	GRADING & DRAINAGE PLAN
40	GRADING & DRAINAGE PLAN
41	GRADING & DRAINAGE PLAN
42	GRADING & DRAINAGE PLAN
43	ROAD A PLAN & PROFILE
44	ROAD B PLAN & PROFILE
45	ROAD B1 & B2 PLAN & PROFILE
46	ROAD G & C PLAN & PROFILE
47	ROAD D & E PLAN & PROFILE
48	ROAD E PLAN & PROFILE
49	ROAD F PLAN & PROFILE
50	ROAD H PLAN & PROFILE
51	ROAD I & J PLAN & PROFILE
52	ROAD K & L PLAN & PROFILE
53	ROAD M & O PLAN & PROFILE
54	ROAD N PLAN & PROFILE
55	ROAD P & R PLAN & PROFILE
56	ROAD S PLAN & PROFILE
57	SANITARY SEWER PLAN & PROFILE
58	SANITARY SEWER PLAN & PROFILE
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66	SANITARY SEWER PLAN & PROFILE
67	SANITARY SEWER PLAN & PROFILE
68	SANITARY SEWER PLAN & PROFILE
69	SANITARY SEWER FORCE MAIN PLAN & PROFILE
70	SANITARY SEWER FORCE MAIN PLAN & PROFILE
71	SANITARY SEWER COMPUTATIONS
72	SANITARY SEWER COMPUTATIONS
73	SANITARY SEWER COMPUTATIONS
74	SANITARY SEWER DETAILS
75	SANITARY SEWER DETAILS
76	PUMP STATION DETAILS
77	PUMP STATION DETAILS
78	PUMP STATION DETAILS
79	WATER MAIN PLAN & PROFILE
80	WATER MAIN PLAN & PROFILE
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88	WATER MAIN PLAN & PROFILE
89	WATER MAIN PLAN & PROFILE
90	WATER MAIN PLAN & PROFILE
91	WATER DETAILS
92	WATER DETAILS
93	STORM SEWER PROFILES
94	STORM SEWER PROFILES
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103	STORM SEWER PROFILES
104	STORM SEWER PROFILES
105	STORM SEWER PROFILES
106	STORM SEWER COMPUTATIONS
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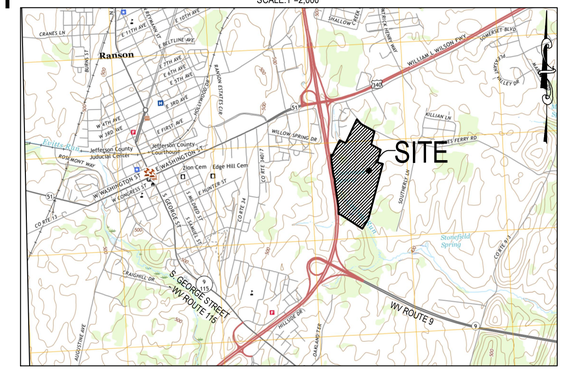
129	WV 340 CROSS SECTIONS
130	WV 340 CROSS SECTIONS
131	WV 340 CROSS SECTIONS
132	WV 340 CROSS SECTIONS
133	WV 340 CROSS SECTIONS

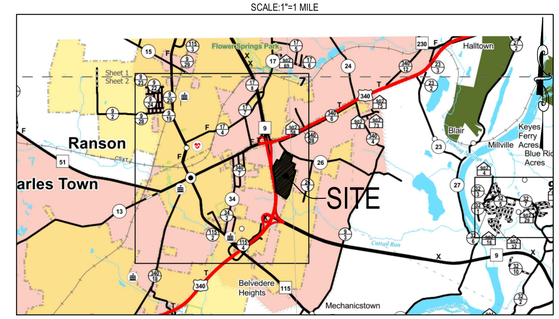
VICINITY MAP

SCALE:1"=2,000'



WVDOH VICINITY MAP

SCALE:1"=1 MILE



APPROVAL BLOCK:

THIS PRELIMINARY PLAN AND PLAT WAS APPROVED BY THE CITY OF CHARLES TOWN, ON THE ____ DAY OF _____, 20___, SUBJECT TO ANY CONDITIONS SPECIFIED HEREON.

ALL EXPENSES INCURRED WITH RESPECT TO IMPROVEMENTS FOR ALL UTILITY SERVICES, PAVING, GRADING, LANDSCAPING, CURBS, GUTTERS, SIDEWALKS, ROAD LIGHTING, ROAD SIGNS, FLOOD PROTECTION DEVICES, DRAINAGE STRUCTURES AND ALL OTHER IMPROVEMENTS THAT MAY BE REQUIRED SHALL BE IN THE RESPONSIBILITY OF THE SUBDIVIDER AND NOT THE CITY.

SECRETARY OF THE PLANNING COMMISSION _____ DATE _____

FLOODPLAIN:

THIS PROPERTY IS LOCATED WITHIN ZONE "X" AREAS OF 0.2% ANNUAL CHANCE FLOOD AND ZONE "A" SPECIAL FLOOD HAZARD AREA SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD, BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) ON FLOOD INSURANCE RATE MAP NO. 54037C0137E FOR COMMUNITY NO. 540065; EFFECTIVE DATE: 12/18/2009.

CERTIFICATE OF LAND SURVEYOR:

THE PLAT REPRESENTS A SURVEY BY GORDON. ALL MONUMENTS AND IMPROVEMENTS INDICATED HEREON ACTUALLY EXIST, AND THEIR LOCATION, SIZE, AND MATERIAL ARE CORRECTLY SHOWN, GORDON IS FAMILIAR WITH ALL REQUIREMENTS OF THIS ORDINANCE, AND TO THE BEST OF OUR KNOWLEDGE AND BELIEF, ALL OF THE REQUIREMENTS OF THIS ORDINANCE HAVE BEEN FULLY COMPLIED HEREIN.

STATEMENT OF ACCEPTANCE:

THE DEVELOPER, IN SIGNING THIS PLAT, AGREES TO ABIDE BY ALL CONDITIONS, TERMS, AND SPECIFICATIONS PROVIDED HEREON; AND TO COMPLETE ALL THE IMPROVEMENTS REQUIRED BY THE SITE PLAN.

STANLEY MARTIN HOMES _____ DATE _____
14200 PARK MEADOW DRIVE, SUITE 100 N
CHANTILLY, VA 20151

STATEMENT OF ACCURACY:

THE ENGINEER AND/OR SURVEYOR, IN SIGNING THIS PLAT./PLAN, ATTESTS TO THE BEST OF HIS/HER KNOWLEDGE, THAT THIS PLAN IS COMPLETE AND ACCURATE

ENGINEER _____ DATE _____

LIST OF APPROVALS:

CHARLES TOWN UTILITY BOARD AVAILABILITY LETTER (WATER):
DATED: _____

CHARLES TOWN UTILITY BOARD AVAILABILITY LETTER (SEWER):
DATED: _____

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS:
PERMIT #_____
DATED: _____

WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES
STATE HEALTH PERMITS BUREAU FOR PUBLIC HEALTH:
PERMIT # : _____ (WATER)
DATE: _____
PERMIT #: _____ (SEWER)
DATE: _____

JEFFERSON COUNTY GIS/ADDRESSING:
APPROVED: _____

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION:
WVNPDES PERMIT # : WVR111983

CITY OF CHARLES TOWN – COMPLETE LIST OF WAIVER/VARIANCES

ORDINANCE	SECTION OF ORDINANCE	WAIVER APPLICATION NUMBER	DESCRIPTION OF WAIVER OR VARIANCE	STATUS	DATE APPROVED
NONE GRANTED					

REVISIONS:

NO.	SHEET NUMBER AND REVISION DESCRIPTION	DATE
#1	WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS	03/16/2023

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 • Phone: 304-725-8456
Martinsburg, WV 25401 • www.ifs-ae.com

JASON P. GERHART REGISTERED NO. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

COVER SHEET

STONE SPRING SUBDIVISON
TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: AS NOTED VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GI-001.DWG	
NCS:	
SHEET:	01 OF 134

FILE PATH: G:\PROJECT\GENERAL\2665\2206 FIRTS FARM\ENGINR_MAP\C-GI-001.DWG
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GENERAL NOTES:

1. THE PROPOSED SITE IMPROVEMENTS FOR 'STONE SPRINGS SUBDIVISION' INCLUDE, BUT ARE NOT LIMITED TO, THE CONSTRUCTION OF 248 SINGLE-FAMILY DETACHED UNITS, 77 TOWNHOUSE UNITS, 3 COMMERCIAL LOTS, DRIVE AISLES AND PARKING AREAS WITH ASSOCIATED DRAINAGE STRUCTURES, SWM FACILITIES AND PUBLIC UTILITIES.
2. THE SUBJECT PROPERTY IS LOCATED IN THE CITY OF CHARLES TOWN, IDENTIFIED AS TAX MAP 15, PARCEL 1. THE PROPERTY OWNER IS PROPERTY OWNER AS RECORDED IN D.B. 451 PG 745 AMONG THE LAND RECORDS OF THE CITY OF CHARLES TOWN, JEFFERSON COUNTY, WEST VIRGINIA.
3. THE TOTAL EXISTING SITE ACREAGE FOR PARCEL 1 IS 98.88 ACRES. DISTURBED AREA FOR THE PROJECT IS ±82.67 ACRES.
4. THE TOPOGRAPHIC CONTOUR INTERVAL IS TWO (2) FEET. TOPOGRAPHIC INFORMATION WAS COMPILED FROM AN AERIAL SURVEY PREPARED BY THRASHER DATED FEBRUARY 2020. HORIZONTAL DATUM IS REFERENCED TO THE WEST VIRGINIA COORDINATE SYSTEM OF 1983, NORTH ZONE. VERTICAL DATUM IS REFERENCED TO NAVD 88.
5. PERIMETER BOUNDARY INFORMATION SHOWN HEREON IS PER A FIELD RUN SURVEY PERFORMED IN FEBRUARY OF 2022 BY GORDON.
6. THE PROPERTY SHOWN HEREON IS LOCATED WITHIN ZONE "X" AREAS OF 0.2% ANNUAL CHANCE FLOOD AND ZONE "A" SPECIAL FLOOD HAZARD AREA SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD, BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), ON FLOOD INSURANCE RATE MAP NO. 54037C0137E FOR COMMUNITY NO. 540065, IN JEFFERSON COUNTY, WEST VIRGINIA. WHICH IS THE CURRENT FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH SAID PREMISES IS SITUATED.
7. THERE ARE NO KNOWN WETLANDS WITHIN THE LIMITS OF CONSTRUCTION.
8. CHANGES OR REVISIONS IN CONSTRUCTION PLANS AND SPECIFICATIONS SHALL NOT BE MADE UNLESS FIRST APPROVED BY THE CITY OF CHARLES TOWN AND/OR OTHER APPROPRIATE AGENCIES.
9. SEE COVER SHEET, SHEET 01, FOR LEGEND OF SYMBOLS USED HEREIN.

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CONTACT "MISS UTILITY" AT 811 OR 1-800-245-4848 A MINIMUM OF SEVENTY-TWO (72) HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR OTHER EARTH DISTURBING ACTIVITIES WITHIN PUBLIC RIGHT-OF-WAYS OR WITHIN AREAS SERVED BY UNDERGROUND UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING THE PRESENCE OF ANY UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
2. TO THE BEST OF OUR KNOWLEDGE AND BELIEF, THERE IS NO EVIDENCE OF ANY GRAVE, OBJECT OR STRUCTURE MARKING A PLACE OF BURIAL ON THIS PROPERTY. THERE ARE NO KNOWN CEMETERIES, ARCHEOLOGICAL SITES, NATURAL FEATURES, NOR HISTORIC SITES LISTED, OR DETERMINED TO BE ELIGIBLE, OR WHICH THE OWNER HAS REASON TO BELIEVE MAY BE ELIGIBLE FOR LISTING ON THE NATIONAL REGISTER OF HISTORIC PLACES WITHIN THE CONSTRUCTION LIMITS.
3. INTEGRITY FEDERAL SERVICES DOES NOT CERTIFY TO THE LOCATION OF OR THE EXISTENCE OF ANY EXISTING UNDERGROUND UTILITIES. THE EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON AVAILABLE INFORMATION. THIS DOES NOT CONSTITUTE A GUARANTEE OF THEIR ACTUAL LOCATIONS OR THAT THEY HAVE ALL BEEN SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK AND FOR ANY DAMAGES WHICH OCCUR BY THEIR FAILURE TO LOCATE OR PRESERVE THESE UNDERGROUND UTILITIES. IF DURING CONSTRUCTION OPERATIONS THE CONTRACTOR SHOULD ENCOUNTER UTILITIES OTHER THAN THOSE SHOWN ON THE PLAN, THEY SHALL IMMEDIATELY NOTIFY THE ENGINEER AND TAKE NECESSARY AND PROPER STEPS TO PROTECT THE FACILITY AND INSURE THE CONTINUANCE OF SERVICE. IF NECESSARY, THE SITE PLAN WILL BE MODIFIED TO ELIMINATE THE CONFLICT AT THE DEVELOPER'S EXPENSE.
4. INTEGRITY FEDERAL SERVICES DOES NOT CERTIFY TO THE SUB-SURFACE CONDITIONS OF THE SITE, THE LOCATION OF UNDERLYING ROCK, OR THE LOCATION OF POTENTIAL SINKHOLES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIGGING OF TEST HOLES TO VERIFY SUB-SURFACE CONDITIONS PRIOR TO BEGINNING ANY CONSTRUCTION. IF SINKHOLES ARE FOUND IN THE FIELD, REMEDIATION WILL BE REQUIRED AS SPECIFIED BY THE WVDEP AND/OR A QUALIFIED GEOTECHNICAL ENGINEERING FIRM.
5. EROSION AND SEDIMENT CONTROL DEVICES ARE TO BE IN PLACE PRIOR TO ANY CONSTRUCTION. REFER TO EROSION AND SEDIMENT CONTROL PLAN FOR PHASING AND DETAILS.
6. ALL LAND, ON OR OFF SITE, WHICH IS DISTURBED BY THIS DEVELOPMENT, AND WHICH IS NOT BUILT UPON OR SURFACED, SHALL BE ADEQUATELY STABILIZED TO CONTROL EROSION AND SEDIMENTATION.
7. DEVELOPMENT OF THE SITE INCLUDING CONSTRUCTION AND MATERIALS SHALL BE IN CONFORMANCE TO CURRENT JEFFERSON COUNTY, CHARLES TOWN UTILITY BOARD, AND THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARDS AND SPECIFICATIONS.
8. ALL TESTS, STUDIES, ETC., REQUIRED DURING CONSTRUCTION WILL BE CARRIED OUT BY A THIRD PARTY ENGINEERING FIRM AND PAID FOR BY THE CONTRACTOR.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE OWNER AND THE ENGINEER OF ANY CHANGES OR CONDITIONS ATTACHED TO PERMITS REQUIRED FOR CONSTRUCTION.
10. THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF CLEANING TRUCKS AND/OR OTHER EQUIPMENT OF MUD PRIOR TO ENTERING THE RIGHT-OF-WAY, AND IT IS THE CONTRACTORS RESPONSIBILITY TO CLEAN STREETS OF MUD AND/OR ALLAY DUST AND TO TAKE WHATEVER MEASURES NECESSARY TO ENSURE THAT THE STREETS ARE KEPT IN A CLEAN AND DUST FREE CONDITION AT ALL TIMES.
11. THE CONTRACTOR SHALL NOTIFY OPERATORS WHO MAINTAIN EXISTING UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION OR BLASTING AT LEAST TWO (2) WORKING DAYS, BUT NOT MORE THAN TEN (10) WORKING DAYS, PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION.
12. THE CLIENT, CONTRACTOR, AND/OR SURVEYOR SHALL BE RESPONSIBLE FOR NOTIFYING INTEGRITY FEDERAL SERVICES OF ANY CONDITIONS FOUND IN THE FIELD THAT VARY FROM WHAT IS SHOWN ON THE APPROVED PLANS. OBSERVATIONS REGARDING APPARENT INCONSISTENCIES IN THE PLANS SHALL BE BROUGHT TO INTEGRITY FEDERAL SERVICES' ATTENTION FOR VERIFICATION PRIOR TO STAKEOUT.
13. THE CLIENT AND CONTRACTOR ARE RESPONSIBLE FOR REVIEWING THE PLANS PRIOR TO CONSTRUCTION AND NOTIFYING INTEGRITY FEDERAL SERVICES OF ANY CIRCUMSTANCES FOUND WITHIN THESE PLANS IN NEED OF VERIFICATION SO THAT APPROPRIATE REVISIONS CAN BE MADE, IF WARRANTED.
14. ALL HANDICAPPED PARKING SPACES SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT. (ADA - CURRENT VERSION). ALL TRAILS & SIDEWALKS SHALL COMPLY WITH ADA REQUIREMENTS).
15. CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH PERFORMANCE OF ITS WORK AND THE WORK OF ITS SUBCONTRACTORS. INTEGRITY FEDERAL SERVICES SHALL NOT HAVE CONTROL OVER, CHARGE OF, OR RESPONSIBILITY FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.
16. THE CONTRACTOR SHALL VISIT THE SITE AND FIELD VERIFY EXISTING CONDITIONS AND GRADES PRIOR TO STARTING CONSTRUCTION.
17. THE CONTRACTOR SHALL CLEAR THE SITE OF ALL APPLICABLE VEGETATION, BUILDINGS, FOUNDATIONS, ETC. WITHIN THE LIMITS OF CONSTRUCTION AND SHALL BE RESPONSIBLE FOR COORDINATING ANY DISCONNECTION AND/OR ABANDONMENT OF EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND ABANDONING ALL EXISTING WELLS AND/OR SEPTIC DRAIN FIELDS AND COORDINATING THEIR ABANDONMENT WITH THE HEALTH DEPARTMENT
18. ALL PROPOSED GRADES AS SHOWN HEREIN ARE FINISHED GRADE UNLESS OTHERWISE NOTED ON THE PLAN.
19. MAINTAIN A MINIMUM VERTICAL CLEARANCE OF ONE (1) FOOT SIX (6) INCHES BETWEEN CROSSINGS OF ALL UTILITY LINES UNLESS OTHERWISE NOTED.
20. THE APPROVAL OF THESE PLANS SHALL IN NO WAY GRANT PERMISSION BY THE APPROVING JURISDICTION FOR THE CONTRACTOR TO TRESPASS ON OFF-SITE PROPERTIES. THE APPROVAL OF THESE PLANS SHALL IN NO WAY RELIEVE THE OWNER OF COMPLYING WITH OTHER APPLICABLE LOCAL, STATE AND FEDERAL REQUIREMENTS.
21. WHERE THE ORDINANCES DIFFER BETWEEN LOCAL, STATE, AND FEDERAL REQUIREMENTS, THE MOST RESTRICTIVE SHALL APPLY.
22. THE PLANS HAVE BEEN PREPARED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT TITLED "FRITTS PROPERTY (SPRINGFIELD)" PREPARED BY GEO-TECHNOLOGY ASSOCIATES, INC., DATED JUNE 29, 2022. (GTA #31221016).
23. CONTRACTOR TO REFERENCE GEOTECHNICAL REPORT OR A PROFESSIONAL ENGINEER OR CERTIFIED TECHNICIAN FOR SUITABLE BACKFILL MATERIAL REQUIREMENTS AND COMPACTION REQUIREMENTS. CBR TESTS SHALL BE PERFORMED PRIOR TO DETERMINATION OF FINAL SUBGRADE ELEVATION FOR PAVEMENT AREAS. SOILS TESTS OF SUBGRADE MUST BE SUBMITTED FOR ACTUAL DETERMINATION OF REQUIRED PAVEMENT SECTION THICKNESS PRIOR TO CONSTRUCTION. ALL SUBGRADE SHALL BE COMPACTED TO THE PERCENTAGES OF MAXIMUM DRY DENSITY (AASHTO T99C) UNLESS OTHERWISE DIRECTED BY AN APPROVED GEOTECHNICAL REPORT. (SEE JEFFERSON COUNTY CONSTRUCTION NOTE 2, SHEET 01.)
24. BUILDING FOOTPRINTS AS SHOWN ARE APPROXIMATE IN BUILDING SIZE AND DO NOT REPRESENT FINAL ARCHITECTURALS.
25. CHANGES IN THE TOP & BOTTOM OF SLOPES SHALL BE A MINIMUM OF FIVE FEET (5') FROM PROPERTY OR RIGHT-OF-WAY LINE.
26. ALL GRADING SHALL PROVIDE PROPER DRAINAGE & DISPOSAL OF STORM WATER WITHOUT PONDING.
27. ALL FILL SHALL BE COMPACTED TO PREVENT EROSION.
28. GRADING SHALL NOT BE DONE IN SUCH A WAY TO DIVERT WATER ONTO THE PROPERTY OF ANOTHER LAND OWNER.
29. LOTS SHALL BE GRADED TO SECURE PROPER DRAINAGE AWAY FROM BUILDINGS AND TO PREVENT POOLING OR COLLECTION OF STORM WATER.
30. EXCAVATION OR FILL SHALL NOT ENDANGER AN ADJOINING PROPERTY.
31. ALL CLEARING, GRADING, DRAINAGE, CONSTRUCTION, AND DEVELOPMENT SHALL BE CONDUCTED IN STRICT ACCORDANCE WITH THE APPROVED PLAN.
32. FIELD VERIFY EXISTING GRADES PRIOR TO CONSTRUCTION.
33. CONTRACTOR TO ENSURE POSITIVE DRAINAGE THROUGHOUT CONSTRUCTION.
34. THERE ARE NO KNOWN CEMETERIES, HISTORIC LANDMARKS, GRAVESITE, OR HISTORIC STRUCTURES ON-SITE.

GENERAL C.T.U.B. UTILITY NOTES:

1. REFER TO THE CHARLES TOWN UTILITY BOARD (CTUB) WATER SYSTEM SPECIFICATIONS DATED APRIL 2015, SANITARY SEWER SYSTEM SPECIFICATIONS DATED MAY 2016, AND THE LATEST MODIFICATIONS OR REVISIONS THERETO, FOR WATER MAIN AND SANITARY SEWER CONSTRUCTION METHODS, MATERIALS, FIELD QUALITY CONTROL, AND FOR ALL DETAILS AND SPECIFICATIONS FOR ALL WATER LINES AND SANITARY SEWER LINES TO BE SERVED BY THE CHARLES TOWN UTILITY BOARD.
2. SEPARATION OF WATER MAINS / SANITARY SEWERS: ALL NEW WATER MAINS SHALL CONFORM TO THE WEST VIRGINIA BUREAU FOR PUBLIC HEALTH, OFFICE OF ENVIRONMENTAL HEALTH SERVICES, ENVIRONMENTAL ENGINEERING DIVISION, PUBLIC WATER SYSTEM DESIGN STANDARDS 64CSR77 10.7 SEPARATION OF WATER MAINS, SANITARY SEWERS AND STORM SEWERS INCLUDING:
   - A. PARALLEL INSTALLATION - WATER MAINS SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED SEWER. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE.
   - B. CROSSINGS - WATER MAINS SHALL CROSS ABOVE SEWERS AND SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18 INCHES BETWEEN THE BOTTOM OF THE WATER MAIN AND TOP OF THE SEWER. AT CROSSINGS, ONE FULL LENGTH (20 FEET) OF WATER PIPE SHALL BE LOCATED SO BOTH JOINTS WILL BE AS FAR FROM THE SEWER AS POSSIBLE. SPECIAL STRUCTURAL SUPPORT FOR THE WATER AND SEWER PIPES MAY BE REQUIRED.
   - C. HORIZONTAL SEPARATION - A MINIMUM OF 10 FEET SEPARATION BETWEEN SEWER LINES AND WATER LINES MUST BE MAINTAINED. IN CASES WHERE THE 10 FEET MINIMUM CANNOT BE MAINTAINED, THE SEWER PIPE SHALL BE 18" LOWER THAN THE WATER LINE AND CONSTRUCTED OF A PRESSURE TYPE PIPE. WHEN LINES ARE PLACED WITHIN 5 FEET OF EACH OTHER, PERMANENT IDENTIFICATION TAPE MUST BE BURIED DIRECTLY ABOVE THE LINES DENOTING "SEWER LINE" OR POTABLE WATER LINE.
   - D. VERTICAL SEPARATION - A MINIMUM OF 18" OF SEPARATION BETWEEN THE TOP OF THE SEWER LINES AND THE BOTTOM OF WATER LINES MUST BE MAINTAINED. IN CASES WHERE THE 18" CANNOT BE MAINTAINED, THE SEWER LINE SHALL CROSS AT MIDPOINT OF A 20' LONG JOINT OF THE WATER LINE AND BE CONSTRUCTED OF PRESSURE TYPE PIPE. A SEWER LINE SHALL NOT BE CONSTRUCTED OVER TOP OF A WATER LINE. IF THE STANDARD VERTICAL INSTALLATION REQUIREMENTS CANNOT BE MAINTAINED, THE SEWER LINE SHALL BE ENCASED SO THAT THE CASING EXTENDS AT LEAST 15 FEET EACH SIDE OF THE CROSSING WITH A MINIMUM OF 18" VERTICAL SEPARATION.
3. THERE SHALL BE NO PHYSICAL CONNECTION BETWEEN THE WATER DISTRIBUTION SYSTEM AND A SANITARY SEWER SYSTEM; ANY PIPES, PUMPS, HYDRANTS OR TANKS WHEREBY UNSAFE WATER OR OTHER CONTAMINATING MATERIALS MAY BE DISCHARGED OR DRAWN INTO THE SYSTEM
4. PIPE BEDDING - NO. 8 OR NO. 10 LIMESTONE SHALL BE USED FOR ALL PIPE BEDDING UNLESS OTHERWISE APPROVED BY CTUB. ALL WATER MAIN, SANITARY SEWER MAIN AND SANITARY LATERALS SHALL BE INSTALLED WITH MINIMUM 6" BEDDING BELOW PIPE AND 12" OVER PIPE
5. REFER TO THE CTUB WATER SYSTEM & SEWER SYSTEM SPECIFICATIONS, AND THE LATEST MODIFICATIONS OR REVISIONS THERETO, FOR:
   - A LIST OF MATERIALS REPRESENTING THE MINIMUM REQUIREMENTS ACCEPTABLE FOR USE BY CTUB.
   - ALL PIPE, FITTINGS, AND OTHER RELATED MATERIALS USED IN THE CONSTRUCTION OF LINES
   - FIRE HYDRANT STANDARDS AND SPECIFICATIONS
   - DISINFECTING NEW AND REPAIRED WATER MAINS. (ALL NEW WATER MAINS SHALL BE DISINFECTED BEFORE THEY ARE PLACED IN SERVICE. ALL WATER MAINS TAKEN OUT OF SERVICE FOR INSPECTING, REPAIRING, OR OTHER ACTIVITY THAT MIGHT LEAD TO CONTAMINATION OF WATER SHALL BE DISINFECTED BEFORE THEY ARE RETURNED TO SERVICE)
   - GRAVITY SEWER CONSTRUCTION METHODS & PIPELINE TESTING.
   - MANHOLES SUBMITTALS, DELIVERY, STORAGE & HANDLING, INSPECTION, PREPARATION, CONSTRUCTION METHODS, AND VACUUM TESTING.
   - CAST IN-PLACE CONCRETE SPECIFICATIONS AND REQUIREMENTS.

WATER:

1. INSTALLATION OF MAINS:
   - A. BEFORE ANY PIPE IS INSTALLED IN TRENCHES, IT SHALL BE INSPECTED FOR DAMAGE AND THE INSIDE OF THE PIPE SHALL BE SWABBED TO REMOVE LOOSE DIRT AND FOREIGN OBJECTS. NO DAMAGED PIPE WILL BE PERMITTED TO BE INSTALLED.
   - B. BEDDING: CONTINUOUS AND UNIFORM BEDDING SHALL BE PROVIDED IN THE TRENCH FOR ALL BURIED PIPE. BACKFILL MATERIAL SHALL BE TAMPED IN LAYERS AROUND THE PIPE AND TO A SUFFICIENT HEIGHT ABOVE THE PIPE TO ADEQUATELY SUPPORT AND PROTECT THE PIPE. STONES FOUND IN THE TRENCH SHALL BE REMOVED FOR A DEPTH OF AT LEAST 6" BELOW THE BOTTOM OF THE PIPE. SEE TYPICAL WATER LINE TRENCH DETAIL.
   - C. COVER: ALL WATER MAINS SHALL BE COVERED WITH A MINIMUM OF 48" OF EARTH COVERING TO PREVENT FREEZING. ALL MAINS LESS THAN 8" IN DIAMETER AND WITHIN 5 FEET OF A HEAVILY TRAVELED HIGHWAY SHALL HAVE A MINIMUM OF 42" OF COVERING.
   - D. BLOCK: ALL TEES, BENDS, PLUGS AND HYDRANTS SHALL BE PROVIDED WITH TIE RODS OR JOINTS DESIGNED TO PREVENT MOVEMENT.
   - E. PRESSURE AND LEAKAGE TESTING: ALL TYPES OF INSTALLED PIPE SHALL BE PRESSURE TESTED AND LEAK TESTED IN ACCORDANCE WITH AWWA STANDARD C600. DEVELOPER SHALL SUBMIT PLAN OF PROPOSED TESTING.
   - F. DISINFECTION: ALL NEW, CLEANED OR REPAIRED WATER MAINS SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA STANDARD C651. THE SPECIFICATIONS SHALL INCLUDE MICROBIOLOGICAL TESTING OF ALL WATER MAINS.
   - G. ALL NON-METALLIC MAINS SHALL BE PROVIDED WITH TRACER WIRE OR METALLIC TAPE; AS DIRECTED BY CTUB.
2. WATER SERVICE LINES SHOWN ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON BUILDING ARCHITECTURAL DRAWINGS AND UTILITY CONNECTION LOCATIONS.

SANITARY SEWER:

1. ALL SANITARY SEWER LINES SHALL BE COVERED WITH A MINIMUM OF 48" OF EARTH COVERING OVER THE TOP OF PIPE.
2. SEWER LINES SHALL BE LAID IN STRAIGHT LINE WITH UNIFORM SLOPE BETWEEN MANHOLES. SEWERS ON 20% SLOPE OR GREATER SHALL BE ANCHORED SECURELY WITH CONCRETE ANCHORS, OR APPROVED EQUAL (SEE CTUB SEWER SYSTEM SPECIFICATIONS FOR SPACING REQUIREMENTS).
3. MANHOLES - SHALL BE PRE-CAST CONCRETE MEETING REQUIREMENTS OF AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM). THE MINIMUM BASE DIAMETER SHALL BE 48" (MINIMUM OPENING 24"). THE INSIDE BASE OF THE MANHOLE SHALL BE FILLED WITH CONCRETE TO FORM A BENCH SLOPING TOWARD THE FLOW CHANNEL. WATERTIGHT MANHOLE COVERS ARE TO BE USED WHEREVER THE MANHOLE COVERS MAY BE FLOODED BY STREET RUNOFF OR HIGH WATER. PIPE CONNECTIONS TO MANHOLES AND JOINTS ON MANHOLES SHALL BE WATERTIGHT. CONCRETE MANHOLES SHALL BE WATERPROOFED ON THE EXTERIOR WHERE GROUNDWATER CONDITIONS ARE UNFAVORABLE.
4. GRAVITY SEWER LINES SHALL BE PVC PIPE, SCHEDULE SDR-35. ALL PIPES AND FITTINGS SHALL MEET OR EXCEED ALL REQUIREMENTS OF ASTM SPECIFICATIONS D-3034 AND/OR OTHER REQUIREMENTS OF UNI-BELL UNI-B4. JOINTS SHALL BE EITHER O-RING TYPE "OR" MECHANICAL SEAL JOINT MEETING MATERIAL REQUIREMENTS OF ASTM 1784 AND JOINT REQUIREMENTS OF ASTM 3212. NO SOLVENT CEMENT JOINTS WILL BE PERMITTED IN FIELD CONSTRUCTION, EXCEPT AS SPECIFICALLY AUTHORIZED BY CTUB.
5. LATERAL PIPING AND FITTINGS, IN SIZES 4" THROUGH 6", SHALL BE PVC PIPE, SCHEDULE 40.
10. THE DEVELOPER SHALL FURNISH AND INSTALL THE WYE BRANCHES, RISER PIPE, SERVICE LATERALS, TRANSITION FITTINGS, AND INCIDENTALS WHERE SHOWN ON THE PLANS OR WHERE DIRECTED BY THE CTUB.
11. HOME OWNER INSTALLED SERVICE LATERALS - PIPE SHALL BE 4" MINIMUM SDR-35 OR SCHEDULE 40 INSTALLED AT 2% MINIMUM SLOPE. LATERAL SHOULD BE PLACED WITH 3 FEET MINIMUM COVER UNLESS OTHERWISE APPROVED BY CTUB. CONNECTION OF HOME OWNER LATERAL TO EXISTING LATERAL SHALL BE BY FITTING OF SAME TYPE OF PIPE. BEDDING SHALL BE NO. 8 OR NO. 10 LIMESTONE OR OTHER MATERIAL AS APPROVED BY CTUB. THE LATERAL AND CONNECTIONS SHALL BE INSPECTED AND APPROVED BY A REPRESENTATIVE OF CTUB PRIOR TO COVERING WITH BEDDING.
12. ALL SANITARY STUBS BEHIND CLEANOUTS SHALL HAVE A VERTICAL 45-DEGREE FITTING WITH A SECTION OF PIPE INSTALLED TO DAYLIGHT FOR PLUMBER TO CONNECT FROM HOUSE.

STANDARD W.V.D.O.H. NOTES:

1. ALL UTILITIES, INCLUDING ALL POLES, ARE TO BE RELOCATED AS NECESSARY AT EITHER THE DEVELOPER OR UTILITY OWNER'S EXPENSE PRIOR TO CONSTRUCTION.
2. THE DEVELOPER IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING ROADS AND UTILITIES WHICH OCCUR AS A RESULT OF PROJECT CONSTRUCTION WITHIN OR CONTIGUOUS TO EXISTING RIGHT-OF-WAY.
3. OPEN CUTTING OF PAVED OR SURFACE TREATED STATE ROADS IS NOT PERMITTED UNLESS APPROVED BY THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION.
4. THE DEVELOPER IS RESPONSIBLE FOR ALL TRAFFIC CONTROL.
5. IF APPLICABLE, A SMOOTH GRADE SHALL BE MAINTAINED FROM THE CENTERLINE OF THE EXISTING ROAD TO THE PROPOSED EDGE OF PAVEMENT TO PRECLUDE THE FORMING OF FALSE GUTTERS AND/OR THE PONDING OF ANY WATER IN THE ROADWAY.
6. OVERLAY OF EXISTING PAVEMENT SHALL BE A MINIMUM OF 1.5". ANY COSTS ASSOCIATED WITH PAVEMENT OVERLAY, OR THE MILLING OF EXISTING PAVEMENT TO OBTAIN REQUIRED DEPTH, SHALL BE THE RESPONSIBILITY OF THE DEVELOPER.
7. STORMWATER DITCHES SHALL BE SEEDED AND MULCHED TO ACHIEVE STABILIZATION. ADDITIONAL DITCH LININGS SHALL BE PROVIDED IF WARRANTED TO ACHIEVE STABILIZATION.
8. ALL TRAFFIC CONTROL SIGNS AND THE MAINTENANCE OF TRAFFIC SHALL COMPLY WITH THE STANDARDS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION.
9. IF APPLICABLE, ALL GUARDRAILS SHALL BE IN ACCORDANCE WITH WVDOH STANDARD DETAILS BOOK VOLUME 1. THE GUARDRAIL POST SHALL BE PRESSURE-TREATED.
10. CONTRACTOR SHALL CONTACT WVDOH AT LEAST 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN WVDOH RIGHT-OF-WAY.

CITY OF CHARLES TOWN ORDINANCE NOTES:

1. STORM WATER MANAGEMENT SHALL BE PROVIDED BY A PROPOSED STORMWATER MANAGEMENT FACILITY.
2. ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF CHARLES TOWN ZONING ORDINANCE AND ARTICLE 1333 OF THE CITY OF CHARLES TOWN SUBDIVISION AND LAND DEVELOPMENT ORDINANCE. CHANGES OR REVISIONS IN CONSTRUCTION PLANS AND SPECIFICATIONS SHALL NOT BE MADE UNLESS FIRST APPROVED BY THE CITY OF CHARLES TOWN AND OTHER APPROPRIATE AGENCIES
3. ALL STREET AND TRAFFIC CONTROL SIGNS SHALL CONFORM TO THE STANDARDS SET FORTH IN SECTION ARTICLE 1333.04 OF THE CITY OF CHARLES TOWN SUBDIVISION AND LAND DEVELOPMENT ORDINANCE. IN ADDITION, ALL SIGNS SHALL BE INSTALLED IN THE PUBLIC RIGHT-OF-WAY AND LOCATED IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2009 EDITION AND THE CITY MANAGER.
4. ARCHITECTURALS SHALL BE PROVIDED UNDER SEPARATE COVER.
5. ALL SITE IMPROVEMENTS SHOWN SHALL BE BONDED TO THE SATISFACTION OF THE PLANNING COMMISSION PRIOR TO ISSUANCE OF ANY BUILDING PERMITS.
6. RETAINING WALLS 18 INCHES OR GREATER IN HEIGHT REQUIRE A BUILDING PERMIT THAT MUST BE OBTAINED BY THE OWNER/DEVELOPER. THESES WALLS MUST BE DESIGNED AND CERTIFIED BY A LICENSED WEST VIRGINIA ENGINEER AND SHALL BE SUBMITTED UNDER SEPARATE COVER.
7. ALL ENTRANCE SIGNS, BUILDING SIGNS AND FREESTANDING PYLON SIGN SHALL REQUIRE A SIGN PERMIT TO ENSURE CONFORMANCE WITH THE CITY OF CHARLES TOWN'S SIGN REGULATIONS.
8. ALL FREESTANDING SIGNS SHALL BE ERECTED AT A MAXIMUM HEIGHT OF 30 FEET AND SHALL CONTAIN A MAXIMUM SQUARE FOOTAGE OF 100 SQUARE FEET, EXCLUDING STRUCTURE COMPONENTS FOR THE SIGN. ALL FREESTANDING SIGNS PERMITTED SHALL COMPLY WITH THE CITY OF CHARLES TOWN ZONING ORDINANCE SIGN REQUIREMENTS.
9. ALL BUILDING MOUNTED SIGNS OR BUSINESS SIGNS LOCATED ON INDIVIDUAL LOTS SHALL HAVE A MAXIMUM SQUARE FOOTAGE OF 50 SQUARE FEET, EXCLUDING STRUCTURAL COMPONENTS FOR THE SIGN AND EACH LOT IS TO BE ALLOWED ONE SIGN.
10. ALL ELECTRIC METERS SHALL BE LOCATED IN THE REAR OF DWELLINGS.
11. NO MORE THAN TWO ABUTTING TOWNHOUSES SHALL SHARE A COMMON ROOF LINE.

CITY OF CHARLES TOWN ENGINEERING NOTES:

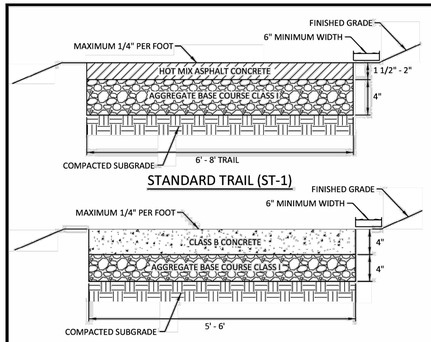
1. EXISTING TREES ARE TO REMAIN IN THEIR NATURAL CONDITION THROUGHOUT THE DEVELOPMENT WHEREVER PRACTICAL.
2. AT THIS TIME, NO OFF-SITE BORROW PITS ARE ANTICIPATED FOR THIS PROJECT.
3. PROPERTY CORNERS ARE TO BE SET WITH 5/8" x 30" REBARS WITH I.D. CAPS UNLESS OTHERWISE NOTED.
4. ALL PROPOSED UTILITIES (E.G. ELECTRIC, CABLE, TELEPHONE) SHALL BE LOCATED UNDERGROUND.
5. CUT AND FILL ACTIVITY/MATERIAL SHALL NOT ENCROACH ON ADJOINING PROPERTIES.
6. NO REFUSE DUMPSTERS ARE ANTICIPATED OR PROPOSED WITH THIS DEVELOPMENT. REFUSE COLLECTION WILL BE PROVIDED VIA CURB-SIDE TRASH PICK-UP.
7. SITE LIGHTING IS PROVIDED IN ACCORDANCE WITH CITY OF CHARLES TOWN REQUIREMENTS.
8. WATER AND SEWER SERVICE TO BE PROVIDED BY THE CITY OF CHARLES TOWN UTILITY BOARD.
9. PERMEABLE AREAS OF THE SITE SHALL BE PLANTED WITH GROUND COVER, SHRUBS, AND TREES AS REQUIRED BY THE SUBDIVISION AND LAND DEVELOPMENT ORDINANCE.
10. ALL COMMON AREAS AND FACILITIES INCLUDING, BUT NOT LIMITED TO, RECREATIONAL FACILITIES, OFF-STREET PARKING AND COMMON OPEN SPACE SHALL BE MAINTAINED IN A SATISFACTORY MANNER. A MANDATORY HOMEOWNERS ASSOCIATION SHALL BE CREATED AND A DECLARATION REGARDING THE SAME SHALL BE RECORDED TO THE SATISFACTION OF THE PLANNING COMMISSION IN THE OFFICE OF THE CLERK OF JEFFERSON COUNTY.
11. A COMMON INTEREST OWNERSHIP AGREEMENT MUST BE ESTABLISHED TO PROVIDE FOR THE MAINTENANCE OF COMMONLY-OWNED LAND, INCLUDING, BUT NOT LIMITED TO THE PRIVATE ROAD SYSTEM WITHIN THE SUBDIVISION. THIS COMMON INTEREST OWNERSHIP AGREEMENT MUST BE DEVELOPED IN ACCORDANCE WITH THE UNIFORM COMMON INTEREST OWNERSHIP ACT OF WEST VIRGINIA.

ZONING ORDINANCE SUMMARY:

1. CURRENT ZONE: NEIGHBORHOOD RESIDENTIAL.
2. PROPOSED USE: RESIDENTIAL/COMMERCIAL
3. STATEMENT OF TOTAL TRACT AREA:
   - DWELLING UNITS (DU) = 77 TOWNHOUSES, 248 SINGLE-FAMILY DETACHED (325 TOTAL)
   - TOWNHOUSE LOT AREA = 233,408 SF
   - SINGLE FAMILY LOT AREA = 1,865,855 SF
   - OPEN SPACE = 440,735 SF
   - STREAM VALLEY PARK DEDICATION = 707,731 SF
   - COMMON AREA = 38,464 SF
   - COMMERCIAL LOTS (3) = 255,975 SF
   - (KEYES FERRY ROAD) ROAD IMPROVEMENT ESM'T PARCEL = 7,478 SF
   - PROPOSED RIGHT-OF-WAY = 756,249 SF
4. NET BUILDABLE LAND AREA (NBLA) = 3,013,717 SF
5. USE REQUIREMENTS:

	REQUIRED	PROVIDED
NET DENSITY:	10 DU/ACRE	4.7 DU/ACRE
DENSITY CALCULATION: PROPOSED DENSITY = NBLA / DU = 3,013,717 / 325 = 9,273 SF / DU		
MINIMUM LOT SIZE (SFD/SFA):	6,000 SF / 2,000 SF	6,600 SF / 2,400 SF
MINIMUM LOT WIDTH (SFD/SFA):	60 FT / 18 FT	60 FT / 20 FT
MAXIMUM BUILDING HEIGHT:	40 FT	40 FT
MAXIMUM BUILDING STORIES:	3	3
BUILDING SETBACKS:		
FRONT:	25 FT (MIN.)	25 FT (MIN.)
SIDE (DETACHED STRUCTURES):	10 FT (MIN.)	10 FT (MIN.)
REAR:	20 FT (MIN.)	20 FT (MIN.)

NOTE: SETBACKS WER

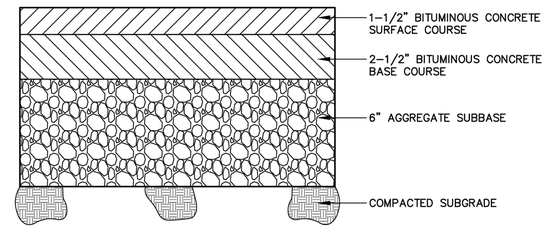


NOTES:

1. ALL PEDESTRIAN AND BIKE TRAILS LOCATED OUTSIDE OF CITY OF CHARLESTOWN RIGHT OF WAY SHALL BE A MINIMUM OF 5' IN WIDTH FOR SIDEWALKS, 6' FOR ALL PEDESTRIAN TRAILS, AND 8' FOR ALL BIKE TRAILS.
2. A PRIVATE ACCESS EASEMENT SHALL BE PROVIDED FOR ALL SIDEWALKS AND TRAILS OUTSIDE OF CITY OF CHARLES TOWN RIGHT OF WAY AND SHALL INCLUDE A MINIMUM OF 3' OF WIDTH ON BOTH SIDES OF THE TRAIL OR SIDEWALK.
3. THE MAXIMUM GRADE FOR ALL PEDESTRIAN TRAILS SHALL BE 10%.
4. THE MAXIMUM GRADE FOR ALL BIKE TRAILS SHALL BE 8%, EXCEPT UP TO 15% IS ALLOWED FOR DISTANCES OF LESS THAN 150 FEET.
5. APPROPRIATE LIGHTING AND SIGNAGE, LANDSCAPING, BUFFERING AND DRAINAGE MEASURES, ALONG WITH CONSIDERATIONS FOR SECURITY SHALL BE INCORPORATED IN THE DESIGN OF THESE FACILITIES.

NOT TO SCALE

	TRAIL AND TYPICAL SIDEWALK City of Charles Town	ST-1 SW-1



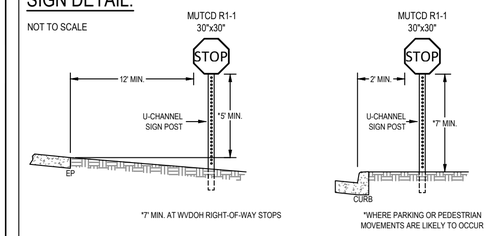
NOTES:

1. ALL BASE AND SUBGRADE MATERIAL SHALL BE COMPACTED TO 95% THEORETICAL MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99 METHOD A, WITHIN A ±2% OF OPTIMUM MOISTURE.

	STANDARD DETAIL TYPICAL DRIVEWAY/PARKING PAVING SECTION	STANDARD NUMBER K-1

SIGN DETAIL:

NOT TO SCALE

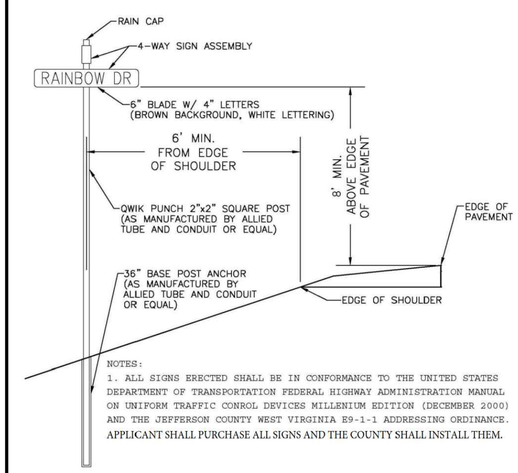


NOTES:

1. FOR MORE EXTENSIVE STANDARDS REFER TO THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS 2009 EDITION (WITH UPDATES) AND THE STANDARDS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION.
2. U-CHANNEL SIGN POST SHALL BE PER WVDOH STANDARD DETAIL SHEET TE1-7A.
3. ALL STOP BARS SHALL BE TYPE V, WHITE, 12" WIDTH, SOLID STOP LINES (PER WVDOH SPECIFICATIONS).

STREET SIGN DETAILS:

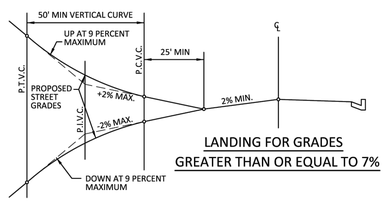
NOT TO SCALE

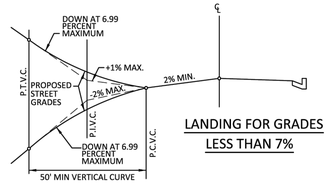


NOTES:
1. ALL SIGNS ERECTED SHALL BE IN CONFORMANCE TO THE UNITED STATES DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION MANUAL ON UNIFORM TRAFFIC CONROL DEVICES MILLENIUM EDITION (DECEMBER 2000) AND THE JEFFERSON COUNTY WEST VIRGINIA E9-1-1 ADDRESSING ORDINANCE. APPLICANT SHALL PURCHASE ALL SIGNS AND THE COUNTY SHALL INSTALL THEM.

STREET SIGN DETAILS

NOT TO SCALE



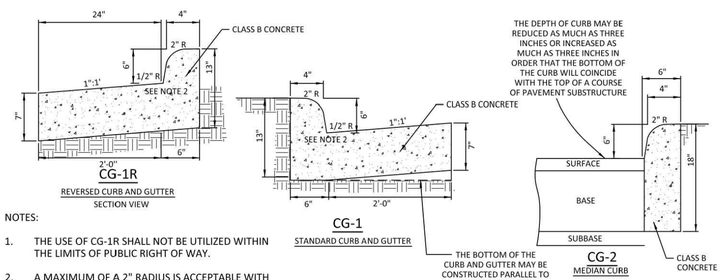


NOTES:

1. THE P.C.V.C. AS SHOWN ON THE DETAIL FOR LANDINGS WITH GRADES LESS THAN 7% SHALL BEGIN AT THE FACE OF CURB ON A CURB AND GUTTER SECTION OR AT THE EDGE OF PAVEMENT ON A SECTION WITHOUT CURB AND GUTTER.
2. THE 25' MINIMUM VERTICAL CURVE AS SHOWN ON THE DETAIL FOR LANDINGS WITH GRADES EQUAL TO OR GREATER THAN 7% SHALL BEGIN AT THE FACE OF CURB ON A CURB AND GUTTER SECTION OR AT THE EDGE OF PAVEMENT ON A SECTION WITHOUT CURB AND GUTTER.

NOT TO SCALE

	INTERSECTION LANDING REQUIREMENTS City of Charles Town	

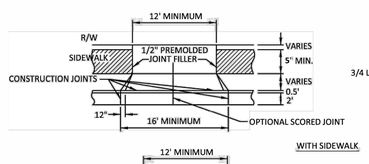


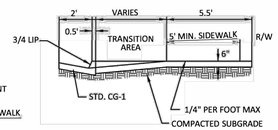
NOTES:

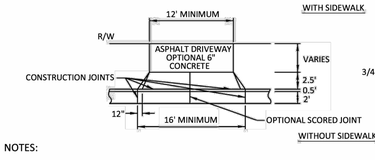
1. THE USE OF CG-1R SHALL NOT BE UTILIZED WITHIN THE LIMITS OF PUBLIC RIGHT OF WAY.
2. A MAXIMUM OF A 2" RADIUS IS ACCEPTABLE WITH CURB AND GUTTER.
3. SUBGRADE FOR ALL CURB AND GUTTER SHALL BE COMPACTED TO 95 PERCENT DENSITY AT OPTIMUM MOISTURE TO THE FULL WIDTH OF RIGHT OF WAY IN ACCORDANCE WITH AASHTO, T99.

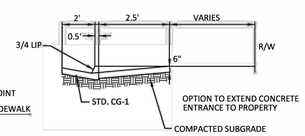
NOT TO SCALE

	TYPICAL COMBINATION CURB AND GUTTER City of Charles Town	CG-1 CG-1R CG-2









NOTES:

1. GRADING PLANS MUST PROVIDE FOR ADEQUATE VEHICULAR CLEARANCE FOR DRIVEWAY APPROACH, DEPARTURE, AND BREAKOVER TRANSITIONS.

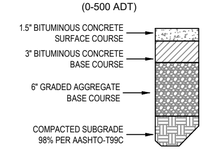
NOT TO SCALE

	DRIVEWAY ENTRACE WITH CURB AND GUTTER City of Charles Town	DE-2

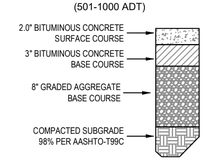
MINIMUM TYPICAL PAVEMENT SECTIONS:

NOT TO SCALE

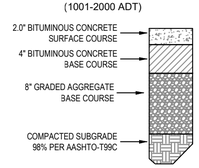
ASPHALT PAVEMENT NEIGHBORHOOD STREET
(0-500 ADT)



ASPHALT PAVEMENT NEIGHBORHOOD CENTER STREET
(501-1000 ADT)



ASPHALT PAVEMENT MINOR COLLECTOR STREET
(1001-2000 ADT)



NOTES:
1. PAVEMENT SECTION BASED ON THE FOLLOWING SUBGRADE SUPPORT CLASS: C (POOR).
2. SIZE RANGE OF AGGREGATES (BASED ON WVDOH STD. SPECIFICATION TABLES 703.4 & 704 6.2:
   BASE COURSE: SIZE NUMBERS 4 TO 57 OR CLASSES 1, 2, 4, 6 OR 8
   SUBBASE COURSE: SIZE NUMBERS 1 TO 357
3. SOILS TESTS OF SUBGRADE MUST BE SUBMITTED FOR ACTUAL DETERMINATION BASED ON CBR OF REQUIRED PAVEMENT SECTION THICKNESS PRIOR TO CONSTRUCTION.
4. ALL SUBGRADE MATERIAL SHALL BE COMPACTED TO 98% OF MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T99C.
5. ALL BASE AND SUBBASE MATERIAL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T99C.
6. BITUMINOUS CONCRETE BASE COURSE SHALL BE APPLIED TO THE PREPARED GRAVEL BASE SURFACE FOLLOWING THE APPLICATION OF A LIQUID ASPHALT PRIME COAT.
7. ASPHALT MATERIAL SHALL COMPLY WITH THE MINIMUM SPECIFICATIONS REQUIRED BY THE WVDOH FOR PUBLIC ROADS.

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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-6-23

REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

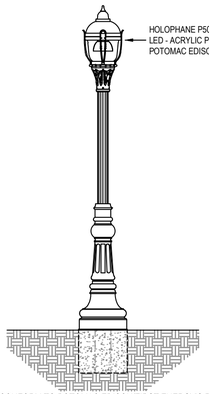
GENERAL DETAILS

STONE SPRING SUBDIVISON
TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: AS NOTED VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GI-501.DWG	
NCS:	
SHEET:	03 OF 134

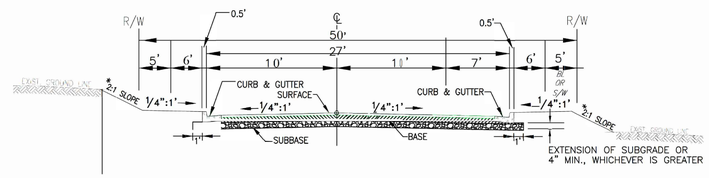
TYPICAL LIGHT POLE & FIXTURE:

NOT TO SCALE



NOTES:

1. LIGHTS SHALL CONFORM TO POTOMAC EDISON/FIRST ENERGY'S REQUIREMENTS PERTAINING TO WATTS, LUMENS, DOWNLIGHT REFLECTORS AND RESIDENTIAL SHIELDS.
2. LIGHT POLES SHALL CONFORM TO ALL POTOMAC EDISON/FIRST ENERGY REQUIREMENTS FOR THE CITY OF CHARLES TOWN.
3. LIGHTS SHALL BE MOUNTED ON FLAT BLACK POLES WITH ACORN STYLE TOPS.
4. STREET LIGHTING WIRING SHALL BE VIA UNDERGROUND DISTRIBUTION.
5. A STREET LIGHT SHALL BE PROVIDED AT ALL INTERSECTIONS. THE PLACEMENT OF STREET LIGHTING FIXTURES SHALL BE AT 400-600 FOOT INTERVALS UNLESS:
   - 5.1. THE ROADWAY LENGTH IS LESS THAN 400 FEET, BUT MORE THAN 200 FEET, IN WHICH CASE A STREET LIGHT SHALL BE PROVIDED AT THE END OF THE STREET; OR
   - 5.2. THE ROADWAY LENGTH IS LESS THAN 200 FEET, A STREET LIGHT IS PLACED AT THE INTERSECTION, NO NATURAL FEATURES INTERFERE WITH THE LIGHT, AND NO STREET LIGHT WILL BE PLACED AT THE END OF THE ROADWAY.
6. MAXIMUM POLE HEIGHT:
   RESIDENTIAL STREET: 15'
   THOROUGHFARES: 30', UNLESS THE SPILLOVER FROM THE FIXTURE WILL CAUSE GLARE IN A RESIDENTIAL AREA, IN WHICH CASE THE MAXIMUM HEIGHT SHALL BE 25'.
7. STREET ILLUMINATION SHALL SATISFY THE REQUIREMENTS OF THE JEFFERSON COUNTY ZONING AND LAND DEVELOPMENT ORDINANCE.
8. LIGHT POLES INSTALLED IN PARKING AREAS SHALL BE INSTALLED ON A 30" HIGH STRUCTURAL BASE (I.E. REINFORCED CONCRETE PIER) TO PROTECT THEM FROM VEHICLE DAMAGE.



TYPICAL ROADWAY SECTION WITH CURB AND GUTTER

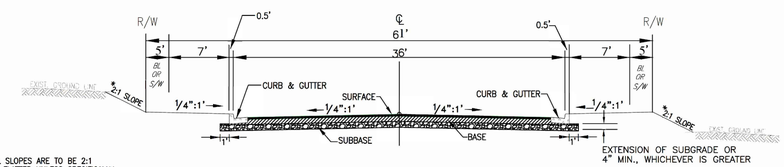
ROAD B: STA 10+00.00 TO 22+84.45 ROAD R: STA 14+65.00 TO 14+92.00
ROAD E: STA 10+00.00 TO 24+39.60
ROAD F: STA 10+42.00 TO 24+11.00
ROAD G: STA 10+42.00 TO 17+42.00
ROAD H: STA 10+35.00 TO 22+05.19
ROAD I: STA 10+35.00 TO 12+35.00
ROAD J: STA 10+00.00 TO 18+24.95
ROAD K: STA 10+00.00 TO 10+42.00
ROAD L: STA 10+42.00 TO 15+88.50
ROAD M: STA 10+42.00 TO 15+62.00
ROAD N: STA 10+00.00 TO 13+68.38
ROAD N: STA 23+23.00 TO 23+50.00
ROAD O: STA 10+42.00 TO 14+65.00
ROAD P: STA 15+12.00 TO 15+54.00
ROAD R: STA 10+00.00 TO 10+42.00

* ALL SLOPES ARE TO BE 2:1 OR FLATTER UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS.

CITY OF CHARLES TOWN 1780

TYPICAL SECTION - NEIGHBORHOOD STREET (0-500 VPD)

City of Charles Town



* ALL SLOPES ARE TO BE 2:1 OR FLATTER UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS.

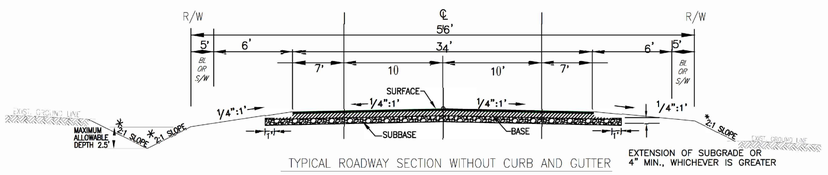
TYPICAL ROADWAY SECTION WITH CURB AND GUTTER

ROAD A: STA 10+46.86 TO 15+30.55
ROAD S: STA 10+34.47 TO 11+43.57

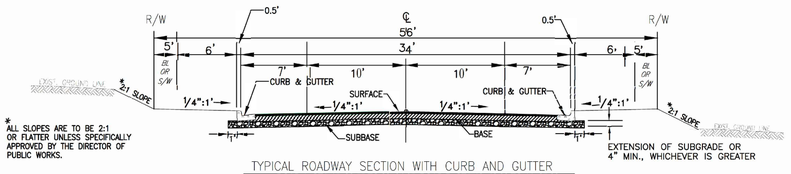
CITY OF CHARLES TOWN 1780

TYPICAL SECTION - MINOR COLLECTOR (1000-2001 VPD)

City of Charles Town



TYPICAL ROADWAY SECTION WITHOUT CURB AND GUTTER



* ALL SLOPES ARE TO BE 2:1 OR FLATTER UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS.

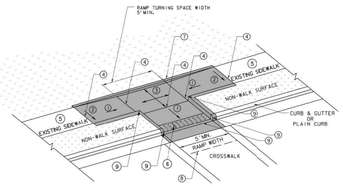
TYPICAL ROADWAY SECTION WITH CURB AND GUTTER

ROAD A: STA 15+30.55 TO 20+04.05 ROAD R: STA 10+42.00 TO 14+65.00
ROAD C: STA 10+43.00 TO 16+48.50
ROAD D: STA 10+42.00 TO 16+48.50
ROAD K: STA 10+42.00 TO 15+20.00
ROAD N: STA 13+68.38 TO 23+23.00
ROAD P: STA 10+42.00 TO 15+12.00

CITY OF CHARLES TOWN 1780

TYPICAL SECTION - NEIGHBORHOOD CENTER STREET (501-1000 VPD)

City of Charles Town



TYPE IV RAMP

NOTES

THE TYPE OF RAMP TO BE USED SHALL BE AS SPECIFIED ON THE PLANS. THESE STANDARDS CAN BE CONSIDERED GUIDELINES IN SELECTING RAMP TYPES, HOWEVER THEY CAN BE DEVIATED FROM WITH A SPECIAL DETAIL AS NOTED IN PLANS.

RAMP CONCRETE SHALL MEET THE REQUIREMENTS OF SECTION 609 OF THE CURRENT WVDOT, DOH STANDARD SPECIFICATIONS ROADS AND BRIDGES AND ANY SUBSEQUENT DOH SUPPLEMENTAL SPECIFICATIONS, AND THE PUBLIC RIGHTS OF WAY ACCESSIBILITY GUIDELINES (PROWAG) DATED JULY 26, 2011. RAMP SURFACE SHALL INCLUDE A "DETECTABLE WARNING SURFACE" (SEE PVT7 SHT. 11 OF 13) AS SHOWN FOR EACH RAMP TYPE. A COARSE BROOM FINISH, TRANSVERSE TO FLARE SLOPES, OR EQUAL NON-SKID FINISH SHALL BE PROVIDED ON CONCRETE SURFACES.

NORMAL GUTTER FLOW LINE AND PROFILE SHALL BE MAINTAINED THROUGH THE RAMP AREA, UNLESS OTHERWISE SHOWN OR SPECIFIED. POSITIVE DRAINAGE MUST BE MAINTAINED SO THAT NO PONDING OCCURS WITHIN THE RAMP OR CLEAR SPACE AREA.

1/4" MINIMUM, 1/2" MAXIMUM PREFORMED EXPANSION JOINT FILLER, MEETING THE REQUIREMENTS OF SECTION 609 OF THE SPECIFICATIONS, AS NOTED ABOVE, SHALL BE PLACED AT ALL LOCATIONS WHERE RAMP CONTACTS CURB, GUTTER, CONCRETE PAVEMENT, OR OTHER RIGID OBJECTS.

WHERE EXISTING SIDEWALK CONNECTS TO PROPOSED SIDEWALK OR RAMPS, EXPANSION JOINTS ALONG WITH DOWEL BARS WILL BE PLACED. DOWEL BARS WILL BE UTILIZED BETWEEN EXISTING AND PROPOSED TO REDUCE VERTICAL CHANGE. SEE SHEET 11 FOR ADDITIONAL INFORMATION.

SAWCUTS WILL BE UTILIZED DURING DEMOLITION OF EXISTING SIDEWALKS. SIMILAR METHODS MAY BE USED UPON APPROVAL BY FIELD ENGINEER.

RAMPS SHALL NOT BE PLACED IN LINE WITH DRAINAGE STRUCTURES. LOCATION OF THE RAMP SHALL TAKE PRECEDENCE OVER LOCATION OF THE DRAINAGE STRUCTURE, EXCEPT WHERE EXISTING STRUCTURES ARE BEING UTILIZED FOR CONSTRUCTION OF NEW RAMPS.

ANY GRATE IN PEDESTRIAN AREAS SHALL HAVE OPENINGS NOT GREATER THAN 1/2" AND SHALL BE PLACED WITH LONG DIMENSION OF OPENING PERPENDICULAR TO THE DIRECTION OF PEDESTRIAN TRAVEL.

IF THE 8.33% (12:1) SLOPE CANNOT BE OBTAINED DUE TO GRADE OF THE ADJACENT ROADWAY, THE SLOPED PORTION OF THE RAMP SHALL BE EXTENDED TO A MINIMUM LENGTH OF 15'-0".

EXISTING CROSS WALK AND STOP BAR MARKINGS TO BE ERADICATED AND RELOCATED AS DICTATED BY PROPOSED RAMP LOCATIONS. COST NOT INCIDENTAL TO COST OF PROPOSED RAMP.

CURB RAMP WIDTH SHALL MATCH SIDEWALK WIDTH PLUS CLEARANCE. TYPICAL SIDEWALK WIDTH IS 5' MINIMUM. RAMP WIDTHS LESS THAN 5' REQUIRE DIVISION/DISTRICT ENGINEER APPROVAL. WIDTHS LESS THAN 4' REQUIRE AN EXCEPTION JUSTIFICATION REPORT. SEE SHEET 11 FOR INFORMATION REGARDING RAMP THICKNESS.

GRADE BREAKS SHALL BE PERPENDICULAR TO THE DIRECTION OF THE RAMP RUN. SURFACE SLOPES THAT MEET AT GRADE BREAKS SHALL BE FLUSH.

CLEAR SPACE- BEYOND THE BOTTOM GRADE BREAK, A CLEAR SPACE THE WIDTH OF THE CURB RAMP AND EXTENDING 4' MINIMUM INTO THE ABUTTING ROADWAY SHALL BE PROVIDED WITHIN THE WIDTH OF THE PEDESTRIAN STREET CROSSING AND WHOLLY OUTSIDE THE PARALLEL TRAVEL LANE. SURFACE TO MATCH EXISTING. ANY CLEAR SPACE WORK TO BE COMPLETED WILL BE INCIDENTAL TO THE COST OF THE RAMP.

ALL CURB RAMPS SHALL BE CONSTRUCTED TO PROVIDE ACCESS TO EXISTING OPERABLE PARTS. AN EXAMPLE OF THIS WOULD BE PEDESTRIAN PUSH BUTTONS.

LEGEND

1. 8.33% (12:1) MAXIMUM RAMP SLOPE INCLUDING CONSTRUCTION TOLLERANCE. SLOPE OF RAMP SHALL CARRY THROUGH TO FACE OF CURB
2. CROSS SLOPE: 2.00% MAXIMUM INCLUDING CONSTRUCTION TOLERANCE
3. CURB RAMPS REQUIRE A 15'-0" MINIMUM TURNING SPACE WHERE PEDESTRIANS PERFORM TURNING MANEUVERS WITH A MAXIMUM CROSS SLOPE OF 2% AND LONGITUDINAL SLOPE MATCHING ROADWAY
4. GRADE BREAK REQUIRED TO BE FLUSH (0") AND PERPENDICULAR TO PEDESTRIAN PATH OF TRAVEL
5. IF SIDEWALK IS EXISTING AND NON-COMPLIANT SEE "TRANSITION TO EXISTING NON-COMPLIANT SIDEWALK" DETAIL SHEET 12
6. DETECTABLE WARNING SURFACE. SEE "DETECTABLE WARNING SURFACE (DWS)" DETAIL SHEET 11
7. CURB WALL OR CHEEK WALL AS DICTATED BY FIELD CONDITIONS. SEE "EXISTING ADJACENT SURFACE TRANSITION" DETAIL SHEET 13
8. CLEAR SPACE - WIDTH OF CURB RAMP AND EXTENDING 4' MINIMUM
9. 3/4" CHAMFER EDGE

PAY LIMITS FOR CURB RAMPS (EXCLUDING DWS)

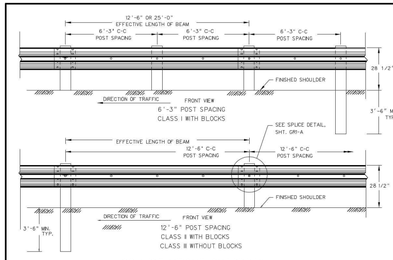
NOT TO SCALE

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 11-12-1998
REVISION DATE
10-15-19
10-15-19
10-15-19
10-15-19
10-15-19

SIDEWALK RAMPS
(Sheet 9 of 13)
TYPE IV RAMP

STANDARD SHEET PVT 7



28-1/2" HEIGHT GUARDRAIL

Splice locations for 28 1/2" Guardrail shall be on the post.

GUARDRAIL HEIGHT

Transitions in guardrail height shall be accomplished at a rate of 1" vertical distance in 12.5' (one element) of horizontal distance. Height transitions shall end before end treatments or connections begin.

Height transitions between 28 1/2" and 31" require moving the Splice on/off the post by placing one additional post at half the normal spacing.

Guardrail height shall be as indicated on plans.

Construction tolerances for rail height is plus/minus 1".

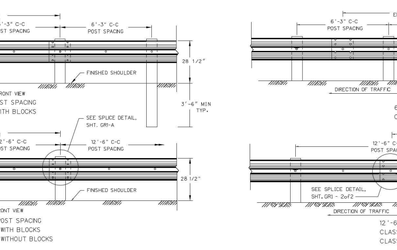
The Special Trailing End Treatment is acceptable for both 28½" and 31" guardrail heights.

Approach Terminals/Separate approved product lists will be maintained for both 28 1/2" & 31" terminal heights.

31" Guardrail that ties to a Cut Slope Terminal (CST) must be transitioned down to 28½" height (the height of the CST) per the above paragraph.

Thrie Beam transitions shall be per Standard GR-11 dated 11-13-12 for 28½" and dated 11-2-15 for 31".

Factory punched slots at 3'-1-1/2" spacing are acceptable for all classes of guardrail.



31" HEIGHT GUARDRAIL

Splice location for 31" Guardrail are generally off the post. However, for tight post spacings, splices on the posts are necessary and acceptable.

NOTES

Guardrail systems on NHS routes must meet NCHRP 350 or the most current AASHTO Manual for Assessing Safety Hardware (MASH) crash testing criteria and have an eligibility letter to be used on WVDOH projects.

Guardrail shall be secured to the blocks, posts and other elements by 5/8" dia. bolts and nuts conforming to the details on Std. GR1 2of2 and to the requirements of 712.4 of the Standard Specifications. Nuts shall conform to ASTM A563, Grade A or better.

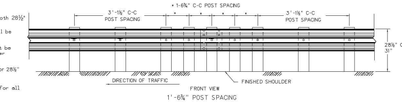
Approach and Trailing End Treatments shall be as specified on the Plans or directed by the Engineer, shown or

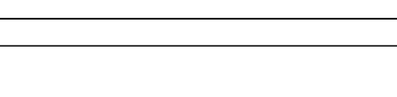
The pay quantity of guardrail will be the Linear Feet of guardrail measured along the face of the rail from center to center of end posts. Cost of the Terminal Section Buffer End (if any) shall be included in the cost of the guardrail.

The approach slope to the face of all guardrail shall be 10:1 or flatter.

The Type, Class and Height of Guardrail shall be as shown in the Plans.

Lap Guardrail in Direction of Traffic.



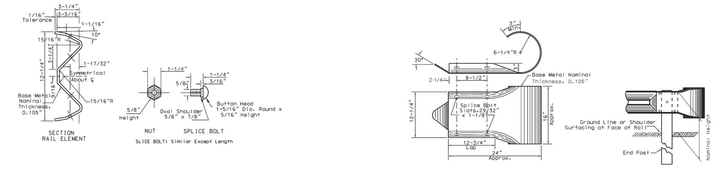


WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 11-12-1998
REVISION DATE
10-15-19
10-15-19
10-15-19
10-15-19
10-15-19

GUARDRAIL ELEMENTS
(SHEET 1 OF 2)

STANDARD SHEET GR1



RAIL SPLICE - 28 1/2" HEIGHT ON POST

Eight (8) Splice Bolts are to be used at all Rail Splices

RAIL SPLICE - 31" HEIGHT OFF POST

Eight (8) Splice Bolts are to be used at all Rail Splices

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 11-12-1998
REVISION DATE

GUARDRAIL ELEMENTS
(SHEET 2 OF 2)

STANDARD SHEET GR1

INTEGRITY FEDERAL SERVICES
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148 S. Queen Street, Suite 201 Martinsburg, WV 25401
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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 3-6-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

GENERAL DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: AS NOTED VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GI-501.DWG	
NCS:	
SHEET:	04 OF 134

FILE PATH: G:\PROJECT\GENERAL\2665\GSD\1 PIETTE HARRISONBURG AREA\C-GI-501.DWG
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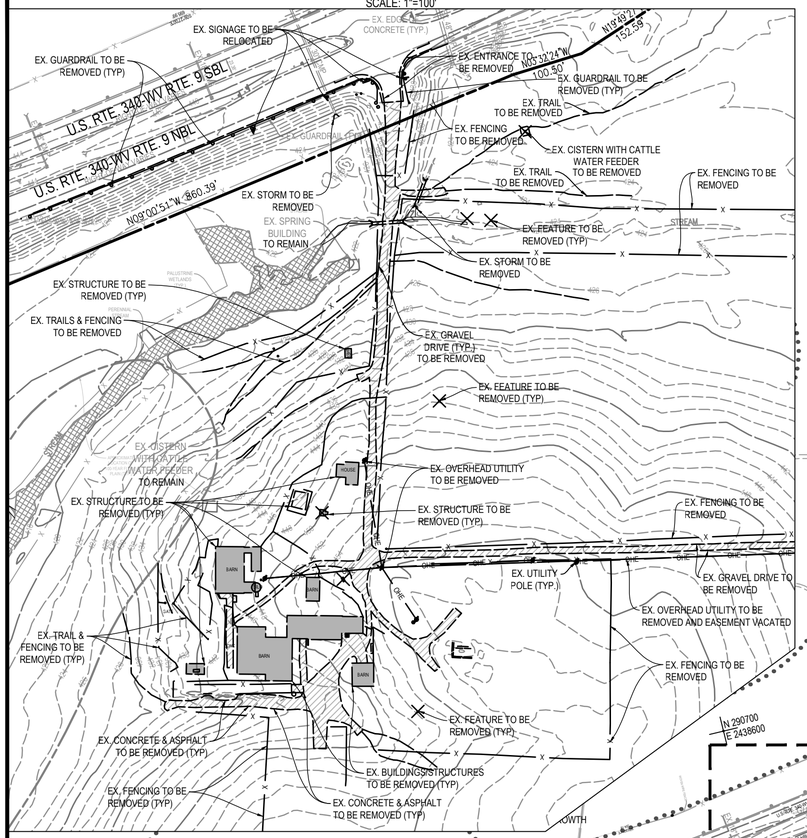
EXISTING CONDITIONS & DEMOLITION PLAN INSET

SCALE: 1"=100'



SOILS MAP UNIT LEGEND

SOIL NAME	MAPPING UNIT	DEPTH TO RESTRICTIVE FEATURE	DRAINAGE CLASS	PERMEABILITY (IN/HR)	DEPTH TO WATER TABLE	HSG
FUNKSTOWN SILT LOAM	Fk	MORE THAN 80"	MODERATELY WELL DRAINED	MODERATELY HIGH-HIGH 0.57-1.98	20"-28"	C
HAGERSTOWN SILT LOAM, 8-15% SLOPES	HbC	43"-98" TO LITHIC BEDROCK	WELL DRAINED	MODERATELY HIGH-HIGH 0.6-2.0	MORE THAN 80"	B
HAGERSTOWN SILT LOAM, 8-15% SLOPES, VERY ROCKY	HeC	MORE THAN 80"	WELL DRAINED	MODERATELY HIGH-HIGH 0.6-2.0	MORE THAN 80"	B
POPLIMENTO SILT LOAM, 3-8% SLOPES	PmB	MORE THAN 80"	WELL DRAINED	MODERATELY HIGH 0.2-0.57	MORE THAN 80"	B
POPLIMENTO SILT LOAM, 8-15 SLOPES	PmC	MORE THAN 80"	WELL DRAINED	MODERATELY HIGH 0.2-0.57	MORE THAN 80"	B
TOMS SILT LOAM	Tm	MORE THAN 80"	SOMEWHAT POORLY DRAINED	MODERATELY HIGH-HIGH 0.5-1.98	0"-12"	B/D
UDORTHENTS, SMOOTHED	Ua	MORE THAN 80"	-	-	MORE THAN 80"	-
URBAN LAND-UDORTHENTS	Uu	MORE THAN 80"	-	-	MORE THAN 80"	-

NOTES:
- SOILS INFORMATION PROVIDED BY THE USDA SOIL SURVEY OF JEFFERSON COUNTY, WEST VIRGINIA.

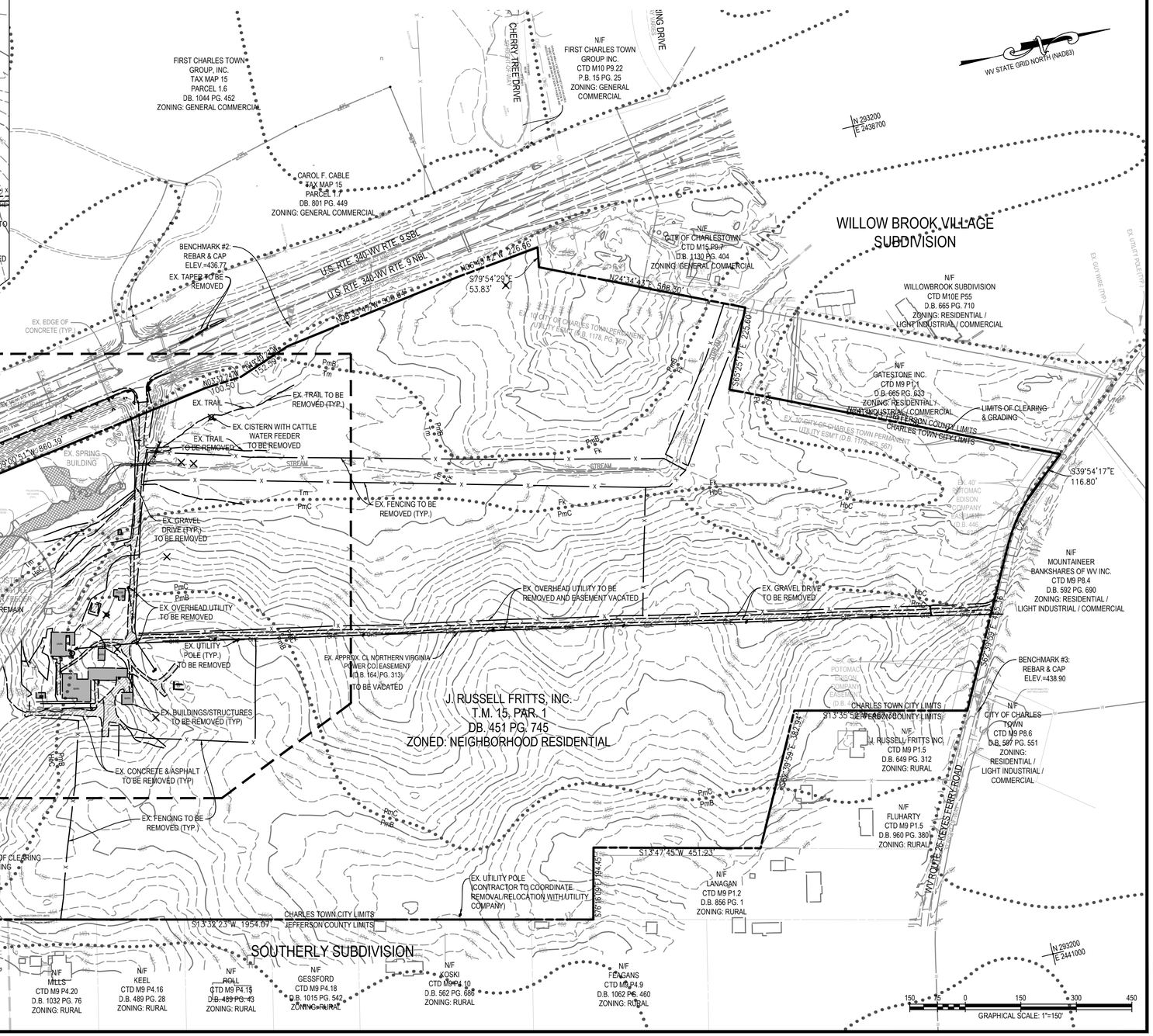
CURVE TABLE

CURVE	ARC LENGTH	RADIUS	DELTA	TANGENT	CHORD	CHORD BEARING
C1	174.80'	440.00'	22°45'42"	88.57'	173.65'	S51°17'08"E

DEMOLITION LEGEND:

- STRUCTURE TO BE REMOVED
- PAVEMENT TO BE REMOVED
- REMOVE EX. VEGETATION (CLEARING & GRUBBING)
- LIMITS OF CLEARING/CONSTRUCTION
- TREE FENCING AND ARMOR
- REMOVE EX. FEATURE

NOTES:
1. THE DEMOLITION PLAN IS A GENERAL GUIDE OF WHAT NEEDS TO BE DEMOLISHED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY ALL ITEMS THAT REQUIRE DEMOLITION TO COMPLETE THE PROPOSED CONSTRUCTION.
2. SITE FEATURES SHOWN IN BOLD TO BE REMOVED.



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JASON P. GERHART REGISTERED NO. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS

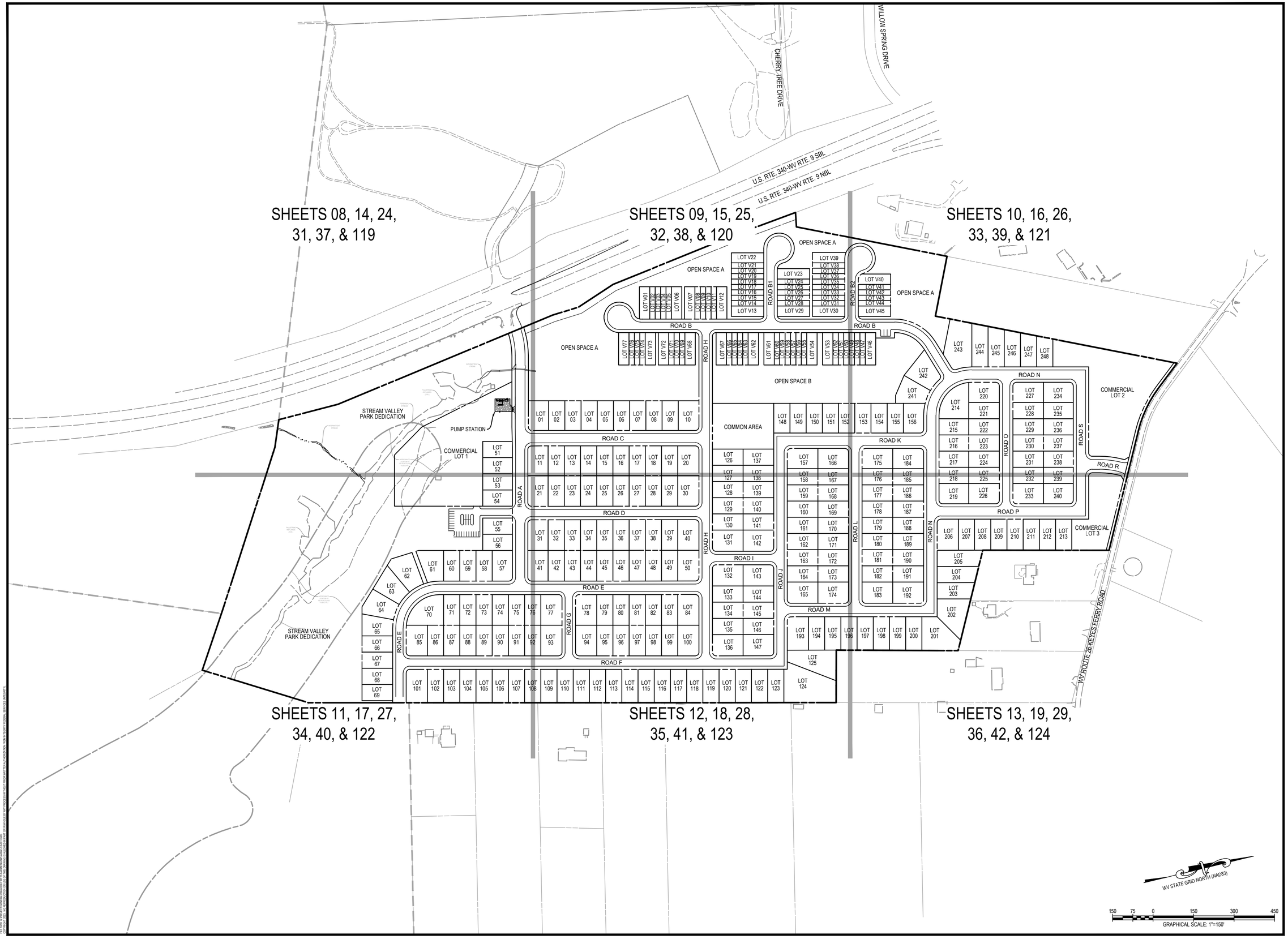
1. 03/16/2023 - WVDOH, CTLB, AND CITY OF CHARLES TOWN COMMENTS

EXISTING CONDITIONS & DEMOLITION PLAN

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1"=150' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CD-101.DWG	
NCS:	
SHEET:	05 OF 134



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REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

OVERALL SITE PLAN

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1"=150' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CS-001.DWG	
NCS:	
SHEET:	06 OF 134

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EROSION AND SEDIMENT CONTROL NARRATIVE:

I. PROJECT DESCRIPTION:

THIS PROJECT IS FOR THE CONSTRUCTION OF SINGLE-FAMILY DETACHED UNITS, TOWNHOUSE UNITS, AND COMMERCIAL LOTS WITH ASSOCIATED DRIVE AISLES PARKING AREAS AND SIDEWALKS. IN ADDITION, THERE WILL BE THE CONSTRUCTION OF UNDERGROUND UTILITIES SERVING THE PROPERTY AND STORMWATER MANAGEMENT. THE TOTAL PROJECT AREA IS APPROXIMATELY ±99 ACRES AND THE PROPOSED DISTURBED AREA IS ±82.67 ACRES. THE TOTAL IMPERVIOUS AREA CREATED BY THE DEVELOPMENT OF THE SITE IS APPROXIMATELY ±38 ACRES. ASSOCIATED GRADING VOLUMES FOR THE PROPOSED SITE IMPROVEMENTS ARE APPROXIMATELY 250,000 C.Y. OF CUT AND 250,200 C.Y. OF FILL (NOT TO BE USED FOR BIDDING PURPOSES).

II. EXISTING SITE CONDITIONS:

THE SITE IS LOCATED ALONG THE EASTERN SIDE OF U.S. ROUTE 340. THE SUBJECT PROPERTY CONSISTS OF UNDEVELOPED OPEN SPACE COVERED WITH FIELD GRASS AND VEGETATED AREAS. THE SITE CONSISTS OF MODERATELY STEEP AND FLAT SLOPES RANGING FROM APPROXIMATELY 1%-15%. THE SURFACE RUNOFF DRAINS VIA SWALES TO AN OUTFALL LOCATION AT THE NORTHEASTERN PORTION OF THE SITE.

III. ADJACENT AREAS:

THE SITE IS BOUNDED BY RESIDENTIAL PROPERTIES TO THE SOUTH, RURAL AREAS TO THE EAST, R.L.I.C. PROPERTIES TO THE NORTH, AND DEVELOPING RESIDENTIAL LAND TO THE WEST OPPOSITE U.S. ROUTE 340. THERE IS LITTLE POTENTIAL FOR OFFSITE EROSION AND SEDIMENT DAMAGE BY THIS PROJECT AS TEMPORARY EROSION AND SEDIMENT CONTROLS WILL BE USED DURING CONSTRUCTION AND PERMANENT STORMWATER MANAGEMENT CONTROLS WILL BE INSTALLED PRIOR TO THE SITE BEING FULLY DEVELOPED.

IV. CRITICAL AREAS:

CRITICAL AREAS ONSITE CONSISTS OF WETLANDS AND STREAMS. THERE WILL BE NO IMPACTS TO THESE AREAS DURING CONSTRUCTION. THESE AREAS AND THEIR BUFFERS SHALL BE CLEARLY FLAGGED IN THE FIELD TO ENSURE THAT EQUIPMENT OPERATORS STAY OUT OF CRITICAL AREAS. DISTURBED AREAS WILL BE PROTECTED WITH SILT FENCE, DIVERSION DIKES AND/OR OTHER CONTROL MEASURES.

V. SOILS:

SOILS MAP UNIT LEGEND

SOIL NAME	MAPPING UNIT	DEPTH TO RESTRICTIVE FEATURE	DRAINAGE CLASS	PERMEABILITY (IN/HR)	HSG
FUNKSTOWN SILT LOAM	Fk	MORE THAN 80"	MODERATELY WELL DRAINED	MODERATE-0.6-2.0	B
HAGERSTOWN SILT LOAM, 8-15% SLOPES	HbC	43"-98" TO LITHIC BEDROCK	WELL DRAINED	MODERATE-0.6-2.0	B
HAGERSTOWN SILT LOAM, 8-15% SLOPES, VERY ROCKY	HeC	MORE THAN 80"	WELL DRAINED	MODERATE-0.6-2.0	B
POPLIMENTO SILT LOAM, 3-8% SLOPES	PmB	MORE THAN 80"	WELL DRAINED	SLOW-0.06-0.20	C
POPLIMENTO SILT LOAM, 8-15 SLOPES	PmC	MORE THAN 80"	WELL DRAINED		
TOMS SILT LOAM	Tm	MORE THAN 80"	SOMEWHAT POORLY DRAINED		
UDORTHENTS, SMOOTHED	Ua	MORE THAN 80"	-		
URBAN LAND-UDORTHENTS	Uu	MORE THAN 80"	-		

NOTES:
- SOILS INFORMATION PROVIDED BY THE USDA SOIL SURVEY OF JEFFERSON COUNTY, WEST VIRGINIA.

VI. EROSION AND SEDIMENT CONTROL ELEMENTS:

UNLESS OTHERWISE NOTED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE CONSTRUCTED AND MAINTAINED IN STRICT COMPLIANCE WITH THE LATEST EDITION OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL AND APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.

1. MARK CLEARING LIMITS:

PRIOR TO BEGINNING LAND DISTURBING ACTIVITIES, CLEARLY MARK ALL CLEARING LIMITS, SENSITIVE AREAS AND THEIR BUFFERS, AND TREES THAT ARE TO BE PRESERVED WITHIN THE CONSTRUCTION AREA. PLASTIC, METAL, OR STAKE WIRE FENCE MAY BE USED TO MARK CLEARING LIMITS. SAFETY FENCE SHOULD BE INSTALLED TO PREVENT PUBLIC ACCESS TO POTENTIALLY HAZARDOUS AREAS OF THE SITE AND TO PREVENT ACCESS TO EROSION AND SEDIMENT CONTROL MEASURES.

2. ESTABLISH CONSTRUCTION ACCESS:

ALL CONSTRUCTION ACCESS SHALL ENTER AND EXIT THE SITE THROUGH THE STABILIZED CONSTRUCTION ENTRANCE AS SHOWN ON THE PLANS LOCATED ON THE EASTERN SIDE OF U.S. ROUTE 340. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. IF WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE. CONTRACTOR SHALL SUPPLY A WATER SOURCE BY PROVIDING A WATER TRUCK/WATER TANK ON SITE OR BY USE OF EXISTING ON SITE WATER SERVICE. THE CONSTRUCTION ENTRANCE LOCATION MAY BE SHIFTED TO ACCOMMODATE CONSTRUCTION PHASING. ANY SHIFT IN THE LOCATION SHALL BE APPROVED BY JEFFERSON COUNTY ENGINEERING.

3. INSTALL SEDIMENT CONTROLS:

THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION SHALL REMAIN IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICABLE. PRIOR TO LEAVING THE CONSTRUCTION SITE, SURFACE RUNOFF FROM DISTURBED AREAS SHALL PASS THROUGH AN APPROPRIATE SEDIMENT CONTROL MEASURE. BMP'S INTENDED TO TRAP SEDIMENT ON SITE SHALL BE CONSTRUCTED AS ONE OF THE FIRST STEPS IN GRADING. THESE BMP'S SHALL BE FUNCTIONAL PRIOR TO LAND DISTURBING ACTIVITIES TAKING PLACE. EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS SHALL BE SEEDED AND MULCHED AS PER TEMPORARY AND PERMANENT SOIL STABILIZATION MEASURES.

SEDIMENT BASIN:

SEDIMENT BASINS SHALL BE INSTALLED PRIOR TO INITIATING ROUGH GRADING TO CAPTURE SEDIMENT-LADEN RUNOFF FROM THE CONSTRUCTION SITE. SEDIMENT BASINS REDUCE THE ENERGY OF THE WATER THROUGH EXTENDED DETENTION (48 TO 72 HOURS) TO SETTLE OUT THE MAJORITY OF THE SUSPENDED SOLIDS AND SEDIMENT. SEDIMENT BASINS ARE OFTEN MODIFIED TO FUNCTION AS A PERMANENT SWM POND/BMP AFTER CONSTRUCTION IS COMPLETED.

SEDIMENT TRAP:

SEDIMENT TRAPS SHALL BE INSTALLED PRIOR TO INITIATING ROUGH GRADING (DURING THE FIRST PHASE OF CONSTRUCTION) TO DETAIN SEDIMENT-LADEN RUNOFF FROM SMALL DISTURBED AREAS OF FIVE ACRES OR LESS. SEDIMENT TRAPS SHALL BE INSTALLED AT THE OUTLET OF DITCHES AND OTHER PERIMETER CONTROLS INSTALLED DURING THE FIRST STAGE OF CONSTRUCTION. SEDIMENT TRAPS MAY ALSO BE INSTALLED AT THE OUTLET OF ANY STRUCTURE WHICH CONCENTRATES SEDIMENT-LADEN RUNOFF (I.E. DISCHARGE POINT OF DIVERSIONS, CHANNELS, SLOPE DRAINS OR OTHER RUNOFF CONVEYANCES).

SILT FENCE:

SILT FENCE SHALL BE INSTALLED ALONG THE DOWN-SLOPE SIDES OF DISTURBED AREAS TO INTERCEPT AND DETAIN SMALL AMOUNTS OF SEDIMENT DURING CONSTRUCTION OPERATIONS IN ORDER TO PREVENT SEDIMENT FROM LEAVING THE SITE.

SUPER SILT FENCE:

SUPER SILT FENCE SHALL BE INSTALLED TO REDUCE RUNOFF VELOCITY AND ALLOW SEDIMENT TO BECOME TRAPPED BEHIND OR UP-SLOPE OF THE SUPER SILT FENCE. SUPER SILT FENCE PROVIDES A BARRIER THAT CAN COLLECT AND HOLD DEBRIS AND SOIL, PREVENTING THE MATERIAL FROM ENTERING CRITICAL AREAS, STREAMS, STREETS, ETC. SUPER SILT FENCE ALSO HELPS TO DECREASE THE VELOCITY OF SHEET FLOWS AND LOW-TO-MODERATE LEVEL CHANNEL FLOWS.

TEMPORARY DIVERSIONS:

TEMPORARY DIVERSIONS SHALL BE INSTALLED TO DIVERT UP-SLOPE CLEAN WATER AROUND A PROJECT SITE TO REDUCE THE QUANTITY OF WATER WITHIN THE SEDIMENT CONTROL SYSTEM; TO DIVERT UP-SLOPE WATER FROM DISTURBED AREAS TO AN APPROPRIATE SEDIMENT TRAPPING FACILITY SUCH AS A SEDIMENT TRAP OR SEDIMENT BASIN; TO DIVERT INTERNAL SEDIMENT-LADEN WATER TO A SEDIMENT-TRAPPING STRUCTURE; TO PREVENT EROSION AND MAINTAIN ACCEPTABLE WORKING CONDITIONS ABOVE CRITICAL DISTURBED AREAS PRIOR TO STABILIZATION. TEMPORARY DIVERSIONS ALSO HELP TO INTERCEPT AND DIVERT WATER AWAY FROM FOOTERS, WALLS & OTHER STRUCTURES.

DIVERSIONS THAT ARE TO SERVE LONGER THAN 14 WORKING DAYS SHALL BE STABILIZED IMMEDIATELY WITH SEED AND MULCH WITH OR WITHOUT A ROLLED EROSION CONTROL PRODUCT MEETING THE REQUIREMENTS FOUND IN THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL TO PRESERVE DIKE HEIGHT, PREVENT EROSION AND REDUCE MAINTENANCE.

INLET PROTECTION:

INLET PROTECTION SHALL BE BE PLACED ON ALL STORM DRAIN DROP INLETS OR CURB INLETS TO TRAP SEDIMENT BEFORE CONTAMINATED RUNOFF ENTERS A STORM DRAINAGE SYSTEM. STORM DRAIN INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY FOLLOWING INSTALLATION OF STORMWATER CONTROLS OR PRIOR TO CONSTRUCTION ACTIVITIES FOR EXISTING STORM DRAINS OR WHERE STORM DRAIN INLETS ARE TO BE MADE OPERATIONAL BEFORE PERMANENT STABILIZATION OF THE CORRESPONDING DISTURBED DRAINAGE AREA.

4. STABILIZE SOILS:

THE GENERAL PERMIT REQUIRES THAT:

- STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOUR (4) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED.
- APPLICABLE PRACTICES INCLUDE, BUT ARE NOT LIMITED TO, TEMPORARY AND PERMANENT SEEDING, SODDING, MULCHING, EROSION CONTROL FABRICS AND MATTING, SURFACE ROUGHENING, SURFACE WATER CONTROL, AND DUST CONTROL.
- SELECTED SOIL STABILIZATION MEASURES SHALL BE APPROPRIATE FOR THE TIME OF YEAR, SITE CONDITIONS, AND ESTIMATED DURATION OF USE.
- ALL SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT TRAPPING MEASURES.
- LINEAR CONSTRUCTION ACTIVITIES SUCH AS RIGHT-OF-WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINES, AND TRENCHING FOR UTILITIES, SHALL BE CONDUCTED TO MEET THE SOIL STABILIZATION TIMEFRAME REQUIREMENTS. CONTRACTORS SHALL INSTALL THE BEDDING MATERIALS, ROADBEDS, STRUCTURES, PIPELINES, OR UTILITIES AND RE-STABILIZE THE DISTURBED SOILS SO THAT THE FOUR (4) DAY REQUIREMENTS ARE MET.
- OFF-SITE FILL MATERIAL MUST COME FROM A SITE THAT IS PERMITTED NOW OR IN THE FUTURE BEFORE TRANSPORT OF MATERIAL, IF OVER AN ACRE IN SIZE PER SECTION II.A.1.F OF THE WVDEP GENERAL PERMIT

TEMPORARY SEEDING:

TEMPORARY STABILIZATION SHALL BE INITIATED WITHIN FOUR (4) DAYS TO AREAS THAT WILL NOT BE RE-DISTURBED FOR MORE THAN FOURTEEN (14) DAYS. AREAS INCLUDE DENUDED AREAS, SOIL STOCKPILES, DIKES, DAMS, SIDES OF SEDIMENT BASINS, TEMPORARY ROAD BANKS, ETC.

PERMANENT SEEDING:

PERMANENT STABILIZATION SHALL BE INITIATED WITHIN FOUR (4) DAYS OF REACHING FINAL GRADE AND WITHIN FOUR (4) DAYS AFTER CONSTRUCTION HAS BEEN COMPLETED. AREAS INCLUDE DISTURBED AREAS WHERE PERMANENT, LONG-LIVED VEGETATIVE COVER IS NEEDED TO STABILIZE THE SOIL AND ROUGH-GRADED AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR SIX MONTHS OR MORE.

MULCHING:

THE APPLICATION OF STRAW, HAY OR OTHER SUITABLE MATERIALS TO THE SOIL SURFACE TO PREVENT EROSION BY PROTECTING THE SOIL SURFACE FROM RAINDROP IMPACT AND REDUCING THE VELOCITY OF OVERLAND FLOW. AREAS THAT HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED SHOULD BE MULCHED IMMEDIATELY FOLLOWING SEEDING. AREAS THAT CANNOT BE SEEDED BECAUSE OF THE SEASON SHOULD BE MULCHED TO PROVIDE SOME PROTECTION TO THE SOIL SURFACE.

TOPSOILING:

TOPSOILING IS THE SPREADING OF TOPSOIL OF A SUITABLE QUALITY OVER AN AREA TO BE STABILIZED BY ESTABLISHING VEGETATION. IF TOPSOIL IS TO BE STOCKPILED AT SITE, IT SHALL BE IN A LOCATION THAT WILL NOTE ERODE, BLOCK DRAINAGE, OR INTERFERE WITH WORK ON THE SITE. ALL SOIL STOCKPILES SHALL BE STABILIZED BY TEMPORARY SEEDING AND MULCHING AND PROTECTED WITH SEDIMENT TRAPPING MEASURES SUCH AS SILT FENCE. TOPSOIL SHALL BE SPREAD AT A LIGHTLY COMPACTED DEPTH OF 2 TO 4 INCHES. 4 INCHES OR GREATER IS RECOMMENDED FOR AREAS WHERE FINE-TEXTURED (CLAYEY) SUBSOIL OR OTHER ROOT LIMITING FACTORS ARE PRESENT.

ROLLED EROSION CONTROL PRODUCTS (RECP):

TEMPORARY OR PERMANENT EROSION CONTROL NETS, BLANKETS AND THREE-DIMENSIONAL MATRIXES MADE FROM A WIDE VARIETY OF NATURAL (SUCH AS JUTE, COIR AND STRAW) AND MAN-MADE MATERIALS ALONE OR IN COMBINATION THAT HELP PREVENT EROSION IN SEVERAL WAYS. PREFABRICATED BLANKETS OR NETTING SHALL BE USED AS A TEMPORARY SURFACE STABILIZING MEASURE AND TO AID IN THE ESTABLISHMENT OF VEGETATION. THEY ARE TYPICALLY USED ON STEEP SLOPES AND TO HELP ESTABLISH GRASS IN LOW VELOCITY VEGETATED CHANNELS.

5. PROTECT SLOPES:

THE GENERAL PERMIT PROHIBITS UP-SLOPE RUNOFF FROM FLOWING DOWN FILL SLOPES. ALL FILL SURFACE RUNOFF SHALL BE CONTAINED WITH TEMPORARY BERMS AND IN PIPES, SLOPE DRAINS, OR STABILIZED CHANNELS. DRAINAGE SHALL BE PROVIDED TO REMOVE GROUND WATER INTERSECTING THE SLOPE SURFACE OF EXPOSED SOIL AREAS. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES, CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS. SOILS ON SLOPES SHALL BE STABILIZED AS SPECIFIED IN TEMPORARY AND PERMANENT SOIL STABILIZATION MEASURES.

6. PROTECT STORM DRAIN INLETS:

STORM DRAIN INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SURFACE WATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. INLET PROTECTION SHALL BE PLACED ON ALL STORM INLETS TO PROTECT AGAINST SEDIMENT-LADEN RUNOFF ENTERING THE SYSTEM AT THE INLETS.

INLET PROTECTION:

INLET PROTECTION SHALL BE BE PLACED ON ALL STORM DRAIN DROP INLETS AND/OR CURB INLETS TO TRAP SEDIMENT BEFORE CONTAMINATED RUNOFF ENTERS A STORM DRAINAGE SYSTEM. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY FOLLOWING INSTALLATION OF STORMWATER CONTROLS, PRIOR TO CONSTRUCTION ACTIVITIES FOR EXISTING STORM DRAINS, AND/OR WHERE STORM DRAIN INLETS ARE TO BE MADE OPERATIONAL BEFORE PERMANENT STABILIZATION OF THE DISTURBED DRAINAGE AREA HAVE OCCURRED.

CULVERT INLET PROTECTION:

CULVERT INLET PROTECTION SHALL BE BE PLACED ON ALL STORM CULVERT INLETS TO PREVENT SEDIMENT FROM ENTERING, ACCUMULATING IN, AND BEING TRANSFERRED BY THE CULVERT AND ASSOCIATED DRAINAGE SYSTEM. CULVERT INLET PROTECTION MAY ALSO PROVIDE EROSION CONTROL AT STORM CULVERT INLETS DURING THE PHASE OF A PROJECT WHERE ELEVATION AND DRAINAGE PATTERNS CHANGE, CAUSING ORIGINAL CONTROL MEASURES TO BE INEFFECTIVE OR IN NEED OF REMOVAL.

7. CONVEY STORMWATER IN A NON-EROSIVE MANNER:

POINTS OF DISCHARGE AND RECEIVING STREAMS SHALL BE PROTECTED FROM EROSION DUE TO INCREASES IN THE VOLUME, VELOCITY, AND PEAK FLOW RATE OF SURFACE WATER RUNOFF FROM THE PROJECT SITE. ALL STORMWATER CONVEYANCE CHANNELS SHALL BE STABILIZED FOR EXPECTED FLOWS.

OUTLET PROTECTION:

OUTLET PROTECTION SHALL BE INSTALLED AT ALL CULVERT OUTLETS OF ALL TYPES, PIPE CONDUITS FROM ALL SEDIMENT BASINS, SWM PONDS, AND NEW CHANNELS CONSTRUCTED AS OUTLETS FOR CULVERTS AND CONDUITS. OUTLET PROTECTION SHALL BE PROVIDED IN THE FORM OF A RIP-RAP-LINED APRON CONSTRUCTED AT A ZERO OR MINIMUM SLOPE TO SLOW THE OUTLET VELOCITY AND ADEQUATELY PROTECT SOILS FROM SCOUR BY REDUCING FLOW.

ROCK CHECK DAMS:

SMALL TEMPORARY STONE DAMS CAN BE CONSTRUCTED ACROSS A WATERWAY TO REDUCE THE VELOCITY OF STORMWATER FLOWS, THEREBY REDUCING EROSION OF THE CHANNEL AND TRAPPING SEDIMENT. CHECK DAMS SHALL BE INSTALLED AT TEMPORARY DITCHES OR SWALES OR TEMPORARY OR PERMANENT DITCHES OR SWALES WHICH NEED PROTECTION DURING THE ESTABLISHMENT OF GRASS LININGS.

8. CONTROL OTHER POLLUTANTS:

ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF SURFACE OR GROUND WATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE. COVER, CONTAINMENT, AND PROTECTION FROM VANDALISM SHALL BE PROVIDED FOR ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCTS, AND NON-INERT WASTES PRESENT ON SITE. ALL MATERIALS USED ON THE SITE SHALL BE PROPERLY STORED, HANDLED, DISPENSED AND DISPOSED OF FOLLOWING ALL APPLICABLE LABEL DIRECTIONS. FLAMMABLE AND COMBUSTIBLE LIQUIDS SHALL BE STORED AND HANDLED ACCORDING TO APPLICABLE REGULATIONS, AND, AT A MINIMUM, ACCORDING TO OSHA STANDARDS 29 CFR 1926 152. ONLY APPROVED CONTAINERS AND PORTABLE TANKS SHALL BE USED FOR STORAGE AND HANDLING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS.

- MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM DRAIN DOWN, SOLVENT AND DE-GREASING CLEANING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO SURFACE WATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CONTAMINATED SURFACES SHALL BE CLEANED IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT.
- WHEEL WASH OR TIRE BATH WASTEWATER SHALL BE DISCHARGED TO A SEPARATE ON-SITE TREATMENT SYSTEM OR TO THE SANITARY SEWER.
- APPLICATION OF AGRICULTURAL CHEMICALS INCLUDING FERTILIZERS AND PESTICIDES SHALL BE CONDUCTED IN A MANNER AND AT APPLICATION RATES THAT WILL NOT RESULT IN LOSS OF CHEMICAL TO SURFACE WATER RUNOFF. MANUFACTURERS RECOMMENDATIONS FOR APPLICATION RATES AND PROCEDURES SHALL BE FOLLOWED.
- IN THE EVENT OF AN ACCIDENTAL SPILL, IMMEDIATE ACTION SHALL BE TAKEN BY THE CONTRACTOR TO CONTAIN AND REMOVE THE SPILLED MATERIAL. THE SPILL SHALL BE REPORTED TO THE APPROPRIATE AGENCIES IN THE REQUIRED TIME FRAMES. AS REQUIRED UNDER PROVISIONS OF THE CLEAN WATER ACT, ANY SPILL OR DISCHARGE ENTERING WATERS OF THE UNITED STATES SHALL BE PROPERLY REPORTED.

9. CONTROL DEWATERING:

FOUNDATION, VAULT, AND UTILITY TRENCH DEWATERING WATER SHALL BE DISCHARGED INTO A CONTROLLED CONVEYANCE SYSTEM PRIOR TO DISCHARGE TO A SEDIMENT POND. CHANNELS RECEIVING THE DISCHARGED WATER MUST BE STABILIZED. HIGHLY TURBID OR CONTAMINATED WATER FROM CONSTRUCTION EQUIPMENT OPERATIONS, WORK INSIDE A COFFERDAM, SHALL BE HANDLED SEPARATELY FROM SURFACE WATER. IF DEWATERING IS REQUIRED FOR SMALL VOLUMES OF LOCALIZED DEWATERING ON THIS SITE, A PUMP AND DEWATERING FILTER BAG SHALL BE UTILIZED. THE FILTER BAG SHALL DISCHARGE TO A DITCH OR SWALE WITH A WELL ESTABLISHED VEGETATIVE AREA.

10. MAINTAIN BMP'S:

TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL BMP'S SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. MAINTENANCE AND REPAIR SHALL BE CONDUCTED IN ACCORDANCE WITH THE BMP'S. AT A MINIMUM, ALL SEDIMENT CONTROL BMP'S SHALL BE INSPECTED AT LEAST ONCE EVERY FOUR (4) CALENDAR DAYS AND WITHIN 24 HOURS OF THE OCCURRENCE OF A PRECIPITATION EVENT OF 0.25 INCHES OR GREATER, OR THE OCCURRENCE OF RUNOFF FROM SNOWMELT SUFFICIENT TO CAUSE A DISCHARGE. TEMPORARY EROSION AND SEDIMENT CONTROL BMP'S SHOULD BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL RESULTING FROM THE REMOVAL OF BMP'S OR VEGETATION SHALL BE PERMANENTLY STABILIZED.

11. MANAGE THE PROJECT:

A SEQUENCE OF CONSTRUCTION HAS BEEN PROVIDED ON THIS SHEET TO DESCRIBE AN OVERALL CONSTRUCTION SEQUENCE AS IT RELATES TO EROSION AND SEDIMENT CONTROL BMP'S AND CONSTRUCTION OF VARIOUS ELEMENTS OF THE PROJECT. IN GENERAL, THE PROJECT IS TO BEGIN CONSTRUCTION IN SUMMER 2023 AND END APPROXIMATELY IN SUMMER 2028. THE CONTRACTOR IS RESPONSIBLE FOR THE DETAILS OF THE DAY TO DAY OPERATIONS.

- THE PRIMARY PROJECT MANAGER SHALL EVALUATE, WITH INPUT FROM UTILITIES AND OTHER CONTRACTORS, THE SURFACE WATER MANAGEMENT REQUIREMENTS FOR THE ENTIRE PROJECT, INCLUDING THE UTILITIES, WHEN PREPARING THE SEDIMENT CONTROL PLAN. ALL BMP'S SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. WHENEVER INSPECTION AND/OR MONITORING REVEALS THAT THE BMP'S IDENTIFIED IN THE SEDIMENT CONTROL PLAN ARE INADEQUATE, THE SEDIMENT CONTROL PLAN SHALL BE MODIFIED, AS APPROPRIATE, IN A TIMELY MANNER.
- CONTRACTOR SHALL REPORT SPILLAGE OR DISCHARGE OF POLLUTANTS WITHIN 24-HOURS. THE SEDIMENT CONTROL PLAN SHALL BE RETAINED ON SITE. THE SEDIMENT CONTROL PLAN SHALL BE MODIFIED WHENEVER THERE IS A SIGNIFICANT CHANGE IN THE DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE OF ANY BMP. THE WVDEP MUST BE NOTIFIED OF ANY CHANGES TO THE CONSTRUCTION SWPP.

12. STABILIZATION:

THE CONSTRUCTION SITE SHOULD BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. ESTABLISHMENT OF FINAL COVER MUST BE INITIATED WITHIN FOUR (4) DAYS AFTER REACHING FINAL GRADE. A NOTICE OF TERMINATION MUST BE FILED WITH THE WVDEP WHEN THE SITE REACHES FINAL STABILIZATION. FINAL STABILIZATION MEANS THAT ALL SOIL-DISTURBING ACTIVITIES ARE COMPLETED, AND THAT EITHER A PERMANENT VEGETATIVE COVER OF 70% OR GREATER HAS BEEN ESTABLISHED OR THAT THE SURFACE HAS BEEN STABILIZED BY HARD COVER SUCH AS PAVEMENT OR BUILDINGS. (THE 70% REQUIREMENT REFERS TO THE TOTAL VEGETATED AREA AND NOT JUST A PERCENT OF THE SITE).

VII. EROSION AND SEDIMENT CONTROL NOTES:

1. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE CONSTRUCTED AND MAINTAINED IN STRICT COMPLIANCE WITH THE LATEST EDITION OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL AND APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
2. AREAS OF DEVELOPMENT SHALL BE PLANNED IN PHASES AND STAGES IN ORDER TO PREVENT THE TRANSPORT OF SEDIMENT FROM THE DEVELOPMENT SITE DURING CONSTRUCTION AND MINIMIZE EXPOSURE TO DISTURBED GROUND. RE-VEGETATION OF EXPOSED AREAS AND THE MAINTENANCE OF THAT VEGETATION SHALL BE AN INTEGRAL PART OF THE CLEARING ACTIVITIES FOR ANY PHASE.
3. NO DISTURBED AREA IS TO REMAIN DENUDED FOR MORE THAN FOUR (4) DAYS EXCEPT FOR MATERIAL STORAGE AREAS OR FOR THOSE AREAS ON WHICH ACTUAL CONSTRUCTION ACTIVITIES ARE CURRENTLY BEING PERFORMED UNLESS AUTHORIZED BY JEFFERSON COUNTY AND/OR THE EASTERN PANHANDLE CONSERVATION DISTRICT.
4. ALL SOIL STOCKPILES SHALL BE STABILIZED BY TEMPORARY SEEDING AND MULCHING AND PROTECTED WITH PERIMETER SEDIMENT CONTROLS SUCH AS SILT FENCE TO PREVENT CONTACT WITH STORMWATER RUNOFF. ALL STOCKPILES MUST BE LOCATED OUTSIDE OF ANY VEGETATED BUFFER AREAS AND SHOULD BE LOCATED AS FAR AS PRACTICABLE FROM STORMWATER CONVEYANCE SYSTEMS AND WATER BODIES.
5. ALL SLOPES SHALL BE LEFT IN A ROUGHENED CONDITION DURING SITE GRADING OPERATIONS TO REDUCE RUNOFF VELOCITIES AND EROSION. TEMPORARY AND/OR PERMANENT STABILIZATION MEASURES SHALL BE APPLIED TO ALL SLOPES AS SPECIFIED IN THE SOIL STABILIZATION MEASURES.
6. DURING CONSTRUCTION, PROTECT ALL FILLS SO THAT RUNOFF DOES NOT GO DOWN THE FACE OF THE HILL. UTILIZE BERMS, TEMPORARY SLOPE DRAINS, OR OTHER METHODS TO DIVERT RUNOFF AWAY FROM THE FILL AND INTO A SEDIMENT TRAPPING STRUCTURE. AS MORE FILL IS ADDED, SLOPE THE TOP (OR BERM IT) TO DIRECT WATER AWAY FROM THE SLOPE AND TO A STABLE CONVEYANCE SYSTEM. SEED & MULCH EVERY FOUR (4) DAYS OR 15' OF FILL.
7. NO OFF-SITE SOURCE OF BORROW MATERIALS IS ANTICIPATED FOR THIS PROJECT. IN THE EVENT THAT AN OFF-SITE SOURCE OF BORROW MATERIALS IS USED, AN EROSION AND SEDIMENT CONTROL PLAN SHALL BE PROVIDED FOR THE BORROW PIT AND THE BORROW PIT SHALL MEET ALL APPLICABLE REQUIREMENTS AND PERMITS OF THE WVDEP.
8. DUE TO GRADE CHANGES DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION AND SEDIMENT CONTROL MEASURES (i.e. SILT FENCES, ETC.) TO PREVENT EROSION AND POLLUTANT DISCHARGE OFF-SITE.

VIII. SOIL STABILIZATION:

EXCEPT AS NOTED BELOW, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOUR (4) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED OR FOUR (4) DAYS FOR SITES REQUIRED TO USE ENHANCED BMP'S.

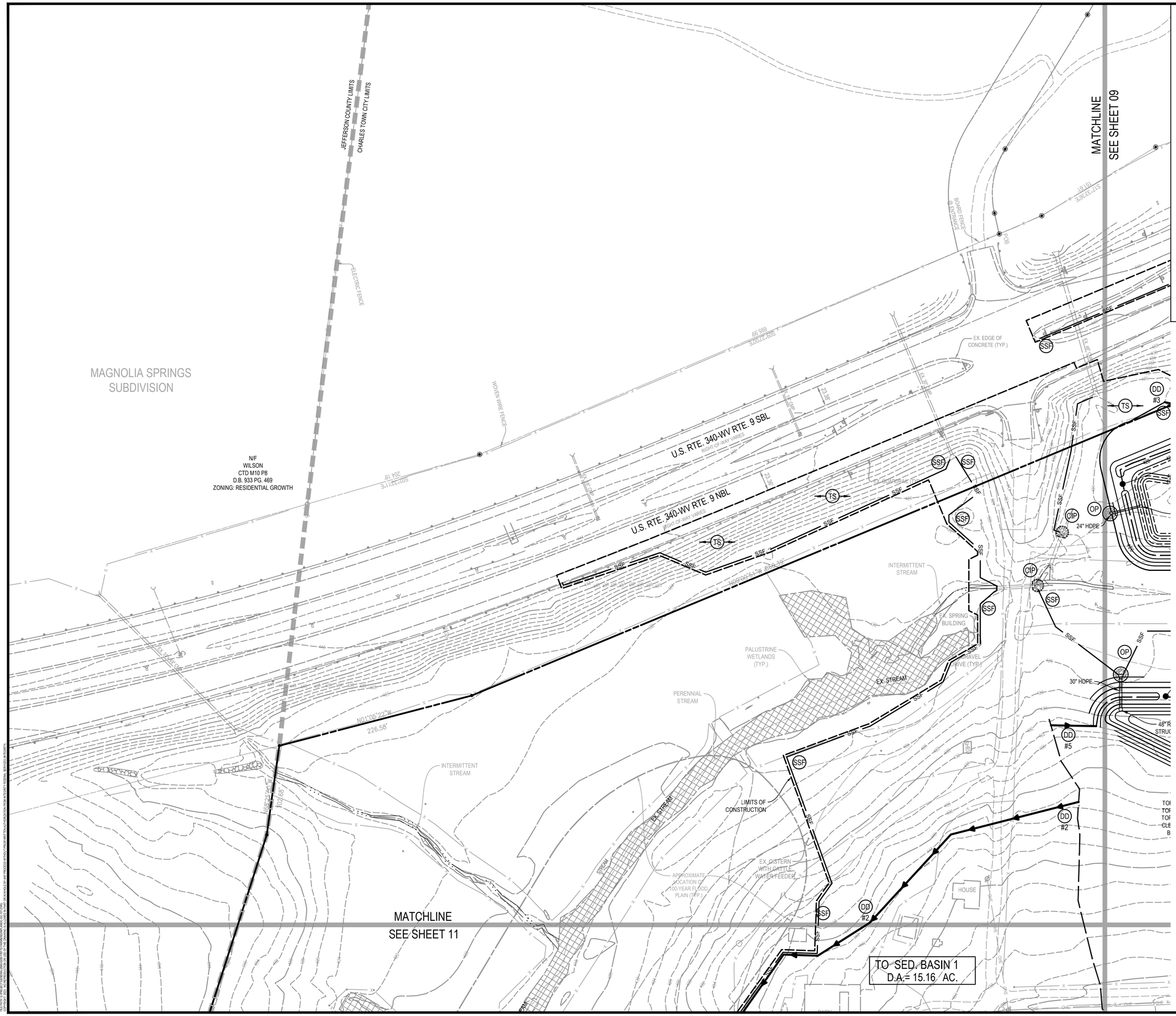
- WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 4TH DAY, AS APPLICABLE AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASES IS PRECLUDED BY NATURAL CAUSES, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS CONDITIONS ALLOW.
- WHERE CONSTRUCTION ACTIVITY WILL RESUME ON A PORTION OF THE SITE WITHIN 14 DAYS FROM WHEN ACTIVITIES CEASED, (E.G. THE TOTAL TIME PERIOD THAT CONSTRUCTION ACTIVITY IS TEMPORARILY HALTED IS LESS THAN 14 DAYS) THEN STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE BY THE 4TH DAY AFTER CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED.
- AREAS WHERE SEED HAS FAILED TO GERMINATE ADEQUATELY (UNIFORM PERENNIAL VEGETATIVE COVER OF 70% OR GREATER) WITHIN 30 DAYS AFTER SEEDING AND MULCHING MUST BE RE-SEEDED IMMEDIATELY, OR AS SOON AS WEATHER CONDITIONS ALLOW.

TEMPORARY STABILIZATION:

- SELECTION OF TEMPORARY SEED MIXTURE SHALL DEPEND ON THE TIME OF YEAR DURING APPLICATION. SELECT PLANTS APPROPRIATE TO THE SEASON AND SITE CONDITIONS. REFER TO TABLE 3.10.1 TEMPORARY SEEDING OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL FOR A LIST OF COVER PLANTS, APPROVED PLANTING DATES, AND APPLICATION RATES.

PERMANENT STABILIZATION:

SEED MIXTURES INCLUDE THE FOLLOWING



EROSION & SEDIMENT CONTROL LEGEND

KEY	SYMBOL	DESCRIPTION
CE		TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
SSF	SSF	SUPER SILT FENCE
IP		INLET PROTECTION
CIP		CULVERT INLET PROTECTION
OP		OUTLET PROTECTION
SD #1		TEMPORARY SEDIMENT TRAP
SB #1		TEMPORARY SEDIMENT BASIN
TS	TS	TEMPORARY SEEDING
PS	PS	PERMANENT SEEDING
		DRAINAGE DIVIDE
		LIMITS OF CONSTRUCTION

WV STATE GRID NORTH (NAD83)

50 25 0 50 100 150

GRAPHICAL SCALE: 1"=50'

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Martinsburg, WV 25401 • www.ifs-ae.com

JASON P. GERMAN
REGISTERED
No. 19127
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
3-16-23

REVISIONS

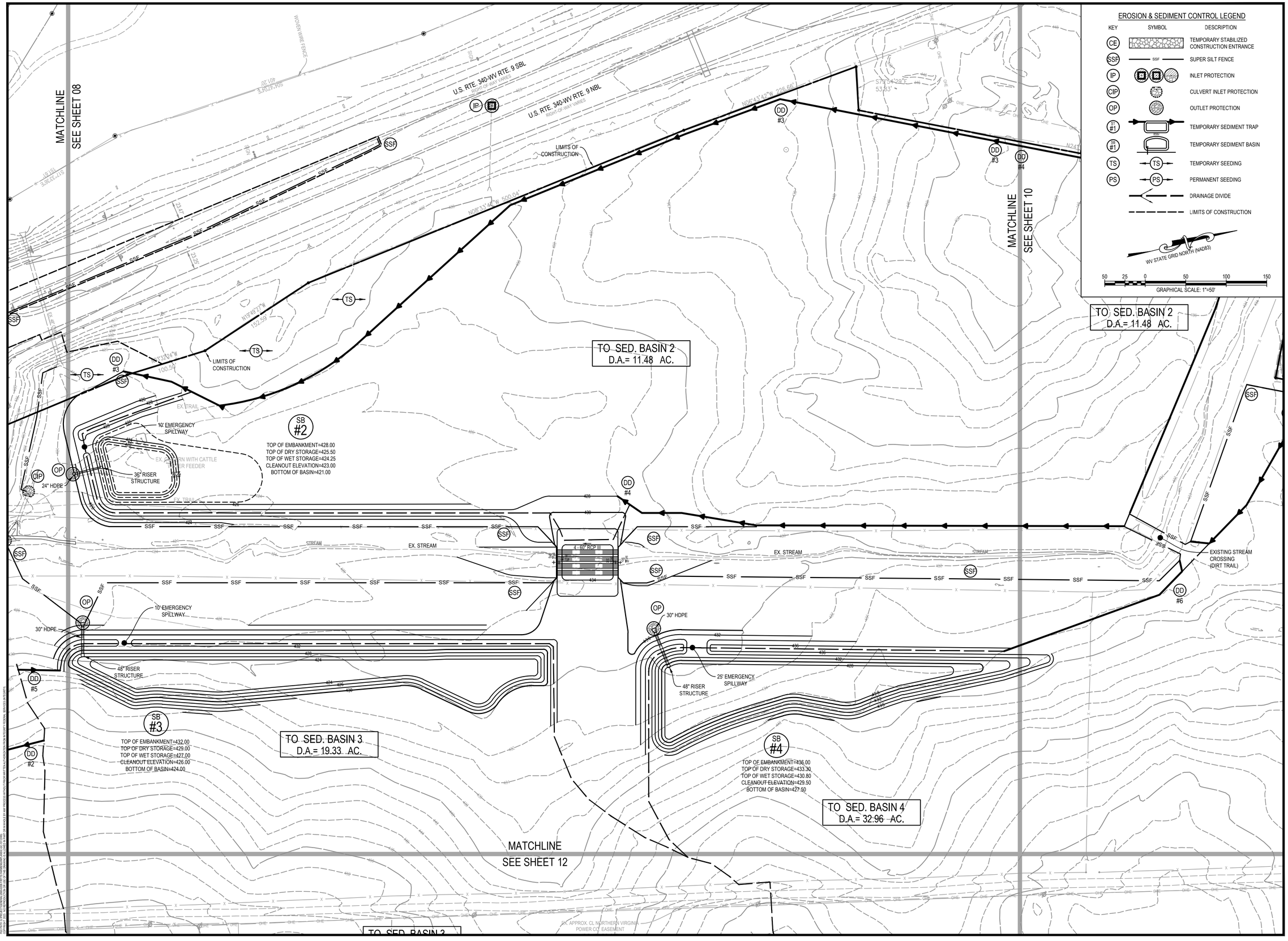
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

EROSION & SEDIMENT CONTROL PLAN - PHASE I

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GC-101.DWG	
NCS:	
SHEET:	08 OF 134



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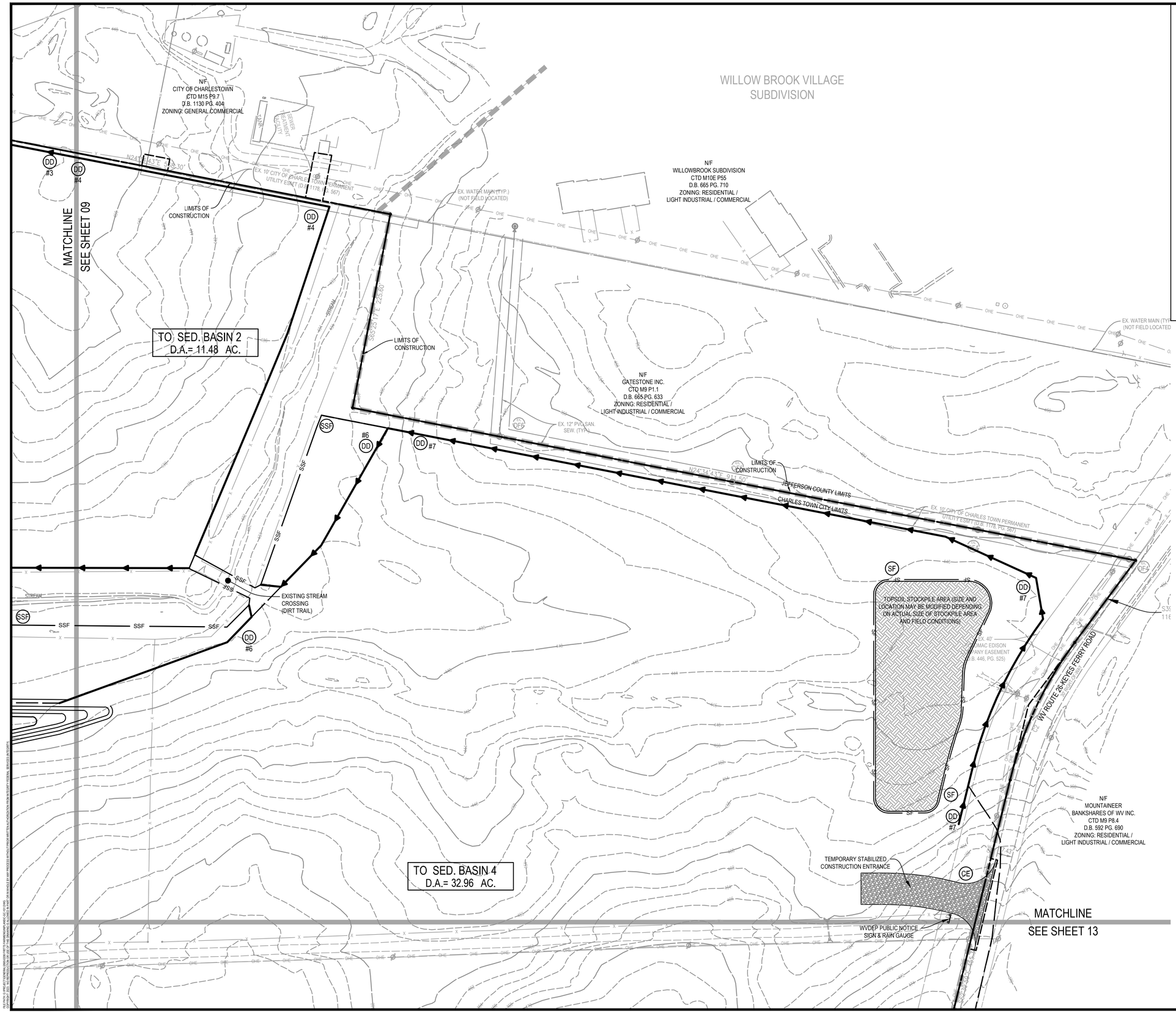
NCS:	
SHEET:	09 OF 134



EROSION & SEDIMENT CONTROL LEGEND

KEY	SYMBOL	DESCRIPTION
CE		TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
SSF	SSF	SUPER SILT FENCE
IP		INLET PROTECTION
CIP		CULVERT INLET PROTECTION
OP		OUTLET PROTECTION
ST #1		TEMPORARY SEDIMENT TRAP
SB #1		TEMPORARY SEDIMENT BASIN
TS	TS	TEMPORARY SEEDING
PS	PS	PERMANENT SEEDING
		DRAINAGE DIVIDE
		LIMITS OF CONSTRUCTION

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JASON P. GERMAN
REGISTERED
No. 19127
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
3-16-23

REVISIONS

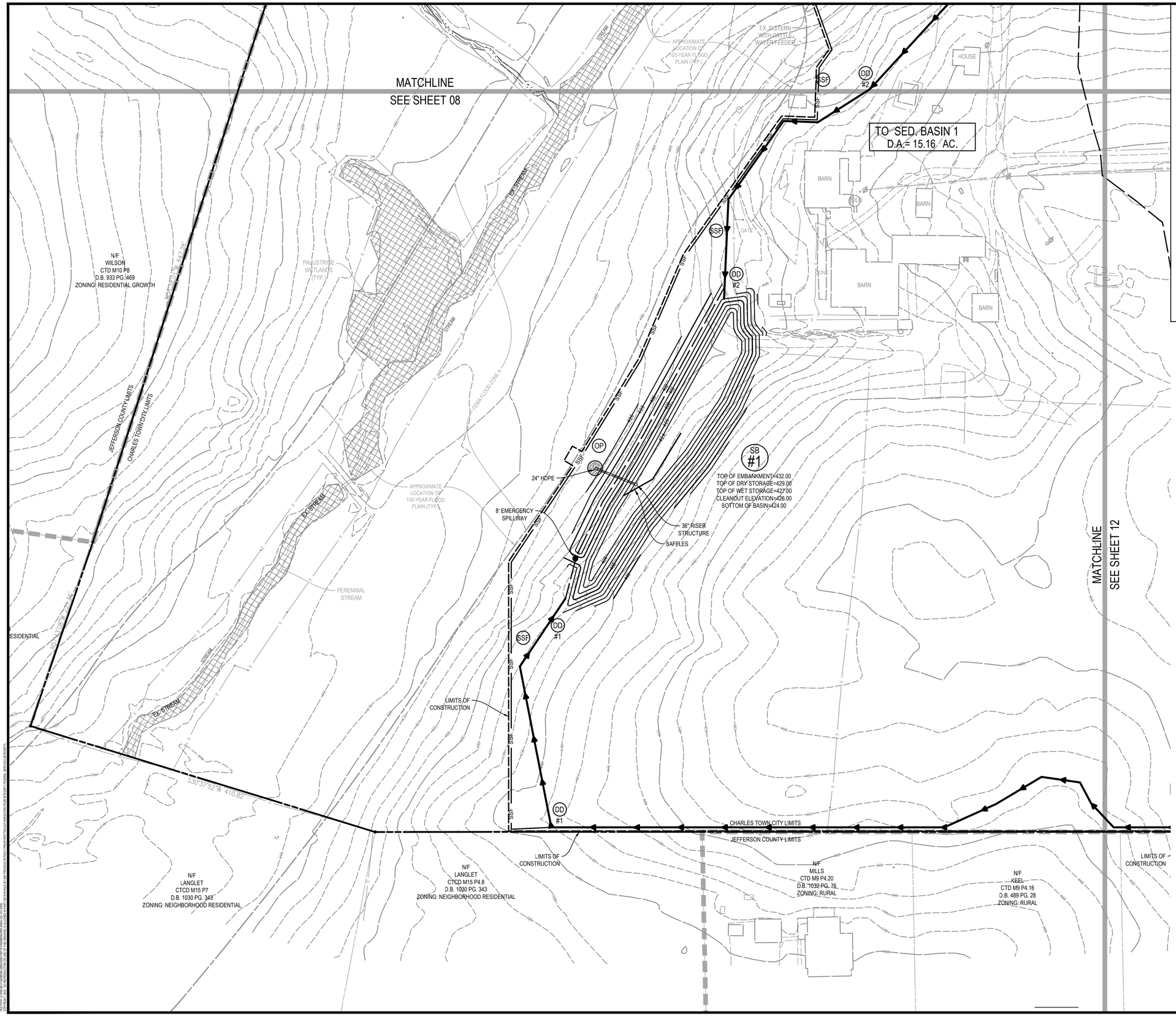
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

EROSION & SEDIMENT CONTROL PLAN - PHASE I

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GC-101.DWG	
NCS:	
SHEET:	10 OF 134



EROSION & SEDIMENT CONTROL LEGEND

KEY	SYMBOL	DESCRIPTION
CE		TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
SSF	SSF	SUPER SILT FENCE
IP	IP	INLET PROTECTION
CIP	CIP	CULVERT INLET PROTECTION
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ST #1	ST #1	TEMPORARY SEDIMENT TRAP
SB #1	SB #1	TEMPORARY SEDIMENT BASIN
TS	TS	TEMPORARY SEEDING
PS	PS	PERMANENT SEEDING
		DRAINAGE DIVIDE
		LIMITS OF CONSTRUCTION

WV STATE GRID NORTH (NAD83)

50 25 0 50 100 150

GRAPHICAL SCALE: 1"=50'

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SHEET:	11 OF 134

TOP OF WET STORAGE=430.80
CLEANOUT ELEVATION=429.50
BOTTOM OF BASIN=427.50

TO SED. BASIN 4
D.A.= 32.96 AC.

MATCHLINE
SEE SHEET 09

TO SED. BASIN 3
D.A.= 19.33 AC.

EX. UTILITY POLE (TYP.)

EX. APPROX. CL NORTHERN VIRGINIA POWER CO. EASEMENT (D.B. 164, PG. 313)

J. RUSSELL FRITTS, INC.
T.M. 15, PAR. 1
DB. 451 PG. 745
ZONED: NEIGHBORHOOD RESIDENTIAL

MATCHLINE
SEE SHEET 11

MATCHLINE
SEE SHEET 13

TO SED. BASIN 1
D.A.= 15.16 AC.

DD #1

SSF

CHARLES TOWN CITY LIMITS

JEFFERSON COUNTY LIMITS

S13°32'23"W 1954.07'

S76°16'09"E 194.45'

LIMITS OF CONSTRUCTION

N/F
ROLL
CTD M9 P4.15
D.B. 489 PG. 43
ZONING: RURAL

N/F
GESSFORD
CTD M9 P4.18
D.B. 1015 PG. 542
ZONING: RURAL

N/F
KOSKI
CTD M9 P4.10
D.B. 562 PG. 686
ZONING: RURAL

N/F
FEAGANS
CTD M9 P4.9
D.B. 1062 PG. 460
ZONING: RURAL

EROSION & SEDIMENT CONTROL LEGEND

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CE		TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
SSF	SSF	SUPER SILT FENCE
IP	IP	INLET PROTECTION
CIP	CIP	CULVERT INLET PROTECTION
OP	OP	OUTLET PROTECTION
ST #1	ST #1	TEMPORARY SEDIMENT TRAP
SB #1	SB #1	TEMPORARY SEDIMENT BASIN
TS	TS	TEMPORARY SEEDING
PS	PS	PERMANENT SEEDING
		DRAINAGE DIVIDE
		LIMITS OF CONSTRUCTION

WV STATE GRID NORTH (NAD83)

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

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NCS:	
SHEET:	12 OF 134

TO SED. BASIN 4
D.A.= 32.96 AC.

TEMPORARY STABILIZED CONSTRUCTION ENTRANCE

CE

WVDEP PUBLIC NOTICE SIGN & RAIN GAUGE

MATCHLINE
SEE SHEET 10

LIGHT INDUSTRIAL / COMMERCIAL

EX. 40' POTOMAC EDISON COMPANY EASEMENT (D.B. 446, PG. 525)

EX. WATER MAIN (TYP.) (NOT FIELD LOCATED)

LIMITS OF CONSTRUCTION

CHARLES TOWN CITY LIMITS

JEFFERSON COUNTY LIMITS

SSF

WV ROUTE 15 & HYES FERRY ROAD

S13°35'52"W 467.39'

N/F
CITY OF CHARLES TOWN
CTD M9 P8.6
D.B. 597 PG. 551
ZONING: RESIDENTIAL / LIGHT INDUSTRIAL / COMMERCIAL

MATCHLINE
SEE SHEET 12

S82°39'52"E 56.41'

N/F
J. RUSSELL FRITTS INC.
CTD M9 P1.5
D.B. 649 PG. 312
ZONING: RURAL

N/F
FLUHARTY
CTD M9 P1.5
D.B. 960 PG. 380
ZONING: RURAL

LIMITS OF CONSTRUCTION

S13°47'45"W 451.23'

SP

SSF

S76°16'00"E 194.95'

N/F
LANAGAN
CTD M9 P1.2
D.B. 856 PG. 1
ZONING: RURAL

N/F
FEAGANS
CTD M9 P4.9
D.B. 1062 PG. 460
ZONING: RURAL

EROSION & SEDIMENT CONTROL LEGEND

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CIP	CIP	CULVERT INLET PROTECTION
OP	OP	OUTLET PROTECTION
ST #1	ST #1	TEMPORARY SEDIMENT TRAP
SB #1	SB #1	TEMPORARY SEDIMENT BASIN
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		DRAINAGE DIVIDE
		LIMITS OF CONSTRUCTION

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

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NCS:	
SHEET:	14 OF 134

MATCHLINE SEE SHEET 14

MATCHLINE SEE SHEET 16

MATCHLINE SEE SHEET 10

U.S. RTE. 340-WV RTE. 9 SBL
RIGHT-OF-WAY VARIES

U.S. RTE. 340-WV RTE. 9 NBL
RIGHT-OF-WAY VARIES

LIMITS OF CONSTRUCTION

25' LANDSCAPING BUFFER

OPEN SPACE A

OPEN SPACE B

10' PROPERTY SERVICE ESM'T

TO SED. BASIN 2
D.A.= 14.48 AC.

TO SED. BASIN 3
D.A.= 19.33 AC.

TO SED. BASIN 4
D.A.= 32.96 AC.

ROAD B

TO STRC. 175A
D.A.= 0.17 AC.
"C"= 0.75

TO STRC. 174
D.A.= 0.55 AC.
"C"= 0.75

TO STRC. 175
D.A.= 0.35 AC.
"C"= 0.75

TO STRC. 178
D.A.= 0.98 AC.
"C"= 0.50

TO STRC. 136
D.A.= 0.53 AC.
"C"= 0.75

TO STRC. 135
D.A.= 0.45 AC.
"C"= 0.75

TO STRC. 27
D.A.= 0.25 AC.
"C"= 0.75

TO STRC. 26A
D.A.= 0.52 AC.
"C"= 0.75

TO STRC. 173A
D.A.= 0.22 AC.
"C"= 0.65

TO STRC. 173
D.A.= 0.11 AC.
"C"= 0.65

TO STRC. 176
D.A.= 0.13 AC.
"C"= 0.75

TO STRC. 177
D.A.= 0.13 AC.
"C"= 0.75

TO STRC. 137
D.A.= 0.05 AC.
"C"= 0.75

TO STRC. 134
D.A.= 0.09 AC.
"C"= 0.70

TO STRC. 26
D.A.= 0.26 AC.
"C"= 0.75

TO STRC. 23
D.A.= 0.24 AC.
"C"= 0.75

TO STRC. 22
D.A.= 0.12 AC.
"C"= 0.75

TO STRC. 172
D.A.= 0.61 AC.
"C"= 0.75

TO STRC. 133
D.A.= 0.32 AC.
"C"= 0.75

TO STRC. 21
D.A.= 0.15 AC.
"C"= 0.70

TO STRC. CC-2
D.A.= 0.20 AC.
"C"= 0.80

TO STRC. 32
D.A.= 0.07 AC.
"C"= 0.80

TO STRC. 33
D.A.= 0.05 AC.
"C"= 0.80

TO STRC. 34
D.A.= 0.06 AC.
"C"= 0.75

TO STRC. 34A
D.A.= 0.18 AC.
"C"= 0.55

TO STRC. 11
D.A.= 0.13 AC.
"C"= 0.70

TO STRC. 12A
D.A.= 0.20 AC.
"C"= 0.70

TO STRC. 91
D.A.= 0.27 AC.
"C"= 0.70

TO STRC. 90
D.A.= 0.27 AC.
"C"= 0.70

TO STRC. 36
D.A.= 0.23 AC.
"C"= 0.70

TO STRC. 35
D.A.= 0.05 AC.
"C"= 0.80

TO STRC. 12B
D.A.= 0.71 AC.
"C"= 0.60

TO STRC. 92
D.A.= 0.66 AC.
"C"= 0.60

TO STRC. 90A
D.A.= 0.85 AC.
"C"= 0.60

TO STRC. 37
D.A.= 0.66 AC.
"C"= 0.60

TO STRC. 38A
D.A.= 0.64 AC.
"C"= 0.60

TO STRC. 43
D.A.= 0.45 AC.
"C"= 0.70

TO STRC. 42
D.A.= 0.23 AC.
"C"= 0.70

TO STRC. 44
D.A.= 0.62 AC.
"C"= 0.60

TO STRC. 45
D.A.= 0.16 AC.
"C"= 0.70

TO STRC. 46
D.A.= 0.41 AC.
"C"= 0.70

TO STRC. 47
D.A.= 0.65 AC
"C"= 0.70

TO STRC. 38
D.A.= 0.26 AC.
"C"= 0.70

TO STRC. 44A
D.A.= 0.90 AC.
"C"= 0.60

TO STRC. 44B
D.A.= 0.25 AC.
"C"= 0.70

TO STRC. 59
D.A.= 0.10 AC.
"C"= 0.70

TO STRC. 13
D.A.= 0.21 AC.
"C"= 0.70

WV STATE GRID NORTH (NAD83)

GRAPHICAL SCALE: 1"=50'

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STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

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JEFFERSON COUNTY, WEST VIRGINIA

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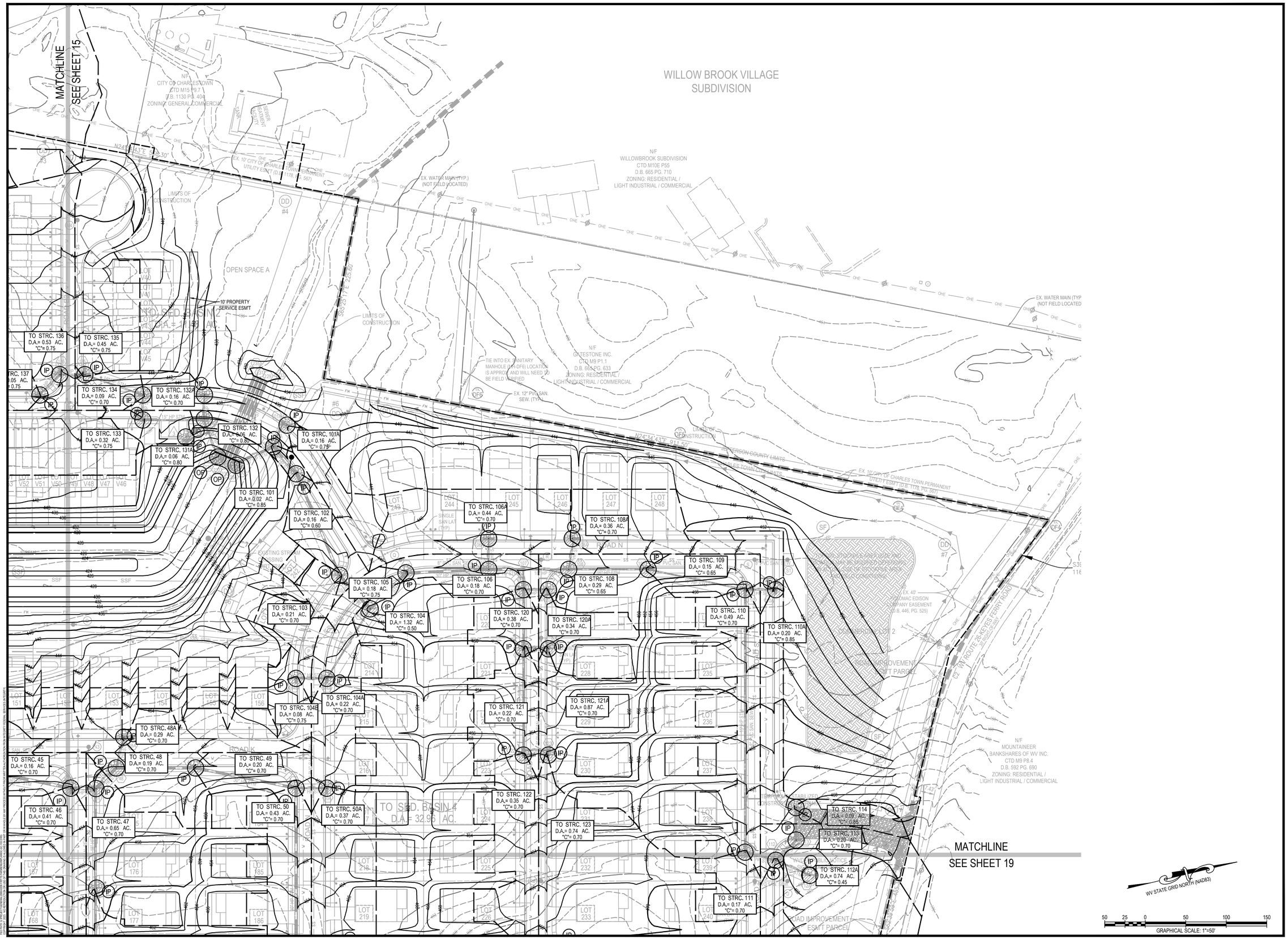
SHEET:	15 OF 134



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NCS:	
SHEET:	16 OF 134

MATCHLINE
SEE SHEET 14

TO STRC. 13A
D.A.= 0.32 AC.
"C"= 0.70

TO STRC. 13
D.A.= 0.21 AC.
"C"= 0.70

TO STRC. 14A
D.A.= 0.25 AC.
"C"= 0.70

TO STRC. 14B
D.A.= 0.90 AC.
"C"= 0.60

TO STRC. 15A
D.A.= 0.23 AC.
"C"= 0.70

TO STRC. 15
D.A.= 0.17 AC.
"C"= 0.70

TO STRC. 16
D.A.= 0.05 AC.
"C"= 0.70

TO STRC. 17
D.A.= 0.24 AC.
"C"= 0.70

TO STRC. 162
D.A.= 0.37 AC.
"C"= 0.70

TO STRC. 160A
D.A.= 0.19 AC.
"C"= 0.70

TO STRC. 161
D.A.= 0.48 AC.
"C"= 0.70

TO STRC. 160
D.A.= 0.18 AC.
"C"= 0.70

TO STRC. 143
D.A.= 0.10 AC.
"C"= 0.85

TO STRC. 143A
D.A.= 1.74 AC.
"C"= 0.50

TO STRC. 142
D.A.= 0.24 AC.
"C"= 0.70

TO STRC. 144A
D.A.= 0.24 AC.
"C"= 0.70

TO STRC. 144
D.A.= 0.15 AC.
"C"= 0.70

TO STRC. 146
D.A.= 0.63 AC.
"C"= 0.70

TO STRC. 147
D.A.= 0.25 AC.
"C"= 0.70

TO STRC. 147A
D.A.= 0.37 AC.
"C"= 0.68

TO STRC. 146A
D.A.= 0.57 AC.
"C"= 0.70

TO STRC. 146B
D.A.= 0.04 AC.
"C"= 0.85

TO SED. BASIN 1
D.A.= 15.10 AC.

COMMERCIAL LOT A

EX. CISTERN WITH CATTLE WATER FEEDER

APPROXIMATE LOCATION OF 100-YEAR FLOOD PLAIN (TYP.)

STREAM VALLEY PARK DEDICATION

PALUSTRINE WETLANDS (TYP.)

FEMA FLOOD ZONE A

24" HDPE

8' EMERGENCY SPILLWAY

PERENNIAL STREAM

LIMITS OF CONSTRUCTION

CHARLES TOWN CITY LIMITS

JEFFERSON COUNTY LIMITS

N/F WILSON CTD M10 P8 D.B. 933 PG. 469 ZONING: RESIDENTIAL GROWTH

N/F LANGLET CTCD M15 P7 D.B. 1030 PG. 343 ZONING: NEIGHBORHOOD RESIDENTIAL

N/F LANGLET CTCD M15 P4.8 D.B. 1030 PG. 343 ZONING: NEIGHBORHOOD RESIDENTIAL

N/F MILLS CTD M9 P4.20 D.B. 1138 PG. 76 ZONING: RURAL

N/F KEEL CTD M9 P4.16 D.B. 489 PG. 28 ZONING: RURAL

S30°37'52"W 410.82'

MATCHLINE
SEE SHEET 18

WV STATE GRID NORTH (NAD83)

50 25 0 50 100 150
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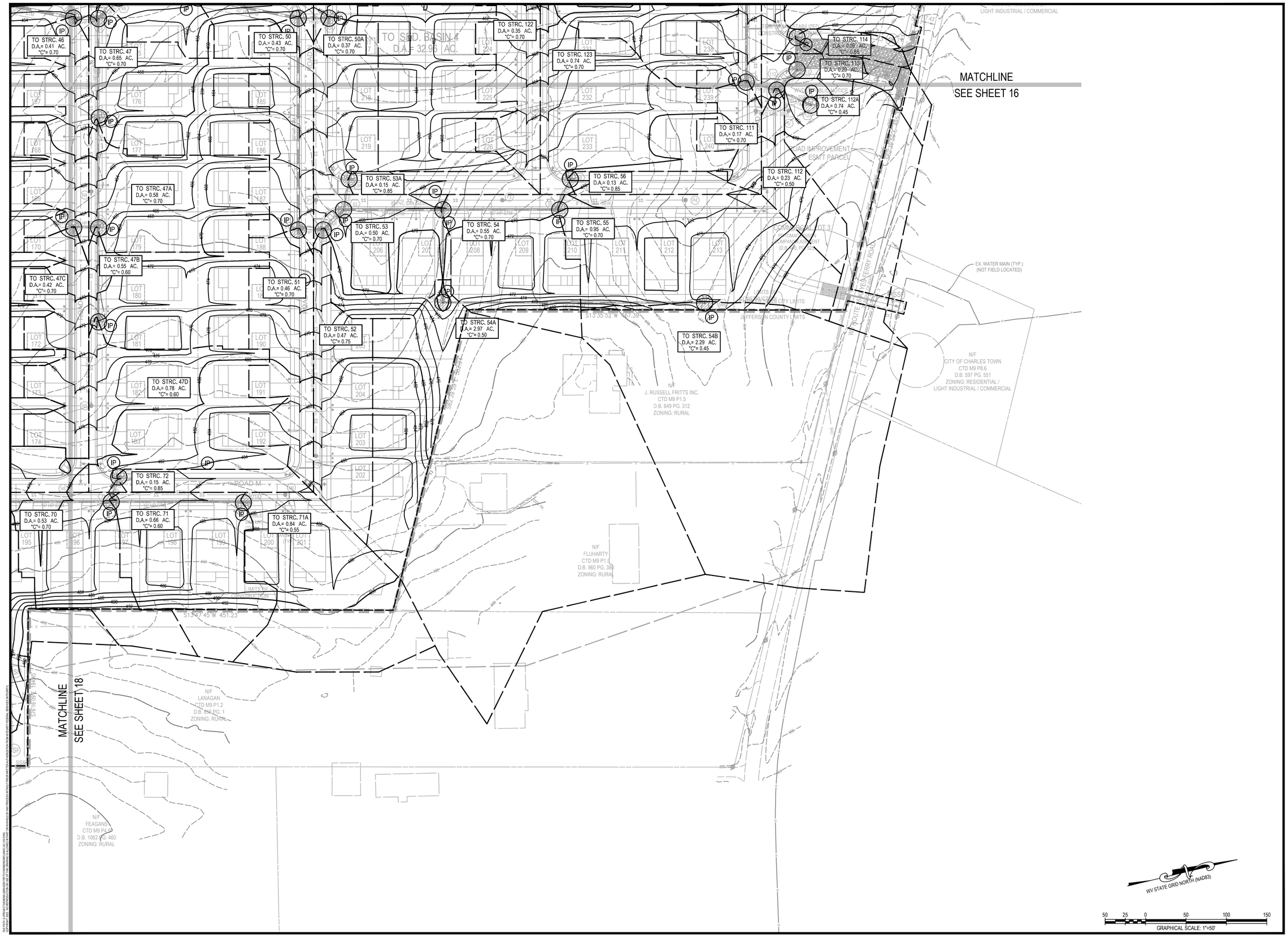

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SHEET:	19 OF 134

EROSION & SEDIMENT CONTROL NOTES:

1. ANY AREA OF EXPOSED SOIL WHERE NO CONSTRUCTION IS ANTICIPATED FOR A PERIOD OF LONGER THAN THREE WEEKS OR WHERE CONSTRUCTION ACTIVITY HAS STOPPED FOR THREE WEEKS SHALL BE TEMPORARILY STABILIZED.
2. FOLLOWING INITIAL SOIL DISTURBANCE OR RE-DISTURBANCE, PERMANENT STABILIZATION SHALL BE COMPLETED WITHIN FOUR (4) CALENDAR DAYS AFTER COMPLETION OF ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES GREATER THAN 3 HORIZONTAL TO 1 VERTICAL (3:1); AND FOUR (4) CALENDAR DAYS AFTER REACHING FINAL GRADE FOR ALL OTHER DISTURBED OR GRADED AREAS.
   - THESE PROVISIONS DO NOT APPLY TO THOSE AREAS THAT ARE SHOWN ON THE PLAN FOR MATERIAL STORAGE OR FOR THOSE AREAS ON WHICH ACTUAL CONSTRUCTION ACTIVITIES ARE CURRENTLY BEING PERFORMED.
   - THESE TIME REQUIREMENTS MAY BE EXTENDED, AS DEEMED NECESSARY BY THE JEFFERSON COUNTY ENGINEER IN THE EVENT THAT ADVERSE CONDITIONS PREVENT COMPLIANCE WITH THE STATED TIME LIMITATIONS FOR THE COMPLETION OF PERMANENT OR TEMPORARY STABILIZATION.
3. STABILIZATION WILL BE CONSIDERED ADEQUATE WHEN THE FOLLOWING CONDITIONS ARE MET:
   A) WATER COURSES, STREAM BANKS, AND DRAINAGE EASEMENTS SHALL BE 100% STABILIZED AND FREE FROM EROSION AND DEPOSITION.
   B) SLOPES STEEPER THAN 10% SHALL HAVE AT LEAST 98% STABLE GROUND COVER, AS DETERMINED BY THE JEFFERSON COUNTY ENGINEER.
   C) ALL OTHER AREAS SHALL HAVE AT LEAST 85% STABLE GROUND COVER, AS DETERMINED BY THE JEFFERSON COUNTY ENGINEER.
   D) GRASS VEGETATION SHALL HAVE REACHED A MINIMUM OF 3 INCHES OF HEIGHT OR HAVE BEEN MOWED BACK TO A MINIMUM OF 2 INCHES IN HEIGHT.
4. FOR ALL PROJECTS ADJACENT TO OR WITHIN 500 FEET OF A CONTINUOUSLY FLOWING STREAM, NO GRADING, EXCAVATING, REMOVAL, OR DESTRUCTION OF TOPSOIL, TREES, OR OTHER VEGETATIVE COVER, OR CONSTRUCTION ACTIVITY SHALL RESULT IN POINT OR NON-POINT LOADING OF SUSPENDED MATTER SUCH THAT TURBIDITY STANDARDS SPELLED OUT IN THE WATER RESOURCES BOARD LEGISLATIVE RULES ARE VIOLATED. SAID STANDARDS STATE THAT TURBIDITY SHALL NOT EXCEED 10 NTU'S OVER BACKGROUND TURBIDITY WHEN THE BACKGROUND IS 50 NTU'S OR LESS, OR HAVE MORE THAN A 10% INCREASE IN TURBIDITY (PLUS 10 NTU'S MINIMUM) WHEN THE BACKGROUND TURBIDITY IS MORE THAN 50 NTU'S.
5. NO OFF-SITE SOURCE OF BORROW MATERIALS IS ANTICIPATED FOR THIS PROJECT. IN THE EVENT THAT AN OFF-SITE SOURCE OF BORROW MATERIALS IS USED, AN EROSION AND SEDIMENT CONTROL PLAN SHALL BE PROVIDED FOR THE BORROW PIT AND THE BORROW PIT SHALL MEET ALL APPLICABLE REQUIREMENTS AND PERMITS OF THE WVDEP
6. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE THAT ALL EROSION AND SEDIMENT CONTROL MEASURES ARE PERFORMING AS DESIGNED. THE JEFFERSON COUNTY ENGINEER MAY REQUIRE MODIFICATIONS TO AN APPROVED PLAN, REQUIRE ADDITIONAL SEDIMENT AND EROSION CONTROL MEASURES, OR CAUSE NEW PLANS TO BE SUBMITTED AS A RESULT OF FIELD INSPECTION REVEALING THE APPROVED PLANS DO NOT PROVIDE ADEQUATE PROTECTION. MODIFICATIONS MAY ALSO BE REQUESTED BY THE OWNER OR DEVELOPER DUE TO UNFORESEEN FIELD CONDITIONS.
7. ALL RESIDENTIAL AND COMMERCIAL/INDUSTRIAL BUILDING LOTS SHALL HAVE A STABILIZED CONSTRUCTION ENTRANCE INSTALLED PRIOR TO BEGINNING CONSTRUCTION ON THE LOT.

PUBLIC NOTICE SIGN:

NOT TO SCALE

NOTES:

1. SECTION II.B. OF THE GENERAL PERMIT STATES THAT "WITHIN 72 HOURS OF FILING AN APPLICATION, THE APPLICANT SHALL DISPLAY A SIGN FOR THE DURATION OF THE CONSTRUCTION PROJECT NEAR THE ENTRANCE OF THE PROJECT OR, FOR LINEAR PROJECTS, AT A LOCATION NEAR AN ACTIVE PART OF THE PROJECT THAT IS ACCESSIBLE BY THE PUBLIC; CONTAINING THE FOLLOWING INFORMATION:
   - THE APPLICANT'S NAME AND EMERGENCY TELEPHONE NUMBER;
   - PROJECT REFERENCE ID;
   - FOR INFO ON THIS STORMWATER PERMIT CALL: 800-654-5227 OR DEP.COMMENTS@WV.GOV
   - PERMIT NUMBER
2. THE SIGN SHALL BE A MINIMUM OF TWO FEET BY TWO FEET AND BE AT LEAST THREE FEET ABOVE GROUND LEVEL; CLEARLY VISIBLE AND LEGIBLE FROM A PUBLIC ROADWAY OR RIGHT-OF-WAY.
3. IF IT IS NOT FEASIBLE TO DISPLAY A SIGN AT OR NEAR THE PROJECT, THE APPLICANT MAY POST, WITHIN 72 HOURS OF FILING THE APPLICATION NOTICE CONTAINING THE FOREGOING INFORMATION AT A LOCAL PUBLIC BUILDING, INCLUDING, BUT NOT LIMITED TO, A TOWN HALL OR PUBLIC LIBRARY.
4. THE APPLICANT SHALL PROVIDE THE LOCATION WHERE THE SIGN OR NOTICE IS TO BE POSTED.
5. WITHIN 7 DAYS OF ASSIGNMENT OF THE PERMIT REGISTRATION NUMBER, THE APPLICANT SHALL AFFIX SUCH NUMBER TO THE SIGN OR TO THE POSTED NOTICE.

A TEMPLATE FOR THE SIGN IS AS FOLLOW:

- THE TOP PART OF THE SIGN, DOWN TO THE WORDS "APPLICATION DATE", SHALL BE WORDED AND FORMATTED AS SHOWN. REMAINING TEXT SHALL BE FILLED IN BY THE APPLICANT (DATE, NAME OF REGISTRANT OR CONTACT, PROJECT DESCRIPTION, AND PHONE) IN THE SIZE AND FORMAT SHOWN. HIGH CONTRAST COLORS MUST BE USED.
- THE SIGN SHALL BE A MINIMUM 24" x 24" WITH 1.6" AND 0.8" LETTERS
- THE SIGN SHALL BE A MINIMUM 36" ABOVE GROUND LEVEL.

① 1.6" LETTERS
② 0.8" LETTERS

① For Info on NPDES
① Stormwater Permit
② To comment on Sediment Control Plan
① Call: 800-654-5227
or
② DEP.Comments@wv.gov
② DEP 601 57th Street SE, Charleston WV 25304
② Application Date: **09/21/22** ①
① ***Stone Spring,***
① ***Residential Subdivision***
② ***WVDEP PERMIT No. WVR111983***
② ***(703) 636-9232***

Table 3.10.1 Temporary seed chart

PLANT NAMES		PLANTING DATES	APPLICATION RATE LBS/ACRE
COMMON	SCIENTIFIC		
Annual Ryegrass	*Lolium multiflorum*	2/16 – 5/15 8/1 – 11/1	40
Field Bromegrass	*Bromus ciliatus*	3/1 – 6/15 8/1 – 9/15	40
Spring Oats	*Avena sativa*	3/1 –6/15	100
Winter Rye	*Secale cereale*	8/15 –2/28	170
Winter Wheat	*Triticum aestivum*	8/15 – 2/28	180
Japanese Millet	*Echinochloa crusgalli*	5/15 – 8/15	30
Redtop	*Agrostis alba*	3/1 – 6/15	10
Annual Ryegrass and Spring Oats	*Lolium multiflorum* *Avena sativa*	3/1 – 6/15	30 70
German/Foxtail Millet	*Setaria italica*	5/1 – 8/1	40
Hairy Vetch	*Vicia villosa*	8/15 – 4/1	60

*Inoculation is required. If a hydroseeder is utilized, the application rate is 5 times the recommended rate.

Table 3.11.1 Permanent seeding

SEED MIX	PLANT NAMES		APPLICATION RATE LBS/ACRE
	COMMON	SCIENTIFIC	
A	Kentucky 31 Fescue Red Fescue Birdsfoot Trefoil	*Festuca arundinacea* *Festuca rubra* *Lotus corniculatus*	65 20 5
B	Switchgrass Perennial Ryegrass Redtop Birdsfoot Trefoil	*Panicum virgatum* *Lolium perenne* *Agrostis alba* *Lotus corniculatus*	15 20 5 15
C	Red Fescue Kentucky Bluegrass Merion Bluegrass	*Festuca rubra* *Poa pratensis* *Poa pratensis*	20 40 30
D	Kentucky 31 Fescue Red Fescue Kentucky Bluegrass White Dutch Clover	*Festuca arundinacea* *Festuca rubra* *Poa pratensis* *Trifolium repens*	45 20 25 5
E	Perennial Ryegrass Switchgrass Crownvetch or Perennial Pea	*Lolium perenne* *Panicum virgatum* *Coronilla varia* *Lathyrus latifolius*	30 15 20 30
F	Orchardgrass Ladino Clover Redtop	*Dactylis glomerata* *Trifolium repens* *Agrostis alba*	20 5 5
G	Birdsfoot Trefoil Weeping Lovegrass Perennial Ryegrass	*Lotus corniculatus* *Eragrostis curvula* *Lolium perenne*	15 45 10
H	Crownvetch Orchardgrass	*Coronilla varia* *Dactylis glomerata*	25 40
I	Crownvetch Perennial Ryegrass	*Coronilla varia* *Lolium perenne*	25 30
J	Perennial Pea Orchardgrass	*Lathyrus latifolius* *Dactylis glomerata*	30 30
K	Deertongue Birdsfoot Trefoil Weeping Lovegrass	*Panicum clandestinum* *Lotus corniculatus* *Eragrostis curvula*	30 15 5
L	Orchardgrass Serecia Lespedeza Ladino Clover	*Dactylis glomerata* *Lespedeza cunata* *Trifolium repens*	30 40 5
M	Perennial Ryegrass Ladino Clover Redtop	*Lolium perenne* *Trifolium repens* *Agrostis alba*	50 5 5
N	Crownvetch Orchardgrass Redtop	*Coronilla varia* *Dactylis glomerata* *Agrostis alba*	15 30 5

Table 3.11.1 Permanent seeding Cont'd.

SEED MIX	PLANT NAMES		APPLICATION RATE LBS/ACRE
	COMMON	SCIENTIFIC	
O	Perennial Ryegrass Birdsfoot Trefoil Redtop	*Lolium perenne* *Lotus corniculatus* *Agrostis alba*	40 15 5
P	Serecia Lespedeza Orchardgrass Redtop	*Lespedeza cunata* *Dactylis glomerata* *Agrostis alba*	40 30 5
Q	Orchardgrass Reed Canarygrass[1] Redtop Ladino Clover	*Dactylis glomerata* *Phalaris arundinacea* *Agrostis alba* *Trifolium repens*	25 30 5 5
R	Kentucky Bluegrass Redtop White Clover or Birdsfoot Trefoil	*Poa pratensis* *Agrostis alba* *Trifolium repens* *Lotus corniculatus*	30 5 5 15
S	Reed Canarygrass[1] Weeping Lovegrass	*Phalaris arundinacea* *Eragrostis curvula*	40 5
T	Perennial Ryegrass Reed Canarygrass[1] Birdsfoot Trefoil	*Lolium perenne* *Phalaris arundinacea* *Lotus corniculatus*	30 15 5
U	Timothy Alfalfa	*Phluem pratense* *Medicago sativa*	10 18
V	Timothy Birdsfoot Trefoil	*Phluem pratense* *Lotus corniculatus*	10 15
W	Redtop Perennial Ryegrass Orchardgrass	*Agrostis alba* *Lolium perenne* *Dactylis glomerata*	5 30 25
X	Reed Canarygrass[1] Birdsfoot Trefoil Redtop	*Phalaris arundinacea* *Lotus corniculatus* *Agrostis alba*	30 20 5
Y	Switchgrass Birdsfoot Trefoil	*Panicum virgatum* *Lotus corniculatus*	30 20
Z	Switchgrass Serecia Lespedeza	*Panicum virgatum* *Lespedeza cunata*	15 30
A-1	Orchardgrass Red Clover	*Dactylis glomerata* *Trifolium pratense*	30 10
A-2	Switchgrass Big Bluestem Indiangrass Little Bluestem Sideoats Grama[2]	*Panicum virgatum* *Andropogon gerardi* *Sorghastrum nutans* *Andropogon scoparius* *Bouteloua curtipendula*	15 5 5 5 5
A-3	Switchgrass Eastern Gamagrass[3]	*Panicum virgatum* *Tripsacum dactyloides*	20 15

NOTE: When utilizing a properly prepared seedbed, the rates of application can be reduced by 30 percent except for seed mixes A-2 & A-3.

[1] Reed Canarygrass shall not be used east of I-79 and/or south of Charleston.
[2] Use north and east of I-64 and I-79.
[3] Use south and west of I-64 and I-79.

Table 3.11.2 Nurse crops

PLANT NAMES		PLANTING DATES	APPLICATION RATE LBS/ACRE
COMMON	SCIENTIFIC		
Annual Ryegrass	*Lolium multiflorum*	2/16 – 5/15 8/1 – 11/1	25
Field Bromegrass	*Bromus ciliatus*	3/1 – 6/15 8/1 – 9/15	20
Spring Oats	*Avena sativa*	3/1 –6/15	50
Winter Rye	*Secale cereale*	8/15 –2/28	85
Winter Wheat	*Triticum aestivum*	8/15 – 2/28	90
Japanese Millet	*Echinochloa crusgalli*	5/15 – 8/15	15
Redtop	*Agrostis alba*	3/1 – 6/15	10
Annual Ryegrass and Spring Oats	*Lolium multiflorum* *Avena sativa*	3/1 – 6/15	15 35
German/Foxtail Millet	*Setaria italica*	5/1 – 8/1	25
Hairy Vetch*	*Vicia villosa*	8/15 – 4/1	30

* Inoculation is required. If a hydroseeder is utilized, the application rate is five times the recommended rate.

Table 3.12.1 Organic mulch materials and application rates

Mulches:	Rates:		Notes:
	Per acre	Per 1,000 ft^2.	
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 1,500 lbs.	35 lbs.	Do not use as mulch for winter cover or during hot, dry periods.* Apply as slurry.
Cornstalks	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 2,000 lbs./ac. or 45 lbs./1,000 sq. ft.

From VA DSWC

Table 3.11.3 Permanent seeding requirements

SEED MIX	FINE LAWN	COARSE LAWN	LOW MAINT.	NO MAINT.	PASTURE	SENSITIVE NATURAL AREAS	pH RANGE	DRAINAGE	SHADE TOLERANCE	PREFERRED PLANTING DATES			
										3/1 -6/15	6/16 -8/14	8/15 - 9/15	9/16 - 2/28
A			✓ 1				6.0 – 7.5	MOD. - WELL	FULL SUN	✓	♦	✓	♦
B				✓			5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
C	✓ 1						6.0 – 7.5	MOD. – WELL	FULL SUN	✓		✓	
D		✓ 1					6.0 – 7.5	MOD. – WELL	FULL SUN	✓		✓	
E				✓ 1			6.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
F			✓	✓	✓		5.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
G				✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
H			✓	✓ 1	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
I			✓	✓ 1	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
J			✓	✓ 1	✓		4.0 – 8.0	MOD. – WELL	TOLERANT	✓	♦	✓	♦
K				✓			4.0 – 7.0	MOD. – WELL	FULL SUN	✓	♦	✓	♦
L				✓	✓		4.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
M			✓	✓	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
N			✓	✓ 1	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
O			✓	✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
P			✓	✓	✓		4.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
Q			✓	✓	✓		4.5 – 7.5	POOR - WELL	TOLERANT	✓	♦	✓	♦
R			✓	✓	✓		5.5 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
S			✓	✓	✓		4.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
T					✓		5.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
U					✓		6.5 – 8.0	MOD. – WELL	FULL SUN	✓	♦	✓	♦
V					✓		5.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
W			✓	✓	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
X					✓		5.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
Y			✓	✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
Z			✓	✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
A-1					✓		4.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
A-2				✓	✓	✓	5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
A-3				✓		✓	5.0 – 7.5	POOR - WELL	FULL SUN	✓	♦	✓	♦

♦ Nurse crop required – See Table B
1 Urban areas only

TEMPORARY DIVERSION CALCULATIONS

I_{10} = 6.60 C = 0.50

Diversion #	A (Ac.)	Q_{10} (CFS)	Slope	Bottom Width (ft.)	Normal Depth (ft.)	Vel. (ft/s)	Channel Lining	Channel Depth (ft.)
1	5.76	19.01	3.1%	6	0.65	5.50	Seed & cover w/ RECP; sod; or lined with riprap	1.0
2	0.86	2.84	2.0%	4	0.25	2.54	Grass (seed and straw)	1.0
3	7.72	25.48	2.1%	6	0.85	5.24	Riprap	2.0
4	3.61	11.91	1.7%	4	0.59	3.87	Grass (seed and straw)	1.0
5	0.11	0.36	1.8%	4	0.80	1.15	Grass (seed and straw)	1.0
6	21.97	72.50	0.7%	6	1.95	1.51	Riprap	3.0
7	10.87	35.87	2.1%	6	1.02	3.11	Riprap	2.0

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JASON P. GERMAN REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

EROSION & SEDIMENT CONTROL NOTES & DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE: HORIZ.: N/A VERT.:
DATE: JANUARY 2023
JOB: 2665-0206
DRAWN: JCH CHECK: JPG
CADD: C-GC-001.DWG
NCS:
SHEET: 20 OF 134

FILE PATH: Z:\PROJECT\GENERAL\2665\CIVIL\SHEETS\HARMONY\HARC-GC-001.DWG
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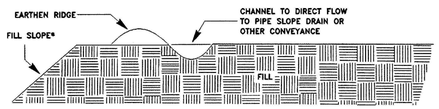
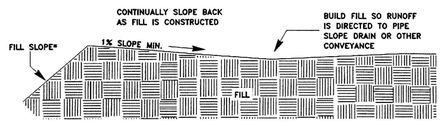
FIGURE 3.15.2

TEMPORARY FILL DIVERSIONS



TEMPORARY BERM

*SEED AND MULCH FILL SLOPE EVERY 10 FEET OF FILL OR EVERY 7 DAYS, WHICHEVER COMES FIRST

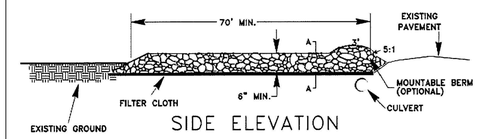


GRADING

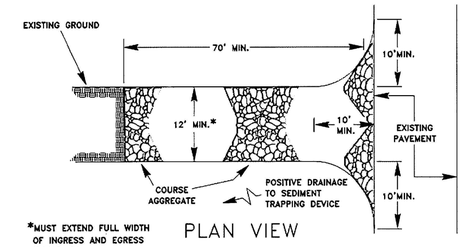
DD

FIGURE 3.02.1

STONE CONSTRUCTION ENTRANCE

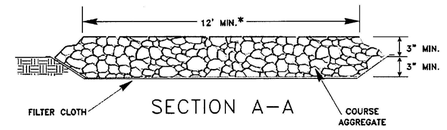


SIDE ELEVATION



*MUST EXTEND FULL WIDTH OF INGRESS AND EGRESS OPERATION

PLAN VIEW



SECTION A–A

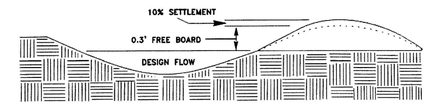
SOURCE: ADAPTED from 1983 Maryland Standards for Soil Erosion and Sediment Control and Va. DSWC

3.02-2

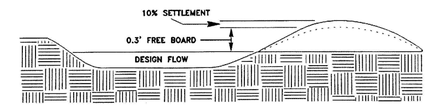
CE

FIGURE 3.15.1

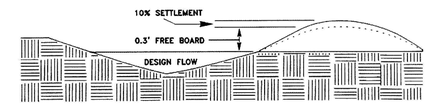
TYPICAL DIVERSIONS



PARABOLIC DIVERSION



TRAPEZOIDAL DIVERSION



VEE-SHAPED DIVERSION

Source: VIRGINIA DCR-DSWC

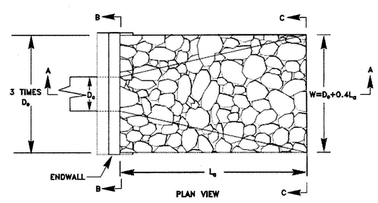
NOTES:
- MINIMUM CONSTRUCTED DEPTH SHALL BE 1.5' (2:1 SIDE SLOPES)

DD

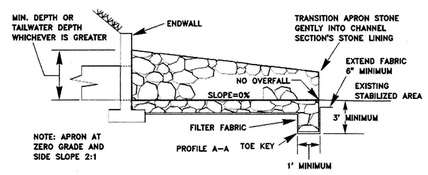
FIGURE 3.17.5

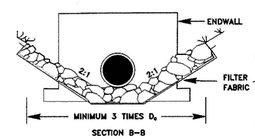
OUTLET PROTECTION

DISCHARGE TO SEMI-CONFINED SECTION (MAXIMUM TAILWATER)

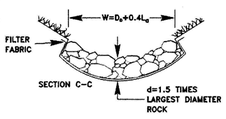


PLAN VIEW





SECTION B–B



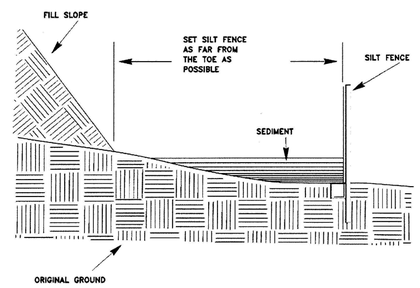
SECTION C–C

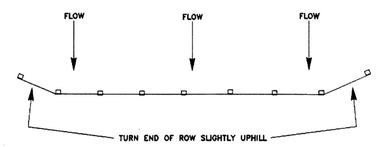
FROM NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL

OP

FIGURE 3.27.1

PLACEMENT OF SILT FENCE



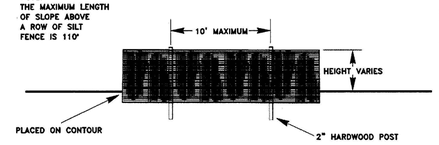


SF

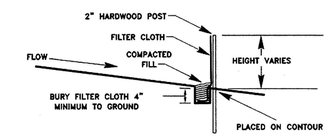
FIGURE 3.27.2

SILT FENCE

NOTE: THE MAXIMUM LENGTH OF SLOPE ABOVE A ROW OF SILT FENCE IS 110'



FRONT ELEVATION



SIDE ELEVATION

TOP VIEW

SF

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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH CTLB, AND CITY OF CHARLES TOWN COMMENTS

EROSION & SEDIMENT CONTROL DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GC-001.DWG	
NCS:	
SHEET:	21 OF 134

FILE PATH: G:\PROJECT FOLDERS\2665-0206 FIRTO HARPERS FARM_WORK\C-GC-001.DWG
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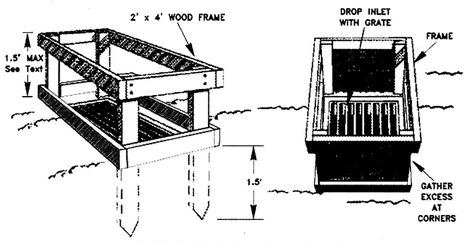
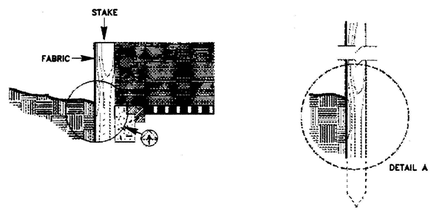
FIGURE 3.33.1

SILT FENCE DROP INLET PROTECTION



PERSPECTIVE VIEWS

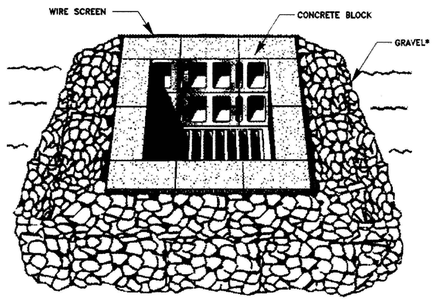


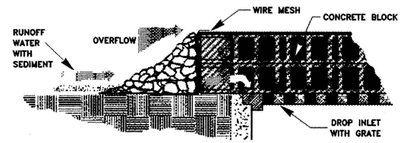
SPECIFIC APPLICATION

IP

FIGURE 3.33.3

BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER



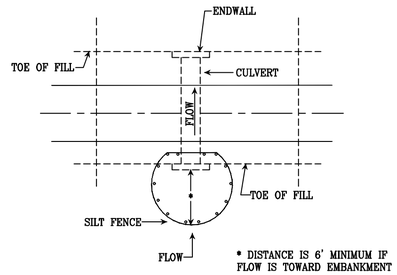


SIDE ELEVATION

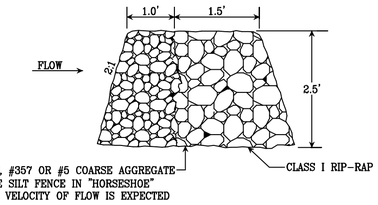
* GRAVEL SHALL BE CLEAN 3/4" TO 2" COARSE AGGREGATE

IP

SILT FENCE CULVERT INLET PROTECTION



OPTIONAL STONE COMBINATION**

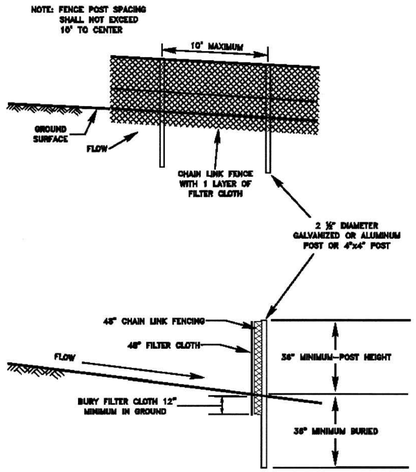


PER VESCH PLATE 3.08-1

CIP

FIGURE 3.28.1

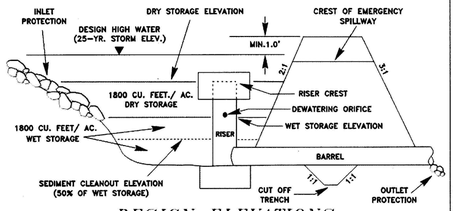
SUPER SILT FENCE



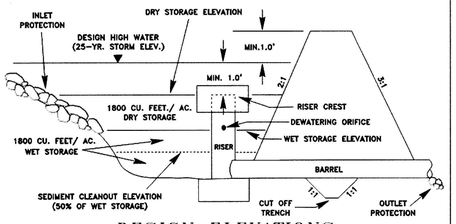
SSF

FIGURE 3.30.2

SEDIMENT BASIN



DESIGN ELEVATIONS WITH EMERGENCY SPILLWAY



DESIGN ELEVATIONS NO EMERGENCY SPILLWAY

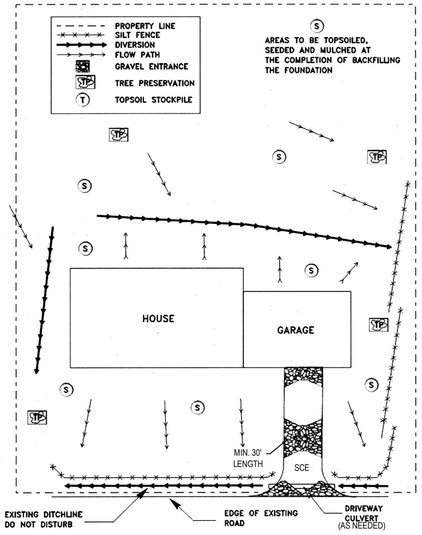
(NTS)

ADAPTED FROM: VA. DSWC

SP #1

FIGURE 6.1

INDIVIDUAL HOUSE LOT SEDIMENT CONTROL PLAN



NOTES:
1. FINAL LIMITS OF CONSTRUCTION WILL BE DETERMINED DURING HOUSE SITING.
2. AREAS OF DISTURBANCE ARE TO BE TOPSOILED, SEEDED AND MULCHED AT THE COMPLETION OF BACKFILLING THE FOUNDATION.

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CITY OF CHARLES TOWN TAX DISTRICT
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SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GC-001.DWG	
NCS:	
SHEET:	22 OF 134

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TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

PROJECT: FRITTS FARM
BASIN ID NO.: SB#1
TOTAL DRAINAGE AREA: 15.16 AC.
"C" FACTOR: 0.50

Basin Volume Design
Wet Storage

1. Minimum Required Volume = 1,800 Cu. Ft. x Total Drainage Area (Ac.)
1800 Cu. Ft. x 15.16 Acres = 27,288 Cu. Ft.
= 0.63 Ac-Ft.

2. Available Basin Volume = 31,188 Cu. Ft. At Elevation 427.00
(From Storage - Elevation Curve)

3. Excavate 31,188 Cu. Ft. to Obtain Required Volume*.

* Elevation Corresponding to Required Volume = Invert of Dewatering Orifice.

4. Available Volume Before Cleanout Required = 15,594 Cu. Ft.
(1/2 Wet Storage Volume)

5. Elevation Corresponding to Cleanout Level = 426.00
(From Storage - Elevation Curve)

6. Distance From Invert of The Dewatering Orifice to Cleanout Level = 1.0'
(Min. = 1.0 Ft.)

Dry Storage

7. Minimum Required Volume = 1800 Cu. Ft. x Total Drainage Area (Ac.)
1,800 Cu. Ft. x 15.16 Acres = 27,288 Cu. Ft.
= 0.63 Ac-Ft.

8. Total Required Volume = 31,188 Cu. Ft. + 27,288 Cu. Ft.
= 58,476 Cu. Ft.
= 1.34 Ac-Ft.

9. Total Available Basin Volume at Crest of Riser = 59,640 Cu. Ft. at Elevation 429.00
(From Storage - Elevation Curve)

Orifice Calculation Breakdown

10. A = (Dry Storage/T)/(64.32*h)*0.5(0.6)
Drawdown Time (T) = 48 Hours
Head (h) = 1
Required Area (A) = 0.02581 Sq.In.
Maximum Diameter = 2.18 In.
Diameter of Dewatering Orifice = 3.00 In.
11. Diameter of Flexible Tubing = 5.00 In. (Min.)
(Dia. of Dewatering Orifice + 2")

Preliminary Design Elevations

12. Crest of Riser = 429.00
Top of Dam = 432.00
Design High Water = 430.00
Upstream Toe of Dam = 424.00
Crest of Emergency Spillway = 430.00

Basin Shape

13. Length of Flow = L = 186.00 = 2.19 Length-to-width Ratio
Effective Width = We = 85.10
If L/We > 2, Baffles Are Not Required
If L/We < 2, Baffles Are Required

Runoff

14. Q_2 = 23.5 cfs.

15. Q_{25} = 43.2 cfs.

Principal Spillway Design

17. With Emergency Spillway, Required Spillway Capacity Qp = Q_2 = 23.5 cfs.
(Riser and Barrel)

Without Emergency Spillway, Required Spillway Capacity Qp = Q_{25} = N/A cfs.
(Riser and Barrel)

18. With Emergency Spillway:
Assumed Available Head (h) = 1.0 (Using Q_2)
h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

Without Emergency Spillway:
Assumed Available Head (h) = N/A (Using Q_{25})
h = Design High Water Elevation - Crest of Riser Elevation

19. Riser Dimensions = 36"
Actual Head (h) = 1.00'
Note: Avoid Orifice Flow Conditions

20. Barrel Length (L) = 50'
Invert In = 425.00 Invert Out = 424.00
Head (H) on Barrel Through Embankment = 6.00'

21. Barrel Diameter = 24" No. of Barrels = 1

22. Trash Rack and Anti-Vortex Device
Dimensions = N/A
Height = N/A

Emergency Spillway Design

23. Required Spillway Capacity Qe = Q25 - Qp = 19.71 cfs.

24. Bottom Width (B) = 8'
Slope of The Exit Channel (S) = 0.3 Ft./Ft.
Minimum Length of The Exit Channel (X) = 20'

Anti-Seep Collar Design

25. Depth of Water at Principal Spillway Crest (Y) = 6.0'
Slope of Upstream Face of Empankment (Z) = 3:1
Slope of Principal Spillway Barrel (Sb) = 2.00%
Length of Barrel in Saturated Zone (Ls) = 45.65'

26. Number of Collars Required = 1 Dimensions = 6.5' x 6.5'

Finial Design Elevations

27. Top of Dam = 432.00
Design High Water = 430.00
Emergency Spillway Crest = 430.00
Principal Spillway Crest = 429.00
Dewatering Orifice Invert = 427.00
Cleanout Elevation = 426.00

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

PROJECT: FRITTS FARM
BASIN ID NO.: SB#2
TOTAL DRAINAGE AREA: 11.48 AC.
"C" FACTOR: 0.50

Basin Volume Design
Wet Storage

1. Minimum Required Volume = 1,800 Cu. Ft. x Total Drainage Area (Ac.)
1800 Cu. Ft. x 11.48 Acres = 20,664 Cu. Ft.
= 0.47 Ac-Ft.

2. Available Basin Volume = 21,284 Cu. Ft. At Elevation 424.25
(From Storage - Elevation Curve)

3. Excavate 21,284 Cu. Ft. to Obtain Required Volume*.

* Elevation Corresponding to Required Volume = Invert of Dewatering Orifice.

4. Available Volume Before Cleanout Required = 10,642 Cu. Ft.
(1/2 Wet Storage Volume)

5. Elevation Corresponding to Cleanout Level = 423.00
(From Storage - Elevation Curve)

6. Distance From Invert of The Dewatering Orifice to Cleanout Level = 1.3'
(Min. = 1.0 Ft.)

Dry Storage

7. Minimum Required Volume = 1800 Cu. Ft. x Total Drainage Area (Ac.)
1,800 Cu. Ft. x 11.48 Acres = 20,664 Cu. Ft.
= 0.47 Ac-Ft.

8. Total Required Volume = 21,284 Cu. Ft. + 20,664 Cu. Ft.
= 41,948 Cu. Ft.
= 0.96 Ac-Ft.

9. Total Available Basin Volume at Crest of Riser = 49,408 Cu. Ft. at Elevation 425.50
(From Storage - Elevation Curve)

Orifice Calculation Breakdown

10. A = (Dry Storage/T)/(64.32*h)*0.5(0.6)
Drawdown Time (T) = 48 Hours
Head (h) = 0.625
Required Area (A) = 0.07514 Sq.Ft.
Maximum Diameter = 3.71 In.
Diameter of Dewatering Orifice = 3.50 In.
11. Diameter of Flexible Tubing = 5.50 In. (Min.)
(Dia. of Dewatering Orifice + 2")

Preliminary Design Elevations

12. Crest of Riser = 425.50
Top of Dam = 428.00
Design High Water = 426.50
Upstream Toe of Dam = 423.00
Crest of Emergency Spillway = 426.50

Basin Shape

13. Length of Flow = L = 352.00 = 7.89 Length-to-width Ratio
Effective Width = We = 44.61
If L/We > 2, Baffles Are Not Required
If L/We < 2, Baffles Are Required

Runoff

14. Q_2 = 17.8 cfs.

15. Q_{25} = 32.7 cfs.

Principal Spillway Design

17. With Emergency Spillway, Required Spillway Capacity Qp = Q_2 = 17.8 cfs.
(Riser and Barrel)

Without Emergency Spillway, Required Spillway Capacity Qp = Q_{25} = N/A cfs.
(Riser and Barrel)

18. With Emergency Spillway:
Assumed Available Head (h) = 1.0 (Using Q_2)
h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

Without Emergency Spillway:
Assumed Available Head (h) = N/A (Using Q_{25})
h = Design High Water Elevation - Crest of Riser Elevation

19. Riser Dimensions = 36"
Actual Head (h) = 1.00'
Note: Avoid Orifice Flow Conditions

20. Barrel Length (L) = 30'
Invert In = 423.00 Invert Out = 422.82
Head (H) on Barrel Through Embankment = 3.68'

21. Barrel Diameter = 24" No. of Barrels = 1

22. Trash Rack and Anti-Vortex Device
Dimensions = N/A
Height = N/A

Emergency Spillway Design

23. Required Spillway Capacity Qe = Q25 - Qp = 14.92 cfs.

24. Bottom Width (B) = 10'
Slope of The Exit Channel (S) = 0.3 Ft./Ft.
Minimum Length of The Exit Channel (X) = 20'
Ft.

Anti-Seep Collar Design

25. Depth of Water at Principal Spillway Crest (Y) = 3.7'
Slope of Upstream Face of Empankment (Z) = 3:1
Slope of Principal Spillway Barrel (Sb) = 0.60%
Length of Barrel in Saturated Zone (Ls) = 26.39'

26. Number of Collars Required = 1 Dimensions = 4.0' x 4.0'

Finial Design Elevations

27. Top of Dam = 428.00
Design High Water = 427.00
Emergency Spillway Crest = 427.00
Principal Spillway Crest = 425.50
Dewatering Orifice Invert = 424.25
Cleanout Elevation = 423.00

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

PROJECT: FRITTS FARM
BASIN ID NO.: SB#3
TOTAL DRAINAGE AREA: 19.33 AC.
"C" FACTOR: 0.50

Basin Volume Design
Wet Storage

1. Minimum Required Volume = 1,800 Cu. Ft. x Total Drainage Area (Ac.)
1800 Cu. Ft. x 19.33 Acres = 34,794 Cu. Ft.
= 0.80 Ac-Ft.

2. Available Basin Volume = 48,116 Cu. Ft. At Elevation 427.00
(From Storage - Elevation Curve)

3. Excavate 48,116 Cu. Ft. to Obtain Required Volume*.

* Elevation Corresponding to Required Volume = Invert of Dewatering Orifice.

4. Available Volume Before Cleanout Required = 24,058 Cu. Ft.
(1/2 Wet Storage Volume)

5. Elevation Corresponding to Cleanout Level = 426.00
(From Storage - Elevation Curve)

6. Distance From Invert of The Dewatering Orifice to Cleanout Level = 1.0'
(Min. = 1.0 Ft.)

Dry Storage

7. Minimum Required Volume = 1800 Cu. Ft. x Total Drainage Area (Ac.)
1,800 Cu. Ft. x 19.33 Acres = 34,794 Cu. Ft.
= 0.80 Ac-Ft.

8. Total Required Volume = 48,116 Cu. Ft. + 34,794 Cu. Ft.
= 82,910 Cu. Ft.
= 1.90 Ac-Ft.

9. Total Available Basin Volume at Crest of Riser = 48,116 Cu. Ft. at Elevation 429.00
(From Storage - Elevation Curve)

Orifice Calculation Breakdown

10. A = (Dry Storage/T)/(64.32*h)*0.5(0.6)
Drawdown Time (T) = 48 Hours
Head (h) = 1
Required Area (A) = 0.00577 Sq.Ft.
Maximum Diameter = 1.03 In.
Diameter of Dewatering Orifice = 3.00 In.
11. Diameter of Flexible Tubing = 5.00 In. (Min.)
(Dia. of Dewatering Orifice + 2")

Preliminary Design Elevations

12. Crest of Riser = 429.00
Top of Dam = 432.00
Design High Water = 430.00
Upstream Toe of Dam = 424.00
Crest of Emergency Spillway = 430.00

Basin Shape

13. Length of Flow = L = 241.00 = 2.93 Length-to-width Ratio
Effective Width = We = 82.19
If L/We > 2, Baffles Are Not Required
If L/We < 2, Baffles Are Required

Runoff

14. Q_2 = 30.0 cfs.

15. Q_{25} = 55.1 cfs.

Principal Spillway Design

17. With Emergency Spillway, Required Spillway Capacity Qp = Q_2 = 30.0 cfs.
(Riser and Barrel)

Without Emergency Spillway, Required Spillway Capacity Qp = Q_{25} = N/A cfs.
(Riser and Barrel)

18. With Emergency Spillway:
Assumed Available Head (h) = 1.0 (Using Q_2)
h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

Without Emergency Spillway:
Assumed Available Head (h) = N/A (Using Q_{25})
h = Design High Water Elevation - Crest of Riser Elevation

19. Riser Dimensions = 48"
Actual Head (h) = 1.00'
Note: Avoid Orifice Flow Conditions

20. Barrel Length (L) = 40'
Invert In = 426.40 Invert Out = 426.00
Head (H) on Barrel Through Embankment = 4.00'

21. Barrel Diameter = 30" No. of Barrels = 1

22. Trash Rack and Anti-Vortex Device
Dimensions = N/A
Height = N/A

Emergency Spillway Design

23. Required Spillway Capacity Qe = Q25 - Qp = 25.13 cfs.

24. Bottom Width (B) = 8'
Slope of The Exit Channel (S) = 0.3 Ft./Ft.
Minimum Length of The Exit Channel (X) = 20'

Anti-Seep Collar Design

25. Depth of Water at Principal Spillway Crest (Y) = 4.0'
Slope of Upstream Face of Empankment (Z) = 3:1
Slope of Principal Spillway Barrel (Sb) = 1.00%
Length of Barrel in Saturated Zone (Ls) = 29.17'

26. Number of Collars Required = 1 Dimensions = 5.5' x 5.5'

Finial Design Elevations

27. Top of Dam = 432.00
Design High Water = 431.00
Emergency Spillway Crest = 430.00
Principal Spillway Crest = 429.00
Dewatering Orifice Invert = 427.00
Cleanout Elevation = 426.00

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

PROJECT: FRITTS FARM
BASIN ID NO.: SB#4
TOTAL DRAINAGE AREA: 32.96 AC.
"C" FACTOR: 0.50

Basin Volume Design
Wet Storage

1. Minimum Required Volume = 1,800 Cu. Ft. x Total Drainage Area (Ac.)
1800 Cu. Ft. x 32.96 Acres = 59,328 Cu. Ft.
= 1.36 Ac-Ft.

2. Available Basin Volume = 59,669 Cu. Ft. At Elevation 430.80
(From Storage - Elevation Curve)

3. Excavate 59,669 Cu. Ft. to Obtain Required Volume*.

* Elevation Corresponding to Required Volume = Invert of Dewatering Orifice.

4. Available Volume Before Cleanout Required = 29,834 Cu. Ft.
(1/2 Wet Storage Volume)

5. Elevation Corresponding to Cleanout Level = 429.50
(From Storage - Elevation Curve)

6. Distance From Invert of The Dewatering Orifice to Cleanout Level = 1.3'
(Min. = 1.0 Ft.)

Dry Storage

7. Minimum Required Volume = 1800 Cu. Ft. x Total Drainage Area (Ac.)
1,800 Cu. Ft. x 32.96 Acres = 59,328 Cu. Ft.
= 1.36 Ac-Ft.

8. Total Required Volume = 59,669 Cu. Ft. + 59,328 Cu. Ft.
= 118,997 Cu. Ft.
= 2.73 Ac-Ft.

9. Total Available Basin Volume at Crest of Riser = 119,209 Cu. Ft. at Elevation 433.30
(From Storage - Elevation Curve)

Orifice Calculation Breakdown

10. A = (Dry Storage/T)/(64.32*h)*0.5(0.6)
Drawdown Time (T) = 48 Hours
Head (h) = 1.25
Required Area (A) = 0.02319 Sq.Ft.
Maximum Diameter = 2.06 In.
Diameter of Dewatering Orifice = 3.00 In.
11. Diameter of Flexible Tubing = 5.00 In. (Min.)
(Dia. of Dewatering Orifice + 2")

Preliminary Design Elevations

12. Crest of Riser = 433.30
Top of Dam = 436.00
Design High Water = 434.30
Upstream Toe of Dam = 427.50
Crest of Emergency Spillway = 434.30

Basin Shape

13. Length of Flow = L = 474.00 = 8.52 Length-to-width Ratio
Effective Width = We = 55.65
If L/We > 2, Baffles Are Not Required
If L/We < 2, Baffles Are Required

Runoff

14. Q_2 = 51.1 cfs.

15. Q_{25} = 93.9 cfs.

Principal Spillway Design

17. With Emergency Spillway, Required Spillway Capacity Qp = Q_2 = 51.1 cfs.
(Riser and Barrel)

Without Emergency Spillway, Required Spillway Capacity Qp = Q_{25} = N/A cfs.
(Riser and Barrel)

18. With Emergency Spillway:
Assumed Available Head (h) = 1.0 (Using Q_2)
h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

Without Emergency Spillway:
Assumed Available Head (h) = N/A (Using Q_{25})
h = Design High Water Elevation - Crest of Riser Elevation

19. Riser Dimensions = 48"
Actual Head (h) = 1.00'
Note: Avoid Orifice Flow Conditions

20. Barrel Length (L) = 50'
Invert In = 429.50 Invert Out = 429.00
Head (H) on Barrel Through Embankment = 5.30'

21. Barrel Diameter = 30" No. of Barrels = 1

22. Trash Rack and Anti-Vortex Device
Dimensions = N/A
Height = N/A

Emergency Spillway Design

23. Required Spillway Capacity Qe = Q25 - Qp = 42.85 cfs.

24. Bottom Width (B) = 12'
Slope of The Exit Channel (S) = 0.3 Ft./Ft.
Minimum Length of The Exit Channel (X) = 20'

Anti-Seep Collar Design

25. Depth of Water at Principal Spillway Crest (Y) = 5.3'
Slope of Upstream Face of Empankment (Z) = 3:1
Slope of Principal Spillway Barrel (Sb) = 1.00%
Length of Barrel in Saturated Zone (Ls) = 38.65'

26. Number of Collars Required = 1 Dimensions = 6.5' x 6.5'

Finial Design Elevations

27. Top of Dam = 436.00
Design High Water = 434.30
Emergency Spillway Crest = 434.30
Principal Spillway Crest = 433.30
Dewatering Orifice Invert = 430.80
Cleanout Elevation = 429.50

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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

EROSION & SEDIMENT CONTROL COMPUTATIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GC-001.DWG	
NCS:	
SHEET:	23 OF 134

FILE PATH: Q:\PROJECTS\GENERAL\2665\2665-0206 FRITTS FARM\DESIGN\C-GC-001.DWG
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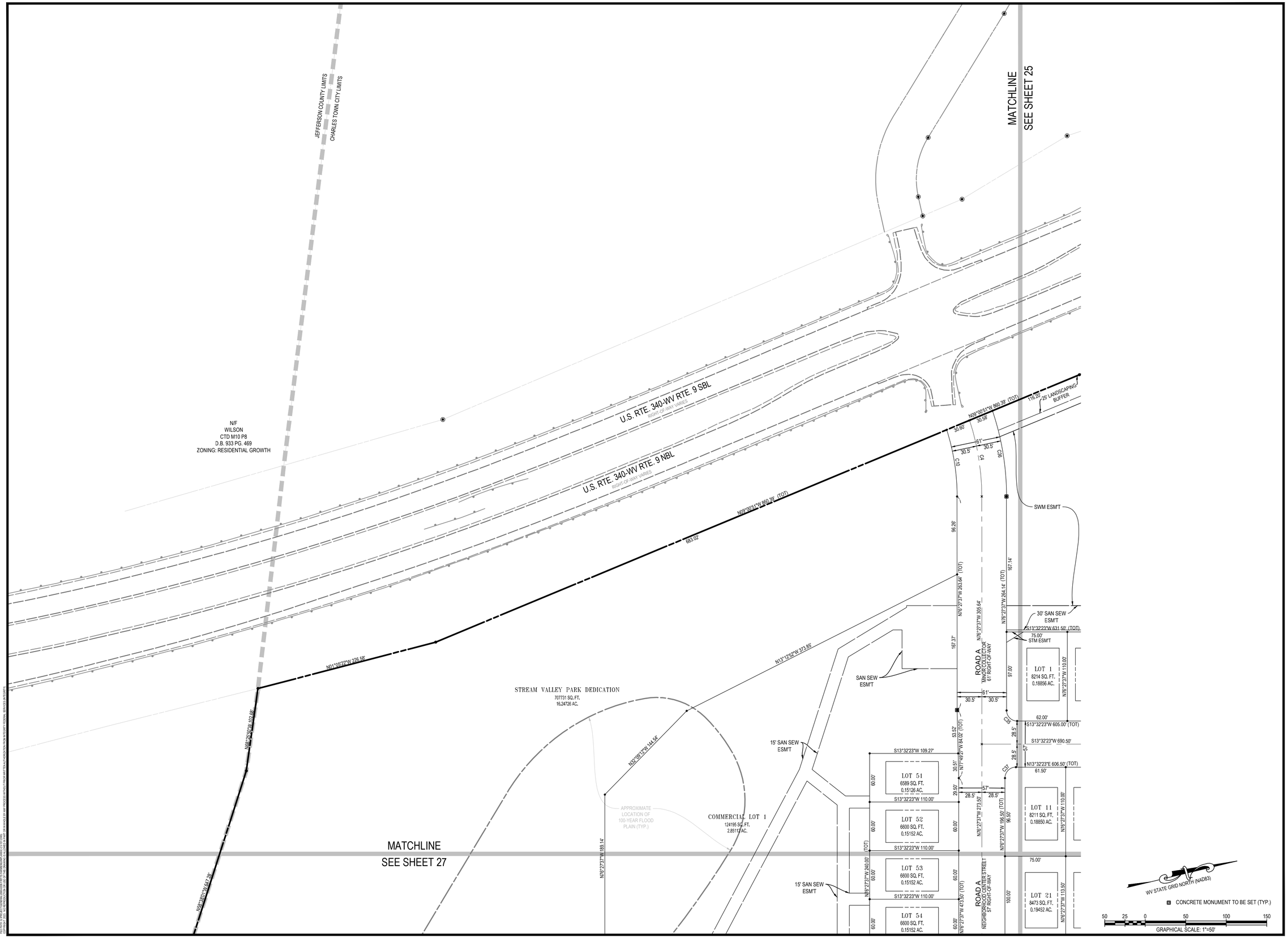

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3-16-23

REVISIONS

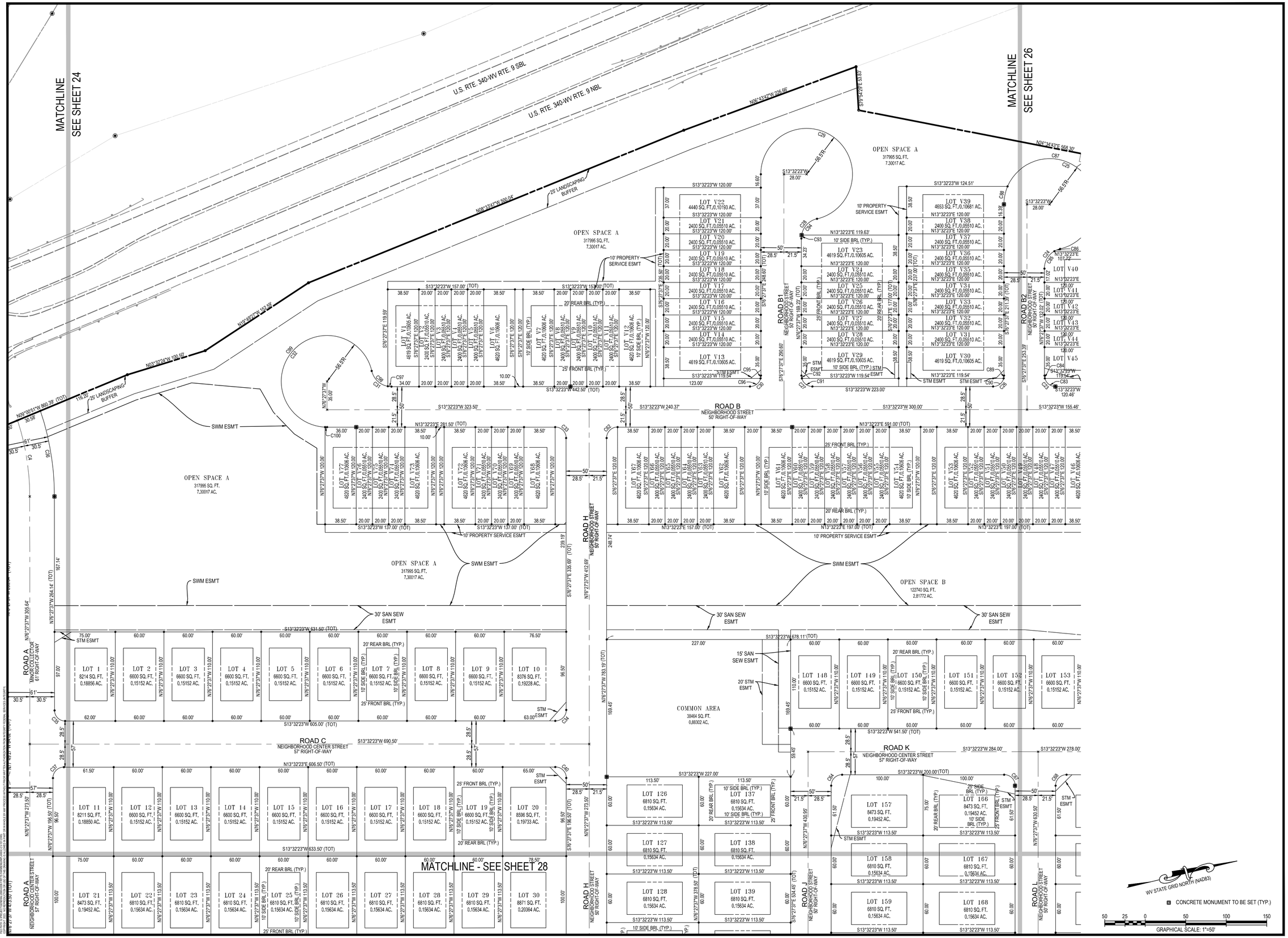
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

PRELIMINARY PLAT

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CV-101.DWG	
NCS:	
SHEET:	24 OF 134



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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.:
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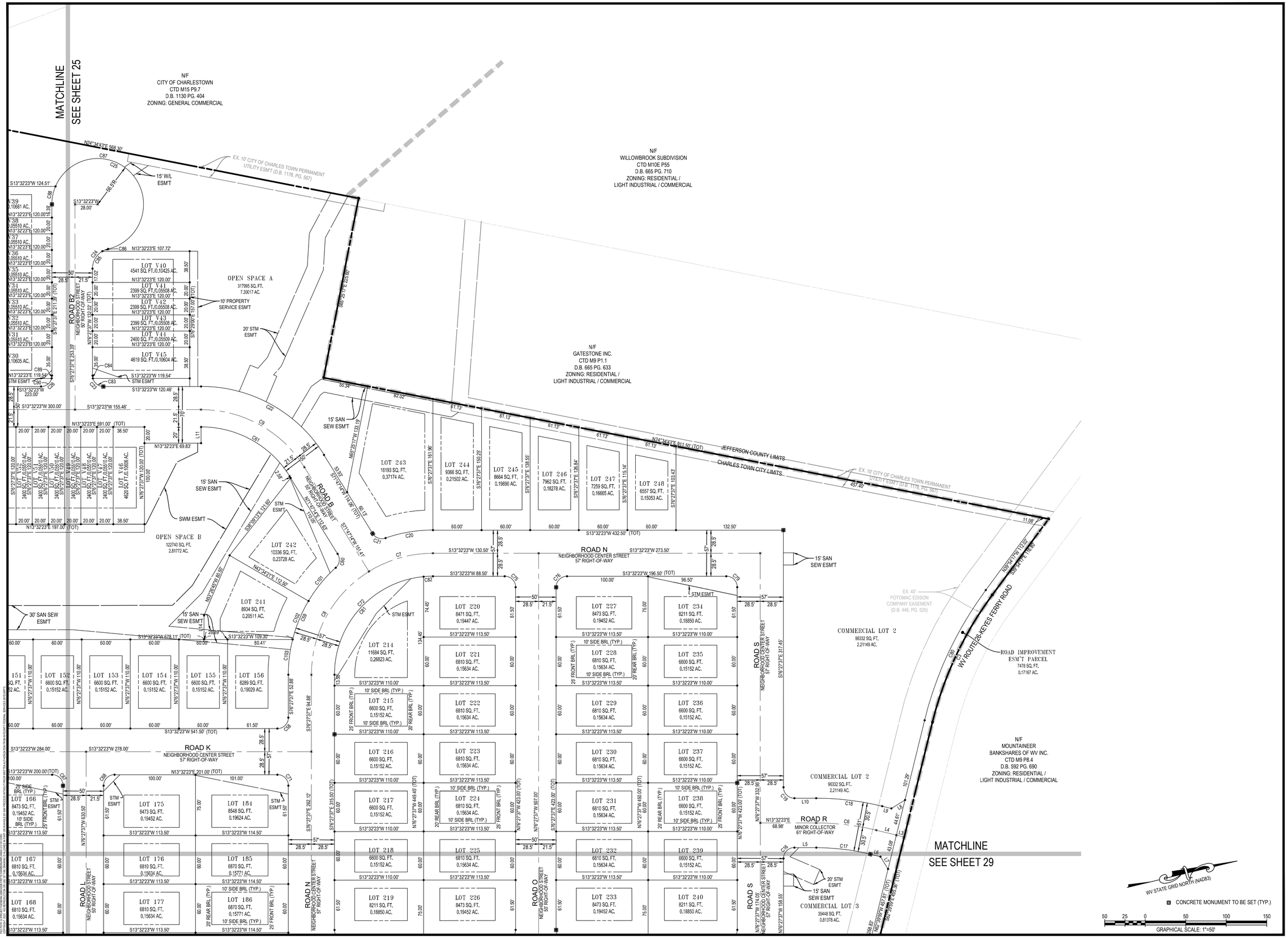
CADD: C-CV-101.DWG	
NCS:	
SHEET:	25 OF 134



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JEFFERSON COUNTY, WEST VIRGINIA

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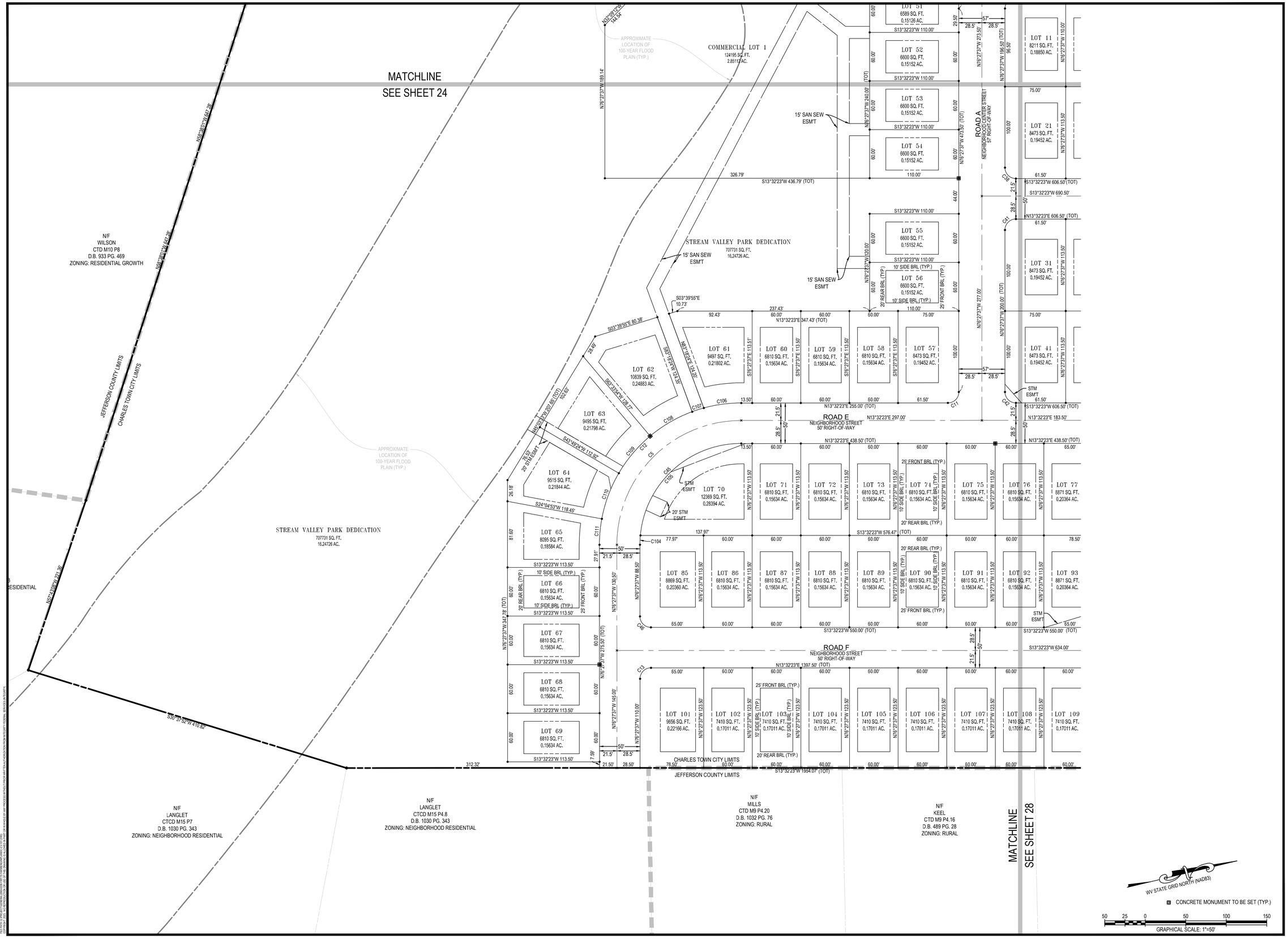
CADD: C-CV-101.DWG	
NCS:	
SHEET:	26 OF 134



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JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.:
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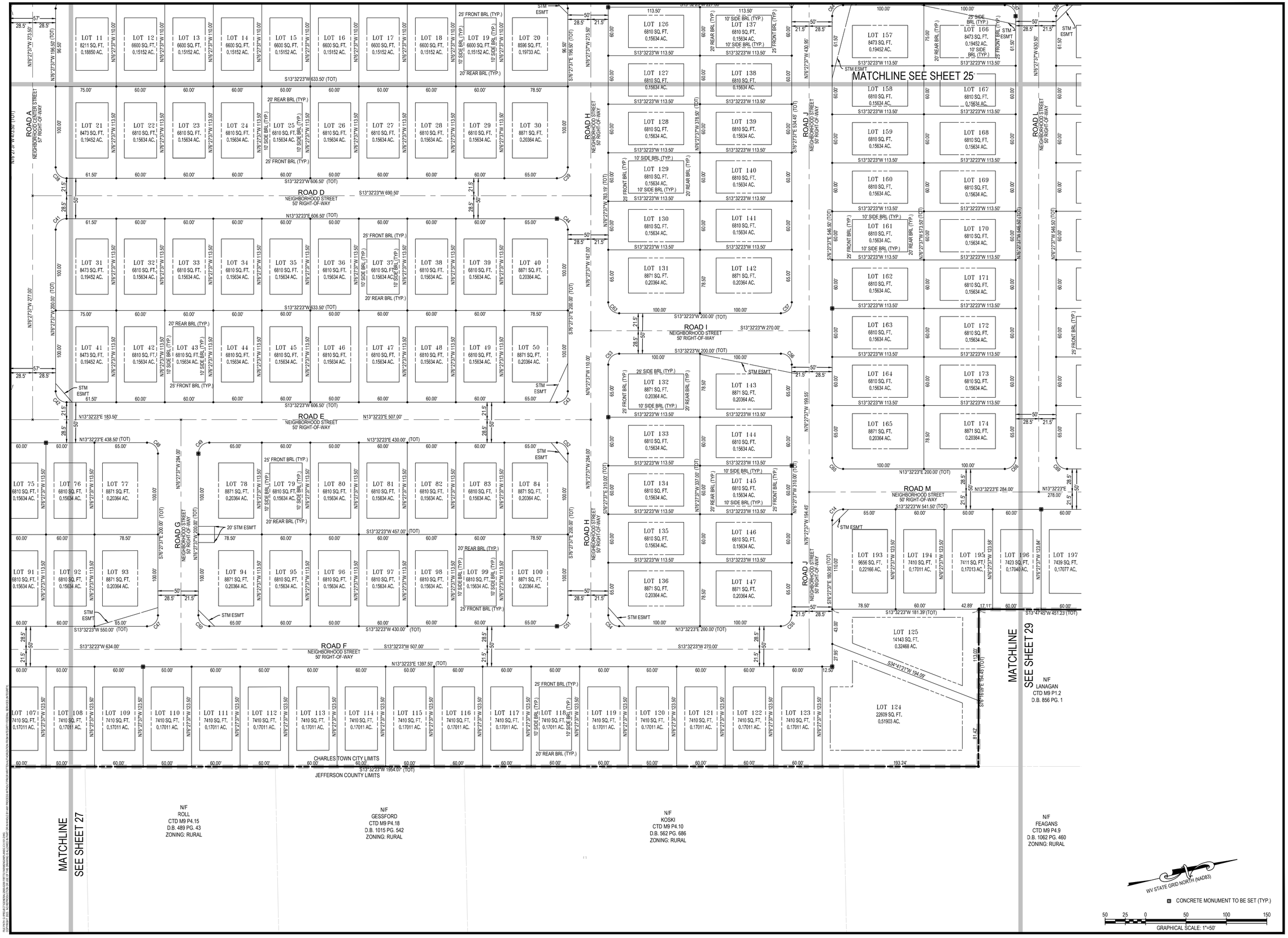
SHEET:	27 OF 134



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STONE SPRING SUBDIVISON

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JEFFERSON COUNTY, WEST VIRGINIA

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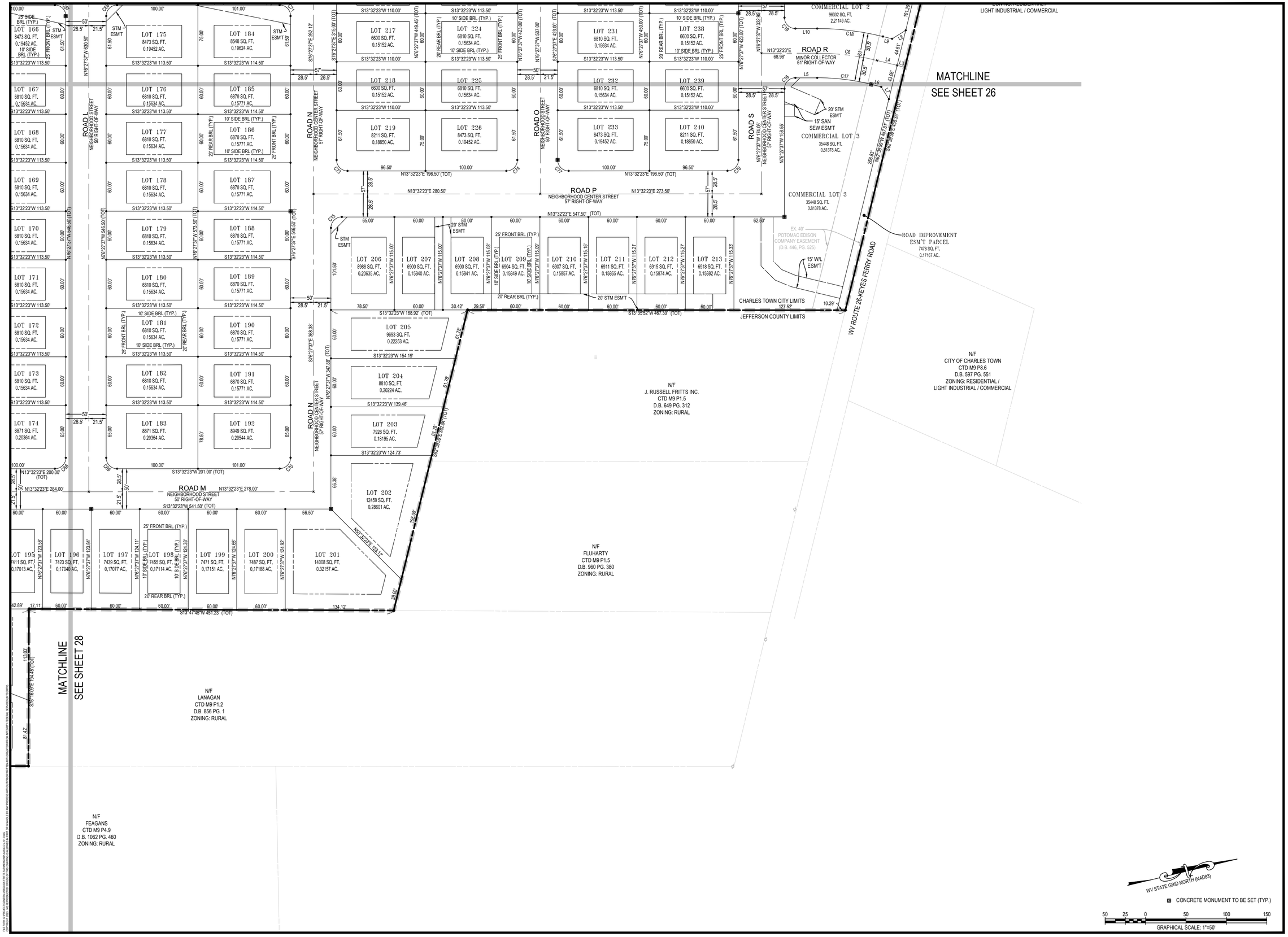
SHEET:	28 OF 134



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DRAWN: JCH	CHECK: JPG
CADD: C-CV-101.DWG	
NCS:	
SHEET:	29 OF 134

PROJECT TITLE		
LOT NUMBER / PARCEL NAME	TOTAL AREA SQ. FT.	TOTAL AREA ACRES
1	8,214	0.18857
2	6,600	0.15152
3	6,600	0.15152
4	6,600	0.15152
5	6,600	0.15152
6	6,600	0.15152
7	6,600	0.15152
8	6,600	0.15152
9	6,600	0.15152
10	8,376	0.19229
11	8,211	0.18850
12	6,600	0.15152
13	6,600	0.15152
14	6,600	0.15152
15	6,600	0.15152
16	6,600	0.15152
17	6,600	0.15152
18	6,600	0.15152
19	6,600	0.15152
20	8,596	0.19734
21	8,473	0.19451
22	6,810	0.15634
23	6,810	0.15634
24	6,810	0.15634
25	6,810	0.15634
26	6,810	0.15634
27	6,810	0.15634
28	6,810	0.15634
29	6,810	0.15634
30	8,871	0.20365
31	8,473	0.19451
32	6,810	0.15634
33	6,810	0.15634
34	6,810	0.15634
35	6,810	0.15634
36	6,810	0.15634
37	6,810	0.15634
38	6,810	0.15634
39	6,810	0.15634
40	8,871	0.20365
41	8,473	0.19451
42	6,810	0.15634
43	6,810	0.15634
44	6,810	0.15634
45	6,810	0.15634
46	6,810	0.15634
47	6,810	0.15634
48	6,810	0.15634
49	6,810	0.15634
50	8,871	0.20365
51	6,589	0.15126
52	6,600	0.15152
53	6,600	0.15152
54	6,600	0.15152
55	6,600	0.15152
56	6,600	0.15152
57	8,473	0.19451
58	6,810	0.15634
59	6,810	0.15634
60	6,810	0.15634
61	9,657	0.22169
62	9,497	0.21802
63	9,495	0.21798
64	9,515	0.21843
65	8,095	0.18584
66	6,810	0.15634
67	6,810	0.15634
68	6,810	0.15634
69	6,810	0.15634
70	12,369	0.28395
71	6,810	0.15634
72	6,810	0.15634
73	6,810	0.15634
74	6,810	0.15634
75	6,810	0.15634
76	6,810	0.15634
77	8,871	0.20365
78	8,871	0.20365
79	6,810	0.15634
80	6,810	0.15634
81	6,810	0.15634
82	6,810	0.15634
83	6,810	0.15634
84	8,871	0.20365
85	8,869	0.20360
86	6,810	0.15634
87	6,810	0.15634
88	6,810	0.15634
89	6,810	0.15634
90	6,810	0.15634
91	6,810	0.15634
92	6,810	0.15634
93	8,871	0.20365
94	8,871	0.20365
95	6,810	0.15634
96	6,810	0.15634
97	6,810	0.15634
98	6,810	0.15634
99	6,810	0.15634
100	8,871	0.20365
101	9,656	0.22167
102	7,410	0.17011
103	7,410	0.17011
104	7,410	0.17011
105	7,410	0.17011
106	7,410	0.17011
107	7,410	0.17011
108	7,410	0.17011
109	7,410	0.17011
110	7,410	0.17011
111	7,410	0.17011
112	7,410	0.17011
113	7,410	0.17011
114	7,410	0.17011
115	7,410	0.17011
116	7,410	0.17011

PROJECT TITLE		
LOT NUMBER / PARCEL NAME	TOTAL AREA SQ. FT.	TOTAL AREA ACRES
117	7,410	0.17011
118	7,410	0.17011
119	7,410	0.17011
120	7,410	0.17011
121	7,410	0.17011
122	7,410	0.17011
123	7,410	0.17011
124	22,609	0.51903
125	14,143	0.32468
126	6,810	0.15634
127	6,810	0.15634
128	6,810	0.15634
129	6,810	0.15634
130	6,810	0.15634
131	8,871	0.20365
132	8,871	0.20365
133	6,810	0.15634
134	6,810	0.15634
135	6,810	0.15634
136	8,871	0.20365
137	6,810	0.15634
138	6,810	0.15634
139	6,810	0.15634
140	6,810	0.15634
141	6,810	0.15634
142	8,871	0.20365
143	8,871	0.20365
144	6,810	0.15634
145	6,810	0.15634
146	6,810	0.15634
147	8,871	0.20365
148	6,600	0.15152
149	6,600	0.15152
150	6,600	0.15152
151	6,600	0.15152
152	6,600	0.15152
153	6,600	0.15152
154	6,600	0.15152
155	6,600	0.15152
156	8,289	0.19029
157	8,473	0.19451
158	6,810	0.15634
159	6,810	0.15634
160	6,810	0.15634
161	6,810	0.15634
162	6,810	0.15634
163	6,810	0.15634
164	6,810	0.15634
165	8,871	0.20365
166	8,473	0.19451
167	6,810	0.15634
168	6,810	0.15634
169	6,810	0.15634
170	6,810	0.15634
171	6,810	0.15634
172	6,810	0.15634
173	6,810	0.15634
174	8,871	0.20365
175	8,473	0.19451
176	6,810	0.15634
177	6,810	0.15634
178	6,810	0.15634
179	6,810	0.15634
180	6,810	0.15634
181	6,810	0.15634
182	6,810	0.15634
183	8,871	0.20365
184	8,548	0.19624
185	6,870	0.15771
186	6,870	0.15771
187	6,870	0.15771
188	6,870	0.15771
189	6,870	0.15771
190	6,870	0.15771
191	6,870	0.15771
192	8,949	0.20544
193	9,656	0.22167
194	7,410	0.17011
195	7,411	0.17013
196	7,423	0.17041
197	7,439	0.17078
198	7,455	0.17114
199	7,471	0.17151
200	7,487	0.17188
201	14,008	0.32158
202	12,459	0.28602
203	7,926	0.18196
204	8,810	0.20225
205	9,693	0.22252
206	8,988	0.20634
207	6,900	0.15840
208	6,900	0.15840
209	6,904	0.15849
210	6,907	0.15856
211	6,911	0.15865
212	6,915	0.15875
213	6,918	0.15882
214	11,684	0.26823
215	6,600	0.15152
216	6,600	0.15152
217	6,600	0.15152
218	6,600	0.15152
219	8,211	0.18850
220	8,471	0.19447
221	6,810	0.15634
222	6,810	0.15634
223	6,810	0.15634
224	6,810	0.15634
225	6,810	0.15634
226	8,473	0.19451
227	8,473	0.19451
228	6,810	0.15634
229	6,810	0.15634
230	6,810	0.15634
231	6,810	0.15634
232	6,810	0.15634

PROJECT TITLE		
LOT NUMBER / PARCEL NAME	TOTAL AREA SQ. FT.	TOTAL AREA ACRES
233	8,473	0.19451
234	8,211	0.18850
235	6,600	0.15152
236	6,600	0.15152
237	6,600	0.15152
238	6,600	0.15152
239	6,600	0.15152
240	8,211	0.18850
241	8,934	0.20510
242	10,336	0.23728
243	16,193	0.37174
244	9,366	0.21501
245	8,664	0.19890
246	7,962	0.18278
247	7,259	0.16664
248	6,557	0.15053
TOTAL	1,865,855	42.83466
V1	4,619	0.10604
V2	2,400	0.05510
V3	2,400	0.05510
V4	2,400	0.05510
V5	2,400	0.05510
V6	4,620	0.10606
V7	4,620	0.10606
V8	2,400	0.05510
V9	2,400	0.05510
V10	2,400	0.05510
V11	2,400	0.05510
V12	4,620	0.10606
V13	4,619	0.10604
V14	2,400	0.05510
V15	2,400	0.05510
V16	2,400	0.05510
V17	2,400	0.05510
V18	2,400	0.05510
V19	2,400	0.05510
V20	2,400	0.05510
V21	2,400	0.05510
V22	4,440	0.10193
V23	4,619	0.10604
V24	2,400	0.05510
V25	2,400	0.05510
V26	2,400	0.05510
V27	2,400	0.05510
V28	2,400	0.05510
V29	4,619	0.10604
V30	4,619	0.10604
V31	2,400	0.05510
V32	2,400	0.05510
V33	2,400	0.05510
V34	2,400	0.05510
V35	2,400	0.05510
V36	2,400	0.05510
V37	2,400	0.05510
V38	2,400	0.05510
V39	4,653	0.10682
V40	4,541	0.10425
V41	2,400	0.05510
V42	2,400	0.05510
V43	2,400	0.05510
V44	2,400	0.05510
V45	4,619	0.10604
V46	4,620	0.10606
V47	2,400	0.05510
V48	2,400	0.05510
V49	2,400	0.05510
V50	2,400	0.05510
V51	2,400	0.05510
V52	2,400	0.05510
V53	4,620	0.10606
V54	4,620	0.10606
V55	2,400	0.05510
V56	2,400	0.05510
V57	2,400	0.05510
V58	2,400	0.05510
V59	2,400	0.05510
V60	2,400	0.05510
V61	4,620	0.10606
V62	4,620	0.10606
V63	2,400	0.05510
V64	2,400	0.05510
V65	2,400	0.05510
V66	2,400	0.05510
V67	4,620	0.10606
V68	4,620	0.10606
V69	2,400	0.05510
V70	2,400	0.05510
V71	2,400	0.05510
V72	4,620	0.10606
V73	4,620	0.10606
V74	2,400	0.05510
V75	2,400	0.05510
V76	2,400	0.05510
V77	4,620	0.10606
TOTAL	233,408	5.35852
RIGHT-OF-WAY	756,249	17.36110
TOTAL	756,249	17.36110
OPEN SPACE A	317,995	7.30016
OPEN SPACE B	122,740	2.81772
TOTAL	440,735	10.11788
STREAM VALLEY PARK DED	707,731	16.24726
TOTAL	707,731	16.24726
COMMON AREA	38,464	0.88301
TOTAL	38,464	0.88301
COMMERCIAL LOT 1	124,195	2.85112
COMMERCIAL LOT 2	96,332	2.21148
COMMERCIAL LOT 3	35,448	0.81377
TOTAL	255,975	5.87637
KEYES FERRY RD IMP ESMT	7,478	0.17167
TOTAL	7,478	0.17167

CURVE TABLE

CURVE	ARC LENGTH	RADIUS	DELTA	TANGENT	CHORD	CHORD BEARING
C4	95.64'	300.00'	18°15'56"	48.23'	95.23'	N85°35'35"W
C5	241.12'	153.50'	90°00'00"	153.50'	217.08'	S31°27'37"E
C6	74.83'	310.00'	13°49'51"	37.60'	74.65'	S20°27'19"W
C7	83.13'	150.00'	31°45'08"	42.66'	82.07'	S02°20'11"E
C8	152.49'	150.00'	58°14'52"	83.57'	146.01'	S47°20'11"E
C9	152.49'	150.00'	58°14'52"	83.57'	146.01'	S42°39'49"W
C10	83.63'	269.50'	17°46'44"	42.15'	83.29'	N85°20'59"W
C11	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C12	274.89'	175.00'	90°00'00"	175.00'	247.49'	S31°27'37"E
C13	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C14	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C15	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C16	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C17	67.47'	279.50'	13°49'51"	33.90'	67.31'	S20°27'19"W
C18	82.19'	340.50'	13°49'51"	41.30'	82.00'	S20°27'19"W
C19	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C20	59.56'	178.50'	19°07'00"	30.06'	59.28'	S03°58'53"W
C21	18.23'	13.50'	77°21'52"	10.81'	16.88'	N33°06'19"E
C22	181.47'	178.50'	58°14'52"	99.45'	173.75'	S42°39'49"W
C23	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C24	33.55'	25.00'	76°52'47"	19.84'	31.08'	S38°01'13"E
C25	253.31'	56.50'	256°52'47"	71.18'	88.51'	S51°58'47"W
C26	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C27	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C28	33.55'	25.00'	76°52'47"	19.84'	31.08'	S38°01'13"E
C29	253.31'	56.50'	256°52'47"	71.18'	88.51'	S51°58'47"W
C30	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C31	33.55'	25.00'	76°52'47"	19.84'	31.08'	N51°58'47"E
C32	253.31'	56.50'	256°52'47"	71.18'	88.51'	S38°01'13"E
C33	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C34	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C35	20.42'	13.00'	90°00'00"	13.00'	18.38'	N58°32'23"E
C36	107.65'	330.50'	18°39'43"	54.30'	107.17'	N85°47'28"W
C37	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C38	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C39	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C40	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C41	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C42	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C43	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C44	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C45	196.35'	125.00'	90°00'00"	125.00'	176.78'	S31°27'37"E
C46	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C47	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C48	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C49	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C50	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C51	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C52	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C53	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C54	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C55	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C56	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C57	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C58	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W

CURVE TABLE

CURVE	ARC LENGTH	RADIUS	DELTA	TANGENT	CHORD	CHORD BEARING
C59	148.74'	178.50'	47°44'40"	79.00'	144.48'	S52°35'17"E
C60	18.73'	13.50'	79°29'48"	11.23'	17.26'	N68°27'51"W
C61	130.63'	128.50'	58°14'52"	71.59'	125.08'	S42°39'49"W
C62	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C63	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C64	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C65	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C66	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C67	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C68	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C69	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C70	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C71	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C72	190.85'	121.50'	90°00'00"	121.50'	171.83'	S31°27'37"E
C73	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C74	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C75	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C76	21.21'	13.50'	90°00'00"	13.50'	19.09'	S31°27'37"E
C77	21.21'	13.50'	90°00'00"	13.50'	19.09'	N58°32'23"E
C78	21.21'	13.50'	90°00'00"	13.50'	19.09'	N31°27'37"W
C79	21.21'	13.50'	90°00'00"	13.50'	19.09'	S58°32'23"W
C80	178.77'	450.00'	22°45'42"	90.58'	177.60'	S51°17'08"E
C81	179.33'	121.50'	84°34'08"	110.50'	163.49'	S34°10'33"E
C82	11.52'	121.50'	5°25'52"	5.76'	11.51'	S10°49'27"W
C83	17.67'	13.50'	74°58'26"	10.35'	16.43'	N51°01'36"E
C84	3.54'	13.50'	15°01'34"	1.78'	3.53'	S83°58'24"E
C85	25.85'	25.00'	59°14'24"	14.21'	24.71'	S46°50'25"E
C86	7.70'	25.00'	17°38'24"	3.88'	7.67'	S08°24'02"E
C87	230.59'	56.50'	233°50'33"	111.27'	100.75'	S63°29'54"W
C88	22.72'	56.50'	23°02'15"	11.51'	22.56'	S64°56'30"E
C89	3.54'	13.50'	15°01'34"	1.78'	3.53'	N68°56'50"W
C90	17.67'	13.50'	74°58'26"	10.35'	16.43'	N23°56'50"W
C91	17.67'	13.50'	74°58'26"	10.35'	16.43'	N51°01'36"E
C92	3.54'	13.50'	15°01'34"	1.78'	3.53'	S83°58'24"E
C93	4.29'	25.00'	9°49'45"	2.15'	4.28'	S71°32'45"E
C94	29.26'	25.00'	67°03'03"	16.56'	27.62'	S33°06'21"E
C95	3.54'	13.50'	15°01'34"	1.78'	3.53'	N68°56'50"W
C96	17.67'	13.50'	74°58'26"	10.35'	16.43'	N23°56'50"W
C97	4.52'	25.00'	10°22'11"	2.27'	4.52'	N18°43'28"E
C98	29.02'	25.00'	66°30'36"	16.39'	27.42'	N57°09'52"E
C99	250.81'	56.50'	254°20'38"	74.51'	90.04'	S36°45'08"E
C100	2.50'	56.50'	2°32'10"	1.25'	2.50'	N14°48'28"E
C101	53.18'	178.50'	17°04'10"	26.79'	52.98'	S37°15'02"E
C102	51.50'	178.50'	16°31'48"	25.93'	51.32'	S54°03'01"E
C103	44.07'	178.50'	14°08'42"	22.15'	43.96'	S69°23'16"E
C104	11.52'	125.00'	5°16'43"	5.76'	11.51'	S73°49'15"E
C105	184.83'	125.00'	84°43'17"	113.98'	168.45'	S28°49'15"E
C106	46.78'	175.00'	15°18'57"	23.53'	46.64'	S05°52'54"W
C107	15.02'	175.00'	4°55'02"	7.51'	15.01'	S04°14'05"E
C108	60.30'	175.00'	19°44'30"	30.45'	60.00'	S16°33'51"E
C109	60.30'	175.00'	19°44'30"	30.45'	60.00'	S36°18'21"E
C110	60.30'	175.00'	19°44'30"	30.45'	60.00'	S56°02'52"E
C111	32.20'	175.00'	10°32'30"	16.14'	32.15'	S71°11'22"E

LINE TABLE

LINE	BEARING	DISTANCE
L3	N27°22'14"E	10.00'
L4	N27°22'14"E	25.54'
L5	N13°32'23"E	26.98'
L6	N27°22'14"E	12.83'
L7	N72°00'51"E	17.90'
L8	N18°04'21"W	19.80'
L9	N27°22'14"E	11.62'
L10	N13°32'23"E	26.98'
L11	N76°27'37"W	20.00'
L14	S76°27'37"E	29.66'

SITE AREA DATA SUMMARY

PARCEL / LOT NAME	TOTAL AREA SUMMARY SQUARE FOOTAGE	TOTAL AREA SUMMARY ACREAGE
SINGLE-FAMILY LOTS (325)	2,099,263 SQ.FT.	48.19318 ACRES
COMMERCIAL LOTS (3)	255,975 SQ.FT.	5.87637 ACRES
RIGHT-OF-WAY-DEDICATION	756,249 SQ.FT.	17.36110 ACRES
KEYES FERRY RD IMPROV ESMT PRCL	7,478 SQ.FT.	0.17167 ACRES
OPEN SPACE PARCELS	440,735 SQ.FT.	10.11788 ACRES
COMMON AREA	38,464 SQ.FT.	0.88301 ACRES
STREAM VALLEY PARK DEDICATION	707,731 SQ.FT.	16.24726 ACRES
TOTAL SITE AREA	4,305,895 SQ.FT.	98.85047 ACRES
GROSS DENSITY PER ACRE (TOTAL SITE):	3.29 UNITS/ACRE	
AVERAGE LOT SIZE (TOTAL SITE):	6,459 SQ.FT.	
MINIMUM LOT SIZE PROVIDED (TOTAL SITE):	2,400 SQ.FT.	

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JASON P. GERHARD REGISTERED PROFESSIONAL ENGINEER NO. 19127 STATE OF WEST VIRGINIA

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

PRELIMINARY PLAT COMPUTATIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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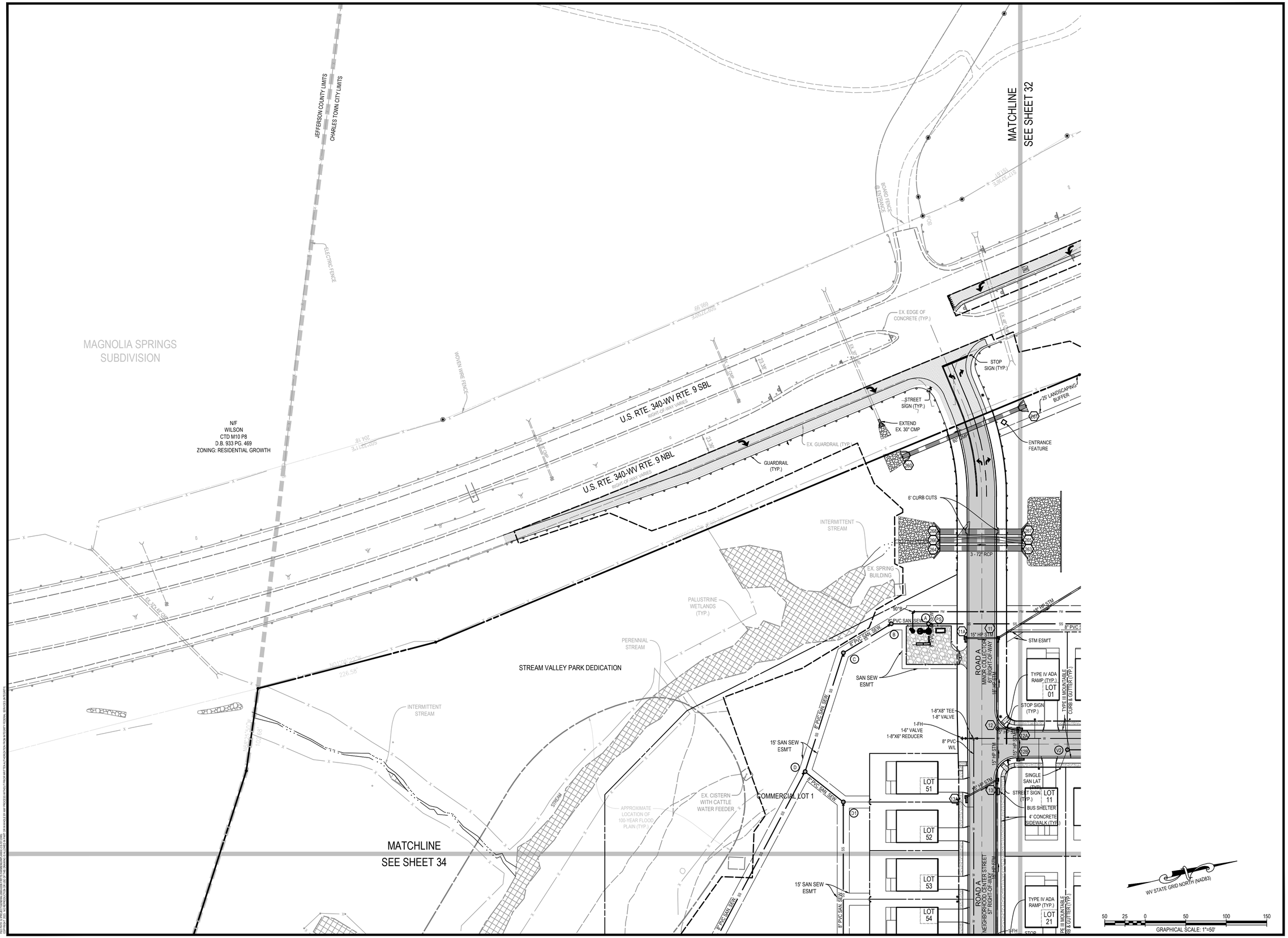

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SITE LAYOUT & UTILITY PLAN

STONE SPRING SUBDIVISON

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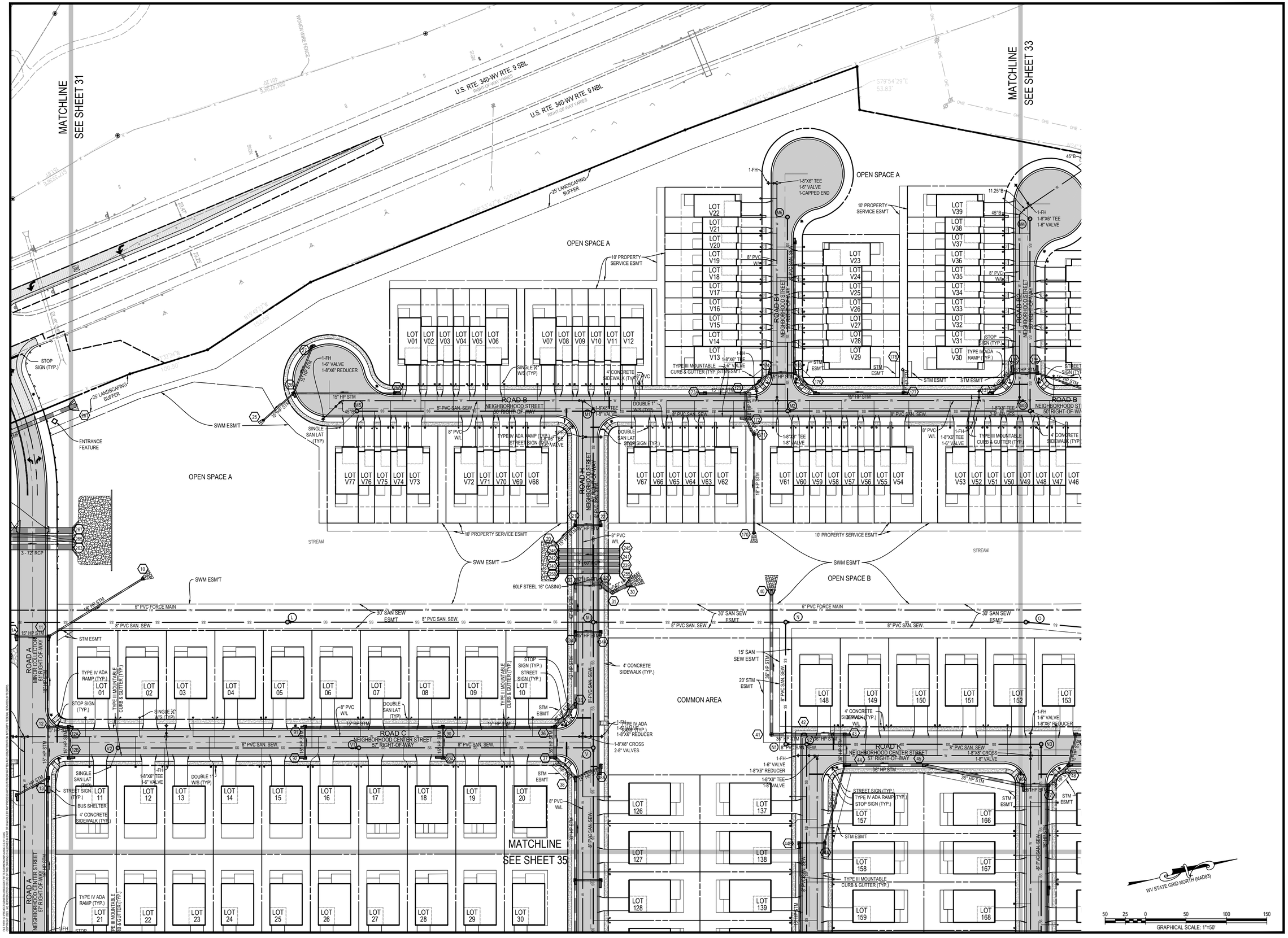

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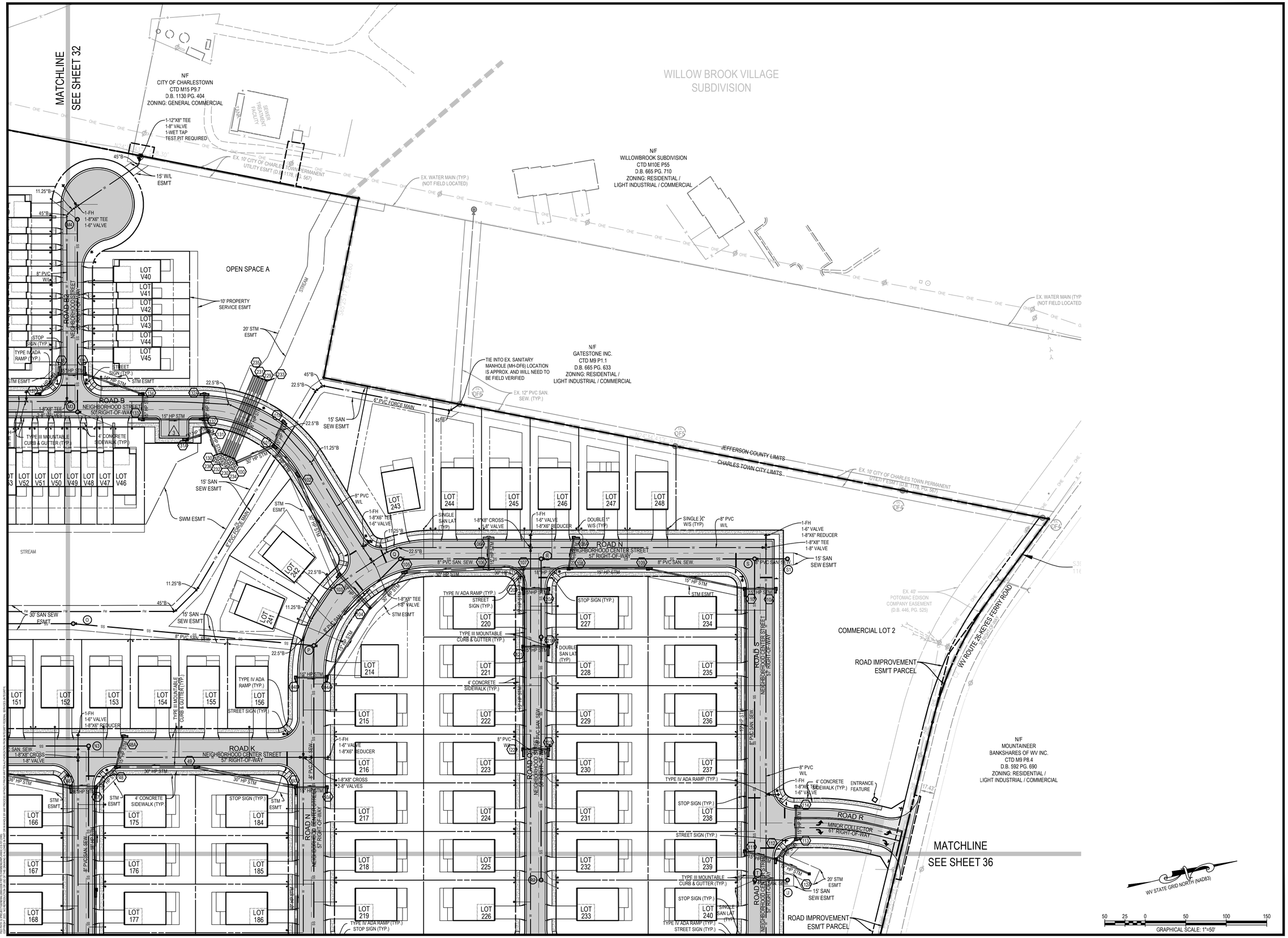

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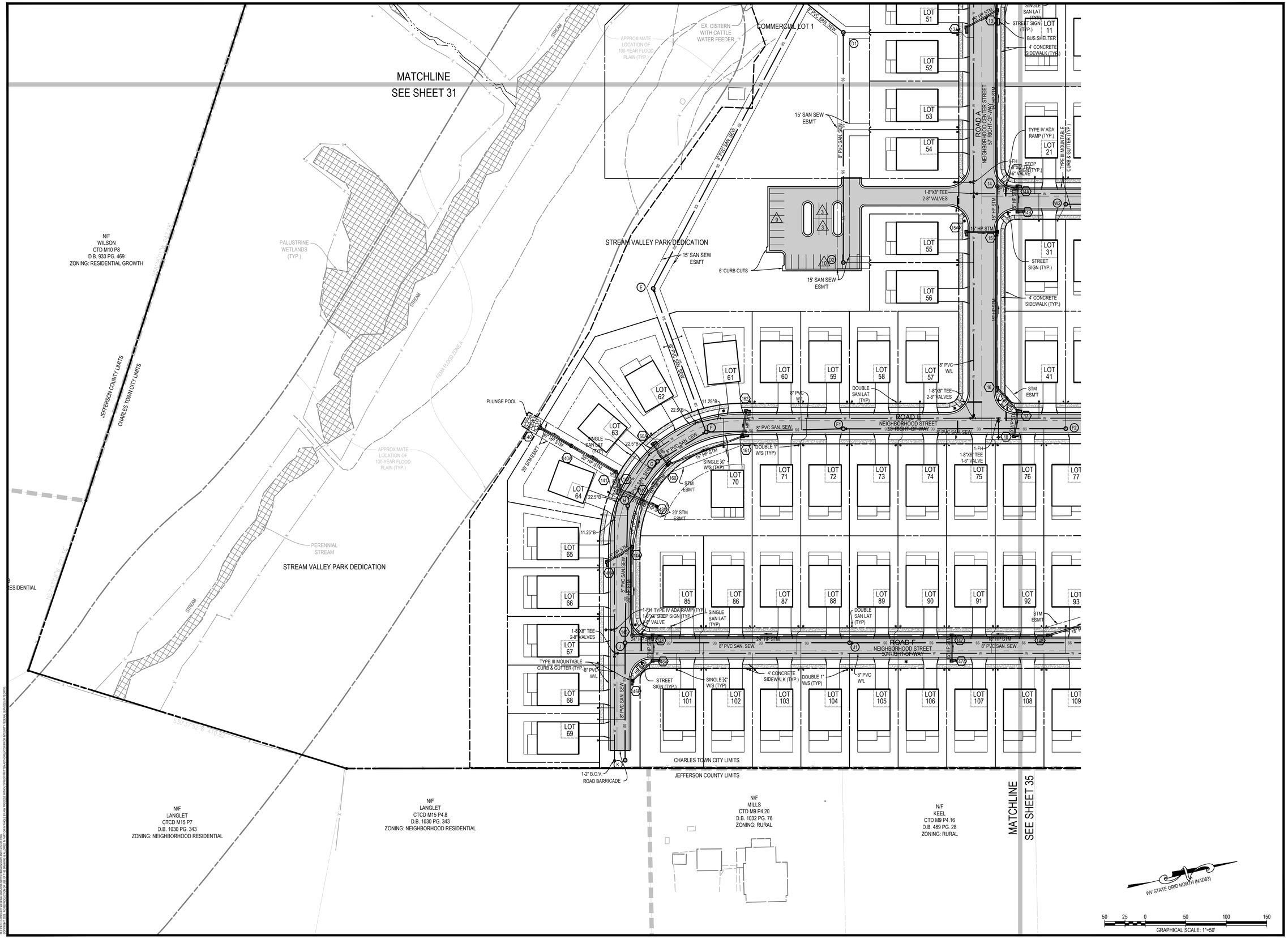

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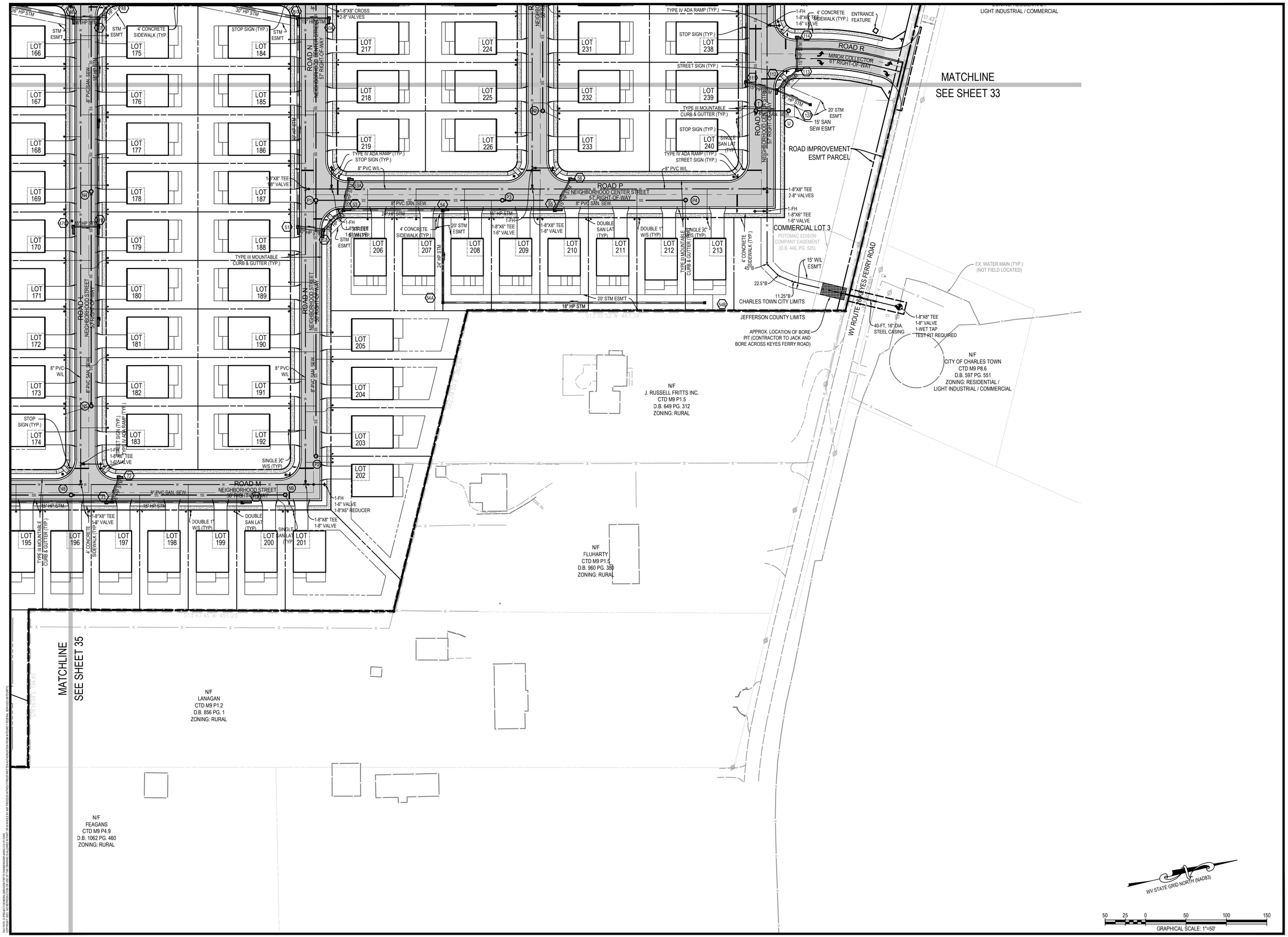

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GRADING & DRAINAGE PLAN

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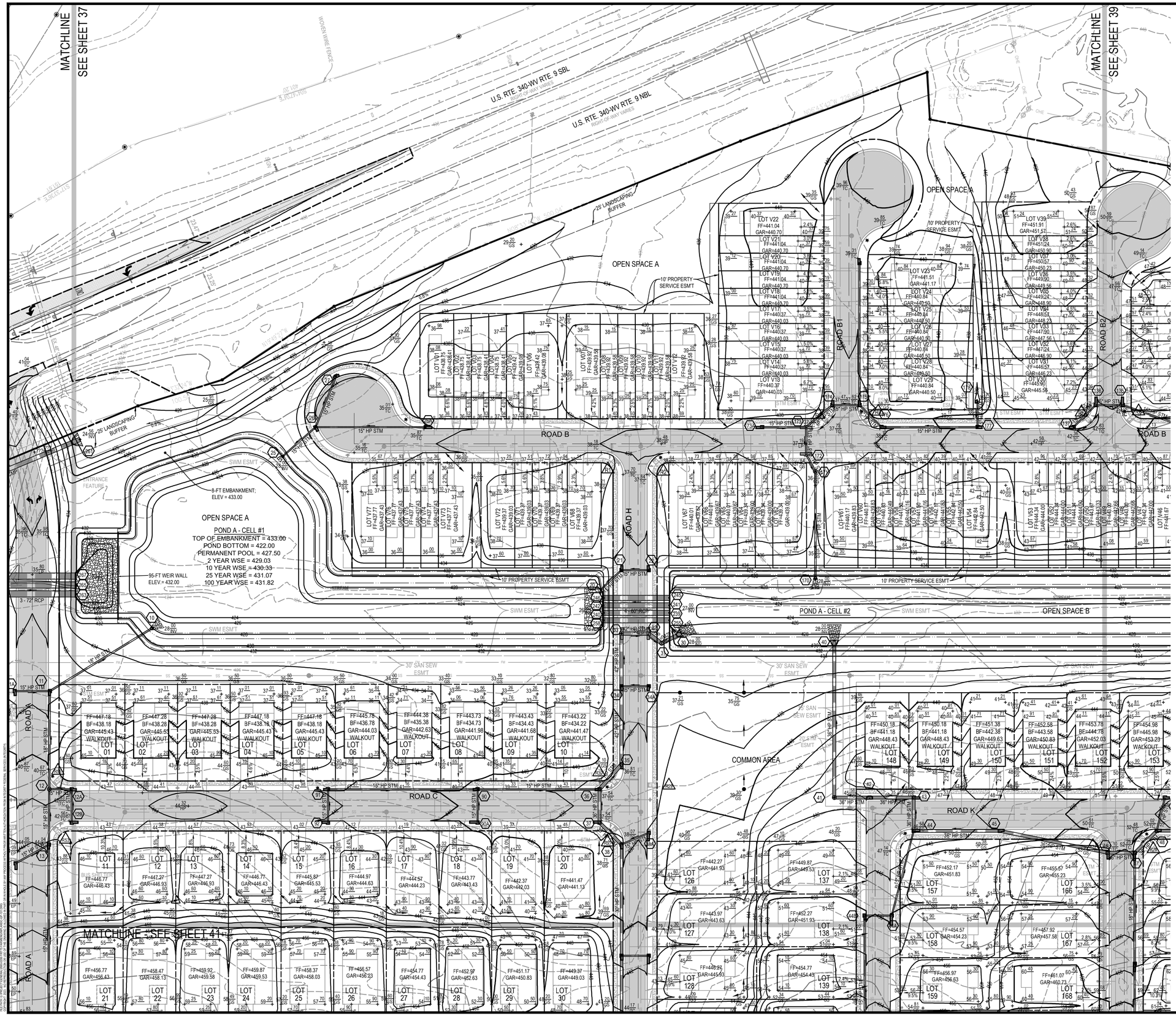

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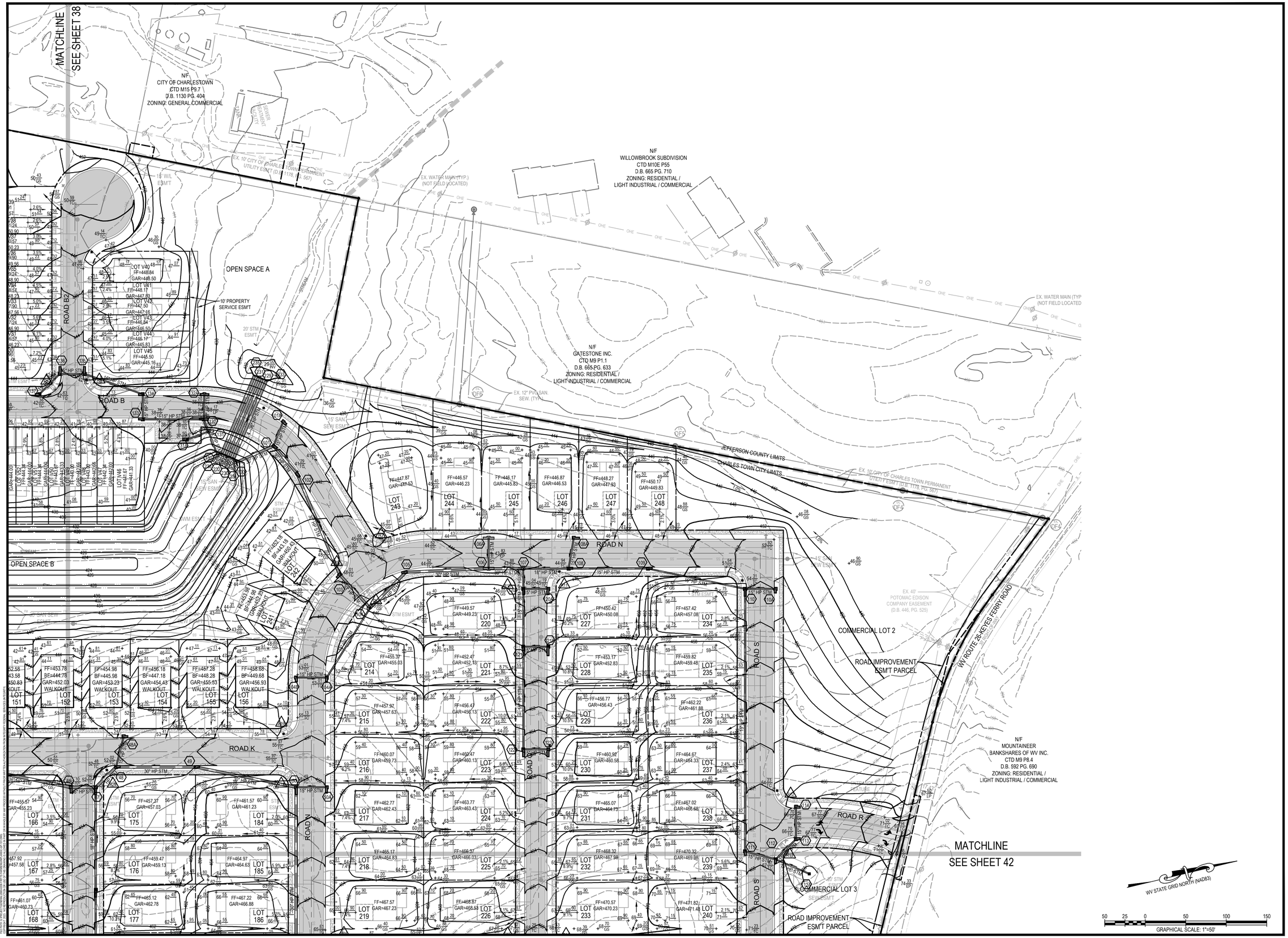

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JASON P. GERHART
REGISTERED
No. 19127
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - W.DOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

GRADING & DRAINAGE PLAN

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GP-101.DWG	
NCS:	
SHEET:	39 OF 134

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1: 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

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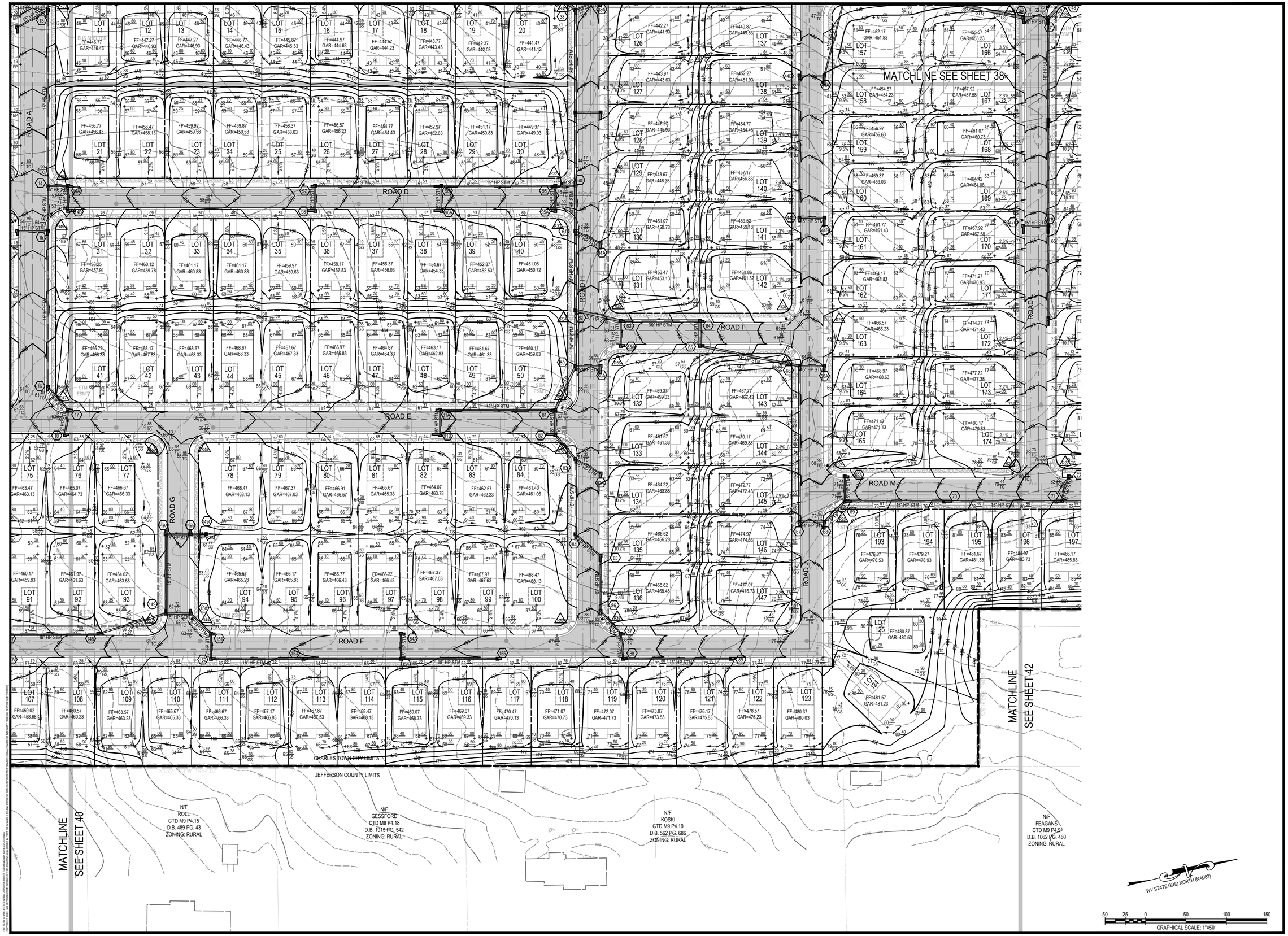
CADD: C-GP-101.DWG	
NCS:	
SHEET:	40 OF 134



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GRADING & DRAINAGE PLAN

STONE SPRING SUBDIVISON

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JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-GP-101.DWG	
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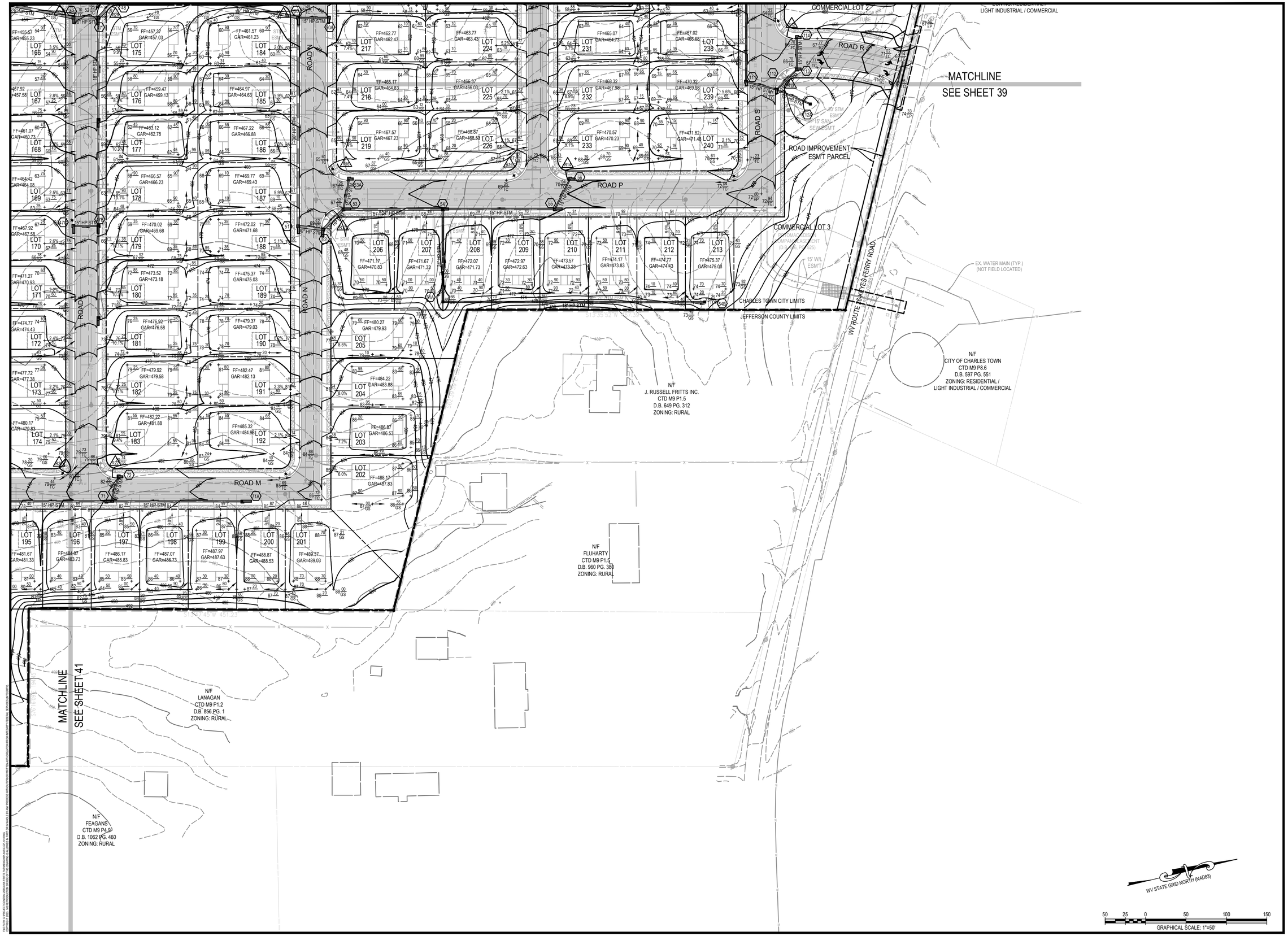
SHEET:	41 OF 134



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REVISIONS

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GRADING & DRAINAGE PLAN

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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DATE:	JANUARY 2023
JOB:	2665-0206
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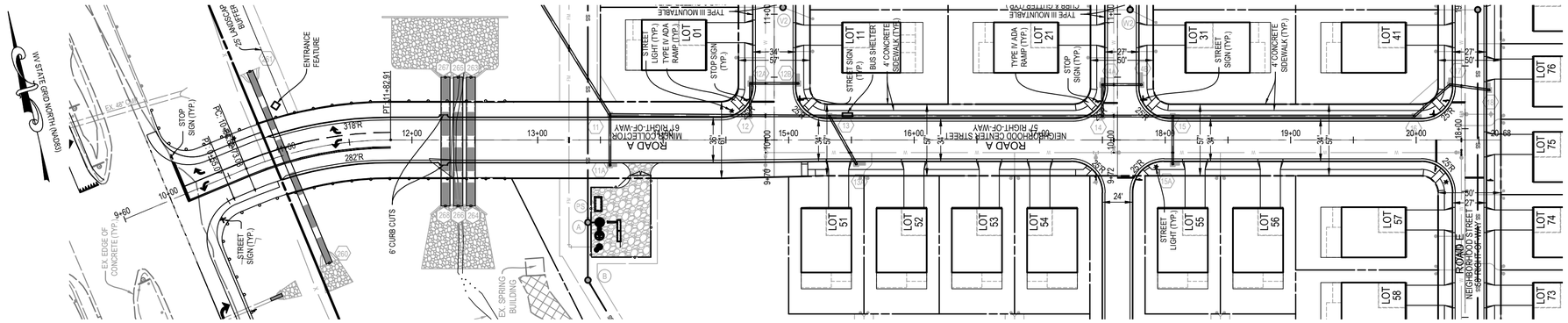
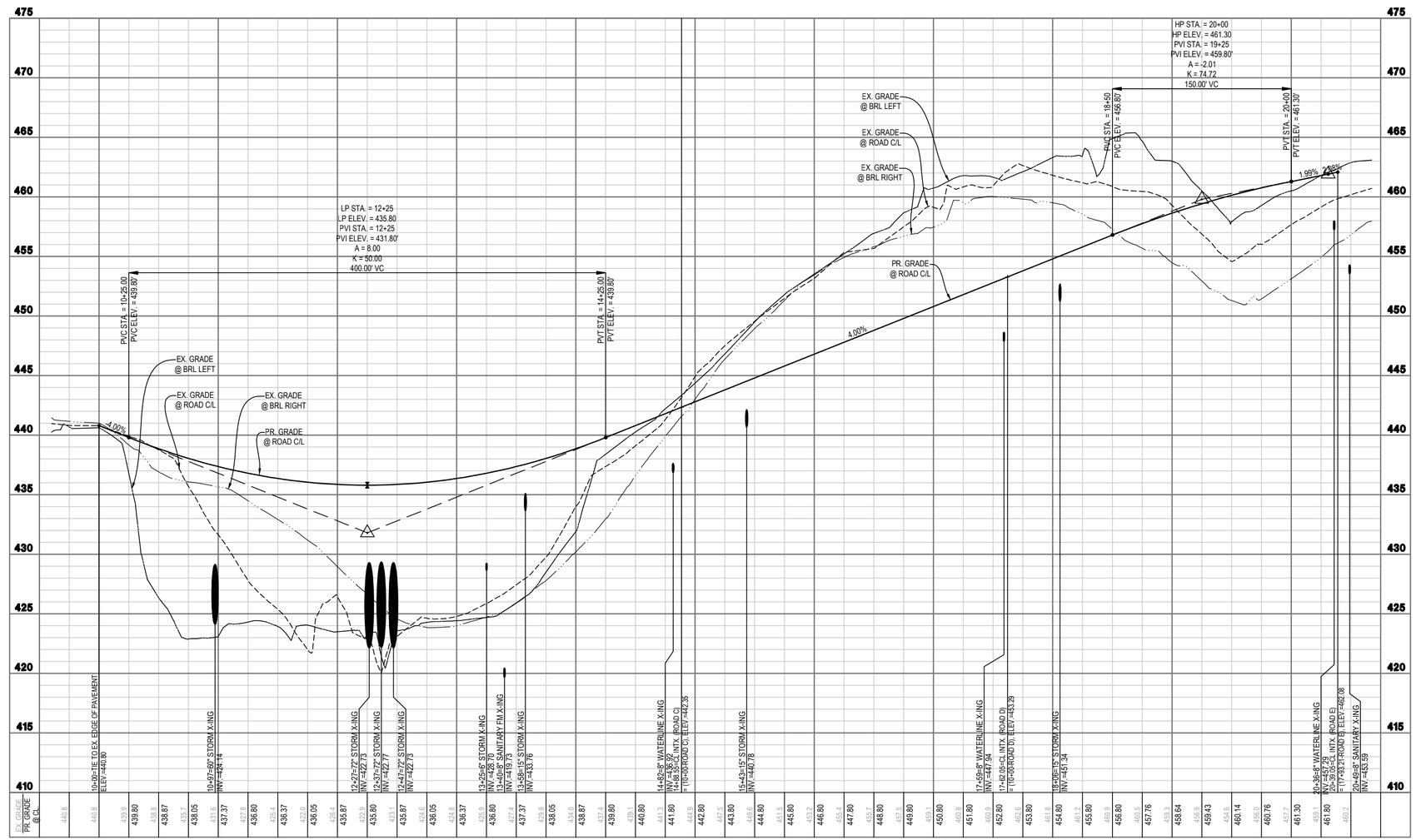
CADD: C-GP-101.DWG	
NCS:	
SHEET:	42 OF 134



ROAD A
MINOR COLLECTOR
STA 10+00.00 TO 14+88.55
(61 FT RIGHT-OF-WAY)
DESIGN SPEED: 35 MPH
POSTED SPEED: 25 MPH

ROAD A
NEIGHBORHOOD CENTER STREET
STA 14+88.55 TO 20+39.05
(57 FT RIGHT-OF-WAY)
DESIGN SPEED: 30 MPH
POSTED SPEED: 25 MPH



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3-16-23

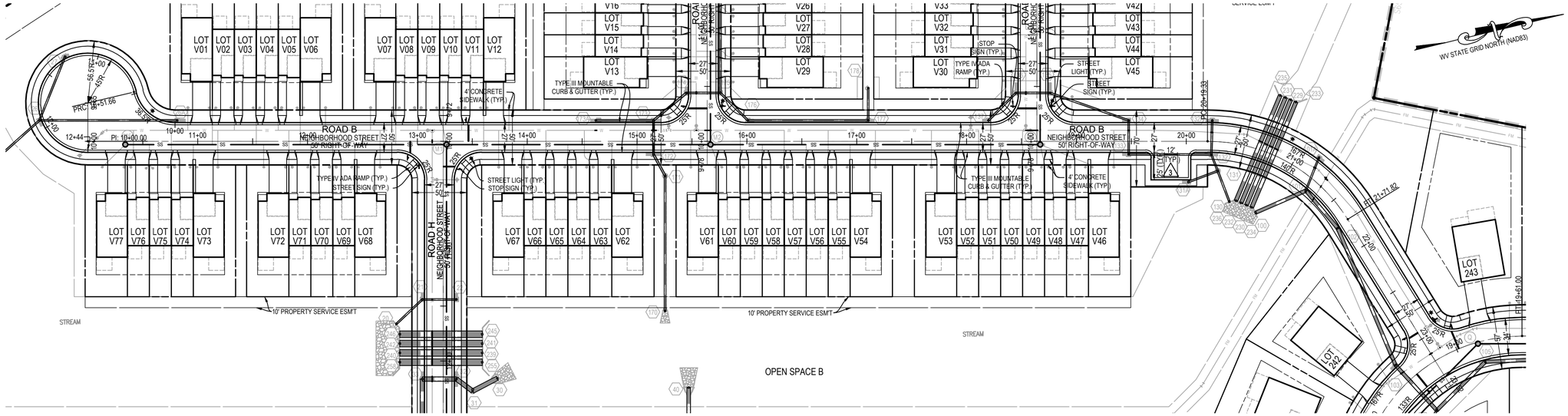
REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

ROAD A PLAN & PROFILE

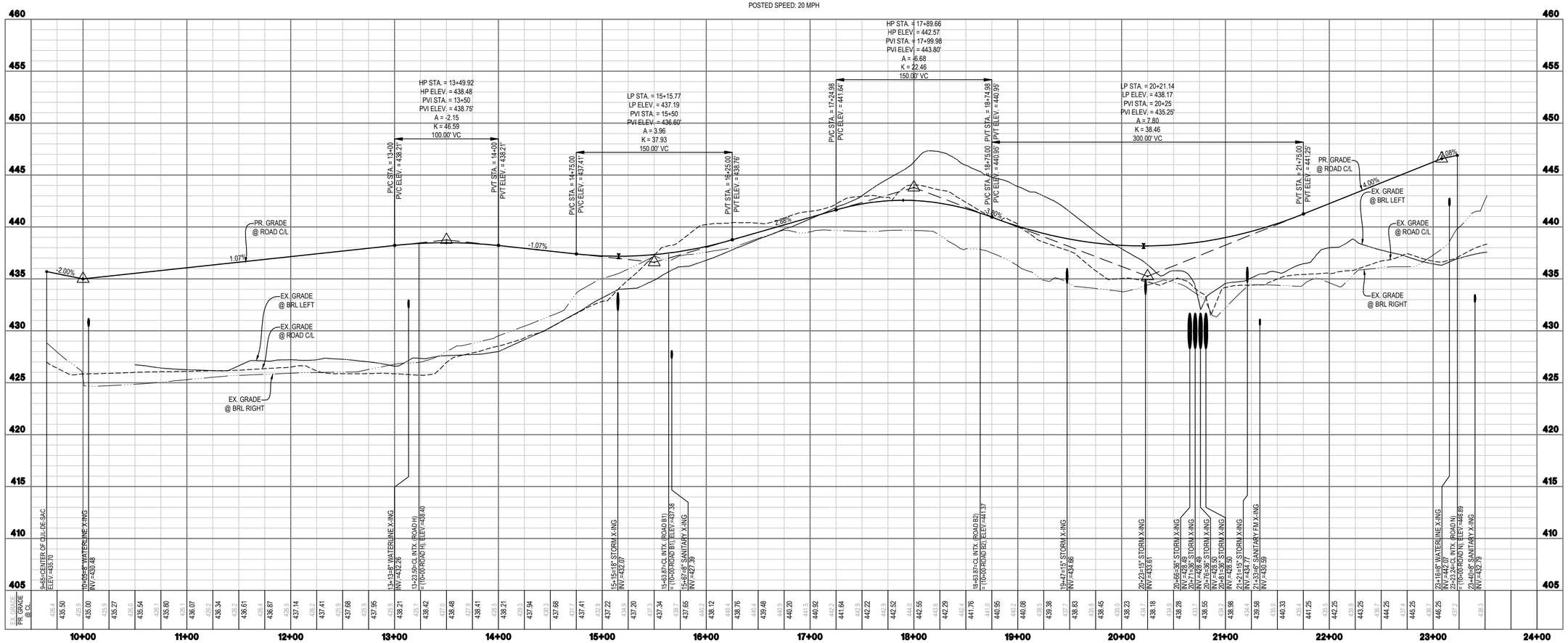
STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	43 OF 134



ROAD B
NEIGHBORHOOD STREET
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH



NOTE: SEE SHEET 56 FOR ROAD B CUL-DE-SAC UNWRAP PLAN AND PROFILE

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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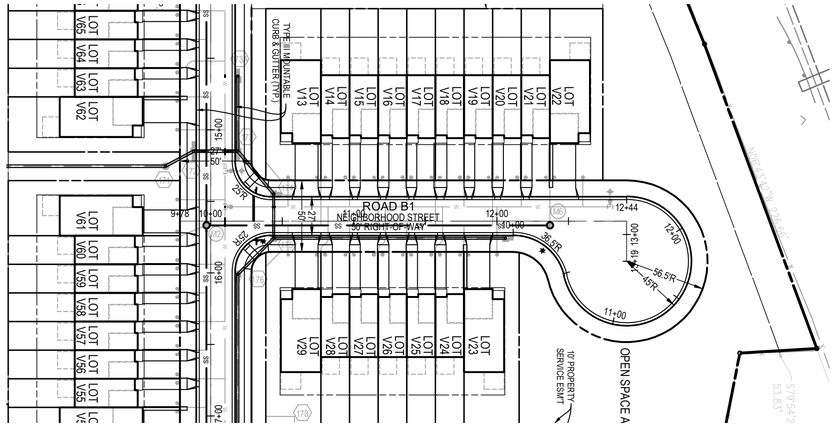
ROAD B PLAN & PROFILE

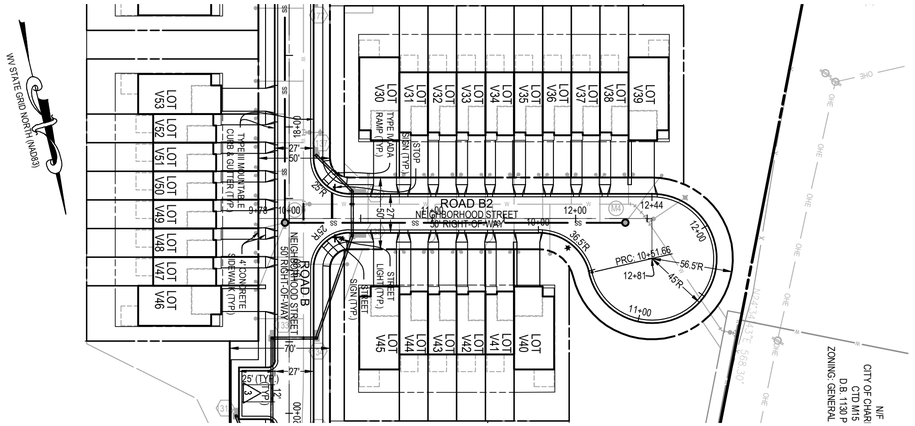
STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

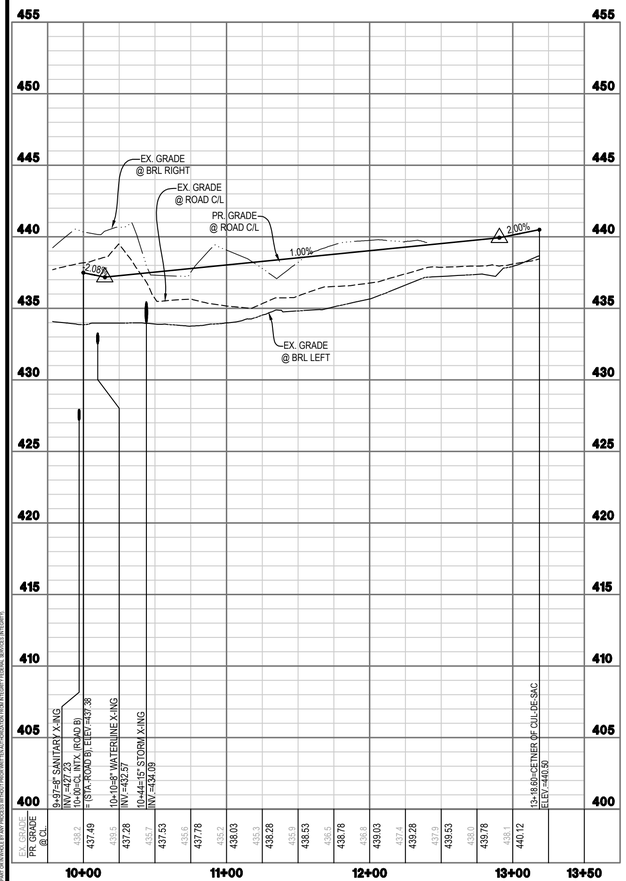
SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	44 OF 134

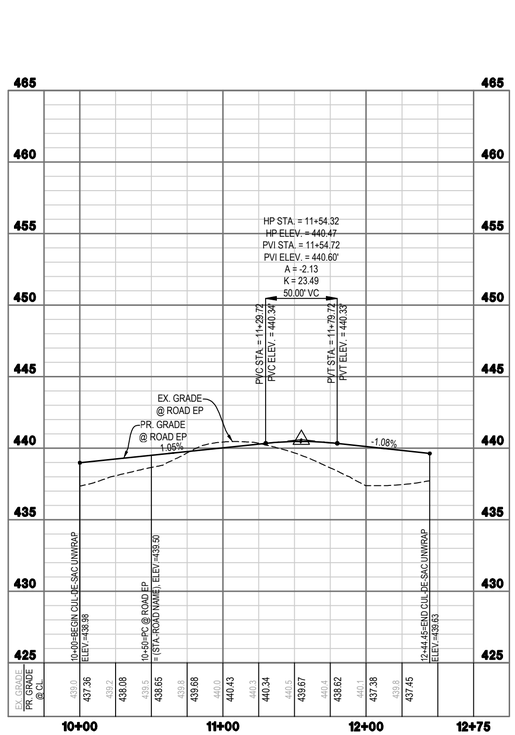


ROAD B1
NEIGHBORHOOD STREET
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH

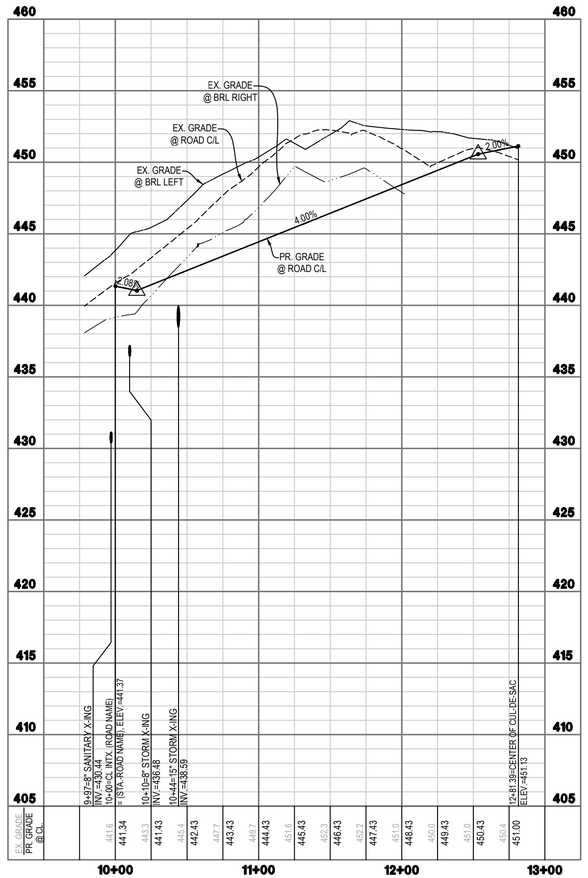


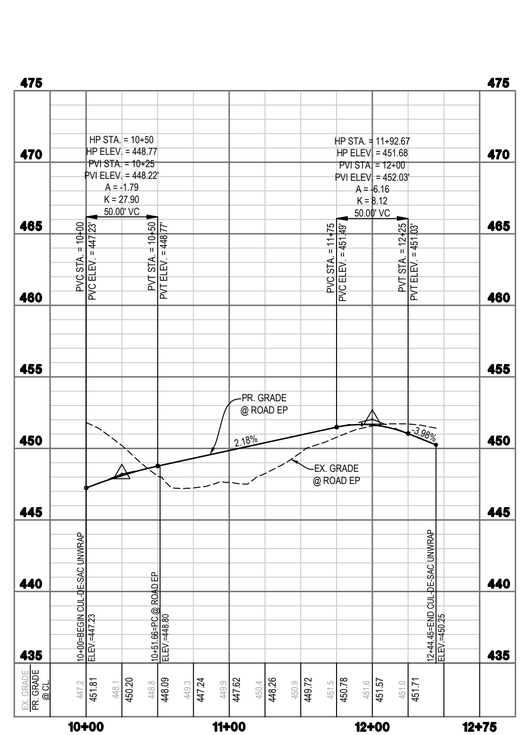
ROAD B2
NEIGHBORHOOD STREET
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH





ROAD B1
CUL-DE-SAC UNWRAP





ROAD B2
CUL-DE-SAC UNWRAP

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

ROAD B1 & B2 PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	45 OF 134

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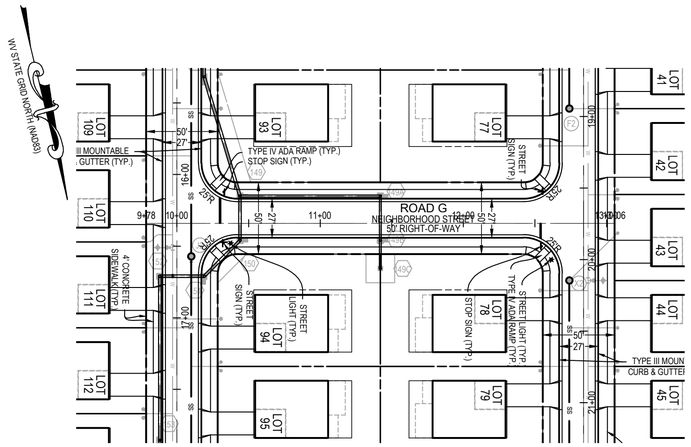
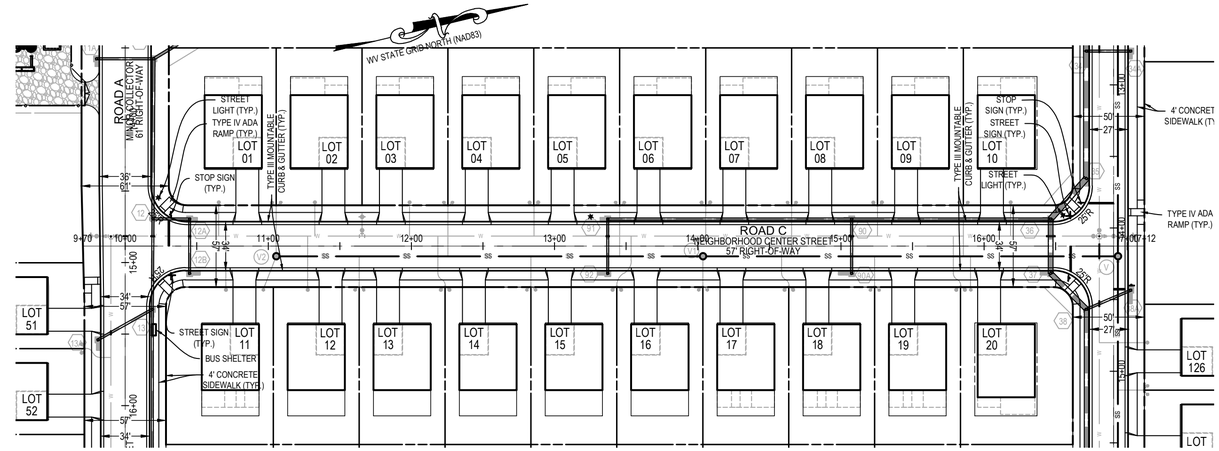
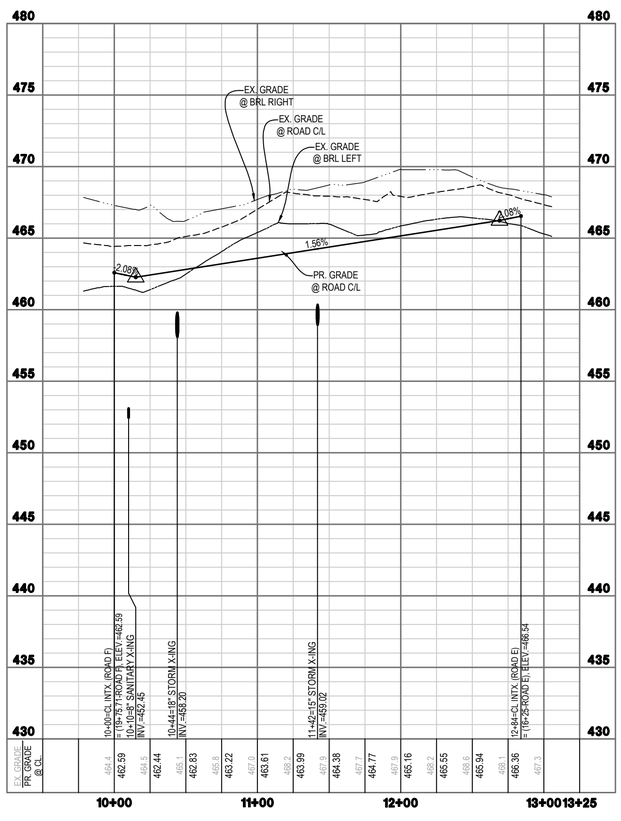
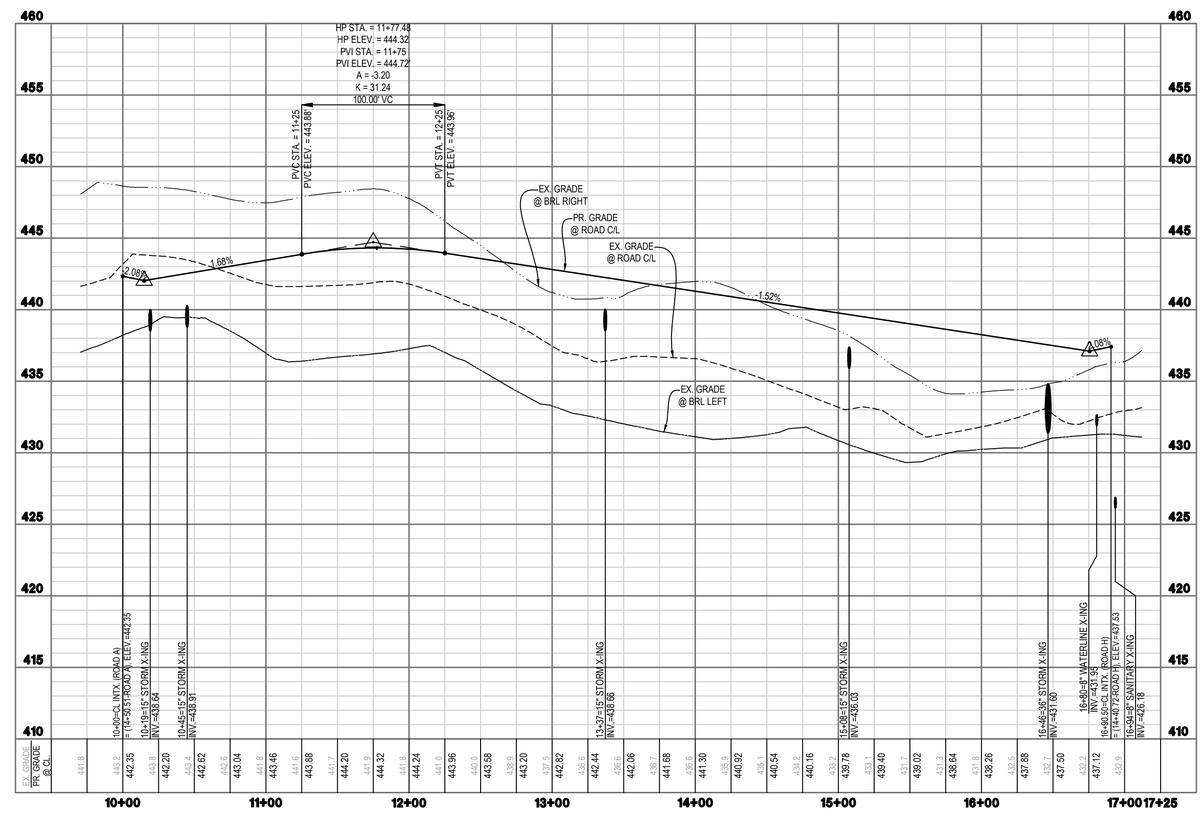


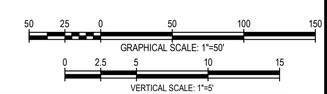
ROAD G
NEIGHBORHOOD STREET (50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH



ROAD C
NEIGHBORHOOD CENTER STREET
(57 FT RIGHT-OF-WAY)
DESIGN SPEED: 30 MPH
POSTED SPEED: 25 MPH







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3-16-23

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ROAD G & C PLAN & PROFILE

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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CADD: C-CT-201.DWG	
NCS:	
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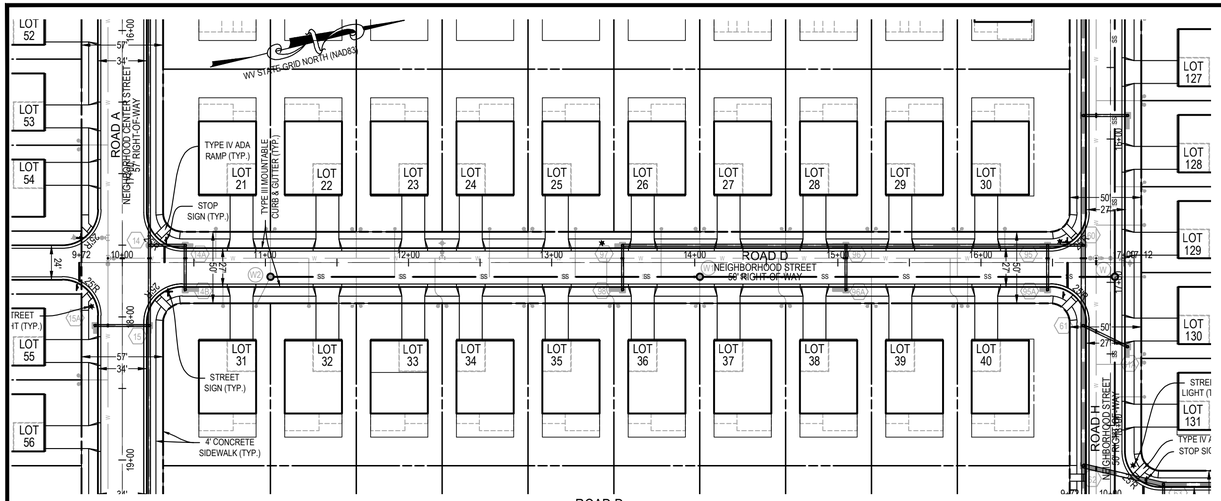
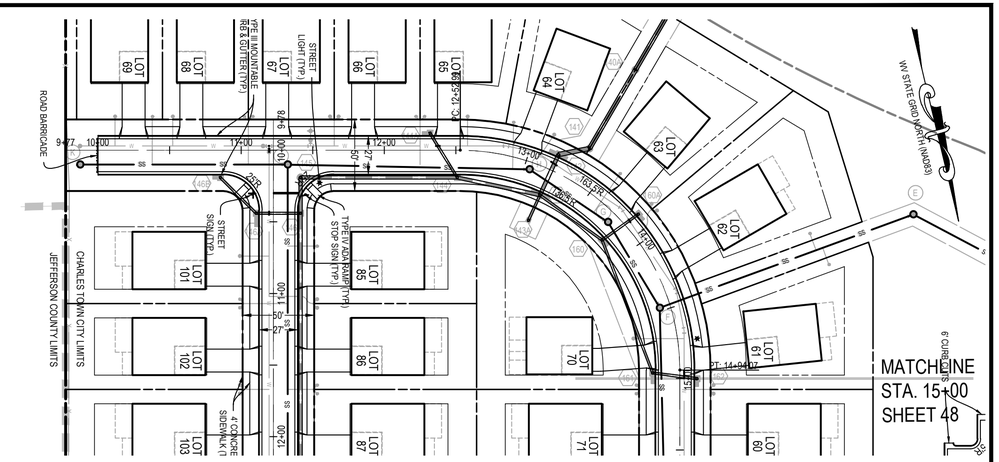
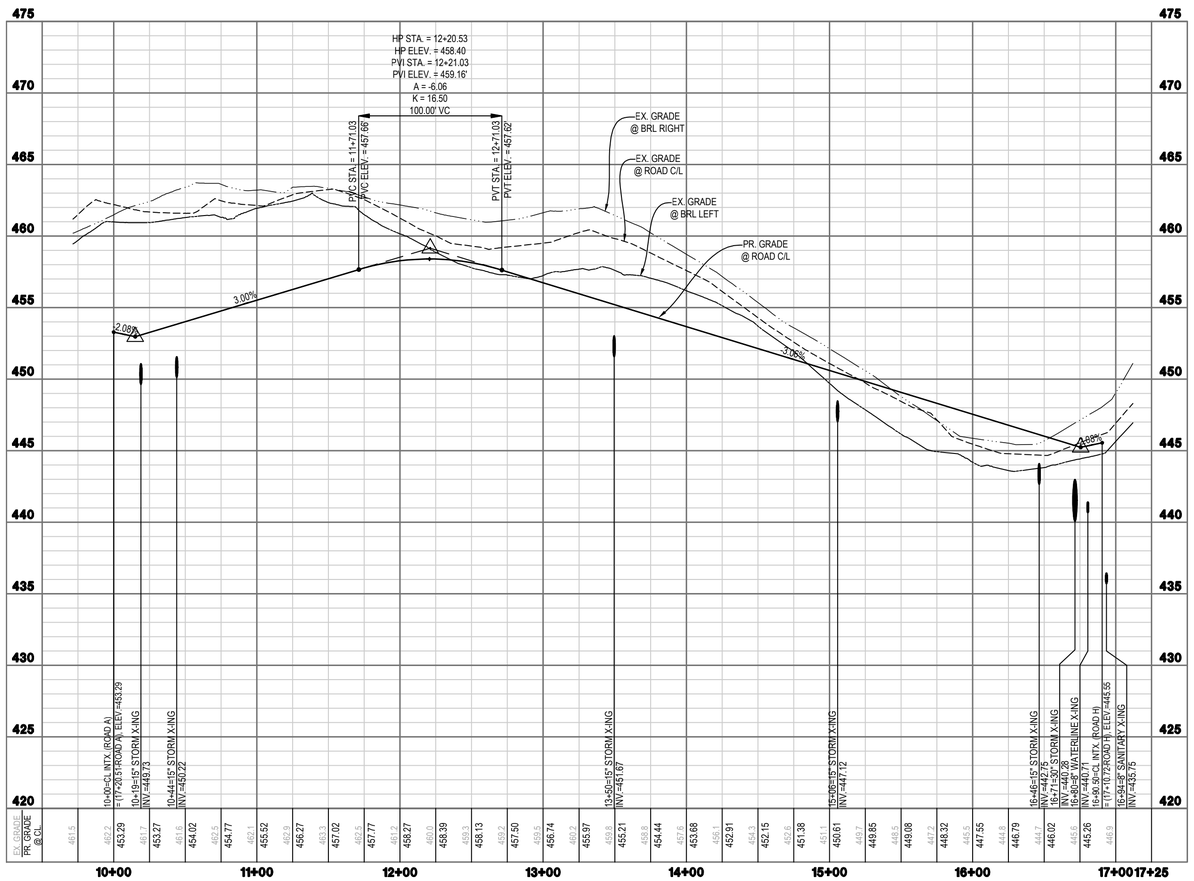
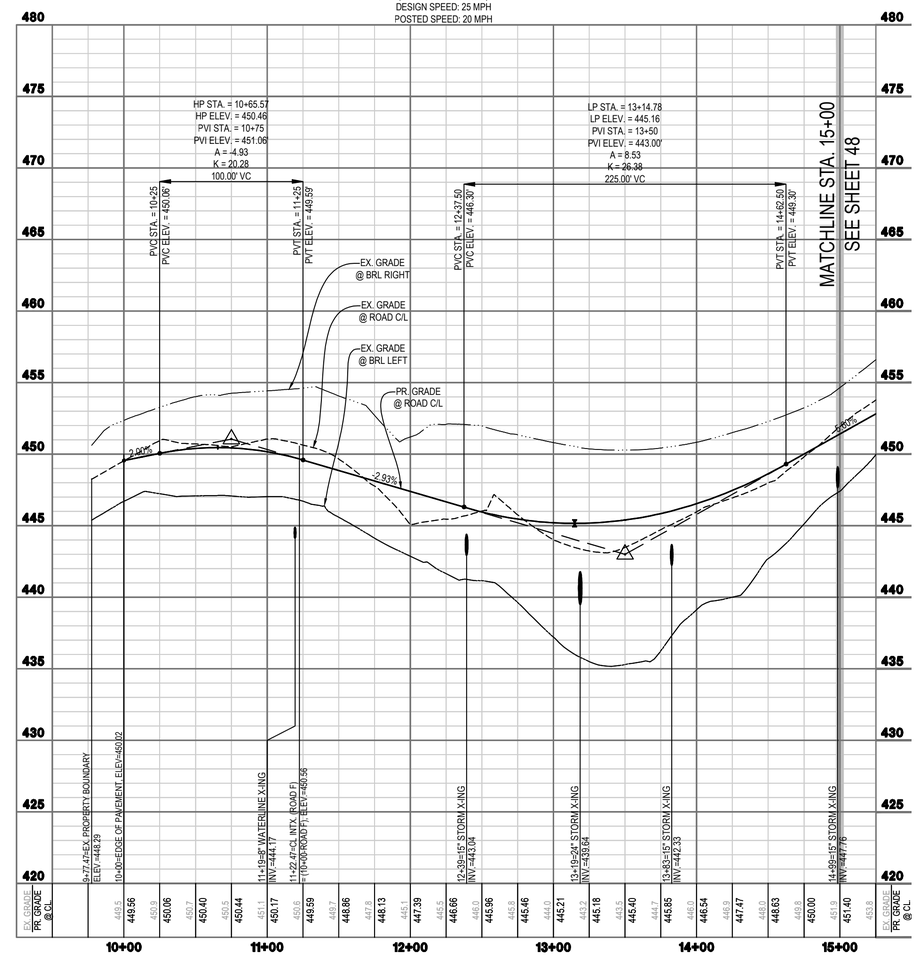


ROAD D
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH



ROAD E (STA. 10+00 - 15+00)
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH





GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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ROAD D & E PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
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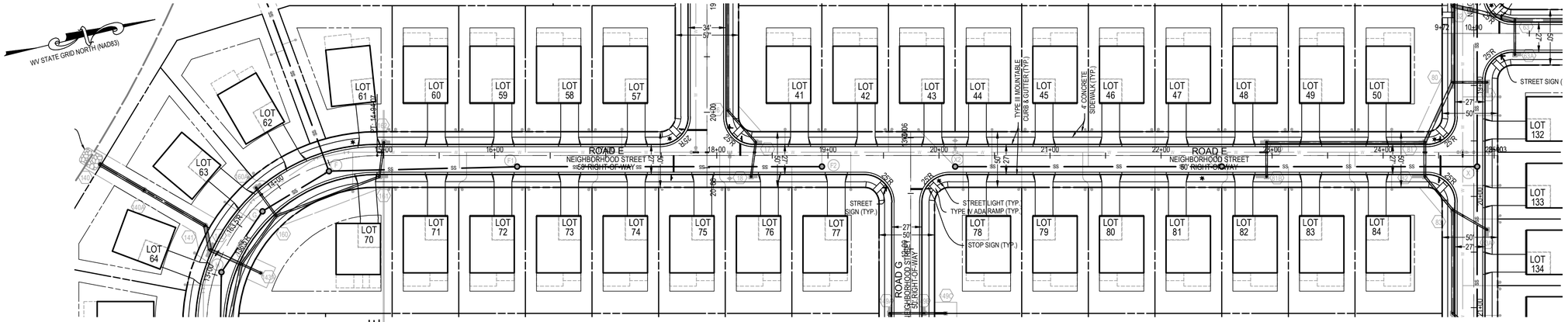
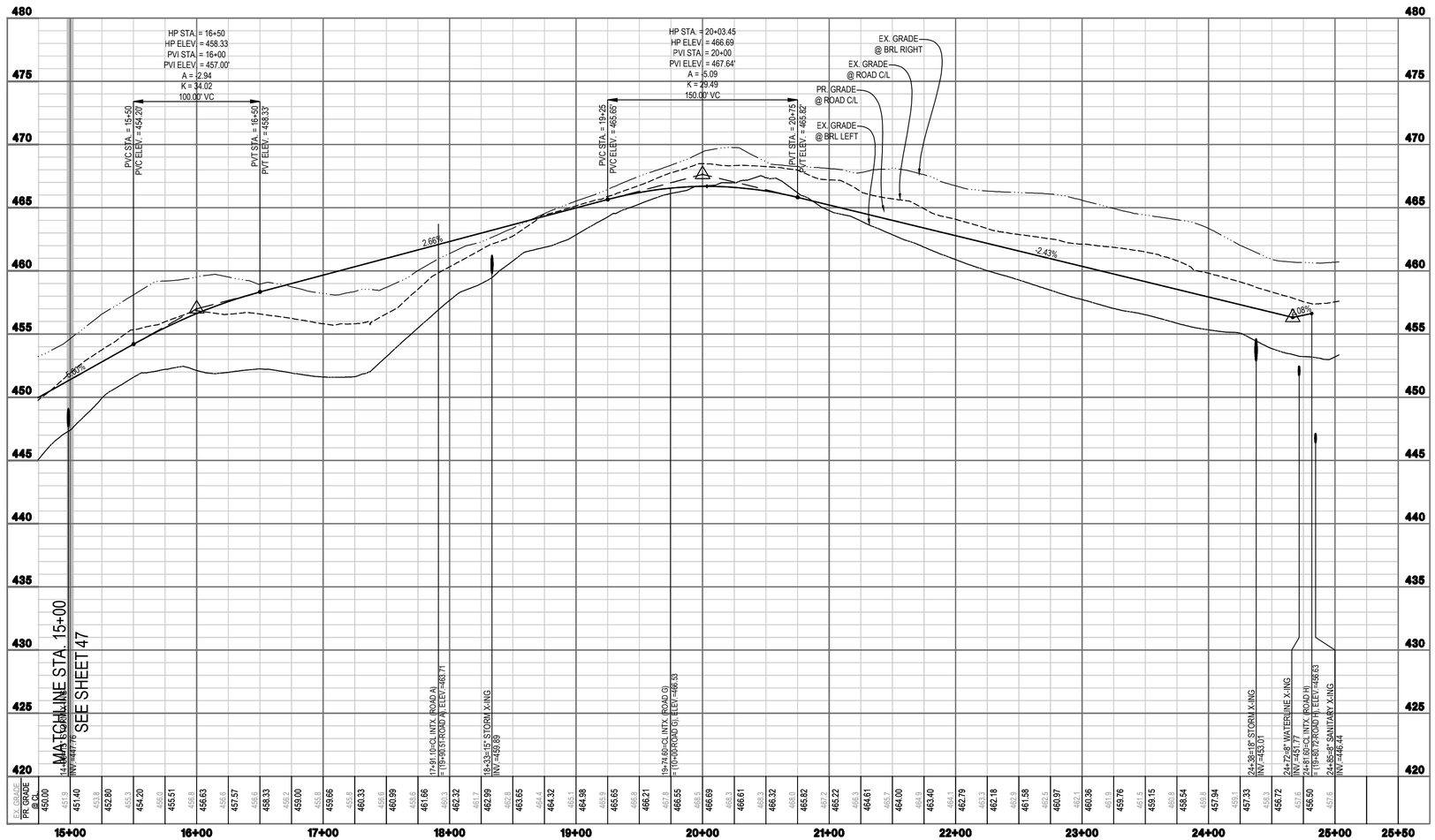
CADD: C-CT-201.DWG	
NCS:	
SHEET:	47 OF 134



ROAD E (STA. 15+00 - END)
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH



GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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ROAD E PLAN & PROFILE

STONE SPRING SUBDIVISON

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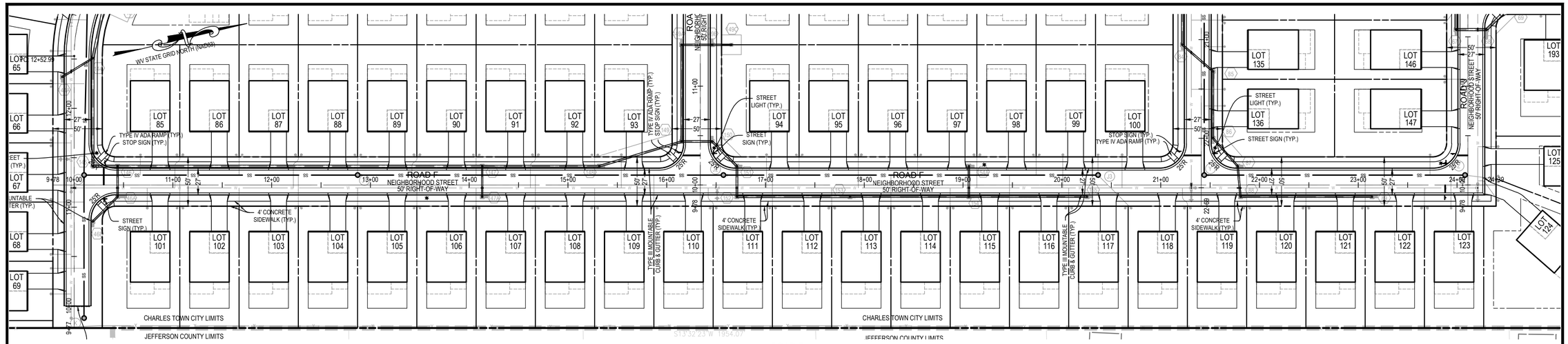
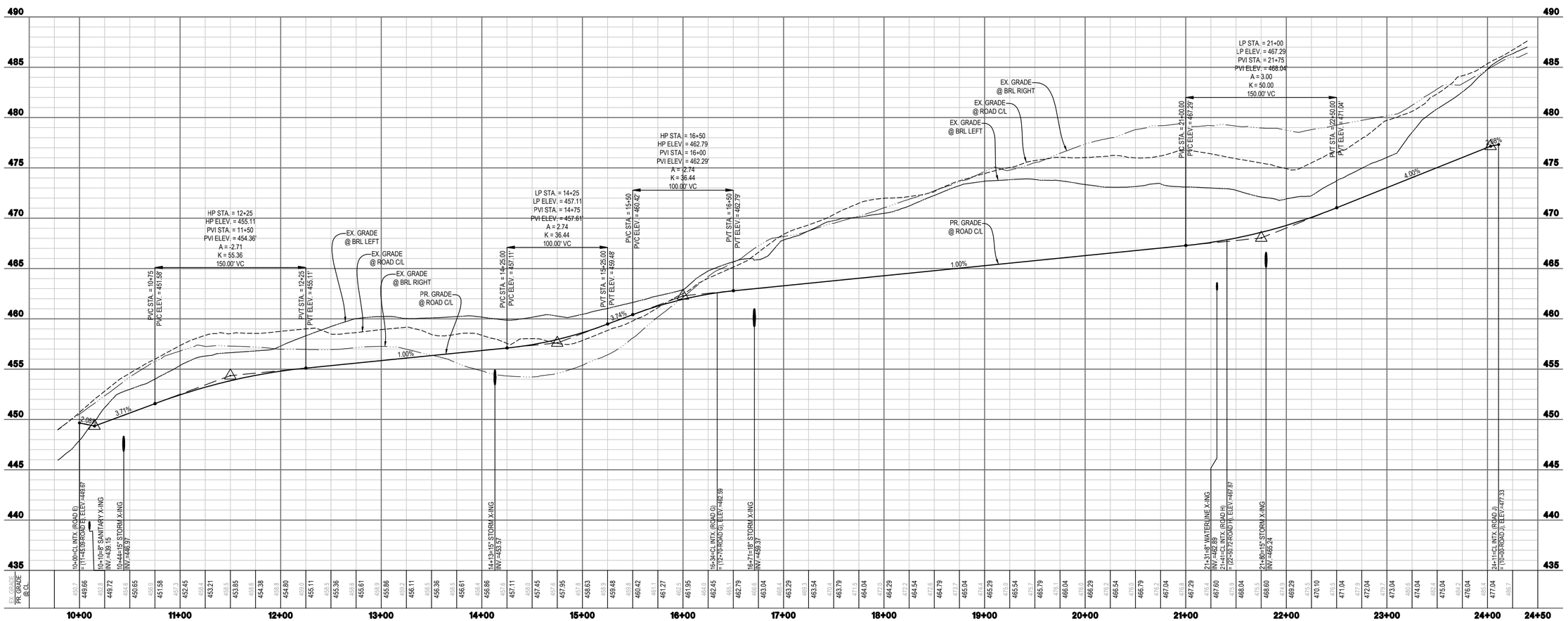
SHEET:	48 OF 134



ROAD F
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 25 MPH



GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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3-16-23

REVISIONS

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ROAD F PLAN & PROFILE

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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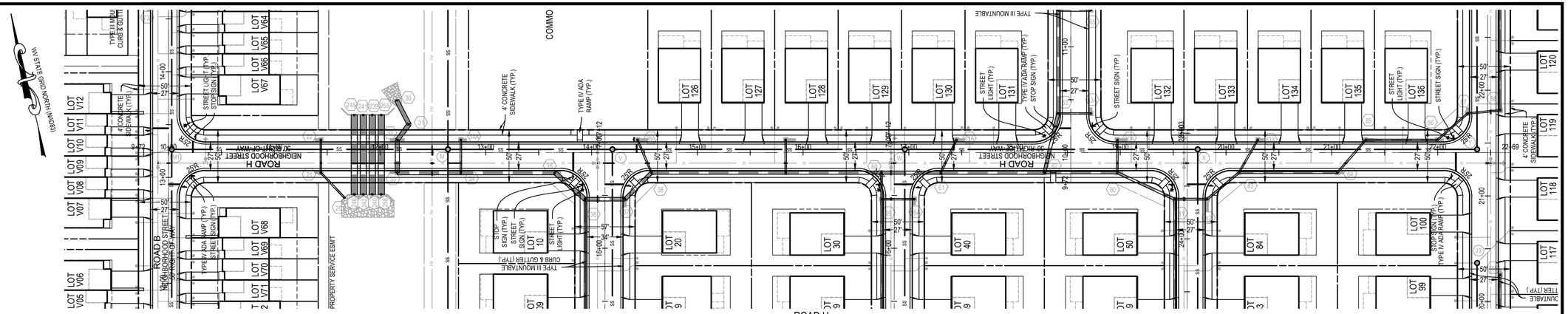
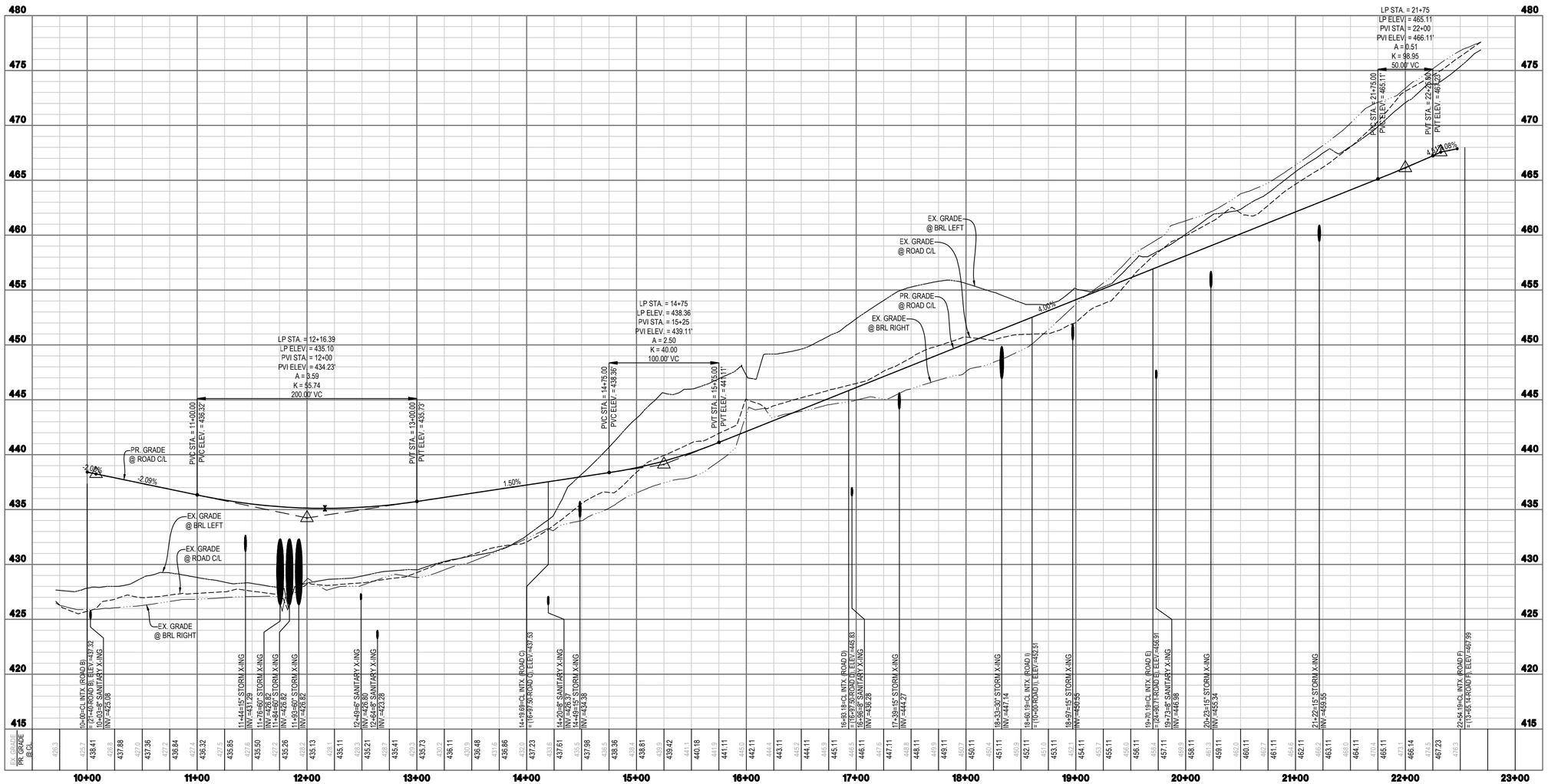
SHEET:	49 OF 134



ROAD H
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH



GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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JASON P. GERHART REGISTERED PROFESSIONAL ENGINEER NO. 19127 STATE OF WEST VIRGINIA

3-16-23

REVISIONS

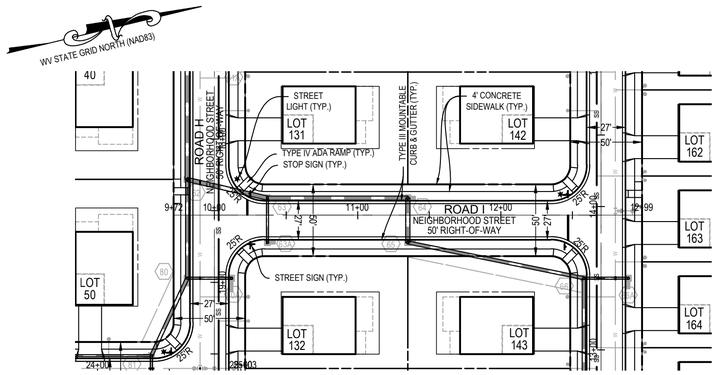
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

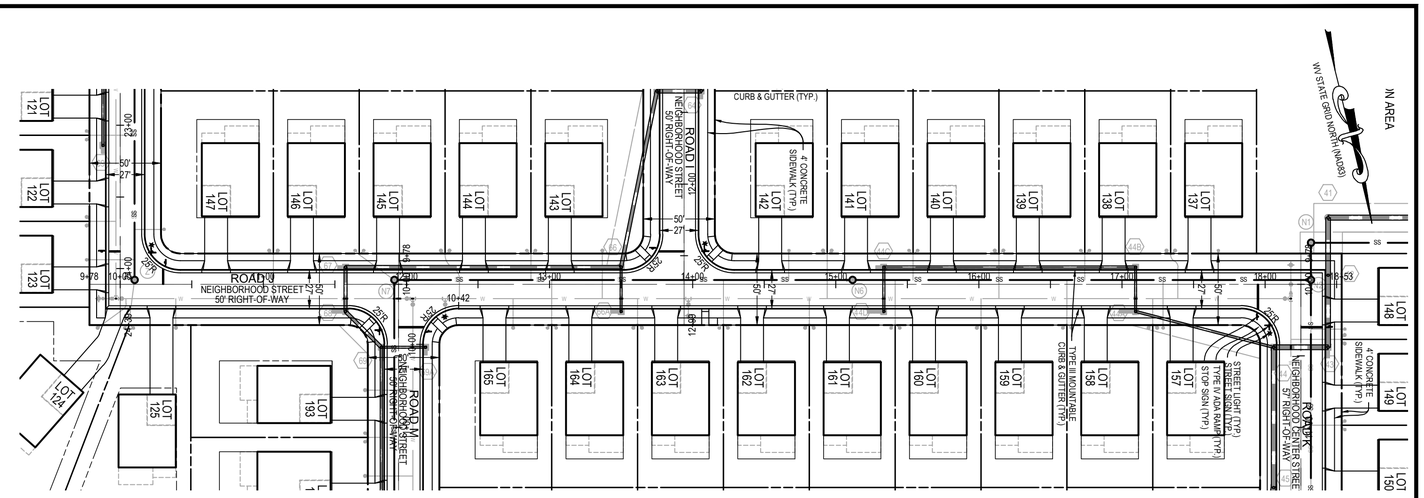
ROAD H PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

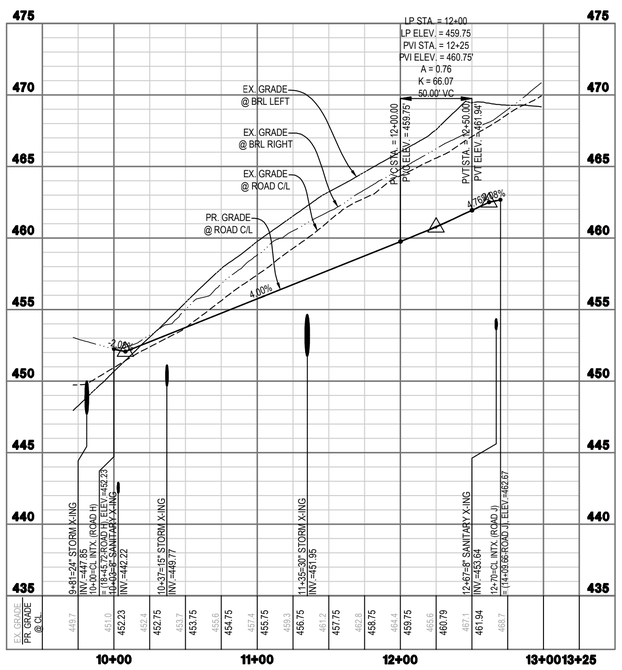
SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	50 OF 134

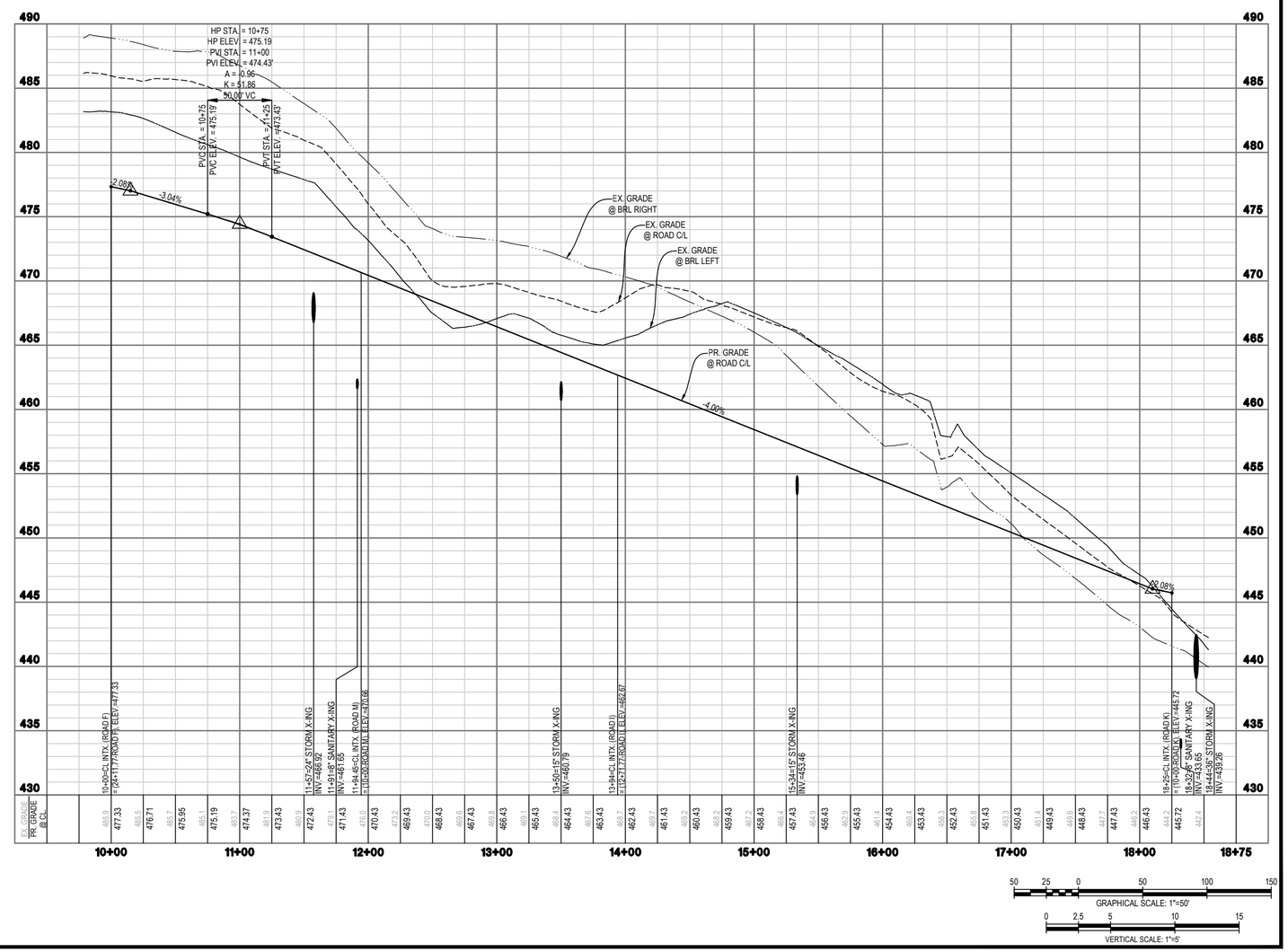




ROAD I
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH

ROAD J
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH





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JASON P. GERHARD
REGISTERED
No. 19127
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
3-16-23

REVISIONS

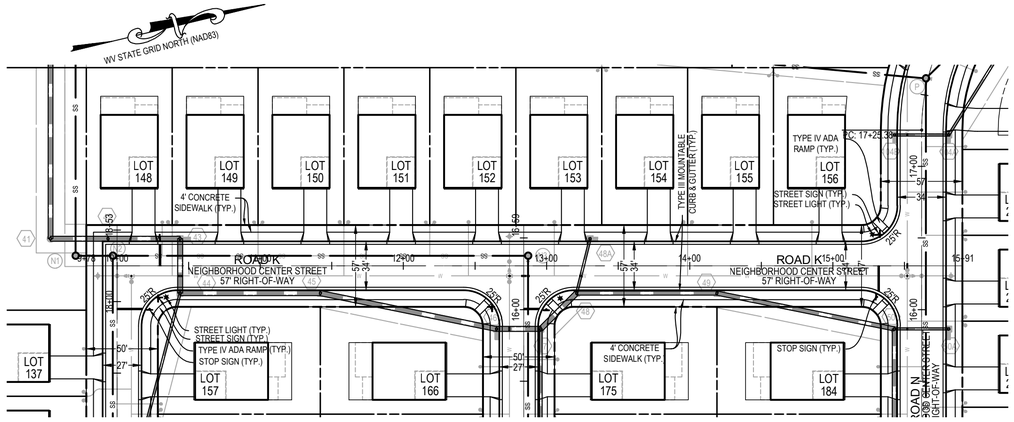
1. 03/16/2023 - WVDOH CT1B, AND CITY OF CHARLES TOWN COMMENTS

ROAD I & J PLAN & PROFILE

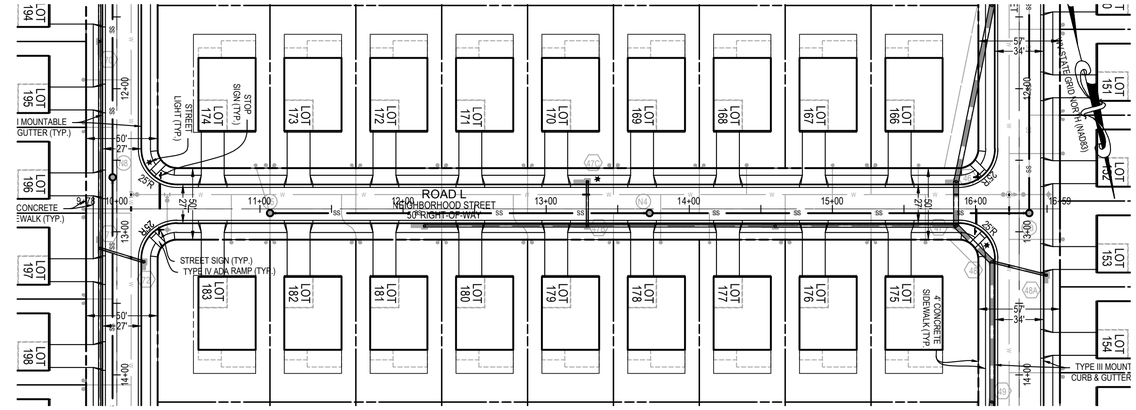
STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

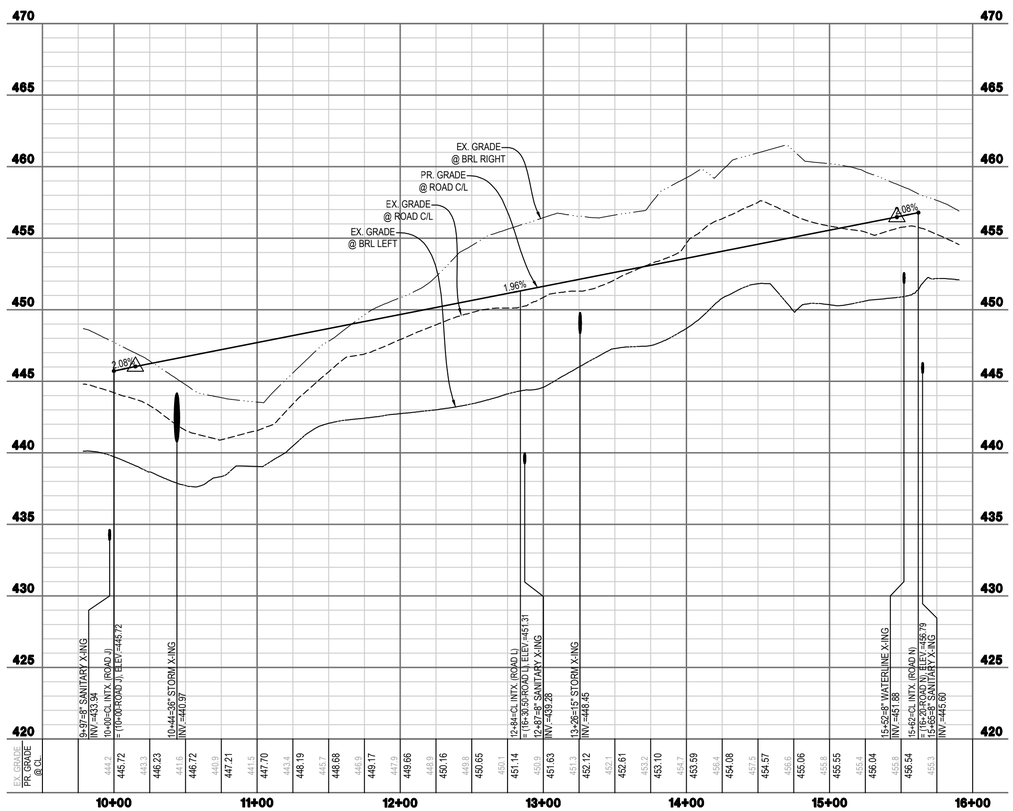
SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	51 OF 134

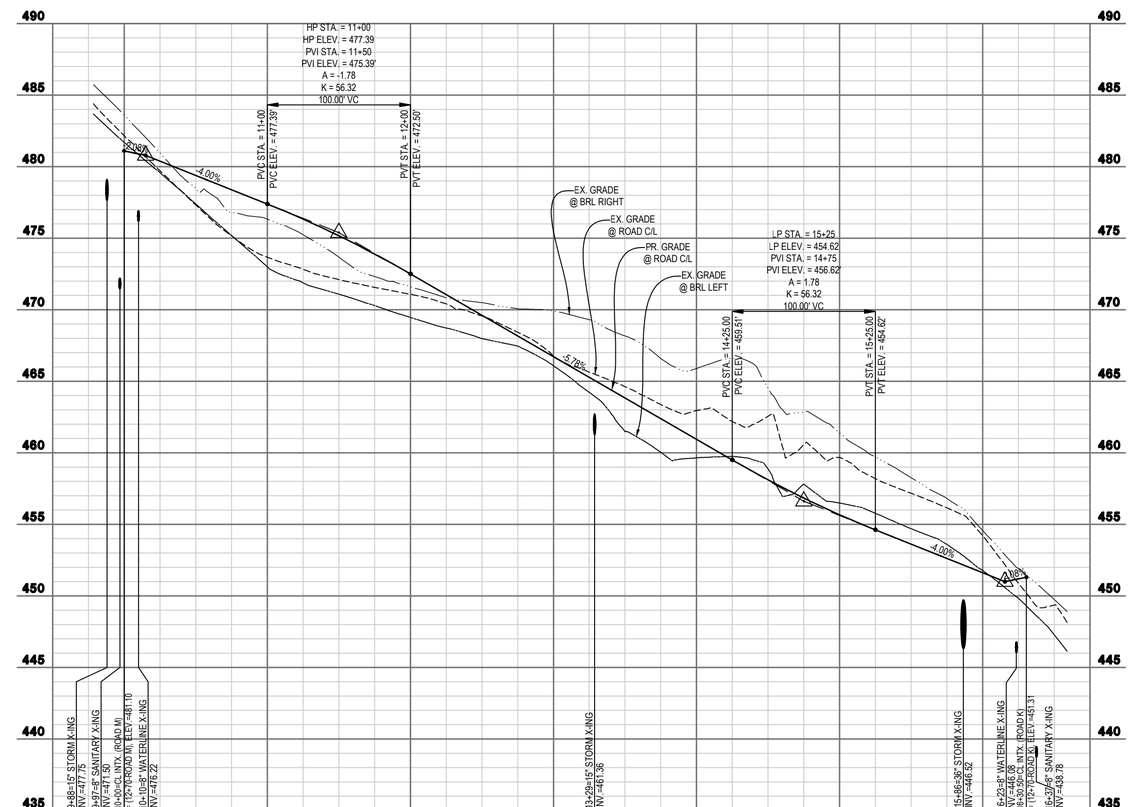


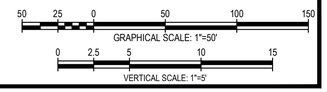
ROAD K
NEIGHBORHOOD CENTER STREET
(57 FT RIGHT-OF-WAY)
DESIGN SPEED: 30 MPH
POSTED SPEED: 25 MPH



ROAD L
NEIGHBORHOOD STREET
DESIGN SPEED: 25 MPH
POSTED SPEED: 25 MPH







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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

ROAD K & L PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	52 OF 134

FILE PATH: G:\PROJECT\CONTROL\0665\0206 FIRST TO HAMPSHIRE\ARCHIVE\C-CT-201.DWG
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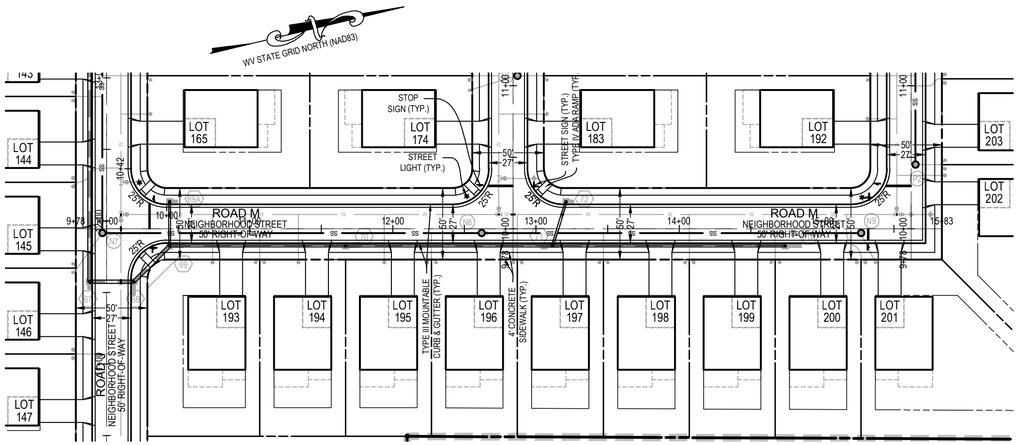
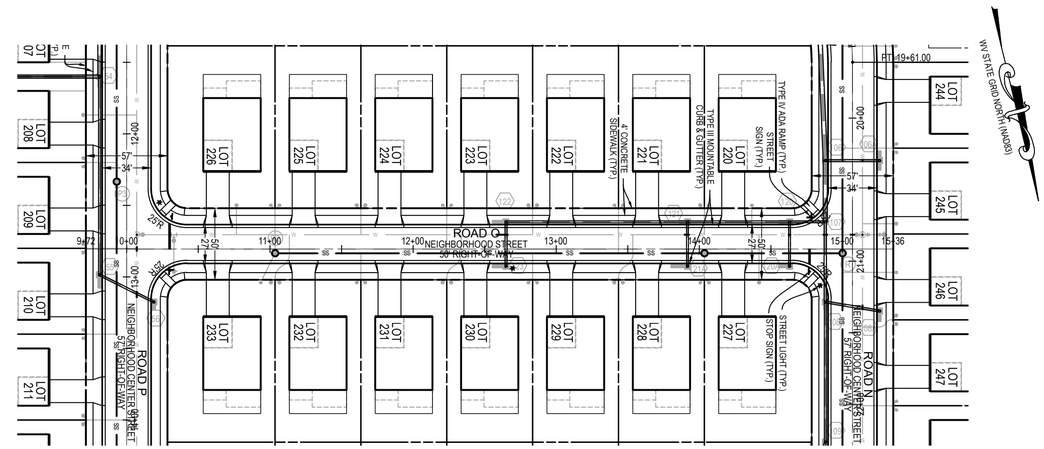
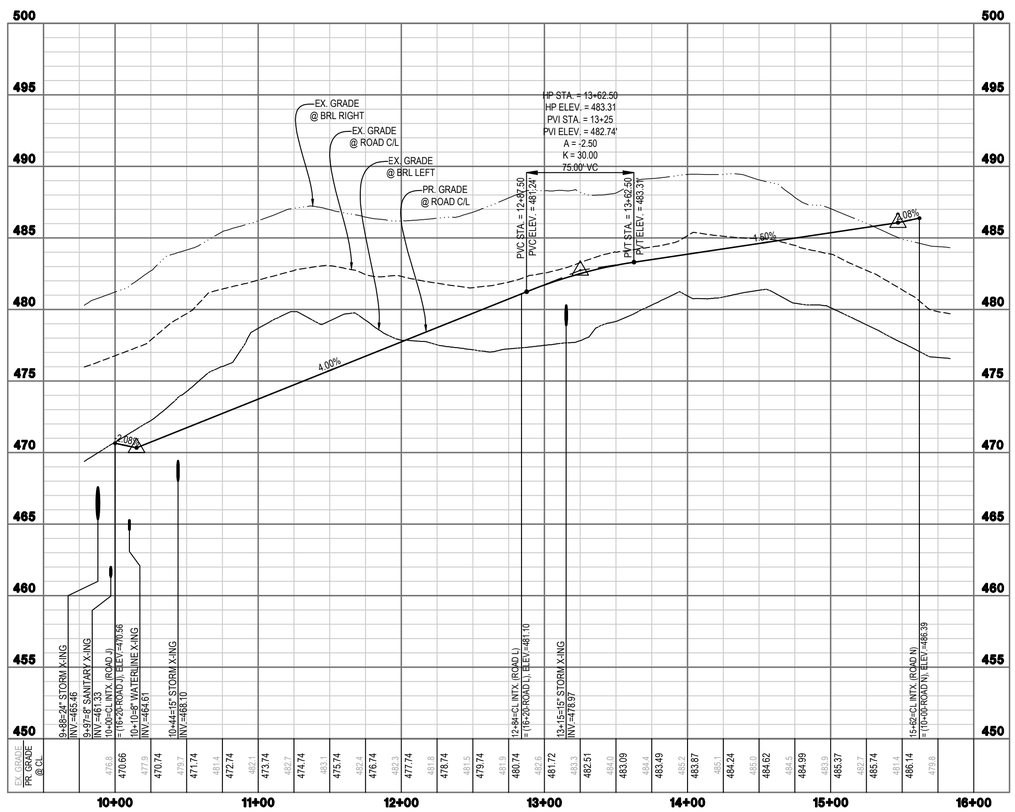
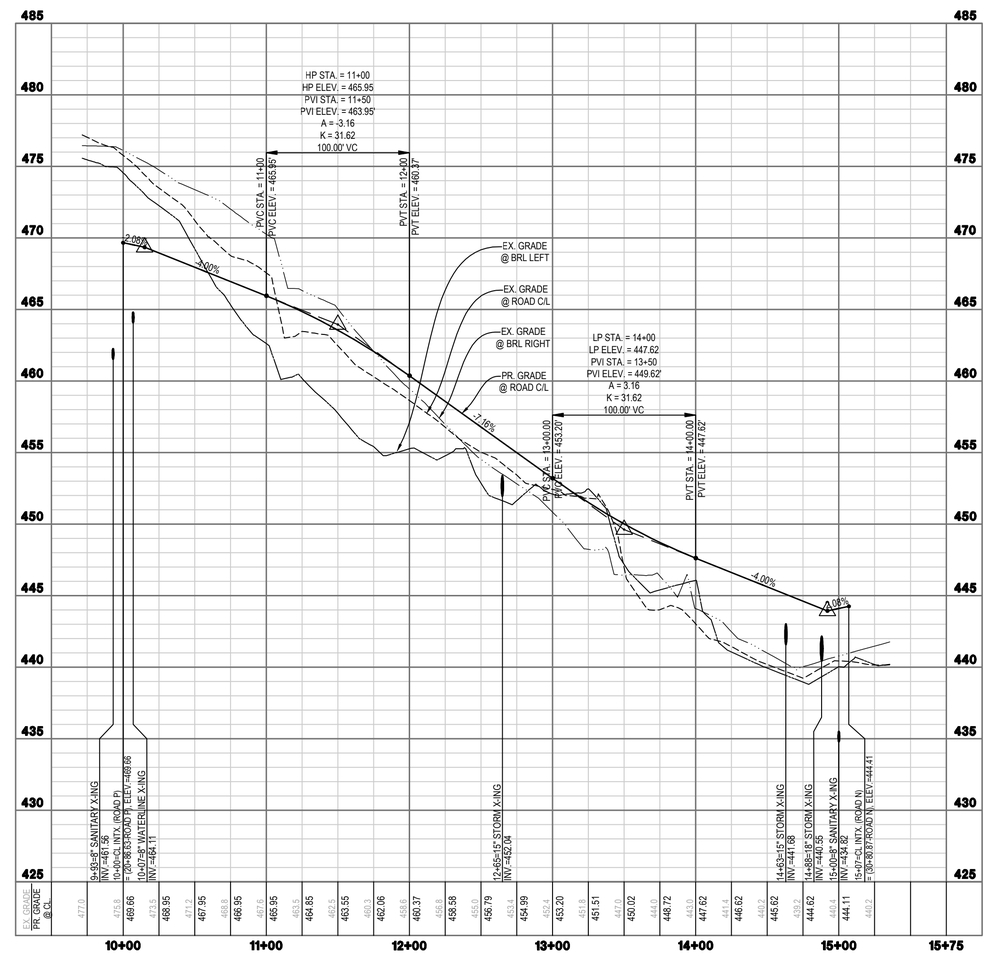


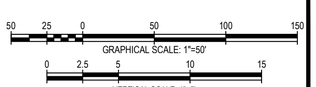
ROAD M
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH



ROAD O
NEIGHBORHOOD STREET
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH







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3-16-23

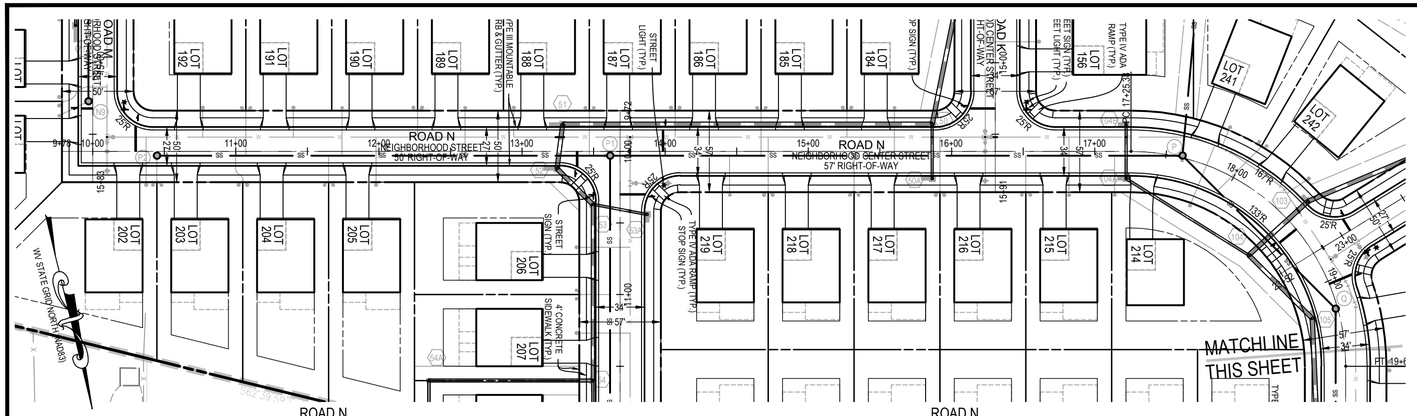
REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

ROAD M & O PLAN & PROFILE

STONE SPRING SUBDIVISON

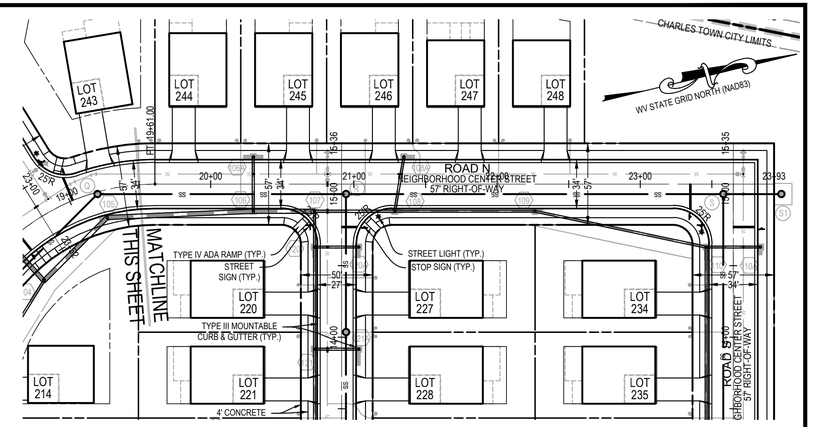
TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

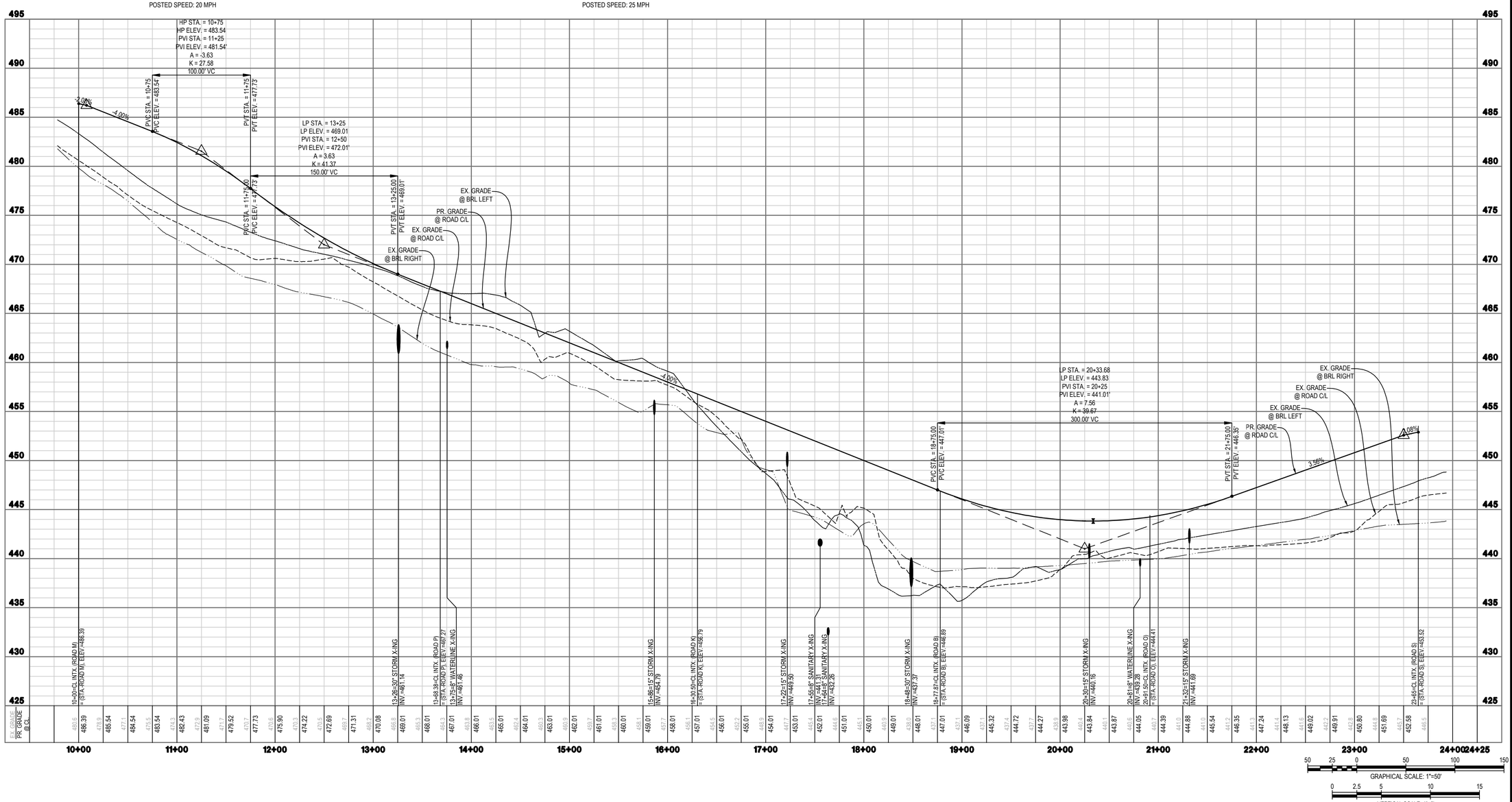
SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	53 OF 134



ROAD N
NEIGHBORHOOD STREET
STA 10+00 TO 13+68.38
(50 FT RIGHT-OF-WAY)
DESIGN SPEED: 25 MPH
POSTED SPEED: 20 MPH

ROAD N
NEIGHBORHOOD CENTER STREET
STA 13+68.38 TO 23+65.00
(57 FT RIGHT-OF-WAY)
DESIGN SPEED: 30 MPH
POSTED SPEED: 25 MPH





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3-16-23

REVISIONS

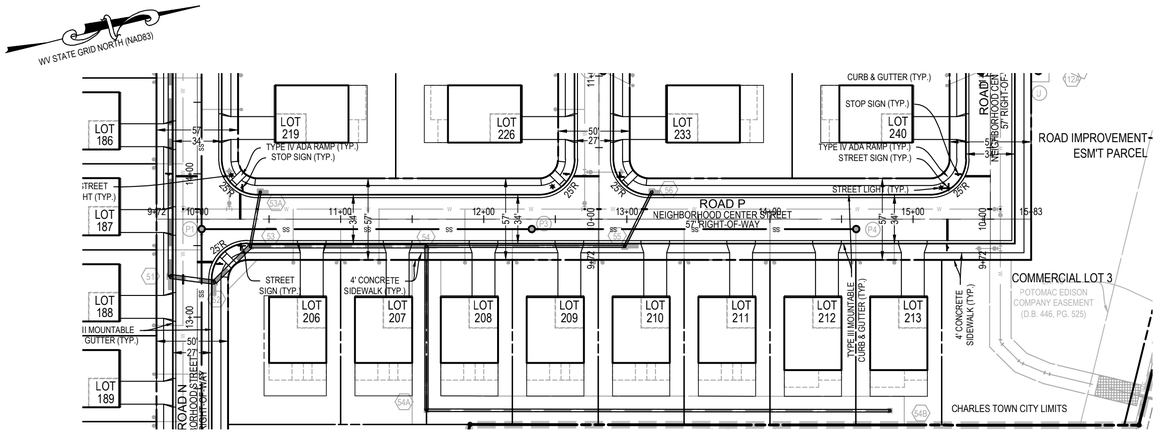
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

ROAD N PLAN & PROFILE

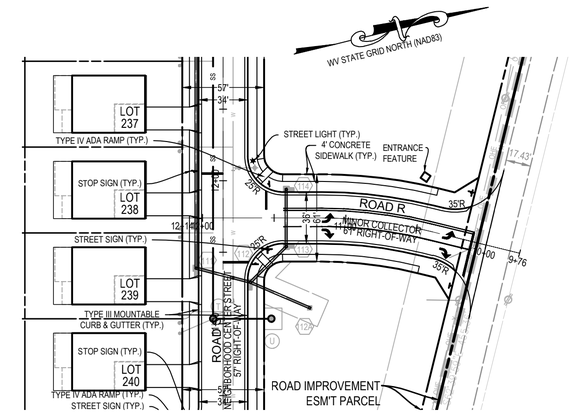
STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

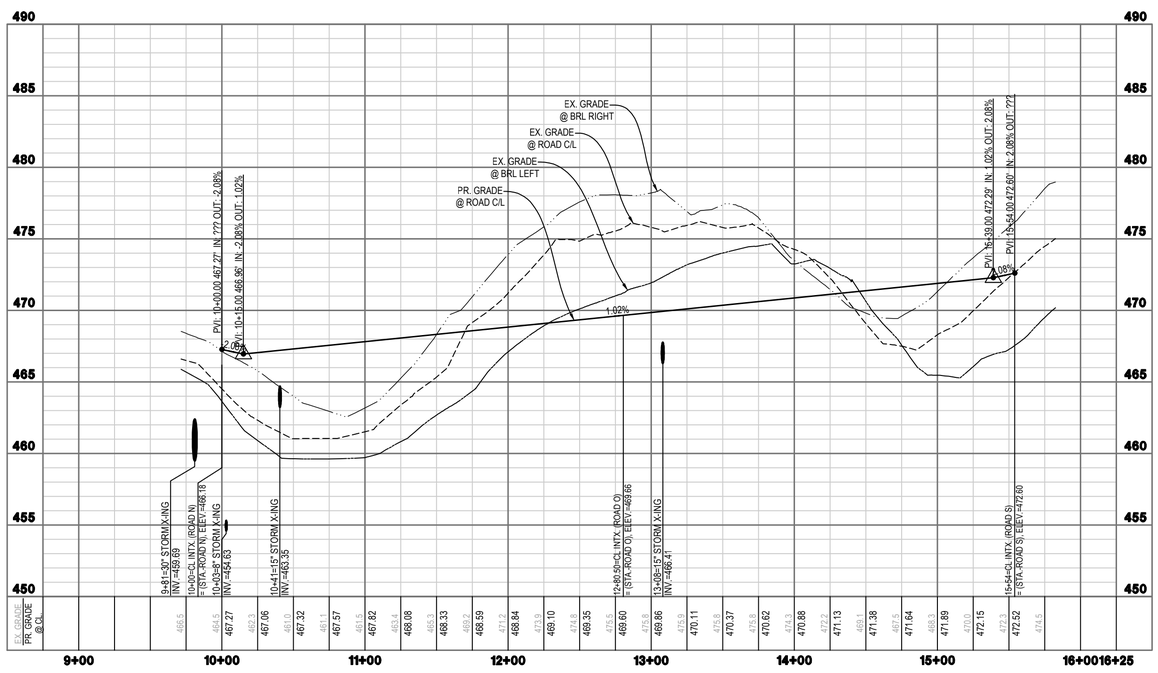
SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	54 OF 134

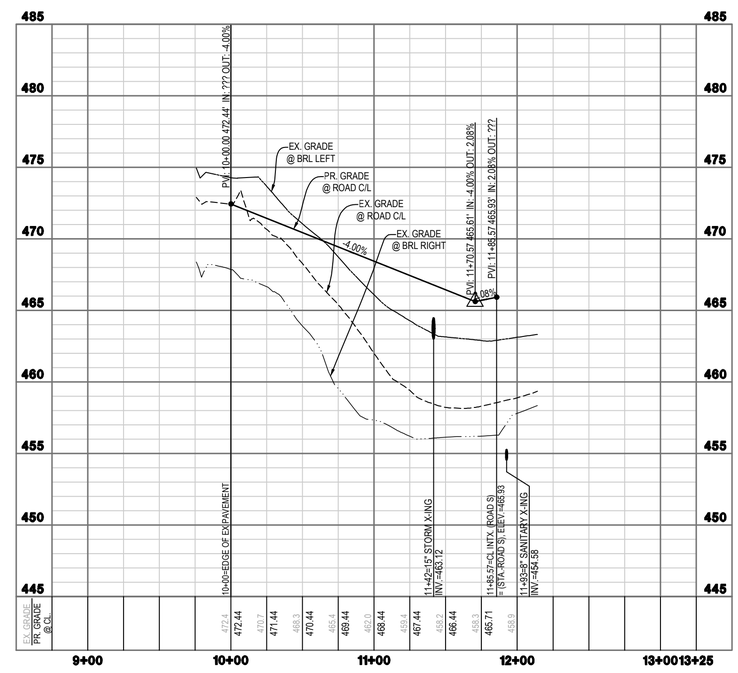


ROAD P
NEIGHBORHOOD CENTER STREET
(57 FT RIGHT-OF-WAY)
DESIGN SPEED: 30 MPH
POSTED SPEED: 25 MPH



ROAD R
MINOR COLLECTOR
(61 FT RIGHT-OF-WAY)
DESIGN SPEED: 35 MPH
POSTED SPEED: 25 MPH





GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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3-16-23

REVISIONS

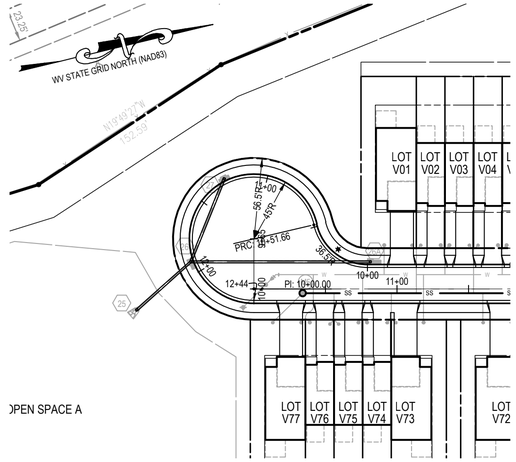
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

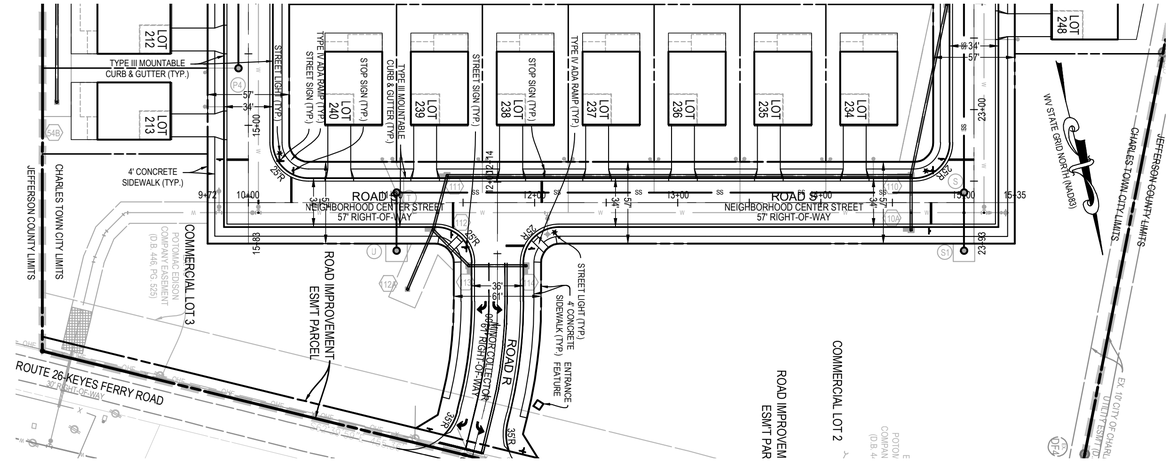
ROAD P & R PLAN & PROFILE

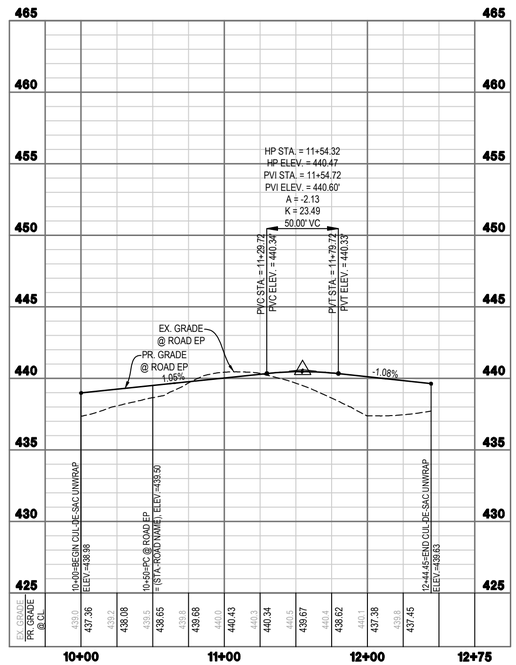
STONE SPRING SUBDIVISON

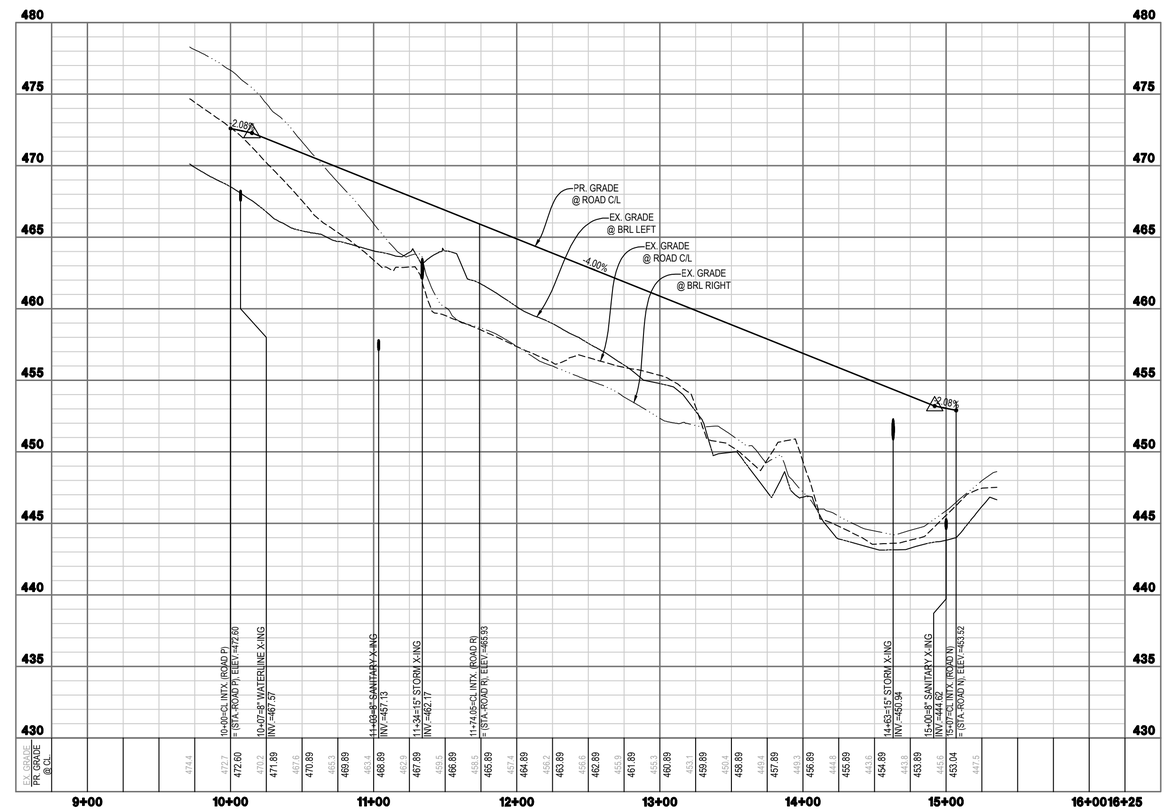
TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	55 OF 134









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PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

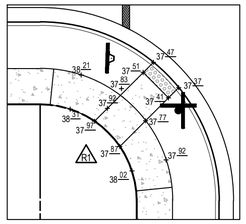
ROAD S PLAN & PROFILE

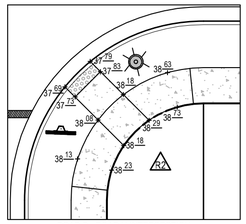
STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-201.DWG	
NCS:	
SHEET:	56 OF 134

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'
0 2.5 5 10 15
VERTICAL SCALE: 1"=5'


ROAD B - ROAD H INTERSECTION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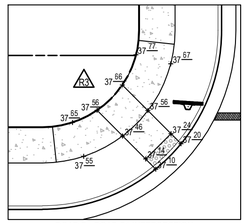
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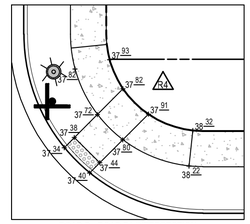
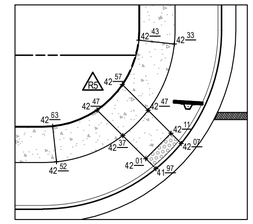
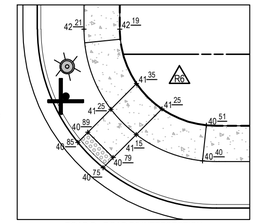
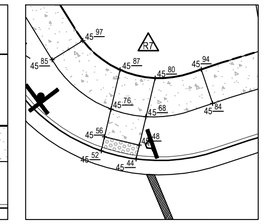
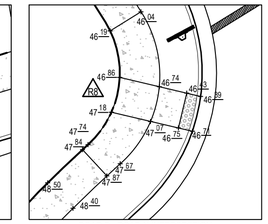

ROAD B - ROAD B1 INTERSECTION


ROAD B - ROAD B2 INTERSECTION


ROAD B - ROAD B2 INTERSECTION


ROAD B - ROAD N INTERSECTION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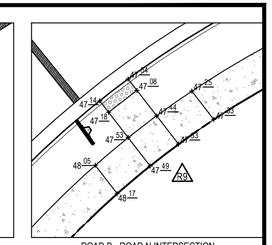
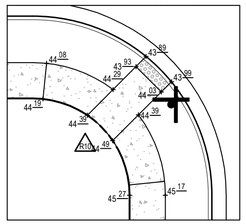
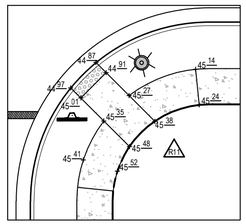
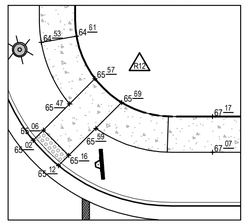
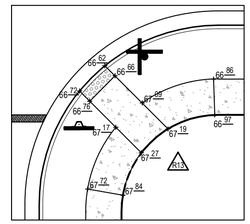

ROAD B - ROAD N INTERSECTION


ROAD N - ROAD O INTERSECTION


ROAD N - ROAD O INTERSECTION


ROAD R - ROAD S INTERSECTION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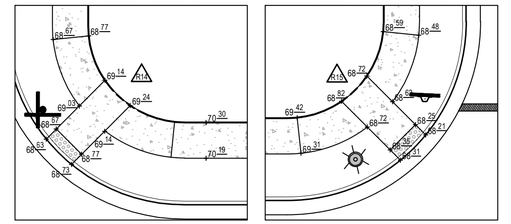
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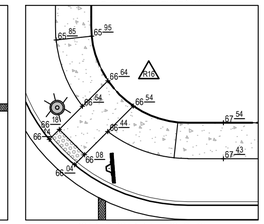
ROAD O - ROAD P INTERSECTION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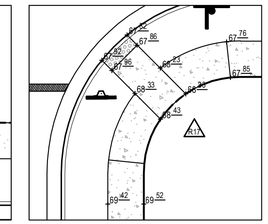
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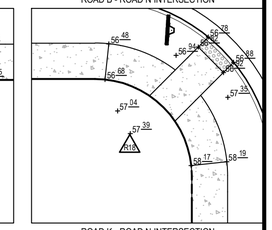
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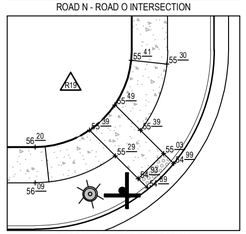
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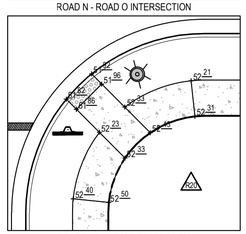
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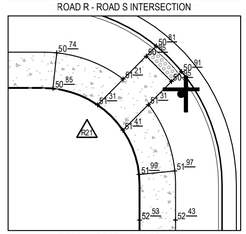
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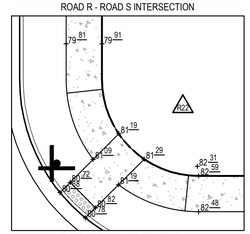
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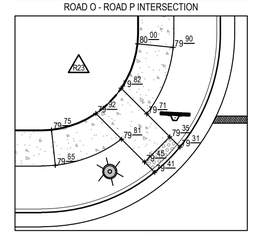
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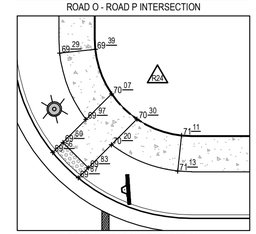
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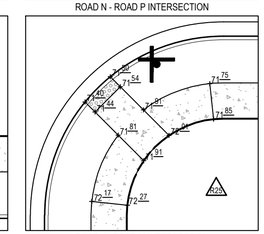
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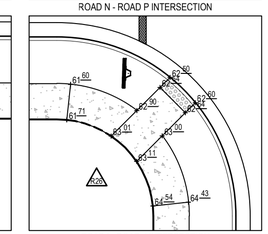
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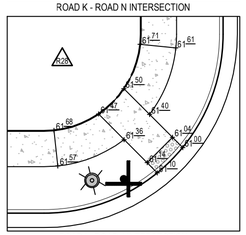
ROAD I - ROAD J INTERSECTION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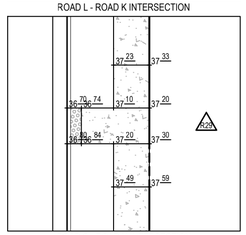
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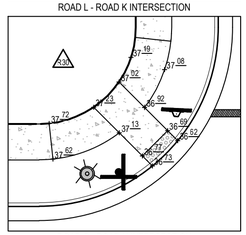
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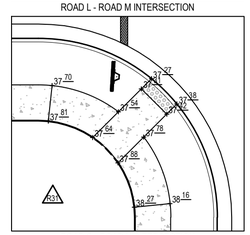
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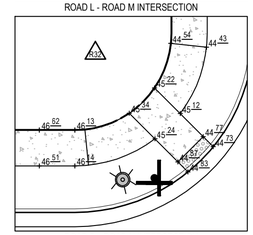
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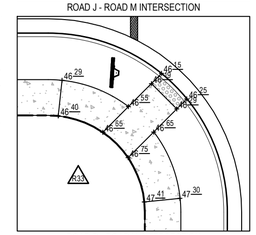
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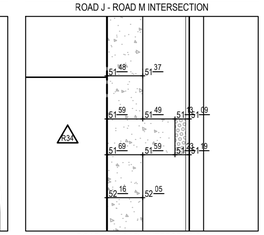
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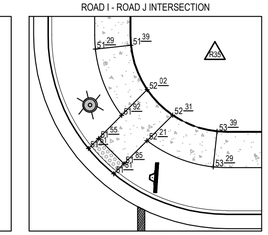
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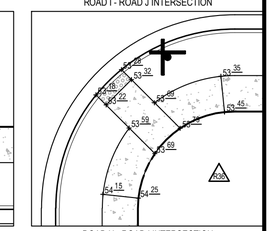
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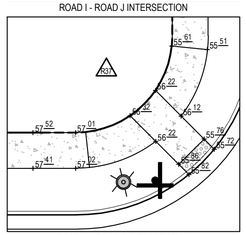
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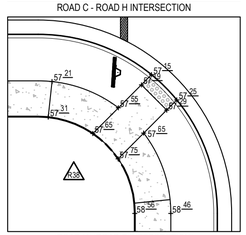
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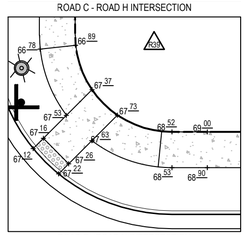
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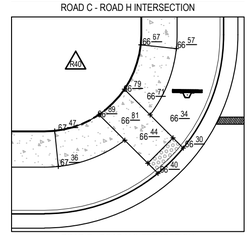
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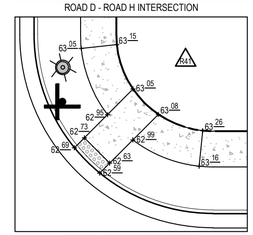
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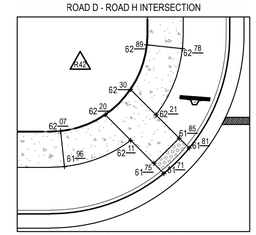
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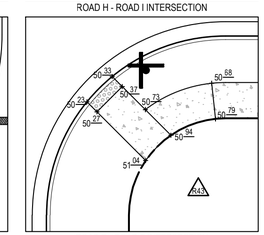
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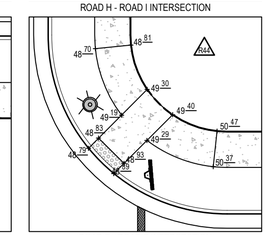
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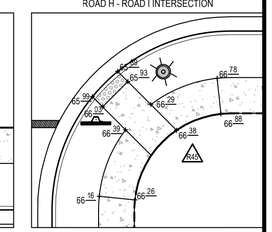
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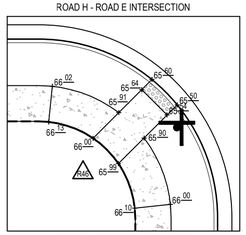
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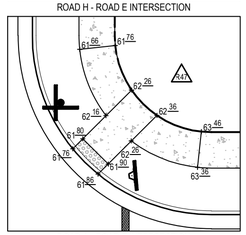
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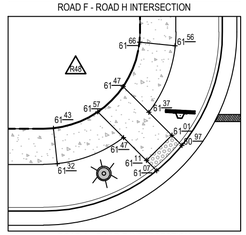
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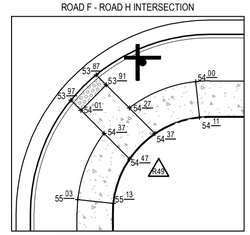
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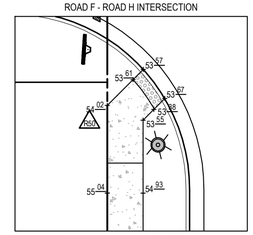
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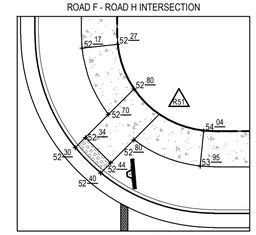
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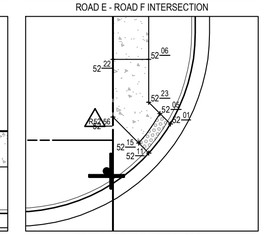
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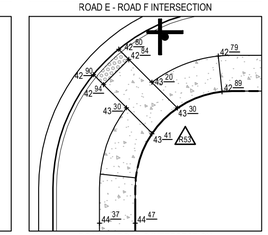
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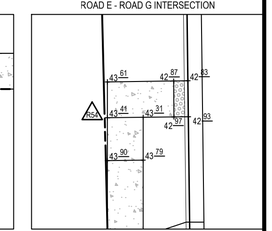
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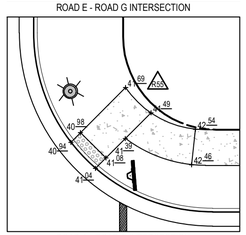
ROAD A - ROAD C INTERSECTION

WV STATE GRID NORTH (NAD83)

10 5 0 10 20 30

GRAPHICAL SCALE: 1"=10'

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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

CURB RAMP GRADING

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-204.DWG	
NCS:	
SHEET:	57 OF 134

FILE PATH: S:\PROJECTS\GENERAL CONSULTING\2665-0206 CITY OF CHARLES TOWN\DRAWINGS\CONSTRUCTION\C-CT-204.DWG
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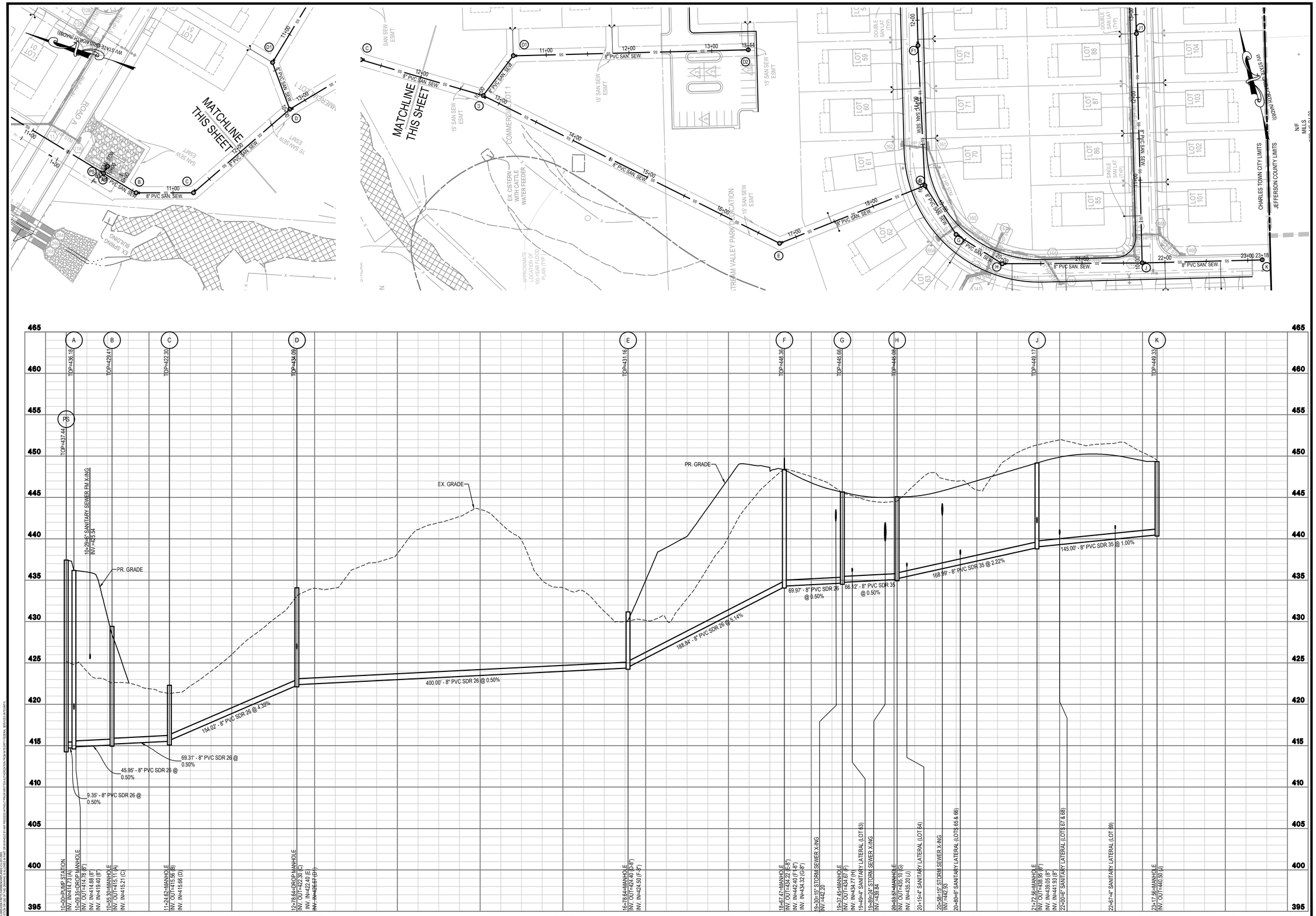

SAN A-K PROFILE

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JASON P. GERHART REGISTERED NO. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SANITARY SEWER PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-201.DWG	
NCS:	
SHEET:	58 OF 134

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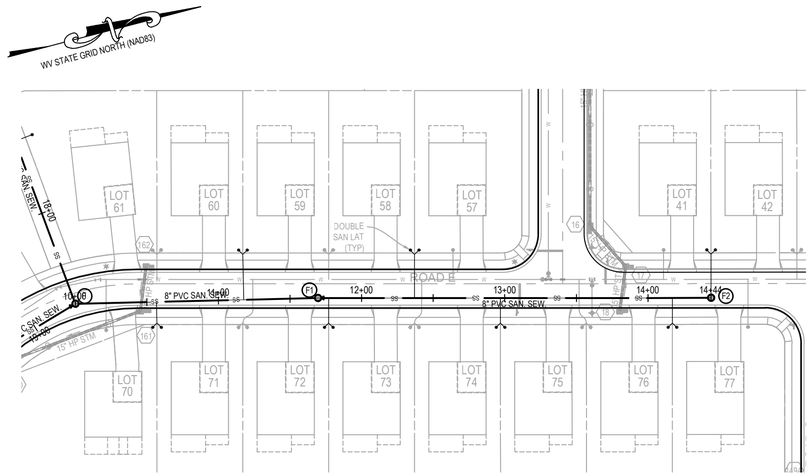
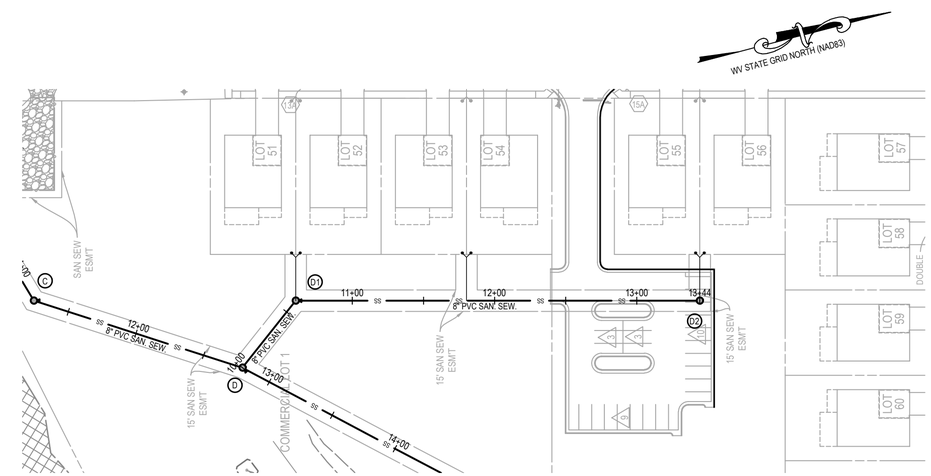
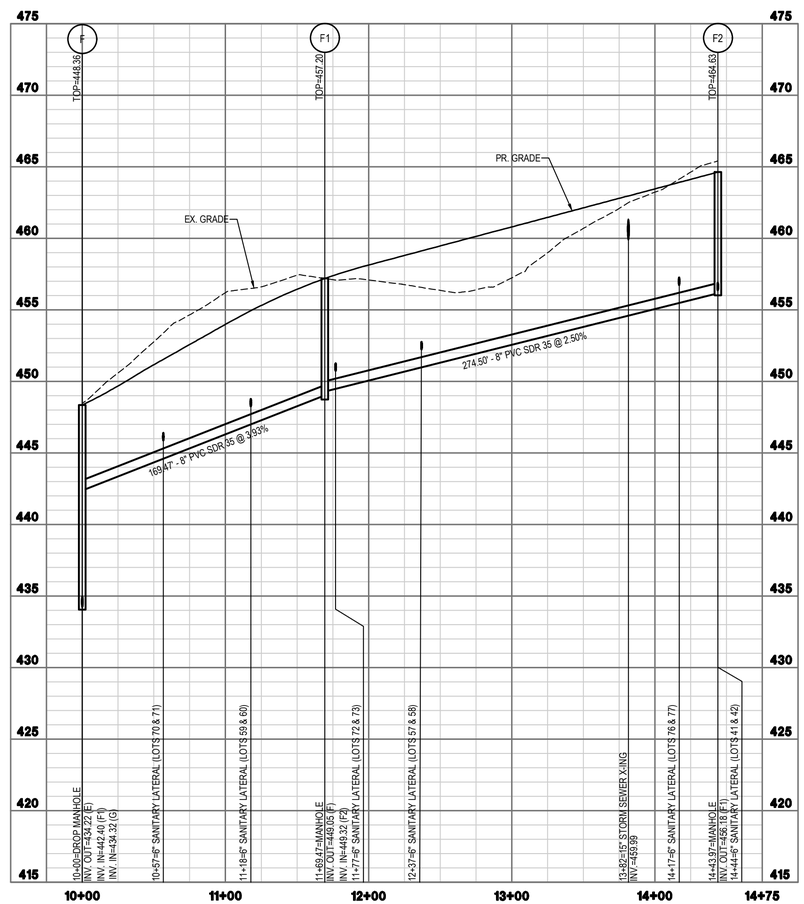
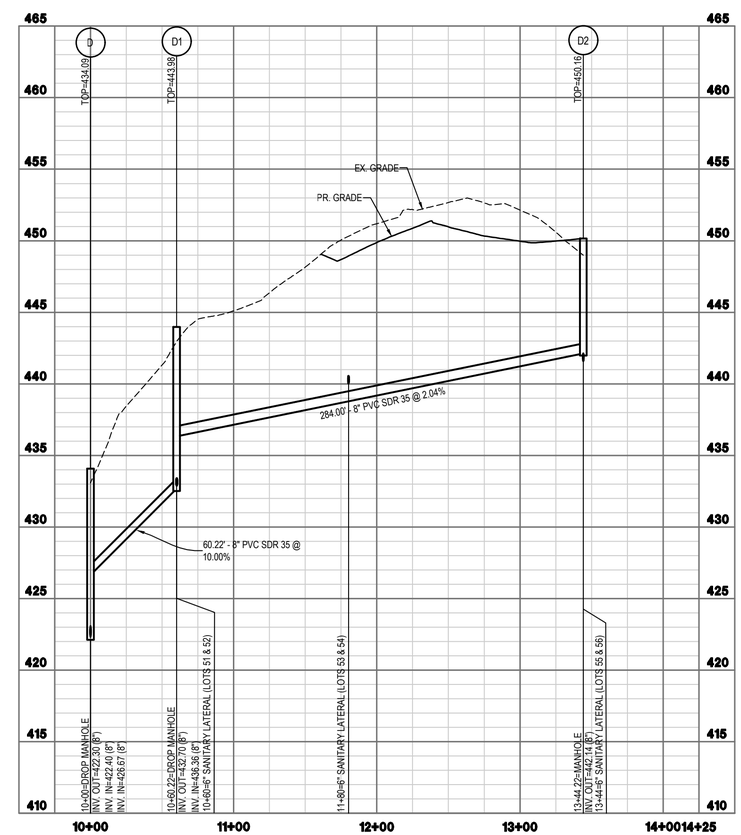






SAN F-F2 PROFILE



SAN D-D1 PROFILE

0 2.5 5 10 15 — VERTICAL SCALE: 1"=5'

50 25 0 50 100 150 — GRAPHICAL SCALE: 1"=50'

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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SANITARY SEWER PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-201.DWG	
NCS:	
SHEET:	59 OF 134

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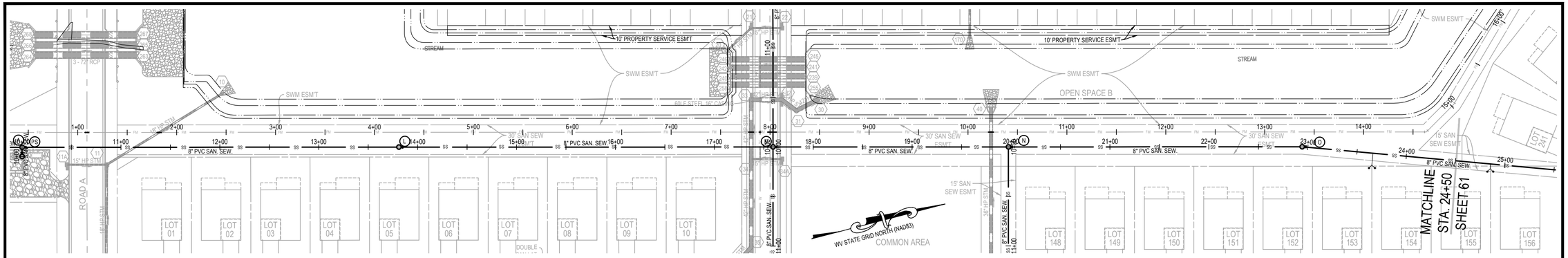

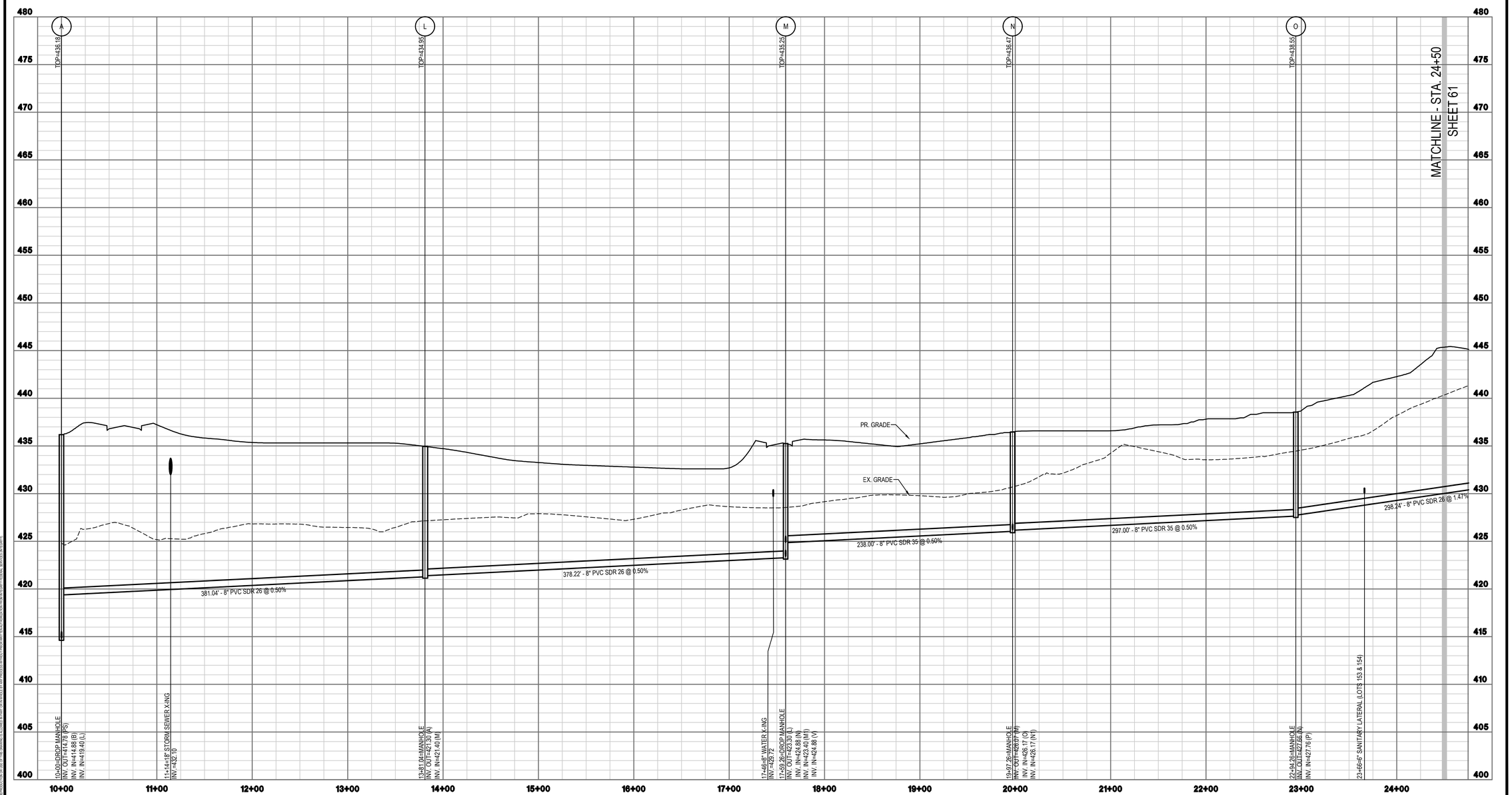

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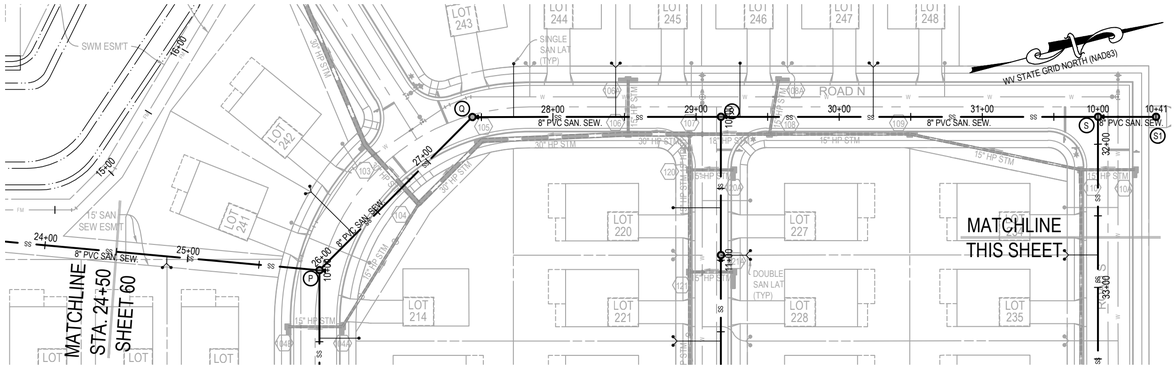

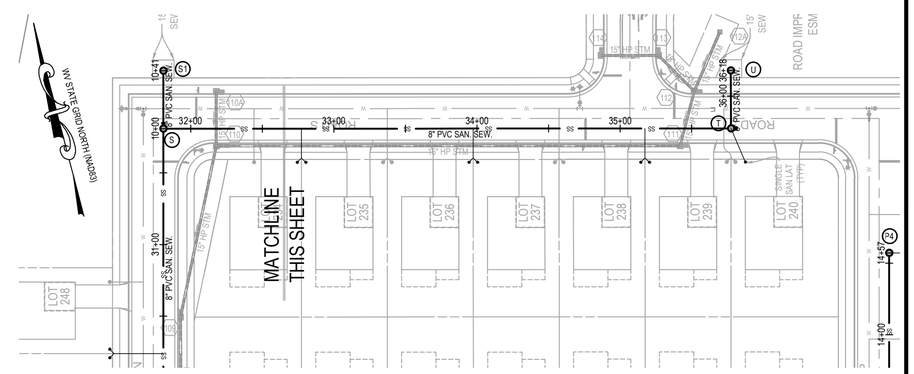

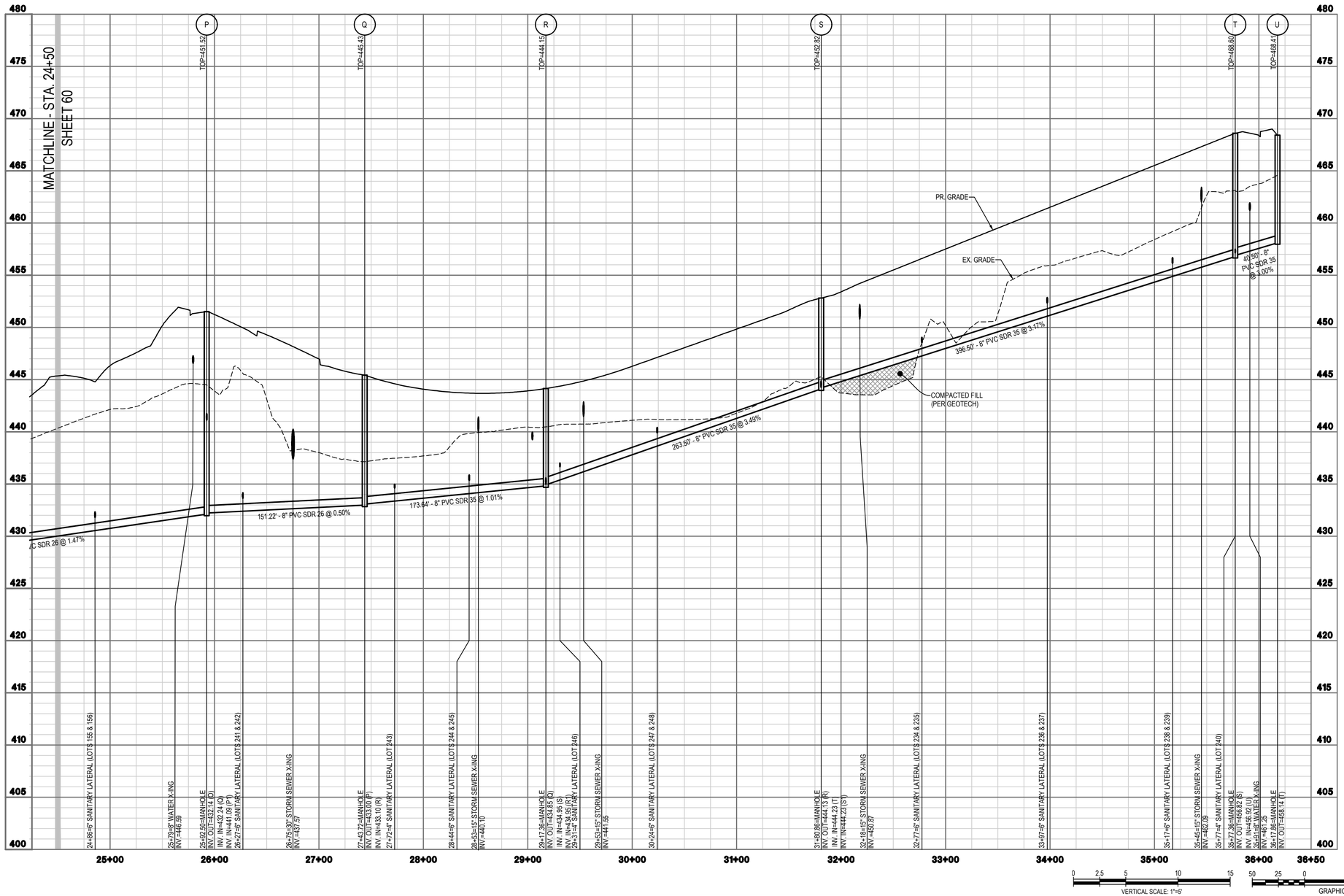

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STONE SPRING SUBDIVISON

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SHEET:	61 OF 134

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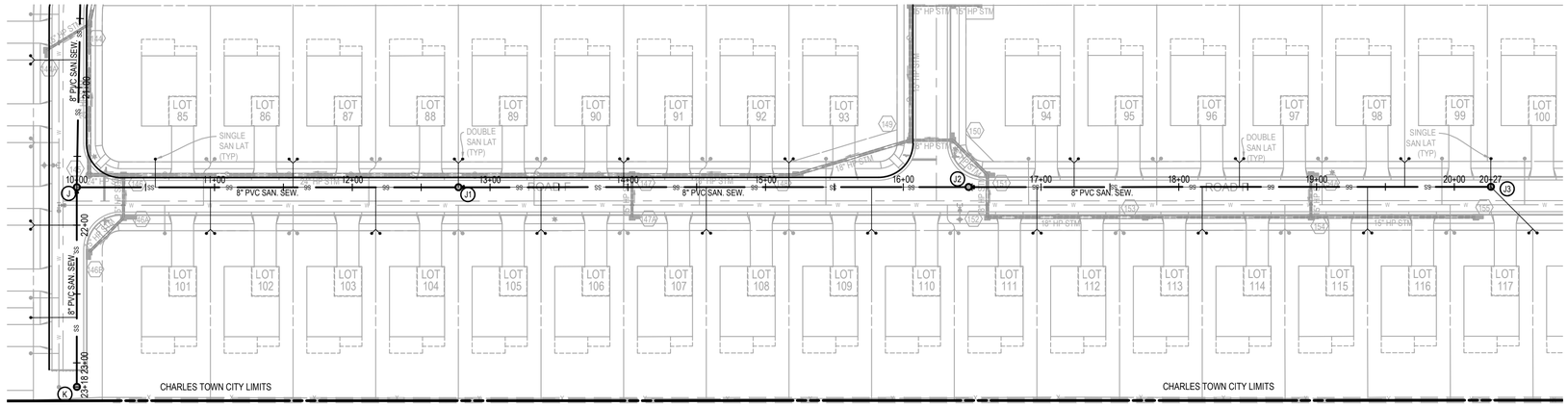

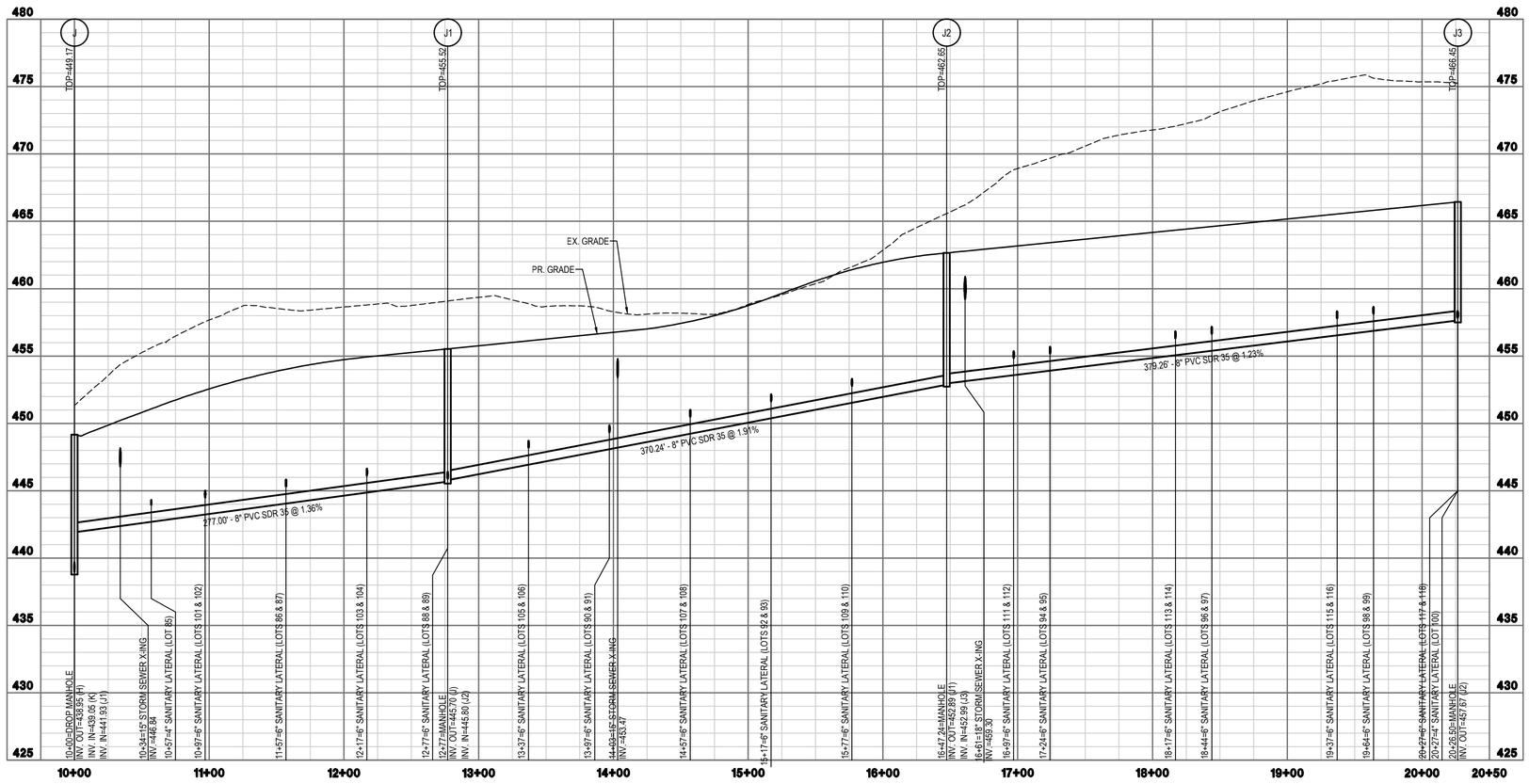

SAN J-J3 PROFILE

VERTICAL SCALE: 1"=5'

GRAPHICAL SCALE: 1"=50'

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CITY OF CHARLES TOWN TAX DISTRICT
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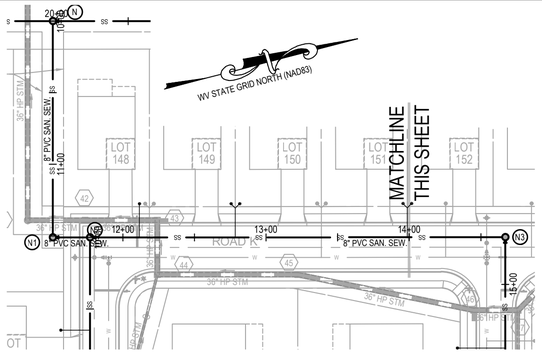
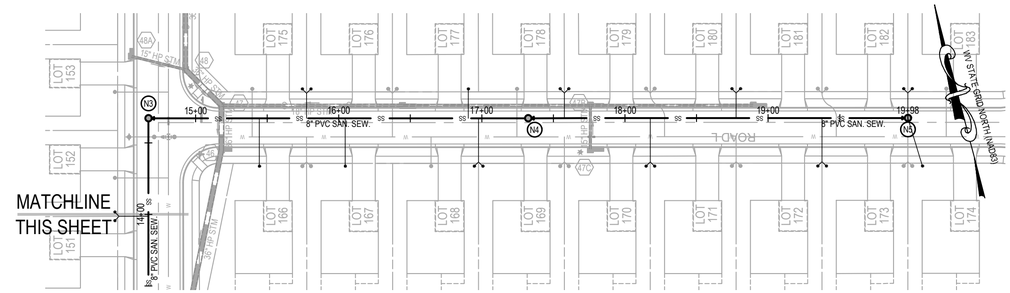
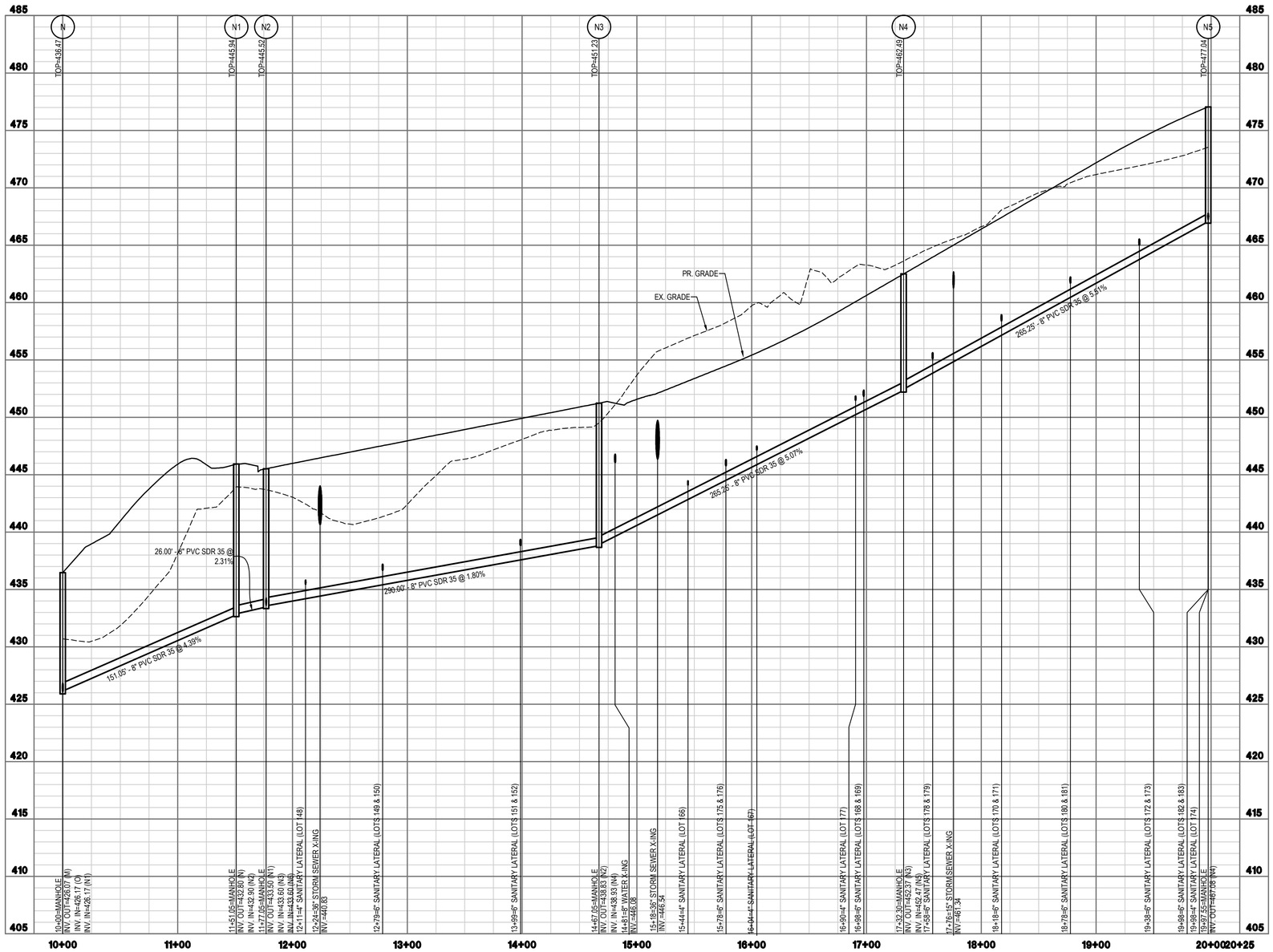
SHEET:	62 OF 134







0 2.5 5 10 15 — VERTICAL SCALE: 1"=5'

50 25 0 50 100 150 — GRAPHICAL SCALE: 1"=50'

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3-16-23

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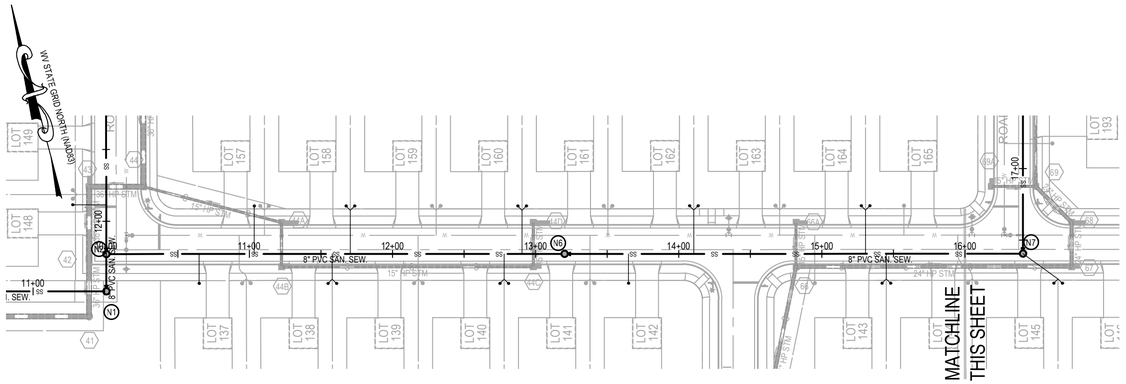

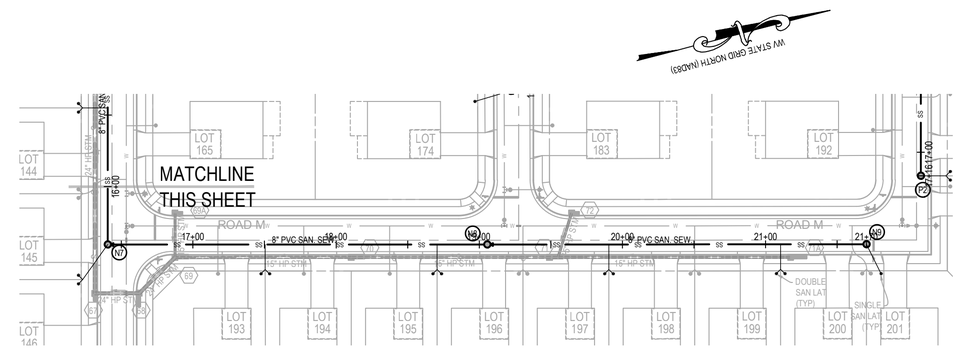

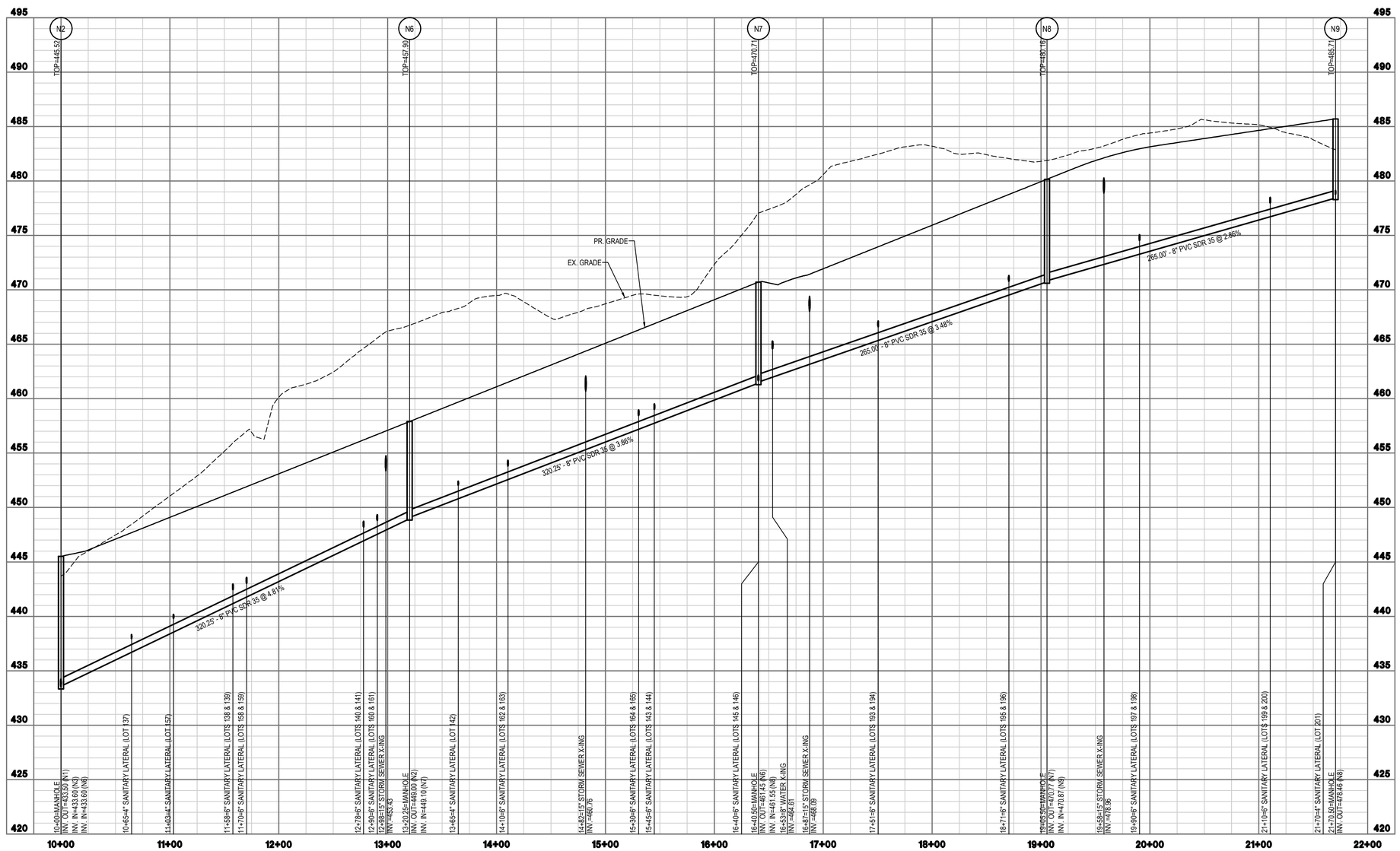

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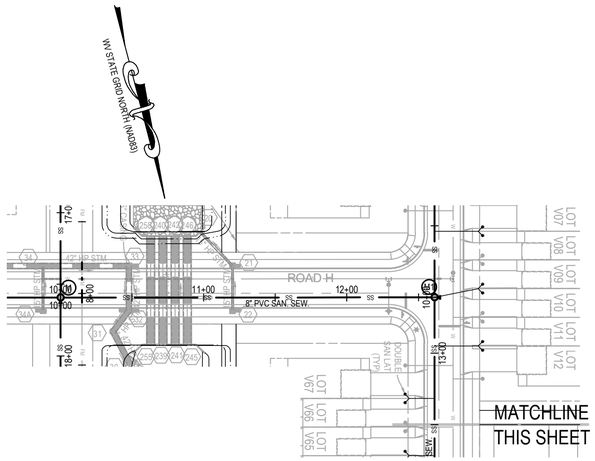

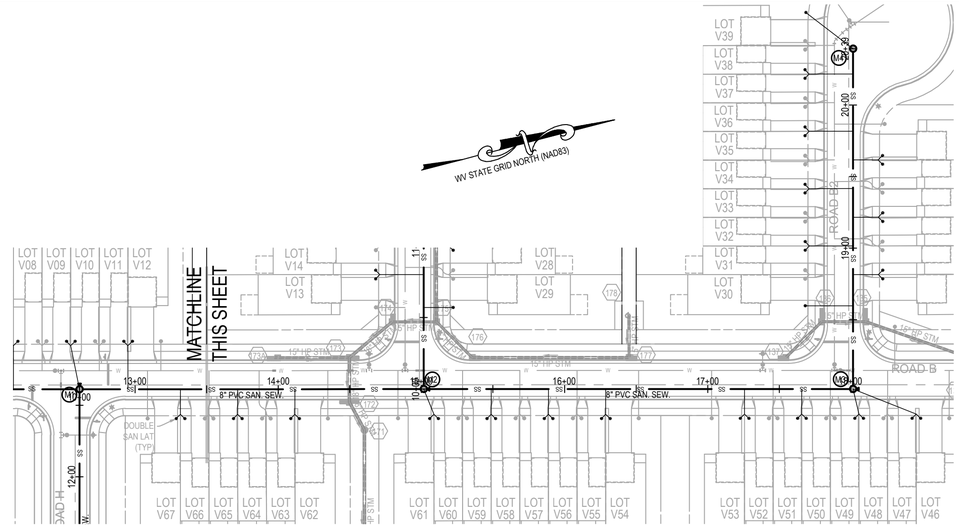

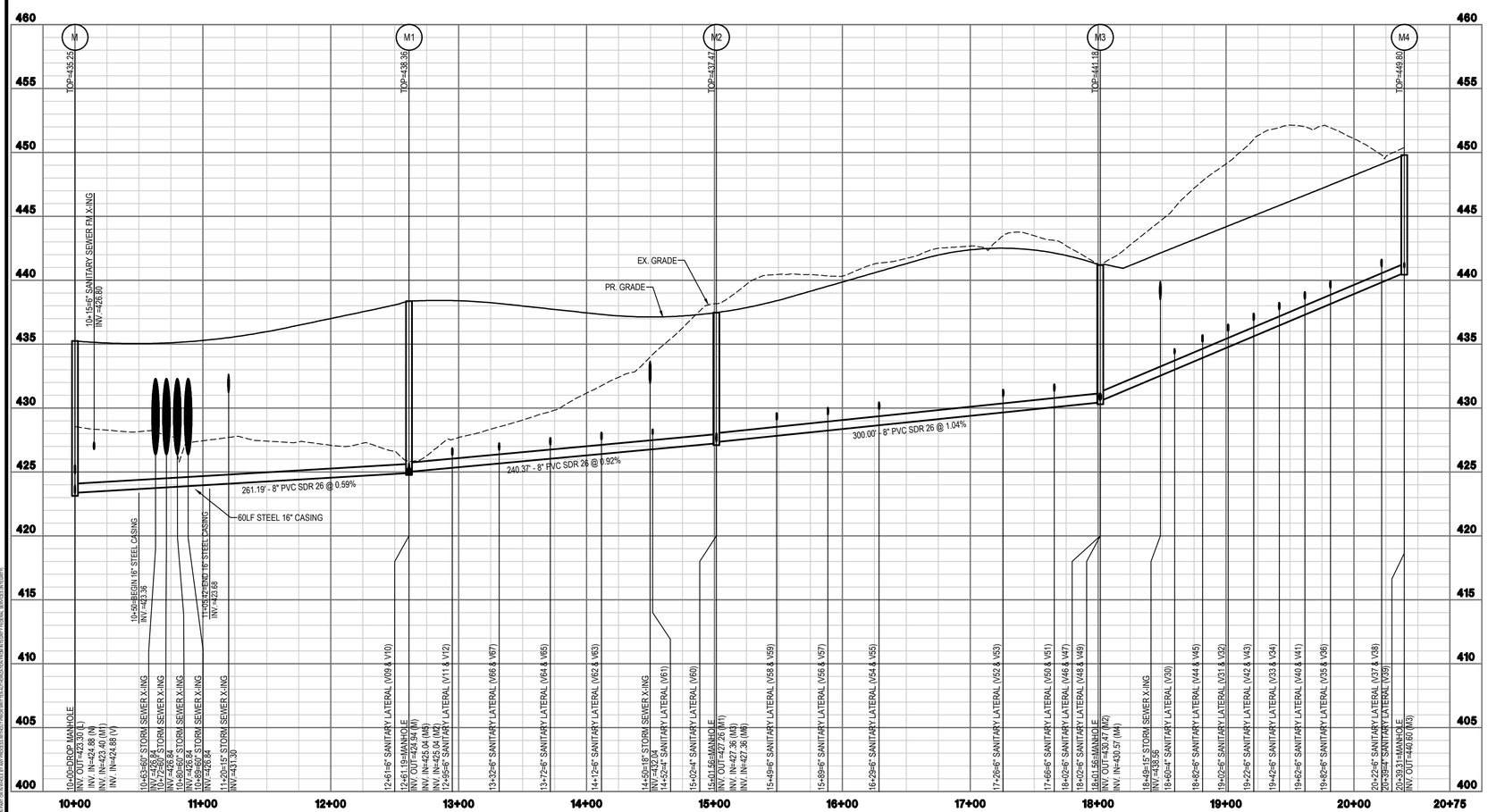

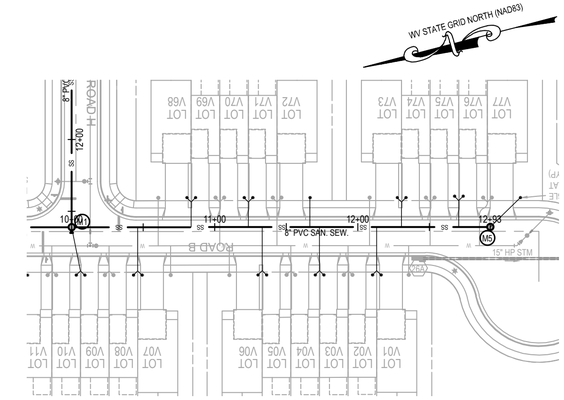

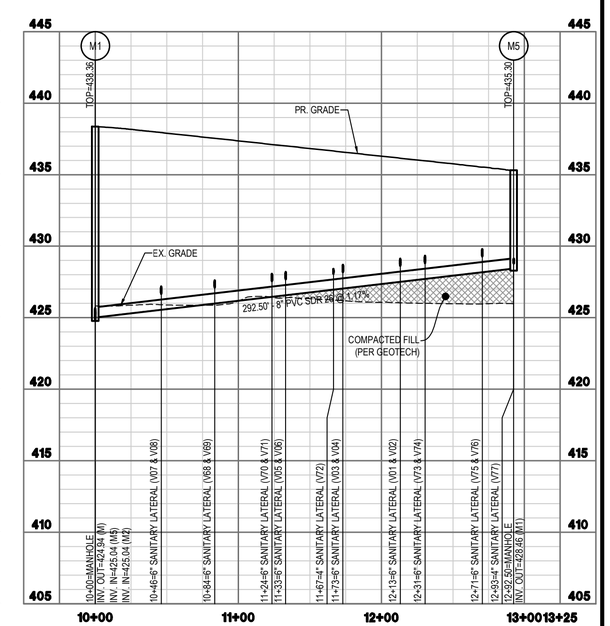

0 2.5 5 10 15
VERTICAL SCALE: 1"=5'

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

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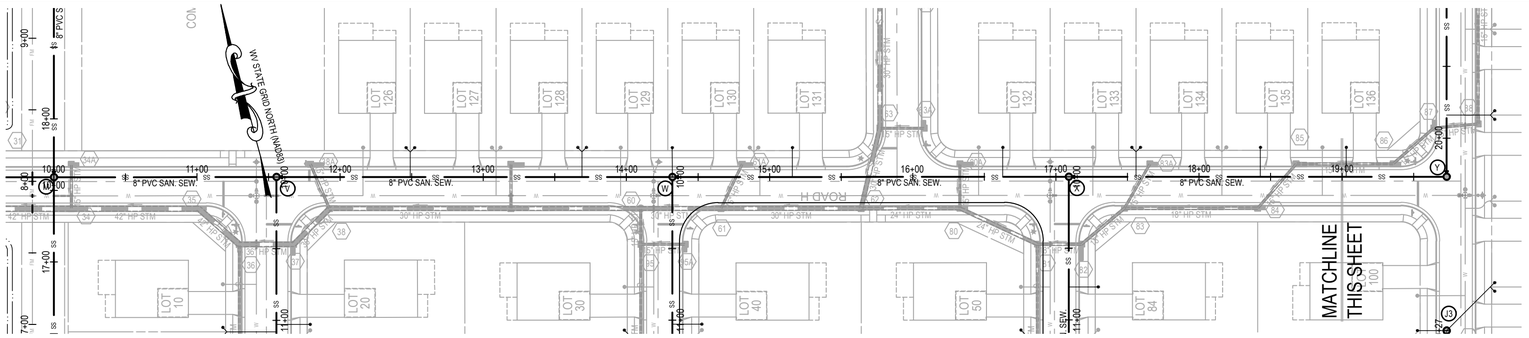

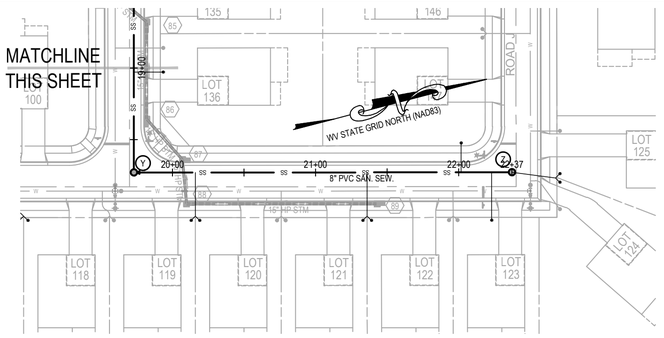

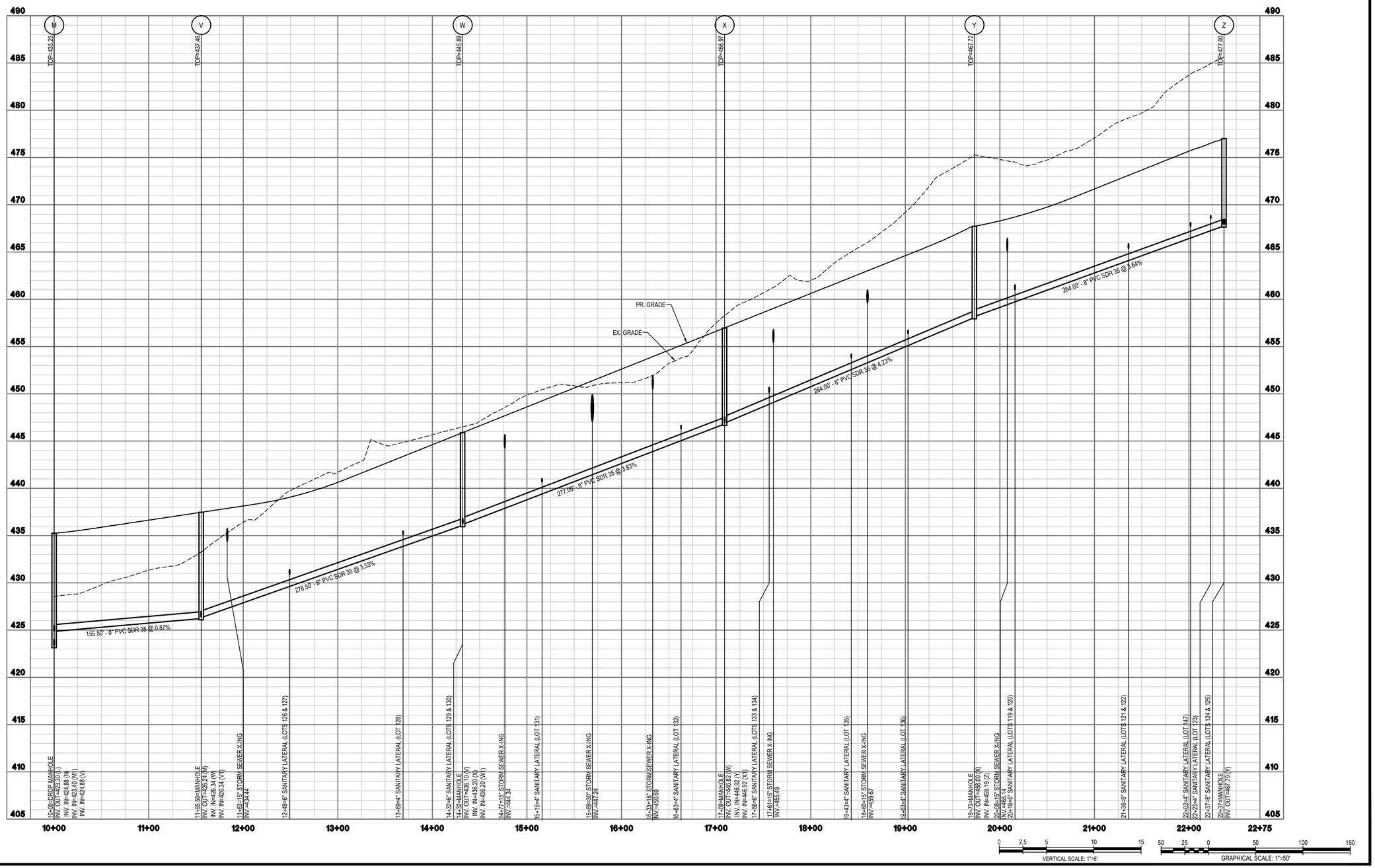

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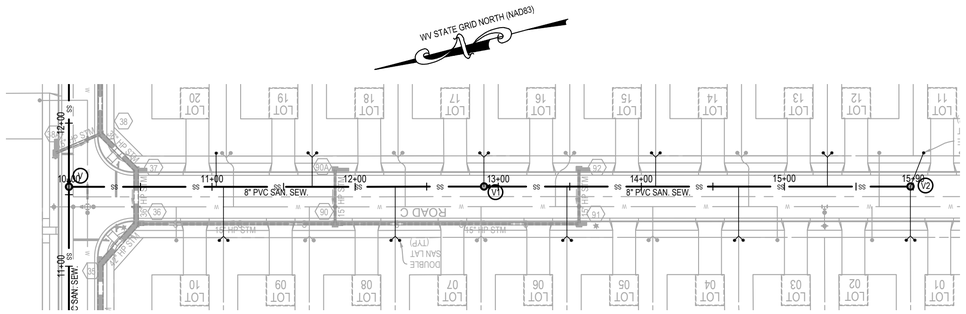

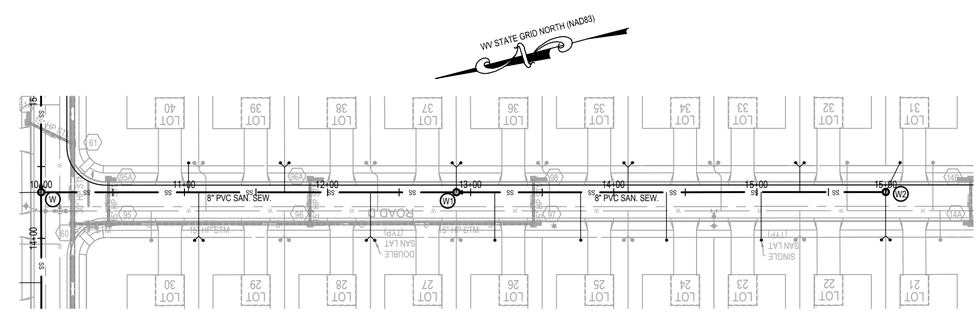

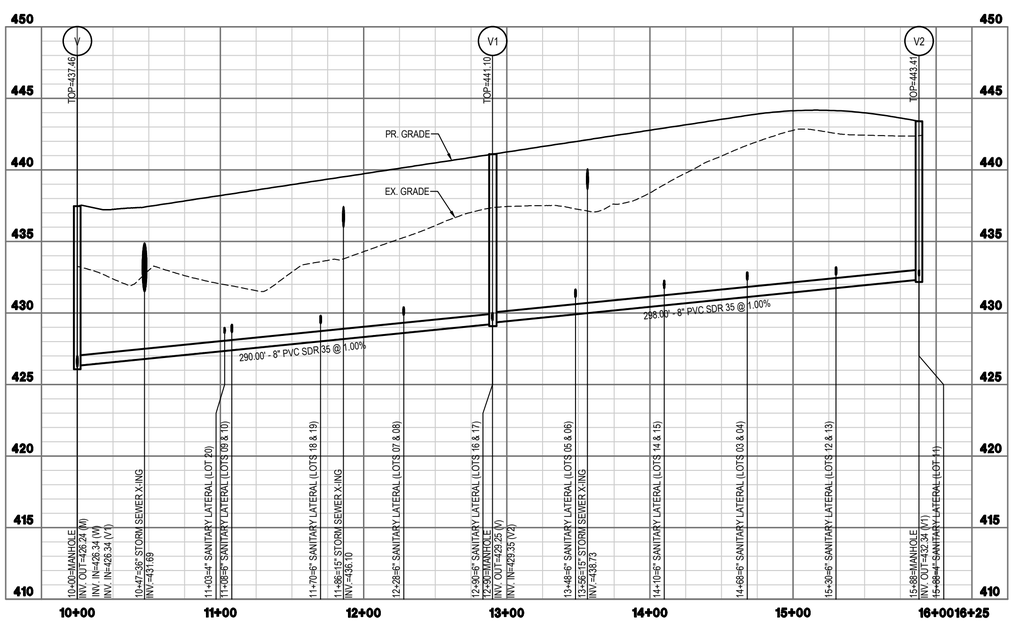

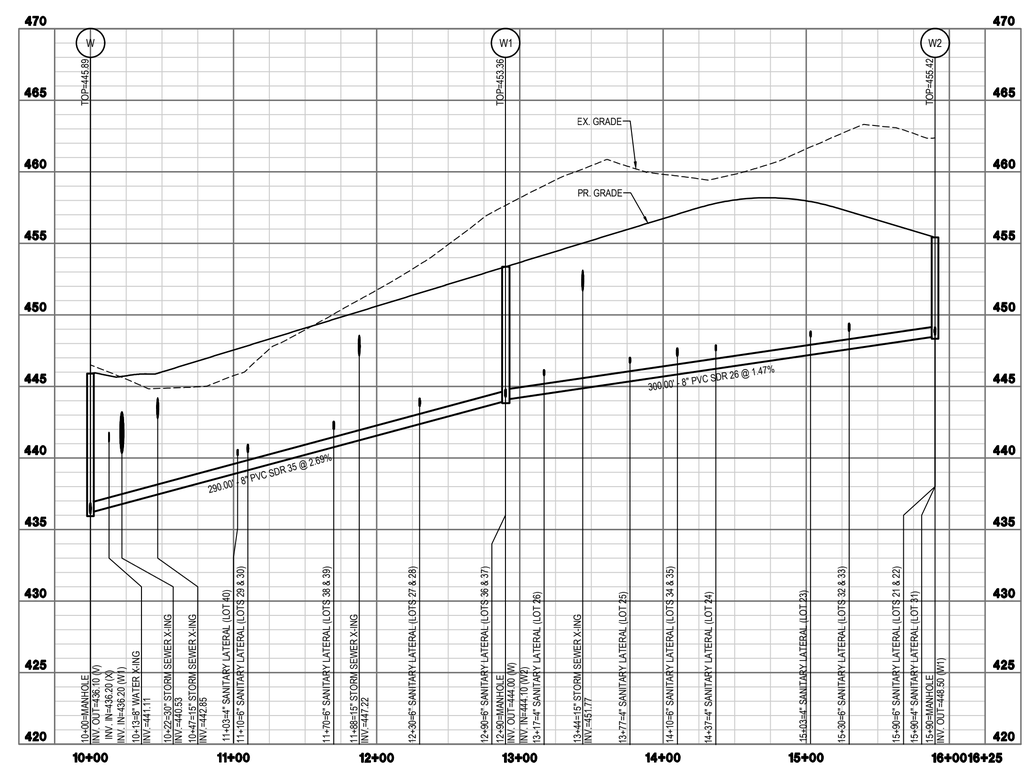

VERTICAL SCALE: 1"=5'

GRAPHICAL SCALE: 1"=50'

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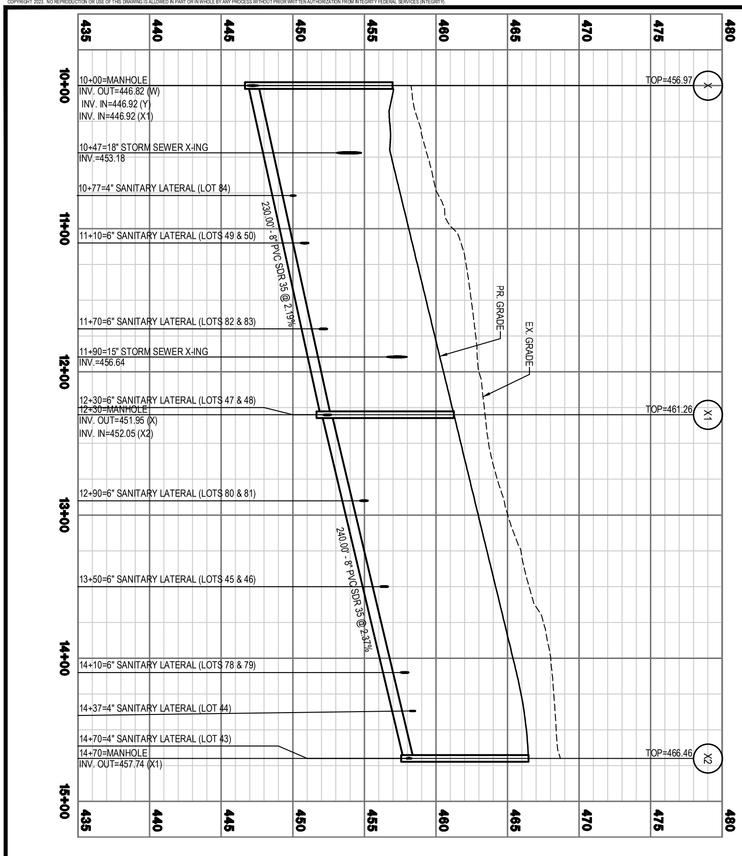

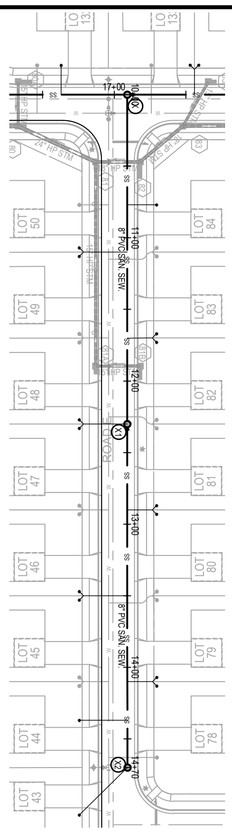

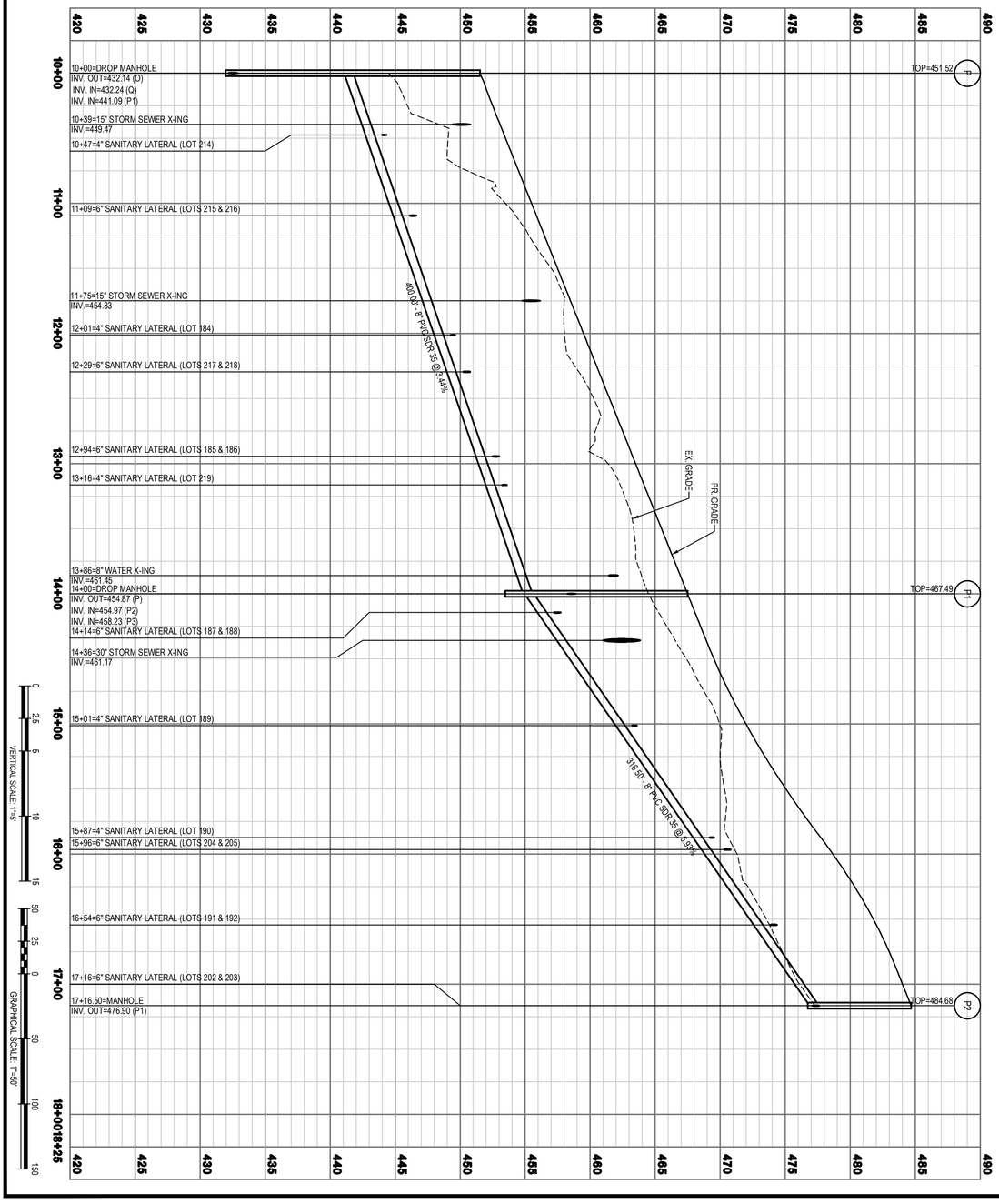

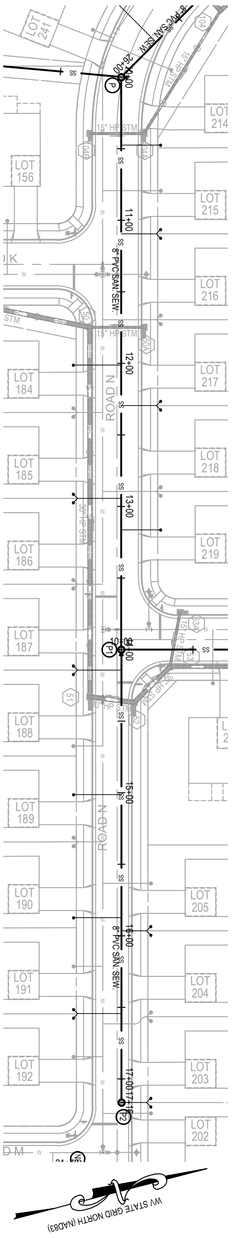

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SANITARY SEWER PLAN & PROFILE

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

REVISIONS
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JOSEPH P. GERUSKY
LICENSED PROFESSIONAL ENGINEER
STATE OF WEST VIRGINIA
No. 19515

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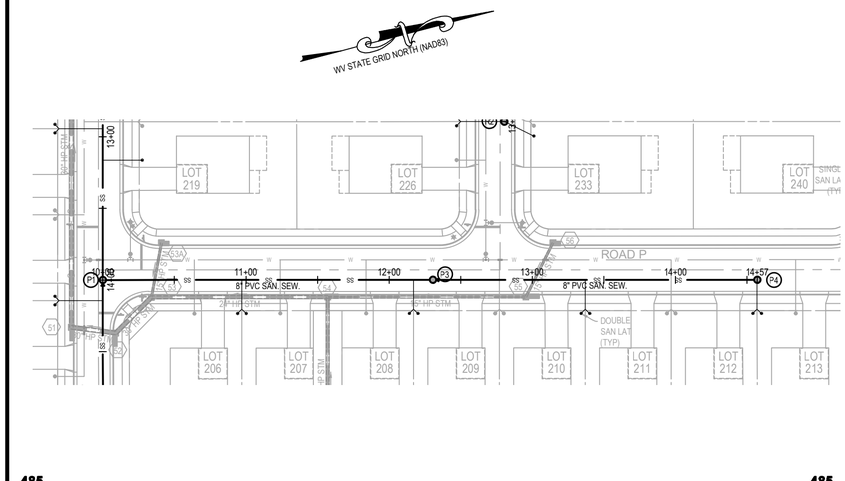

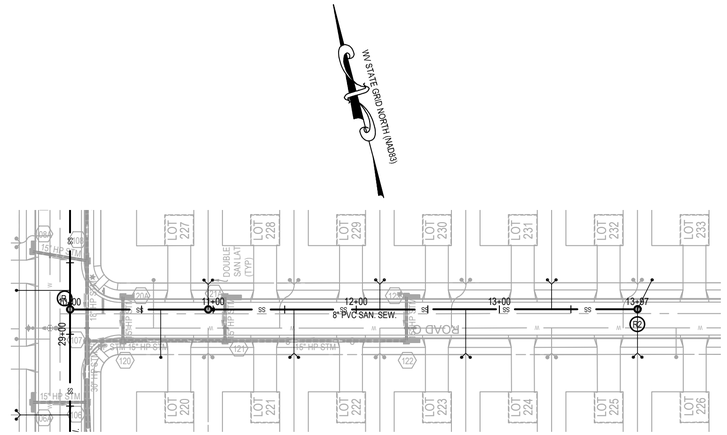

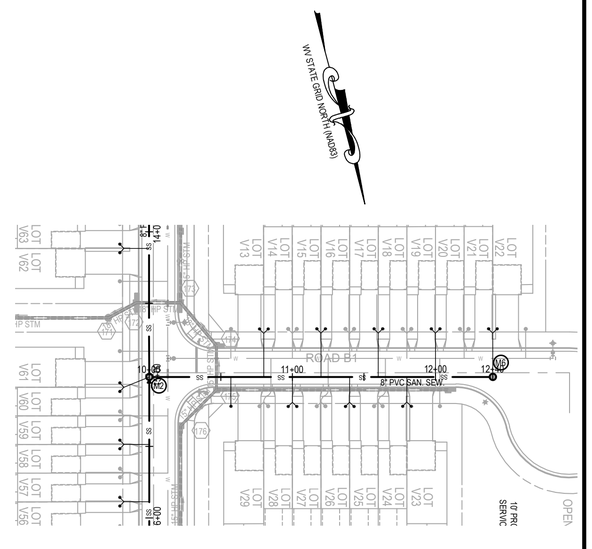

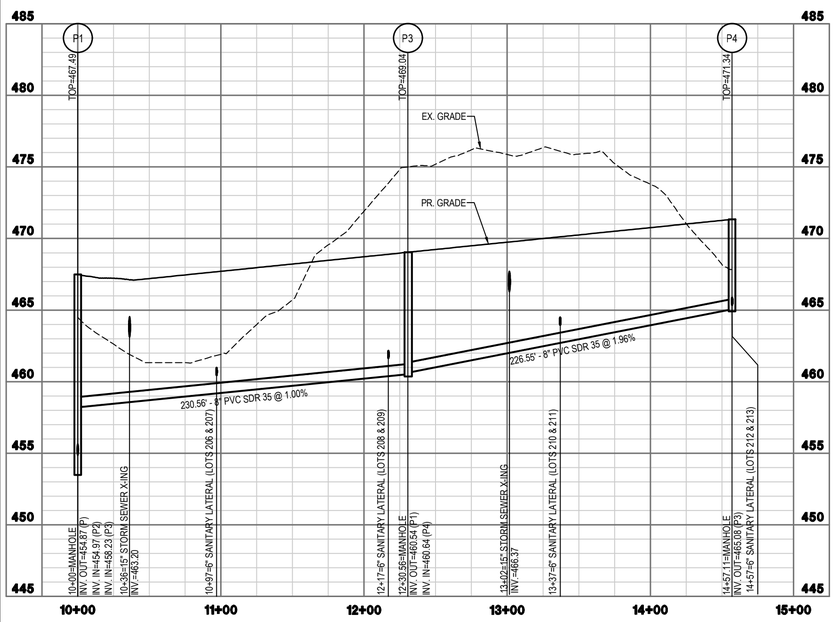

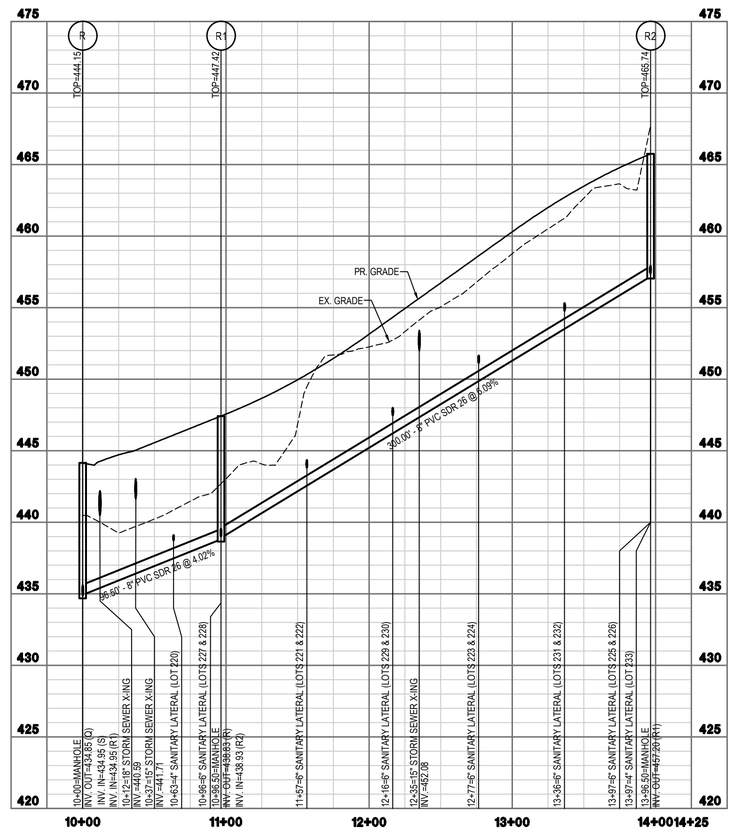

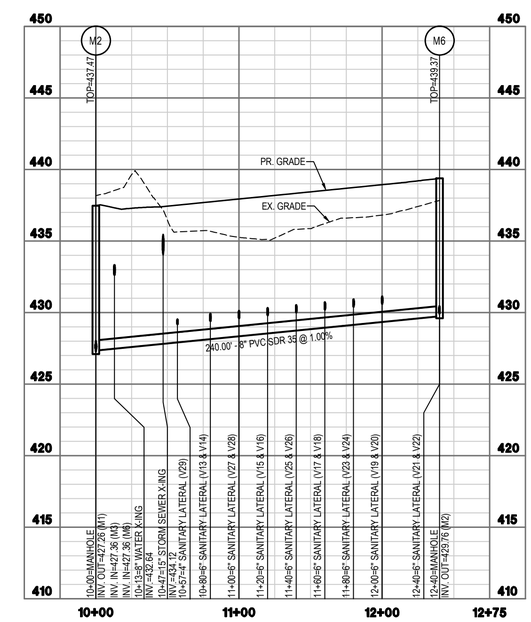

VERTICAL SCALE: 1"=5'

GRAPHICAL SCALE: 1"=50'

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JASON P. GERHART REGISTERED PROFESSIONAL ENGINEER NO. 19127 STATE OF WEST VIRGINIA
3-16-23

REVISIONS

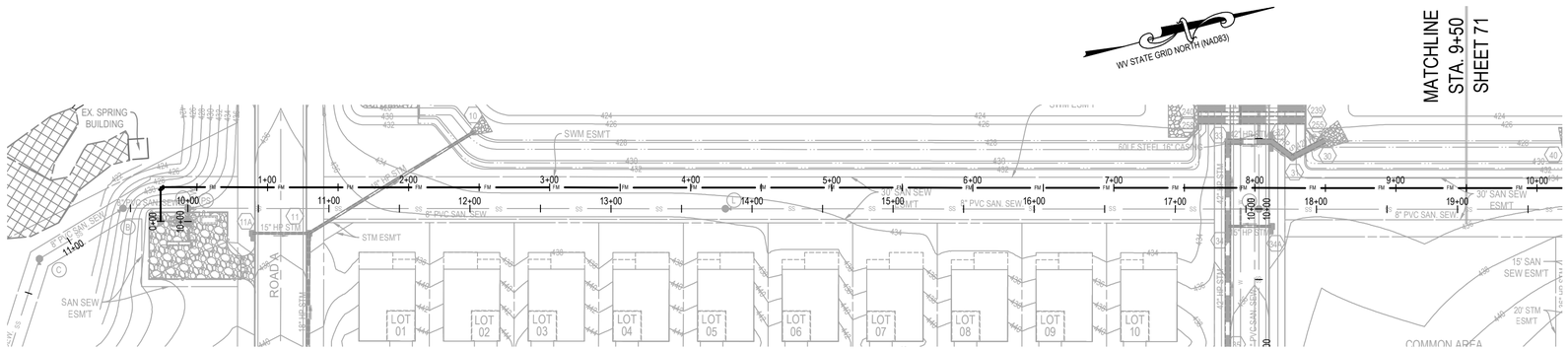
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

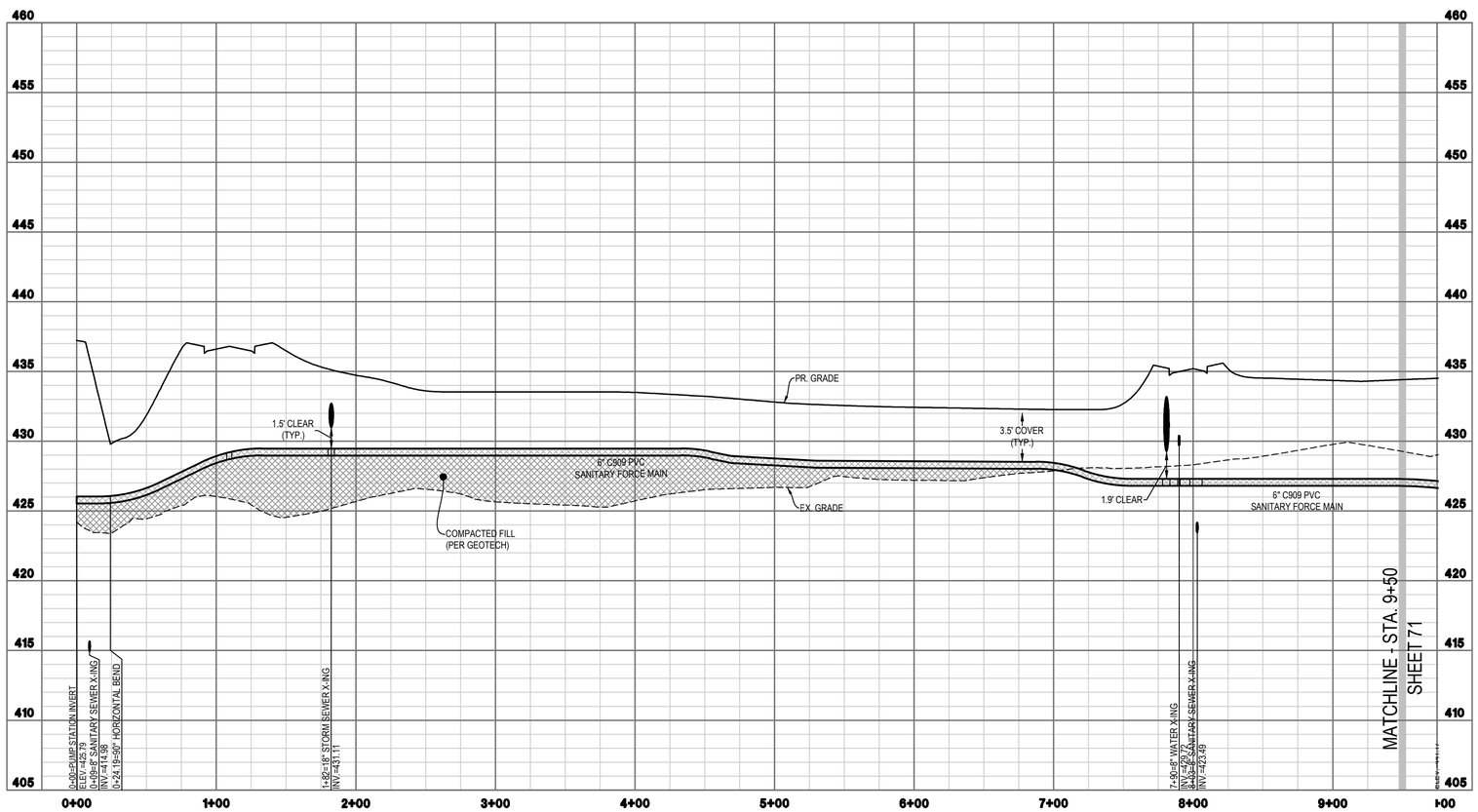
SANITARY SEWER PLAN & PROFILE

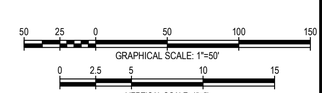
STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE: JANUARY 2023	
JOB: 2665-0206	
DRAWN: JCH	CHECK: JPG
CADD: C-CU-201.DWG	
NCS:	
SHEET: 69 OF 134	







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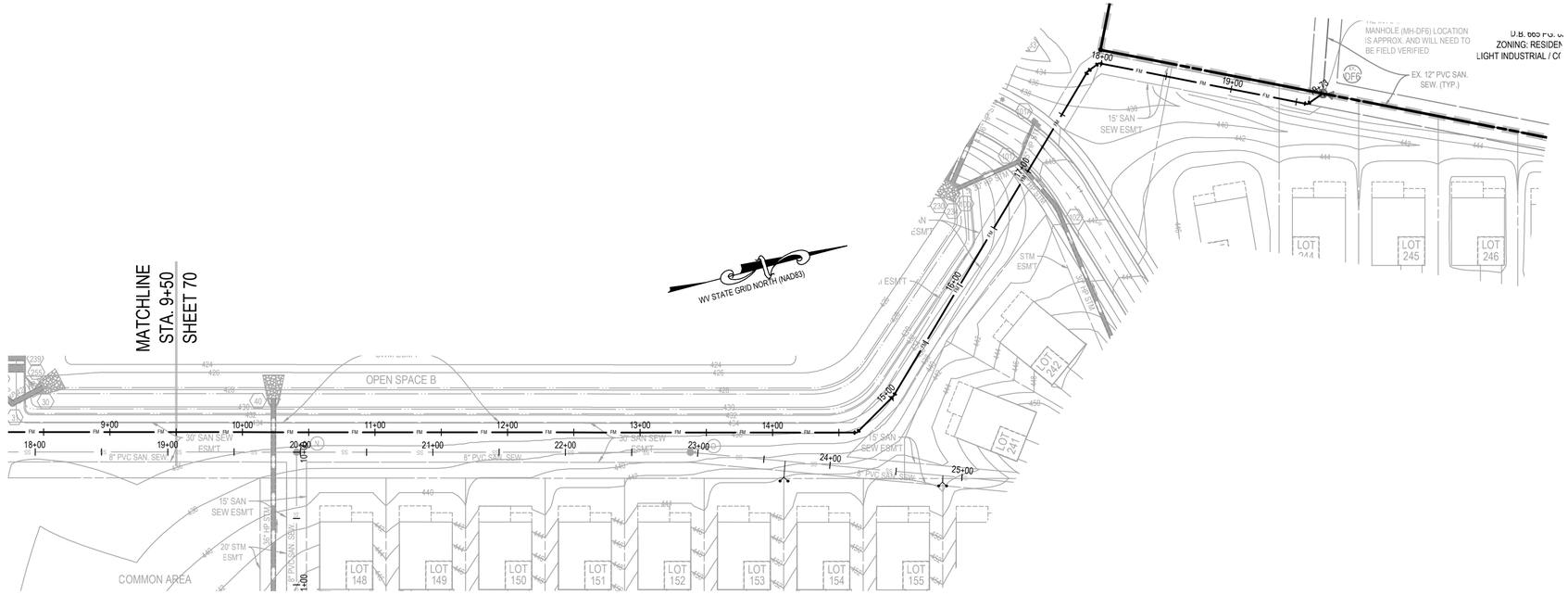
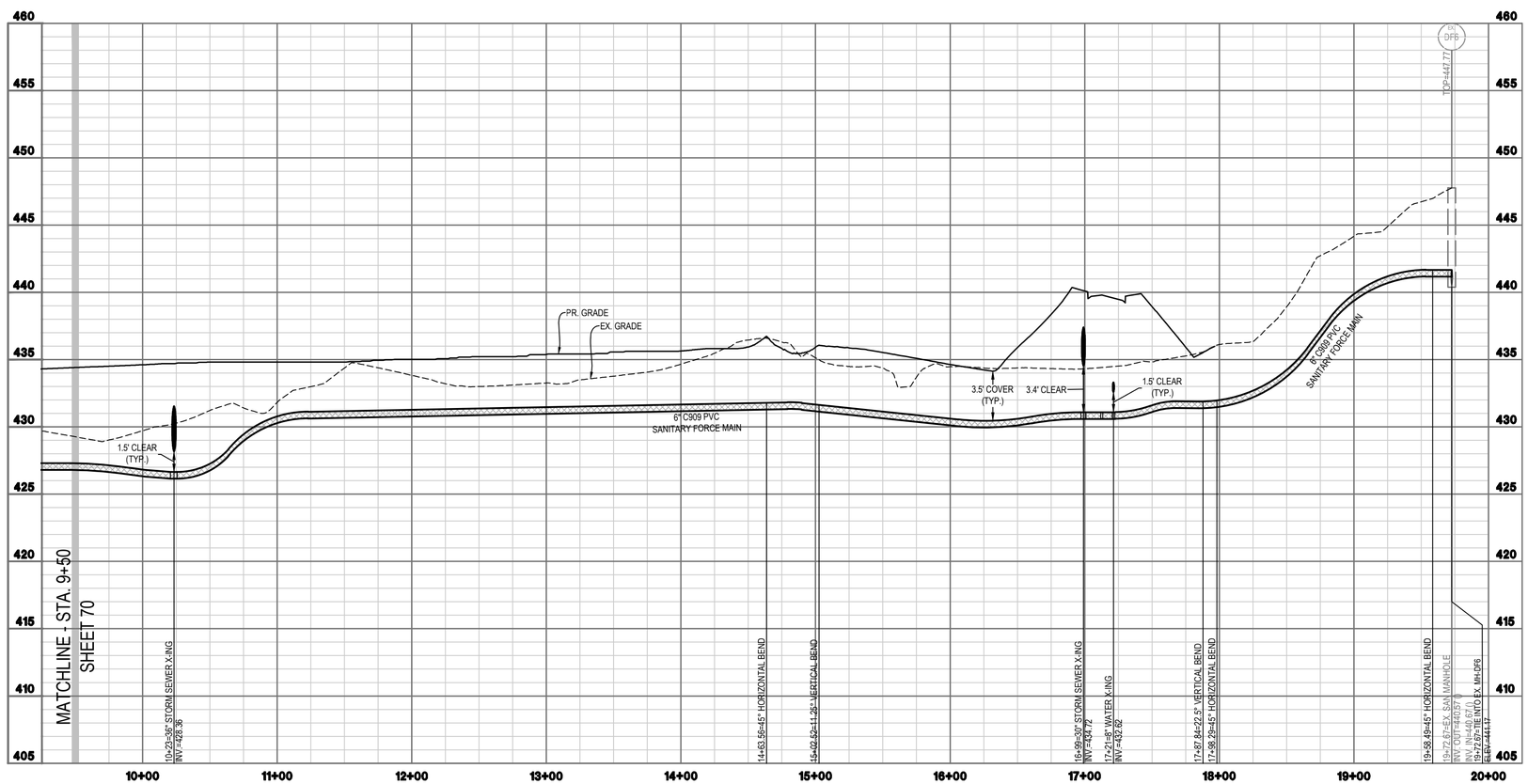
SANITARY SEWER FORCE MAIN PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-301.DWG	
NCS:	
SHEET:	70 OF 134





GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SANITARY SEWER FORCE MAIN PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 60' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-301.DWG	
NCS:	
SHEET:	71 OF 134

PROJECT: STONE SPRING
SANITARY SEWER COMPUTATIONS

SANITARY SEWER STRUCTURE NO.		FLOW DETERMINATION				SANITARY SEWER FLOW				PIPE RUN N = 0.013			PIPE CAPACITY			PROPORTIONAL FLOW			SANITARY MANHOLE ELEVATIONS					
		FORCE MAIN		BUILDING																				
UPPER M.H. STRUCTURE	LOWER M.H. STRUCTURE	NO. OF UNITS	FLOW PER UNIT (G.P.D.)	NO. OF UNITS	FLOW PER UNIT (G.P.D.)	INCREM. FLOW (M.G.D.)	TOTAL AVG. FLOW (M.G.D.)	PEAK FLOW FACTOR	PEAK FLOW (M.G.D.)	TOTAL LENGTH (FT.)	PIPE DIA. (IN.)	PIPE SLOPE (%)	FLOW RATE (M.G.D.)	FLOW RATE (C.F.S.)	VEL. (F.P.S.)	FULL FLOW (%)	DEPTH OF FLOW (FT.)	VEL. (F.P.S.)	PIPE FALL (FT.)	DROP IN STRUCT. (FT.)	UPPER INVERT (ELEV.)	LOWER INVERT (ELEV.)	TOP OF STRUCT. (ELEV.)	STRUCT. DEPTH (FT.)
X2	X1			8	280	0.0022	0.0022	4.00	0.0090	240.00	8	2.37%	1.20	1.86	5.33	0.75%	0.04	1.53	5.69	---	457.74	452.05	466.46	8.72
X1	X			7	280	0.0020	0.0020	4.00	0.0078	230.00	8	2.19%	1.15	1.79	5.12	0.68%	0.04	1.41	5.03	0.10	451.95	446.92	461.26	9.31
W2	W1			11	280	0.0031	0.0031	4.00	0.0123	300.00	8	1.47%	0.95	1.46	4.19	1.30%	0.05	1.34	4.40	---	448.50	444.10	455.42	6.92
W1	W			9	280	0.0025	0.0025	4.00	0.0101	290.00	8	2.69%	1.28	1.98	5.68	0.79%	0.04	1.63	7.80	0.10	444.00	436.20	453.36	9.36
V2	V1			11	280	0.0031	0.0031	4.00	0.0123	298.00	8	1.00%	0.78	1.21	3.47	1.57%	0.05	1.11	2.99	---	432.34	429.35	443.41	11.07
V1	V			9	280	0.0025	0.0025	4.00	0.0101	290.00	8	1.00%	0.78	1.21	3.47	1.29%	0.05	1.11	2.91	0.10	429.25	426.34	441.10	11.85
Z	Y			8	280	0.0022	0.0022	4.00	0.0090	264.17	8	3.63%	1.49	2.30	6.60	0.60%	0.04	1.82	9.60	---	467.79	458.19	477.00	9.21
Y	X			4	280	0.0011	0.0011	4.00	0.0045	264.24	8	4.23%	1.61	2.48	7.12	0.28%	0.02	1.40	11.17	0.10	458.09	446.92	467.72	9.63
X	W			2	280	0.0006	0.0006	4.00	0.0022	277.20	8	3.83%	1.53	2.37	6.78	0.15%	0.02	1.07	10.62	0.10	446.82	436.20	456.97	10.15
W	V			5	280	0.0014	0.0014	4.00	0.0056	276.67	8	3.53%	1.47	2.27	6.50	0.38%	0.03	1.40	9.76	0.10	436.10	426.34	445.89	9.79
V	M			0	280	0.0000	0.0000	4.00	0.0000	155.51	8	0.87%	0.73	1.13	3.24	0.00%	0.00	0.00	1.36	0.10	426.24	424.88	437.46	11.22
S1	S			0	280	0.0000	0.0000	4.00	0.0000	40.50	8	5.60%	1.85	2.86	8.20	0.00%	0.00	0.00	2.27	---	446.50	444.23	452.76	6.26
R2	R1			11	280	0.0031	0.0031	4.00	0.0123	300.00	8	6.09%	1.93	2.98	8.54	0.64%	0.04	2.35	18.27	---	457.20	438.93	465.74	8.54
R1	R			3	280	0.0008	0.0008	4.00	0.0034	96.50	8	4.02%	1.57	2.42	6.94	0.21%	0.02	1.36	3.88	0.10	438.83	434.95	447.42	8.59
P4	P3			4	280	0.0011	0.0011	4.00	0.0045	226.55	8	1.96%	1.09	1.69	4.85	0.41%	0.03	1.17	4.44	---	465.08	460.64	471.34	6.26
P3	P1			4	280	0.0011	0.0011	4.00	0.0045	230.56	8	1.00%	0.78	1.21	3.47	0.57%	0.03	0.90	2.31	0.10	460.54	458.23	469.04	8.50
P2	P1			10	280	0.0028	0.0028	4.00	0.0112	316.50	8	6.93%	2.06	3.18	9.11	0.54%	0.03	2.37	21.93	---	476.90	454.97	484.68	7.78
P1	P			9	280	0.0025	0.0025	4.00	0.0101	400.00	8	3.45%	1.45	2.24	6.43	0.70%	0.04	1.77	13.78	0.10	454.87	441.09	467.49	12.62
N9	N8			5	280	0.0014	0.0014	4.00	0.0056	265.00	8	2.86%	1.32	2.05	5.86	0.42%	0.03	1.41	7.59	---	478.46	470.87	485.71	7.25
N8	N7			4	280	0.0011	0.0011	4.00	0.0045	265.00	8	3.48%	1.46	2.25	6.46	0.31%	0.03	1.39	9.22	0.10	470.77	461.55	480.16	9.39
N7	N6			9	280	0.0025	0.0025	4.00	0.0101	320.25	8	3.86%	1.53	2.37	6.80	0.66%	0.04	1.87	12.35	0.10	461.45	449.10	470.71	9.26
N6	N2			10	280	0.0028	0.0028	4.00	0.0112	320.25	8	4.81%	1.71	2.65	7.59	0.65%	0.04	2.09	15.40	0.10	449.00	433.60	457.90	8.90
N5	N4			11	280	0.0031	0.0031	4.00	0.0123	265.61	8	5.50%	1.83	2.83	8.12	0.67%	0.04	2.24	14.61	---	467.08	452.47	477.04	9.96
N4	N3			7	280	0.0020	0.0020	4.00	0.0078	265.63	8	5.06%	1.76	2.72	7.79	0.45%	0.03	1.88	13.44	0.10	452.37	438.93	462.49	10.12
N3	N2			5	280	0.0014	0.0014	4.00	0.0056	290.05	8	1.80%	1.05	1.62	4.65	0.53%	0.03	1.21	5.23	0.10	438.83	433.60	451.23	12.40
N2	N1			0	280	0.0000	0.0000	4.00	0.0000	26.01	8	2.31%	1.19	1.84	5.26	0.00%	0.00	0.00	0.60	0.10	433.50	432.90	445.52	12.02
N1	N			0	280	0.0000	0.0000	4.00	0.0000	151.20	8	4.38%	1.64	2.53	7.25	0.00%	0.00	0.00	6.63	0.10	432.80	426.17	445.94	13.14
M6	M2			17	280	0.0048	0.0048	4.00	0.0190	240.00	8	1.00%	0.78	1.21	3.46	2.44%	0.07	1.37	2.40	---	429.76	427.36	439.37	9.61
M5	M1			18	280	0.0050	0.0050	4.00	0.0202	292.50	8	1.17%	0.84	1.31	3.74	2.39%	0.07	1.48	3.42	---	428.46	425.04	435.30	6.84
M4	M3			16	280	0.0045	0.0045	4.00	0.0179	237.75	8	4.22%	1.60	2.48	7.11	1.12%	0.05	2.28	10.03	---	440.60	430.57	449.80	9.20
M3	M2			14	280	0.0039	0.0039	4.00	0.0157	300.00	8	1.04%	0.80	1.23	3.52	1.97%	0.05	1.13	3.11	0.10	430.47	427.36	441.18	10.71
M2	M1			10	280	0.0028	0.0028	4.00	0.0112	240.37	8	0.92%	0.75	1.16	3.33	1.49%	0.05	1.07	2.22	0.10	427.26	425.04	437.47	10.21
M1	M			2	280	0.0006	0.0006	4.00	0.0022	261.19	8	0.59%	0.60	0.93	2.66	0.37%	0.03	0.57	1.54	0.10	424.94	423.40	438.36	13.42
U	T			0	280	0.0000	0.0000	4.00	0.0000	40.50	8	3.01%	1.36	2.10	6.01	0.00%	0.00	0.00	1.22	---	458.14	456.92	468.41	10.27
T	S			7	280	0.0020	0.0020	4.00	0.0078	396.50	8	3.18%	1.39	2.15	6.17	0.56%	0.03	1.61	12.59	0.10	456.82	444.23	468.60	11.78
S	R			3	280	0.0008	0.0008	4.00	0.0034	263.50	8	3.48%	1.46	2.26	6.46	0.23%	0.02	1.27	9.18	0.10	444.13	434.95	452.82	8.69
R	Q			3	280	0.0008	0.0008	4.00	0.0034	173.64	8	1.01%	0.78	1.21	3.48	0.43%	0.03	0.84	1.75	0.10	434.85	433.10	444.15	9.30
Q	P			2	280	0.0006	0.0006	4.00	0.0022	151.22	8	0.50%	0.55	0.86	2.45	0.40%	0.03	0.59	0.76	0.10	433.00	432.24	445.43	12.43
P	O			4	280	0.0011	0.0011	4.00	0.0045	298.24	8	1.47%	0.95	1.46	4.20	0.47%	0.03	1.01	4.38	0.10	432.14	427.76	451.52	19.38
O	N			0	280	0.0000	0.0000	4.00	0.0000	297.00	8	0.50%	0.55	0.86	2.45	0.00%	0.00	0.00	1.49	0.10	427.66	426.17	438.55	10.89
N	M			0	280	0.0000	0.0000	4.00	0.0000	238.00	8	0.50%	0.55	0.85	2.45	0.00%	0.00	0.00	1.19	0.10	426.07	424.88	436.52	10.45
M	L			0	280	0.0000	0.0000	4.00	0.0000	378.22	8	0.50%	0.55	0.86	2.45	0.00%	0.00	0.00	1.90	1.58	423.30	421.40	435.25	11.95
L	A			0	280	0.0000	0.0000	4.00	0.0000	381.04	8	0.50%	0.55	0.85	2.44	0.00%	0.00	0.00	1.90	0.10	421.30	419.40	434.29	12.99
J3	J2			15	280	0.0042	0.0042	4.00	0.0168	379.26	8	1.23%	0.87	1.34	3.85	1.94%	0.05	1.23	4.68	---	457.67	452.99	466.45	8.78
J2	J1			10	280	0.0028	0.0070	4.00	0.0280	370.24	8	1.91%	1.08	1.67	4.79	2.59%	0.07	1.90	7.09	0.10	452.89	445.80	462.65	9.76
J1	J			9	280	0.0025	0.0095	4.00	0.0381	277.00	8	1.36%	0.91	1.41	4.04	4.18%	0.09	1.96	3.77	0.10	445.70	441.93	455.52	9.82
F2	F1			10	280	0.0028	0.0028	4.00	0.0112	274.50	8	2.50%	1.23	1.91	5.47	0.91%	0.04	1.69	6.86	---	456.18	449.32	464.63	8.45
F1	F			4	280	0.0011	0.0039	4.00	0.0157	169.47	8	3.92%	1.55	2.39	6.86	1.01%	0.05	2.20	6.65	0.27	449.05	442.40	457.33	8.28
D2	D1			4	280	0.0011	0.0011	4.00	0.0045	284.00	8	2.04%	1.11	1.72	4.94	0.40%	0.03	1.19	5.78	---	442.14	436.36	450.16	8.02
D1	D			2	280	0.0006	0.0017	4.00	0.0067	60.22	8	10.01%	2.47	3.82	10.95	0.27%	0.02	2.15	6.03	3.66	432.70	426.67	443.98	11.28
K	J			3	280	0.0008	0.0008	4.00	0.0034	145.00	8	1.00%	0.78	1.21	3.46	0.43%	0.03	0.84	1.45	---	440.50	439.05	449.33	8.83
J	H			3	280	0.0008	0.0112	4.00	0.0448	168.99	8	2.22%	1.16	1.80	5.16	3.85%	0.08	2.31	3.75	0.10	438.95	435.20	449.17	10.22
H	G			0	280	0.0000	0.0112	4.00	0.0448	66.12	8	0.50%	0.55	0.85	2.45	8.12%	0.13	1.47	0.33	0.10	435.10	434.77	445.08	9.98
G	F			1	280	0.0003	0.0115	4.00	0.0459	69.97	8	0.50%	0.55	0.85	2.45	8.31%	0.13	1.47	0.35	0.10	434.67	434.32	445.66	10.99
F	E			2	280	0.0006	0.0160	4.00	0.0638	188.84	8	5.15%	1.77	2.74	7.85	3.60%	0.08	3.52	9.72	0.10	434.22	424.50	448.36	14.14
E	D			0	280	0.0000	0.0160	4.00	0.0638	400.00	8	0.50%	0.55	0.85	2.45	11.56%	0.15	1.61	2.00	0.10	424.40	422.40	431.16	6.76
D	C			0	280	0.0000	0.0176	4.00	0.0706	154.02	8	4.31%	1.62	2.51	7.19	4.35%	0.09	3.50	6.64	0.10	422.30	415.66	434.09	11.79
C	B			0	280	0.0000	0.0176	4.00	0.0706	69.31	8	0.50%	0.56	0.86	2.46	12.71%	0.16	1.66	0.35	0.10	415.56	415.21	422.30	6.74
B	A			0	280	0.0000	0.0176	4.00	0.0706	45.95	8	0.50%	0.55	0.85	2.45	12.77%	0.16	1.65	0.23	0.10	415.11	414.88	429.41	14.30
A	PS			0	280	0.0000	0.0176	4.00	0.0706	9.35	8	0.53%	0.57	0.88	2.53	12.35%	0.16	1.71	0.05	0.10	414.78	414.73	436.18	21.40

NOTES:
1. SEWER FLOWS BASED ON TABLE 64-47-B OF WV SERIES 47 SEWAGE TREATMENT AND COLLECTION SYSTEM DESIGN STANDARDS (64CSR47).

INTEGRITY FEDERAL SERVICES
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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SANITARY SEWER COMPUTATIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-701.DWG	
NCS:	
SHEET:	72 OF 134

PROJECT: STONE SPRING
SANITARY SEWER LATERAL COMPUTATIONS

BUILDING / LOT NO.	SANITARY SEWER MAIN: UPPER MANHOLE STR. NO.	LOWER MANHOLE STR. NO.	DIST. FROM LOWER MANHOLE (FT.)	SLOPE OF MAIN (%)	INV. OF SEWER MAIN	INV. OF LATERAL @ SEWER MAIN	LATERAL RISER @ MAIN: HEIGHT (FT.)	INV. OF LATERAL @ RISER	SANITARY SEWER LATERAL: TOTAL LENGTH (FT.)	PLAN LENGTH: 6" DIA. (FT.)	4" DIA. (FT.)	LAT. ANGLE @ SEWER MAIN	PIPE SLOPE (%)	INV. OF LATERAL STUB (ELEV.)	BUILDING / SLAB ELEV.	ELEV. DIFF. (LAT END-SLAB)(FT.)
213*	P4	P3	230.56	1.96%	465.16	465.36	---	---	25.15	20.91	4.24	90°	2.08%	465.88	475.37	7.64
212*	P4	P3	230.56	1.96%	465.16	465.36	---	---	25.15	20.91	4.24	90°	2.08%	465.88	474.77	7.04
211	P4	P3	106.44	1.96%	462.73	463.98	---	---	24.74	20.50	4.24	90°	2.08%	464.49	474.17	7.83
210	P4	P3	106.44	1.96%	462.73	463.98	---	---	24.74	20.50	4.24	90°	2.08%	464.49	473.57	7.23
209	P3	P1	217.00	1.00%	460.40	461.65	---	---	24.74	20.50	4.24	90°	2.08%	462.17	472.63	8.62
208	P3	P1	217.00	1.00%	460.40	461.65	---	---	24.74	20.50	4.24	90°	2.08%	462.17	471.73	7.72
207	P3	P1	97.00	1.00%	459.20	460.45	---	---	24.74	20.50	4.24	90°	2.08%	460.97	471.33	8.52
206	P3	P1	97.00	1.00%	459.20	460.45	---	---	24.74	20.50	4.24	90°	2.08%	460.97	471.17	8.36
201*	N9	N8	265.00	2.86%	478.46	478.79	---	---	22.86	---	22.86	90°	2.08%	479.27	489.37	8.33
200	N9	N8	205.00	2.86%	476.74	477.99	---	---	21.74	17.50	4.24	90°	2.08%	478.44	488.87	8.58
199	N9	N8	205.00	2.86%	476.74	477.99	---	---	21.74	17.50	4.24	90°	2.08%	478.44	487.97	7.68
198	N9	N8	85.00	2.86%	473.30	474.55	---	---	21.74	17.50	4.24	90°	2.08%	475.01	487.07	10.22
197	N9	N8	85.00	2.86%	473.30	474.55	---	---	21.74	17.50	4.24	90°	2.08%	475.01	486.17	9.32
196	N8	N7	230.00	3.48%	469.55	470.80	---	---	21.74	17.50	4.24	90°	2.08%	471.26	484.07	10.97
195	N8	N7	230.00	3.48%	469.55	470.80	---	---	21.74	17.50	4.24	90°	2.08%	471.26	481.67	8.57
194	N8	N7	110.00	3.48%	465.38	466.63	---	---	21.74	17.50	4.24	90°	2.08%	467.08	479.27	10.35
193	N8	N7	110.00	3.48%	465.38	466.63	---	---	21.70	17.50	4.20	90°	2.08%	467.08	476.87	7.95
146*	N7	N6	320.25	3.86%	461.45	461.65	---	---	34.35	30.11	4.24	90°	2.08%	462.37	474.97	10.76
145*	N7	N6	320.25	3.86%	461.45	461.65	---	---	34.35	30.11	4.24	90°	2.08%	462.37	472.77	8.56
144	N7	N6	224.70	3.86%	457.77	459.02	---	---	21.83	17.58	4.25	90°	2.08%	459.47	470.17	8.86
143	N7	N6	224.70	3.86%	457.77	459.02	---	---	21.82	17.58	4.24	90°	2.08%	459.47	467.77	6.46
165	N7	N6	210.25	3.86%	457.21	458.46	---	---	34.74	30.50	4.24	90°	2.08%	459.18	471.47	10.44
164	N7	N6	210.25	3.86%	457.21	458.46	---	---	34.74	30.50	4.24	90°	2.08%	459.18	468.97	7.94
163	N7	N6	90.25	3.86%	452.58	453.83	---	---	34.74	30.50	4.24	90°	2.08%	454.55	466.57	10.17
162	N7	N6	90.25	3.86%	452.58	453.83	---	---	34.74	30.50	4.24	90°	2.08%	454.55	464.17	7.77
142	N7	N6	27.80	3.86%	450.17	451.42	---	---	20.50	---	20.50	90°	2.08%	451.85	461.86	8.24
161	N6	N2	290.50	4.81%	447.57	448.82	---	---	34.74	30.50	4.24	90°	2.08%	449.54	461.77	10.38
160	N6	N2	290.50	4.81%	447.57	448.82	---	---	34.74	30.50	4.24	90°	2.08%	449.54	459.37	7.98
141	N6	N2	277.95	4.81%	446.97	448.22	---	---	21.82	17.58	4.24	90°	2.08%	448.67	459.52	9.01
140	N6	N2	277.95	4.81%	446.97	448.22	---	---	21.82	17.58	4.24	90°	2.08%	448.67	457.17	6.66
159	N6	N2	170.50	4.81%	441.80	443.05	---	---	34.74	30.50	4.24	90°	2.08%	443.77	456.97	11.35
158	N6	N2	170.50	4.81%	441.80	443.05	---	---	34.74	30.50	4.24	90°	2.08%	443.77	454.57	8.95
139	N6	N2	157.95	4.81%	441.20	442.45	---	---	21.82	17.58	4.24	90°	2.08%	442.90	454.77	10.03
138	N6	N2	157.95	4.81%	441.20	442.45	---	---	21.82	17.58	4.24	90°	2.08%	442.90	452.27	7.53
157	N6	N2	100.40	4.81%	438.43	439.68	---	---	33.50	---	33.50	90°	2.08%	440.38	452.17	10.02
137	N6	N2	87.84	4.81%	437.82	439.07	---	---	20.50	---	20.50	90°	2.08%	439.50	449.87	8.60
1*	V2	V1	295.00	1.00%	432.31	432.51	---	---	38.88	34.64	4.24	90°	2.08%	433.32	438.18	3.02
2*	V2	V1	295.00	1.00%	432.31	432.51	---	---	38.88	34.64	4.24	90°	2.08%	433.32	438.28	3.12
11*	V2	V1	295.00	1.00%	432.31	432.64	---	---	26.43	---	26.43	90°	2.08%	433.19	446.77	11.81
12	V2	V1	235.00	1.00%	431.71	432.96	---	---	24.74	20.50	4.24	90°	2.08%	433.47	447.27	11.95
13	V2	V1	235.00	1.00%	431.71	432.96	---	---	24.74	20.50	4.24	90°	2.08%	433.47	447.27	11.95
3	V2	V1	173.00	1.00%	431.09	432.34	---	---	38.82	34.58	4.24	90°	2.08%	433.14	438.28	3.29
4	V2	V1	173.00	1.00%	431.09	432.34	---	---	38.82	34.58	4.24	90°	2.08%	433.14	438.18	3.19
14	V2	V1	115.00	1.00%	430.50	431.75	---	---	24.74	20.50	4.24	90°	2.08%	432.27	446.77	12.66
15	V2	V1	115.00	1.00%	430.50	431.75	---	---	24.74	20.50	4.24	90°	2.08%	432.27	445.87	11.76
5	V2	V1	53.00	1.00%	429.88	431.13	---	---	38.82	34.58	4.24	90°	2.08%	431.94	438.18	4.40
6	V2	V1	53.00	1.00%	429.88	431.13	---	---	38.82	34.58	4.24	90°	2.08%	431.94	436.78	3.00
16*	V1	V	295.00	1.00%	429.30	429.50	---	---	25.34	21.10	4.24	90°	2.08%	430.03	444.97	13.10
17*	V1	V	295.00	1.00%	429.30	429.50	---	---	25.34	21.10	4.24	90°	2.08%	430.03	444.57	12.70
7	V1	V	228.00	1.00%	428.63	429.88	---	---	38.82	34.58	4.24	90°	2.08%	430.69	435.38	2.85
8	V1	V	228.00	1.00%	428.63	429.88	---	---	38.82	34.58	4.24	90°	2.08%	430.69	434.73	2.20
18	V1	V	170.00	1.00%	428.05	429.30	---	---	24.82	20.58	4.24	90°	2.08%	429.81	443.77	12.11
19	V1	V	170.00	1.00%	428.05	429.30	---	---	24.82	20.58	4.24	90°	2.08%	429.81	442.37	10.71
9	V1	V	108.00	1.00%	427.42	428.67	---	---	38.82	34.58	4.24	90°	2.08%	429.48	434.43	3.10
10	V1	V	108.00	1.00%	427.42	428.67	---	---	38.82	34.58	4.24	90°	2.08%	429.48	434.22	2.89
20	V1	V	99.90	1.00%	427.34	428.59	---	---	23.50	---	23.50	90°	2.08%	429.08	441.47	10.60
V22*	M6	M2	240.00	1.00%	429.76	429.96	---	---	34.82	30.58	4.24	90°	2.08%	430.69	441.04	8.57
V21*	M6	M2	240.00	1.00%	429.76	429.96	---	---	34.82	30.58	4.24	90°	2.08%	430.69	441.04	8.83
V20	M6	M2	200.00	1.00%	429.36	430.61	---	---	34.82	30.58	4.24	90°	2.08%	431.34	441.04	8.18
V19	M6	M2	200.00	1.00%	429.36	430.61	---	---	34.82	30.58	4.24	90°	2.08%	431.34	441.04	8.18
V23	M6	M2	180.00	1.00%	429.16	430.41	---	---	21.82	17.58	4.24	90°	2.08%	430.86	441.51	8.86
V24	M6	M2	180.00	1.00%	429.16	430.41	---	---	21.82	17.58	4.24	90°	2.08%	430.86	440.84	8.45
V18	M6	M2	160.00	1.00%	428.96	430.21	---	---	34.82	30.58	4.24	90°	2.08%	430.94	441.04	8.58
V17	M6	M2	160.00	1.00%	428.96	430.21	---	---	34.82	30.58	4.24	90°	2.08%	430.94	440.37	7.91
V25	M6	M2	140.00	1.00%	428.76	430.01	---	---	21.82	17.58	4.24	90°	2.08%	430.46	440.84	8.85
V26	M6	M2	140.00	1.00%	428.76	430.01	---	---	21.82	17.58	4.24	90°	2.08%	430.46	440.84	8.85
V16	M6	M2	120.00	1.00%	428.56	429.81	---	---	34.82	30.58	4.24	90°	2.08%	430.54	440.37	8.31
V15	M6	M2	120.00	1.00%	428.56	429.81	---	---	34.82	30.58	4.24	90°	2.08%	430.54	440.37	8.31
V27	M6	M2	100.00	1.00%	428.36	429.61	---	---	21.82	17.58	4.24	90°	2.08%	430.06	440.84	9.25
V28	M6	M2	100.00	1.00%	428.36	429.61	---	---	21.82	17.58	4.24	90°	2.08%	430.06	440.84	9.25
V14	M6	M2	80.00	1.00%	428.16	429.41	---	---	34.82	30.58	4.24	90°	2.08%	430.14	440.84	9.17
V13	M6	M2	80.00	1.00%	428.16	429.41	---	---	34.82	30.58	4.24	90°	2.08%	430.14	440.37	8.45
V29	M6	M2	60.00	1.00%	427.96	429.21	---	---	20.50	---	20.50	90°	2.08%	429.64	440.84	9.44
V77*	M5	M1	292.50	1.17%	428.46	428.79	---	---	27.28	---	27.28	90°	2.08%	429.36	437.77	6.65
V76	M5	M1	270.50	1.17%	428.20	429.45	---	---	22.74	18.50	4.24	90°	2.08%	429.93	437.77	6.33
V75	M5	M1	270.50	1.17%	428.20	429.45	---	---	22.74	18.50	4.24	90°	2.08%	429.93	437.77	6.33
V74	M5	M1	230.50	1.17%	427.74	428.99	---	---	21.82	17.58	4.24	90°	2.08%	429.44	437.77	6.80
V73	M5	M1	230.50	1.17%	427.74	428.99	---	---	21.82	17.58	4.24	90°	2.08%	429.44	437.77	6.55
V1	M5	M1	213.13	1.17%	427.53	428.78	---	---	34.74	30.50	4.24	90°	2.08%	429.51	438.75	7.46
V2	M5	M1	213.13	1.17%	427.53	428.78	---	---	34.74	30.50	4.24	90°	2.08%	429.51	438.75	7.71
V3	M5	M1	173.13	1.17%	427.06	428.31	---	---	34.74	30.50	4.24	90°	2.08%	429.04	438.75	8.19
V4	M5	M1	173.13	1.17%	427.06	428.31	---	---	34.74	30.50	4.24	90°	2.08%	429.04	438.75	8.18
V72	M5	M1	163.50	1.17%	426.95	428.20	---	---	20.50	---	20.50	90°	2.08%	428.63	439.37	8.98
V5	M5	M1	133.13	1.17%	426.60	427.85	---	---	34.74	30.50	4.24	90°	2.08%	428.57	439.42	9.32
V6	M5	M1	133.13	1.17%	426.60	427.85	---	---	34.74	30.50	4.24	90°	2.08%	428.57	439.42	9.06
V71	M5	M1	123.50	1.17%	426.48	427.73	---	---	21.82	17.58	4.24	90°	2.08%	428.19	439.37	9.66
V70	M5	M1	123.50	1.17%	426.48	427.73	---	---	21.82	17.58	4.24	90°	2.08%	428.19	439.37	9.65
V69	M5	M1	83.50	1.17%	426.02	427.27	---	---	21.82	17.58	4.24	90°	2.08%	427.72	439.37	10.12
V68	M5	M1	83.50	1.17%	426.02	427.27	---	---	21.82	17.58	4.24	90°	2.08%	427.72	439.37	9.86
V7	M5	M1	46.13	1.17%	425.58	426.83	---	---	34.74	30.50	4.24	90°	2.08%	427.55	439.92	10.58
V8	M5	M1	46.13	1.17%	425.58	426.83	---	---	36.74	32.50	4.24	90°	2.08%	427.59	439.92	10.79

PROJECT: STONE SPRING
SANITARY SEWER LATERAL COMPUTATIONS

BUILDING / LOT NO.	SANITARY SEWER MAIN: UPPER MANHOLE STR. NO.	LOWER MANHOLE STR. NO.	DIST. FROM LOWER MANHOLE (FT.)	SLOPE OF MAIN (%)	INV. OF SEWER MAIN	INV. OF LATERAL @ SEWER MAIN	LATERAL RISER @ MAIN: HEIGHT (FT.)	INV. OF LATERAL @ RISER	SANITARY SEWER LATERAL: TOTAL LENGTH (FT.)	PLAN LENGTH: 6" DIA. (FT.)	4" DIA. (FT.)	LAT. ANGLE @ SEWER MAIN	PIPE SLOPE (%)	INV. OF LATERAL STUB (ELEV.)	BUILDING / SLAB ELEV.	ELEV. DIFF. (LAT END-SLAB)(FT.)
233*	R2	R1	300.00	6.09%	457.20	457.53	---	---	22.85	---	22.85	90°	2.08%	458.01	470.57	10.79
226*	R2	R1	300.00	6.09%	457.20	457.40	---	---	34.74	30.50	4.24	90°	2.08%	458.12	468.87	8.90
225*	R2	R1	300.00	6.09%	457.20	457.40	---	---	34.74	30.50	4.24	90°	2.08%	458.12	466.37	6.40
232	R2	R1	240.00	6.09%	453.55	454.80	---	---	21.74	17.50	4.24	90°	2.08%	455.25	468.32	11.23
231	R2	R1	240.00	6.09%	453.55	454.80	---	---	21.74	17.50	4.24	90°	2.08%	455.25	465.07	7.98
224	R2	R1	180.00	6.09%	449.89	451.14	---	---	34.74	30.50	4.24	90°	2.08%	451.87	463.77	10.06
223	R2	R1	180.00	6.09%	449.89	451.14	---	---	34.74	30.50	4.24	90°	2.08%	451.87	460.47	6.76
230	R2	R1	120.00	6.09%	446.24	447.49	---	---	21.74	17.50	4.24	90°	2.08%	447.94	460.92	11.14
229	R2	R1	120.00	6.09%	446.24	447.49	---	---	21.74	17.50	4.24	90°	2.08%	447.94	456.77	6.99
222	R2	R1	60.00	6.09%	442.58	443.83	---	---	34.74	30.50	4.24	90°	2.08%	444.56	456.47	10.07
221	R2	R1	60.00	6.09%	442.58	443.83	---	---	34.74	30.50	4.24	90°	2.08%	444.56	452.47	6.07
228*	R1	R	96.50	4.02%	438.83	439.03	---	---	21.74	17.50	4.24	90°	2.08%	439.48	453.17	11.84
227*	R1	R	96.50	4.02%	438.83	439.03	---	---	21.74	17.50	4.24	90°	2.08%	439.48	450.42	9.09
220	R1	R	66.40	4.02%	437.62	438.87	---	---	33.50	---	33.50	90°	2.08%	439.57	449.57	8.38
202*	P2	P1	316.50	6.93%	476.90	477.10	---	---	21.74	17.50	4.24	90°	2.08%	477.55	488.17	8.77
203*	P2	P1	316.50	6.93%	476.90	477.10	---	---	21.74	17.50	4.24	90°	2.08%	477.55	486.87	7.47
192	P2	P1	254.38	6.93%	472.60	473.85	---	---	34.74	30.50	4.24	90°	2.08%	474.57	485.32	8.91
191	P2	P1	254.38	6.93%	472.60	473.85	---	---	34.74	30.50	4.24	90°	2.08%	474.57	482.47	6.06
204	P2	P1	196.50	6.93%	468.59	469.84	---	---	21.74	17.50	4.24	90°	2.08%	470.29	484.22	12.09
205	P2	P1	196.50	6.93%	468.59	469.84	---	---	21.74	17.50	4.24	90°	2.08%	470.29	480.27	8.14
190	P2	P1	184.27	6.93%	467.74	468.99	---	---	33.50	---	33.50	90°	2.08%	469.69	479.37	7.91
189	P2	P1	104.27	6.93%	462.19	463.44	---	---	33.50	---	33.50	90°	2.08%	464.14	475.37	9.61
188	P2	P1	14.38	6.93%	455.97	457.22	---	---	34.74	30.50	4.24	90°	2.08%	457.94	472.02	12.24
187	P2	P1	14.38	6.93%	455.97	457.22	---	---	34.74	30.50	4.24	90°	2.08%	457.94	469.77	9.99
219	P1	P	319.60	3.45%	452.10	453.35	---	---	27.50	---	27.50	90°	2.08%	453.92	467.57	12.03
186	P1	P	294.38	3.45%	451.23	452.48	---	---	34.74	30.50	4.24	90°	2.08%	453.21	467.22	12.17
185	P1	P	294.38	3.45%	451.23	452.48	---	---	34.74	30.50	4.24	90°	2.08%	453.21	464.97	9.92
218	P1	P	229.50	3.45%	449.00	450.25	---	---	28.74	24.50	4.24	90°	2.08%	450.85	465.17	12.48
217	P1	P	229.50	3.45%	449.00	450.25	---	---	28.74	24.50	4.24	90°	2.08%	450.85	462.77	10.08
184	P1	P	204.27	3.45%	448.13	449.38	---	---	33.50	---	33.50	90°	2.08%	450.08	461.57	9.88
216	P1	P	109.50	3.45%	444.86	446.11	---	---	28.74	24.50	4.24	90°	2.08%	446.71	460.07	11.52
215	P1	P	109.50	3.45%	444.86	446.11	---	---	28.74	24.50	4.24	90°	2.08%	446.71	457.97	9.42
214	P1	P	47.50	3.45%	442.73	443.98	---	---	27.50	---	27.50	90°	2.08%	444.55	455.37	8.84
183*	N5	N4	265.25	5.50%	467.06	467.26	---	---	21.74	17.50	4.24	90°	2.08%	467.71	482.22	12.66
182*	N5	N4	265.25	5.50%	467.06	467.26	---	---	21.74	17.50	4.24	90°	2.08%	467.71	479.92	10.36
174*	N5	N4	265.25	5.50%	467.06	467.39	---	---	34.99	---	34.99	90°	2.08%	468.12	480.17	10.28
173	N5	N4	205.25	5.50%	463.76	465.01	---	---	34.74	30.50	4.24	90°	2.08%	465.73	477.72	10.14
172	N5	N4	205.25	5.50%	463.76	465.01	---	---	34.74	30.50	4.24	90°	2.08%	465.73	474.77	7.19
181	N5	N4	145.25	5.50%	460.46	461.71	---	---	21.74	17.50	4.24	90°	2.08%	462.16	476.92	12.91
180	N5	N4	145.25	5.50%	460.46	461.71	---	---	21.74	17.50	4.24	90°	2.08%	462.16	473.52	9.51
171	N5	N4	85.25	5.50%	457.16	458.41	---	---	34.74	30.50	4.24	90°	2.08%	459.13	471.27	10.29
170	N5	N4	85.25	5.50%	457.16	458.41	---	---	34.74	30.50	4.24	90°	2.08%	459.13	467.92	6.94
179	N5	N4	25.25	5.50%	453.86	455.11	---	---	21.74	17.50	4.24	90°	2.08%	455.56	470.02	12.61
178	N5	N4	25.25	5.50%	453.86	455.11	---	---	21.74	17.50	4.24	90°	2.08%	455.56	466.57	9.16
169	N4	N3	230.50	5.06%	450.59	451.84	---	---	34.74	30.50	4.24	90°	2.08%	452.57	464.42	10.01
168	N4	N3	230.50	5.06%	450.59	451.84	---	---	34.74	30.50	4.24	90°	2.08%	452.57	461.07	6.66
177	N4	N3	220.40	5.06%	450.08	451.33	---	---	20.50	---	20.50	90°	2.08%	451.76	463.12	9.59
167	N4	N3	140.04	5.06%	446.02	447.27	---	---	33.50	---	33.50	90°	2.08%	447.96	457.92	8.34
176	N4	N3	110.50	5.06%	444.52	445.77	---	---	21.74	17.50	4.24	90°	2.08%	446.22	459.47	11.40
175	N4	N3	110.50	5.06%	444.52	445.77	---	---	21.74	17.50	4.24	90°	2.08%	446.22	457.37	9.30
166	N4	N3	80.40	5.06%	443.00	444.25	---	---	33.50	---	33.50	90°	2.08%	444.95	455.57	9.01
152	N3	N2	221.50	1.80%	437.59	438.84	---	---	24.74	20.50	4.24	90°	2.08%	439.36	444.78	3.58
151	N3	N2	221.50	1.80%	437.59	438.84	---	---	24.74	20.50	4.24	90°	2.08%	439.36	443.58	2.38
150	N3	N2	101.50	1.80%	435.43	436.68	---	---	24.74	20.50	4.24	90°	2.08%	437.20	442.38	3.34
149	N3	N2	101.50	1.80%	435.43	436.68	---	---	24.74	20.50	4.24	90°	2.08%	437.20	441.18	2.14
148	N3	N2	31.40	1.80%	434.17	435.42	---	---	23.50	---	23.50	90°	2.08%	435.91	441.18	3.50
125*	Z	Y	264.00	3.63%	467.78	467.98	---	---	35.07	30.83	4.24	90°	2.08%	468.71	480.87	10.03
124*	Z	Y	264.00	3.63%	467.78	467.98	---	---	35.07	30.83	4.24	90°	2.08%	468.71	481.57	10.59
123	Z	Y	252.90	3.63%	467.38	468.63	---	---	33.50	---	33.50	90°	2.08%	469.33	480.37	9.42
147	Z	Y	228.65	3.63%	466.50	467.75	---	---	20.50	---	20.50	90°	2.08%	468.18	477.07	7.03
122	Z	Y	163.00	3.63%	464.11	465.36	---	---	34.82	30.58	4.24	90°	2.08%	466.09	478.57	10.64
121	Z	Y	163.00	3.63%	464.11	465.36	---	---	34.82	30.58	4.24	90°	2.08%	466.09	476.17	8.24
120	Z	Y	43.00	3.63%	459.75	461.00	---	---	34.82	30.58	4.24	90°	2.08%	461.73	473.87	10.30
119	Z	Y	43.00	3.63%	459.75	461.00	---	---	34.82	30.58	4.24	90°	2.08%	461.73	472.07	8.50
136	Y	X	197.10	4.23%	455.25	456.50	---	---	20.50	---	20.50	90°	2.08%	456.93	468.82	10.27
135	Y	X	136.90	4.23%	452.71	453.96	---	---	20.50	---	20.50	90°	2.08%	454.38	466.62	10.62
134	Y	X	47.00	4.23%	448.91	450.16	---	---	21.82	17.58	4.24	90°	2.08%	450.61	464.22	11.77
133	Y	X	47.00	4.23%	448.91	450.16	---	---	21.82	17.58	4.24	90°	2.08%	450.61	461.67	9.22
132	X	W	234.10	3.83%	445.17	446.42	---	---	20.50	---	20.50	90°	2.08%	446.85	459.37	10.91
131	X	W	87.10	3.83%	439.54	440.79	---	---	20.50	---	20.50	90°	2.08%	441.21	453.47	10.64
130*	W	V	276.50	3.53%	436.09	436.29	---	---	22.07	17.83	4.24	90°	2.08%	436.75	451.07	12.47
129*	W	V	276.50	3.53%	436.09	436.29	---	---	22.07	17.83	4.24	90°	2.08%	436.75	448.67	10.07
128	W	V	203.40	3.53%	433.52	434.77	---	---	20.50	---	20.50	90°	2.08%	435.19	446.27	9.31
127	W	V	93.50	3.53%	429.64	430.89	---	---	18.82	17.58	1.24	90°	2.08%	431.28	443.97	10.85
126	W	V	93.50	3.53%	429.64	430.89	---	---	21.82	17.58	4.24	90°	2.08%	431.34	442.27	9.08
V39*	M4	M3	240.00	4.22%	440.69	441.02	---	---	40.12	---	40.12	90°	2.08%	441.86	451.91	8.29
V38	M4	M3	220.00	4.22%	439.85	441.10	---	---	34.82	30.58	4.24	90°	2.08%	441.83	451.24	7.88
V37	M4	M3	220.00	4.22%	439.85	441.10	---	---	34.82	30.58	4.24	90°	2.08%	441.83	450.57	7.21
V36	M4	M3	180.00	4.22%	438.16	439.41	---	---	34.82	30.58	4.24	90°	2.08%	440.14	449.90	8.23
V35	M4	M3	180.00	4.22%	438.16	439.41	---	---	34.82

PROJECT: STONE SPRING
SANITARY SEWER LATERAL COMPUTATIONS

BUILDING / LOT NO.	SANITARY SEWER MAIN: UPPER MANHOLE STR. NO.	LOWER MANHOLE STR. NO.	DIST. FROM LOWER MANHOLE (FT.)	SLOPE OF MAIN (%)	INV. OF SEWER MAIN	INV. OF LATERAL @ SEWER MAIN	LATERAL RISER @ MAIN: HEIGHT (FT.)	INV. OF LATERAL @ RISER	SANITARY SEWER LATERAL: TOTAL LENGTH (FT.)	PLAN LENGTH: 6" DIA. (FT.)	4" DIA. (FT.)	LAT. ANGLE @ SEWER MAIN	PIPE SLOPE (%)	INV. OF LATERAL STUB (ELEV.)	BUILDING / SLAB ELEV.	ELEV. DIFF. (LAT END-SLAB)(FT.)
V46*	M3	M2	300.00	1.04%	430.47	430.67	---	---	51.74	47.50	4.24	90°	2.08%	431.75	441.67	8.14
V47*	M3	M2	300.00	1.04%	430.47	430.67	---	---	51.74	47.50	4.24	90°	2.08%	431.75	442.34	9.06
V48*	M3	M2	300.00	1.04%	430.47	430.67	---	---	22.29	18.05	4.24	90°	2.08%	431.13	443.00	10.34
V49*	M3	M2	300.00	1.04%	430.47	430.67	---	---	22.29	18.05	4.24	90°	2.08%	431.13	443.00	10.34
V50	M3	M2	264.13	1.04%	430.10	431.35	---	---	21.82	17.58	4.24	90°	2.08%	431.80	443.67	10.34
V51	M3	M2	264.13	1.04%	430.10	431.35	---	---	21.82	17.58	4.24	90°	2.08%	431.80	444.34	11.01
V52	M3	M2	224.13	1.04%	429.68	430.93	---	---	21.82	17.58	4.24	90°	2.08%	431.39	444.34	11.42
V53	M3	M2	224.13	1.04%	429.68	430.93	---	---	21.82	17.58	4.24	90°	2.08%	431.39	444.34	11.17
V54	M3	M2	127.13	1.04%	428.68	429.93	---	---	21.82	17.58	4.24	90°	2.08%	430.38	442.84	10.67
V55	M3	M2	127.13	1.04%	428.68	429.93	---	---	21.82	17.58	4.24	90°	2.08%	430.38	442.84	10.93
V56	M3	M2	87.13	1.04%	428.26	429.51	---	---	21.82	17.58	4.24	90°	2.08%	429.97	442.84	11.34
V57	M3	M2	87.13	1.04%	428.26	429.51	---	---	21.82	17.58	4.24	90°	2.08%	429.97	441.50	10.00
V58	M3	M2	47.13	1.04%	427.85	429.10	---	---	21.82	17.58	4.24	90°	2.08%	429.55	441.50	10.42
V59	M3	M2	47.13	1.04%	427.85	429.10	---	---	21.82	17.58	4.24	90°	2.08%	429.55	440.83	9.75
V60*	M2	M1	240.37	0.92%	427.26	427.46	---	---	23.21	18.97	4.24	90°	2.08%	427.94	440.17	10.47
V61*	M2	M1	240.37	0.92%	427.26	427.46	---	---	23.21	18.97	4.24	90°	2.08%	427.94	440.17	10.47
V62	M2	M1	150.50	0.92%	426.43	427.68	---	---	21.82	17.58	4.24	90°	2.08%	428.13	439.34	9.68
V63	M2	M1	150.50	0.92%	426.43	427.68	---	---	21.82	17.58	4.24	90°	2.08%	428.13	439.34	9.68
V64	M2	M1	110.50	0.92%	426.06	427.31	---	---	21.82	17.58	4.24	90°	2.08%	427.77	439.34	10.05
V65	M2	M1	110.50	0.92%	426.06	427.31	---	---	21.82	17.58	4.24	90°	2.08%	427.77	440.01	10.72
V66	M2	M1	70.50	0.92%	425.69	426.94	---	---	21.82	17.58	4.24	90°	2.08%	427.40	440.01	11.08
V67	M2	M1	70.50	0.92%	425.69	426.94	---	---	21.82	17.58	4.24	90°	2.08%	427.40	440.01	10.83
V12	M2	M1	33.87	0.92%	425.35	426.60	---	---	34.74	30.50	4.24	90°	2.08%	427.33	439.92	10.81
V11	M2	M1	33.87	0.92%	425.35	426.60	---	---	34.74	30.50	4.24	90°	2.08%	427.33	439.92	11.06
43*	X2	X1	235.00	2.37%	457.62	457.95	---	---	45.04	---	45.04	90°	2.08%	458.89	468.67	8.16
44	X2	X1	205.10	2.37%	456.91	458.16	---	---	33.50	---	33.50	90°	2.08%	458.86	468.67	8.19
78	X2	X1	175.00	2.37%	456.20	457.45	---	---	21.74	17.50	4.24	90°	2.08%	457.90	468.47	8.72
79	X2	X1	175.00	2.37%	456.20	457.45	---	---	21.74	17.50	4.24	90°	2.08%	457.90	467.37	7.62
45	X2	X1	115.00	2.37%	454.78	456.03	---	---	34.74	30.50	4.24	90°	2.08%	456.75	467.67	9.08
46	X2	X1	115.00	2.37%	454.78	456.03	---	---	34.74	30.50	4.24	90°	2.08%	456.75	466.17	7.58
80	X2	X1	55.00	2.37%	453.35	454.60	---	---	21.74	17.50	4.24	90°	2.08%	455.06	466.91	10.01
81	X2	X1	55.00	2.37%	453.35	454.60	---	---	21.74	17.50	4.24	90°	2.08%	455.06	465.67	8.77
47*	X1	X	230.00	2.19%	451.95	452.15	---	---	34.74	30.50	4.24	90°	2.08%	452.87	464.67	9.95
48*	X1	X	230.00	2.19%	451.95	452.15	---	---	34.74	30.50	4.24	90°	2.08%	452.87	463.17	8.45
82	X1	X	170.00	2.19%	450.64	451.89	---	---	21.74	17.50	4.24	90°	2.08%	452.34	464.07	9.89
83	X1	X	170.00	2.19%	450.64	451.89	---	---	21.74	17.50	4.24	90°	2.08%	452.34	462.57	8.39
49	X1	X	110.00	2.19%	449.33	450.58	---	---	34.74	30.50	4.24	90°	2.08%	451.30	461.67	8.53
50	X1	X	110.00	2.19%	449.33	450.58	---	---	34.74	30.50	4.24	90°	2.08%	451.30	460.17	7.03
84	X1	X	79.99	2.19%	448.67	449.92	---	---	20.50	---	20.50	90°	2.08%	450.35	461.40	9.44
31*	W2	W1	295.00	1.47%	448.43	448.76	---	---	22.85	---	22.85	90°	2.08%	449.23	458.25	7.25
21*	W2	W1	295.00	1.47%	448.43	448.63	---	---	34.82	30.58	4.24	90°	2.08%	449.35	456.77	5.58
22*	W2	W1	295.00	1.47%	448.43	448.63	---	---	34.82	30.58	4.24	90°	2.08%	449.35	458.47	7.28
32	W2	W1	235.00	1.47%	447.55	448.80	---	---	21.74	17.50	4.24	90°	2.08%	449.25	460.12	9.03
33	W2	W1	235.00	1.47%	447.55	448.80	---	---	21.74	17.50	4.24	90°	2.08%	449.25	461.17	10.08
23	W2	W1	204.90	1.47%	447.11	448.36	---	---	33.50	---	33.50	90°	2.08%	449.05	459.92	9.25
24	W2	W1	144.90	1.47%	446.23	447.48	---	---	33.50	---	33.50	90°	2.08%	448.17	459.87	10.08
34	W2	W1	115.00	1.47%	445.79	447.04	---	---	21.74	17.50	4.24	90°	2.08%	447.49	461.17	11.84
35	W2	W1	115.00	1.47%	445.79	447.04	---	---	21.74	17.50	4.24	90°	2.08%	447.49	459.97	10.64
25	W2	W1	84.90	1.47%	445.35	446.60	---	---	33.50	---	33.50	90°	2.08%	447.29	458.37	9.46
26	W2	W1	24.90	1.47%	444.47	445.72	---	---	33.50	---	33.50	90°	2.08%	446.41	456.57	8.54
36*	W1	W	295.00	2.69%	444.13	444.33	---	---	22.44	18.20	4.24	90°	2.08%	444.80	458.17	11.52
37*	W1	W	295.00	2.69%	444.13	444.33	---	---	22.44	18.20	4.24	90°	2.08%	444.80	459.37	12.72
27	W1	W	230.00	2.69%	442.39	443.64	---	---	34.82	30.58	4.24	90°	2.08%	444.36	454.77	8.57
28	W1	W	230.00	2.69%	442.39	443.64	---	---	34.82	30.58	4.24	90°	2.08%	444.36	452.97	6.77
38	W1	W	170.00	2.69%	440.77	442.02	---	---	21.82	17.58	4.24	90°	2.08%	442.48	454.67	10.35
39	W1	W	170.00	2.69%	440.77	442.02	---	---	21.82	17.58	4.24	90°	2.08%	442.48	452.87	8.55
29	W1	W	110.00	2.69%	439.16	440.41	---	---	34.82	30.58	4.24	90°	2.08%	441.13	452.87	9.89
30	W1	W	110.00	2.69%	439.16	440.41	---	---	34.82	30.58	4.24	90°	2.08%	441.13	449.37	6.39
40	W1	W	99.90	2.69%	438.89	440.14	---	---	20.50	---	20.50	90°	2.08%	440.56	451.06	8.73
V9*	M1	M	261.19	0.59%	424.94	425.14	---	---	35.35	31.11	4.24	90°	2.08%	425.88	439.92	12.51
V10*	M1	M	261.19	0.59%	424.94	425.14	---	---	35.35	31.11	4.24	90°	2.08%	425.88	439.92	12.51
240*	T	S	396.50	3.18%	456.82	457.15	---	---	25.58	---	25.58	90°	2.08%	457.68	471.82	12.37
239	T	S	336.50	3.18%	454.91	456.16	---	---	24.82	20.58	4.24	90°	2.08%	456.68	470.32	11.80
238	T	S	336.50	3.18%	454.91	456.16	---	---	24.82	20.58	4.24	90°	2.08%	456.68	467.02	8.50
237	T	S	216.50	3.18%	451.10	452.35	---	---	24.82	20.58	4.24	90°	2.08%	452.87	464.67	9.96
236	T	S	216.50	3.18%	451.10	452.35	---	---	24.82	20.58	4.24	90°	2.08%	452.87	462.22	7.51
235	T	S	96.50	3.18%	447.29	448.54	---	---	24.82	20.58	4.24	90°	2.08%	449.06	459.82	8.92
234	T	S	96.50	3.18%	447.29	448.54	---	---	24.82	20.58	4.24	90°	2.08%	449.06	457.42	6.52
248	S	R	106.50	3.48%	438.66	439.91	---	---	38.82	34.58	4.24	90°	2.08%	440.72	450.17	7.61
247	S	R	106.50	3.48%	438.66	439.91	---	---	38.82	34.58	4.24	90°	2.08%	440.72	448.27	5.71
246	S	R	16.40	3.48%	435.52	436.77	---	---	37.50	---	37.50	90°	2.08%	437.55	446.87	7.70
245	R	Q	100.14	1.01%	434.11	435.36	---	---	38.82	34.58	4.24	90°	2.08%	436.17	446.17	8.16
244	R	Q	100.14	1.01%	434.11	435.36	---	---	38.82	34.58	4.24	90°	2.08%	436.17	446.57	8.56
243	R	Q	28.76	1.01%	433.39	434.64	---	---	37.14	---	37.14	90°	2.08%	435.41	447.87	10.65
242	Q	P	34.61	0.50%	432.41	433.66	---	---	46.80	42.56	4.24	90°	2.08%	434.64	443.18	6.70
241	Q	P	34.61	0.50%	432.41	433.66	---	---	46.80	42.56	4.24	90°	2.08%	434.64	444.98	8.48
156	P	O	191.40	1.47%	430.57	431.82	---	---	5.36	1.12	4.24	90°	2.08%	431.93	449.68	15.78
155	P	O	191.40	1.47%	430.57	431.82	---	---	5.36	1.12	4.24	90°	2.08%	431.93	448.28	14.38
154	P	O	71.90	1.47%	428.82	430.07	---	---	16.29	12.05	4.24	90°	2.08%	430.41	447.18	14.81
153	P	O	71.90	1.47%	428.82	430.07	---	---	16.29	12.05	4.24	90°	2.08%	430.41	445.98	13.61
118*	J3	J2	379.26	1.23%	457.67	457.87	---	---	47.37	43.13	4.24	90°	2.08%	458.86	471.07	10.37
117*	J3	J2	379.26	1.23%	457.67	457.87	---	---	47.37	43.13	4.24	90°	2.08%	458.86	470.47	9.77
100*	J3	J2	379.26	1.23%	457.67	458.00	---	---	20.50	---	20.50	90°	2.08%	458.43	468.47	8.19
99	J3	J2	316.76	1.23%	456.90	458.15	---	---	21.74	17.50	4.24	90°	2.08%	458.60	467.97	7.52
98	J3	J2	316.76	1.23%	456.90	458.15	---	---	21.74	17.50	4.24	90°	2.08%	458.60	467.37	6.92
116	J3	J2	289.76	1.23%	456.57	457.82	---	---	34.74	30.50	4.24	90°	2.08%	458.54	469.67	9.29
115	J3	J2	289.76	1.23%	456.57	457.82	---	---	34.74	30.50	4.24	90°	2.08%	458.54	469.07	8.69
97	J3	J2	196.76	1.23%	455.42	456.67	---	---	21.74	17.50	4.24	90°	2.08%	457.12	466.77	7.81
96	J3	J2	196.76	1.23%	455.42	456.67	---	---	21.74	17.50	4.24	90°	2.08%	457.12	466.77	7.81
114	J3	J2	169.76	1.23%	455.08	456.33	---	---	34.74	30.50	4.24	90°	2.08%	457.06	468.47	9.57
113	J3	J2	169.76	1.23%	455.08	456.33	---	---	34.74	30.50	4.24	90°	2.08%	457.06	467.87	8.97
95	J3	J2	76.76	1.23%	453.94	455.19	---	---	21.74	17.50	4.24	90°	2.08%	455.64	466.17	8.69
94	J3	J2	76.76	1.23%	453.94	455.19	---	---	21.74	17.50	4.24	90°	2.08%	455.64	465.57	8.09
112	J3	J2	49.76	1.23%	453.60	454.85	---	---	34.74	30.50	4.24	90°	2.08%	455.58	467.17	9.75

PROJECT: STONE SPRING
SANITARY SEWER LATERAL COMPUTATIONS

BUILDING / LOT NO.	SANITARY SEWER MAIN: UPPER MANHOLE STR. NO.	LOWER MANHOLE STR. NO.	DIST. FROM LOWER MANHOLE (FT.)	SLOPE OF MAIN (%)	INV. OF SEWER MAIN	INV. OF LATERAL @ SEWER MAIN	LATERAL RISER @ MAIN: HEIGHT (FT.)	INV. OF LATERAL @ RISER	SANITARY SEWER LATERAL: TOTAL LENGTH (FT.)	PLAN LENGTH: 6" DIA. (FT.)	4" DIA. (FT.)	LAT. ANGLE @ SEWER MAIN	PIPE SLOPE (%)	INV. OF LATERAL STUB (ELEV.)	BUILDING / SLAB ELEV.	ELEV. DIFF. (LAT END-SLAB)(FT.)
110	J2	J1	300.00	1.91%	451.54	452.79	---	---	34.74	30.50	4.24	90°	2.08%	453.52	465.67	10.31
109	J2	J1	300.00	1.91%	451.54	452.79	---	---	34.74	30.50	4.24	90°	2.08%	453.52	463.57	8.21
93	J2	J1	240.00	1.91%	450.40	451.65	---	---	21.74	17.50	4.24	90°	2.08%	452.10	464.02	10.08
92	J2	J1	240.00	1.91%	450.40	451.65	---	---	21.74	17.50	4.24	90°	2.08%	452.10	461.97	8.03
108	J2	J1	180.00	1.91%	449.25	450.50	---	---	34.74	30.50	4.24	90°	2.08%	451.22	460.57	7.51
107	J2	J1	180.00	1.91%	449.25	450.50	---	---	34.74	30.50	4.24	90°	2.08%	451.22	459.02	5.96
91	J2	J1	120.00	1.91%	448.10	449.35	---	---	21.74	17.50	4.24	90°	2.08%	449.80	460.17	8.53
90	J2	J1	120.00	1.91%	448.10	449.35	---	---	21.74	17.50	4.24	90°	2.08%	449.80	459.17	7.53
106	J2	J1	60.00	1.91%	446.95	448.20	---	---	34.74	30.50	4.24	90°	2.08%	448.92	458.37	7.60
105	J2	J1	60.00	1.91%	446.95	448.20	---	---	34.74	30.50	4.24	90°	2.08%	448.92	458.17	7.40
89*	J1	J	277.00	1.36%	445.70	445.90	---	---	21.74	17.50	4.24	90°	2.08%	446.35	458.27	10.07
88*	J1	J	277.00	1.36%	445.70	445.90	---	---	21.74	17.50	4.24	90°	2.08%	446.35	457.47	9.27
104	J1	J	217.00	1.36%	444.88	446.13	---	---	34.74	30.50	4.24	90°	2.08%	446.86	457.77	9.07
103	J1	J	217.00	1.36%	444.88	446.13	---	---	34.74	30.50	4.24	90°	2.08%	446.86	457.22	8.52
87	J1	J	157.00	1.36%	444.07	445.32	---	---	21.74	17.50	4.24	90°	2.08%	445.77	456.87	9.26
86	J1	J	157.00	1.36%	444.07	445.32	---	---	21.74	17.50	4.24	90°	2.08%	445.77	455.97	8.36
102	J1	J	97.00	1.36%	443.25	444.50	---	---	34.74	30.50	4.24	90°	2.08%	445.22	456.98	9.91
101	J1	J	97.00	1.36%	443.25	444.50	---	---	34.74	30.50	4.24	90°	2.08%	445.22	454.97	7.90
85	J1	J	57.00	1.36%	442.71	443.96	---	---	20.50	---	20.50	90°	2.08%	444.38	454.37	8.30
42*	F2	F1	274.50	2.50%	456.18	456.38	---	---	34.74	30.50	4.24	90°	2.08%	457.10	468.17	9.22
41*	F2	F1	274.50	2.50%	456.18	456.38	---	---	34.74	30.50	4.24	90°	2.08%	457.10	466.72	7.77
77	F2	F1	247.50	2.50%	455.51	456.76	---	---	21.74	17.50	4.24	90°	2.08%	457.21	466.67	7.62
76	F2	F1	247.50	2.50%	455.51	456.76	---	---	21.74	17.50	4.24	90°	2.08%	457.21	465.07	6.02
75	F2	F1	127.50	2.50%	452.51	453.76	---	---	21.74	17.50	4.24	90°	2.08%	454.21	463.47	7.42
74	F2	F1	127.50	2.50%	452.51	453.76	---	---	21.74	17.50	4.24	90°	2.08%	454.21	461.87	5.82
57	F2	F1	67.50	2.50%	451.01	452.26	---	---	34.74	30.50	4.24	90°	2.08%	452.98	461.97	7.15
58	F2	F1	67.50	2.50%	451.01	452.26	---	---	34.74	30.50	4.24	90°	2.08%	452.98	460.37	5.55
73	F2	F1	7.50	2.50%	449.51	450.76	---	---	21.74	17.50	4.24	90°	2.08%	451.21	460.37	7.32
72	F2	F1	7.50	2.50%	449.51	450.76	---	---	21.74	17.50	4.24	90°	2.08%	451.21	458.77	5.72
69	K	J	97.51	1.00%	440.03	441.28	---	---	33.50	---	33.50	90°	2.08%	441.97	444.75	1.01
68	K	J	27.41	1.00%	439.32	440.57	---	---	34.82	30.58	4.24	90°	2.08%	441.30	445.68	2.54
67	K	J	27.41	1.00%	439.32	440.57	---	---	34.82	30.58	4.24	90°	2.08%	441.30	444.43	1.29
66	J	H	76.38	2.22%	436.89	438.14	---	---	36.61	32.37	4.24	90°	2.08%	438.91	441.88	1.13
65	J	H	76.38	2.22%	436.89	438.14	---	---	36.61	32.37	4.24	90°	2.08%	438.91	440.08	-0.67
64	J	H	11.81	2.22%	435.46	436.71	---	---	32.59	---	32.59	90°	2.08%	437.39	439.23	-0.02
63*	G	F	69.97	0.50%	434.67	435.00	---	---	33.78	---	33.78	90°	2.08%	435.70	439.73	2.41
62	F	E	72.49	5.15%	428.23	429.48	---	---	46.76	42.52	4.24	90°	2.08%	430.46	441.38	9.03
61	F	E	69.49	5.15%	428.08	429.33	---	---	46.76	42.52	4.24	90°	2.08%	430.30	445.78	13.59
60	F1	F	117.70	3.92%	447.02	448.27	---	---	35.97	31.73	4.24	90°	2.08%	449.02	449.28	-1.58
59	F1	F	117.70	3.92%	447.02	448.27	---	---	35.97	31.73	4.24	90°	2.08%	449.02	452.38	1.52
70	F1	F	56.79	3.92%	444.63	445.88	---	---	19.07	14.83	4.24	90°	2.08%	446.28	453.47	5.23
71	F1	F	56.79	3.92%	444.63	445.88	---	---	19.07	14.83	4.24	90°	2.08%	446.28	455.57	7.45
56*	D2	D1	248.00	2.04%	441.41	441.61	---	---	34.82	30.58	4.24	90°	2.08%	442.33	459.57	15.25
55*	D2	D1	248.00	2.04%	441.41	441.61	---	---	34.82	30.58	4.24	90°	2.08%	442.33	457.37	13.05
54	D2	D1	120.00	2.04%	438.80	440.05	---	---	34.82	30.58	4.24	90°	2.08%	440.78	454.37	11.61
53	D2	D1	120.00	2.04%	438.80	440.05	---	---	34.82	30.58	4.24	90°	2.08%	440.78	451.77	9.01
52*	D1	D	60.22	10.01%	432.70	432.90	---	---	34.82	30.58	4.24	90°	2.08%	433.63	449.37	13.76
51*	D1	D	60.22	10.01%	432.70	432.90	---	---	34.82	30.58	4.24	90°	2.08%	433.63	446.97	11.36

NOTES:

*SANITARY LATERAL TO BE EXTENDED FROM SANITARY SEWER MANHOLE.

1. ALL SERVICE LATERALS SHALL BE INSTALLED AT A MIN. DEPTH OF 4 FEET, UNLESS OTHERWISE SPECIFIED OR APPROVED.
2. ALL SANITARY STUBS BEHIND CLEANOUTS SHALL HAVE A VERTICAL 45-DEGREE FITTING WITH A SECTION OF PIPE INSTALLED TO DAYLIGHT FOR PLUMBER TO CONNECT FROM HOUSE.

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 Martinsburg, WV 25401
Phone: 304-725-8456 www.ifs-se.com

JASON P. GERHART REGISTERED PROFESSIONAL ENGINEER NO. 19127 STATE OF WEST VIRGINIA

REVISIONS

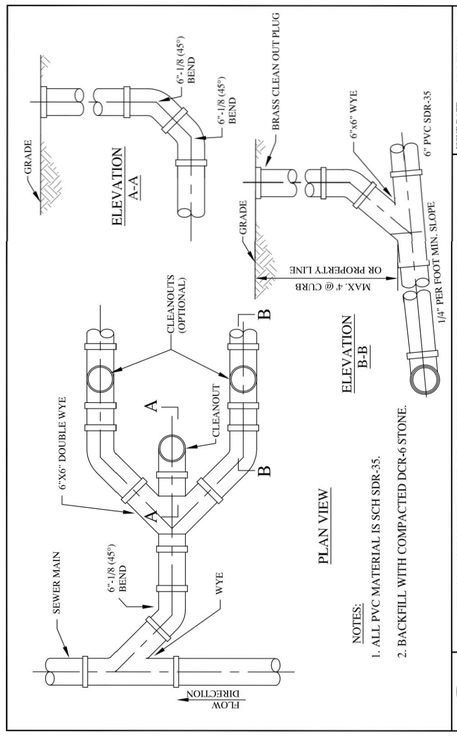
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SANITARY SEWER COMPUTATIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-701.DWG	
NCS:	
SHEET:	74 OF 134



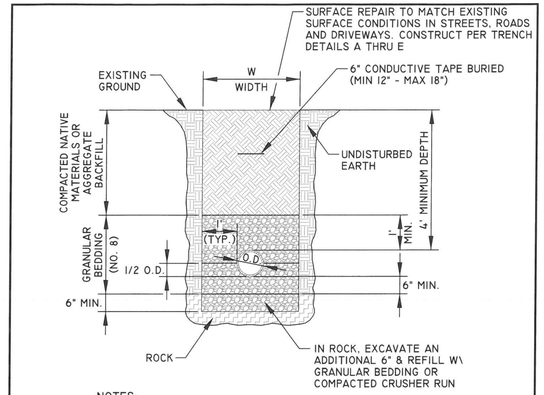
NOTES:
1. ALL PVC MATERIAL IS SCH SDR-35.
2. BACKFILL WITH COMPACTED DCR-6 STONE.

CITY OF HAGERSTOWN, MARYLAND - UTILITIES DEPARTMENT, WASTEWATER DIVISION

ISSUE DATE: MARCH 2010
REVISIONS

DOUBLE WYE HOUSE CONNECTION

DETAIL WW114

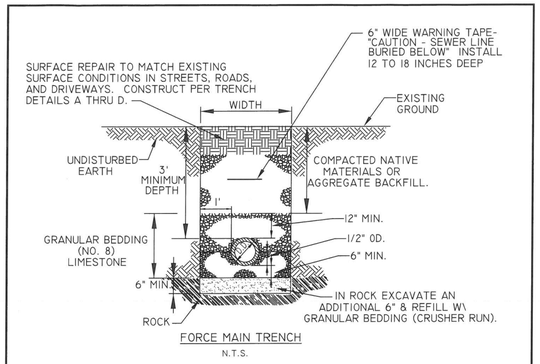


NOTES:
1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON, W = O.D. + 24", UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
4. BACKFILL ON SIDES TO 1/2 O.D. OF PIPE TO HOLD PIPE IN PLACE PRIOR TO PLACING ADDITIONAL BEDDING.
5. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (+2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
6. MAINTAIN MINIMUM OF 4' OF COVER TO THE TOP OF PIPE.
7. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS
8. ALL WATER LINES REQUIRE PERMIT FROM APPLICABLE REGULATORY ENTITIES. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

Charles Town Utility Board
832 S. George Street, P.O. Box 359, Charles Town, WV 25414
Phone: (304) 725-2316 •Fax: (304) 725-4313

SEWER LINE TRENCH DETAIL

Standard Detail No. **S-1**
NOT TO SCALE
SEPTEMBER 2015



FORCE MAIN TRENCH
N.T.S.

NOTES:
1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON, W = O.D. + 24", UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
4. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (+2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
5. MAINTAIN MINIMUM OF 3' OF COVER TO THE TOP OF PIPE.
6. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS

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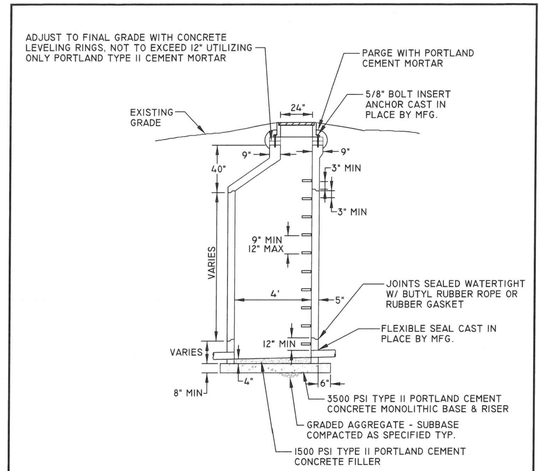
FORCE MAIN TRENCH DETAIL

Standard Detail No. **S-2**
NOT TO SCALE
SEPTEMBER 2015



NOTES:
1. PRECAST MANHOLE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 478 UTILIZING TYPE II PORTLAND CEMENT. 3500 PSI MIX MINIMUM.
2. 0.1' FALL TYPICAL INVERT IN TO INVERT OUT OR MATCH CROWNS FOR DIFFERING PIPE DIAMETERS.
3. COMPLETE MANHOLE SHALL PASS VACUUM TEST PRIOR TO ACCEPTANCE.

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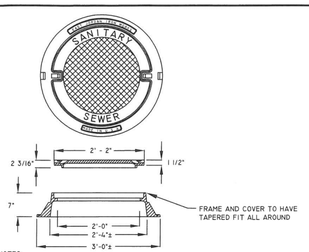
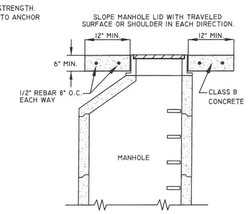
PRECAST MANHOLE W/ ECCENTRIC TOP DETAIL

Standard Detail No. **S-6**
NOT TO SCALE
SEPTEMBER 2015



NOTES:
1. MANHOLE COVERS SHALL NOT HAVE VENT HOLES
2. AVERAGE WEIGHT IS 600 LBS
3. DIMENSIONS ABOVE ARE FOR EAST JORDAN IRONWORKS PRODUCTS
4. APPROVED SUPPLIERS:
   EAST JORDAN IRON WORKS
   HIGHWAY: FRAME - PROD. NO. 1045Z UNDIPPED
   COVER - PROD. NO. 1040A UNDIPPED, SELF SEALING
   FRAME & COVER - PROD. NO. 1045AGS UNDIPPED, SELF SEALING
   WATERTIGHT: FRAME & COVER PROD. NO. 1045ZPT/010APT, UNDIPPED
   NEENAH
   HIGHWAY: FRAME & COVER R-1642, UNDIPPED, SELF SEALING
   WATERTIGHT: FRAME & COVER R-1916, UNDIPPED
5. FRAME AND COVER TO COMPLY WITH ASTM A48, CLASS 30 TENSILE STRENGTH
6. USE THREADED STAINLESS STEEL STANDARD HEXAGON HEAD BOLTS TO ANCHOR FRAME AND COVER TO MANHOLE.

MANHOLE FRAME AND COVER

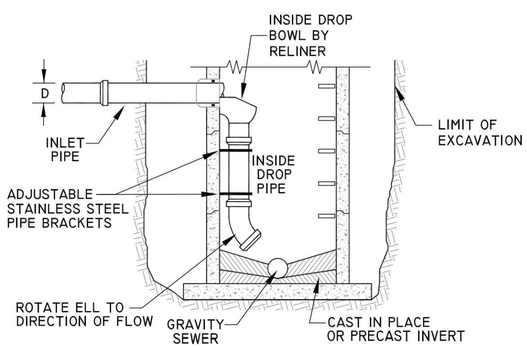


ANCHOR DETAIL FOR FRAME & COVER IN PAVED ROAD SURFACE AREAS AND SHOULDERS OF ROAD

Charles Town Utility Board
832 S. George Street, P.O. Box 359, Charles Town, WV 25414
Phone: (304) 725-2316 •Fax: (304) 725-4313

MANHOLE FRAME & COVER ANCHOR FOR FRAME & COVER DETAIL

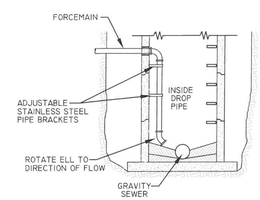
Standard Detail No. **S-7**
NOT TO SCALE
SEPTEMBER 2015



INSIDE DROP MANHOLE (TO BE USED FOR DROPS >2')

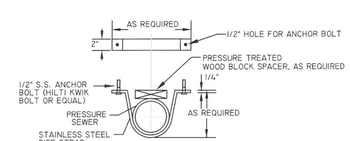
NOT TO SCALE

NOTES:
1. DROP PIPE TO BE THE SAME SIZE AS INLET.
2. USE A4 BOWL FOR 4" SEWER PIPE.
   USE B8 BOWL FOR 6"-8" SEWER PIPE.
   USE B10 BOWL FOR 10"-12" SEWER PIPE.
3. FOR PRECAST HOLE USE A-LOK "X-CELL" OR "Z-LOK" FOR FIELD CORE, USE A-LOK "G-3" RUBBER BOOT OR KORBAND MULTI-CONNECTOR.
4. FOR IRREGULAR HOLES SEAL PIPE ON BOTH SIDES WITH HYDRAULIC CEMEMNT.
5. ANCHOR DROP PIPE TO MANHOLE USING ADJUSTABLE STAINLESS STEEL PIPE BRACKETS. 2 BRACKETS MIN. WITH MAX SPACING OF 3'.



FORCE MAIN INLET

NOTES:
1. FORCE MAIN CONNECTIONS WITHIN MANHOLE SHALL BE RESTRAINED.
2. ANCHOR FORCE MAIN TO MANHOLE USING ADJUSTABLE STAINLESS STEEL PIPE BRACKETS. 2 BRACKETS MIN. AND 3' MAX. SPACING.
3. FOR IRREGULAR HOLES SEAL PIPE ON BOTH SIDES WITH HYDRAULIC CEMEMNT.
4. ANCHOR FORCE MAIN TO MANHOLE USING ADJUSTABLE STAINLESS STEEL PIPE BRACKETS. 2 BRACKETS MIN. WITH MAX SPACING OF 3'.
5. COST OF FORCE MAIN INLET SHALL BE INCLUDED IN UNIT BID PRICE FOR FORCE MAIN.



FORCEMAIN ANCHOR STRAP DETAIL

Charles Town Utility Board
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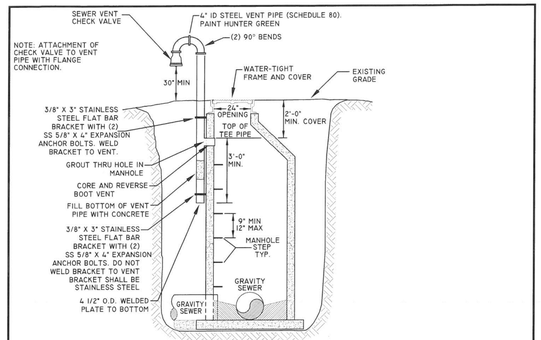
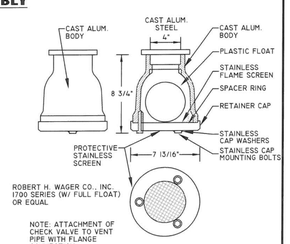
FORCEMAIN MANHOLE FORCEMAIN ANCHOR STRAP DETAIL

Standard Detail No. **S-9**
NOT TO SCALE
SEPTEMBER 2015



MANHOLE VENT ASSEMBLY



SEWER VENT CHECK VALVE

Charles Town Utility Board
832 S. George Street, P.O. Box 359, Charles Town, WV 25414
Phone: (304) 725-2316 •Fax: (304) 725-4313

MANHOLE VENT & SEWER VENT CHECK VALVE DETAILS

Standard Detail No. **S-10**
NOT TO SCALE
SEPTEMBER 2015

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JASON P. GERHART REGISTERED NO. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SANITARY SEWER DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-501.DWG	
NCS:	
SHEET:	75 OF 134

FILE PATH: S:\PROJECT\GENERAL\665\0206 FIRST\1-MAINTENANCE\C-CU-501.DWG
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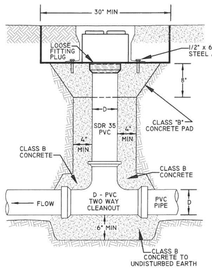
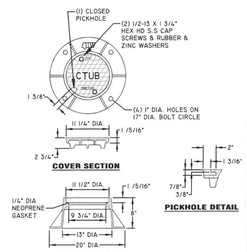


MAIN LINE CLEANOUT

(FOR D ≤ 6")

NOTES:

1. CLEANOUT FRAME AND COVER SHALL BE INSTALLED SUCH THAT IT IS LEVEL TO 2" BELOW SURROUNDING SURFACE. CLEANOUTS PROJECTING ABOVE SURFACE ARE UNACCEPTABLE.
2. FOR CLEANOUTS SUBJECT TO VEHICULAR TRAVEL, CONSTRUCT 30"x30"x8" CLASS B CONCRETE PAD. REINFORCE WITH 6x6 W6.0/6.0 WIRE MESH OR #3 REBAR @ 12" C-C EACH DIRECTION.
3. FOR NON-VEHICULAR TRAFFIC AREAS CONCRETE PAD CAN BE ELIMINATED AT DIRECTION OF ENGINEER. BACKFILL TO MATCH SURROUNDING AREA.
4. USE TEE AND PLUG FOR CLEANOUT AT END OF LINE.
5. FOR MAINLINE DIAMETER OF 8" OR GREATER, USE STRAIGHT TEE.



NOTE: DIMENSIONS ABOVE ARE FOR EAST JORDAN IRON WORKS APPROVED SUPPLIERS.
EAST JORDAN IRON WORKS
FRAME & COVER 157807, UNDIPPED

MAIN LINE CLEANOUT FRAME & COVER

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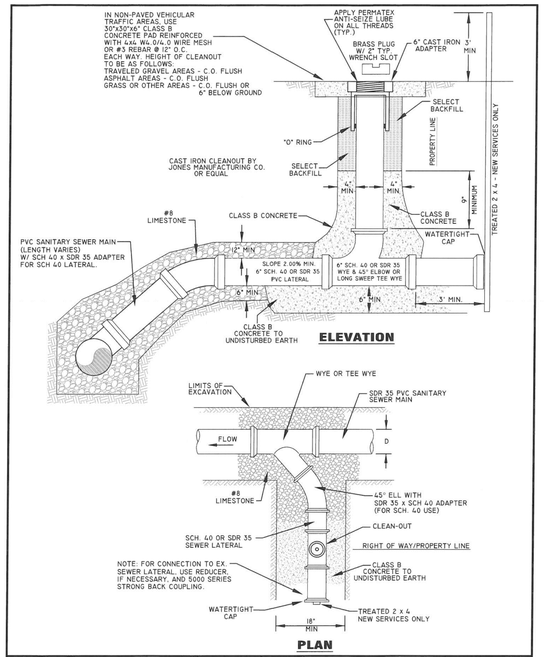
MAINLINE CLEANOUT & FRAME & COVER DETAIL

Standard Detail No. **S-12**
NOT TO SCALE
SEPTEMBER 2015



Charles Town Utility Board
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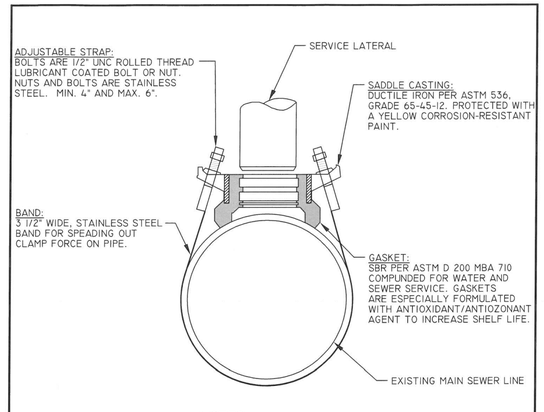
Phone: (304) 725-2316 •Fax: (304) 725-4313

NEW LATERAL CONNECTION DETAIL

Standard Detail No. **S-13**
NOT TO SCALE
SEPTEMBER 2015



NOTES:

1. SADDLE SHALL BE CAPABLE OF ATTACHING TO VARIOUS SIZES AND MATERIALS OF GRAVITY SEWER MAIN LINES. SADDLE SHALL BE INSTALLED SO SEWER LATERAL IS AT 45° FROM VERTICAL AT MAINLINE.
2. ROMAC ORIGINAL, STYLE "CB" SEWER SADDLE.
3. PIPE STOP CAPABLE OF WITHSTANDING 1000 POUNDS OF OF THRUST IS MOLDED INTO THE CB SADDLE GASKET. CARE MUST BE TAKEN DURING SYSTEM DESIGN & INSTALLATION TO ASSURE THAT THIS THRUST LIMIT IS NOT EXCEEDED.
4. NEW LATERAL CONNECTIONS USE 4" SADDLE OR SIZE OF LATERAL IF LARGER.
5. FOR SEWER LATERAL REPLACEMENTS USE 6" SADDLE AND USE PIPE REDUCER TO CONNECT TO LATERAL.
6. A PVC REDUCER IS REQUIRED FOR LOW PRESSURE SEWER MAINS.

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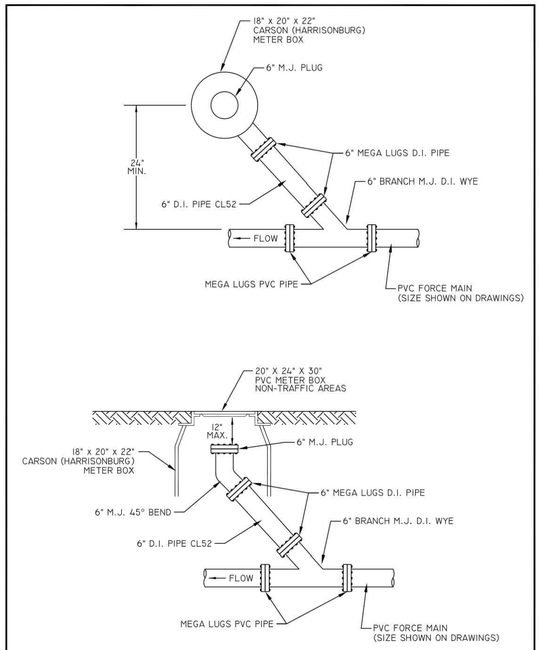
SEWER SADDLE DETAIL

Standard Detail No. **S-15**
NOT TO SCALE
SEPTEMBER 2015



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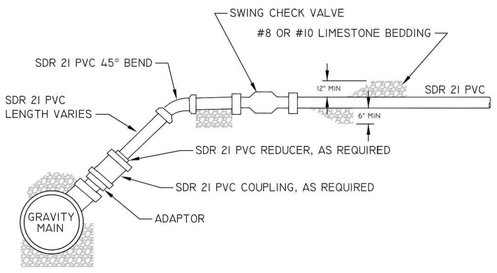
FORCE MAIN CLEAN OUT DETAIL

Standard Detail No. **S-18**
NOT TO SCALE
SEPTEMBER 2015



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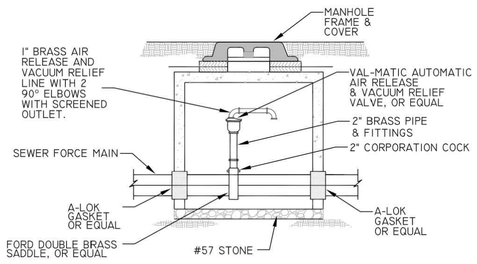
FORCE MAIN TO GRAVITY CONNECTION DETAIL

Standard Detail No. **S-21**
NOT TO SCALE
SEPTEMBER 2015



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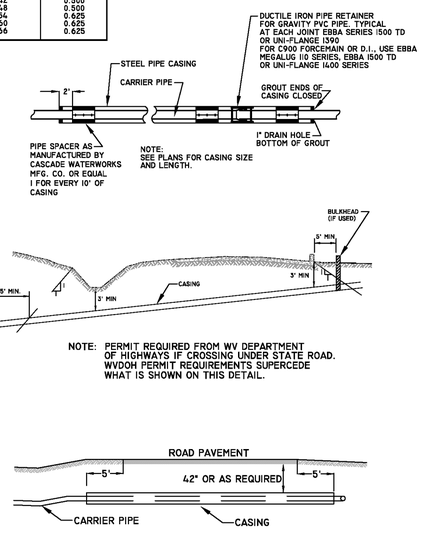
AIR RELEASE & VACUUM RELIEF VALVE DETAIL

Standard Detail No. **S-23**
NOT TO SCALE
SEPTEMBER 2015

CASING SCHEDULE

CARRIER PIPE DIA. (IN.)	CASING PIPE DIA. (IN.)	NOM. WALL THICKNESS
4	10	0.313
6	12	0.313
8	16	0.313
10	24	0.375
12	24	0.375
16	30	0.500
20	36	0.500
24	42	0.500
30	48	0.500
36	54	0.625
42	60	0.625
48	66	0.625



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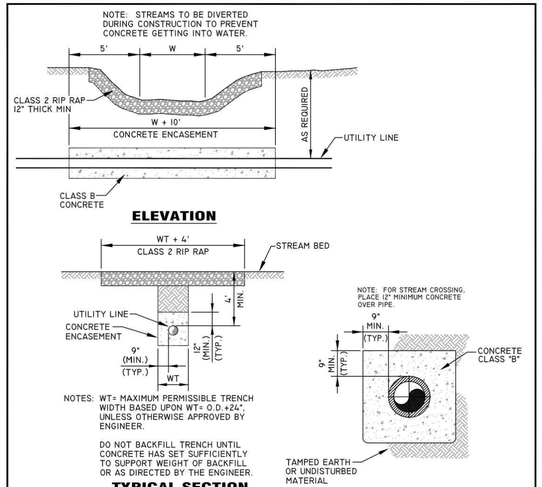
PIPE CASING DETAIL

Standard Detail No. **S-24**
NOT TO SCALE
SEPTEMBER 2015



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STREAM CROSSING & PIPE ENCASEMENT DETAIL

Standard Detail No. **S-25**
NOT TO SCALE
SEPTEMBER 2015

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JASON P. GERHART REGISTERED No. 19727 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 3-16-23

REVISIONS

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SANITARY SEWER DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-501.DWG	
NCS:	
SHEET:	76 OF 134

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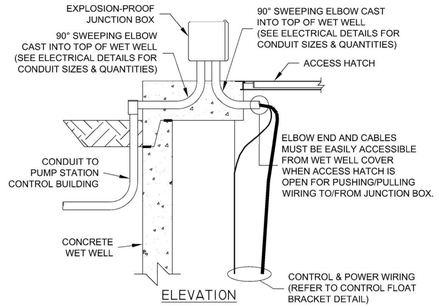
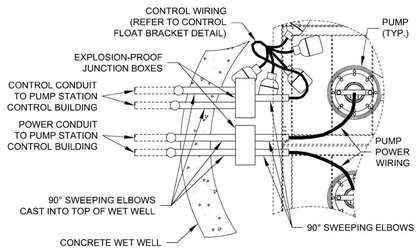


ELEVATION

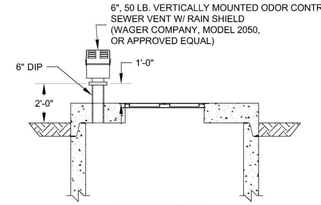


PLAN

NOTE: REFER TO ELECTRICAL PLANS AND DETAILS FOR FURTHER INFORMATION.

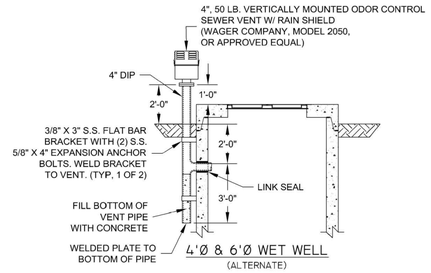
JUNCTION BOX ARRANGEMENT DETAIL

NOT TO SCALE



8'Ø WET WELL

(4'Ø & 6'Ø IF SPACE ALLOWS)

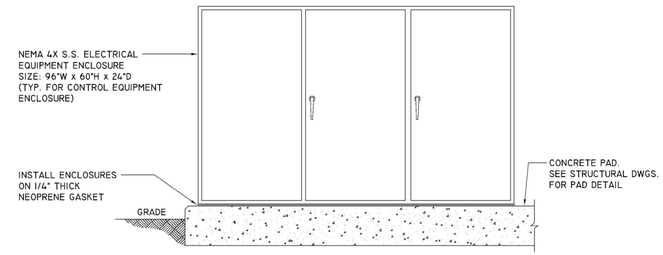


4'Ø & 6'Ø WET WELL

(ALTERNATE)

WET WELL VENT DETAIL

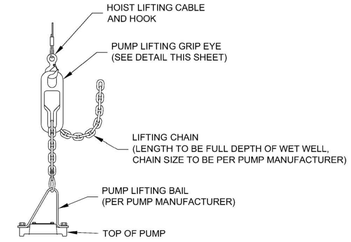
NOT TO SCALE



ELECTRICAL EQUIPMENT ENCLOSURE MOUNTING DETAIL

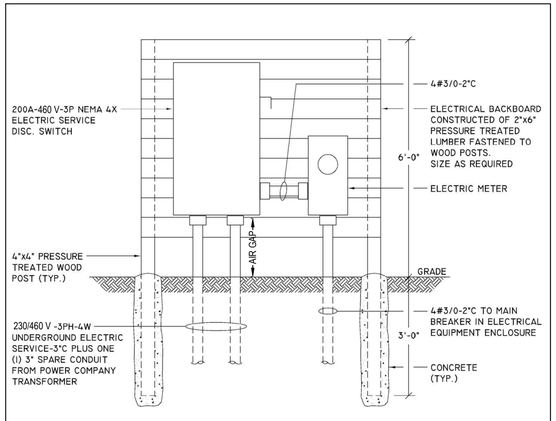
(TYP. FOR CONTROL EQUIPMENT ENCLOSURE)

NO SCALE



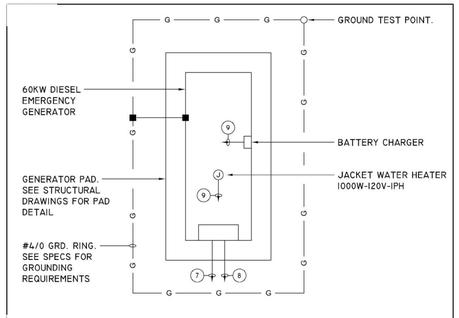
PUMP LIFTING SYSTEM DETAIL

NOT TO SCALE

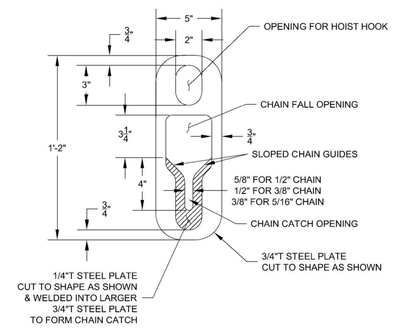


ELECTRIC SERVICE BACKBOARD DETAIL

NO SCALE



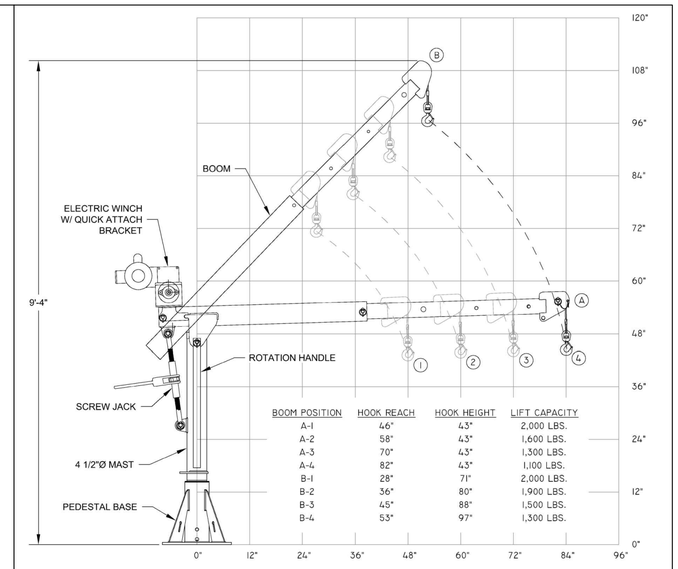
EMERGENCY GENERATOR ELECTRICAL PLAN



NOTE: SEVERAL COMPANIES, INCLUDING FLYGT, CONERY MFG., FEHR BROS. INDUSTRIES, EASILY MOVED INDUSTRIES, INC., ECT. MANUFACTURE SIMILAR GRIP EYE TYPE PRODUCTS. THESE PRODUCTS MAY BE USED, HOWEVER MUST BE APPROVED BY THE ENGINEER. GRIP EYE MUST MATCH SIZE OF PUMP LIFT CHAIN.

PUMP LIFTING GRIP EYE DETAIL

NOT TO SCALE

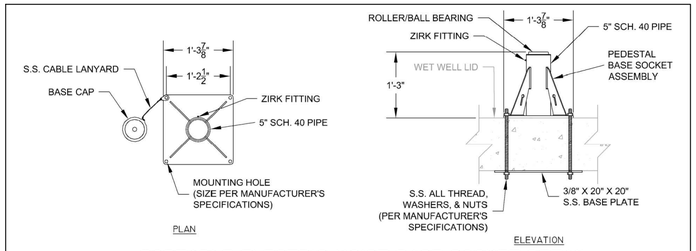


BOOM POSITION	HOOK REACH	HOOK HEIGHT	LIFT CAPACITY
A-1	46"	43"	2,000 LBS.
A-2	58"	43"	1,600 LBS.
A-3	70"	43"	1,300 LBS.
A-4	82"	43"	1,100 LBS.
B-1	28"	71"	2,000 LBS.
B-2	36"	80"	1,900 LBS.
B-3	45"	88"	1,500 LBS.
B-4	53"	97"	1,300 LBS.

NOTE: HOIST SHALL BE AS MANUFACTURED BY THERN, MODEL COMMANDER 2000 5PT20, OR ENGINEER APPROVED EQUAL. HOIST SHALL OPERATED BY AN ELECTRIC WINCH, WITH 120 VOLT, 20 AMP, 60 HERTZ ELECTRIC POWER MADE AVAILABLE TO EACH HOIST BASE SOCKET LOCATION WITHIN THE PROJECT. HOIST WINCH SHALL BE OUTFITTED WITH ENOUGH LENGTH OF STAINLESS STEEL CABLE TO REACH BOTTOM OF WET WELL. HOIST, BASE SOCKET, AND ALL OTHER EXPOSED METAL SURFACES SHALL BE EPOXY COATED. A BASE EXTENSION SHALL BE PROVIDED WITH EACH HOIST.

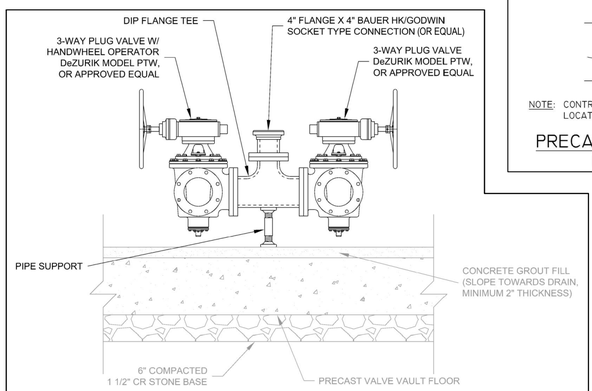
PORTABLE ELECTRIC HOIST DETAIL

NOT TO SCALE



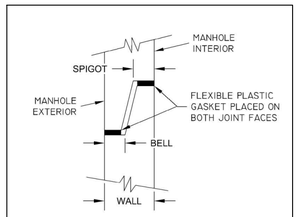
PORTABLE ELECTRIC HOIST BASE SOCKET DETAIL

NOT TO SCALE



PUMP BYPASS CONNECTION DETAIL

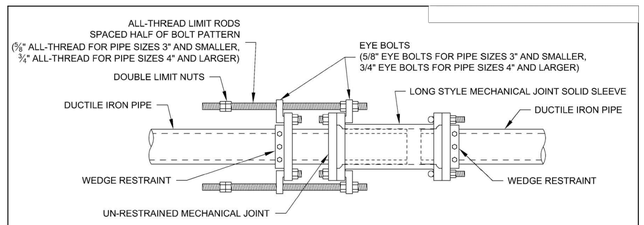
NOT TO SCALE



NOTE: CONTRACTOR SHALL COORDINATE JOINT LOCATIONS TO AVOID PIPE PENETRATIONS.

PRECAST JOINT DETAIL

NOT TO SCALE



NOTE: 1. CONTRACTOR MUST SET DOUBLE LIMIT NUTS AT A DISTANCE THAT DOES NOT ALLOW THE PIPE TO BE PULLED OUT OF THE SOLID SLEEVE DURING EXPANSION.

2. ABOVE DETAIL DEPICTS EXPANSION/CONTRACTION JOINT FOR PIPE SIZES 3" AND LARGER. EXPANSION/CONTRACTION JOINT FOR 2" PVC PIPE IS SIMILAR AND UTILIZES SPLIT CLAMP-STYLE RESTRAINT RINGS. RESTRAINT RING FOR BELL END OF PIPE SHALL BE NON-SERRATED AND THE RESTRAINT RING FOR THE PLAIN END OF PIPE SHALL BE SERRATED.

EXPANSION/CONTRACTION JOINT DETAIL

NOT TO SCALE

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3-16-23

REVISIONS

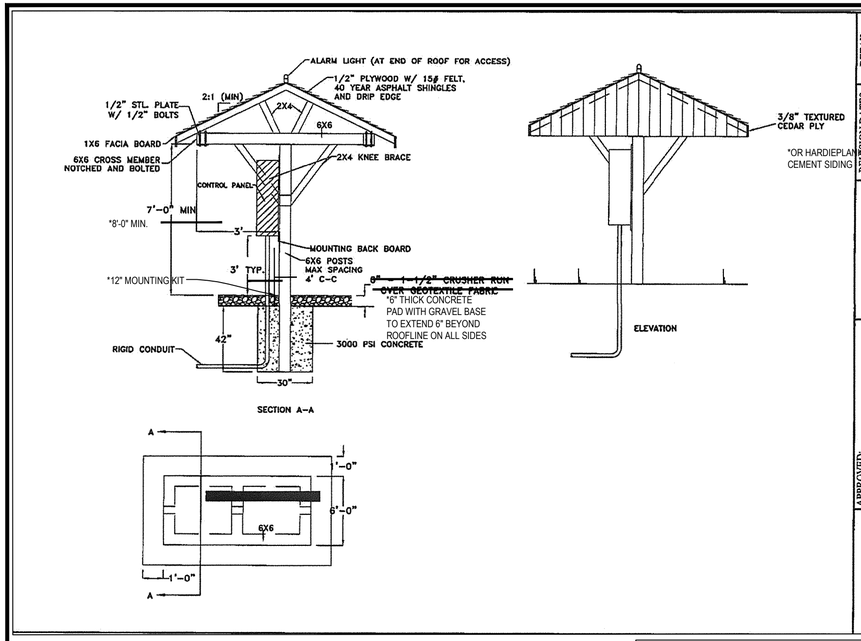
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

PUMP STATION DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-510.DWG	
NCS:	
SHEET:	77 OF 134



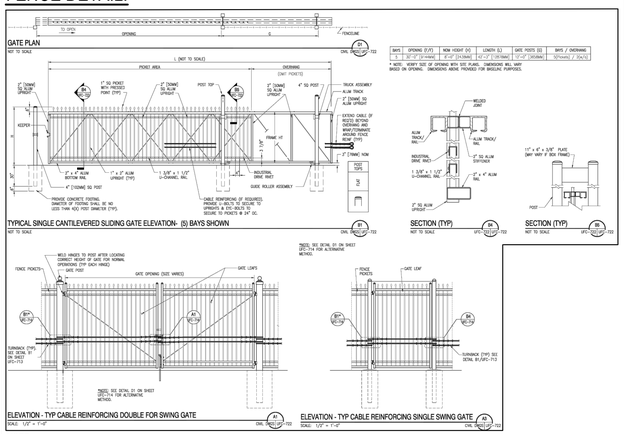
REVISION DATES	DETAIL
05-27-2009	DETAIL S-46

SHELTER DETAILS

APPROVED: JCPSD GENERAL MANAGER

JEFFERSON COUNTY, WEST VIRGINIA

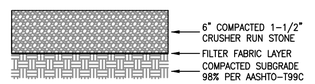
FENCE DETAIL:



NOTE:
1. OWNER/CONTRACTOR MAY OPT TO USE THIS CHAIN LINK ACCESS GATE DETAIL OR APPROVED ALTERNATE.

PUMP STATION TYPICAL GRAVEL SECTION:

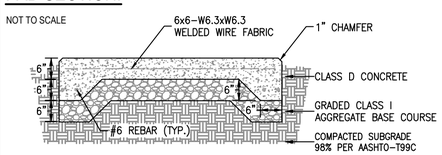
NOT TO SCALE



NOTES:
1. SUBGRADE SHALL BE COMPACTED TO 98% DENSITY AT OPTIMUM MOISTURE CONTENT PER AASHTO-T99.

GENERATOR/ELECTRICAL EQUIPMENT PAD SECTION:

NOT TO SCALE



NOTES:
1. SUBGRADE SHALL BE COMPACTED TO 98% DENSITY AT OPTIMUM MOISTURE CONTENT PER AASHTO-T99C.
2. MINIMUM 4,000 PSI FIBERGLASS REINFORCED CONCRETE.
3. COORDINATE THE SIZE OF THE CONCRETE GENERATOR PAD WITH THE ACTUAL GENERATOR BEING FURNISHED. CONCRETE PAD SHALL EXTEND 6" BEYOND ALL SIDES OF THE GENERATOR.

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STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

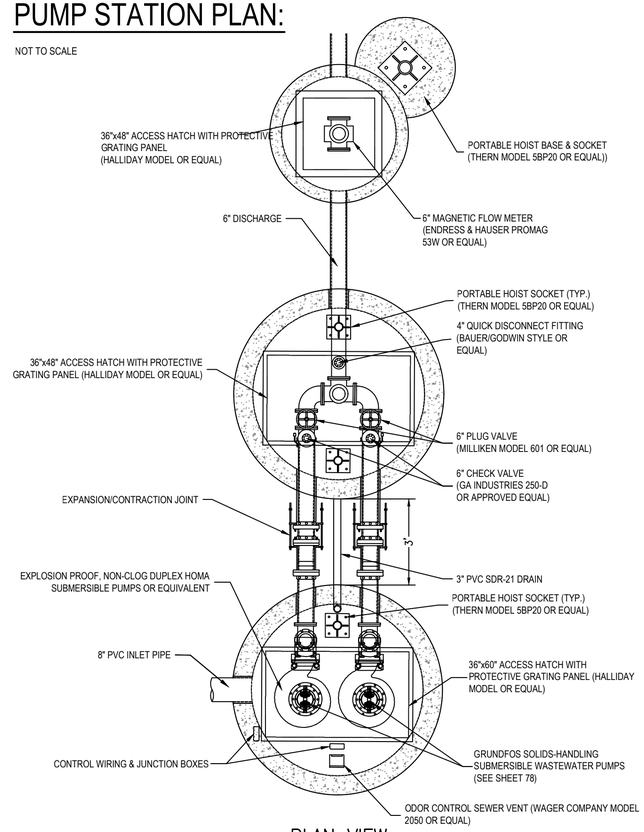
SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-510.DWG	
NCS:	
SHEET:	78 OF 134

PUMP STATION NOTES:

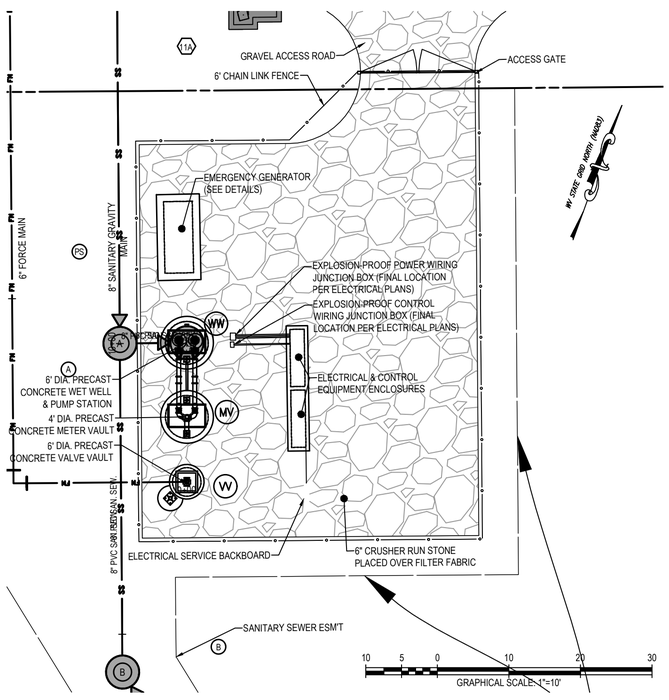
1. CONCRETE COATINGS AND PAINTINGS SHALL BE PERFORMED AS PER MANUFACTURERS RECOMMENDATIONS.
2. ALL FASTENERS (NUTS, BOLTS, WASHERS AND SCREWS) AND BRACKETS INSIDE THE WET WELL SHALL BE MANUFACTURED FROM 304 STAINLESS STEEL.
3. PUMPS TO BE CONTROLLED BY PROGRAM LOGIC CONTROLLER (PLC) WITH SQUARE D COMPONENTS, OR AN APPROVED ALTERNATE.
4. FINAL ELECTRICAL CONDUIT SIZES AND LOCATIONS TO BE DETERMINED BY THE ON-SITE ELECTRICIAN.
5. ALL CONDUITS FROM THE WET WELL OR VALVE VAULT SHALL BE SEALED GAS TIGHT.
6. AN AUTOMATED TELEPHONE DIALER, CRYSTAL BALL SHALL BE UTILIZED. PROVIDE ALARM LIGHT AND HORN FOR CONTROL CENTER.
7. A DUPLEX ALTERNATING CONTROL PANEL SHALL BE PROVIDED FOR PUMP OPERATION.
8. INSTALL FLANGES IN VALVE VAULT TO ALLOW DISASSEMBLY.
9. ALL PIPING AND APPURTENANCES SHALL BE ADEQUATELY SUPPORTED AT THE DISCRETION OF THE ON SITE CONSTRUCTION SUPERVISOR.
10. BACKFILL COMPACTION MUST BE COMPLETED WITH PROPER CARE. CONCRETE TANKS MAY EXPERIENCE DAMAGE DUE TO IMPROPER OR EXTREME COMPACTION.
11. THE HATCH FOR THE PUMP STATION SHALL BE CONSTRUCTED OF ALUMINUM WITH AN ANGLE FRAME FLOOR FOR THE ACCESS DOOR(S) AS MANUFACTURED BY HALLIDAY (OR EQUAL). IT SHALL BE WATERTIGHT, BE ABLE TO SUPPORT A 150-POUND PER SQUARE FOOT LIVE LOAD, BE EQUIPPED WITH A FLUSH MOUNTING HANDLE, HAVE STAINLESS STEEL HINGES AND TAMPER RESISTANCE HARDWARE AND LOCKS. THE DOOR(S) SHALL BE SELF-SUPPORTING IN THE RAISED POSITION AND HAVE A MECHANISM TO PREVENT SLAMMING WHEN CLOSING. UNDER THE HATCH/HINGED DOOR(S) SHALL BE A LOAD-BEARING GRATE (SUPPORTING A 150-POUND PER SQUARE FOOT LIVE LOAD), HINGED WITH FLUSH MOUNTED 'PULL-RINGS'/LATCH THROUGH THE AFOREMENTIONED OUTERMOST HATCH/HINGED DOOR(S). THE GRATE, CONSTRUCTED OF ALUMINUM OR STAINLESS STEEL, SHALL REST ON ITS OWN FRAME ATTACHED CONTIGUOUSLY AROUND THE PERIMETER OF THE WET WELL.
12. ACCESS INTO THE WET WELL SHALL BE PROVIDED WITH THE FALL PROTECTION GRATING LOCKING INTO THE HATCH/HINGED DOOR(S) AND REMAINING SELF-SUPPORTING WHEN RAISED. ALL FASTENERS (NUTS, BOLTS, WASHERS AND SCREWS) AND BRACKETS INSIDE THE WET WELL SHALL BE MANUFACTURED FROM 304 STAINLESS STEEL.
13. A METERED WATER SUPPLY WITH A FREEZE PROOF HOSE BIB SHALL BE PROVIDED FOR WASH DOWN AND CLEANING PURPOSES. THE INSTALLATION AND FEE(S) FOR THE WATER TAP AND CAPACITY IMPROVEMENT FEES, INCLUDING ANY AND ALL APPURTENANCES, INCLUDING THE CROCK AND METER, SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO PROVIDE FROM THE APPROPRIATE WATER SUPPLIER. THE HOSE BIB SHALL BE LOCATED WITHIN 5 FEET OF THE WET WELL OPENING AND ALSO BE INSTALLED WITH A WEST VIRGINIA BUREAU OF PUBLIC HEALTH APPROVED REDUCED PRESSURE TYPE 'BACKFLOW-PREVENTER'.
14. PORTABLE HOIST SPECIFIED IS RATED AT A MAXIMUM LOAD OF 2,000 POUNDS. CONTRACTOR TO VERIFY THAT WEIGHT OF PUMP INSTALLED DOES NOT EXCEED MAXIMUM LOAD CAPACITY OR PORTABLE HOIST & LIFT CHAIN. IF WEIGHT OF PUMP SELECTED EXCEEDS MAXIMUM LOAD RATING OF HOIST & LIFT CHAIN CONTRACTOR IS TO WORK WITH THE ENGINEER TO COME UP WITH A FEASIBLE SOLUTION.
15. ALL PIPING LOCATED IN CONCRETE VAULT & WET WELL SHALL BE FLANGE JOINT PAINTED DUCTILE IRON CLASS 53. ALL PIPING LOCATED IN GROUND SHALL BE MECHANICAL JOINT DUCTILE IRON CLASS 51 UNLESS OTHERWISE NOTED.
16. ANCHOR PIPE AND RAILING IN WET WELL PER MANUFACTURERS RECOMMENDATIONS.
17. ALL HARDWARE MUST BE STAINLESS STEEL.
18. PUMP OPERATION SHALL BE CONTROLLED VIA WET WELL FLOAT SWITCHES.
19. WET WELL ACCESS HATCH MUST HAVE A BUILT IN NEOPRENE CUSHION/GASKET TO LIMIT THE TRANSMISSION OF ODORS.
20. CONTROL FLOAT ELEVATIONS SHOWN ARE APPROXIMATE AND MAY NEED TO FILED ADJUSTED.
21. ALL CHECK VALVES SHALL HAVE EXTERNAL CUSHIONED LEVER & WEIGHT. ALL NON-BURIED PLUG VALVES SHALL HAVE HANDWHEEL ACTUATORS.
22. PUMP STATION SITE IS NOT LOCATED WITHIN ANY FLOOD HAZARD ZONE.
23. ALL GRAVITY INFLUENT PIPE CONNECTIONS IN WET WELL SHALL UTILIZE AN INSIDE WET WELL DROP PIPE. SEE INSIDE DROP WET WELL DETAIL FOR FURTHER INFORMATION.
24. PUMP STATION PLANS DESIGNED AND DRAWN AROUND THE YEOMANS PUMP SYSTEM. THE CONTRACTOR IS RESPONSIBLE FOR ANY DESIGN CHANGES TO THE WET WELL, PIPING, AND ANY OTHER RELATED PUMP STATION COMPONENTS.
25. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING REMOTE MONITORING SYSTEM.

PUMP STATION PLAN:

NOT TO SCALE



PLAN VIEW



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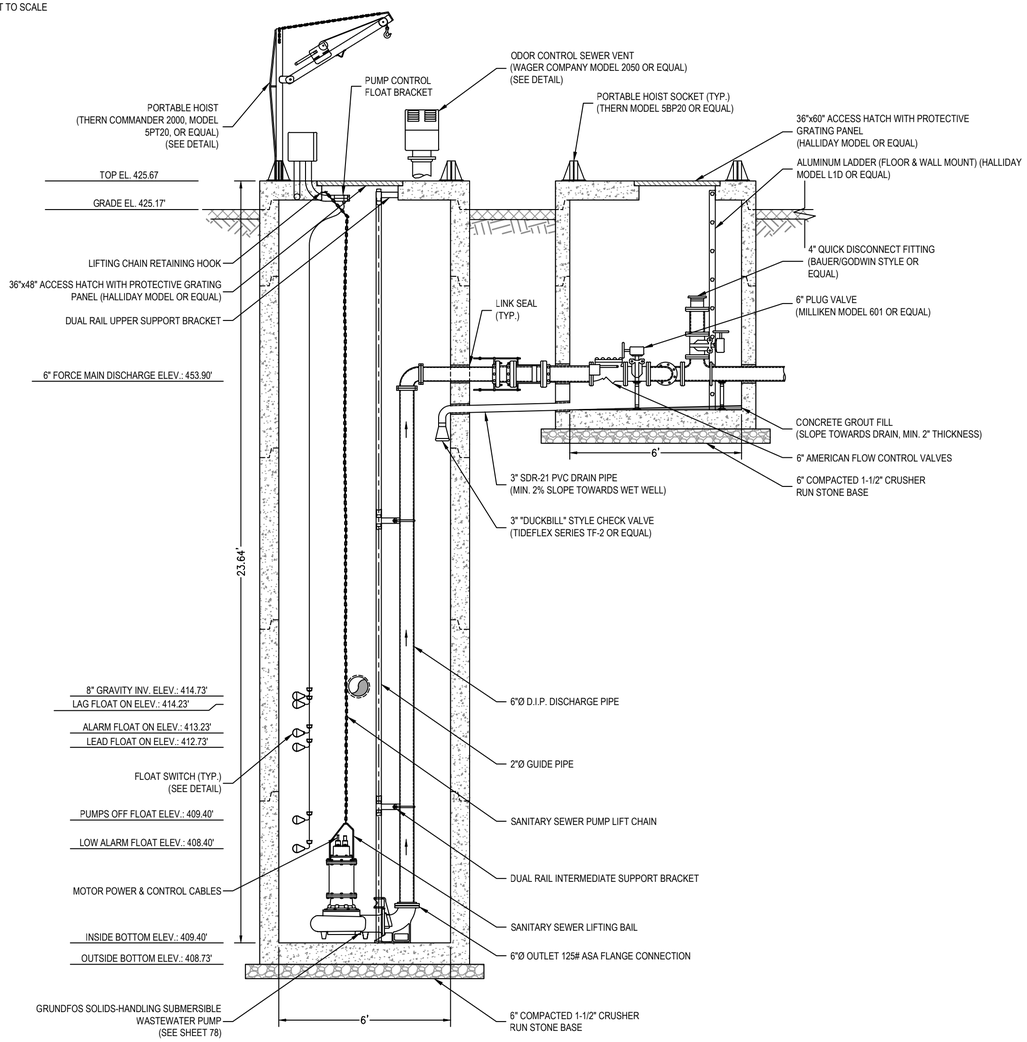

SECTION VIEW

PUMP STATION SECTION CONT'D:

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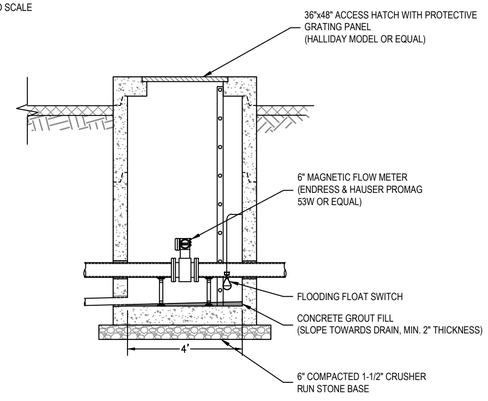

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REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

PUMP STATION DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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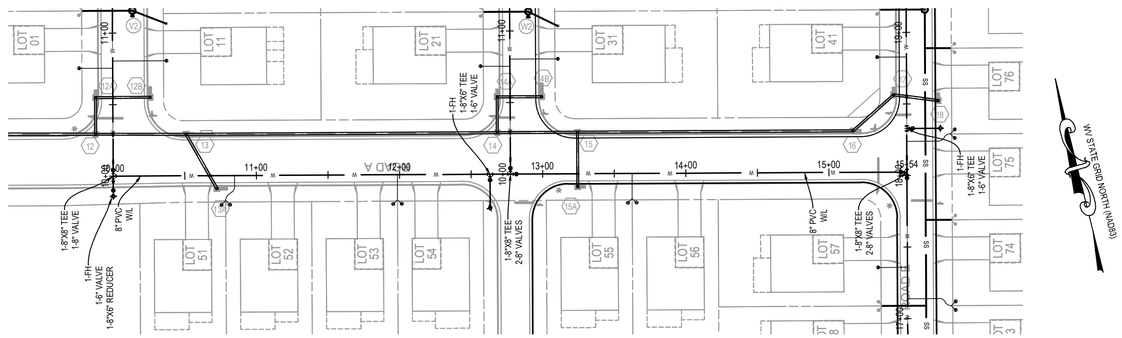

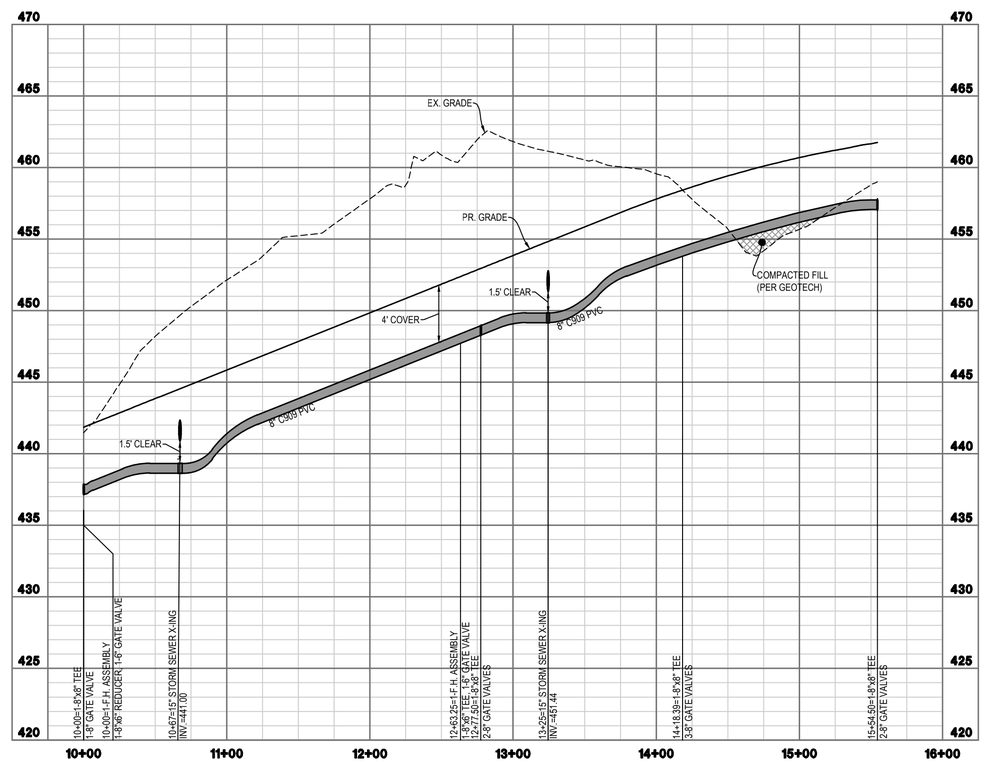

ROAD A WATERLINE PROFILE

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

0 2.5 5 10 15
VERTICAL SCALE: 1"=5'

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WATER MAIN PLAN & PROFILE

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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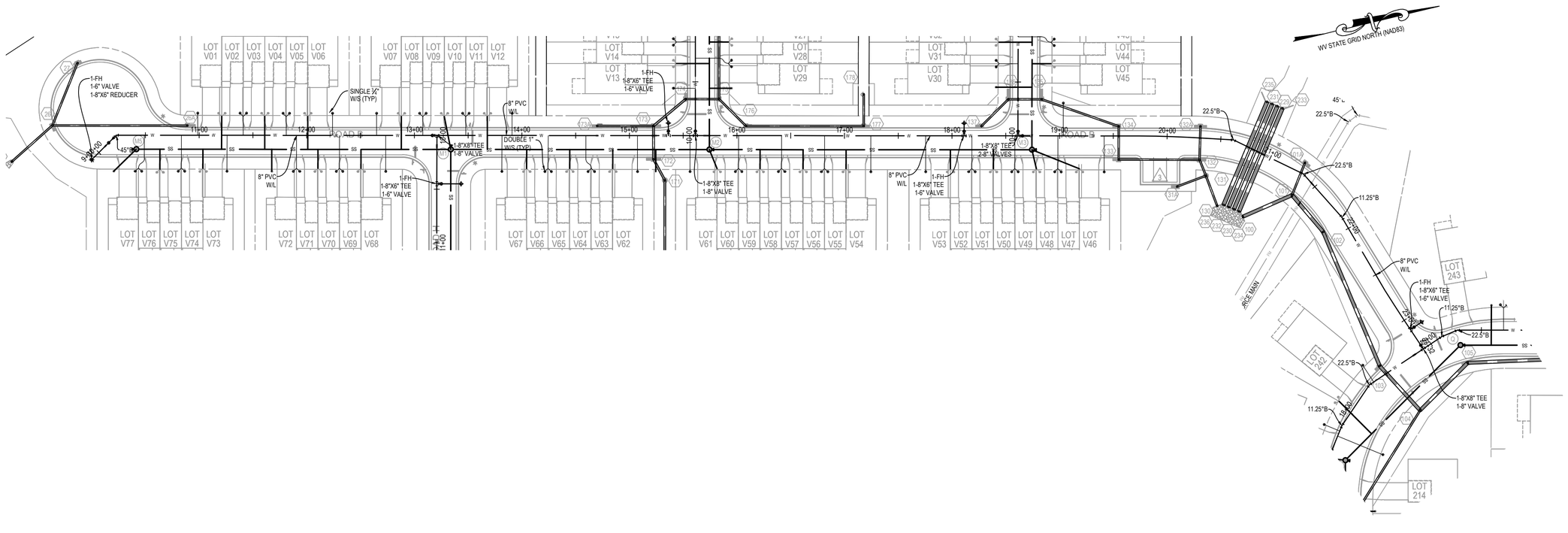

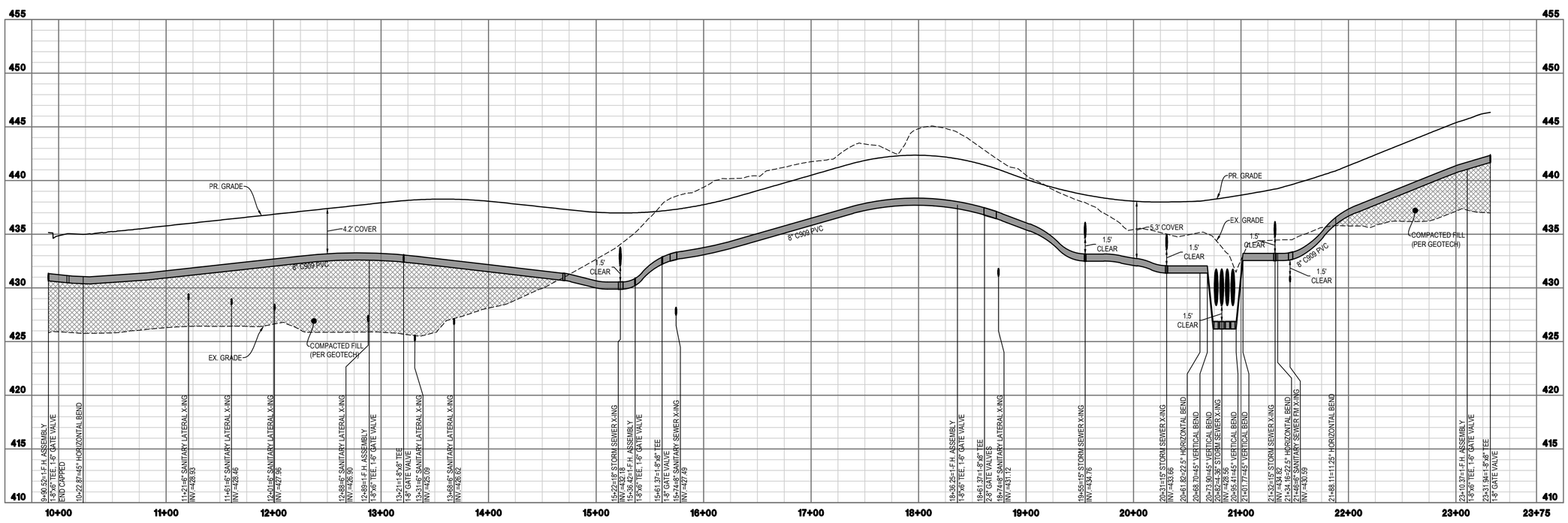

ROAD B WATERLINE PROFILE

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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JEFFERSON COUNTY, WEST VIRGINIA

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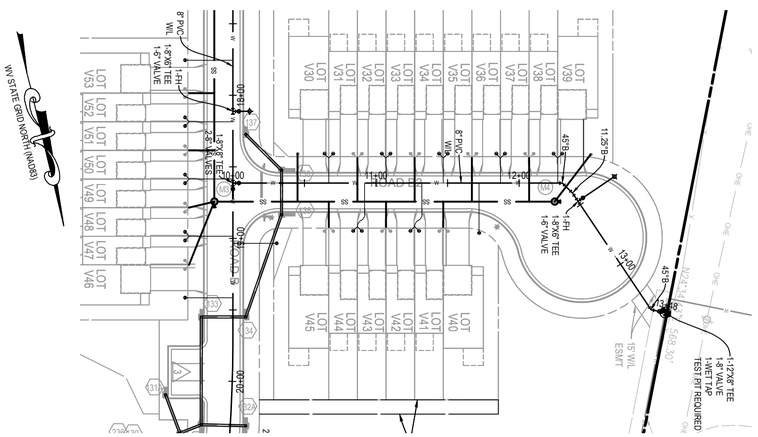

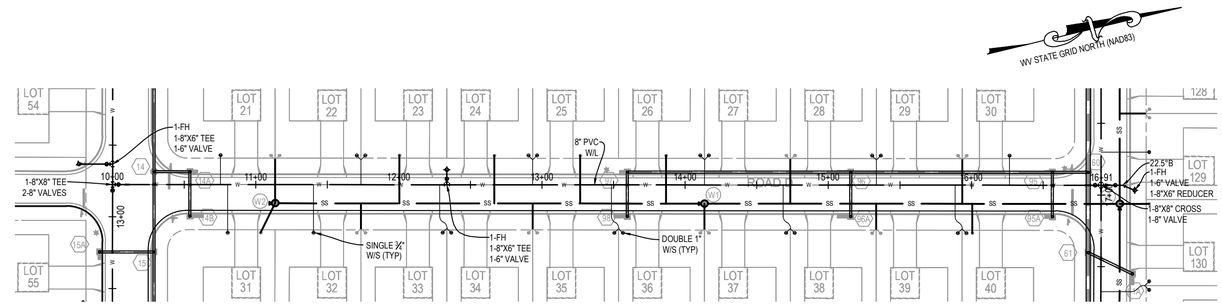

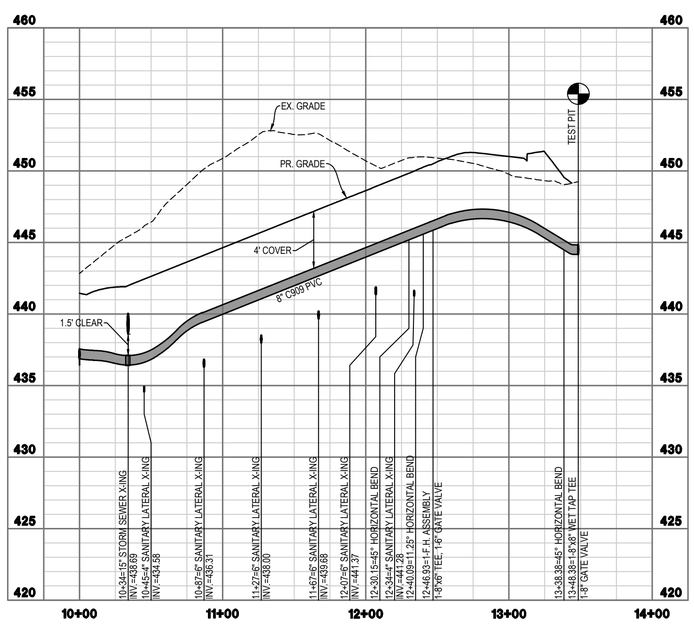

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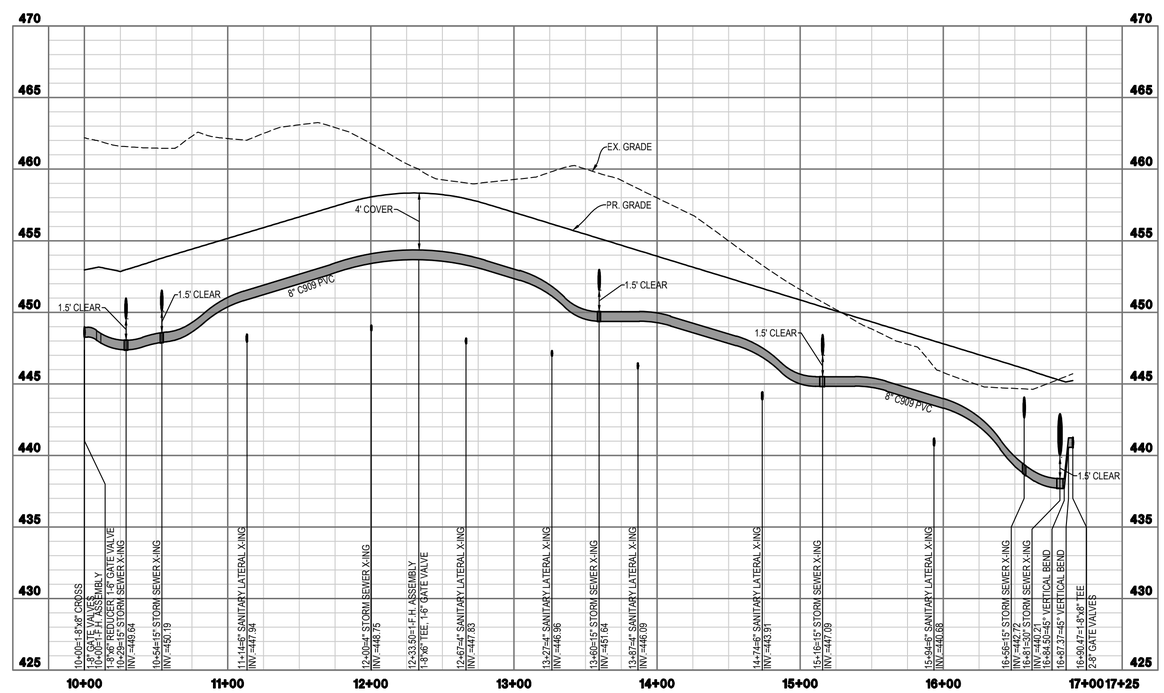

ROAD D WATERLINE PROFILE

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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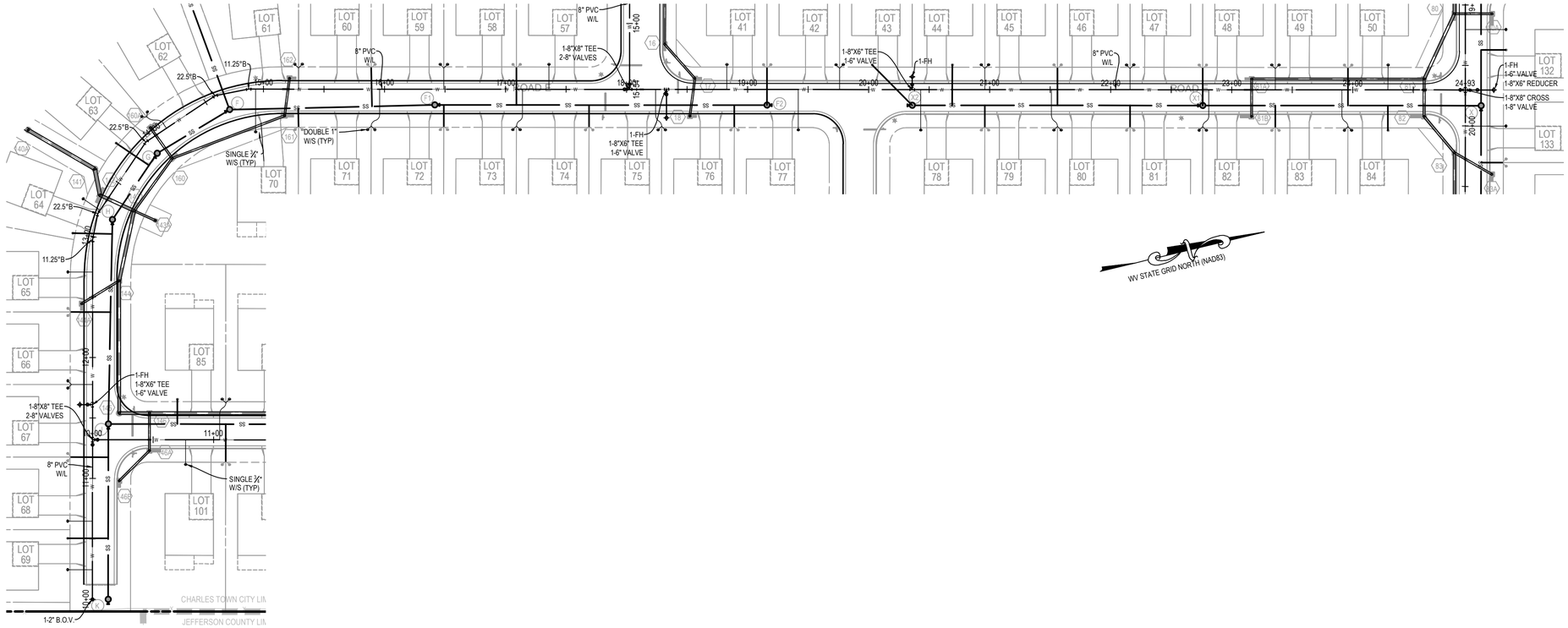

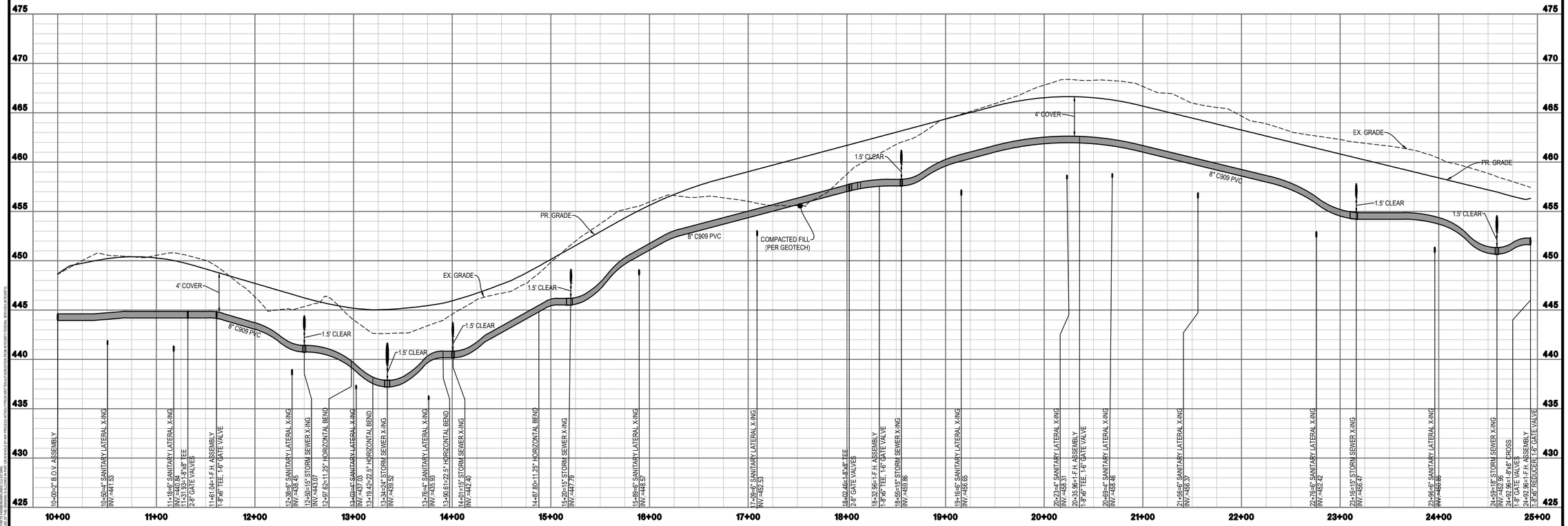

ROAD E WATERLINE PROFILE

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STONE SPRING SUBDIVISON

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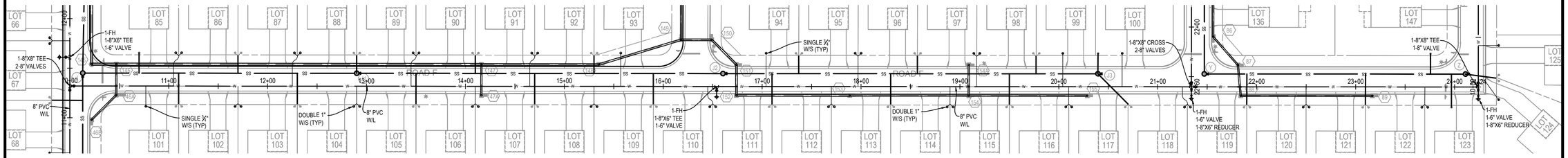

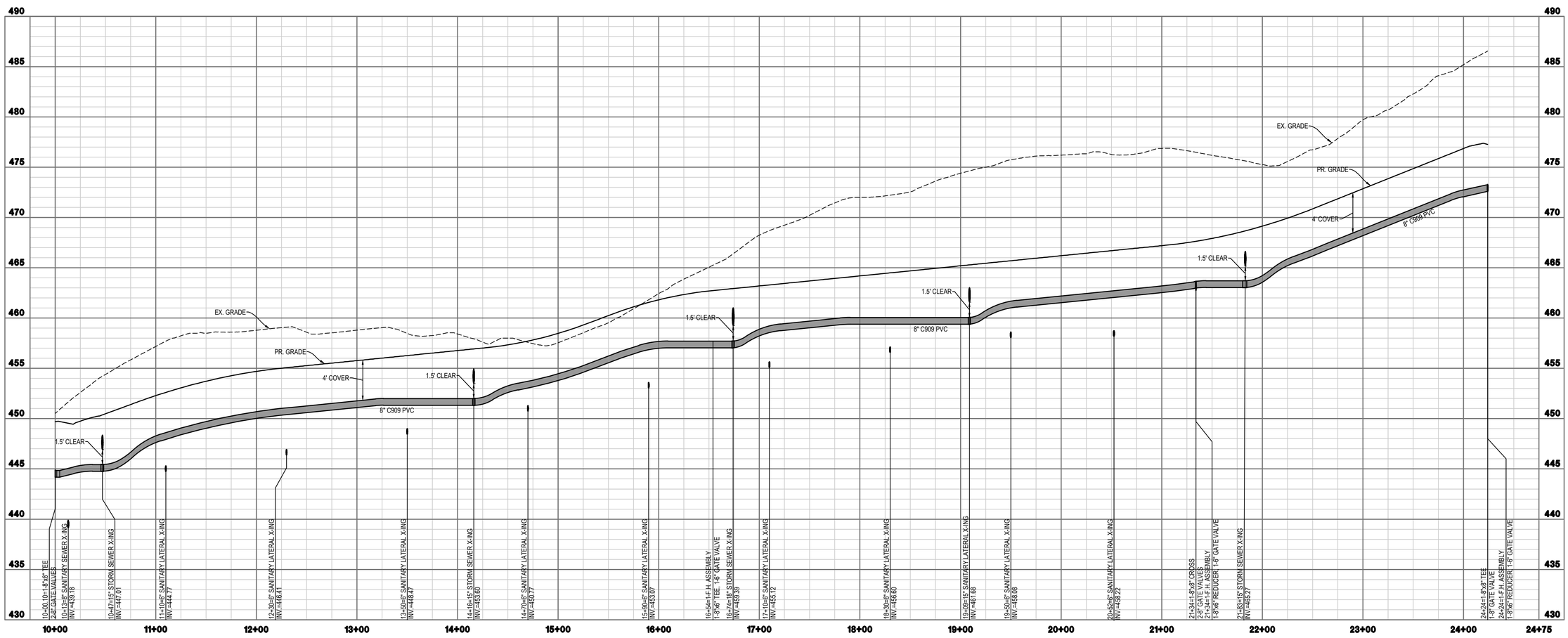

ROAD F WATERLINE PROFILE

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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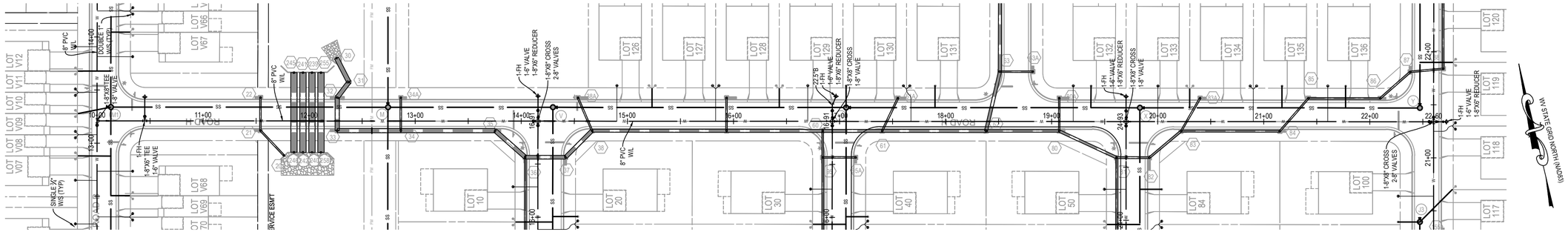

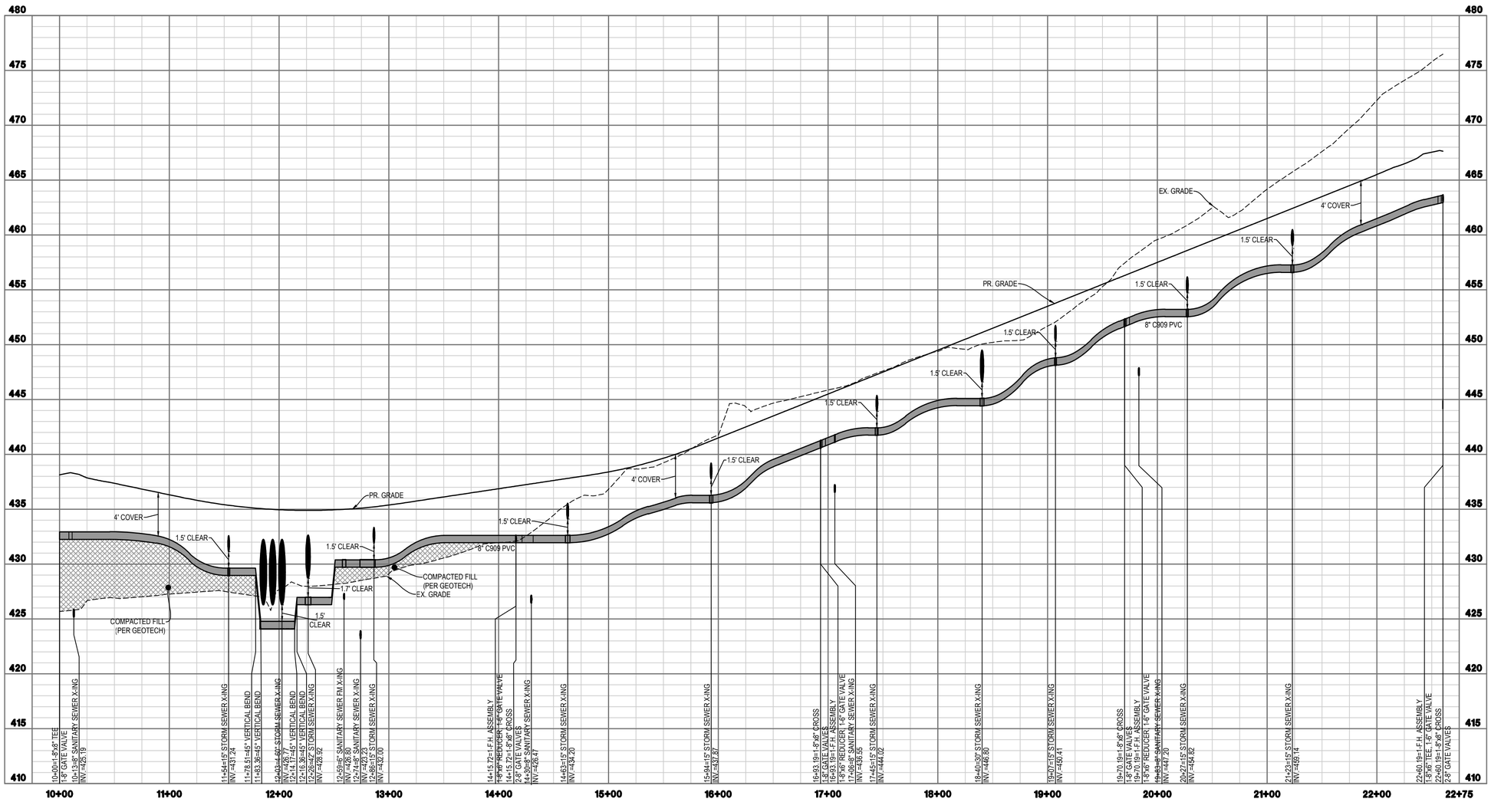

ROAD H WATERLINE PROFILE

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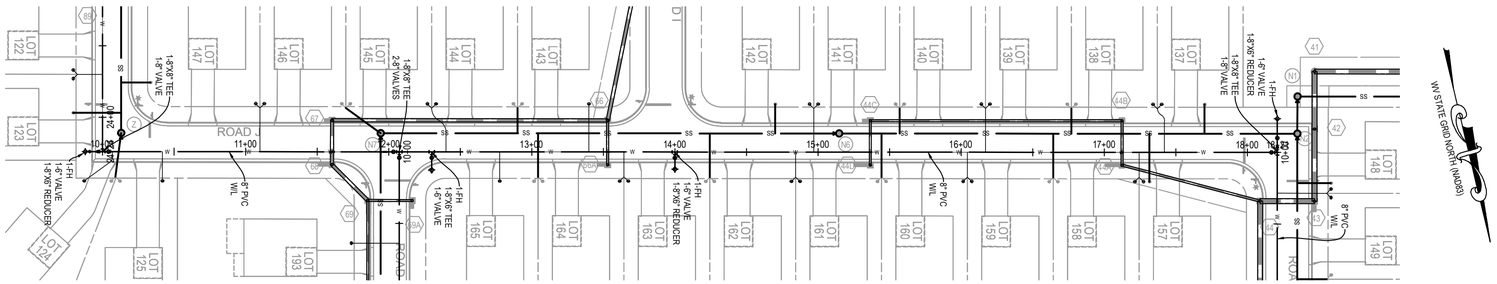

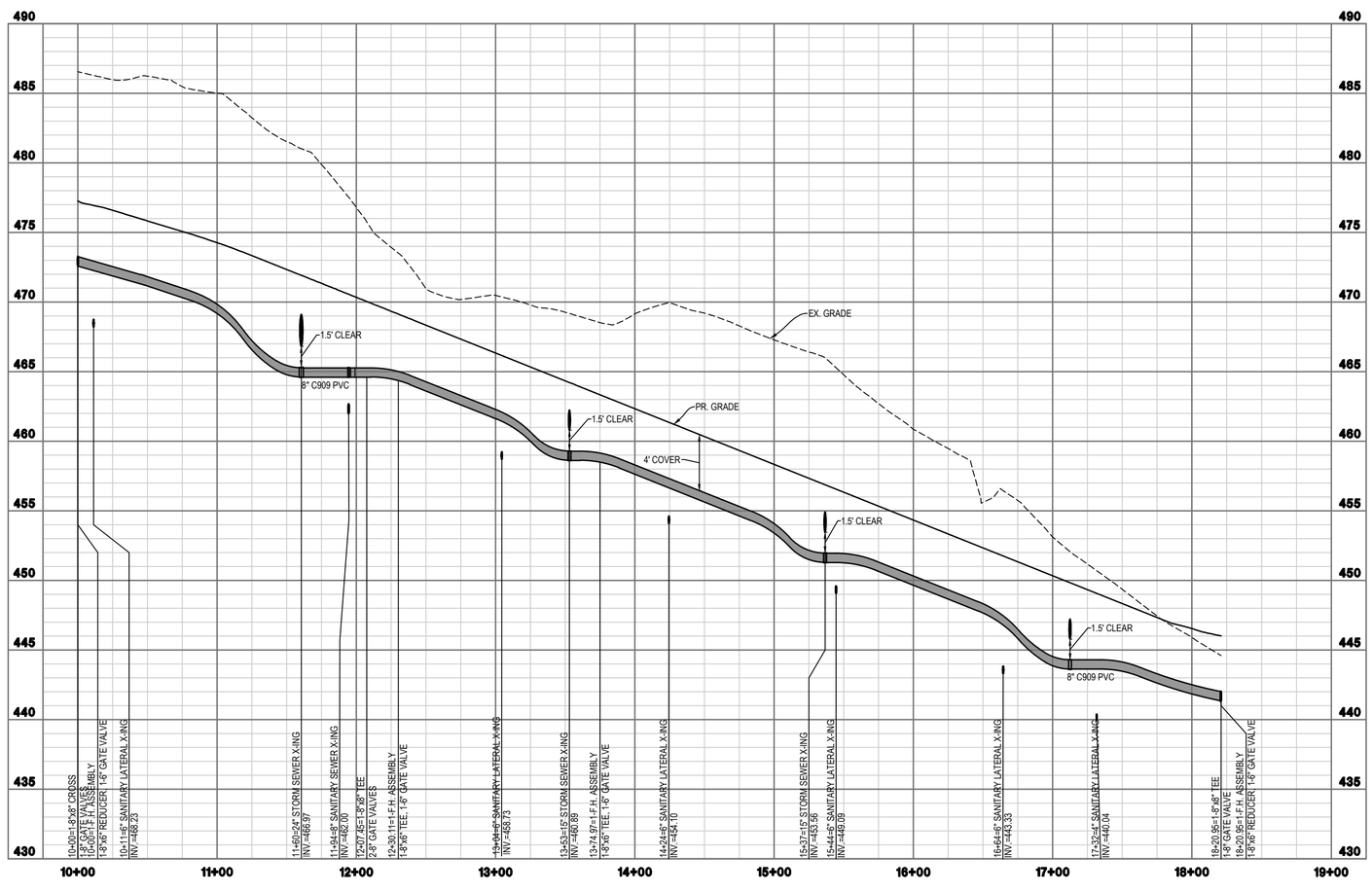

ROAD J WATERLINE PROFILE

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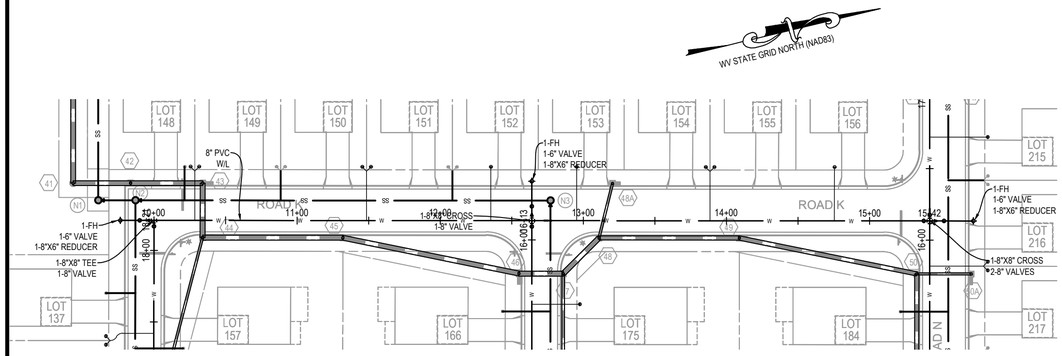
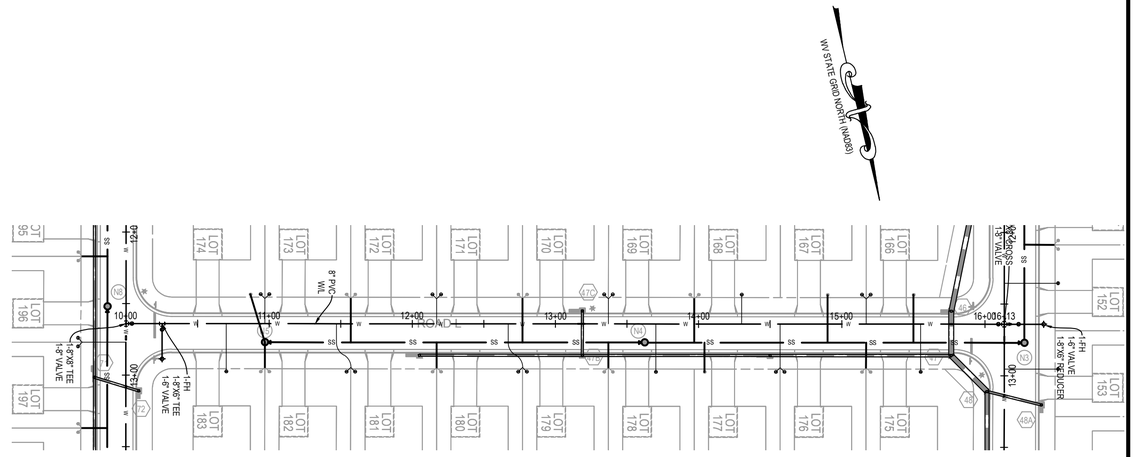
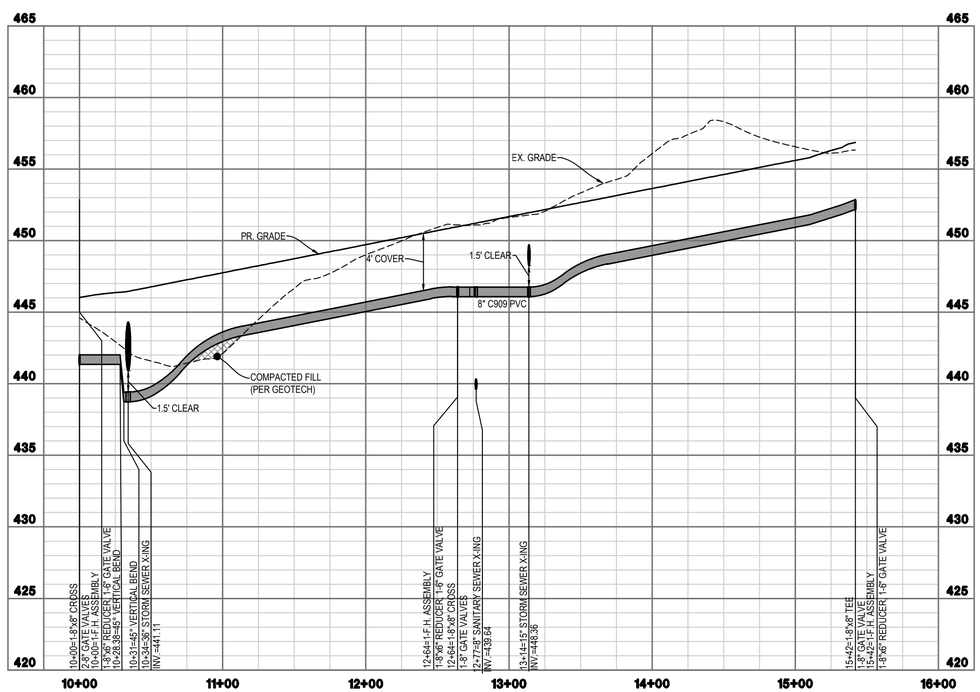
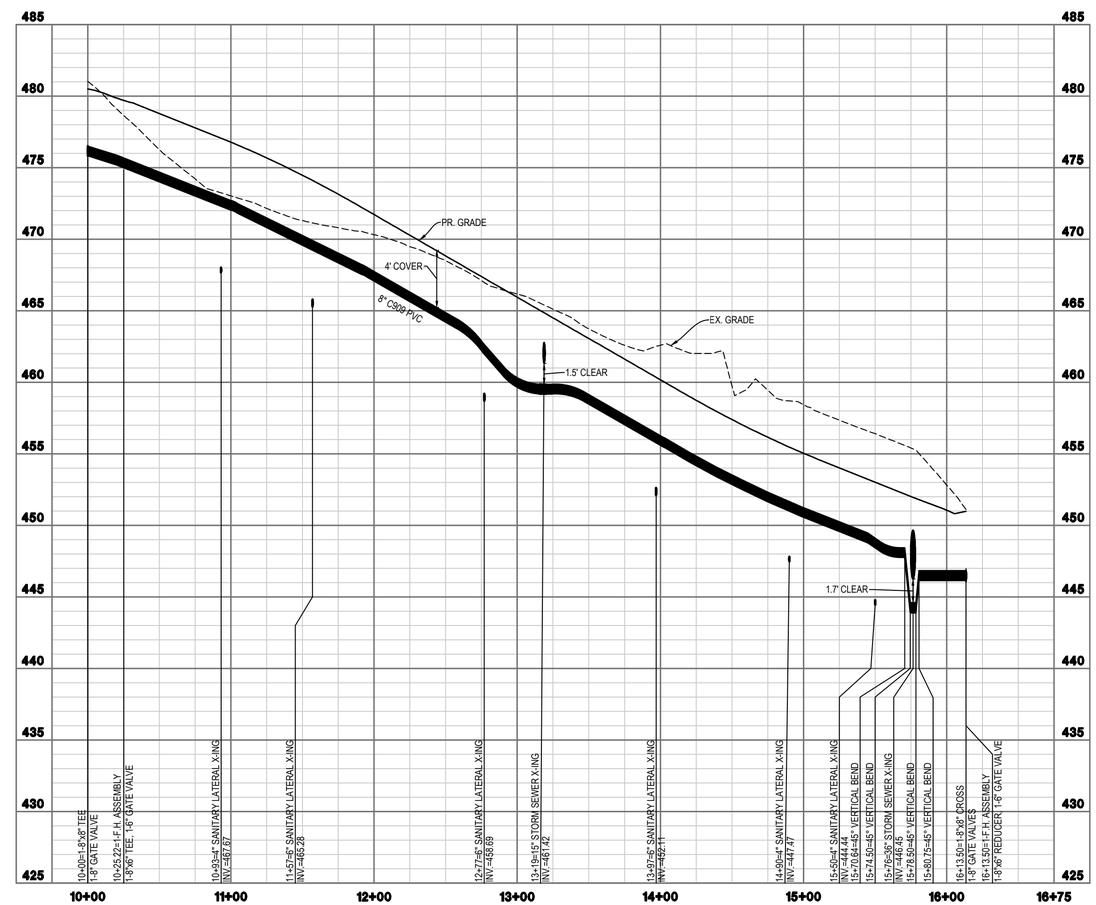






ROAD K WATERLINE PROFILE



ROAD L WATERLINE PROFILE

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NO. 19127
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

WATER MAIN PLAN & PROFILE

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-231.DWG	
NCS:	
SHEET:	87 OF 134

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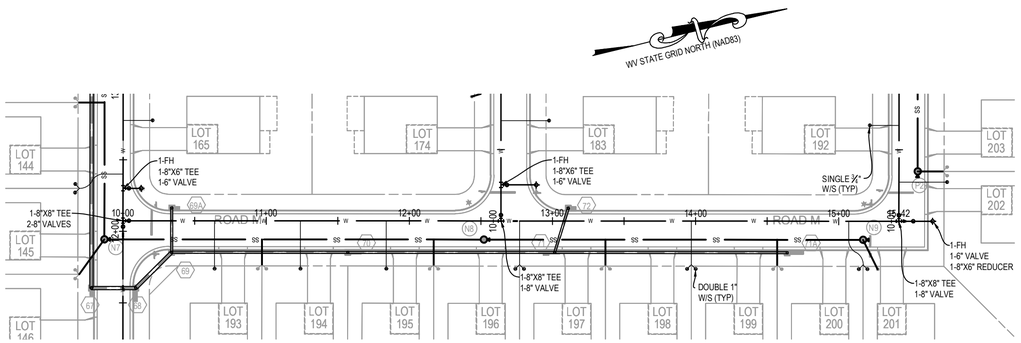
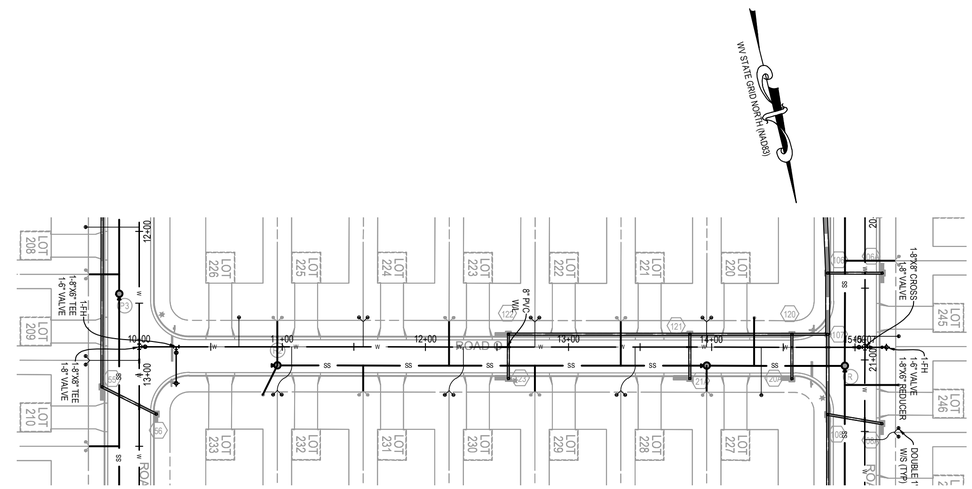
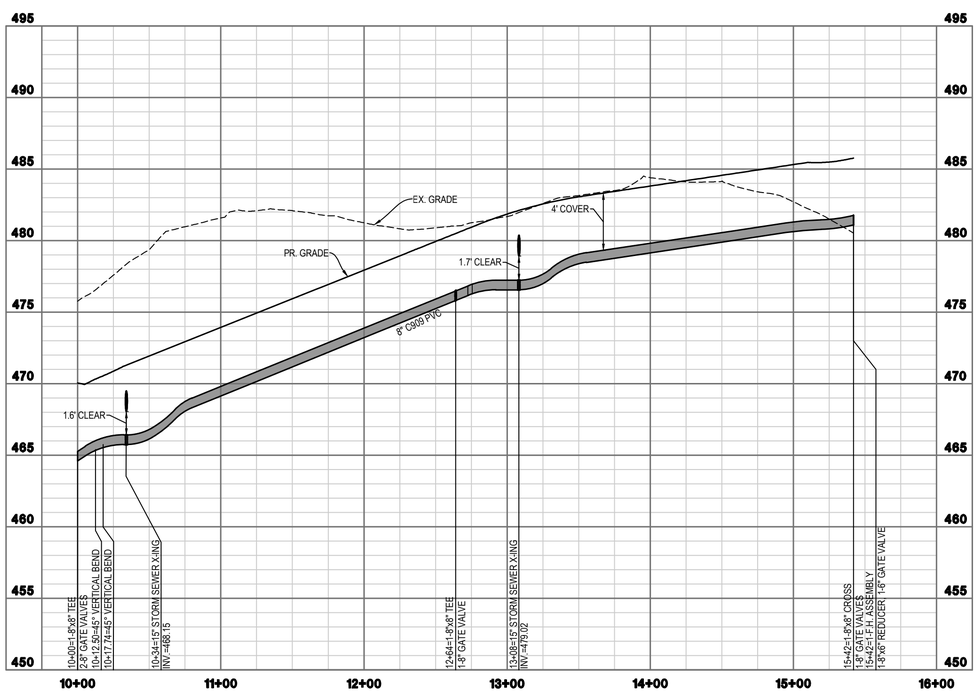
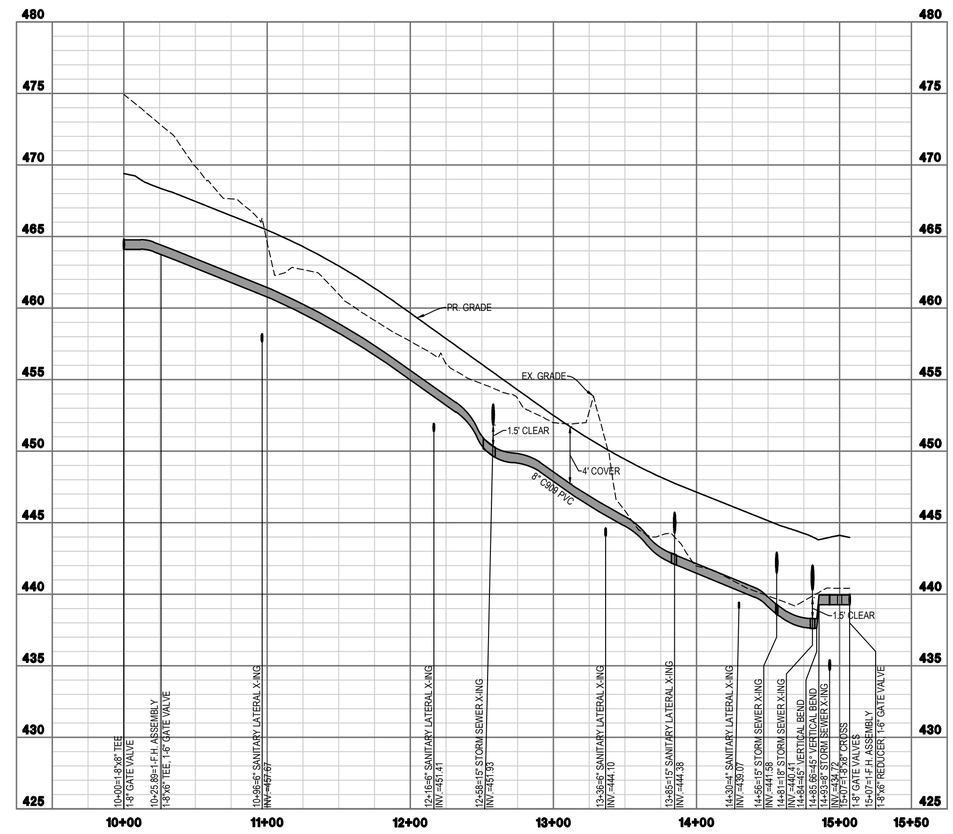






ROAD M WATERLINE PROFILE



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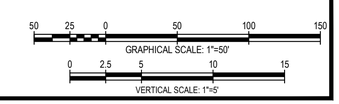

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JASON P. GERHARD
REGISTERED
No. 19127
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
3-16-23

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CITY OF CHARLES TOWN TAX DISTRICT
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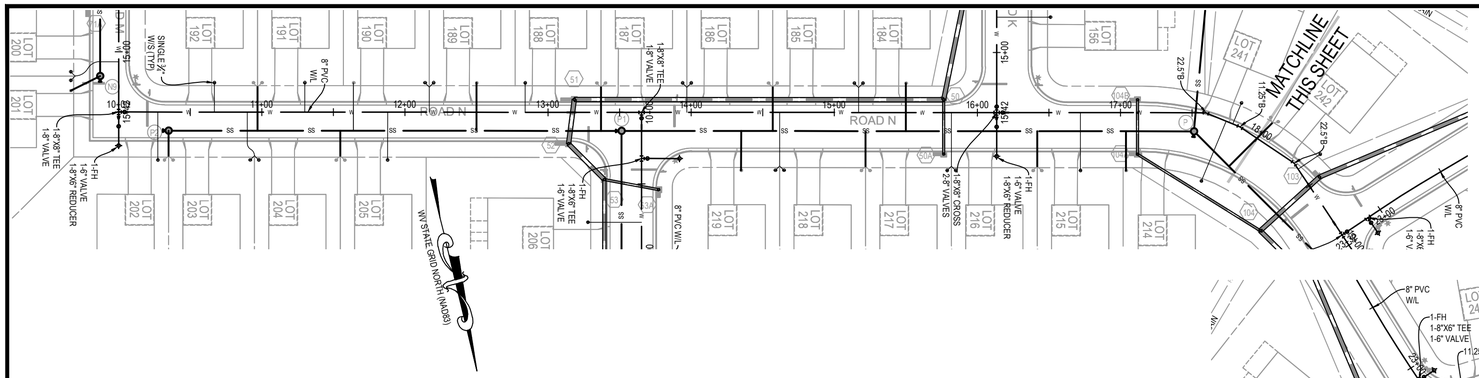

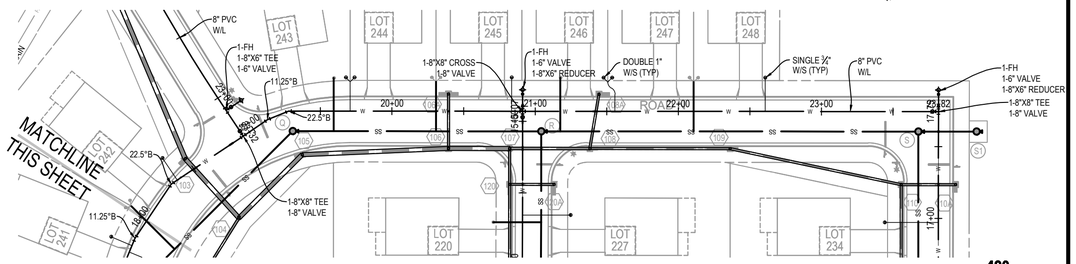

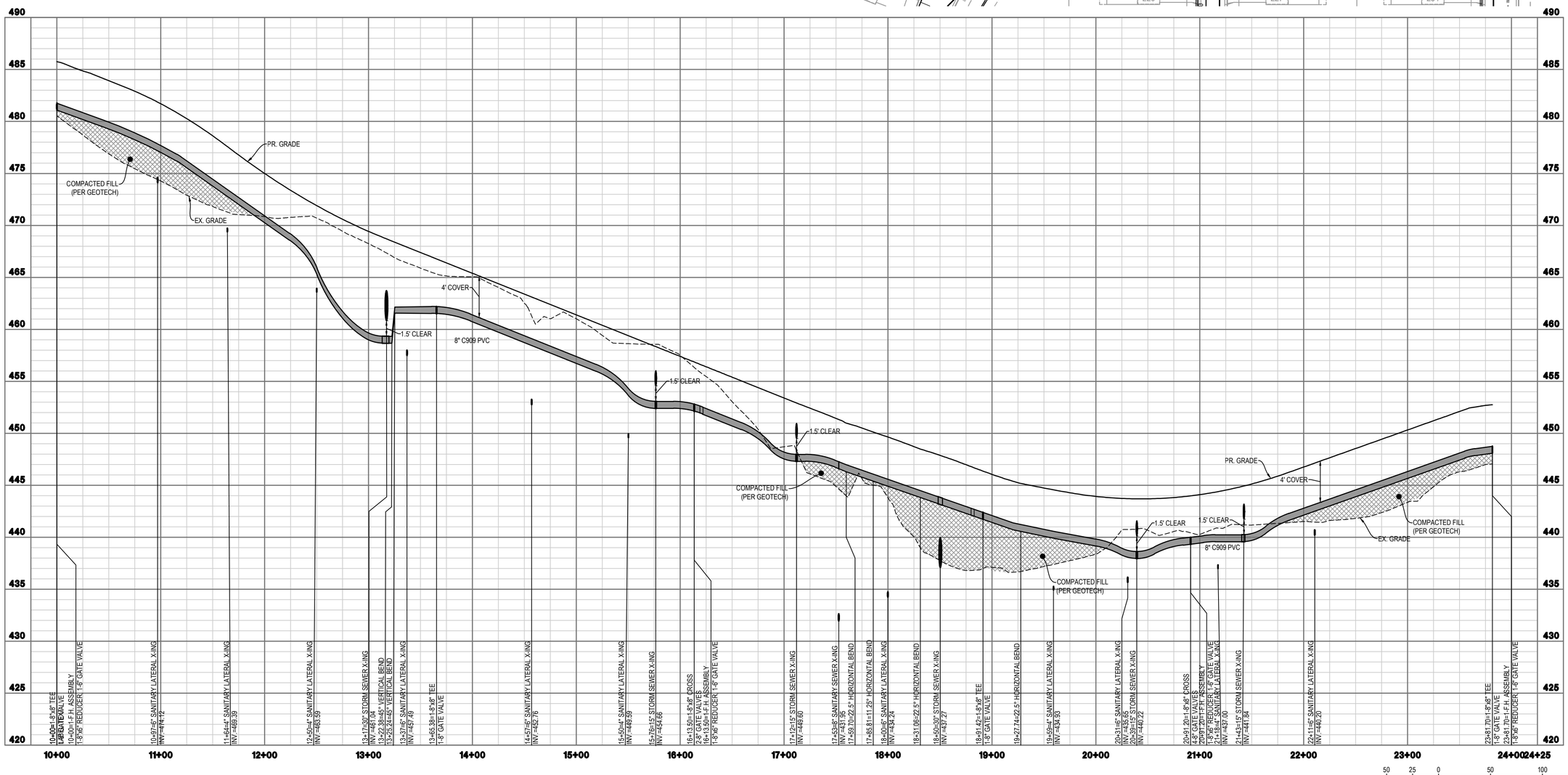

ROAD N WATERLINE PROFILE

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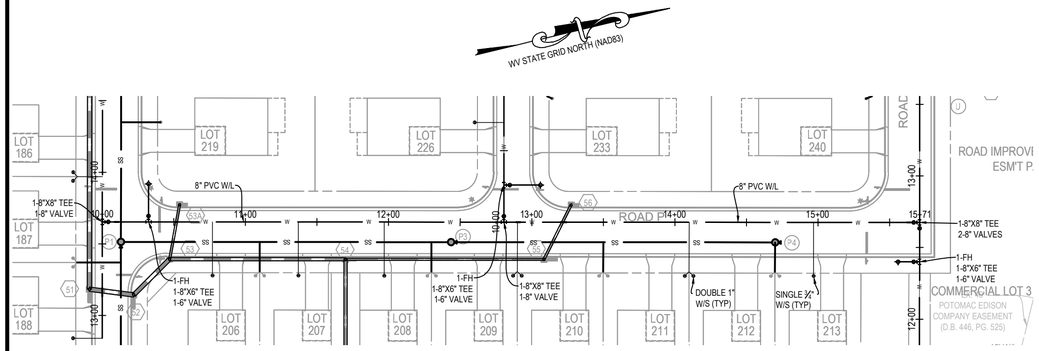

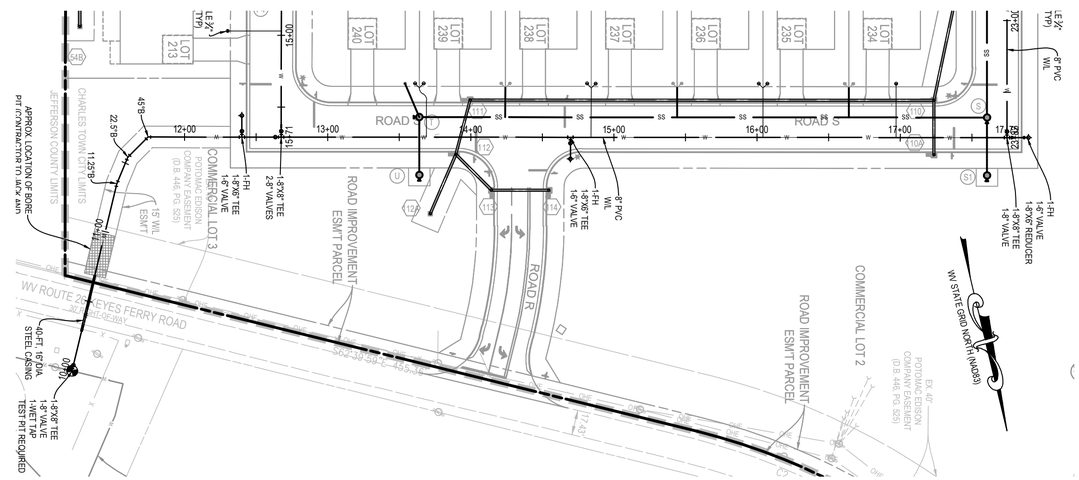

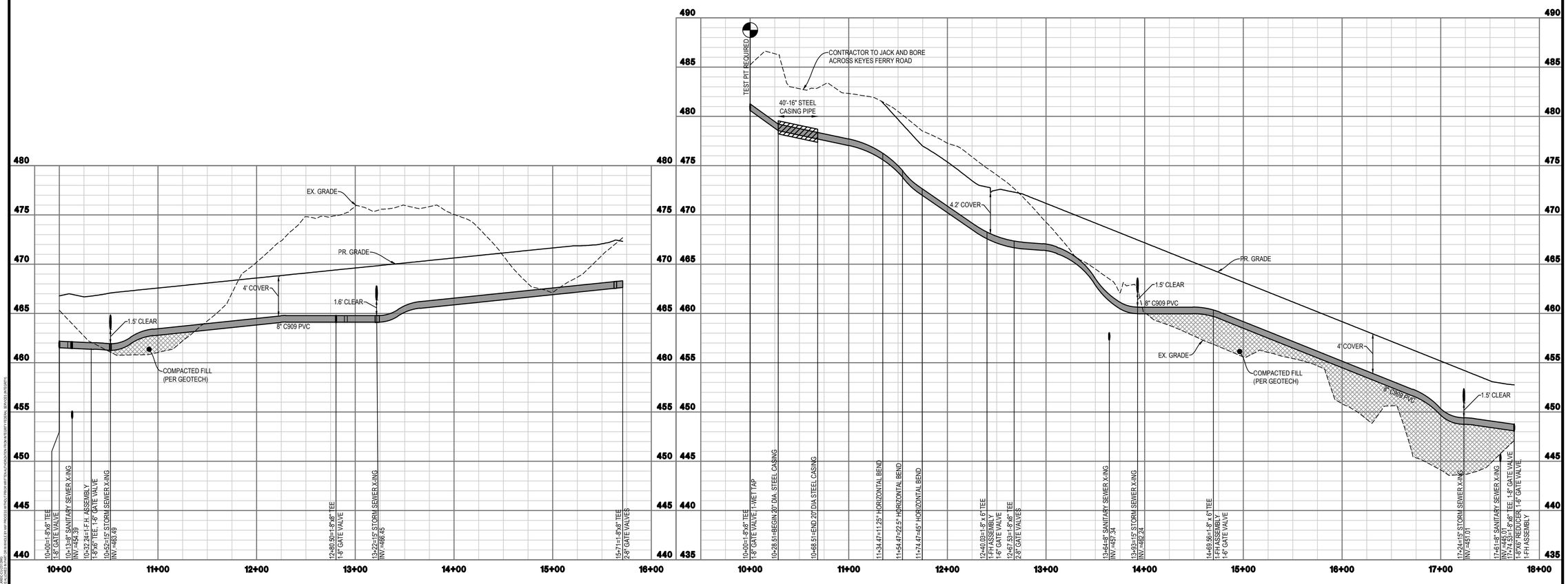

ROAD P WATERLINE PROFILE

ROAD S WATERLINE PROFILE

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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SHEET:	90 OF 134

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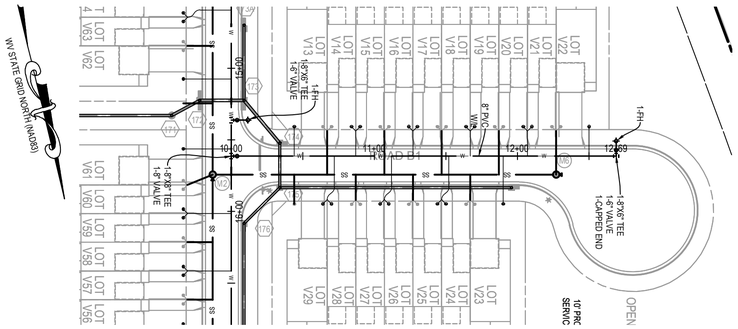
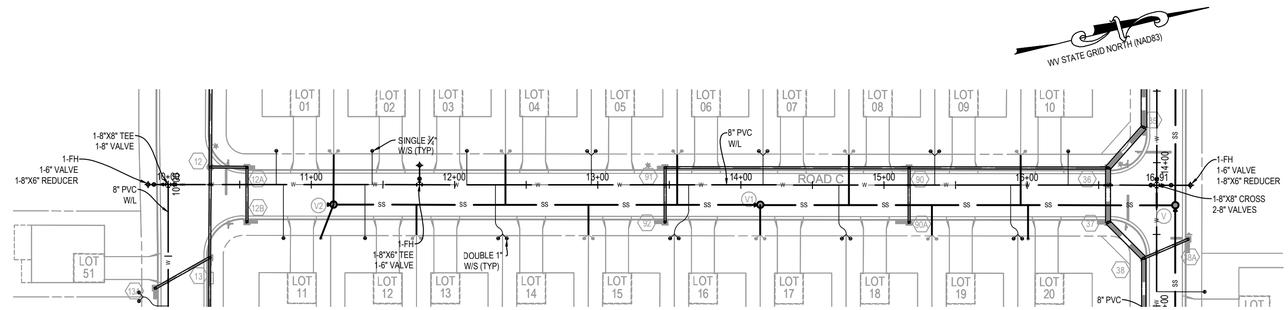
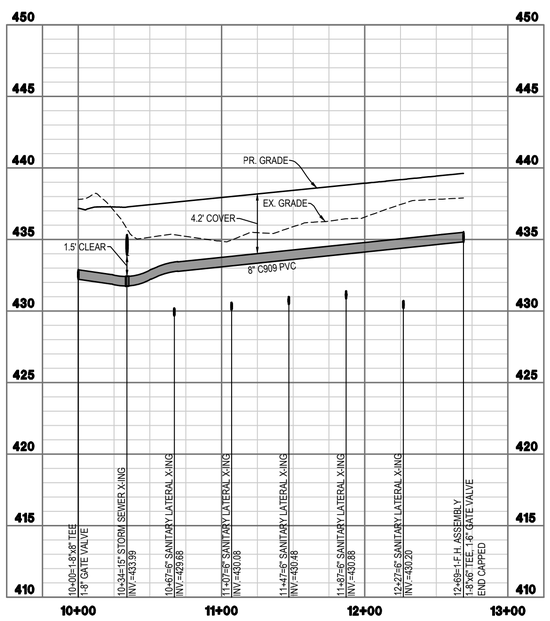
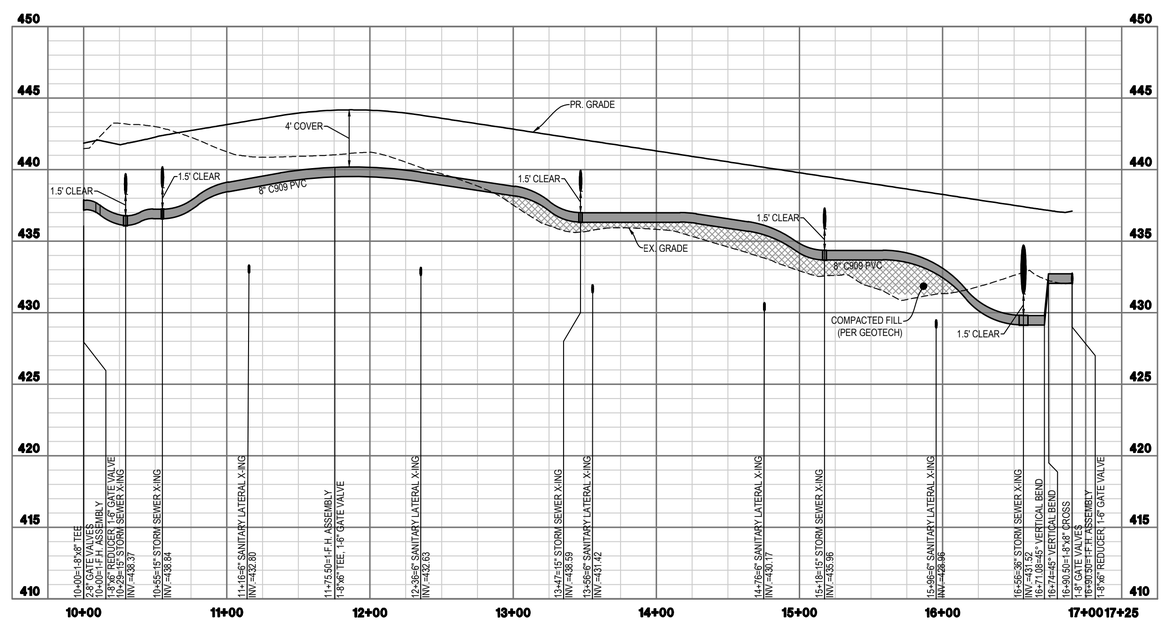






ROAD B1 WATERLINE PROFILE



ROAD C WATERLINE PROFILE

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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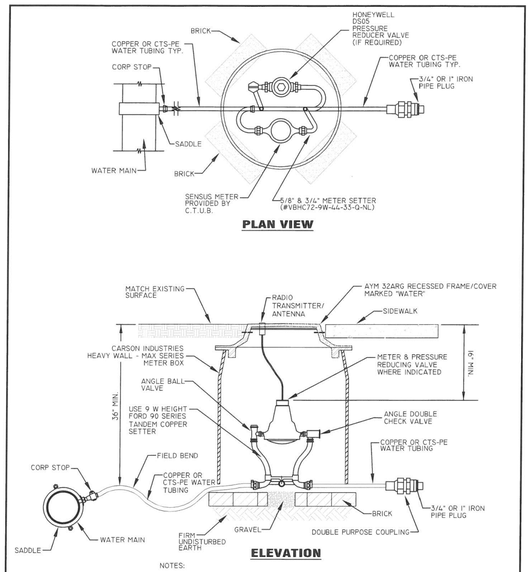
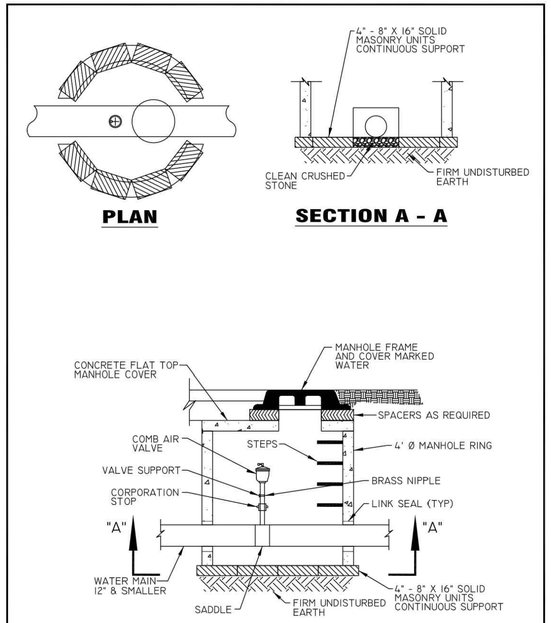


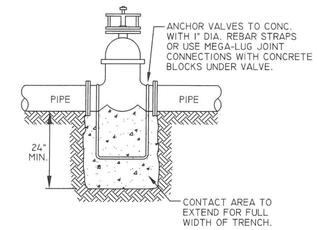
NOTES:

1. ALL BOLTS TO BE STAINLESS STEEL
2. CONNECT NEW METER SETTER TO EXISTING SERVICE LINES FOR LOCATIONS REQUIRING ONLY METER REPLACEMENT
3. PRESSURE REDUCING VALVE REQUIRED IF STATIC SYSTEM PRESSURES EXCEED 100 PSI
4. ALL METERS TO BE SENSUS RADIO READ PLACED AT PROPERTY LINE.

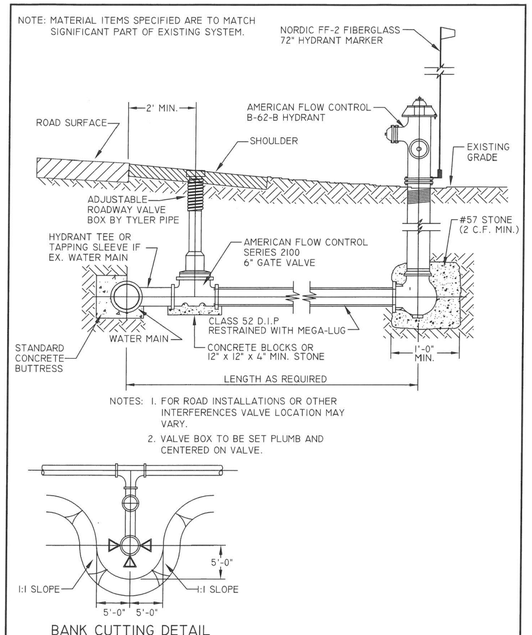
Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	METERED CONNECTION DETAIL	Standard Detail No. W-1 NOT TO SCALE APRIL 2015



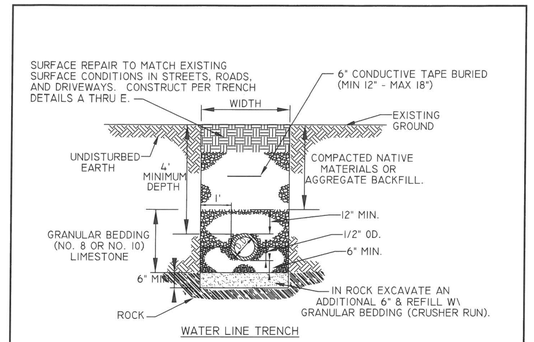
Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	AIR RELEASE & VALVE DETAIL	Standard Detail No. W-2 NOT TO SCALE APRIL 2015



Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	WATER VALVES DETAIL	Standard Detail No. W-3 NOT TO SCALE APRIL 2015



Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	FIRE HYDRANT WITH TAPPING SLEEVE AND VALVE DETAIL	Standard Detail No. W-5 NOT TO SCALE APRIL 2015



NOTES:

1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON, W = O.D. + 24", UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
4. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (+2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
5. MAINTAIN MINIMUM OF 4' OF COVER TO THE TOP OF PIPE.
6. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS
7. ALL WATER LINES REQUIRE PERMIT FROM APPLICABLE REGULATORY ENTITIES. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	WATER LINE TRENCH DETAIL	Standard Detail No. W-9 NOT TO SCALE APRIL 2015

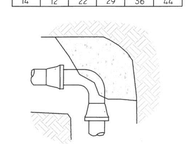
22.5 & 45 DEGREE CONTACT AREA (SF)

PIPE SIZE	PRESSURE CLASS 100	150	200	250	300
2	1	1	1	1	1
4	1	1	2	2	2
6	2	2	3	4	5
8	3	4	5	7	8
10	4	6	8	10	12
12	5	9	12	15	18
14	8	12	16	20	24

90 DEGREE BEND CONTACT AREA (SF)

PIPE SIZE	PRESSURE CLASS 100	150	200	250	300
2	1	1	1	1	1
4	2	2	3	3	4
6	3	4	5	7	8
8	5	7	10	12	15
10	7	11	15	19	22
12	9	16	21	27	32
14	12	22	29	36	44

22.5° & 45° BENDS



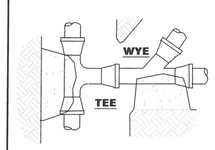
90° BEND

TEE CONTACT AREA (SF)

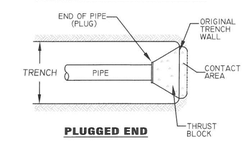
PIPE SIZE	PRESSURE CLASS 100	150	200	250	300
2	1	1	1	1	1
4	1	2	2	2	3
6	2	3	4	5	6
8	4	5	7	9	10
10	5	8	11	13	16
12	7	12	15	19	23
14	10	16	21	26	31

PLUGGED END CONTACT AREA (SF)

PIPE SIZE	PRESSURE CLASS 100	150	200	250	300
2	1	1	1	1	1
4	1	2	2	2	3
6	2	3	4	5	6
8	4	5	7	9	10
10	5	8	11	13	16
12	7	12	15	19	23
14	10	16	21	26	31



SAME CONTACT AREA AS TEE



PLUGGED END

THRUST BLOCK GENERAL NOTES

1. ALL CONCRETE SHALL BE 3000 P.S.I. (AE)
2. THRUST BLOCKS SHALL BE IMBEDDED IN UNDISTURBED SOIL.
3. SOIL BEARING CAPACITY IS ASSUMED AT 3000 LB. SQ. FT. FOR WEAKER SOILS THRUST BLOCK AREAS SHALL BE INCREASED AS REQUIRED.
4. WRAP PIPE WITH POLYETHYELENE TO PREVENT CONTACT BETWEEN PIPE AND THE CONCRETE.

Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	PIPE BUTTRESS DETAILS	Standard Detail No. W-13 NOT TO SCALE APRIL 2015

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WATER DETAILS

STONE SPRING SUBDIVISON

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JEFFERSON COUNTY, WEST VIRGINIA

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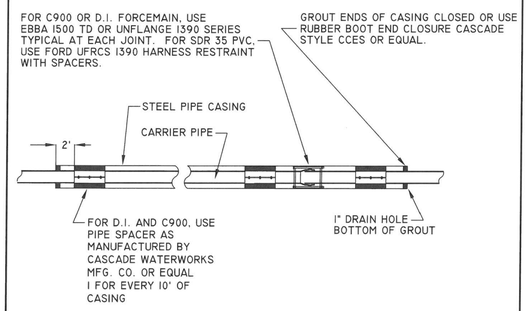
CASING SCHEDULE FOR C900, DI, OR DI TR FLEX RESTRAINED JT 350 PSI		
CARRIER PIPE DIA. (IN.)	MIN. CASING PIPE DIA. (IN.)	NOM. WALL THICKNESS
4	10	0.313
6	12	0.313
8	16	0.313
10	18	0.375
12	20	0.375

NOTE: SDR 35 PVC, CASING FOR 4" CARRIER IS 12" DIA. AND FOR 6" CARRIER IS 16" DIA. OTHER SIZE SDR 35 ARE SAME AS ABOVE. STEEL CASING SHALL BE USED WITH SPECIFIED MINIMUM YIELD STRENGTH OF AT LEAST 35,000 PSI.



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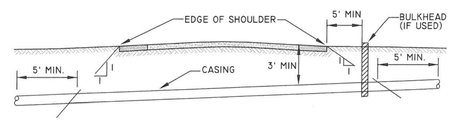
PIPE CASING DETAIL

Standard Detail No. **W-14**
NOT TO SCALE
APRIL 2015



NOTE: PERMIT REQUIRED FROM WV DEPARTMENT OF HIGHWAYS IF CROSSING UNDER STATE ROAD. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

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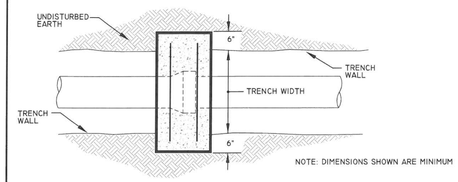
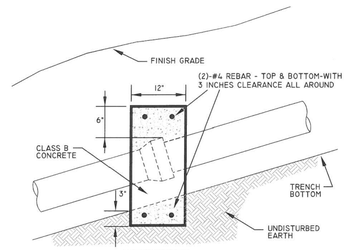
PIPE CASING TYP. ROAD CROSSING SECTION DETAIL

Standard Detail No. **W-15**
NOT TO SCALE
APRIL 2015



NOTE: DIMENSIONS SHOWN ARE MINIMUM

PLAN



SECTION

1. PROVIDE ANCHORS ON GRADES OF 20% AND GREATER OR WHERE SPECIFIED.
2. PROVIDE ANCHORS 36 FT. O.C. ON GRADES BETWEEN 20% AND 34%.
3. PROVIDE ANCHORS 24 FT. O.C. ON GRADES BETWEEN 34% AND 50%.
4. PROVIDE ANCHORS 16 FT. O.C. ON GRADES 50% OR GREATER.
5. WHEN NECESSARY EXTEND ANCHOR TO 12" BELOW FINISH GRADE TO PREVENT WASHOUT OF BACKFILL BY SURFACE WATER.
6. ANCHORS SHALL BE PLACED AT JOINTS NOT TO EXCEED O.C. DISTANCES.

Charles Town Utility Board
832 S. George Street, P.O. Box 359, Charles Town, WV 25414
Phone: (304) 725-2316 • Fax: (304) 725-4313

SLOPE ANCHOR DETAIL

Standard Detail No. **W-16**
NOT TO SCALE
APRIL 2015

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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

WATER DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.: N/A
DATE: JANUARY 2023	
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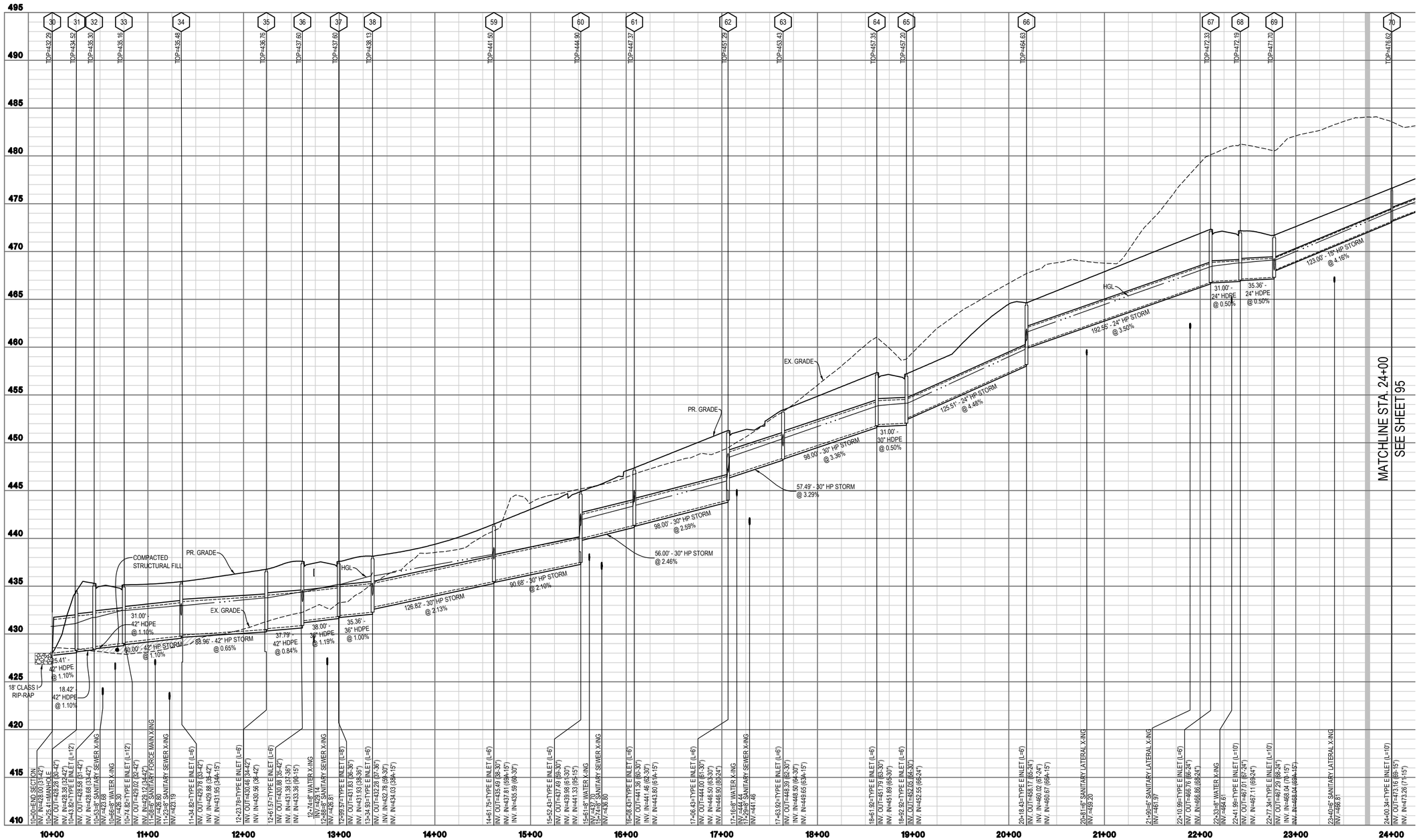
CADD: C-CU-531.DWG	
NCS:	
SHEET: 93 OF 134	



NOTE: THE DEVELOPER MAY SUBSTITUTE PIPE MATERIAL FOR EQUIVALENT N-FACTOR PIPE MATERIAL.

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER PROFILES

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-261.DWG	
NCS:	
SHEET:	94 OF 134

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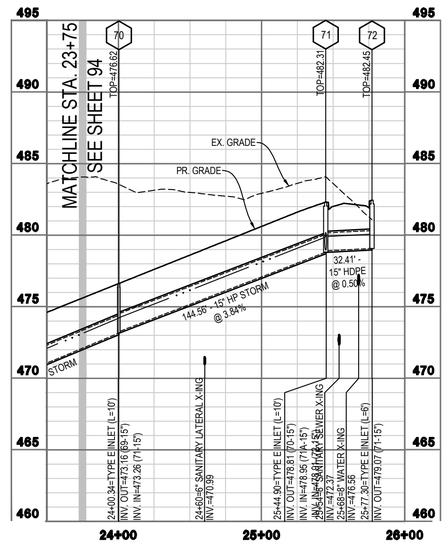

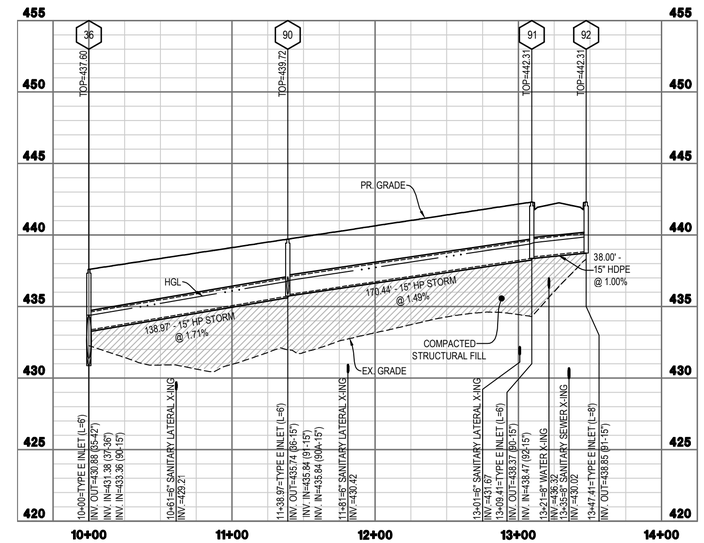

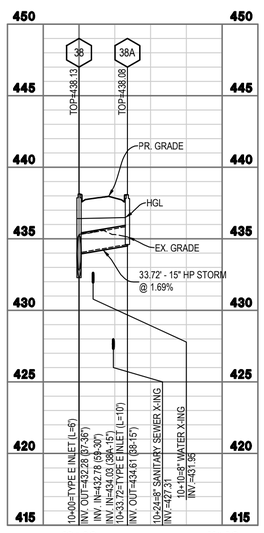

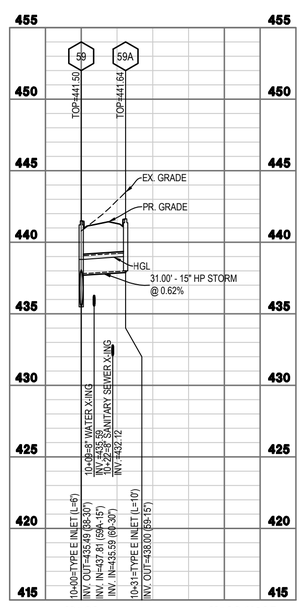

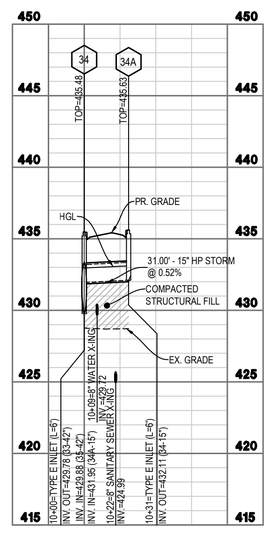

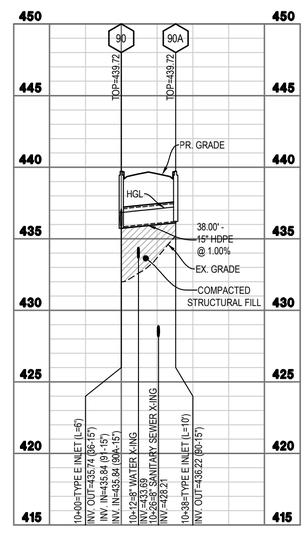

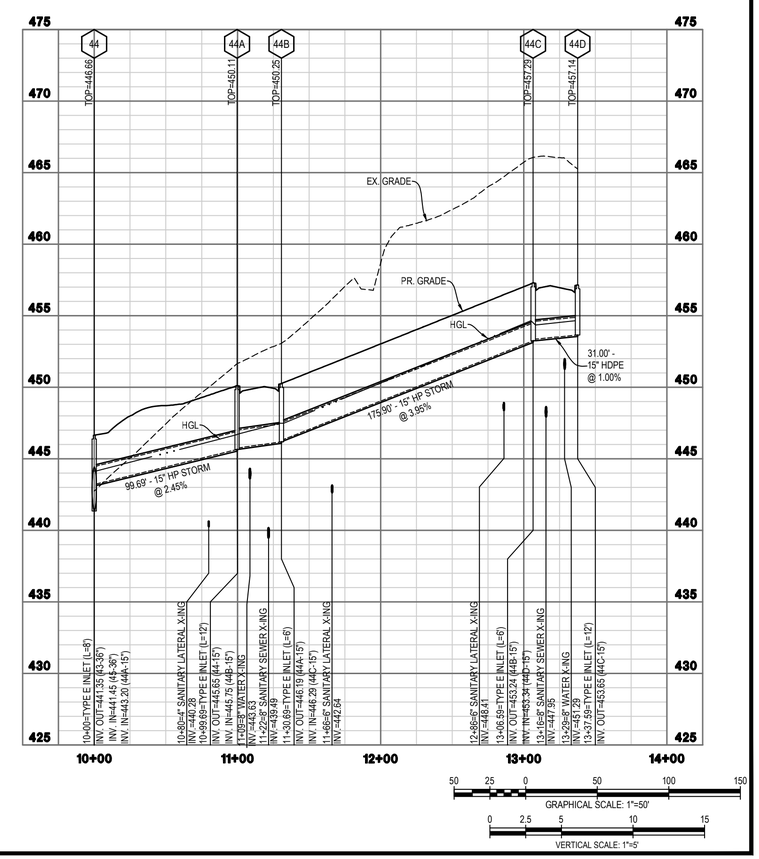

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REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER PROFILES

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-261.DWG	
NCS:	
SHEET:	95 OF 134

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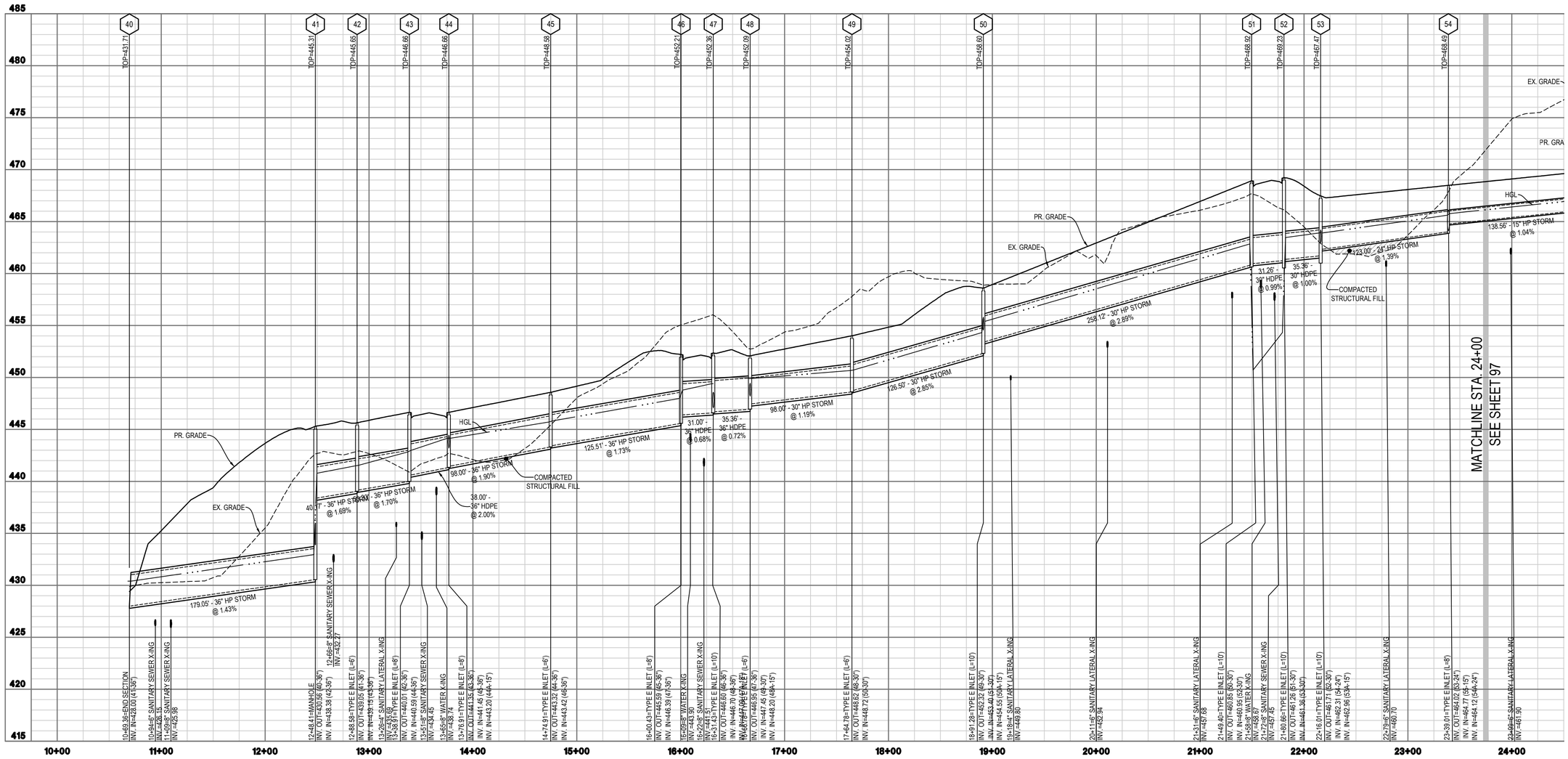

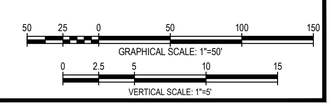

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50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

0 2.5 5 10 15
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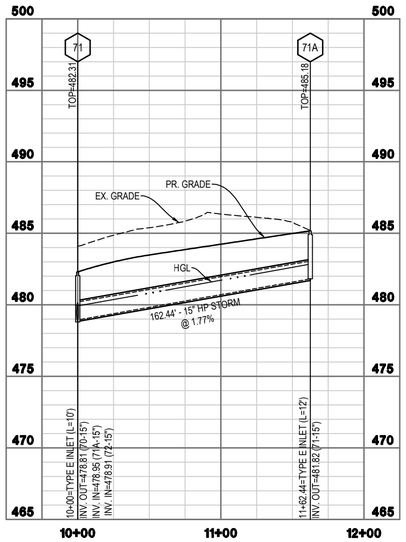

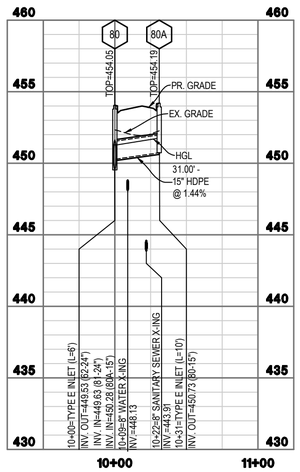

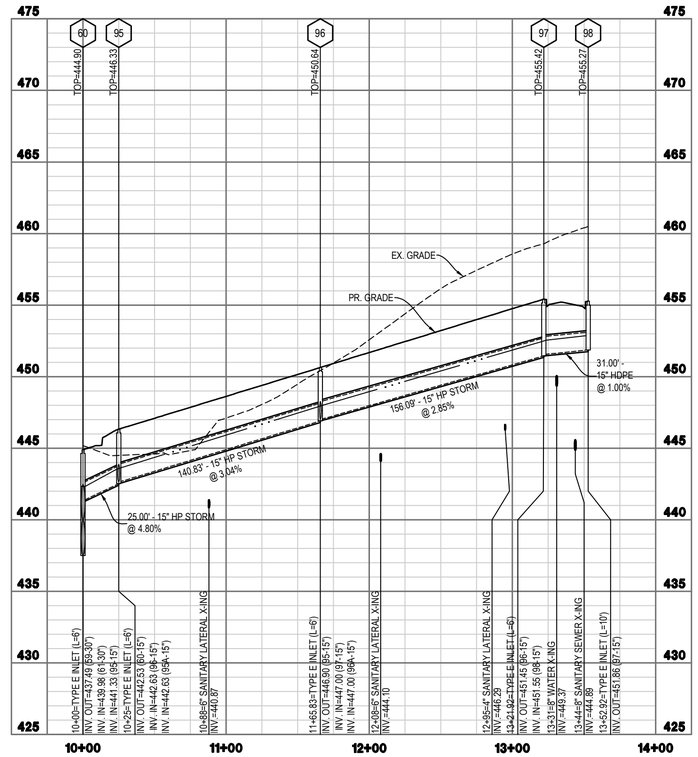

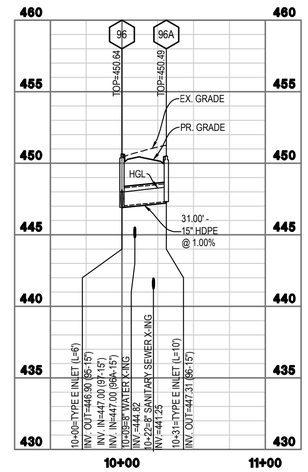

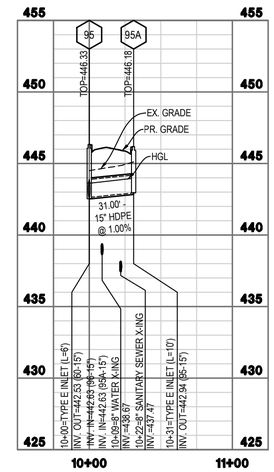

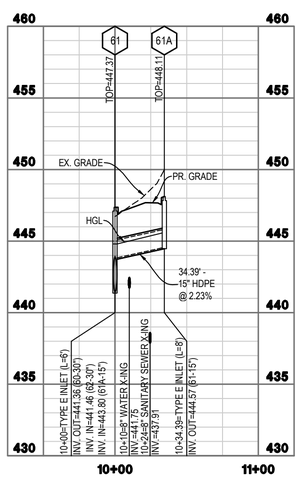

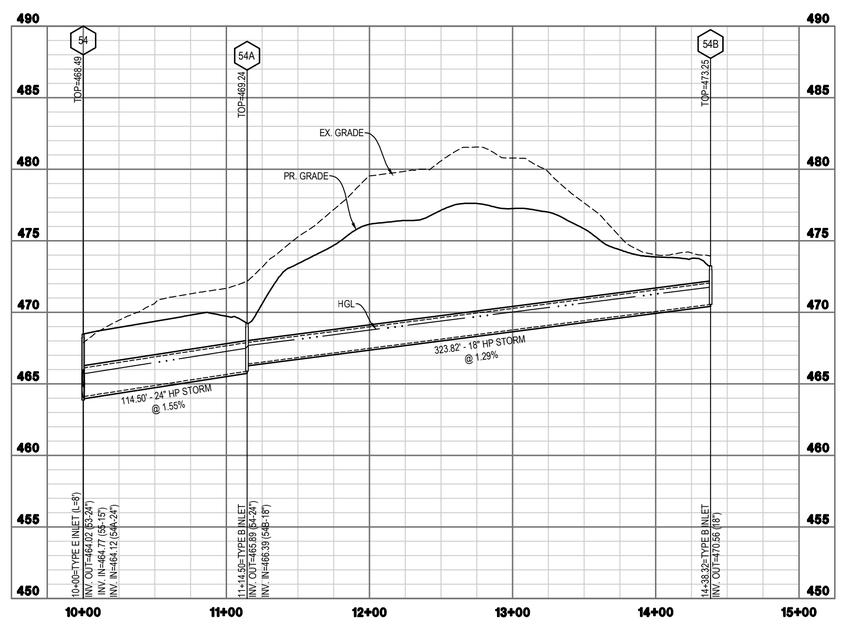

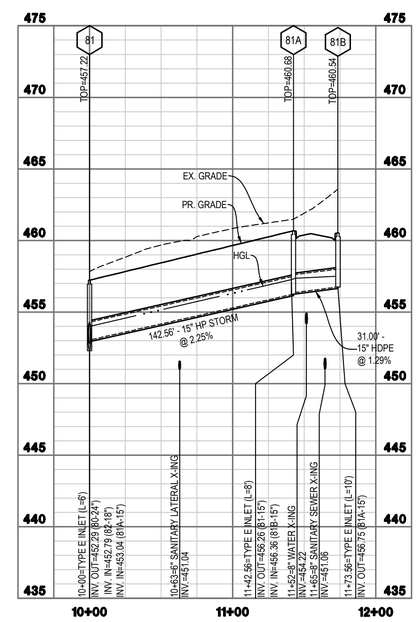

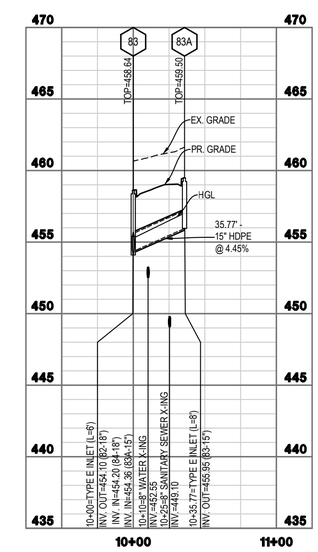

GRAPHICAL SCALE: 1"=50'

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3-16-23

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STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
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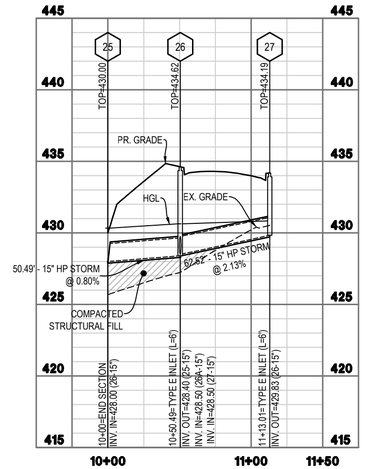
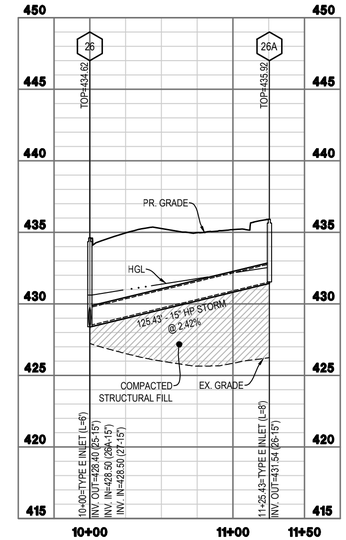
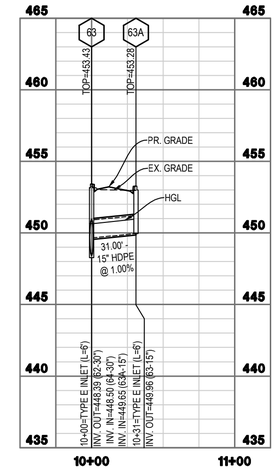
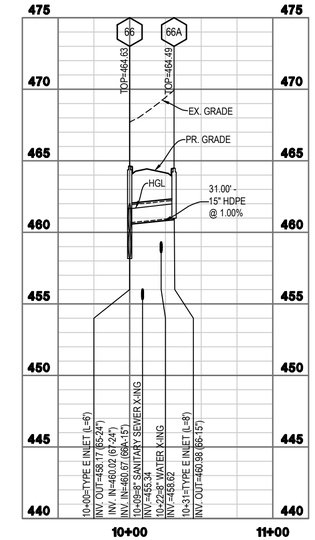
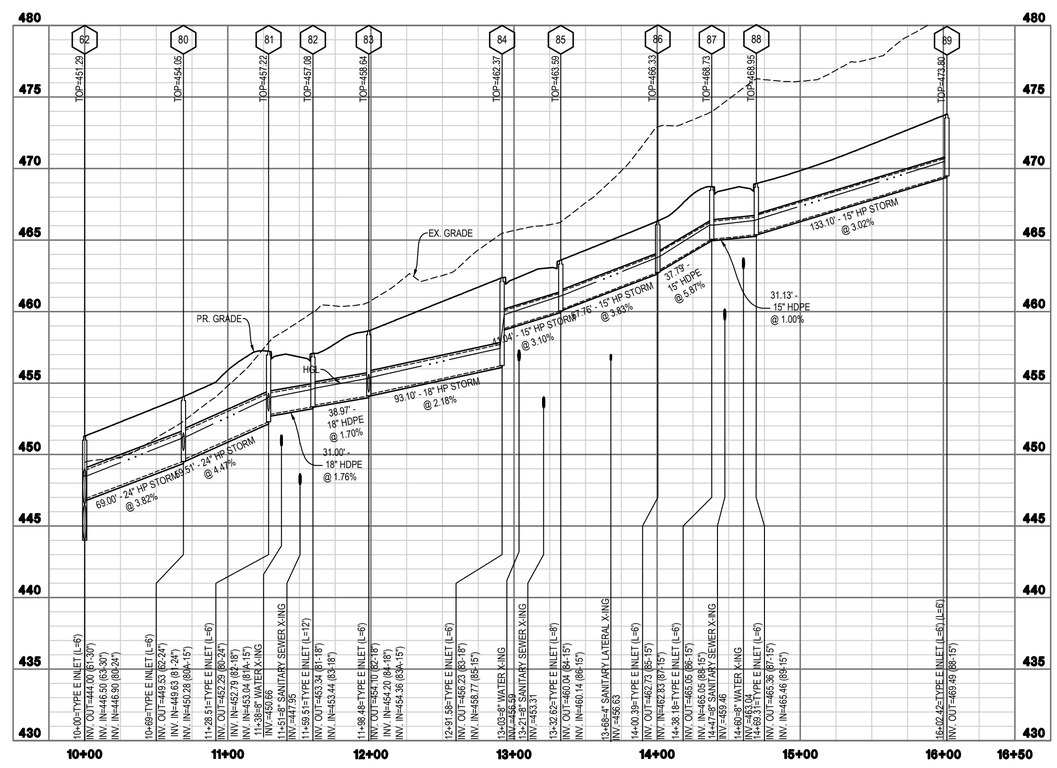
SHEET:	98 OF 134

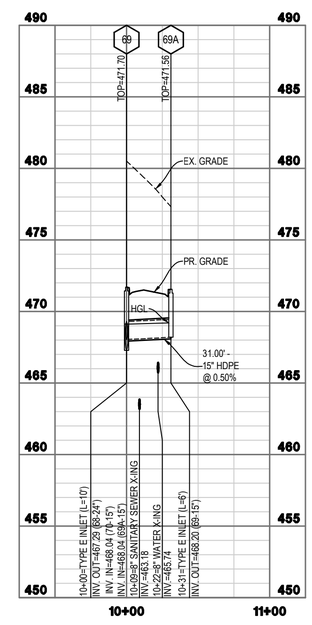


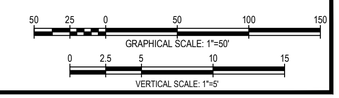












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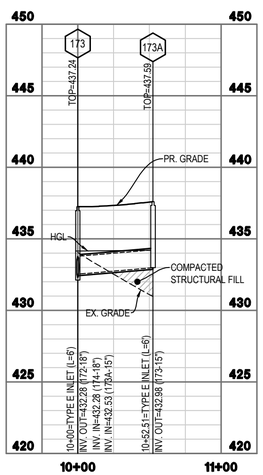

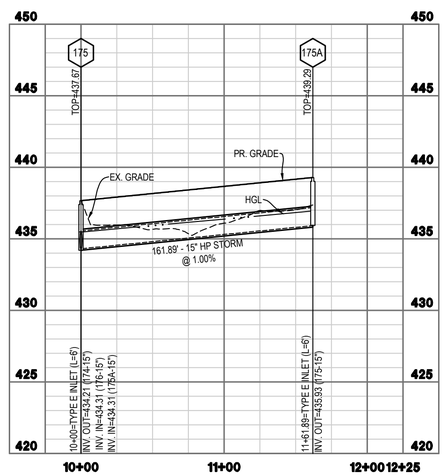

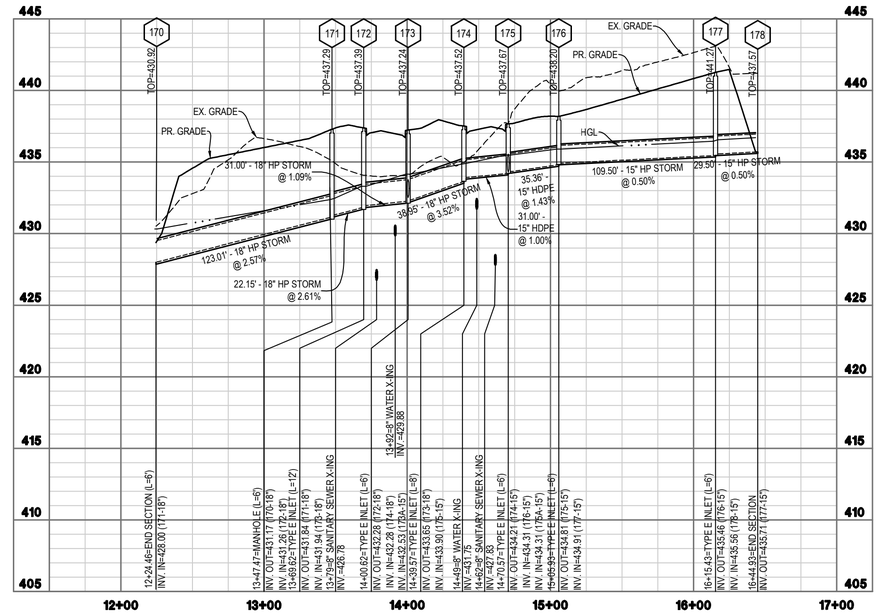

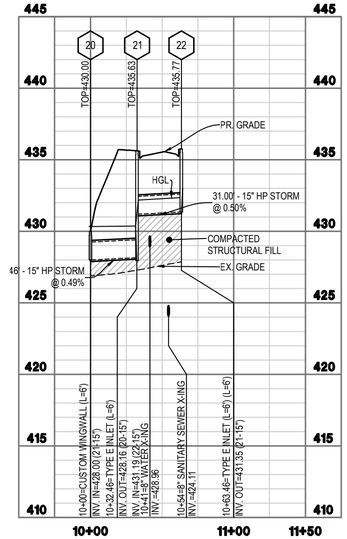

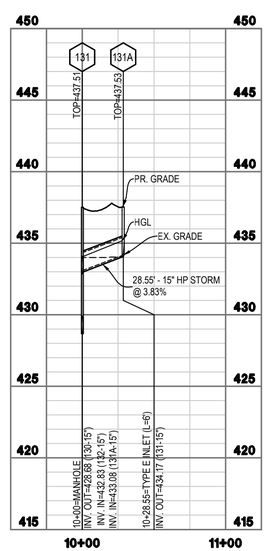

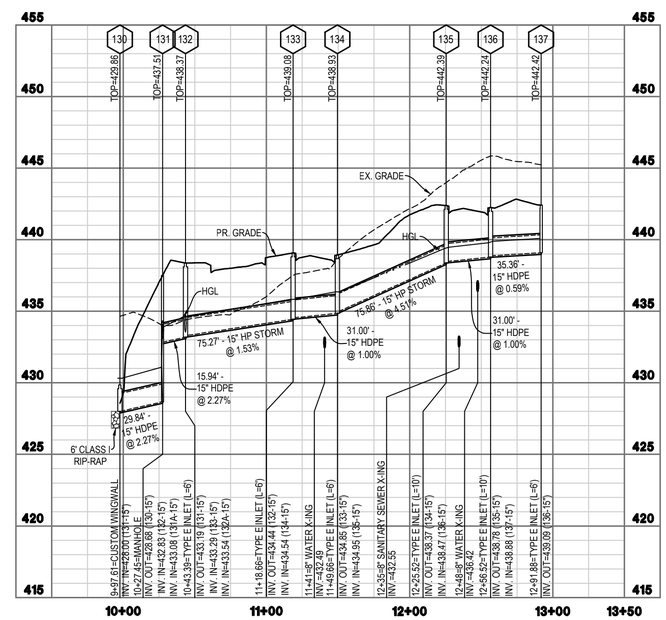

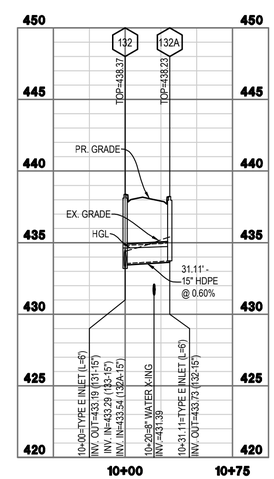

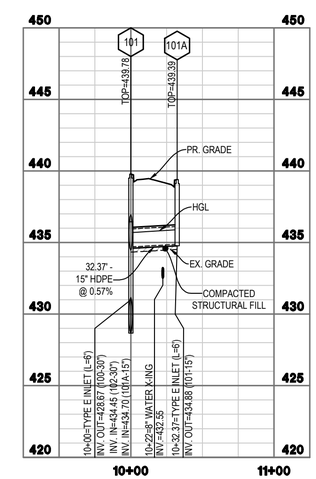

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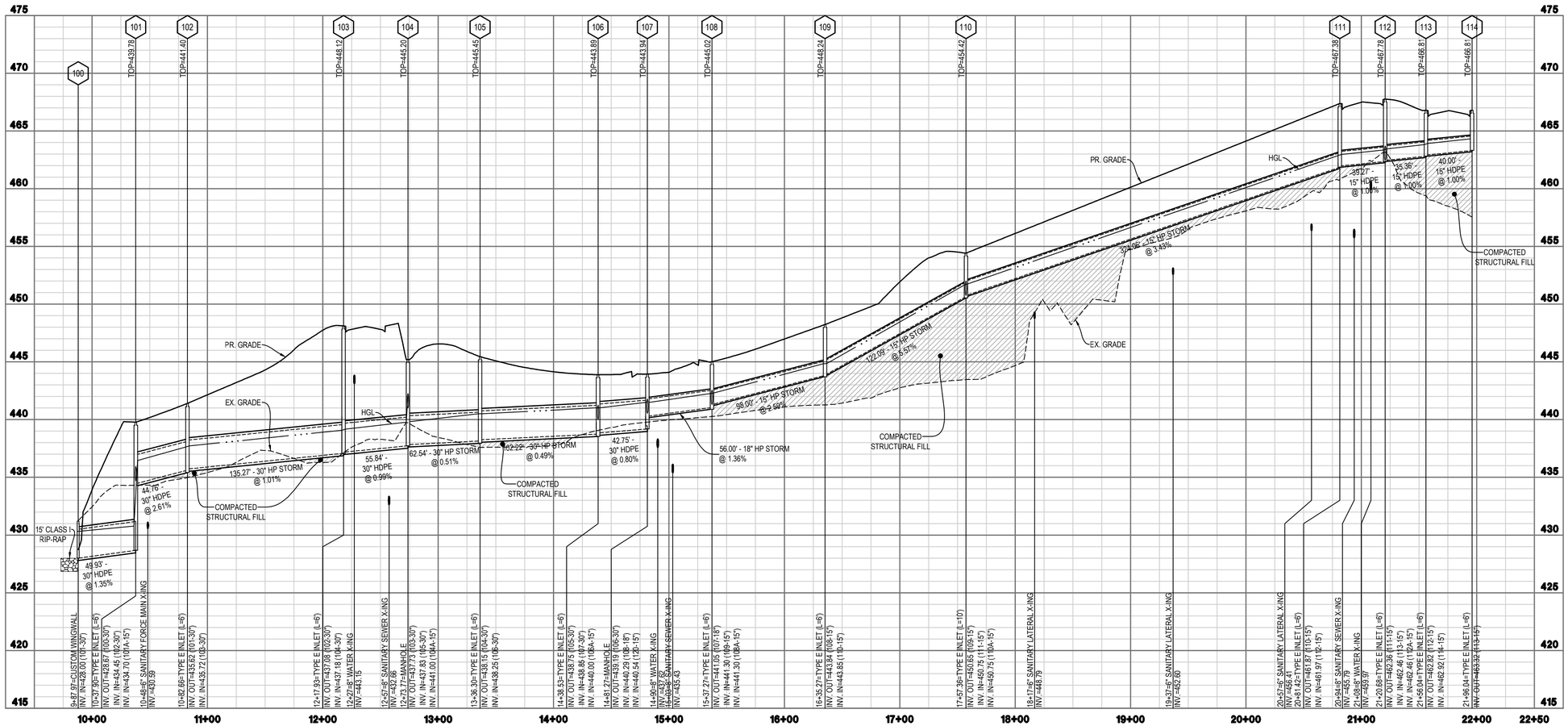

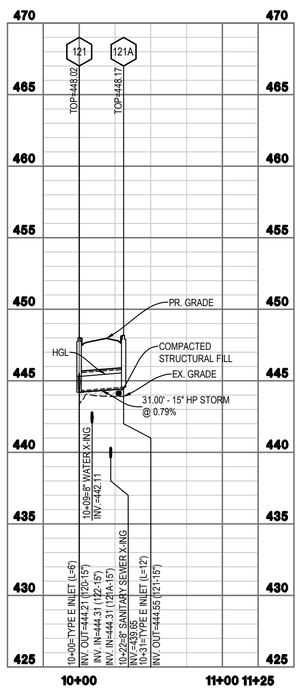

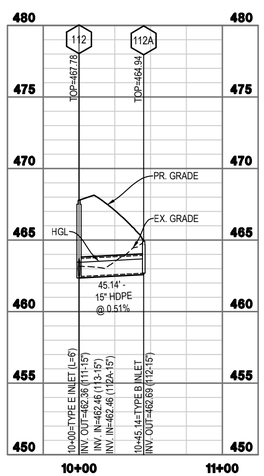

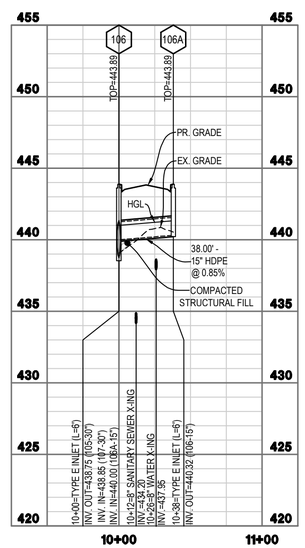

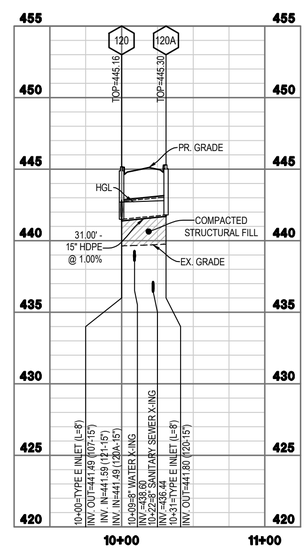

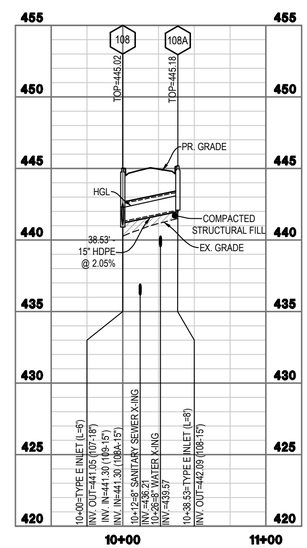

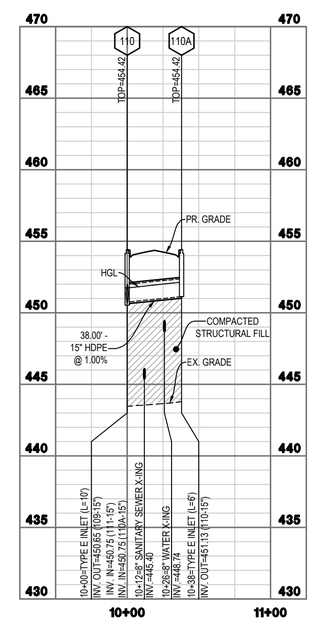

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER PROFILES

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE:	JANUARY 2023
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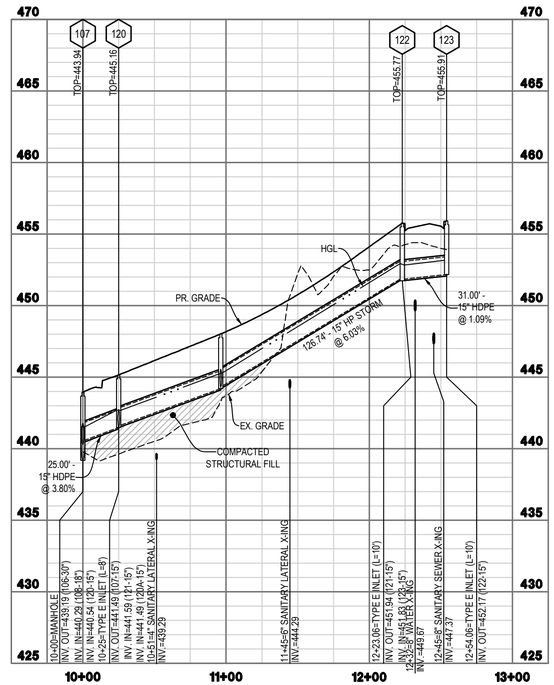

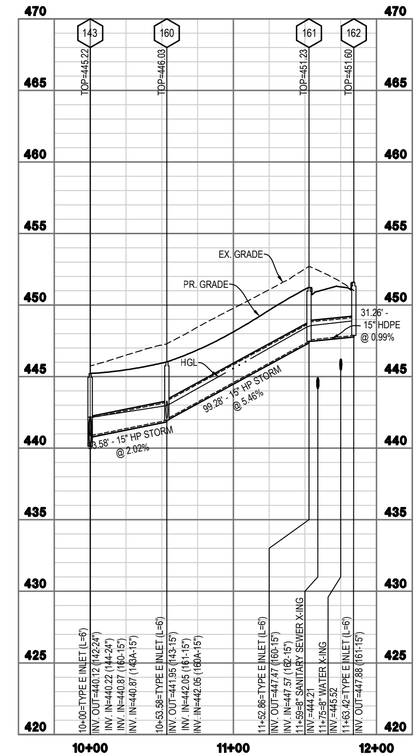

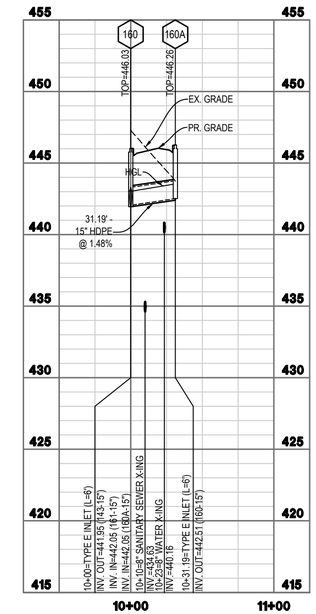

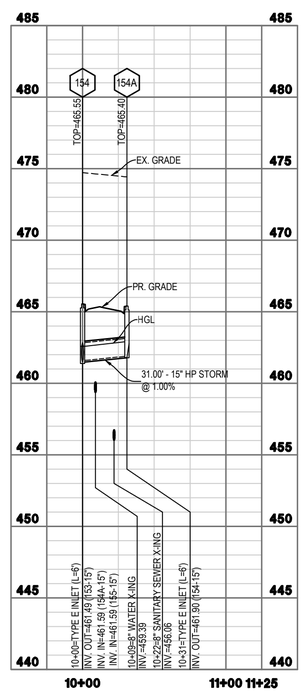

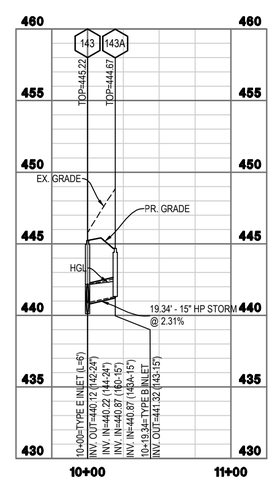

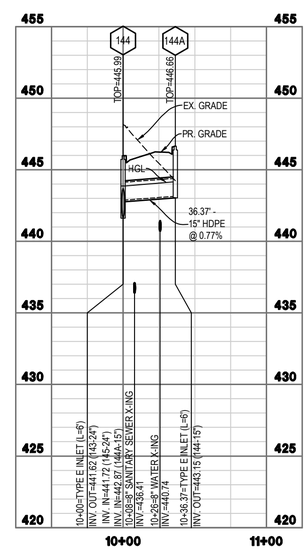

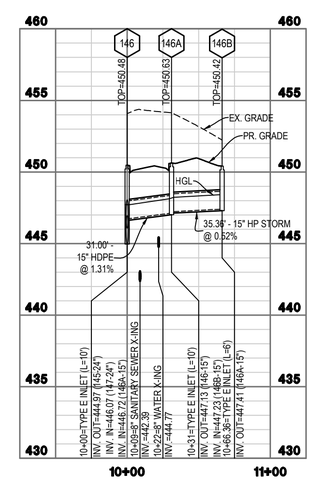

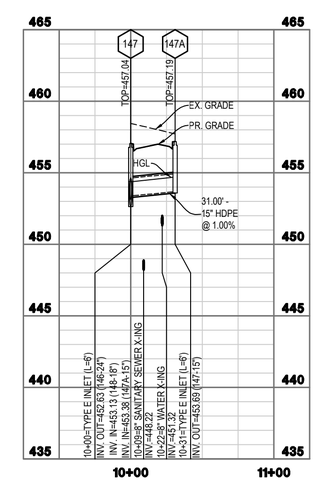

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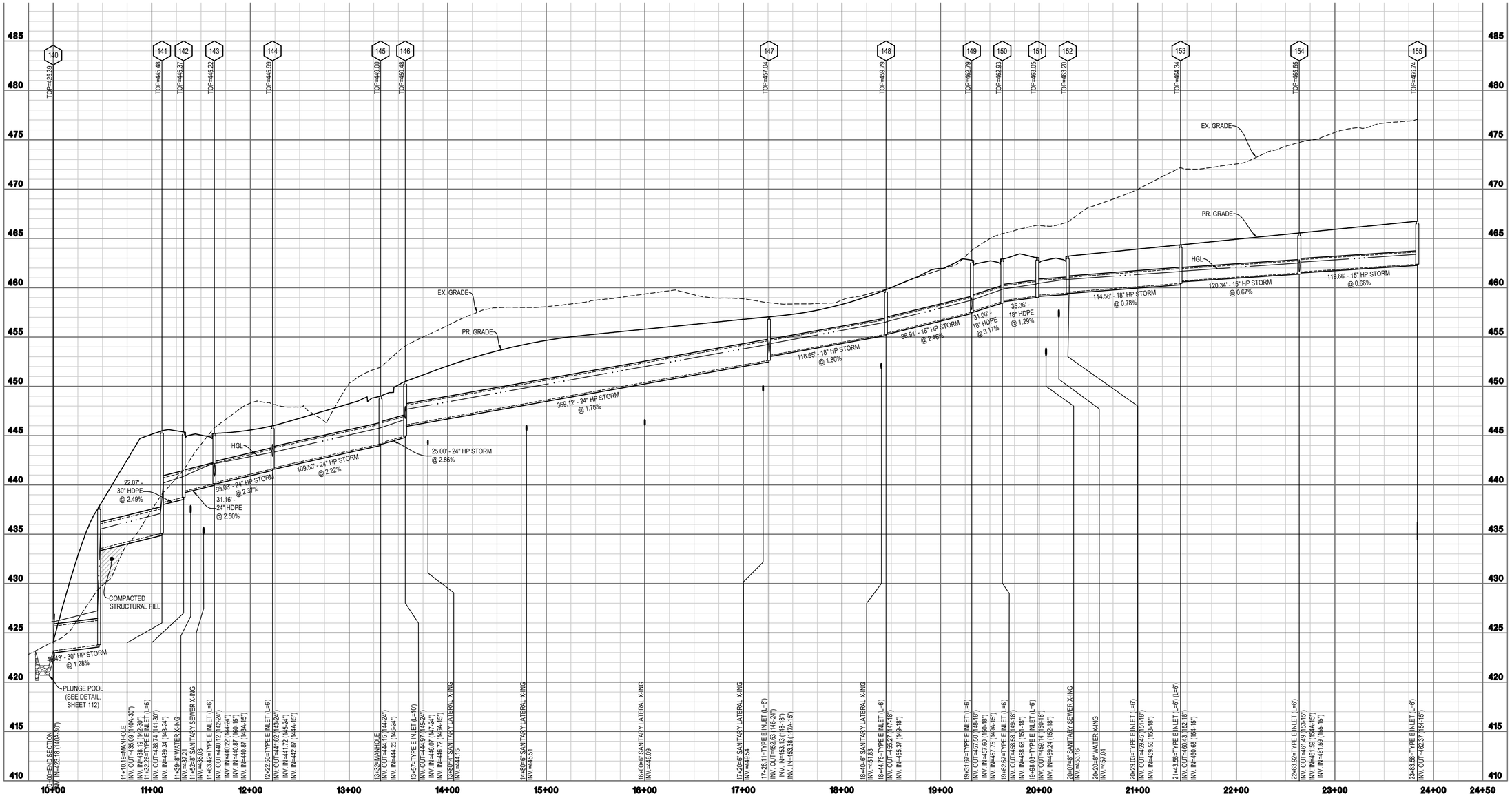

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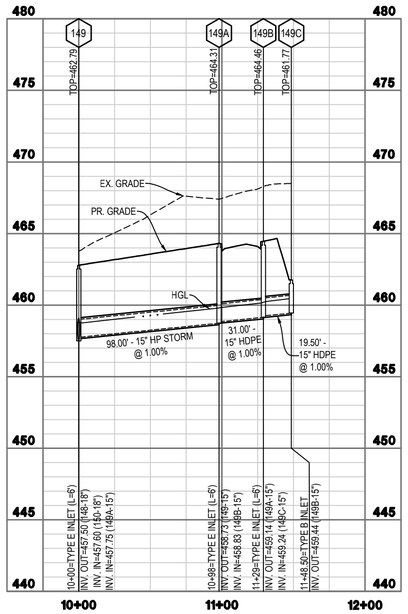

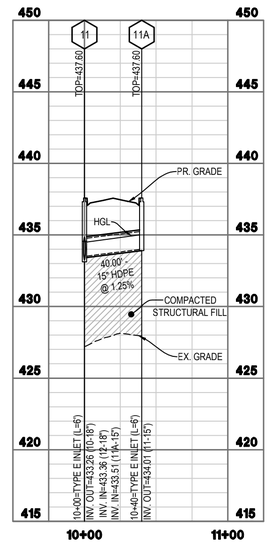

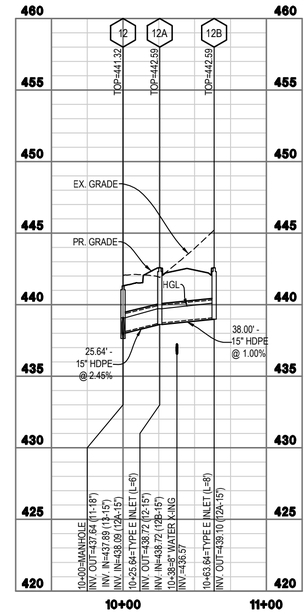

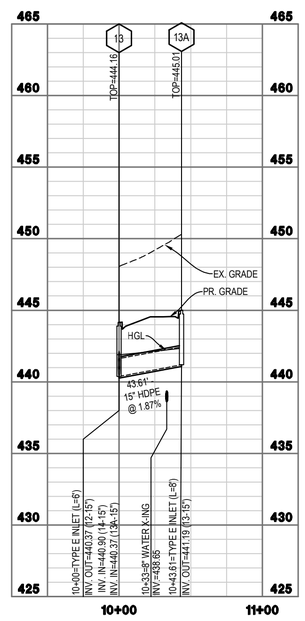

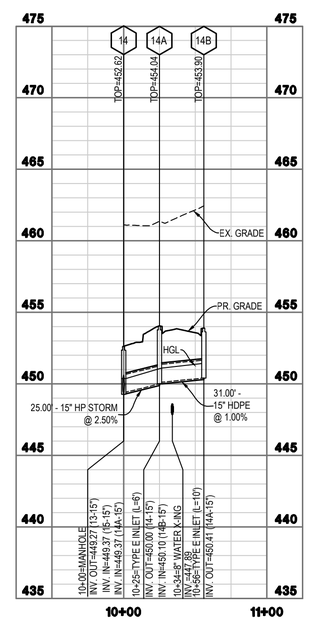

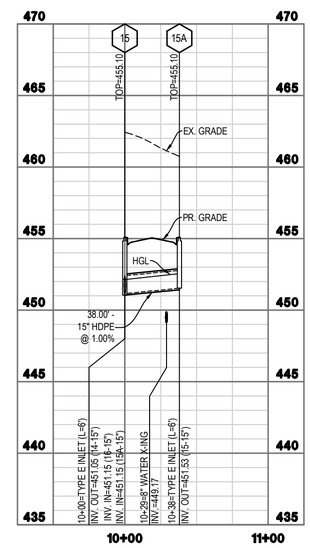

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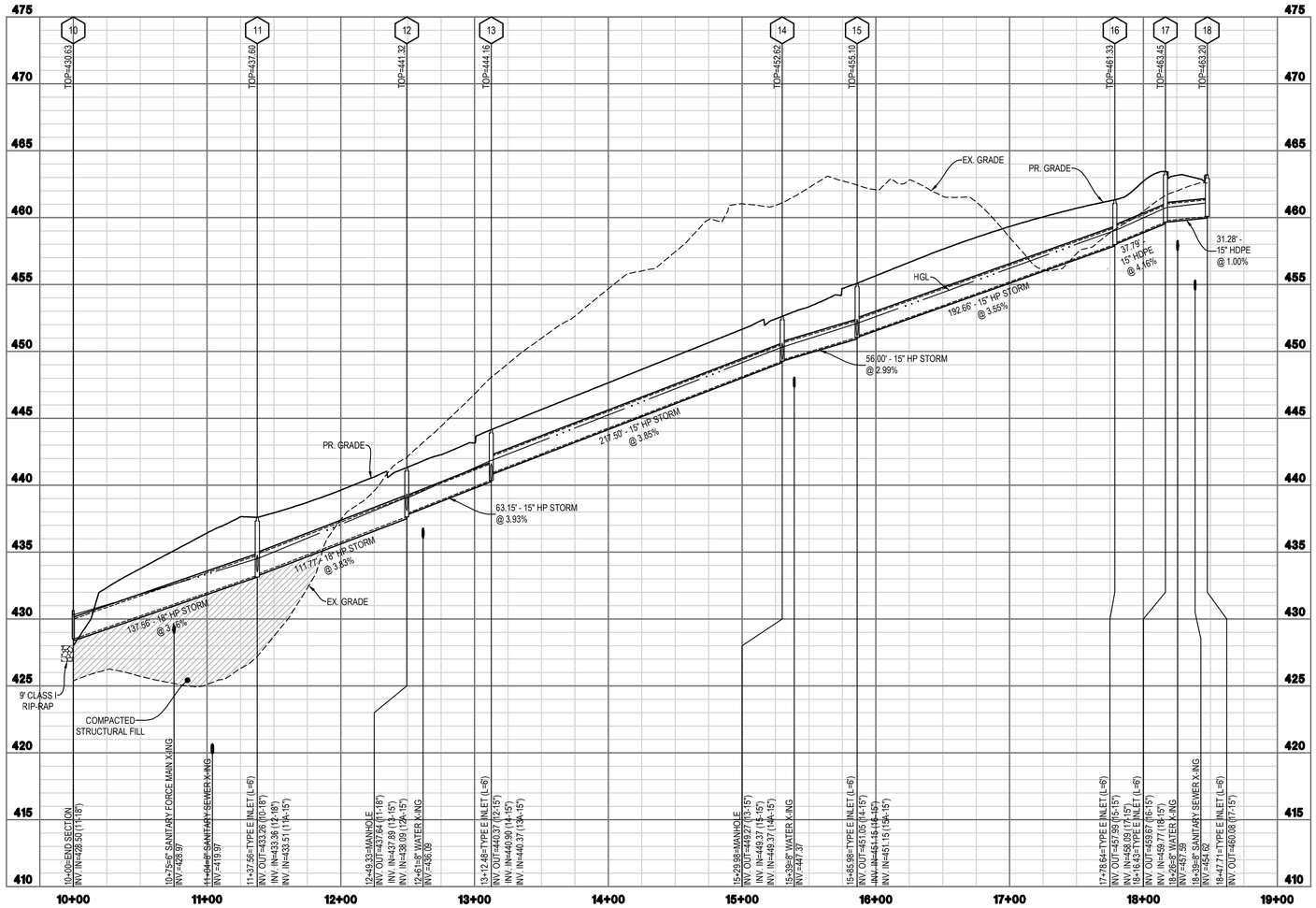

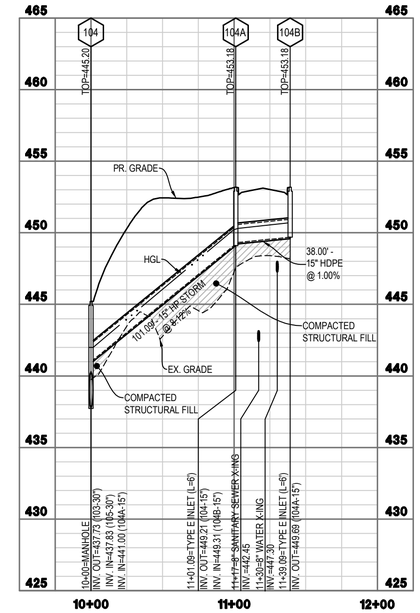

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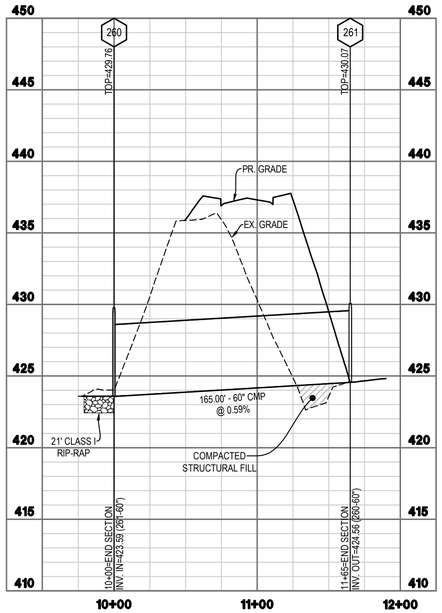

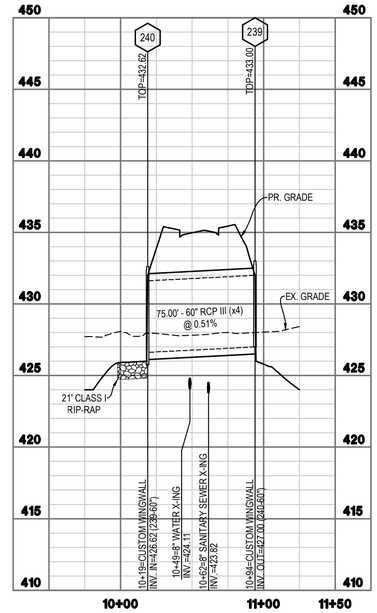

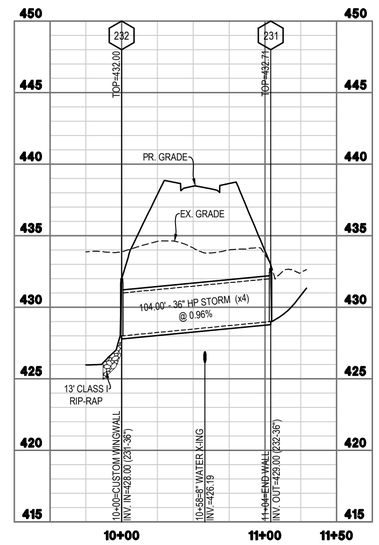

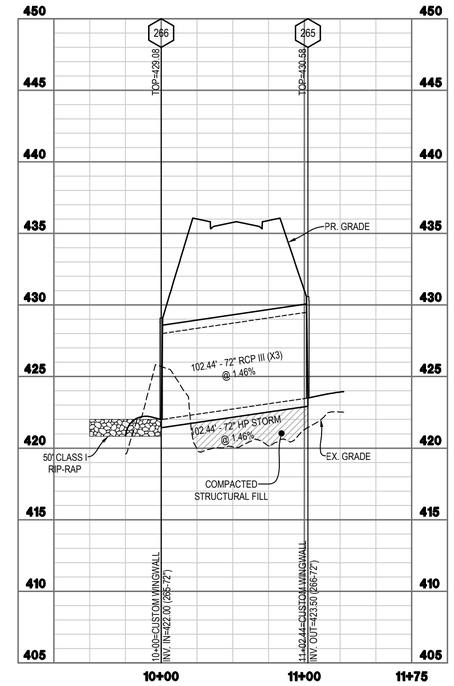

Culvert Calculator Report
ROAD A-2 CULVERTS

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	432.06	ft	Headwater Depth/Height	1.30	
Computed Headwater Elevi	431.04	ft	Discharge	144.01	cfs
Inlet Control HW Elev.	430.55	ft	Tailwater Elevation	427.59	ft
Outlet Control HW Elev.	431.04	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	424.56	ft	Downstream Invert	423.59	ft
Length	165.00	ft	Constructed Slope	0.005879	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	4.00	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	3.44	ft
Velocity Downstream	8.55	ft/s	Critical Slope	0.015572	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	431.04	ft	Upstream Velocity Head	0.85	ft
Ke	0.90		Entrance Loss	0.76	ft

Inlet Control Properties					
Inlet Control HW Elev.	430.55	ft	Flow Control	N/A	
Inlet Type	Projecting		Area Full	19.6	ft²
K	0.03400		HDS 5 Chart	2	
M	1.50000		HDS 5 Scale	3	
C	0.05530		Equation Form	1	
Y	0.54000				

Culvert Calculator Report
ROAD H CULVERTS - 100 YEAR

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	434.97	ft	Headwater Depth/Height	1.58	
Computed Headwater Elevi	433.89	ft	Discharge	710.00	cfs
Inlet Control HW Elev.	432.14	ft	Tailwater Elevation	431.80	ft
Outlet Control HW Elev.	433.89	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	426.00	ft	Downstream Invert	426.00	ft
Length	143.00	ft	Constructed Slope	0.000000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	5.80	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	3.82	ft
Velocity Downstream	9.04	ft/s	Critical Slope	0.004571	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	4				

Outlet Control Properties					
Outlet Control HW Elev.	433.89	ft	Upstream Velocity Head	1.27	ft
Ke	0.20		Entrance Loss	0.25	ft

Inlet Control Properties					
Inlet Control HW Elev.	432.14	ft	Flow Control	N/A	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	78.5	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
ROAD B CULVERTS

Solve For: Section Size

Culvert Summary					
Allowable HW Elevation	434.00	ft	Headwater Depth/Height	1.48	
Computed Headwater Elevi	433.44	ft	Discharge	153.00	cfs
Inlet Control HW Elev.	432.02	ft	Tailwater Elevation	430.51	ft
Outlet Control HW Elev.	433.44	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	429.00	ft	Downstream Invert	428.00	ft
Length	100.00	ft	Constructed Slope	-0.010000	ft/ft

Hydraulic Profile					
Profile	CompositeA2Pressure	Profile	Depth, Downstream	2.51	ft
Slope Type	Adverse		Normal Depth	0.00	ft
Flow Regime	Subcritical		Critical Depth	2.01	ft
Velocity Downstream	6.06	ft/s	Critical Slope	0.004481	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	4				

Outlet Control Properties					
Outlet Control HW Elev.	433.44	ft	Upstream Velocity Head	0.46	ft
Ke	0.20		Entrance Loss	0.09	ft

Inlet Control Properties					
Inlet Control HW Elev.	432.02	ft	Flow Control	N/A	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	28.3	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
ROAD A CULVERTS

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	434.80	ft	Headwater Depth/Height	1.85	
Computed Headwater Elevi	434.62	ft	Discharge	1,200.00	cfs
Inlet Control HW Elev.	433.90	ft	Tailwater Elevation	430.00	ft
Outlet Control HW Elev.	434.62	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	423.50	ft	Downstream Invert	422.00	ft
Length	100.00	ft	Constructed Slope	0.015000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	8.00	ft
Slope Type	N/A		Normal Depth	3.95	ft
Flow Regime	N/A		Critical Depth	5.33	ft
Velocity Downstream	14.15	ft/s	Critical Slope	0.007941	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	72 inch		Rise	6.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	434.62	ft	Upstream Velocity Head	3.11	ft
Ke	0.20		Entrance Loss	0.62	ft

Inlet Control Properties					
Inlet Control HW Elev.	433.90	ft	Flow Control	Submerged	
Inlet Type	Beveled ring, 45° bevels		Area Full	84.8	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	A	
C	0.03000		Equation Form	1	
Y	0.74000				

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DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-261.DWG	
NCS:	
SHEET:	106 OF 134

NOTE: THE DEVELOPER MAY SUBSTITUTE PIPE MATERIAL FOR EQUIVALENT N-FACTOR PIPE MATERIAL.

Reference Note	Structure Up	Structure Down	LineID	DrainageArea (ac)	RunoffCoeff (C)	IncrCxA	TotalCxA	InletTime (min)	iSys (in/hr)	Incr Flow Rate (cfs)	KnownQ (cfs)	Cumulative (cfs)	Total FlowRate (cfs)	InvertUp (ft)	InvertDn (ft)	LineLength (ft)	LineSlope (%)	LineSize (in)	Manning's Roughness Coefficient n	CapacityFull (cfs)	Vel Partial (ft/s)	PipeTravel (min)	Tc Total (min)	Grnd/Rim Elev Up (ft)
18	1	2	2A	3	4	5	6	7	8	9A	9B	9C	9	10	11	12	13	14	14A	15	16	17	17A	A
	15A	15	15A-15	0.23	0.70	0.16	0.16	5.00	6.53	1.05	0.00	0.00	1.05	451.53	451.15	38.00	1.00	15	0.012	7.00	3.9	0.16	5.00	455.10
	14B	14A	14B-14A	0.90	0.60	0.54	0.54	5.00	6.53	3.53	0.00	0.00	3.53	450.41	450.10	31.00	1.00	15	0.012	7.00	5.7	0.09	5.00	453.90
	14A	14	14A-14	0.25	0.70	0.18	0.72	5.00	6.49	4.64	0.00	0.00	4.64	450.00	449.37	25.00	2.52	15	0.012	11.11	8.5	0.05	5.09	454.04
	13A	13	13A-13	0.32	0.70	0.22	0.22	5.00	6.53	1.46	0.00	0.00	1.46	441.19	440.37	43.61	1.88	15	0.012	9.60	5.3	0.14	5.00	445.01
	12B	12A	12B-12A	0.71	0.60	0.43	0.43	5.00	6.53	2.78	0.00	0.00	2.78	439.10	438.72	38.00	1.00	15	0.012	7.00	5.3	0.12	5.00	442.59
	12A	12	12A-12	0.20	0.70	0.14	0.57	5.00	6.48	3.67	0.00	0.00	3.67	438.72	438.09	25.64	2.46	15	0.012	10.97	7.9	0.05	5.12	442.59
	11A	11	11A-11	0.21	0.75	0.16	0.16	5.00	6.53	1.03	0.00	0.00	1.03	434.01	433.51	40.00	1.25	15	0.012	7.82	4.1	0.16	5.00	437.60
	18	17	18-17	0.16	0.70	0.11	0.11	5.00	6.53	0.73	0.00	0.00	0.73	460.08	459.77	31.28	0.99	15	0.012	6.97	3.4	0.15	5.00	463.20
	17	16	17-16	0.24	0.70	0.17	0.28	5.00	6.47	1.81	0.00	0.00	1.81	459.67	458.09	37.79	4.18	15	0.012	14.31	7.3	0.09	5.15	463.45
	16	15	16-15	0.05	0.70	0.04	0.32	5.00	6.44	2.03	0.00	0.00	2.03	457.99	451.15	192.66	3.55	15	0.012	13.19	7.3	0.44	5.24	461.33
	15	14	15-14	0.17	0.70	0.12	0.60	5.00	6.29	3.74	0.00	0.00	3.74	451.05	449.37	56.00	3.00	15	0.012	12.12	8.5	0.11	5.68	455.10
	14	13	14-13	0.00	0.50	0.00	1.31	5.00	6.26	8.20	0.00	0.00	8.20	449.27	440.90	217.50	3.85	15	0.012	13.73	11.7	0.31	5.79	452.62
	13	12	13-12	0.21	0.70	0.15	1.68	5.00	6.16	10.35	0.00	0.00	10.35	440.37	437.89	63.15	3.93	15	0.012	13.87	12.4	0.08	6.10	444.16
	12	11	12-11	0.00	0.80	0.00	2.25	5.00	6.13	13.78	0.00	0.00	13.78	437.64	433.36	111.77	3.83	18	0.012	22.27	13.2	0.14	6.18	441.32
OUTFALL	11	10	11-10	0.13	0.70	0.09	2.50	5.00	6.09	15.19	0.00	0.00	15.19	433.26	428.50	137.56	3.46	18	0.012	21.17	13.1	0.18	6.32	437.60
	154A	154	154A-154	0.21	0.70	0.15	0.15	5.00	6.53	0.96	0.00	0.00	0.96	461.90	461.59	31.00	1.00	15	0.012	7.00	3.7	0.14	5.00	465.40
	149C	149B	149C-149B	0.58	0.60	0.35	0.35	5.00	6.53	2.27	0.00	0.00	2.27	459.44	459.24	19.50	1.03	15	0.012	7.09	5.1	0.06	5.00	461.77
	149B	149A	149B-149A	0.13	0.70	0.09	0.44	5.00	6.50	2.85	0.00	0.00	2.85	459.14	458.83	31.00	1.00	15	0.012	7.00	5.3	0.10	5.06	464.46
	149A	149	149A-149	0.08	0.85	0.07	0.51	5.00	6.47	3.28	0.00	0.00	3.28	458.73	457.75	98.00	1.00	15	0.012	7.00	5.5	0.30	5.16	464.31
	147A	147	147A-147	0.37	0.68	0.25	0.25	5.00	6.53	1.64	0.00	0.00	1.64	453.69	453.38	31.00	1.00	15	0.012	7.00	4.5	0.11	5.00	457.19
	146B	146A	146B-146A	0.04	0.85	0.03	0.03	5.00	6.53	0.22	0.00	0.00	0.22	447.41	447.23	35.36	0.51	15	0.012	4.99	1.9	0.31	5.00	450.42
	146A	146	146A-146	0.57	0.70	0.40	0.43	5.00	6.41	2.78	0.00	0.00	2.78	447.13	446.72	31.00	1.32	15	0.012	8.05	5.8	0.09	5.31	450.63
	144A	144	144A-144	0.24	0.70	0.17	0.17	5.00	6.53	1.10	0.00	0.00	1.10	443.15	442.87	36.37	0.77	15	0.012	6.14	3.6	0.17	5.00	446.66
	143A	143	143A-143	1.74	0.50	0.87	0.87	5.00	6.53	5.68	0.00	0.00	5.68	441.32	440.87	19.34	2.33	15	0.012	10.67	8.8	0.04	5.00	444.67
	160A	160	160A-160	0.19	0.70	0.13	0.13	5.00	6.53	0.87	0.00	0.00	0.87	442.51	442.05	31.19	1.47	15	0.012	8.50	4.2	0.13	5.00	446.26
	162	161	162-161	0.37	0.70	0.26	0.26	5.00	6.53	1.69	0.00	0.00	1.69	447.88	447.57	31.26	0.99	15	0.012	6.97	4.5	0.11	5.00	451.60
	161	160	161-160	0.48	0.70	0.34	0.60	5.00	6.48	3.86	0.00	0.00	3.86	447.47	442.05	99.28	5.46	15	0.012	16.35	10.5	0.16	5.11	451.23
	160	143	160-143	0.18	0.70	0.13	0.85	5.00	6.43	5.49	0.00	0.00	5.49	441.95	440.87	53.58	2.02	15	0.012	9.94	8.3	0.11	5.27	446.03
	155	154	155-154	0.57	0.60	0.34	0.34	5.00	6.53	2.23	0.00	0.00	2.23	462.37	461.59	119.66	0.65	15	0.012	5.65	4.3	0.47	5.00	466.74
	154	153	154-153	0.38	0.60	0.23	0.72	5.00	6.36	4.56	0.00	0.00	4.56	461.49	460.68	120.34	0.67	15	0.012	5.74	5.2	0.39	5.47	465.55
	153	152	153-152	0.40	0.60	0.24	0.96	5.00	6.24	5.97	0.00	0.00	5.97	460.43	459.55	114.56	0.77	18	0.012	9.97	5.9	0.32	5.85	464.34
	152	151	152-151	0.29	0.60	0.17	1.13	5.00	6.13	6.94	0.00	0.00	6.94	459.45	459.24	31.00	0.68	18	0.012	9.37	5.8	0.09	6.17	463.20
	151	150	151-150	0.42	0.70	0.29	1.43	5.00	6.11	8.70	0.00	0.00	8.70	459.14	458.68	35.36	1.30	18	0.012	12.98	7.9	0.07	6.26	463.05
	150	149	150-149	0.09	0.70	0.06	1.49	5.00	6.08	9.05	0.00	0.00	9.05	458.58	457.60	31.00	3.16	18	0.012	20.23	11.0	0.05	6.34	462.93
	149	148	149-148	0.07	0.85	0.06	2.05	5.00	6.07	12.47	0.00	0.00	12.47	457.50	455.37	86.91	2.45	18	0.012	17.81	10.9	0.13	6.38	462.79
	148	147	148-147	0.18	0.70	0.13	2.18	5.00	6.03	13.15	0.00	0.00	13.15	455.27	453.13	118.65	1.80	18	0.012	15.28	9.8	0.20	6.52	459.79
	147	146	147-146	0.25	0.70	0.18	2.61	5.00	5.97	15.56	0.00	0.00	15.56	452.63	446.07	369.12	1.78	24	0.012	32.67	10.2	0.60	6.72	457.04
	146	145	146-145	0.63	0.70	0.44	3.48	5.00	5.80	20.18	0.00	0.00	20.18	444.97	444.25	25.00	2.88	24	0.012	41.59	13.1	0.03	7.32	450.48
	145	144	145-144	0.00	0.85	0.00	3.48	5.00	5.79	20.15	0.00	0.00	20.15	444.15	441.72	109.50	2.22	24	0.012	36.51	12.0	0.15	7.36	449.00
	144	143	144-143	0.15	0.70	0.11	3.75	5.00	5.75	21.58	0.00	0.00	21.58	441.62	440.22	59.08	2.37	24	0.012	37.73	12.5	0.08	7.51	445.99
	143	142	143-142	0.10	0.85	0.09	5.56	5.00	5.73	31.86	0.00	0.00	31.86	440.12	439.34	31.16	2.50	24	0.012	38.77	13.8	0.04	7.59	445.22
	142	141	142-141	0.24	0.70	0.17	5.73	5.00	5.72	32.76	0.00	0.00	32.76	438.74	438.19	22.07	2.49	30	0.012	70.15	13.9	0.03	7.62	445.37
	141	140A	141-140A	0.00	0.75	0.00	5.73	5.00	5.71	32.72	0.00	0.00	32.72	435.09	433.52	63.77	2.46	30	0.012	69.72	13.8	0.08	7.65	445.48
OUTFALL	140A	140	140A-140	0.00	0.85	0.00	5.73	5.00	5.69	32.60	0.00	0.00	32.60	425.23	424.15	46.43	2.33	30	0.012	67.77	13.7	0.06	7.73	437.79
	26A	26	26A-26	0.52	0.75	0.39	0.39	5.00	6.53	2.55	0.00	0.00	2.55	431.54	428.50	125.43	2.42	15	0.012	10.89	7.0	0.30	5.00	435.92
	27	26	27-26	0.25	0.75	0.19	0.19	5.00	6.53	1.22	0.00	0.00	1.22	429.83	428.50	62.52	2.13	15	0.012	10.21	5.1	0.21	5.00	434.19
OUTFALL	26	25	26-25	0.26	0.75	0.20	0.77	5.00	6.42	4.96	0.00	0.00	4.96	428.40	428.00	50.49	0.79	15	0.012	6.23	5.6	0.15	5.30	434.62
	22	21	22-21	0.12	0.75	0.09	0.09	5.00	6.53	0.59	0.00	0.00	0.59	431.35	431.19	31.00	0.52	15	0.012	5.03	2.5	0.21	5.00	435.77
OUTFALL	21	20	21-20	0.15	0.70	0.11	0.20	5.00	6.45	1.26	0.00	0.00	1.26	428.16	428.00	32.46	0.49	15	0.012	4.91	3.2	0.17	5.21	435.63
	69A	69	69A-69	0.16	0.85	0.14	0.14	5.00	6.53	0.89	0.00	0.00	0.89	468.20	468.04	31.00	0.52	15	0.012	5.03	2.9	0.18	5.00	471.56
	66A	66	66A-66	0.49	0.60	0.29	0.29	5.00	6.53	1.92	0.00	0.00	1.92	460.98	460.67	31.00	1.00	15	0.012	7.00	4.7	0.11	5.00	464.49
	63A	63	63A-63	0.10	0.85	0.09	0.09	5.00	6.53	0.56	0.00	0.00	0.56	449.96	449.65	31.00	1.00	15	0.012	7.00	3.0	0.17	5.00	453.28
	83A	83	83A-83	0.36	0.60	0.22	0.22	5.00	6.53	1.41	0.00	0.00	1.41	455.95	454.36	35.77	4.45	15	0.012	14.75	6.9	0.09	5.00	459.50
	81B	81A	81B-81A	0.67	0.70	0.47	0.47	5.00	6.53	3.06	0.00	0.00	3.06	456.75	456.36	31.00	1.26	15	0.012	7.85	5.9	0.09	5.00	460.54
	81A	81	81A-81	0.41	0.70	0.29	0.76	5.00	6.49	4.91	0.00	0.00	4.91	456.26	453.04	142.56	2.26	15	0.012	10.52	8.3	0.29	5.09	460.68
	80A	80	80A-80	0.59	0.60	0.35	0.35	5.00	6.53	2.31	0.00	0.00	2.31	450.73	450.28	31.00	1.45	15	0.012	8.43	5.7	0.09	5.00	454.19
	89	88	89-88	0.46	0.65	0.30	0.30	5.00	6.53	1.95	0.00	0.00	1.95	469.49	465.46	133.10	3.03	15	0.012	12.18	6.9	0.32	5.00	473.80
	88	87	88-87	0.41	0.65	0.27	0.57	5.00	6.41	3.63	0.00	0.00	3.63	465.36	465.05	31.13	1.00	15	0.012	6.98	5.7	0.09	5.32	468.95
	87	86	87-86	0.14	0.85	0.12	0.68	5.00	6.38	4.37	0.00	0.00	4.37	465.05	462.83	37.79	5.87	15	0.012	16.96	11.2	0.06	5.41	468.73
	86	85	86-85	0.10	0.70	0.07	0.75	5.00	6.36	4.80	0.00	0.00	4.80	462.73	460.14	67.76	3.82	15	0.012	13.68	10.0	0.11	5.47	466.33
	85	84	85-84	0.37	0.60	0.22	0.98	5.00	6.32	6.18	0.00	0.00	6.18	460.04	458.77	41.04	3.09	15	0.012	12.31	10.0	0.07	5.58	463.59
	84	83	84-83	0.15	0.70	0.11	1.08	5.00	6.30	6.82	0.00	0.00	6.82	456.23	454.20	93.10	2.18	18	0.012	16.80	8.8	0.18	5.65	462.37
	83	82	83-82	0.06	0.70	0.04	1.34	5.00	6.25	8.37	0.00	0.00	8.37	454.10	453.44	38.97	1.69	18	0.012	14.81	8.6	0.08	5.82	458.64
	82	81	82-81	0.99	0.70	0.69	2.03	5.00	6.22	12.64	0.00	0.00	12.64	453.34	452.79	31.00	1.77	18	0.012	15.16	9.7	0.05	5.90	457.08
	81	80	81-80	0.22	0.70	0.15	2.94	5.00	6.21	18.26	0.00	0.00	18.26	452.29	449.63	59.51	4.47	24	0.012	51.81	14.8	0.07	5.95	457.22
	80	62	80-62	0.06	0.70	0.04	3.34	5.00	6.18	20.65	0.00	0.00	20.65	449.53	446.90	69.00	3.81	24	0.012	47.85	14.5	0.08	6.02	454.05
	61A	61	61A-61	0.41	0.60	0.25	0.25	5.00	6.53	1.61	0.00	0.00	1.61	444.57	443.80	34.39	2.24	15	0.012	10.47	5.8	0.10	5.00	448.11
	96A	96	96A-96	0.63	0.60	0.38	0.38	5.00	6.53	2.47	0.00	0.00	2.47	447.31	447.00	31.00	1.00	15	0.012	7.00	5.1	0.10	5.00	450.49
	95A	95	95A-95	0.73	0.60	0.44	0.44	5.00	6.53	2.86	0.00	0.00	2.86	442.94	442.63	31.00	1.00	15	0.012	7.00	5.3	0.10	5.00	446.18
	98	97	98-97	0.68	0.60	0.41	0.41	5.00	6.53	2.66	0.00	0.00	2.66	451.86	451.55	31.00	1.00	15	0.012	7.00	5.3	0.10	5.00	455.27
	97	96	97-96	0.14	0.70	0.10	0.51	5.00	6.49	3.28	0.00	0.00	3.28	451.45	447.00	156.09	2.85	15	0.012	11.82	8.0	0.33	5.10	455.42
	96	95	96-95	0.26	0.70	0.18	1.07	5.00	6.38	6.80	0.00	0.00	6.80	446.90	442.63	140.83	3.03	15	0.012	12.19	10.2	0.23	5.42	450.64
	95	60	95-60	0.22	0.70	0.15	1.66	5.00	6.30	10.45	0.00	0.00	10.45	442.53	441.33	25.00	4.80	15	0.012	15.33	13.5	0.03	5.65	446.33
	38A	38	38A-38	0.64	0.60	0.38	0.38	5.00	6.53	2.51	0.00	0.00	2.51	434.61	434.03	33.72	1.72	15	0.012	9.18	6.2	0.09	5.00	438.08
	90A	90	90A-90	0.85	0.60	0.51	0.51	5.00	6.53	3.33	0.00	0.00	3.33	436.22	435.84	38.00	1.00	15	0.012	7.00	5.6	0.11	5.00	439.72
	92	91	92-91	0.66	0.60	0.40	0.40	5.00	6.53	2.59	0.00	0.00	2.59	438.85	438.47	38.00	1.00	15	0.012	7.00	5.2	0.12	5.00	442.31
	91	90	91-90	0.27	0.70	0.19	0.59	5.00	6.48	3.79	0.00	0.00	3.79	438.37	435.84	170.44	1.48	15	0.012	8.53	6.7	0.43	5.12	442.31
	90	36	90-36	0.27	0.70	0.19	1.28	5.00	6.33	8.13	0.00	0.00	8.13	435.74	433.36	138.97	1.71	15	0.012	9.16	8.5	0.27	5.55	439.72
	34A	34	34A-34	0.18	0.55	0.10	0.10	5.00	6.53	0.65	0.00	0.00	0.65	432.11	431.95	31.00	0.52	15	0.012	5.03	2.6	0.20	5.00	435.63
	71A	71	71A-71	0.84	0.55	0.46	0.46	5.00	6.53	3.02	0.00	0.00	3.02	481.82	478.95	162.44	1.77	15	0.012	9.30	6.7	0.41	5.00	485.18
	72	71	72-71	0.15	0.85	0.13	0.13	5.00	6.53	0.83	0.00	0.00	0.83	479.07	478.91	32.41	0.49	15	0.012	4.92	2.8	0.19	5.00	482.45
	71	70	71-70	0.66	0.60	0.40	0.99	5.00	6.38	6.29	0.00	0.00	6.29	478.81	473.26	144.56	3.84	15	0.012	13.71	10.8	0.22	5.41	482.31
	70	69	70-69	0.53	0.70	0.37	1.36	5.00	6.31	8.56	0.00	0.00	8.56	473.16	468.04	123.00	4.16	15	0.012	14.28	12.2	0.17	5.63	476.62
	69	68	69-68	0.67	0.65	0.44	1.93	5.00	6.25	12.06	0.00	0.00	12.06	467.29	467.11	35.36	0.51	24	0.012	17.49	6.0	0.10	5.80	471.70
	68	67	68-67	0.70	0.60	0.42	2.35	5.00	6.22	14.61	0.00	0.00	14.61	467.01	466.86	31.00	0.48	24	0.012	17.05	6.1	0.08	5.89	472.19
	67	66	67-66	0.17	0.70	0.12	2.47	5.00	6.20	15.29	0.00	0.00	15.29	466.76	460.02	192.55	3.50	24	0.012	45.85	12.8	0.25	5.98	472.33
	66	65	66-65	0.26	0.70	0.18	2.94	5.00	6.12	18.00	0.00	0.00	18.00	458.17	452.55	125.51	4.48	24	0.012	51.86	14.7	0.14	6.23	464.63
	65	64	65-64	0.15	0.70	0.11	3.05	5.00	6.07	18.51	0.00	0.00	18.51	452.05	451.89	31.00	0.52	30	0.012	31.92	6.8	0.08	6.37	457.20
	64	63	64-63	0.11	0.85	0.09	3.14	5.00	6.05	19.01	0.00	0.00	19.01	451.79	448.50	98.00	3.36	30	0.012	81.42	13.1	0.12	6.45	457.35
	63	62	63-62	0.05	0.85	0.04	3.27	5.00	6.01	19.66	0.00	0.00	19.66	448.39	446.50	57.49	3.29	30	0.012	80.57	13.1	0.07	6.57	453.43
	62	61	62-61	0.10	0.70	0.07	6.68	5.00	5.99	40.01	0.00	0.00	40.01	444.00	441.46	98.00	2.59	30	0.012	71.54	15.0	0.11	6.64	451.29
	61	60	61-60	0.20	0.70	0.14	7.06	5.00	5.96	42.10	0.00	0.00	42.10	441.36	439.98	56.00	2.46	30	0.012	69.75	14.9	0.06	6.75	447.37
	59A	59	59A-59	0.61	0.60	0.37	0.37	5.00	6.53	2.39	0.00	0.00	2.39	438.00	437.81	31.00	0.61	15	0.012	5.48	4.2	0.12	5.00	441.64
	60	59	60-59	0.00	0.90	0.00	8.72	5.00	5.94	51.82	0.00	0.00	51.82	437.49	435.59	90.68	2.10	30	0.012	64.32	14.7	0.10	6.82	444.90
	59	38	59-38	0.10	0.70	0.07	9.16	5.00	5.91	54.14	0.00	0.00	54.14	435.49	432.78	126.82	2.14	30	0.012	64.96	15.0	0.14	6.92	441.50
	38	37	38-37	0.26	0.70	0.18	9.72	5.00	5.87	57.09	0.00	0.00	57.09	432.28	431.93	35.36	0.99	36	0.012	71.89	11.3	0.05	7.06	438.13
	37	36	37-36	0.66	0.60	0.40	10.12	5.00	5.86	59.27	0.00	0.00	59.27	431.83	431.38	38.00	1.18	36	0.012	78.63	12.2	0.05	7.11	437.60
	36	35	36-35	0.23	0.70	0.16	11.56	5.00	5.84	67.56	0.00	0.00	67.56	430.88	430.56	37.79	0.85	42	0.012	100.30	11.2	0.06	7.16	437.60
	35	34	35-34	0.05	0.80	0.04	11.60	5.00	5.83	67.61	0.00	0.00	67.61	430.46	429.88	88.96	0.65	42	0.012	88.01	10.1	0.15	7.22	436.76
	34	33	34-33	0.06	0.75	0.05	11.75	5.00	5.79	67.97	0.00	0.00	67.97	429.78	429.12	60.00	1.10	42	0.012	114.31	12.5	0.08	7.37	435.48
	33	32	33-32	0.09	0.85	0.08	11.83	5.00	5.76	68.16	0.00	0.00	68.16	429.02	428.68	31.00	1.10	42	0.012	114.15	12.5	0.04	7.45	435.16
	32	31	32-31	0.07	0.80	0.06	11.88	5.00	5.75	68.35	0.00	0.00	68.35	428.58	428.38	18.42	1.09	42	0.012	113.57	12.4	0.02	7.49	435.30
OUTFALL	31	30	31-30	0.00	0.65	0.00	11.88	5.00	5.75	68.27	0.00	0.00	68.27	428.28	428.00	25.41	1.10	42	0.012	114.41	12.5	0.03	7.51	434.52

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JASON P. GERHART REGISTERED No. 19727 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS

1. 03/16/2023 - W/DOH, CTLB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER COMPUTATIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-761.DWG	
NCS:	
SHEET:	107 OF 134

Reference Note	INLET STATION Up	INLET STATION Down	Outlet Water Surface Elev.	JUNCTION LOSS V_0	H_0 Loss Coefficient k	H_0	Q_i	V_i	Angle	1.3 H_t	0.5 H_t	0.5 IS-1 Applicable	Final H	Inlet Water Surface Elev.	Inlet Invert +0.8D Elev.	Rim/Flow Line Elev.	Remarks
	81B	81A	457.36	2.50	0.25	0.02		4.00		0.14	0.07	Y	0.13	**457.49**	457.75	459.87	Curb Inlet
	83A	83	455.36	1.15	0.25	0.01		2.50		0.05	0.03	Y	0.04	**455.40**	456.95	458.83	Curb Inlet
	63A	63	450.65	0.45	0.25	0.00		1.15		0.01	0.01	Y	0.01	**450.66**	450.96	452.61	Curb Inlet
	66A	66	461.67	1.56	0.25	0.01		0.45		0.01	0.01	Y	0.03	**461.70**	461.98	463.82	Curb Inlet
	69A	69	469.12	0.72	0.25	0.00		1.56		0.02	0.01	Y	0.01	**469.14**	469.20	470.89	Curb Inlet
OUTFALL	**171**	170	430.33	7.56	0.25	0.22	13.38	0.72	0	0.29	0.15	Y	1.84	**432.17**	432.37	436.62	Curb Inlet
	172	171	432.46	7.57	0.25	0.22	10.58	7.56	28	1.07	0.54	Y	0.84	**433.30**	433.04	436.72	Curb Inlet
	173	172	433.30	5.99	0.25	0.14	9.27	7.57	50	1.16	0.58	Y	0.85	**434.15**	433.48	436.57	Curb Inlet
	174	173	434.15	5.25	0.25	0.11	6.73	5.99	40	0.70	0.35	Y	0.61	**434.76**	434.85	436.85	Curb Inlet
	175	174	434.90	5.48	0.25	0.12	4.34	5.25	45	0.60	0.30	Y	0.59	**435.49**	435.21	437.00	Curb Inlet
	176	175	435.49	3.54	0.25	0.05	3.81	5.48	45	0.56	0.28	Y	0.42	**435.90**	435.81	437.53	Curb Inlet
	177	176	435.91	3.10	0.25	0.04	3.20	3.54	90	0.31	0.16	Y	0.48	**436.39**	436.46	440.60	Curb Inlet
	178	177	436.56	2.61	0.25	0.03		3.10		0.10	0.05	Y	0.11	**436.67**	436.71	#VALUE!	End Section
	173A	173	434.15	0.76	0.25	0.00		2.61		0.05	0.03	Y	0.03	**434.19**	433.98	436.92	Curb Inlet
	175A	175	435.49	0.68	0.25	0.00		0.76		0.01	0.00	Y	0.03	**435.52**	436.93	438.62	Curb Inlet
OUTFALL	**41**	40	430.40	8.51	0.25	0.28	60.32	0.68	0	0.37	0.18	Y	1.43	**431.83**	432.96	444.64	Curb Inlet
	42	41	440.78	8.53	0.25	0.28	59.56	8.51	0	0.88	0.44	Y	0.72	**441.50**	441.45	444.98	Curb Inlet
	43	42	441.55	8.43	0.25	0.28	57.85	8.53	90	1.90	0.95	Y	1.29	**442.84**	442.41	445.99	Curb Inlet
	44	43	442.99	8.18	0.25	0.26	48.10	8.43	90	1.84	0.92	Y	1.16	**444.15**	443.75	445.99	Curb Inlet
	45	44	444.15	6.80	0.25	0.18	47.80	8.18	11	0.90	0.45	Y	0.88	**445.04**	445.72	447.91	Curb Inlet
	46	45	445.82	6.76	0.25	0.18	46.23	6.80	11	0.69	0.35	Y	0.89	**446.71**	447.99	451.54	Curb Inlet
	47	46	448.79	6.54	0.25	0.17	34.79	6.76	45	0.97	0.48	Y	0.61	**449.40**	449.00	451.69	Curb Inlet
	48	47	449.40	4.92	0.25	0.09	33.05	6.54	45	0.83	0.41	Y	0.50	**449.90**	449.35	451.42	Curb Inlet
	49	48	449.90	6.73	0.25	0.18	32.44	4.92	11	0.47	0.23	Y	0.78	**450.67**	450.62	453.35	Curb Inlet
	50	49	450.72	6.61	0.25	0.17	29.51	6.73	79	1.14	0.57	Y	1.24	**451.96**	454.32	457.93	Curb Inlet
	51	50	455.40	6.01	0.25	0.14	27.62	6.61	83	1.08	0.54	Y	1.68	**457.08**	462.85	468.25	Curb Inlet
	52	51	462.95	5.63	0.25	0.12	25.54	6.01	52	0.79	0.39	Y	0.52	**463.47**	463.26	468.56	Curb Inlet
	53	52	463.47	5.20	0.25	0.11	22.84	5.63	45	0.66	0.33	Y	0.45	**463.91**	463.71	466.80	Curb Inlet
	54	53	463.91	7.27	0.25	0.21	15.79	5.20	90	0.84	0.42	Y	1.49	**465.40**	465.62	467.82	Curb Inlet
	55	54	465.77	4.06	0.25	0.06	0.72	7.27	64	1.08	0.54	Y	1.24	**467.01**	467.21	469.23	Curb Inlet
	56	55	467.31	0.59	0.25	0.00		4.06		0.12	0.06	Y	0.06	**467.37**	467.51	469.42	Curb Inlet
	44A	44	444.20	6.99	0.25	0.19	5.16	0.59	75	0.25	0.13	Y	1.62	**445.82**	446.65	449.44	Curb Inlet
	44B	44A	446.75	4.20	0.25	0.07	4.11	6.99	90	1.12	0.56	Y	0.73	**447.48**	447.19	449.58	Curb Inlet
	44C	44B	447.48	9.63	0.25	0.36	3.45	5.65	90	1.14	0.57	Y	1.18	**448.66**	454.24	456.62	Curb Inlet
	44D	44C	454.34	5.65	0.25	0.12				0.16	0.08	Y	0.16	**454.50**	454.65	456.47	Curb Inlet
	47A	47	449.40	5.42	0.25	0.11	7.05	2.81	0	0.20	0.10	Y	1.00	**450.40**	455.43	457.12	Curb Inlet
	47B	47A	455.33	12.52	0.25	0.61	3.06	9.76	0	1.46	0.73	Y	2.06	**457.39**	462.19	464.60	Curb Inlet
	47C	47B	462.29	4.02	0.25	0.06				0.08	0.04	Y	0.06	**462.35**	462.48	464.45	Curb Inlet
	47D	47B	463.02	9.76	0.25	0.37				0.48	0.24	Y	0.46	**463.48**	469.28	471.17	Curb Inlet
	48A	48	449.90	1.08	0.25	0.00		2.49		0.05	0.02	Y	0.04	**449.94**	449.70	451.61	Curb Inlet
	50A	50	455.55	4.87	0.25	0.09				0.12	0.06	Y	0.08	**455.63**	456.03	457.93	Curb Inlet
	53A	53	463.96	4.43	0.25	0.08				0.10	0.05	Y	0.05	**464.01**	464.73	466.64	Curb Inlet
	54A	54	465.72	9.80	0.25	0.37	6.73	7.38	90	1.64	0.82	Y	1.29	**467.01**	467.49	468.57	Curb Inlet
	54B	54A	467.59	7.38	0.25	0.21				0.27	0.14	Y	1.27	**468.86**	471.76	473.08	Curb Inlet
OUTFALL	**131**	130	430.33	9.47	0.25	0.35	7.74	6.31		0.73	0.37	Y	0.76	**431.09**	429.68	436.84	Curb Inlet
	132	131	433.83	6.31	0.25	0.15	6.80	6.55	68	1.02	0.51	Y	0.71	**434.54**	434.19	437.70	Curb Inlet
	133	132	434.54	5.54	0.25	0.12	5.30	6.31	90	1.00	0.50	Y	1.21	**435.75**	435.44	438.41	Curb Inlet
	134	133	435.75	4.32	0.25	0.07	4.93	5.54	71	0.69	0.35	Y	0.52	**436.27**	435.85	438.26	Curb Inlet
	135	134	436.27	4.02	0.25	0.06	2.79	4.32	19	0.30	0.15	Y	0.53	**436.80**	439.37	441.72	Curb Inlet
	136	135	439.47	5.30	0.25	0.11	0.24	2.02	45	0.21	0.10	Y	0.15	**439.62**	439.78	441.57	Curb Inlet
	137	136	439.88	2.02	0.25	0.02				0.02	0.01	Y	0.01	**439.89**	440.09	441.75	Curb Inlet
	131A	131	434.08	3.90	0.25	0.06				0.08	0.04	Y	0.04	**434.12**	435.17	436.86	Curb Inlet
	132A	132	434.54	2.90	0.25	0.03				0.04	0.02	Y	0.02	**434.56**	434.73	437.56	Curb Inlet
OUTFALL	**101**	100	430.33	7.12	0.25	0.20	34.25	0.60	0	0.26	0.13	Y	0.44	**430.77**	430.67	439.11	Curb Inlet
	102	101	436.45	6.98	0.25	0.19	34.06	7.12	17	0.82	0.41	Y	0.68	**437.13**	437.62	440.73	Curb Inlet
	103	102	437.72	6.94	0.25	0.19	33.34	6.98	19	0.82	0.41	Y	1.21	**438.93**	439.08	447.45	Curb Inlet
	104	103	439.18	6.79	0.25	0.18	26.41	6.94	93	0.57	0.29	Y	0.60	**439.78**	439.73	444.53	Curb Inlet
	105	104	439.83	5.38	0.25	0.11	25.91	6.79	43	0.89	0.45	Y	0.67	**440.50**	440.15	444.78	Curb Inlet
	106	105	440.50	5.28	0.25	0.11	23.39	5.38	2	0.36	0.18	Y	0.53	**441.02**	440.75	443.22	Curb Inlet
	107	106	441.02	4.76	0.25	0.09	12.98	5.28	90	0.70	0.35	Y	0.47	**441.49**	441.19	443.27	Curb Inlet
	108	107	441.49	6.32	0.25	0.15	8.55	4.76	0	0.36	0.18	Y	0.72	**442.22**	442.25	444.35	Curb Inlet
	109	108	442.30	6.97	0.25	0.19	8.02	6.32	12	0.65	0.33	Y	1.79	**444.09**	444.84	447.57	Curb Inlet
	110	109	444.85	6.53	0.25	0.17	4.98	6.97	78	1.20	0.60	Y	2.20	**447.05**	451.65	453.75	Curb Inlet
	111	110	451.75	9.82	0.25	0.37	4.25	5.97	75	1.20	0.60	Y	2.24	**453.99**	462.87	466.71	Curb Inlet
	112	111	462.97	5.97	0.25	0.14	2.17	4.26	9	0.35	0.18	Y	0.32	**463.29**	463.36	467.11	Curb Inlet
	113	112	463.46	4.26	0.25	0.07	0.50	3.02	45	0.24	0.12	Y	0.13	**463.59**	463.82	466.14	Curb Inlet
	114	113	463.92	3.02	0.25	0.04				0.05	0.02	Y	0.03	**463.95**	464.32	466.14	Curb Inlet
	101A	101	435.70	2.89	0.25	0.03				0.04	0.02	Y	0.03	**435.73**	435.88	438.72	Curb Inlet
	104A	104	442.00	8.29	0.25	0.27	0.39	2.74	58	0.48	0.24	Y	0.28	**442.28**	450.21	452.51	Curb Inlet
	104B	104A	450.31	2.74	0.25	0.03				0.04	0.02	Y	0.02	**450.33**	450.69	452.51	Curb Inlet
	106A	106	441.02	4.55	0.25	0.08				0.10	0.05	Y	0.08	**441.11**	441.32	443.22	Curb Inlet
	120	107	441.54	10.58	0.25	0.43	9.81	1.64	0	0.58	0.29	Y	1.15	**442.69**	442.49	444.49	Curb Inlet
	121	120	442.69	11.91	0.25	0.55	4.95	11.75	0	1.69	0.85	Y	2.25	**444.94**	445.21	447.35	Curb Inlet
	122	121	445.31	11.75	0.25	0.54	3.38	5.79	90	1.41	0.70	Y	1.34	**446.65**	452.94	455.10	Curb Inlet
	123	122	452.83	5.79	0.25	0.13				0.17	0.08	Y	0.16	**452.99**	453.17	455.24	Curb Inlet
	120A	120	442.69	4.39	0.25	0.07				0.10	0.05	Y	0.06	**442.76**	442.80	444.63	Curb Inlet
	121A	121	445.31	5.32	0.25	0.11				0.14	0.07	Y	0.17	**445.48**	445.55	447.50	Curb Inlet
	108A	108	442.30	5.72	0.25	0.13				0.16	0.08	Y	0.10	**442.40**	443.09	444.51	Curb Inlet
	110A	110	451.75	3.88	0.25	0.06				0.08	0.04	Y	0.05	**451.80**	452.13	453.75	Curb Inlet
	112A	112	463.46	3.87	0.25	0.06				0.08	0.04	Y	0.08	**463.54**	463.69	464.27	Curb Inlet

Reference Note	INLET STATION Up	INLET STATION Down	Outlet Water Surface Elev.	JUNCTION LOSS V_0	H_0 Loss Coefficient k	H_0	Q_i	V_i	Angle	1.3 H_t	0.5 H_t	0.5 IS-1 Applicable	Final H	Inlet Water Surface Elev.	Inlet Invert +0.8D Elev.	Rim/Flow Line Elev.	Remarks
0	**1**	**1A**	**2**	**8**	**9A**	**9**	**10**	**11**	**14**	**17**	**18**	**18A**	**19**	**20**	**20A**	**B**	**C**
OUTFALL	**11**	10	430.33	13.06	0.25	0.66	13.78	13.23	0	2.10	1.05	Y	3.50	**433.83**	434.46	436.93	Curb Inlet
	12	11	434.56	13.23	0.25	0.68	10.35	12.43	0	1.98	0.99	Y	2.63	**437.19**	438.84	441.32	Manhole
	13	12	438.89	12.43	0.25	0.60	8.20	11.75	0	1.75	0.88	Y	2.26	**441.15**	441.37	443.49	Curb Inlet
	14	13	441.90	11.75	0.25	0.54	4.64	8.51	90	2.23	1.12	Y	4.10	**446.00**	450.27	452.62	Manhole
	15	14	450.37	8.49	0.25	0.28	2.03	7.31	0	0.74	0.37	Y	0.53	**450.90**	452.05	454.43	Curb Inlet
	16	15	452.15	7.31	0.25	0.21	1.81	7.35	41	1.13	0.56	Y	0.73	**452.88**	458.99	460.66	Curb Inlet
	17	16	459.09	7.35	0.25	0.21	0.73	3.41	49	0.47	0.23	Y	0.26	**459.35**	460.67	462.78	Curb Inlet
	18	17	460.77	3.41	0.25	0.05				0.06	0.03	Y	0.03	**460.80**	461.08	462.53	Curb Inlet
	11A	11	434.51	4.14	0.25	0.07				0.09	0.04	Y	0.05	**434.56**	435.01	436.93	Curb Inlet
	12A	12	439.09	7.87	0.25	0.24	2.78	5.30	90	0.91	0.45	Y	0.52	**439.61**	439.72	441.92	Curb Inlet
	12B	12A	439.72	5.30	0.25	0.11				0.14	0.07	Y	0.13	**439.85**	440.10	441.92	Curb Inlet
	13A	13	441.37	5.32	0.25	0.11				0.14	0.07	Y	0.09	**441.46**	442.19	444.34	Curb Inlet
	14A	14	450.37	8.51	0.25	0.28	3.53	5.70	90	1.05	0.53	Y	0.64	**451.01**	451.00	453.37	Curb Inlet
	14B	14A	451.10	5.70	0.25	0.13				0.16	0.08	Y	0.16	**451.26**	451.41	453.23	Curb Inlet
	15A	15	452.15	3.88	0.25	0.06				0.08	0.04	Y	0.05	**452.20**	452.53	454.43	Curb Inlet
OUTFALL	**140A**	140	426.15	6.64	0.25	0.17	32.72	0.86	0	0.23	0.11	Y	0.36	**426.51**	427.23	437.79	Manhole
	141	140A	435.52	6.67	0.25	0.17	32.76	6.64	49	0.98	0.49	Y	0.83	**436.35**	437.09	445.48	Manhole
	142	141	440.19	6.67	0.25	0.17	31.86	6.67	54	1.01	0.50	Y	0.62	**440.81**	440.74	444.70	Curb Inlet
	143	142	440.94	10.14	0.25	0.40	21.58	6.67	77	1.41	0.71	Y	1.23	**442.17**	441.72	444.55	Curb Inlet
	144	143	442.17	6.87	0.25	0.18	20.15	10.14	12	1.28	0.64	Y	1.10	**443.27**	443.22	445.32	Curb Inlet
	145	144	443.32	6.41	0.25	0.16	20.18	6.87	90	1.21	0.60	Y	1.34	**444.66**	445.75	449.00	Manhole
	146	145	445.85	6.42	0.25	0.16	15.56	6.41	0	0.50	0.25	Y	0.42	**446.27**	446.57	449.81	Curb Inlet
	147	146	447.67	4.95	0.25	0.10	13.15	6.42	0	0.42	0.21	Y	1.70	**449.37**	454.23	456.37	Curb Inlet
	148	147	454.33	7.44	0.25	0.21	12.47	4.95	17	0.56	0.28	Y	1.86	**456.19**	456.47	459.12	Curb Inlet
	149	148	456.57	7.06	0.25	0.19	9.05	7.44	17	0.88	0.44	Y	1.49	**458.06**	458.70	462.12	Curb Inlet
	150	149	458.80	5.12	0.25	0.10	8.70	7.06	45	0.95	0.48	Y	0.67	**459.47**	459.78	462.26	Curb Inlet
	151	150	459.88	4.92	0.25	0.09	6.94	5.12	45	0.55	0.28	Y	0.48	**460.36**	460.34	462.38	Curb Inlet
	152	151	460.44	3.93	0.25	0.06	5.97	4.92	90	0.59	0.30	Y	0.41	**460.85**	460.65	462.53	Curb Inlet
	153	152	460.85	3.38	0.25	0.04	4.56	3.93	0	0.17	0.08	Y	0.40	**461.25**	461.63	463.67	Curb Inlet
	154	153	461.68	5.19	0.25	0.10	2.23	4.28	0	0.27	0.13	Y	0.64	**462.32**	462.49	464.88	Curb Inlet
	155	154	462.59	4.28	0.25	0.07				0.09	0.05	Y	0.17	**462.76**	463.37	466.07	Curb Inlet
	160	143	442.17	4.47	0.25	0.08	3.86	1.82	33	0.15	0.07	Y	0.40	**442.58**	442.95	445.36	Curb Inlet
	161	160	443.05	3.14	0.25	0.04	1.69	4.47	62	0.42	0.21	Y	0.51	**443.56**	448.47	450.56	Curb Inlet
	162	161	448.57	4.54	0.25	0.08				0.10	0.05	Y	0.07	**448.64**	448.88	450.93	Curb Inlet
	160A	160	443.05	4.16	0.25	0.07				0.09	0.04	Y	0.05	**443.10**	443.51	445.59	Curb Inlet
	143A	143	442.17	4.63	0.25	0.08		0.71		0.11	0.06	Y	0.18	**442.36**	442.32	444.67	Grate Inlet
	144A	144	443.87	3.55	0.25	0.05				0.06	0.03	Y	0.04	**443.91**	444.15	445.99	Curb Inlet
	146A	146	447.72	5.84	0.25	0.13	0.22	1.87	45	0.23	0.11	Y	0.16	**447.88**	448.13	449.96	Curb Inlet
	146B	146A	448.23	1.87	0.25	0.01				0.02	0.01	Y	0.01	**448.24**	448.41	449.75	Curb Inlet
	147A	147	454.38	4.51	0.25	0.08				0.10	0.05	Y	0.07	**454.45**	454.69	456.52	Curb Inlet
	149A	149	458.75	5.53	0.25	0.12	2.85	5.30	90	0.75	0.38	Y	0.59	**459.34**	459.73	463.64	Curb Inlet
	149B	149A	459.83	5.30	0.25	0.11	2.27	5.08	0	0.32	0.16	Y	0.21	**460.04**	460.14	463.79	Curb Inlet
	149C	149B	460.24	5.08	0.25	0.10				0.13	0.07	Y	0.09	**460.33**	460.44	461.77	Grate Inlet
	154A	154	462.59	3.71	0.25	0.05				0.07	0.03	Y	0.04	**462.63**	462.90	464.73	Curb Inlet
OUTFALL	**26**	25	430.33	4.04	0.25	0.06	2.55	0.78		0.09	0.04	Y	0.30	**430.63**	429.40	433.95	Curb Inlet
	27	26	430.63	1.00	0.25	0.00		4.04		0.12	0.06	Y	0.08	**430.71**	430.83	433.52	Curb Inlet
	26A	26	430.63	2.08	0.25	0.02		1.00		0.03	0.01	Y	0.18	**430.81**	432.54	435.25	Curb Inlet
OUTFALL	**21**	20	430.33	1.02	0.25	0.00	0.59	2.08		0.04	0.02	Y	0.03	**430.36**	429.16	434.96	Curb Inlet
	22	21	432.19	0.48	0.25	0.00		1.02		0.01	0.00	Y	0.01	**432.20**	432.35	435.10	Curb Inlet
OUTFALL	**31**	30	430.80	7.10	0.25	0.20	68.35	0.48	90	0.26	0.13	Y	0.23	**431.03**	431.08	434.52	Manhole
	32	31	431.18	7.10	0.25	0.20	68.16	7.10	37	1.02	0.51	Y	0.58	**431.76**	431.38	434.63	Curb Inlet
	33	32	431.76	7.08	0.25	0.19	67.97	7.10	90	1.32	0.66	Y	0.78	**432.55**	431.82	434.49	Curb Inlet
	34	33	432.55	7.07	0.25	0.19	67.61	7.08	0	0.61	0.30	Y	0.54	**433.08**	432.58	434.81	Curb Inlet
	35	34	433.08	7.03	0.25	0.19	67.56	7.07	41	1.04	0.52	Y	0.86	**433.95**	433.26	436.09	Curb Inlet
	36	35	433.95	7.02	0.25	0.19	59.27	7.03	41	1.03	0.52	Y	0.66	**434.61**	433.68	436.93	Curb Inlet
	37	36	434.61	8.38	0.25	0.27	57.09	7.02	45	1.17	0.58	Y	0.84	**435.45**	434.23	436.93	Curb Inlet
	38	37	435.45	8.08	0.25	0.25	54.14	8.38	45	1.49	0.74	Y	0.96	**436.41**	434.68	437.46	Curb Inlet
	59	38	436.41	11.03	0.25	0.47	51.82	8.08	0	1.07	0.54	Y	2.42	**438.83**	437.49	440.83	Curb Inlet
	60	59	438.83	10.56	0.25	0.43	42.10	11.03	0	1.42	0.71	Y	1.94	**440.78**	439.49	444.90	Manhole
	61	60	441.98	8.58	0.25	0.29	40.01	10.56	0	1.16	0.58	Y	1.08	**443.06**	443.36	446.70	Curb Inlet
	62	61	443.46	8.15	0.25	0.26	20.65	8.58	0	0.85	0.43	Y	1.22	**444.68**	446.00	450.62	Curb Inlet
	63	62	448.50	4.00	0.25	0.06	19.01	8.15	13	0.77	0.39	Y	0.50	**449.00**	450.39	452.76	Curb Inlet
	64	63	450.50	3.87	0.25	0.06	18.51	4.00	90	0.42	0.21	Y	0.39	**450.89**	453.79	456.68	Curb Inlet
	65	64	453.89	3.77	0.25	0.06	18.00	3.87	79	0.38	0.19	Y	0.24	**454.13**	454.05	456.53	Curb Inlet
	66	65	454.15	5.73	0.25	0.13	15.29	3.77	79	0.45	0.23	Y	0.90	**455.05**	459.77	463.96	Curb Inlet
	67	66	461.62	4.87	0.25	0.09	14.61	5.73	90	0.82	0.41	Y	1.16	**462.78**	468.36	471.66	Curb Inlet
	68	67	468.46	4.65	0.25	0.08	12.06	4.87	45	0.50	0.25	Y	0.36	**468.82**	468.61	471.52	Curb Inlet
	69	68	468.82	3.84	0.25	0.06	8.56	4.65	45	0.43	0.22	Y	0.30	**469.12**	468.89	471.03	Curb Inlet
	70	69	469.12	6.97	0.25	0.19	6.29	3.84	0	0.35	0.17	Y	2.01	**471.13**	474.16	475.95	Curb Inlet
	71	70	474.26	5.12	0.25	0.10	3.02	6.97	0	0.48	0.24	Y	1.41	**475.67**	479.81	481.64	Curb Inlet
	72	71	479.91	0.68	0.25	0.00		5.12		0.19	0.09	Y	0.10	**480.01**	480.07	481.78	Curb Inlet
	71A	71	479.95	2.46	0.25	0.02		0.68		0.03	0.02	Y	0.32	**480.27**	482.82	484.51	Curb Inlet
	34A	34	433.08	0.53	0.25	0.00		2.46		0.04	0.02	Y	0.02	**433.11**	433.11	434.96	Curb Inlet
	90	36	434.61	6.63	0.25	0.17	3.79	0.53	0	0.22	0.11	Y	1.99	**436.60**	436.74	439.05	Curb Inlet
	91	90	436.84	3.09	0.25	0.04	2.59	6.63	90	0.98	0.49	Y	0.99	**437.83**	439.37	441.64	Curb Inlet
	92	91	439.47	2.11	0.25	0.02		3.09		0.09	0.04	Y	0.10	**439.57**	439.85	441.64	Curb Inlet
	90A	90	436.84	2.71	0.25	0.03		2.11		0.07	0.03	Y	0.12	**436.96**	437.22	439.05	Curb Inlet
	59A	59	438.83	1.95	0.25	0.01		2.71		0.07	0.04	Y	0.07	**438.90**	439.00	440.97	Curb Inlet
	38A	38	436.41	2.04	0.25	0.02		1.95		0.05	0.02	Y	0.07	**436.48**	435.61	437.41	Curb Inlet
	95	60	442.33	8.51	0.25	0.28	6.80	2.04	0	0.40	0.20	Y	0.75	**443.08**	443.53	445.66	Curb Inlet
	96	95	443.63	5.54	0.25	0.12	3.28	8.51	0	0.67	0.33	Y	1.66	**445.29**	447.90	449.97	Curb Inlet
	97	96	448.00	2.67	0.25	0.03	2.66	5.54	90	0.69	0.34	Y	0.69	**448.69**	452.45	454.75	Curb Inlet
	98	97	452.55	2.17	0.25	0.02		2.67		0.07	0.04	Y	0.08	**452.63**	452.86	454.60	Curb Inlet

STORM INLET COMPUTATIONS

INLET NO.			RUNOFF TO INLET								CURB / SUMP INLET COMPUTATIONS																	RUNOFF INTERCEPTED					REMARKS
Inlet Structure No.	Inlet Type	Length (ft)	Drainage Area (ac)	C	CA	Sum CA	I (in/hr)	Q, increm (cfs)	Q, carryover (cfs)	Qa, gutter (cfs)	S, gutter (ft/ft)	Sx, cross slope (ft/ft)	T, spread (ft)	W (ft)	WFT	Sw (ft/ft)	SwGSx	Eo	a (in)	SYw = a/(12W)	Se (ft/ft) = Sx + SYwEo	Lt (ft)	P, eff length (ft)	Lt/Lt	d (ft)	E	h (ft)	Q intercepted	d/h	Qb, carryover (cfs)	d, sump (ft)	T, spread at sag (ft)	
59	TYPE E	6	0.10	0.70	0.07	--	4.00	0.28	0.00	0.28	0.0400	0.0208	1.38	2.00	1.45	0.0833	4.00	1.00	3.50	0.15	0.17	4.87	--	1.23	0.12	1.00	0.33	0.28	--	0.00	--	--	--
38	TYPE E	6	0.26	0.70	0.18	--	4.00	0.73	0.00	0.73	0.0150	0.0208	3.44	2.00	0.58	0.0833	4.00	0.97	3.50	0.15	0.16	5.50	--	1.09	0.20	1.00	0.33	0.73	--	0.00	--	--	--
37	TYPE E	8	0.66	0.60	0.40	--	4.00	1.58	0.00	1.58	0.0150	0.0208	6.03	2.00	0.33	0.0833	4.00	0.81	3.50	0.15	0.14	8.36	--	0.96	0.25	1.00	0.33	1.58	--	0.01	--	--	--
36	TYPE E	6	0.23	0.70	0.16	--	4.00	0.64	0.00	0.64	0.0150	0.0208	3.05	2.00	0.65	0.0833	4.00	0.99	3.50	0.15	0.16	5.19	--	1.16	0.19	1.00	0.33	0.64	--	0.00	--	--	--
35	TYPE E	6	0.05	0.80	0.04	--	4.00	0.16	0.00	0.16	0.0150	0.0208	1.35	2.00	1.48	0.0833	4.00	1.00	3.50	0.15	0.17	2.87	--	2.09	0.11	1.00	0.33	0.16	--	0.00	--	--	--
34	TYPE E	6	0.06	0.75	0.05	--	4.00	0.18	0.00	0.18	0.0110	0.0208	1.49	2.00	1.34	0.0833	4.00	1.00	3.50	0.15	0.17	2.75	--	2.18	0.12	1.00	0.33	0.18	--	0.00	--	--	--
33	TYPE E	6	0.09	0.85	0.08	--	4.00	0.31	0.00	0.31	0.0100	0.0208	1.85	2.00	1.08	0.0833	4.00	--	--	--	--	--	9.60	--	0.15	--	0.33	0.31	--	0.00	0.07	0.79	SUMP
32	TYPE E	6	0.07	0.80	0.06	--	4.00	0.22	0.00	0.22	0.0010	0.0208	4.00	2.00	0.50	0.0833	4.00	--	--	--	--	--	9.60	--	0.21	--	0.33	0.22	--	0.00	0.05	0.64	SUMP
173A	TYPE E	6	0.22	0.65	0.14	--	4.00	0.57	0.00	0.57	0.0110	0.0208	3.17	2.00	0.63	0.0833	4.00	0.98	3.50	0.15	0.16	4.50	--	1.33	0.19	1.00	0.33	0.57	--	0.00	--	--	--
177	TYPE E	6	0.13	0.75	0.10	--	4.00	0.39	0.00	0.39	0.0290	0.0208	1.66	2.00	1.20	0.0833	4.00	1.00	3.50	0.15	0.17	5.09	--	1.18	0.14	1.00	0.33	0.39	--	0.00	--	--	--
176	TYPE E	6	0.13	0.75	0.10	--	4.00	0.39	0.00	0.39	0.0230	0.0208	1.74	2.00	1.15	0.0833	4.00	1.00	3.50	0.15	0.17	4.74	--	1.26	0.14	1.00	0.33	0.39	--	0.00	--	--	--
175A	TYPE E	6	0.17	0.75	0.13	--	4.00	0.51	0.00	0.51	0.0120	0.0208	2.67	2.00	0.75	0.0833	4.00	1.00	3.50	0.15	0.17	4.38	--	1.37	0.18	1.00	0.33	0.51	--	0.00	--	--	--
175	TYPE E	6	0.35	0.75	0.26	--	4.00	1.05	0.00	1.05	0.0120	0.0208	5.00	2.00	0.40	0.0833	4.00	0.89	3.50	0.15	0.16	6.30	--	0.95	0.23	1.00	0.33	1.05	--	0.00	--	--	--
174	TYPE E	8	0.55	0.75	0.41	--	4.00	1.65	0.00	1.65	0.0100	0.0208	6.91	2.00	0.29	0.0833	4.00	0.75	3.50	0.15	0.13	7.84	--	1.02	0.27	1.00	0.33	1.65	--	0.00	--	--	--
173	TYPE E	6	0.11	0.65	0.07	--	4.00	0.29	0.00	0.29	0.0010	0.0208	4.81	2.00	0.42	0.0833	4.00	--	--	--	--	--	9.60	--	0.23	--	0.33	0.29	--	0.00	0.06	0.76	SUMP
172	TYPE E	12	0.61	0.75	0.46	--	4.00	1.83	0.00	1.83	0.0010	0.0208	12.45	2.00	0.16	0.0833	4.00	--	--	--	--	--	15.60	--	0.38	--	0.33	1.83	--	0.00	0.14	1.65	SUMP
53A	TYPE E	6	0.15	0.85	0.13	--	4.00	0.51	0.00	0.51	0.0100	0.0208	2.95	2.00	0.68	0.0833	4.00	0.99	3.50	0.15	0.17	4.16	--	1.44	0.19	1.00	0.33	0.51	--	0.00	--	--	--
50A	TYPE E	8	0.37	0.70	0.26	--	4.00	1.04	0.00	1.04	0.0400	0.0208	3.01	2.00	0.67	0.0833	4.00	0.99	3.50	0.15	0.17	8.49	--	0.94	0.19	0.99	0.33	1.03	--	0.01	--	--	--
48A	TYPE E	6	0.29	0.70	0.20	--	4.00	0.81	0.00	0.81	0.0200	0.0208	3.33	2.00	0.60	0.0833	4.00	0.98	3.50	0.15	0.16	6.26	--	0.96	0.19	1.00	0.33	0.81	--	0.00	--	--	--
47D	TYPE E	10	0.78	0.60	0.47	--	4.00	1.87	0.00	1.87	0.0580	0.0208	4.31	2.00	0.46	0.0833	4.00	0.93	3.50	0.15	0.16	12.56	--	0.80	0.21	0.94	0.33	1.76	--	0.11	--	--	--
47C	TYPE E	10	0.42	0.70	0.29	--	4.00	1.18	0.00	1.18	0.0580	0.0208	2.82	2.00	0.71	0.0833	4.00	0.99	3.50	0.15	0.17	9.99	--	1.00	0.18	1.00	0.33	1.18	--	0.00	--	--	--
47B	TYPE E	10	0.55	0.60	0.33	--	4.00	1.32	0.11	1.43	0.0580	0.0208	3.43	2.00	0.58	0.0833	4.00	0.97	3.50	0.15	0.16	10.94	--	0.91	0.20	0.99	0.33	1.41	--	0.02	--	--	--
47A	TYPE E	10	0.58	0.70	0.41	--	4.00	1.62	0.02	1.64	0.0520	0.0208	4.06	2.00	0.49	0.0833	4.00	0.94	3.50	0.15	0.16	11.42	--	0.88	0.21	0.98	0.33	1.60	--	0.04	--	--	--
44D	TYPE E	12	0.88	0.60	0.53	--	4.00	2.11	0.00	2.11	0.0400	0.0208	5.33	2.00	0.38	0.0833	4.00	0.86	3.50	0.15	0.15	12.29	--	0.98	0.24	1.00	1.33	2.11	--	0.00	--	--	--
44C	TYPE E	6	0.15	0.70	0.11	--	4.00	0.42	0.00	0.42	0.0400	0.0208	1.61	2.00	1.24	0.0833	4.00	1.00	3.50	0.15	0.17	5.78	--	1.04	0.13	1.00	2.33	0.42	--	0.00	--	--	--
44B	TYPE E	6	0.25	0.70	0.18	--	4.00	0.70	0.00	0.70	0.0400	0.0208	1.95	2.00	1.03	0.0833	4.00	1.00	3.50	0.15	0.17	7.16	--	0.84	0.16	0.96	0.33	0.67	--	0.03	--	--	--
44A	TYPE E	12	0.90	0.60	0.54	--	4.00	2.16	0.00	2.16	0.0400	0.0208	5.40	2.00	0.37	0.0833	4.00	0.86	3.50	0.15	0.15	12.44	--	0.96	0.24	1.00	0.33	2.15	--	0.01	--	--	--
56	TYPE E	6	0.13	0.85	0.11	--	4.00	0.44	0.00	0.44	0.0100	0.0208	2.50	2.00	0.80	0.0833	4.00	1.00	3.50	0.15	0.17	3.90	--	1.54	0.18	1.00	0.33	0.44	--	0.00	--	--	--
55	TYPE E	10	0.95	0.70	0.67	--	4.00	2.66	0.00	2.66	0.0100	0.0208	8.79	2.00	0.23	0.0833	4.00	0.64	3.50	0.15	0.11	10.42	--	0.96	0.31	1.00	0.33	2.65	--	0.01	--	--	--
54	TYPE E	8	0.55	0.70	0.39	--	4.00	1.54	0.00	1.54	0.0100	0.0208	6.66	2.00	0.30	0.0833	4.00	0.77	3.50	0.15	0.13	7.53	--	1.06	0.26	1.00	0.33	1.54	--	0.00	--	--	--
53	TYPE E	10	0.50	0.70	0.35	--	4.00	1.40	0.00	1.40	0.0350	0.0208	4.18	2.00	0.48	0.0833	4.00	0.94	3.50	0.15	0.16	9.52	--	1.05	0.21	1.00	0.33	1.40	--	0.00	--	--	--
52	TYPE E	10	0.47	0.75	0.35	--	4.00	1.41	0.00	1.41	0.0400	0.0208	3.61	2.00	0.50	0.0833	4.00	0.95	3.50	0.15	0.16	9.88	--	1.05	0.21	1.00	0.33	1.41	--	0.00	--	--	--
51	TYPE E	10	0.46	0.70	0.32	--	4.00	1.29	0.00	1.29	0.0400	0.0208	3.70	2.00	0.54	0.0833	4.00	0.96	3.50	0.15	0.16	9.44	--	1.06	0.20	1.00	0.33	1.29	--	0.00	--	--	--
50	TYPE E	10	0.43	0.70	0.30	--	4.00	1.20	0.00	1.20	0.0400	0.0208	3.48	2.00	0.57	0.0833	4.00	0.97	3.50	0.15	0.16	9.12	--	1.10	0.20	1.00	0.33	1.20	--	0.00	--	--	--
49	TYPE E	6	0.20	0.70	0.14	--	4.00	0.56	0.00	0.56	0.0200	0.0208	2.17	2.00	0.92	0.0833	4.00	1.00	3.50	0.15	0.17	5.30	--	1.13	0.17	1.00	0.33	0.56	--	0.00	--	--	--
48	TYPE E	6	0.19	0.70	0.13	--	4.00	0.53	0.00	0.53	0.0200	0.0208	2.01	2.00	1.00	0.0833	4.00	1.00	3.50	0.15	0.17	5.18	--	1.16	0.17	1.00	0.33	0.53	--	0.00	--	--	--
47	TYPE E	10	0.65	0.70	0.46	--	4.00	1.82	0.00	1.82	0.0400	0.0208	4.83	2.00	0.38	0.0833	4.00	0.90	3.50	0.15	0.15	11.32	--	0.98	0.23	0.98	0.33	1.81	--	0.04	--	--	--
46	TYPE E	8	0.41	0.70	0.29	--	4.00	1.15	0.00	1.15	0.0400	0.0208	3.33	2.00	0.60	0.0833	4.00	0.98	3.50	0.15	0.16	8.92	--	0.90	0.19	0.98	1.33	1.13	--	0.02	--	--	--
45	TYPE E	6	0.16	0.70	0.11	--	4.00	0.45	0.00	0.45	0.0200	0.0208	1.88	2.00	1.06	0.0833	4.00	1.00	3.50	0.15	0.17	4.82	--	1.24	0.16	1.00	0.33	0.45	--	0.00	--	--	--
44	TYPE E	8	0.62	0.60	0.37	--	4.00	1.49	0.00	1.49	0.0200	0.0208	5.32	2.00	0.38	0.0833	4.00	0.86	3.50	0.15	0.15	8.61	--	0.93	0.24	0.99	0.33	1.48	--	0.01	--	--	--
43	TYPE E	8	0.45	0.70	0.32	--	4.00	1.26	0.00	1.26	0.0200	0.0208	4.76	2.00	0.42	0.0833	4.00	0.90	3.50	0.15	0.15	7.86	--	1.02	0.22	1.00	0.33	1.26	--	0.00	--	--	--
42	TYPE E	6	0.23	0.70	0.16	--	4.00	0.64	0.00	0.64	0.0100	0.0208	3.70	2.00	0.54	0.0833	4.00	--	--	--	--	--	9.60	--	0.20	--	0.33	0.64	--	0.00	0.11	1.30	SUMP
132A	TYPE E	6	0.16	0.70	0.11	--	4.00	0.45	0.00	0.45	0.0100	0.0208	2.55	2.00	0.78	0.0833	4.00	--	--	--	--	--	9.60	--	0.18	--	0.33	0.45	--	0.00	0.09	1.02	SUMP
131A	TYPE E	6	0.06	0.80	0.05	--	4.00	0.19	0.00	0.19	0.0220	0.0208	1.34	2.00	1.49	0.0833	4.00	1.00	3.50	0.15	0.17	3.48	--	1.73	0.11	1.00	0.33	0.19	--	0.00	--	--	--
137	TYPE E	6	0.05	0.75	0.04	--	4.00	0.15	0.00	0.15	0.0110	0.0208	1.39	2.00	1.43	0.0833	4.00	1.00	3.50	0.15	0.17	2.55	--	2.36	0.12	1.00	0.33	0.15	--	0.00	--	--	--
136	TYPE E	10	0.53	0.75	0.40	--	4.00	1.59	0.00	1.59	0.0400	0.0208	4.38	2.00	0.46	0.0833	4.00	0.93	3.50	0.15	0.16	10.52	--	0.95	0.22	1.00	0.33	1.58	--	0.01	--	--	--
135	TYPE E	10	0.45	0.75	0.34	--	4.00	1.35	0.00	1.35	0.0400	0.0208	3.85	2.00	0.52	0.0833	4.00	0.96	3.50	0.15	0.16	9.66	--	1.03	0.21	1.00	0.33	1.35	--	0.00	--	--	--
134	TYPE E	6	0.09	0.70	0.06	--	4.00	0.25	0.00	0.25	0.0190	0.0208	1.53	2.00	1.31	0.0833	4.00	1.00	3.50	0.15	0.17	3.73	--	1.61	0.13	1.00	0.33	0.25	--	0.00	--	--	--
133	TYPE E	6	0.32	0.75	0.24	--	4.00	0.96	0.00	0.96	0.0190	0.0208	3.95	2.00	0.51	0.0833	4.00	0.95	3.50	0.15	0.16	6.72	--	0.89	0.21	0.98	0.33	0.94	--	0.02	--	--	--
132	TYPE E	6	0.06	0.80	0.05	--	4.00	0.19	0.00	0.19	0.0010	0.0208	3.50	2.00	0.57	0.0833	4.00	--	--	--	--	--	9.60	--	0.20	--	0.33	0.19	--	0.00	0.05	0.58	SUMP
110A	TYPE E	6	0.20	0.85	0.17	--	4.00	0.68	0.00	0.68	0.0400	0.0208	1.93	2.00	1.04	0.0833	4.00	1.00	3.50	0.15	0.17	7.67	--	0.85	0.16	0.97	0.33	0.66	--	0.02	--	--	--
108A	TYPE E	8	0.36	0.70	0.25	--	4.00	1.01	0.00	1.01	0.0260	0.0208	3.60	2.00	0.56	0.0833	4.00	0.97	3.50	0.15	0.16	7.46	--	1.07	0.20	1.00	0.33	1.01	--	0.00	--	--	--
120A	TYPE E	8	0.34	0.70	0.24	--	4.00	0.95	0.22	1.17	0.0400	0.0208	3.39	2.00	0.59	0.0833	4.00	0.98	3.50	0.15	0.16	9.00	--	0.89	0.20	0.98	0.33	1.15	--	0.02	--	--	--
121A	TYPE E	12	0.87	0.70	0.61	--	4.00	2.44	0.22	2.65	0.0720	0.0208	5.10	2.00	0.39	0.0833	4.00	0.88	3.50	0.15	0.15	15.98	--	0.75	0.23	0.92	0.33	2.43	--	0.22	--	--	--
123	TYPE E	10	0.74	0.70	0.52	--	4.00	2.07	0.00	2.07	0.0720	0.0208	4.29	2.00	0.47	0.0833	4.00	0.93	3.50	0.15	0.16	13.98	--	0.72	0.21	0.90	0.33	1.86	--	0.22	--	--	--
122	TYPE E	10	0.35	0.70	0.25	--	4.00	0.98	0.00	0.98	0.0720	0.0208	1.98	2.00	1.01	0.0833	4.00	1.00	3.50	0.15	0.17	9.84	--	1.02	0.17	1.00	0.33	0.98	--	0.00	--	--	--
121	TYPE E	6	0.22	0.70	0.15	--	4.00	0.62	0.00	0.62	0.0720	0.0208	1.06	2.00	1.20	0.0833	4.00	1.00	3.50	0.15	0.17	8.09	--	0.74	0.14	0.91	0.33	0.56	--	0.05	--	--	--
120	TYPE E	8	0.38	0.70	0.27	--	4.00	1.06	0.05	1.12	0.0400	0.0208	3.25	2.00	0.62	0.0833	4.00	0.98	3.50	0.15	0.16	8.80	--	0.91	0.19	0.99	0.33	1.10	--	0.02	--	--	--
106A	TYPE E	6	0.44	0.70	0.31	--	4.00	1.23	0.00	1.23	0.0010	0.0208	10.48	2.00	0.19	0.0833	4.00	--	--	--	--	--	9.60	--	0.34	--	0.33	1.23	--	0.00	0.17	2.01	SUMP
104B	TYPE E	6	0.08	0.75	0.06	--	4.00	0.24	0.00	0.24	0.0400	0.0208	1.31	2.00	1.53	0.0833	4.00	1.00	3.50	0.15	0.17	4.57	--	1.31	0.11	1.00	0.33	0.24	--	0.00	--	--	--
104A	TYPE E	6	0.22	0.70	0.15	--	4.00	0.62	0.00	0.62	0.0400	0.0208	1.86	2.00	1.08	0.0833	4.00	1.00	3.50	0.15	0.17	6.79	--	0.88	0.15	0.98	0.33	0.60	--	0.01	--	--	--
101A	TYPE E	6	0.16	0.75	0.12	--	4.00	0.48	0.00	0.48	0.0210	0.0208	1.91	2.00	1.05	0.0833	4.00	1.00	3.50	0.15	0.17	5.04	--	1.19	0.16	1.00	0.33	0.48	--	0.00	--	--	--
114	TYPE E	6	0.09	0.85	0.08	--	4.00	0.31	0.00	0.31	0.0400	0.0208	1.43	2.00	1.40	0.0833	4.00	1.00	3.50	0.15	0.17	5.06	--	1.19	0.12	1.00	0.33	0.31	--	0.00	--	--	--
113	TYPE E	6	0.20	0.70	0.14	--	4.00	0.56	0.00	0.56	0.0400	0.0208	1.79	2.00	1.12	0.0833	4.00	1.00	3.50	0.15	0.17	6.52	--	0.92	0.15	0.99	0.33	0.55	--	0.01	--	--	--
112	TYPE E	6	0.23	0.50	0.12	--	4.00	0.46	0.00	0.46	0.0400	0.0208	1.67	2.00	1.20	0.0833	4.00	1.00	3.50	0.15	0.17	6.00	--	1.00	0.14	1.00	0.33	0.46	--	0.00	--	--	--
111	TYPE E	6	0.17	0.70	0.12	--	4.00	0.48	0.00	0.48	0.0400	0.0208	1.69	2.00	1.19	0.0833	4.00	1.00	3.50	0.15	0.17	6.09	--	0.99	0.14	1.00	0.33	0.48	--	0.00	--	--	--
110	TYPE E	10	0.49	0.70	0.34	--	4.00	1.37	0.00	1.37	0.0400	0.0208	3.90	2.00	0.51	0.0833	4.00	0.95	3.50	0.15	0.16	9.74	--	1.03	0.21	1.00	0.33	1.37	--	0.00	--	--	--
109	TYPE E	6	0.15	0.65	0.10	--	4.00	0.39	0.00	0.39	0.0360	0.0208	1.60	2.00	1.25	0.0833	4.00	1.00	3.50	0.15	0.17	5.43	--	1.11	0.13	1.00	0.33	0.39	--	0.00	--	--	--
108	TYPE E	6	0.29	0.65	0.19	--	4.00	0.75	0.00	0.75	0.0250	0.0208	2.75	2.00	0.73	0.0833	4.00	0.99	3.50	0.15	0.17	6.43	--	0.93	0.18	0.99	0.33	0.75	--	0.01	--	--	--
106	TYPE E	6	0.18	0.70	0.13	--	4.00	0.50	0.00	0.50	0.0010	0.0208	6.78	2.00	0.29	0.0833	4.00	--	--	--	--	--	9.60	--	0.27	--	0.33	0.50	--	0.00	0.09	1.11	SUMP
105	TYPE E	6	0.18	0.75	0.14	--	4.00	0.54	0.00	0.54	0.0320	0.0208	1.85	2.00	1.08	0.0833	4.00	1.00	3.50	0.15	0.17	6.01	--	1.00	0.15	1.00	0.33	0.54	--	0.00	--	--	--
103	TYPE E	6	0.21	0.70	0.15	--	4.00	0.59	0.00	0.59	0.0370	0.0208	1.85	2.00	1.08	0.0833	4.00	1.00	3.50	0.15	0.17	6.50	--	0.92	0.15	0.99	0.33	0.58	--	0.01	--	--	--
102	TYPE E	6	0.16	0.60	0.10	--	4.00	0.38	0.00	0.38	0.0400	0.0208	1.56	2.00	1.28	0.0833	4.00	1.00	3.50	0.15	0.17	5.56	--	1.08	0.13	1.00	0.33	0.38	--	0.00	--	--	--
101	TYPE E	6	0.02	0.85	0.02	--	4.00	0.07	0.00	0.07	0.0300	0.0208	0.86	2.00	2.33	0.0833	4.00	1.00	3.50	0.15	0.17	2.47	--	2.43	0.07	1.00	0.33	0.07	--	0.00	--	--	--
80A	TYPE E	10	0.59	0.60	0.35	--	4.00	1.42	0.00	1.42	0.0240	0.0208	0.21	2.00	9.59	1.0833	52.00	0.90	3.50	0.15	0.15	8.74	--	1.14	0.23	1.00	1.33	1.42	--	0.00	--	--	--
155	TYPE E	6	0.57	0.60	0.34	--	4.00	1.37	0.00	1.37	0.0200	0.0208	5.03	2.00	0.40	0.0833	4.00	0.88	3.50	0.15	0.15	8.22	--	0.73	0.23	0.91	0.33	1.24	--	0.13	--	--	--
154	TYPE E	6	0.38	0.60	0.23	--	4.00	0.91	0.00	0.91	0.0100	0.0208	4.83	2.00	0.41	0.0833	4.00	0.90	3.50	0.15	0.15	5.59	--	1.07	0.23	1.00	0.33	0.91	--	0.00	--	--	--

GRATE INLET DESIGN COMPUTATIONS

INLET NO.	TYPE	AREA (Ac)	"C"	"I" (in/hr)	GRATE DESIGN				REMARKS
					FLOW (cfs)	$AREA_{50}$ (sf)	$PERIM_{50}$ (ft)	DEPTH (ft)	
149C	TYPE A	0.58	0.60	6.53	2.27	3.00	9.42	0.19	SUMP
143A	TYPE A	1.74	0.50	6.53	5.68	3.00	9.42	0.34	SUMP
54B	TYPE A	2.29	0.45	6.53	6.73	3.00	9.42	0.38	SUMP
54A	TYPE A	2.97	0.50	6.53	9.70	2.25	8.25	0.80	SUMP

STORM INLET COMPUTATIONS

INLET NO.			RUNOFF TO INLET								CURB / SUMP INLET COMPUTATIONS																	RUNOFF INTERCEPTED					REMARKS
Inlet Structure No.	Inlet Type	Length (ft)	Drainage Area (ac)	C	CA	Sum CA	I (in/hr)	Q, increm (cfs)	Q, carryover (cfs)	Qa, gutter (cfs)	S, gutter (ft/ft)	Sx, cross slope (ft/ft)	T, spread (ft)	W (ft)	WFT	Sw (ft/ft)	SwGSx	Eo	a (in)	SYw = a/(12W)	Se (ft/ft) = Sx + SYwEo	Lt (ft)	P, eff length (ft)	Lt/Lt	d (ft)	E	h (ft)	Q intercepted	d/h	Qb, carryover (cfs)	d, sump (ft)	T, spread at sag (ft)	
15A	TYPE E	6	0.08	0.70	0.06	--	4.00	0.22	0.00	0.22	0.0400	0.0208	1.27	2.00	1.57	0.0833	4.00	1.00	3.50	0.15	0.17	4.44	--	1.35	0.11	1.00	0.33	0.22	--	0.00	--	--	--
14B	TYPE E	10	0.90	0.60	0.54	--	4.00	2.16	0.00	2.16	0.0300	0.0208	5.90	2.00	0.34	0.0833	4.00	0.82	3.50	0.15	0.14	11.66	--	0.86	0.25	0.97	0.33	2.10	--	0.06	--	--	-

Reference Note	Structure Up	Structure Down	LineID	DrainageArea (ac)	RunoffCoeff (C)	IncrCxA	TotalCxA	InletTime (min)	iSys (in/hr)	Incr Flow Rate (cfs)	KnownQ (cfs)	Cumulative (cfs)	Total FlowRate (cfs)	InvertUp (ft)	InvertDn (ft)	LineLength (ft)	LineSlope (%)	LineSize (in)	Manning's Roughness Coefficient n	CapacityFull (cfs)	Vel Partial (ft/s)	PipeTravel (min)	Tc Total (min)	Grnd/Rim Elev Up (ft)
18	1	2	2A	3	4	5	6	7	8	9A	9B	9C	9	10	11	12	13	14	14A	15	16	17	17A	A
	173A	173	173A-173	0.22	0.65	0.14	0.14	5.00	6.53	0.93	0.00	0.00	0.93	432.98	432.53	52.51	0.86	15	0.012	6.48	3.5	0.25	5.00	437.59
	175A	175	175A-175	0.17	0.75	0.13	0.13	5.00	6.53	0.83	0.00	0.00	0.83	435.93	434.31	161.89	1.00	15	0.012	7.00	3.5	0.78	5.00	439.29
	178	177	178-177	0.98	0.50	0.49	0.49	5.00	6.53	3.20	0.00	0.00	3.20	435.71	435.56	29.50	0.51	15	0.012	4.99	4.3	0.11	5.00	437.57
	177	176	177-176	0.13	0.75	0.10	0.59	5.00	6.48	3.81	0.00	0.00	3.81	435.46	434.91	109.50	0.50	15	0.012	4.96	4.4	0.41	5.11	441.27
	176	175	176-175	0.13	0.75	0.10	0.69	5.00	6.34	4.34	0.00	0.00	4.34	434.81	434.31	35.36	1.41	15	0.012	8.32	6.8	0.09	5.52	438.20
	175	174	175-174	0.35	0.75	0.26	1.08	5.00	6.26	6.73	0.00	0.00	6.73	434.21	433.90	31.00	1.00	15	0.012	7.00	6.6	0.08	5.78	437.67
	174	173	174-173	0.55	0.75	0.41	1.49	5.00	6.24	9.27	0.00	0.00	9.27	433.65	432.28	38.95	3.52	18	0.012	21.34	11.5	0.06	5.85	437.52
	173	172	173-172	0.11	0.65	0.07	1.70	5.00	6.22	10.58	0.00	0.00	10.58	432.28	431.94	31.00	1.10	18	0.012	11.92	7.7	0.07	5.91	437.24
	172	171	172-171	0.61	0.75	0.46	2.16	5.00	6.20	13.38	0.00	0.00	13.38	431.84	431.26	22.15	2.62	18	0.012	18.41	11.4	0.03	5.98	437.39
OUTFALL	171	170	171-170	0.00	0.60	0.00	2.16	5.00	6.19	13.36	0.00	0.00	13.36	431.17	428.00	123.01	2.58	18	0.012	18.27	11.3	0.18	6.01	437.29
	54B	54A	54B-54A	2.29	0.45	1.03	1.03	5.00	6.53	6.73	0.00	0.00	6.73	470.56	466.39	323.82	1.29	18	0.012	12.91	7.4	0.73	5.00	473.75
	54A	54	54A-54	2.97	0.50	1.49	2.52	5.00	6.28	15.79	0.00	0.00	15.79	465.89	464.12	114.50	1.55	24	0.012	30.47	9.8	0.19	5.73	469.24
	53A	53	53A-53	0.15	0.85	0.13	0.13	5.00	6.53	0.83	0.00	0.00	0.83	463.73	462.96	38.64	1.99	15	0.012	9.88	4.4	0.15	5.00	467.31
	50A	50	50A-50	0.37	0.70	0.26	0.26	5.00	6.53	1.69	0.00	0.00	1.69	455.03	454.55	38.00	1.26	15	0.012	7.87	4.9	0.13	5.00	458.60
	48A	48	48A-48	0.29	0.70	0.20	0.20	5.00	6.53	1.33	0.00	0.00	1.33	448.70	448.20	39.14	1.28	15	0.012	7.91	4.5	0.14	5.00	452.28
	47D	47B	47D-47B	0.78	0.60	0.47	0.47	5.00	6.53	3.06	0.00	0.00	3.06	468.28	462.02	113.78	5.50	15	0.012	16.39	9.8	0.19	5.00	471.84
	47C	47B	47C-47B	0.42	0.70	0.29	0.29	5.00	6.53	1.92	0.00	0.00	1.92	461.48	461.29	31.00	0.61	15	0.012	5.48	4.0	0.13	5.00	465.12
	47B	47A	47B-47A	0.55	0.60	0.33	1.09	5.00	6.45	7.05	0.00	0.00	7.05	461.19	454.33	131.23	5.23	15	0.012	16.00	12.5	0.17	5.19	465.27
	47A	47	47A-47	0.58	0.70	0.41	1.50	5.00	6.39	9.58	0.00	0.00	9.58	454.23	447.09	126.50	5.64	18	0.012	27.04	13.8	0.15	5.37	457.79
	44D	44C	44D-44C	0.88	0.60	0.53	0.53	5.00	6.53	3.45	0.00	0.00	3.45	453.65	453.34	31.00	1.00	15	0.012	7.00	5.6	0.09	5.00	457.14
	44C	44B	44C-44B	0.15	0.70	0.11	0.63	5.00	6.49	4.11	0.00	0.00	4.11	453.24	446.29	175.90	3.95	15	0.012	13.91	9.6	0.30	5.09	457.29
	44B	44A	44B-44A	0.25	0.70	0.18	0.81	5.00	6.39	5.16	0.00	0.00	5.16	446.19	445.75	31.00	1.42	15	0.012	8.34	7.1	0.07	5.40	450.25
	44A	44	44A-44	0.90	0.60	0.54	1.35	5.00	6.36	8.57	0.00	0.00	8.57	445.65	443.20	99.69	2.46	15	0.012	10.97	9.9	0.17	5.47	450.11
	56	55	56-55	0.13	0.85	0.11	0.11	5.00	6.53	0.72	0.00	0.00	0.72	466.51	466.31	42.46	0.47	15	0.012	4.80	2.7	0.27	5.00	470.09
	55	54	55-54	0.95	0.70	0.67	0.78	5.00	6.43	4.99	0.00	0.00	4.99	466.21	464.77	138.56	1.04	15	0.012	7.13	6.3	0.37	5.27	469.90
	54	53	54-53	0.55	0.70	0.39	3.68	5.00	6.21	22.84	0.00	0.00	22.84	464.02	462.31	123.00	1.39	24	0.012	28.90	10.2	0.20	5.93	468.49
	53	52	53-52	0.50	0.70	0.35	4.15	5.00	6.15	25.54	0.00	0.00	25.54	461.71	461.36	35.36	0.99	30	0.012	44.21	9.4	0.06	6.13	467.47
	52	51	52-51	0.47	0.75	0.35	4.51	5.00	6.13	27.62	0.00	0.00	27.62	461.26	460.95	31.26	0.99	30	0.012	44.25	9.6	0.05	6.19	469.23
	51	50	51-50	0.46	0.70	0.32	4.83	5.00	6.11	29.51	0.00	0.00	29.51	460.85	453.40	258.12	2.89	30	0.012	75.49	14.3	0.30	6.24	468.92
	50	49	50-49	0.43	0.70	0.30	5.39	5.00	6.02	32.44	0.00	0.00	32.44	452.32	448.72	126.50	2.85	30	0.012	74.96	14.5	0.15	6.55	458.60
	49	48	49-48	0.20	0.70	0.14	5.53	5.00	5.98	33.05	0.00	0.00	33.05	448.62	447.45	98.00	1.19	30	0.012	48.55	10.7	0.15	6.69	454.02
	48	47	48-47	0.19	0.70	0.13	5.86	5.00	5.93	34.79	0.00	0.00	34.79	446.95	446.70	35.36	0.71	36	0.012	60.76	8.9	0.07	6.84	452.09
	47	46	47-46	0.65	0.70	0.46	7.82	5.00	5.91	46.23	0.00	0.00	46.23	446.60	446.39	31.00	0.68	36	0.012	59.47	9.3	0.06	6.91	452.36
	46	45	46-45	0.41	0.70	0.29	8.10	5.00	5.90	47.80	0.00	0.00	47.80	445.59	443.42	125.51	1.73	36	0.012	95.01	13.4	0.16	6.96	452.21
	45	44	45-44	0.16	0.70	0.11	8.22	5.00	5.85	48.10	0.00	0.00	48.10	443.32	441.45	98.00	1.91	36	0.012	99.81	14.0	0.12	7.12	448.58
	44	43	44-43	0.62	0.60	0.37	9.94	5.00	5.82	57.85	0.00	0.00	57.85	441.35	440.59	38.00	2.00	36	0.012	102.19	14.9	0.04	7.24	446.66
	43	42	43-42	0.45	0.70	0.32	10.25	5.00	5.81	59.56	0.00	0.00	59.56	440.01	439.15	50.33	1.71	36	0.012	94.45	14.2	0.06	7.28	446.66
	42	41	42-41	0.23	0.70	0.16	10.41	5.00	5.79	60.32	0.00	0.00	60.32	439.05	438.38	40.17	1.67	36	0.012	93.32	14.0	0.05	7.34	445.65
OUTFALL	41	40	41-40	0.00	0.75	0.00	10.41	5.00	5.78	60.19	0.00	0.00	60.19	430.56	428.00	179.05	1.43	36	0.012	86.40	13.2	0.23	7.39	445.31
	132A	132	132A-132	0.16	0.70	0.11	0.11	5.00	6.53	0.73	0.00	0.00	0.73	433.73	433.54	31.11	0.61	15	0.012	5.47	2.9	0.18	5.00	438.23
	131A	131	131A-131	0.06	0.80	0.05	0.05	5.00	6.53	0.31	0.00	0.00	0.31	434.17	433.08	28.55	3.82	15	0.012	13.67	3.9	0.12	5.00	437.53
	137	136	137-136	0.05	0.75	0.04	0.04	5.00	6.53	0.24	0.00	0.00	0.24	439.09	438.88	35.36	0.59	15	0.012	5.39	2.0	0.29	5.00	442.42
	136	135	136-135	0.53	0.75	0.40	0.44	5.00	6.42	2.79	0.00	0.00	2.79	438.78	438.47	31.00	1.00	15	0.012	7.00	5.3	0.10	5.29	442.24
	135	134	135-134	0.45	0.75	0.34	0.77	5.00	6.39	4.93	0.00	0.00	4.93	438.37	434.95	75.86	4.51	15	0.012	14.86	10.7	0.12	5.39	442.39
	134	133	134-133	0.09	0.70	0.06	0.84	5.00	6.35	5.30	0.00	0.00	5.30	434.85	434.54	31.00	1.00	15	0.012	7.00	6.3	0.08	5.51	438.93
	133	132	133-132	0.32	0.75	0.24	1.08	5.00	6.32	6.80	0.00	0.00	6.80	434.44	433.29	75.27	1.53	15	0.012	8.65	7.8	0.16	5.59	439.08
	132	131	132-131	0.06	0.80	0.05	1.24	5.00	6.27	7.74	0.00	0.00	7.74	433.19	432.83	15.94	2.26	15	0.012	10.52	9.3	0.03	5.75	438.37
OUTFALL	131	130	131-130	0.00	0.80	0.00	1.28	5.00	6.26	8.03	0.00	0.00	8.03	428.68	428.00	29.84	2.28	15	0.012	10.56	9.5	0.05	5.78	437.51
	112A	112	112A-112	0.74	0.45	0.33	0.33	5.00	6.53	2.17	0.00	0.00	2.17	462.69	462.46	45.14	0.51	15	0.012	5.00	3.9	0.19	5.00	464.94
	110A	110	110A-110	0.20	0.85	0.17	0.17	5.00	6.53	1.11	0.00	0.00	1.11	451.13	450.75	38.00	1.00	15	0.012	7.00	3.9	0.16	5.00	454.42
	108A	108	108A-108	0.36	0.70	0.25	0.25	5.00	6.53	1.65	0.00	0.00	1.65	442.09	441.30	38.53	2.05	15	0.012	10.02	5.7	0.11	5.00	445.18
	120A	120	120A-120	0.34	0.70	0.24	0.24	5.00	6.53	1.55	0.00	0.00	1.55	441.80	441.49	31.00	1.00	15	0.012	7.00	4.4	0.12	5.00	445.30
	121A	121	121A-121	0.87	0.70	0.61	0.61	5.00	6.53	3.98	0.00	0.00	3.98	444.55	444.31	31.00	0.77	15	0.012	6.16	5.3	0.10	5.00	448.17
	123	122	123-122	0.74	0.70	0.52	0.52	5.00	6.53	3.38	0.00	0.00	3.38	452.17	451.83	31.00	1.10	15	0.012	7.33	5.8	0.09	5.00	455.91
	122	121	122-121	0.35	0.70	0.25	0.76	5.00	6.49	4.95	0.00	0.00	4.95	451.94	444.31	126.74	6.02	15	0.012	17.17	11.8	0.18	5.09	455.77
	121	120	121-120	0.22	0.70	0.15	1.53	5.00	6.43	9.81	0.00	0.00	9.81	444.21	441.59	71.32	3.67	15	0.012	13.41	11.9	0.10	5.27	448.02
	120	107	120-107	0.38	0.70	0.27	2.03	5.00	6.39	12.98	0.00	0.00	12.98	441.49	440.54	25.00	3.80	15	0.012	13.64	12.8	0.03	5.37	445.16
	106A	106	106A-106	0.44	0.70	0.31	0.31	5.00	6.53	2.01	0.00	0.00	2.01	440.32	440.00	38.00	0.84	15	0.012	6.42	4.6	0.14	5.00	443.89
	104B	104A	104B-104A	0.08	0.75	0.06	0.06	5.00	6.53	0.39	0.00	0.00	0.39	449.69	449.31	38.00	1.00	15	0.012	7.00	2.7	0.23	5.00	453.18
	104A	104	104A-104	0.22	0.70	0.15	0.21	5.00	6.44	1.38	0.00	0.00	1.38	449.21	441.00	101.09	8.12	15	0.012	19.94	8.3	0.20	5.23	453.18
	101A	101	101A-101	0.16	0.75	0.12	0.12	5.00	6.53	0.78	0.00	0.00	0.78	434.88	434.70	32.37	0.56	15	0.012	5.22	2.9	0.19	5.00	439.39
	114	113	114-113	0.09	0.85	0.08	0.08	5.00	6.53	0.50	0.00	0.00	0.50	463.32	462.92	40.00	1.00	15	0.012	7.00	3.0	0.22	5.00	466.81
	113	112	113-112	0.20	0.70	0.14	0.22	5.00	6.44	1.40	0.00	0.00	1.40	462.82	462.46	35.36	1.02	15	0.012	7.06	4.3	0.14	5.22	466.81
	112	111	112-111	0.23	0.50	0.12	0.66	5.00	6.40	4.25	0.00	0.00	4.25	462.36	461.97	39.27	0.99	15	0.012	6.97	6.0	0.11	5.36	467.78
	111	110	111-110	0.17	0.70	0.12	0.78	5.00	6.36	4.98	0.00	0.00	4.98	461.87	450.75	324.06	3.43	15	0.012	12.96	9.8	0.55	5.47	467.38
	110	109	110-109	0.49	0.70	0.34	1.30	5.00	6.18	8.02	0.00	0.00	8.02	450.65	443.85	122.09	5.57	15	0.012	16.52	13.3	0.15	6.02	454.42
	109	108	109-108	0.15	0.65	0.10	1.39	5.00	6.14	8.55	0.00	0.00	8.55	443.84	441.30	98.00	2.59	15	0.012	11.27	10.1	0.16	6.17	448.24
	108	107	108-107	0.29	0.65	0.19	1.83	5.00	6.09	11.16	0.00	0.00	11.16	441.05	440.29	56.00	1.36	18	0.012	13.26	8.5	0.11	6.33	445.02
	107	106	107-106	0.00	0.75	0.00	3.86	5.00	6.05	23.39	0.00	0.00	23.39	439.19	438.85	42.75	0.80	30	0.012	39.63	8.5	0.08	6.44	443.94
	106	105	106-105	0.18	0.70	0.13	4.30	5.00	6.03	25.91	0.00	0.00	25.91	438.75	438.25	102.22	0.49	30	0.012	31.08	7.2	0.24	6.53	443.89
	105	104	105-104	0.18	0.75	0.14	4.43	5.00	5.96	26.41	0.00	0.00	26.41	438.15	437.83	62.54	0.51	30	0.012	31.79	7.3	0.14	6.77	445.45
	104	103	104-103	1.32	0.75	0.99	5.64	5.00	5.91	33.34	0.00	0.00	33.34	437.73	437.18	55.84	0.98	30	0.012	44.10	9.9	0.09	6.91	445.20
	103	102	103-102	0.21	0.70	0.15	5.78	5.00	5.89	34.06	0.00	0.00	34.06	437.08	435.72	135.27	1.01	30	0.012	44.55	10.0	0.23	7.00	448.12
	102	101	102-101	0.16	0.60	0.10	5.88	5.00	5.82	34.25	0.00	0.00	34.25	435.62	434.45	44.76	2.61	30	0.012	71.84	14.3	0.05	7.23	441.40
OUTFALL	101	100	101-100	0.02	0.85	0.02	6.02	5.00	5.81	34.96	0.00	0.00	34.96	428.67	428.00	49.93	1.34	30	0.012	51.47	11.2	0.07	7.28	439.78

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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER COMPUTATIONS

STONE SPRING SUBDIVISON

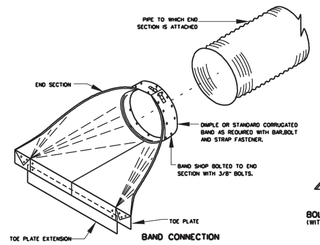
TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-761.DWG	
NCS:	
SHEET:	110 OF 134

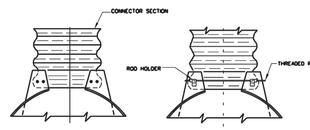
DIMENSIONS OF GALVANIZED STEEL END SECTION FOR ROUND PIPE							
PIPE DIAM. (INCHES)	METAL THK. (INCHES)	DIMENSIONS (INCHES) A ±1"	B MAX	H ±1"	L ±1 1/2"	W ±2"	APPROX. SLOPE	BODY
12	.064	6	6	6	21	24	2 1/2	1 PC.
15	.064	7	8	6	26	30	2 1/2	1 PC.
18	.064	8	10	6	31	36	2 1/2	1 PC.
21	.064	9	12	6	36	42	2 1/2	1 PC.
24	.064	10	13	6	41	48	2 1/2	1 PC.
30	.079	12	16	8	51	60	2 1/2	1 PC.
36	.079	14	19	9	60	72	2 1/2	2 PC.
42	.109	16	22	11	69	84	2 1/2	2 PC.
48	.109	18	27	12	78	90	2 1/4	2 PC.
54	.109	18	30	12	84	102	2	2 PC.
60	.109	18	33	12	87	114	1 3/4	3 PC.
66	.109	18	36	12	87	120	1 1/2	3 PC.
72	.109	18	39	12	87	126	1 1/3	3 PC.
78	.109	18	42	12	87	132	1 1/4	3 PC.
84	.109	18	45	12	87	138	1 1/6	3 PC.

DIMENSIONS OF GALVANIZED STEEL END SECTION FOR PIPE ARCH									
PIPE ARCH SPAN X RISE (INCHES)	EQUIV. DIAM. (INCHES)	METAL THK. (INCHES)	DIMENSIONS (INCHES) A ±1"	B MAX	H ±1"	L ±1 1/2"	W ±2"	APPROX. SLOPE	BODY
17X13	15	.064	7	9	6	19	30	2 1/2	1 PC.
21X15	18	.064	7	10	6	23	36	2 1/2	1 PC.
24X18	21	.064	8	12	6	28	42	2 1/2	1 PC.
28X20	24	.064	9	14	6	32	48	2 1/2	1 PC.
35X24	30	.079	10	16	6	39	60	2 1/2	1 PC.
42X29 (40X31)	36	.079	12	18	8	46	75	2 1/2	1 PC.
49X33 (46X36)	42	.109	13	21	9	53	85	2 1/2	2 PC.
57X38 (53X41)	48	.109	18	26	12	63	90	2 1/2	2 PC.
64X43 (60X46)	54	.109	18	30	12	70	102	2 1/4	2 PC.
71X47 (66X51)	60	.109	18	33	12	77	114	2 1/4	3 PC.
77X52 (73X55)	66	.109	18	36	12	77	126	2	3 PC.
83X57 (81X59)	72	.109	18	39	12	77	138	2	3 PC.

NOTE: SPAN AND RISE DIMENSIONS IN PARENTHESES ARE FOR 3"X1" CORRUGATED PIPE ARCHES; ALL OTHER SPAN AND RISE VALUES ARE FOR 2 1/2"X1/2" CORRUGATED PIPE ARCHES.

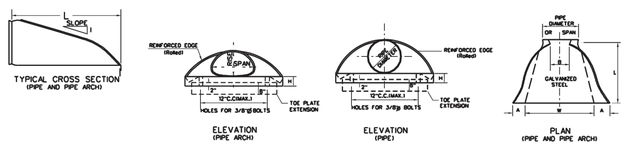


BAND CONNECTION



BOLTED OR RIVETED CONNECTION (WITH OR WITHOUT CONNECTOR SECTION)

THREADED ROD CONNECTION



TYPICAL CROSS SECTION (PIPE AND PIPE ARCH)

ELEVATION (PIPE ARCH)

ELEVATION (PIPE)

PLAN (PIPE AND PIPE ARCH)

NOTES

TYPICAL END SECTIONS FOR PIPES AND PIPE ARCHES ARE DETAILED HEREIN. OTHER SIMILAR DESIGNS MAY BE USED IF ACCEPTABLE TO THE ENGINEER.

GALVANIZED STEEL END SECTIONS SHALL BE USED ON THE ENDS OF CORRUGATED STEEL PIPES AND/OR PIPE ARCHES AT THOSE LOCATIONS SPECIFIED ON THE PLANS. END SECTIONS SHALL BE MEASURED AS THE NUMBER OF UNITS INSTALLED OF EACH SIZE AND TYPE AND SHALL BE PAID FOR IN ACCORDANCE WITH 604 OF THE SPECIFICATIONS.

TWO-PIECE AND THREE-PIECE END SECTIONS SHALL BE OF LAP SEAM CONSTRUCTION. TIGHTLY JOINED WITH 3/8" DIAMETER GALVANIZED RIVETS OR BOLTS.

FOR 60" THRU 84" PIPES. THE REINFORCED EDGES OF THE END SECTIONS SHALL BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES FASTENED BY 3 /8 " DIAMETER GALVANIZED BOLTS AND NUTS. THIS REQUIREMENT SHALL ALSO BE APPLICABLE TO THE END SECTIONS FOR 77"X52", 73"X 55", 83"X 57", AND 81"X 59" PIPE ARCH SIZES. IN ADDITION, FOR THOSE PIPE ARCH SIZES, ANGLE REINFORCEMENT SHALL BE USED UNDER THE CENTER PANEL SEAMS.

THE END SECTION CONNECTION DETAILS SHALL BE AS SHOWN ON THIS PLAN SHEET OR OF A SIMILAR DESIGN AS RECOMMENDED BY THE MANUFACTURER. ALL SIMILAR DESIGNS SHALL PROVIDE A SECURE ATTACHMENT OF THE END SECTION TO THE PIPE OR PIPE ARCH.

ALTHOUGH A PIPE OR PIPE ARCH MAY HAVE A BITUMINOUS COATING AND/OR PAVED INVERT, IT WILL NOT BE NECESSARY TO BITUMINOUS COAT OR PAVE THE END SECTION, CONNECTORS, OR CONNECTOR SECTION.

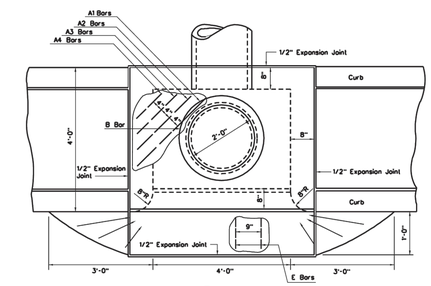
TOE PLATE EXTENSIONS SHALL BE THE SAME THICKNESS AS THE END SECTIONS AND SHALL BE FASTENED TO TOE PLATES WITH 3/8" DIAMETER GALVANIZED BOLTS. LENGTH OF TOE PLATE EXTENSION SHALL BE W=10"(approx.) FOR 12" THRU 30" DIAMETER PIPES AND FOR PIPE ARCHES WITH RISE VALUES UP TO AND INCLUDING 29". THE LENGTH SHALL BE W=22"(approx.) FOR LARGER PIPE SIZES AND W=18" (approx.) FOR LARGER PIPE ARCHES.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

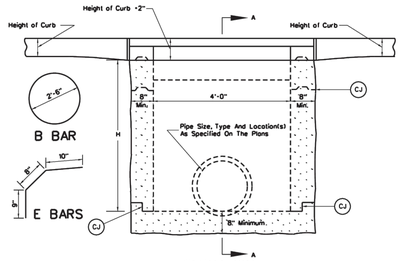
PREPARED 7-1-99
REVISION DATE

END SECTIONS FOR CORRUGATED STEEL PIPES AND PIPE ARCHES

STANDARD SHEET DR3

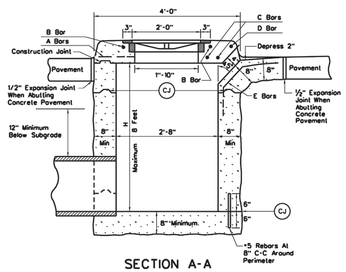


PLAN



B BAR

ELEVATION



SECTION A-A

NOTES

Optional construction joints labeled "CJ" may be roughened concrete, keyed or doweled as per the typical details shown herein or as approved by the Engineer. Non shrink grout meeting the requirements of subsection 715.3 of the specifications may be used to a depth of 1/2" for leveling between precast sections. Thicker depths will be allowed if as per the manufacturer's recommendations.

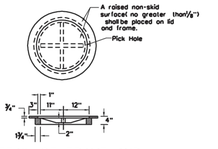
The covering for reinforcing steel shall be two inches, measured from the surface of the concrete to the face of the bar, unless otherwise shown. All reinforcing steel shall be epoxy coated and meet the requirements of section 602 of the specifications.

This inlet shall not be placed in a pedestrian cross walk.

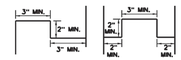
Construction may be cast-in-place, precast in one or multiple sections, or any combination of cast-in-place and precast.

The minimum distance from the top of any pipe opening to any construction joint above the opening shall be four (4) inches.

The number and location of pipe openings shall be as shown in the plans. The contractor at no additional cost, shall be responsible for any temporary bracing required to transport precast inlet sections due to multiple openings.



DETAIL OF FRAME AND COVER CASTING (RING TYPE)



CONSTRUCTION JOINT DETAILS

BILL OF STEEL				
Mark	Size Bar	No.	Length	Weight
A1	#5	2	3'-11"	8 lbs.
A2	#5	2	3'-3"	7
A3	#5	2	2'-7"	5
A4	#5	2	1'-11"	6
B	#5	1	8'-0"	8
C	#8	2	5'-0"	27
D	#5	1	5'-0"	5
E	#5	6	2'-3"	14
			Total	80 lbs.

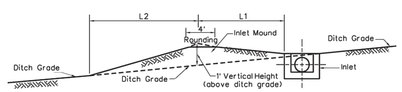
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-1-99
REVISION DATE

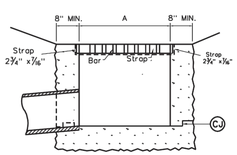
TYPE D INLET

STANDARD SHEET DR6-D

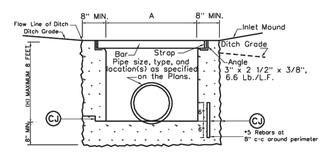
INLET MOUNDING TABLE			
DITCH GRADE (%)		L1, HORIZONTAL LENGTH (FT.)	L2, HORIZONTAL LENGTH (FT.)
FROM	TO		
0	3	10	15
3	5	9	20
5	7.5	8	40
7.5	UP	SPECIAL DESIGN	SPECIAL DESIGN



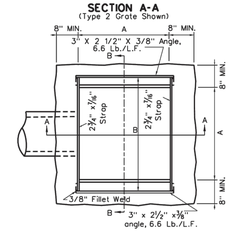
MOUNDING DETAIL
Median and Side Ditches



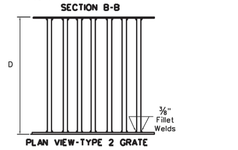
SECTION A-A
(Type 2 Grate Shown)



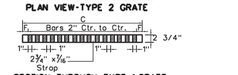
SECTION B-B



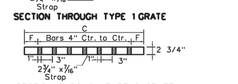
PLAN



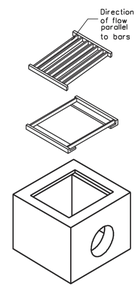
PLAN VIEW-TYPE 2 GRATE



SECTION THROUGH TYPE 1 GRATE



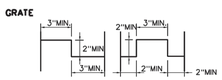
SECTION THROUGH TYPE 2 GRATE



EXPLODED DETAIL

DIMENSIONS					TYPE 2 GRATE		FRAME		TYPE 1 GRATE		
Pipe Size	A	B	C	D	H(Min)	F	Bars	WT.	WT.	F	Bars	WT.
18"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-0"	3 3/8"	7	223	62	1 3/8"	15	453
21"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-3"	3 3/8"	7	223	62	1 3/8"	15	453
24"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-6"	3 3/8"	7	223	62	1 3/8"	15	453
27"	3'-0"	3'-6"	2'-11 3/4"	3'-5 3/4"	2'-9"	3 3/8"	8	279	69	1 3/8"	17	566
30"	3'-6"	4'-0"	3'-5 3/4"	3'-11 3/4"	3'-0"	3 3/8"	9	357	80	1 3/8"	21	797
33"	3'-9"	4'-3"	3'-8 3/4"	4'-2 3/4"	3'-3"	3 7/8"	10	419	85	1 7/8"	21	847
36"	4'-0"	4'-6"	3'-11 3/4"	4'-5 3/4"	3'-6"	3 3/8"	11	486	90	1 3/8"	23	981
42"	4'-6"	5'-0"	4'-5 3/4"	4'-11 3/4"	4'-0"	3 3/8"	12	587	101	1 3/8"	27	1277
48"	5'-0"	5'-6"	4'-11 3/4"	5'-5 3/4"	4'-6"	3 3/8"	14	748	112	1 3/8"	29	1507

Table Note: Grate and frame weights are for information only and will increase if larger straps and bars are used.
The following substitutions in dimensions are acceptable for fabricating the grate and frame:
Strap Thickness: 1/2" Strap Depth: 3" Bar Depth: 3"



CONSTRUCTION JOINT DETAILS

NOTES

The final installed top surface of inlet and grate shall be flush with adjacent finished surfaces such as pavement, gutters, curbs, and sidewalks. Top of grate elevation, if shown on the plans, is for information only.

Construction may be cast-in place, precast in one or multiple sections, or any combination of cast-in-place and precast.

Type 2 Grate shall be used at all locations unless otherwise specified on the Plans. Type 1 Urban Grates shall be used only at specially designated locations as shown on the plans.

The Contractor, at his option, may omit use of the frame by forming a ledge in the concrete.

Special care shall be execised in forming the 2" wide concrete ledge to provide a smooth, even surface for supporting the grates if the shallow frame is not used. no projections shall exist on the bearing surfaces of the ledge or the grates, and the grates shall seat on the ledge without rocking.

The Mounding Detail as shown is not required when an inlet is placed in a sag.

Optional construction joints labeled "CJ" may be roughened concrete, keyed or doweled as per the typical details shown herein or as approved by the Engineer. Non shrink grout meeting the requirements of subsection 715.5 of the specifications may be used to a depth of 1/2" for leveling between precast sections. Thicker depths will be allowed as per the manufacturer's recommendations.

This inlet is to be installed in roadside or median ditches only. It is not to be placed adjacent to pavement or in the gutter pan of combination curb and gutter.

The minimum distance from the top of any pipe opening to any construction joint above the opening shall be four (4) inches.

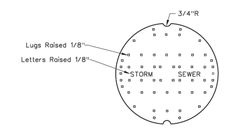
The number and location of pipe openings shall be as shown in the plans. The contractor at no additional cost, shall be responsible for any temporary bracing required to transport precast inlet sections due to multiple openings.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

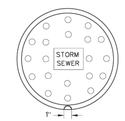
PREPARED 7-1-99
REVISION DATE

TYPE G INLET

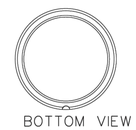
STANDARD SHEET DR8-G



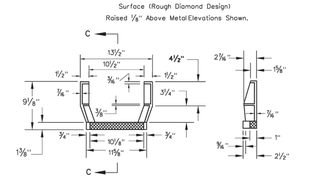
PLAN



PLAN



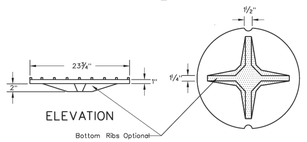
BOTTOM VIEW OF COVER



PLAN

SECTION C-C

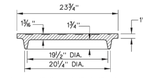
GRAY IRON STEP



ELEVATION

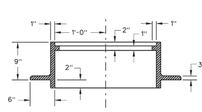
INVERTED PLAN

MANHOLE COVER



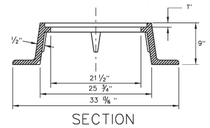
COVER SECTION

ALTERNATE MANHOLE COVER



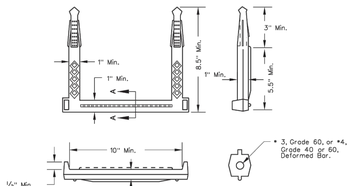
SECTION

MANHOLE FRAME



SECTION

ALTERNATE MANHOLE FRAME



SECTION A-A
(Enlarged)

REINFORCED PLASTIC AND REINFORCED - CORROSION RESISTANT RUBBER MANHOLE STEPS

NOTES

Lettering on covers shall denote STORM SEWER or SANITARY SEWER as applicable.
Bottom ribs may be deleted from manhole cover castings.
The 1/8" raised lugs are a skid resistant measure. Alternative measures will require approval by the Engineer.
Shop Drawings shall be submitted if details and dimensions vary.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-1-99
REVISION DATE
5/3/11

MANHOLE CASTINGS

STANDARD SHEET DR7-X

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JASON P. GERHART REGISTERED No. 19727 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS
1. 03/16/2023- WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: AS NOTED VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-561.DWG	
NCS:	
SHEET:	111 OF 134

FILE PATH: S:\PROJECT\GENERAL\2665\DWG FILES\1-MAINDRAWINGS\C-CU-561.DWG
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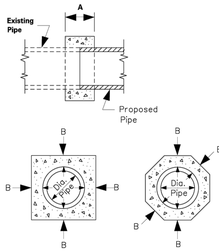


CONCRETE COLLAR DETAIL

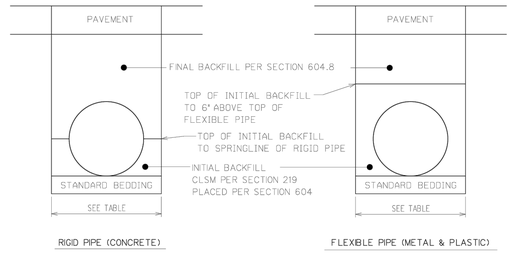
DIAMETER OF PIPE	A	B	CU. YD. CONC. *	DIAMETER OF PIPE	A	B	CU. YD. CONC. *
15"	1'-0"	0'-6"	0.18	48"	2'-0"	1'-0"	2.10
18"	1'-0"	0'-6"	0.21	54"	2'-6"	1'-0"	2.09
21"	1'-0"	0'-6"	0.24	60"	3'-0"	1'-6"	4.31
24"	1'-0"	0'-6"	0.27	72"	3'-0"	1'-6"	5.03
30"	1'-6"	0'-9"	0.75	84"	3'-0"	2'-0"	7.94
36"	1'-6"	0'-9"	0.92	96"	3'-0"	2'-0"	8.90
42"	2'-0"	1'-0"	1.84	108"	3'-0"	2'-0"	9.87

* FOR INFORMATION ONLY

NOTES :

A AND B ARE MINIMUM DIMENSIONS. FORMING WILL NOT BE REQUIRED IF MINMUM DIMENSIONS ARE OBTAINED. EXISTING METAL PIPES SHALL BE CAREFULLY INSPECTED AND APPROVED BY THE ENGINEER BEFORE EXTENDING THE PIPE. IF THE EXISTING PIPE IS IN POOR CONDITION, IT SHALL BE REPAIRED OR REPLACED. METAL CONNECTING BANDS SHALL NOT BE SUBSTITUTED FOR A CONCRETE COLLAR AS THEY DO NOT MEET THE STANDARD SPECIFICATION 604.6 REQUIREMENT FOR A LEAK RESISTANT SEAL.

CONCRETE FOR CONSTRUCTING THE COLLAR SHALL BE IN ACCORDANCE WITH SECTION 715.12 OF THE SPECIFICATIONS; HOWEVER, TESTING WILL NOT BE REQUIRED. THE COST OF CONCRETE COLLAR IS TO BE INCLUDED IN THE UNIT BID PRICE OF PROPOSED PIPE.



TYPE F DRAINAGE PIPE TRENCH

MINIMUM TRENCH WIDTH (IN)

DIAMETER OF PIPE	FOR RIGID PIPE	FOR FLEX. PIPE	DIAMETER OF PIPE	FOR RIGID PIPE	FOR FLEX. PIPE
12"	30"	30"	48"	74"	74"
15"	33"	33"	54"	82"	82"
18"	36"	36"	60"	90"	90"
24"	42"	42"	72"	106"	--
30"	51"	51"	84"	122"	--
36"	59"	59"	96"	139"	--
42"	66"	66"	108"	154"	--

TRENCH WIDTH MAY BE REDUCED TO OUTSIDE PIPE DIAMETER PLUS 12" FOR TRENCHES IN ROCK.

NOTES

CLSM - CONTROLLED LOW STRENGTH MATERIAL, SECTION 219

THIS DETAIL SHALL BE USED ON PROPOSED PIPES / CULVERTS WHEN SPECIFIED ON THE PLANS. THE COST OF THE TYPE F TRENCH IS INCIDENTAL TO THE PIPE/CULVERT.

FINAL TRENCH BACKFILL MAY BE COMPLETED WITH CLSM. CLASS B CONCRETE MAY BE SUBSTITUTED FOR CLSM.

LOW STRENGTH CLSM IS NOT A SUITIBLE DRIVING SURFACE.

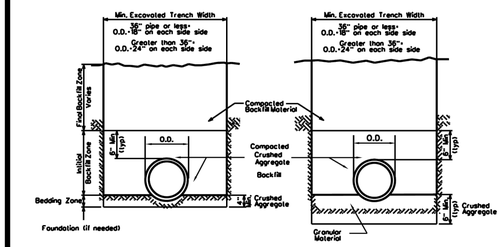
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-21-93

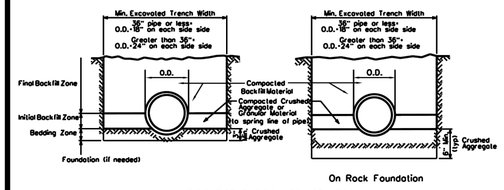
REVISION DATE
10/15/12
4/30/15
10/1/16
8/8/20

DRAINAGE PIPE TRENCH, CONCRETE COLLAR

STANDARD DETAIL SHEET DR-10

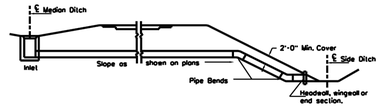


FLEXIBLE PIPE TYPICAL (96" OR LESS)



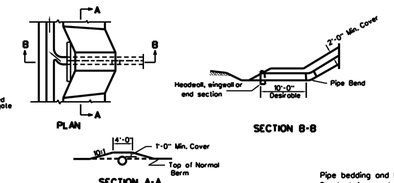
RIGID PIPE TYPICAL (96" OR LESS)

PIPE INSTALLATION TYPICAL



MEDIAN OUTLET IN HIGH FILL

To be used where called for on the plans or as shown on the cross sections.



OUTLET THROUGH BERM

To be used where called for on the plans or as shown on the cross sections.

NOTES

Pipe bedding and backfill material in accordance with Section 604.
Crushed Aggregate shall be in accordance with 704.6, Class 1 or Class 3.
Granular Material shall be in accordance with 716.1.1.2.
The bedding material under the middle 1/3 of pipe diameter shall be loosely placed and uncompacted, for cradling of the pipe bottom.
Bedding outside of the middle 1/3 shall be compacted.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-1-99

REVISION DATE
10/1/16

MISCELLANEOUS DRAINAGE (sheet 1 of 4)

STANDARD SHEET DR8

HP STORM TRENCH INSTALLATION DETAIL

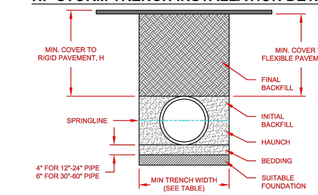


TABLE 1, RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
12" (300mm)	30" (762mm)
15" (375mm)	34" (864mm)
18" (450mm)	39" (991mm)
24" (600mm)	48" (1219mm)
30" (750mm)	56" (1422mm)
36" (900mm)	64" (1626mm)
42" (1050mm)	72" (1829mm)
48" (1200mm)	80" (2032mm)
60" (1500mm)	96" (2438mm)

TABLE 2, MINIMUM RECOMMENDED COVER BASED ON VEHICLE LOADING CONDITIONS

PIPE DIAM.	SURFACE LIVE LOADING CONDITION	
	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD) *
12"- 48" (300mm - 1200mm)	12" (305mm)	48" (1219mm)
60" (1500mm)	24" (610mm)	60" (1524mm)

* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

TABLE 3, MAXIMUM COVER FOR ADS HP STORM PIPE, ft

	CLASS I		CLASS II		CLASS III		CLASS IV
PIPE DIA	COMPACTED	95%	90%	85%	95%	90%	95%
12" (300mm)	41 (12.5m)	28 (8.5m)	21 (6.4m)	16 (4.9m)	20 (6.1m)	16 (4.9m)	16 (4.9m)
15" (375mm)	42 (12.8m)	29 (8.8m)	21 (6.4m)	16 (4.9m)	21 (6.4m)	16 (4.9m)	16 (4.9m)
18" (450mm)	44 (13.4m)	30 (9.1m)	21 (6.4m)	16 (4.9m)	22 (6.7m)	17 (5.2m)	16 (4.9m)
24" (600mm)	37 (11.3m)	26 (7.9m)	18 (5.5m)	14 (4.3m)	19 (5.8m)	14 (4.3m)	14 (4.3m)
30" (750mm)	39 (11.9m)	27 (8.2m)	19 (5.8m)	14 (4.3m)	19 (5.8m)	15 (4.6m)	14 (4.3m)
36" (900mm)	28 (8.5m)	20 (6.1m)	14 (4.3m)	10 (3.0m)	14 (4.3m)	11 (3.4m)	10 (3.0m)
42" (1050mm)	30 (9.1m)	21 (6.4m)	14 (4.3m)	10 (3.0m)	15 (4.6m)	11 (3.4m)	10 (3.0m)
48" (1200mm)	29 (8.8m)	20 (6.1m)	14 (4.3m)	9 (2.7m)	14 (4.3m)	10 (3.0m)	10 (3.0m)
60" (1500mm)	29 (8.8m)	20 (6.1m)	14 (4.3m)	9 (2.7m)	14 (4.3m)	10 (3.0m)	9 (2.7m)

FILL HEIGHT TABLE GENERATED USING AASHTO SECTION 12, LOAD RESISTANCE FACTOR DESIGN (LRFD) PROCEDURE WITH THE FOLLOWING ASSUMPTIONS:
NO HYDROSTATIC PRESSURE
UNIT WEIGHT OF SOIL (γs) = 120 PCF

NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS". LATEST ADDITION, WITH THE EXCEPTION THAT THE INITIAL BACKFILL MAY EXTEND TO THE CROWN OF THE PIPE. SOIL CLASSIFICATIONS ARE PER THE LATEST VERSION OF ASTM D2321. CLASS IVB MATERIALS (MH, CH) AS DEFINED IN PREVIOUS VERSIONS OF ASTM D2321 ARE NOT APPROPRIATE BACKFILL MATERIALS.
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II, III, OR IV. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. COMPACTION SHALL BE SPECIFIED BY THE ENGINEER IN ACCORDANCE WITH TABLE 3 FOR THE APPLICABLE FILL HEIGHTS LISTED. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 12"-24" (300mm-600mm) DIAMETER PIPE; 6" (150mm) FOR 30"-60" (750mm-1500mm) DIAMETER PIPE. THE MIDDLE 1/3 BENEATH THE PIPE INVERT SHALL BE LOOSELY PLACED. PLEASE NOTE, CLASS IV MATERIAL HAS LIMITED APPLICATION AND CAN BE DIFFICULT TO PLACE AND COMPACT; USE ONLY WITH THE APPROVAL OF A SOIL EXPERT.
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II, III, OR IV IN THE PIPE ZONE EXTENDING TO THE CROWN OF THE PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION. COMPACTION SHALL BE SPECIFIED BY THE ENGINEER IN ACCORDANCE WITH TABLE 3 FOR THE APPLICABLE FILL HEIGHTS LISTED. PLEASE NOTE, CLASS IV MATERIAL HAS LIMITED APPLICATION AND CAN BE DIFFICULT TO PLACE AND COMPACT; USE ONLY WITH THE APPROVAL OF A SOIL EXPERT.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" (300mm) FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOTATION. FOR TRAFFIC APPLICATIONS; CLASS I OR II MATERIAL COMPACTED TO 90% SPD AND CLASS III COMPACTED TO 95% SPD IS REQUIRED. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" (300mm) UP TO 48" (1200mm) DIAMETER PIPE AND 24" (600mm) OF COVER FOR 60" (1500mm) DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.
7. FOR ADDITIONAL INFORMATION SEE TECHNICAL NOTE 2.04.

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REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D
6	REV. MAXIMUM COVER HEIGHTS	RWD	01/11/17	

TRENCH INSTALLATION DETAIL (HP STORM)

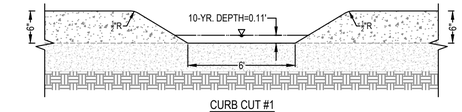
DRAWING NUMBER: STD-101D

ADS — ADVANCED DRAINAGE SYSTEMS, INC. 4640 TRUEMAN BLVD HILLIARD, OHIO 43026

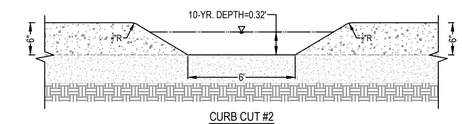
DR	JAB
CK	01/29/09
AP	
SCALE	NTS
SHEET	1 OF 1

CURB CUT FLOW DEPTHS:

NOT TO SCALE



CURB CUT #1

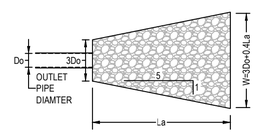


CURB CUT #2

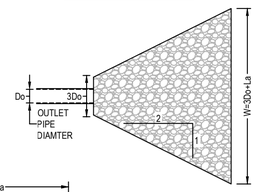
OUTLET PROTECTION COMPUTATIONS

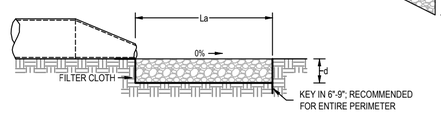
NOT TO SCALE

MAXIMUM TAILWATER CONDITION



MINIMUM TAILWATER CONDITION





STR. NO.	PIPE DIAMETER (IN.)	DISCHARGE Q_{10} (CFS)	VELOCITY (FPS)	TW DEPTH > 1/2 DIA. PIPE	TAILWATER CONDITION	STONE QUALITY			BLANKET THICKNESS (IN.)	APRON LENGTH (La) MINIMUM (FT.)	APRON WIDTH (W) MINIMUM (FT.)	3 Do (FT)
						CLASS	D_{50} (IN.)	D_{MAX} (IN.)				
10	18"	15.19	8.60	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	22.00	13.30	4.50
25	15"	4.96	5.60	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	6.00	6.15	3.75
30	42"	68.27	12.5	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	15.00	16.50	10.50
40	36"	60.19	13.2	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	18.00	16.20	9.00
232	36" (M)	38.25	6.06	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	13.00	14.20	9.00
258	60" (M)	177.50	9.04	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	21.00	23.40	15.00
260	60"	144.01	8.55	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	21.00	23.40	15.00
266	72" (M)	400.00	14.15	YES	MAX.	I	D_{50}=6"	D_{MAX}=9"	14	50.00	38.00	18.00

NOTES:

1. STONE QUALITY FOR RIP-RAP SHALL CONSIST OF FIELDSTONE OR ROUGH UNHEWN QUARRY STONE. THE STONE SHALL BE HARD, OF AN ANGULAR END AND OF A QUALITY THAT WILL NOT DISINTEGRATE ON EXPOSURE TO WATER OR WEATHERING. RECYCLED CONCRETE MAY BE USED PROVIDED IT HAS A DENSITY OF AT LEAST 150 POUNDS PER CUBIC FOOT AND DOES NOT HAVE ANY EXPOSED STEEL OR REINFORCING BARS.
2. IN ALL CASES, FILTER FABRIC SHALL BE PLACED BETWEEN THE RIP-RAP AND THE UNDERLYING SOIL TO PROTECT SOIL MOVEMENT INTO, THROUGH, AND UNDERNEATH THE RIP-RAP. THE MATERIAL MUST MEET OR EXCEED THESE REQUIREMENTS: THE PLASTIC FILTER CLOTH CAN BE WOVEN OR NON-WOVEN MONOFILAMENT YARNS AND SHALL MEET THESE BASE REQUIREMENTS: THICKNESS=20-60 MILS., GRAB STRENGTH=90-120 LBS. AND SHALL CONFORM TO ASTM D-1777 AND ASTM D-1682

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JASON P. GERHART REGISTERED No. 19727 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

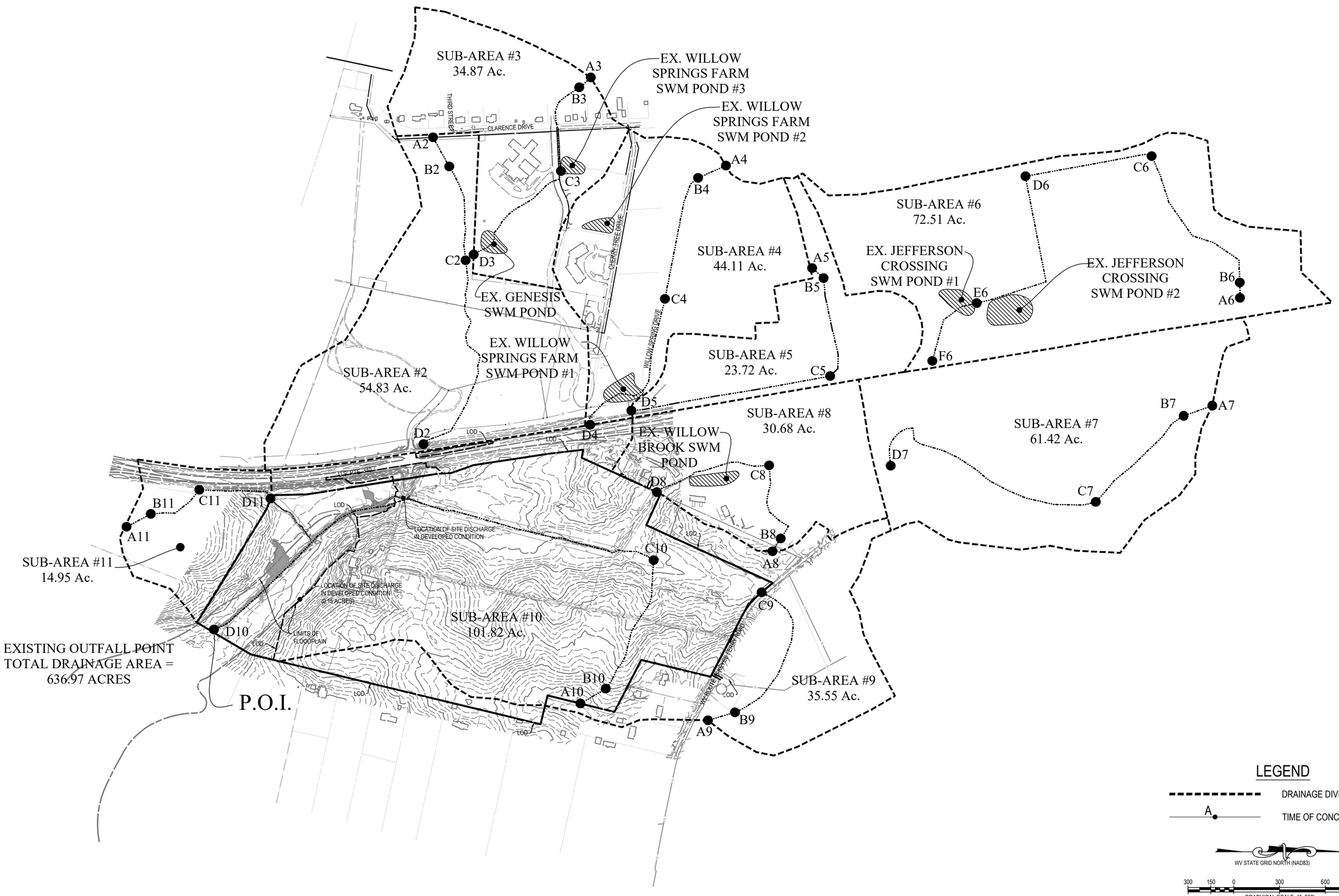
REVISIONS
1. 03/16/2023 - WVDOH, CTLB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: AS NOTED VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-561.DWG	
NCS:	
SHEET:	112 OF 134



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JASON P. GERMAN REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1: 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

PRE DEVELOPMENT DRAINAGE MAP

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 300' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CJ-101.DWG	
NCS:	
SHEET:	113 OF 134

FILE PATH: Z:\PROJECT\GENERAL\2665\0206 FIRETTS HAMPSHIRE\ARCH\C-CJ-101.DWG
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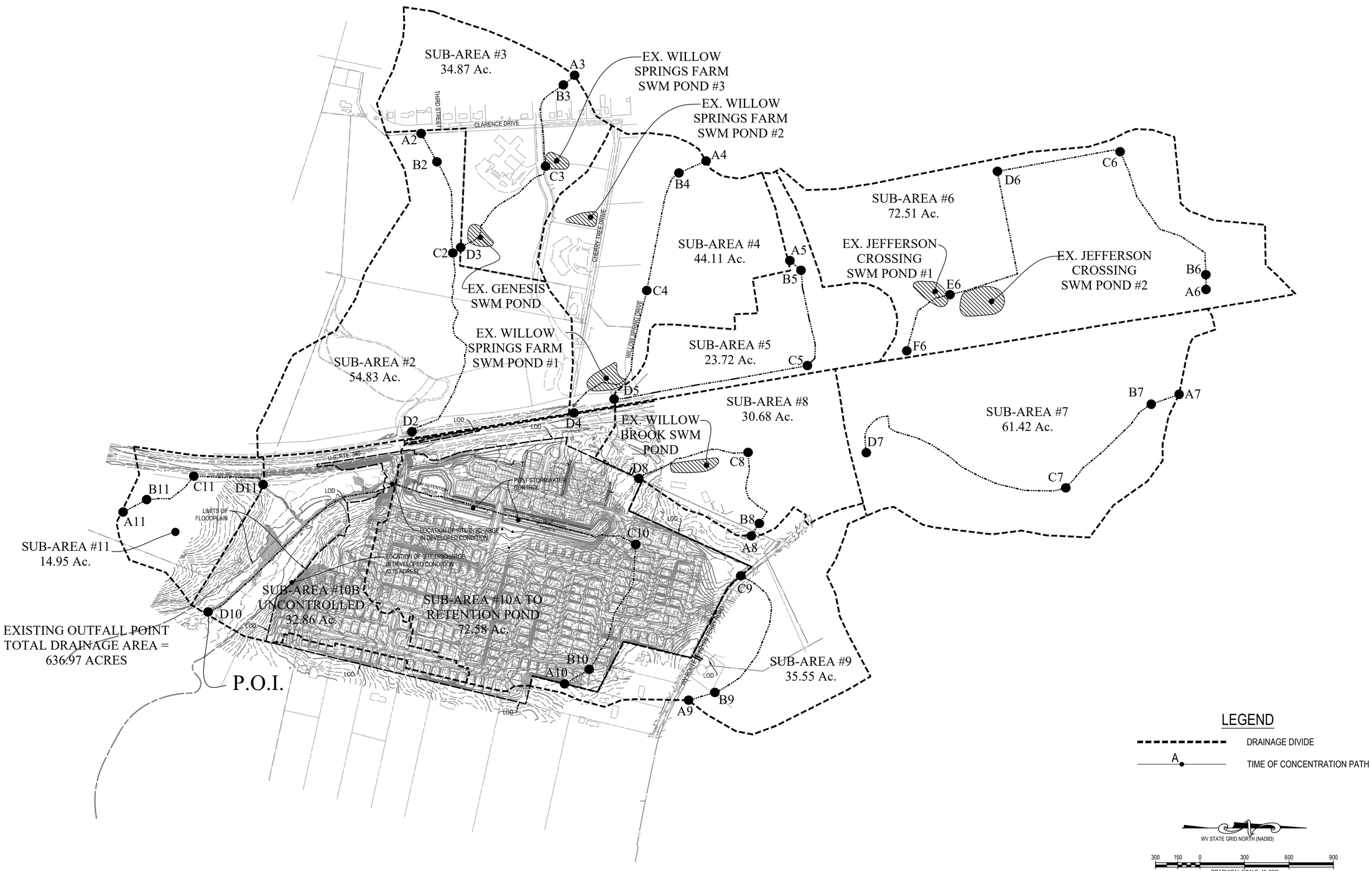

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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

POST DEVELOPMENT DRAINAGE MAP

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 300' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
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Performance Based Water Quality Calculations

STEP 1 **Determine the applicable area (A) and the post-developed impervious cover (I_{post}).**

Applicable area (A)= 100.13 Acres

Pre-development impervious cover:

Total Ex Impervious Area = 1.65

$I_{existing}$ = (total pre-development impervious cover ÷ A) × 100 = 1.65% utilized average land cover condition

Post-development impervious cover:

Total Proposed Impervious Area = 37.64

I_{post} = (total post-development impervious cover ÷ A) × 100 = 37.6%

STEP 2 **Determine the average land cover conditions ($I_{watershed}$) or the existing impervious cover ($I_{existing}$).**

$I_{existing}$ = 16.0%

STEP 3 **Determine the appropriate Development Situation.**

I_{post} 37.6% > $I_{existing}$ 16.0%

Situation 2 exists. The existing percent impervious cover is less than the average land cover condition and the proposed improvements will create a total percent impervious cover which is greater than the average land cover condition.

STEP 4 **Determine the relative pre-development pollutant load (L_{pre}).**

$L_{pre(watershed)}$ = [0.05 + 0.009 × $I_{watershed}$)] × A × 2.28 **VSMH (Equation 5-16)**

= 44.29 pounds per year

STEP 5 **Determine the relative post-development pollutant load (L_{post}).**

L_{post} = [0.05 + 0.009 × I_{post})] × A × 2.28 **VSMH (Equation 5-21)**

= 88.65 pounds per year

STEP 6 **Determine the relative pollutant removal requirement (RR).**

RR = L_{post} - $L_{pre(watershed)}$

=44.36 pounds per year

STEP 7 **Identify the best management practice (BMP) for the site.**

1 Determine the required pollutant removal efficiency for the site:

EFF = (RR ÷ Lpost) × 100

= 50.04%

2 Select BMP(s)

	Area	I_{BMP}	Eff_{BMP}	Description	Impervious Area
Pond #1	67.37	46.58%	65%	Retention Basin III (4xWQV w/ Aquatic Bench)	31.38

3 Determine the pollutant load entering the proposed BMP(s).

L_{post} = [0.05 + 0.009 × I_{BMP})] × A × 2.28 **VSMH (Equation 5-24)**

L_{BMP1} = 72.07 pounds per year Pond #1

4 Calculate the pollutant load removed by the proposed BMP(s).

$L_{removed}$ = Eff_{BMP} × L_{BMP} **VSMH (Equation 5-24)**

$L_{removed/BMP1}$ = 46.85 pounds per year Pond #1

5 Calculate the total pollutant load removed by the BMP(s)

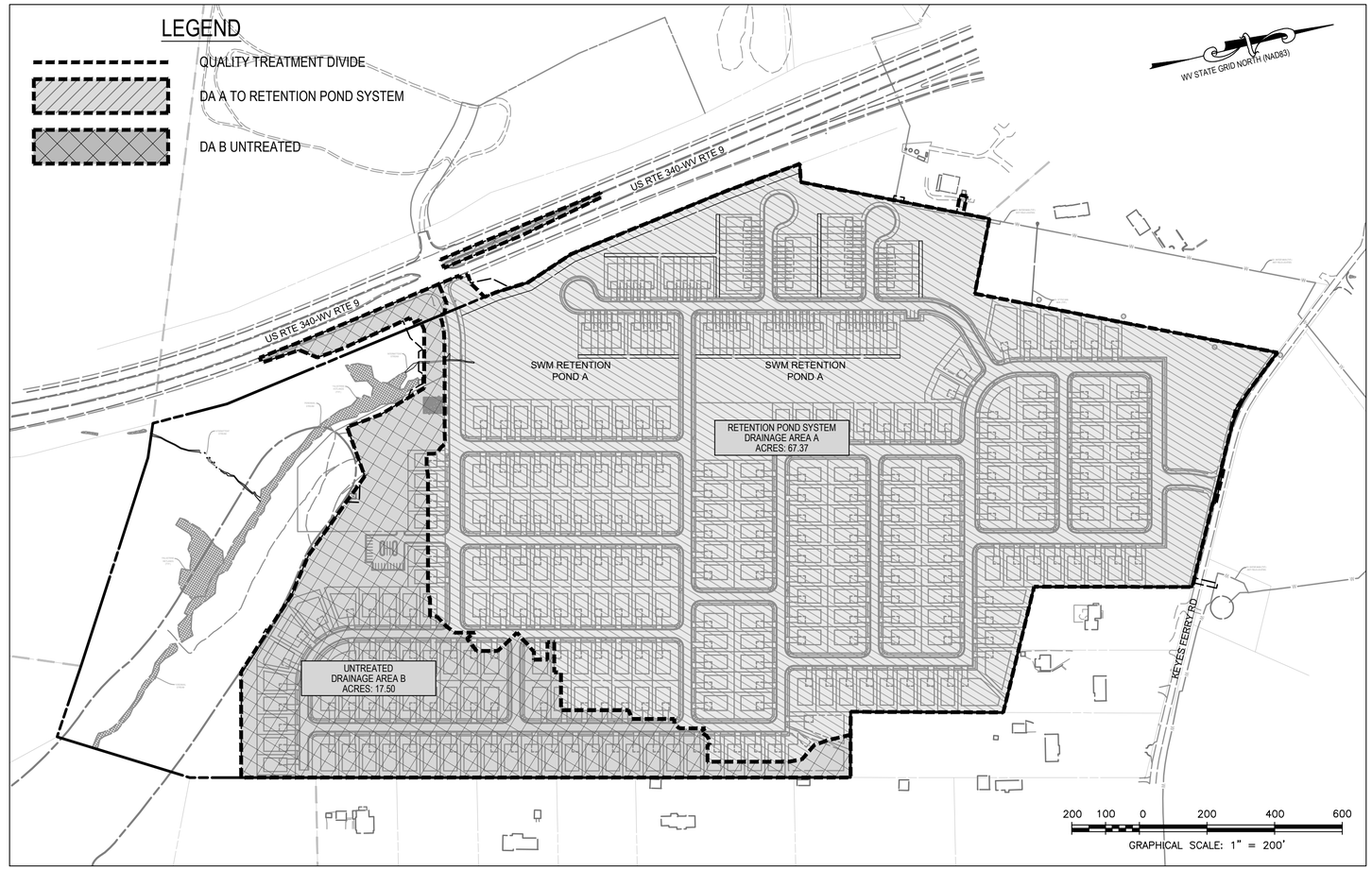
$L_{removed/total}$ = $L_{removed/BMP1}$ + $L_{removed/BMP2}$ + $L_{removed\ BMP3}$ + ….. **VSMH (Equation 5-25)**

$L_{removed/total}$ = 46.85 pounds per year

6 Verify compliance:

$L_{removed/total}$ 46.85 > 44.36 **OKAY**

QUALITY CONTROL CALCULATIONS



QUALITY CONTROL MAP

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REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORMWATER QUALITY MAP

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 200' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CJ-103.DWG	
NCS:	
SHEET:	115 OF 134

STORMWATER MANAGEMENT NARRATIVE:

1. ALL STORMWATER MANAGEMENT POND CONSTRUCTION SHALL BE IN STRICT COMPLIANCE WITH ALL APPLICABLE CITY OF CHARLES TOWN REQUIREMENTS, THE U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE STANDARDS AND SPECIFICATIONS, AND AS PUBLISHED IN THE "WEST VIRGINIA STORMWATER MANAGEMENT AND DESIGN GUIDANCE MANUAL"

2. EMBANKMENT:

(A) DESIGN AND CONSTRUCTION OF THE PROPOSED DAM IS SUBJECT TO RECOMMENDATIONS AND INSPECTION BY A QUALIFIED GEOTECHNICAL ENGINEER.

(B) AREAS UNDER THE EMBANKMENT AND ANY STRUCTURAL WORKS SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL, ROOTS OR OTHER OBJECTIONABLE MATERIAL.

(C) 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.

(D) TESTS FOR SOIL ANALYSIS, MOISTURE CONTENT, AND COMPACTION ARE TO BE CONDUCTED IN ACCORDANCE WITH THE LATEST APPLICABLE ASTM STANDARDS AND SPECIFICATIONS.

(E) MATERIALS USED FOR THE IMPERVIOUS CORE AND CUT-OFF TRENCH, IF REQUIRED BY THE GEOTECHNICAL ENGINEER, SHALL BE COMPRISED OF ONE OF THE FOLLOWING SOILS AS DESIGNATED BY THE UNIFIED SOIL SYSTEM: SC, CL, OR ML HAVING A MINIMUM PLASTICITY INDEX OF 8 WITH A MINIMUM OF 45% PASSING THE NO. 200 SIEVE AND A MAX. OF 5% RETAINED ON THE NO. 4 SIEVE. THE CUT-OFF TRENCH (IF REQUIRED) SHALL EXTEND A MINIMUM OF 4 FEET BELOW SUBGRADE OR TO REFUSAL.

(F) THE CUT-OFF TRENCH SHALL BE EXCAVATED INTO IMPERVIOUS MATERIAL ALONG OR PARALLEL TO THE CENTERLINE OF THE EMBANKMENT AS SHOWN ON THE PLANS. THE BOTTOM WIDTH OF THE TRENCH SHALL BE A MINIMUM WIDTH OF 4 FEET. THE DEPTH SHALL BE AT LEAST 4 FEET BELOW EXISTING GRADE OR AS SHOWN ON THE PLANS. THE SIDE SLOPES OF THE TRENCH SHALL BE 1 TO 1 OR FLATTER. THE BACKFILL SHALL BE COMPACTED WITH CONSTRUCTION EQUIPMENT, ROLLERS, OR HAND TAMPERS TO ASSURE MAXIMUM DENSITY AND MINIMUM PERMEABILITY.

(G) THE EMBANKMENT MAY BE CONSTRUCTED AS A HOMOGENOUS EMBANKMENT DAM USING ACCEPTABLE MATERIAL CLASSIFIED ML, CL, SC, OR GC SOILS PER ASTM D-2487. IN TO THESE MATERIALS, SOILS CLASSIFIED CH AND MH MAY BE USED AS COMPACTED ADDITION EMBANKMENT FILL BELOW THE UPPER 5 FEET OF THE SLOPES. SOILS CLASSIFIED AS SM OR GM PER ASTM D-2487 OR SUITABLE FILL MAY BE USED FOR EMBANKMENT IN THE DOWNSTREAM HALF OF THE EMBANKMENT SUBJECT TO APPROVAL BY A QUALIFIED GEOTECHNICAL ENGINEER.

(H) COMPACTION SHALL BE NOT LESS THAN 98% OF THE MAXIMUM DRY DENSITY FOR THE GIVEN EMBANKMENT MATERIAL AS DETERMINED BY USE OF THE STANDARD PROCTOR METHOD PER ASTM T-99 OR ASTM D-698.

(I) EMBANKMENT FILL SHALL BE CONSTRUCTED IN 8-INCH LOOSE LIFTS AND SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF THE FILL SO THAT SMOOTH HORIZONTAL PLANES ARE NOT BUILT INTO THE FILL STRUCTURE. SCARIFYING OR USE OF SHEEPS-FOOT ROLLERS CAN BE USED TO AVOID SMOOTH HORIZONTAL PLANES.

(J) THE EMBANKMENT SHALL BE CONSTRUCTED TO A MINIMUM ELEVATION 5% HIGHER THAN THE DESIGNED HEIGHT TO ALLOW FOR SETTLEMENT WHEN MECHANICAL COMPACTORS ARE USED FOR CONSTRUCTION.

(K) THE CONTRACTOR IS RESPONSIBLE FOR ACQUIRING ACCEPTABLE BORROW MATERIAL EITHER FROM ON-SITE OR OFF-SITE SOURCES AS REQUIRED. ALL OFF-SITE WASTE OR BORROW SOURCES SHALL BE INCLUDED IN THE NPDES PERMIT.

(L) THE CONTRACTOR SHALL MAINTAIN ALL MATERIAL TICKETS, SOIL TEST RESULTS AND PHOTOGRAPHIC RECORDS OF COVERED EMBANKMENT CONSTRUCTION ELEMENTS (CUT-OFF TRENCH, ANTI-SEEP MEASURES, PIPE INSTALLATION) FOR INCLUSION INTO AS-BUILT POND RECORDS.

(M) EMBANKMENT CONSTRUCTION SHALL BE CERTIFIED BY AN ENGINEER AS MEETING THE ABOVE REQUIREMENTS

3. OUTLET CONTROL STRUCTURE NOTES:

(A) THE PURPOSE OF THIS PLAN IS TO PROVIDE THE BASIC DIMENSIONS REQUIRED TO CONTROL THE CONSTRUCTION OF THE COMBINATION PRINCIPAL/EMERGENCY SPILLWAY. THE BASIC DIMENSIONS OF ALL DRAINAGE STRUCTURES AND ORIFICES SHOWN FOR EACH CONTROL STRUCTURE SHALL BE MAINTAINED.

(B) ALL RISER, SPILLWAY, AND FOOTING DIMENSIONS AND/OR THICKNESS, AS WELL AS REINFORCEMENT, BUOYANCY CALCULATIONS AND THE METHOD OF JOINING THE VARIOUS STRUCTURAL ELEMENTS SHALL BE VERIFIED BY A PROFESSIONAL STRUCTURAL ENGINEER AND SUBMITTED TO THE ENGINEER OF RECORD FOR ACCEPTANCE PRIOR TO FABRICATION.

(C) SUBGRADE PREPARATION AND BEDDING REQUIREMENTS FOR ALL STRUCTURAL ELEMENTS ARE SUBJECT TO DESIGN BY A PROFESSIONAL GEOTECHNICAL ENGINEER.

(D) PRECAST CONCRETE IS TO ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI. CAST-IN-PLACE CONCRETE SHALL BE WVDOH CLASS B. ALL CONCRETE SHALL MEET THE REQUIREMENTS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS.

(E) ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4".

(F) SHOP DRAWINGS ARE TO BE SUBMITTED TO AND APPROVED BY THE ENGINEER OF RECORD PRIOR TO FABRICATION.

(G) BACKFILL ADJACENT TO THE OUTLET STRUCTURES SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE ADJOINING FILL MATERIAL. THE FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED FOUR INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL NEEDS TO FILL COMPLETELY ALL SPACES UNDER AND ADJACENT TO THE PIPE. AT NO TIME DURING THE BACKFILLING OPERATION SHALL DRIVEN EQUIPMENT BE ALLOWED TO OPERATE CLOSER THAN FOUR FEET, MEASURED HORIZONTALLY, TO ANY PART OF A STRUCTURE. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT BE DRIVEN OVER ANY PART OF A CONCRETE STRUCTURE.

(H) ROCK RIP-RAP SHALL MEET THE REQUIREMENTS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS. THE RIP-RAP SHALL BE PLACED TO THE REQUIRED THICKNESS IN ONE OPERATION. THE ROCK SHALL BE DELIVERED AND PLACED IN A MANNER THAT WILL ENSURE THE RIP-RAP IS REASONABLY HOMOGENOUS WITH LARGER ROCKS UNIFORMLY DISTRIBUTED AND FIRMLY IN CONTACT WITH SMALLER ROCKS FILLING THE VOIDS BETWEEN THE LARGER ROCKS. FILTER CLOTH SHALL BE PLACED UNDER ALL RIP-RAP AND SHALL MEET THE REQUIREMENTS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS.

4. MAINTENANCE REQUIREMENTS:

(A) OWNERSHIP, MAINTENANCE, INSPECTIONS, AND CLEANING OF STORMWATER MANAGEMENT FACILITIES SHALL BE THE RESPONSIBILITY OF THE HOMEOWNERS ASSOCIATION OR LOT OWNERS ASSOCIATION AND/OR PROPERTY OWNER OR OTHER RESPONSIBLE ENTITY. ALL STORMWATER MANAGEMENT FACILITIES SHALL BE CONVEYED BY DEED TO THE RESPONSIBLE PARTY AT THE SAME TIME TRANSFER OF ALL OTHER COMMON AREAS IS REQUIRED UNDER THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS.

(B) THE HOMEOWNERS ASSOCIATION OR LOT OWNERS ASSOCIATION AND/OR PROPERTY OWNER OR OTHER ENTITY RESPONSIBLE FOR THE MAINTENANCE OF THE STORMWATER MANAGEMENT FACILITIES CONSTRUCTED PURSUANT TO THE CITY OF CHARLES TOWN STORMWATER MANAGEMENT ORDINANCE SHALL MAINTAIN IN GOOD CONDITION AND PROMPTLY REPAIR AND RESTORE ALL GRADE SURFACES, WALLS, DRAINS, DAMS AND STRUCTURES, DISCHARGE STRUCTURES, TRASH RACKS, VEGETATION, EROSION AND SEDIMENT CONTROL MEASURES, AND OTHER PROTECTIVE DEVICES. SUCH REPAIRS OR RESTORATION AND MAINTENANCE SHALL BE IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS.

(C) THE PARTY RESPONSIBLE FOR THE MAINTENANCE OF THE STORMWATER MANAGEMENT SYSTEM SHALL MAINTAIN AND PROVIDE WRITTEN RECORDS OF ALL MAINTENANCE AND REPAIRS WITHIN 30 DAYS OF WORK COMPLETION TO THE WVDEP. A COPY OF THESE RECORDS SHALL BE SUBMITTED TO THE CITY OF CHARLES TOWN ENGINEERING DEPARTMENT AS NOTIFICATION THAT MAINTENANCE WORK WAS PERFORMED.

(D) A PERIODIC MAINTENANCE SCHEDULE SHALL BE DEVELOPED FOR THE LIFE OF ANY STORMWATER MANAGEMENT FACILITY. ALL MAINTENANCE AND REPAIR, PERIODIC INSPECTIONS, AND CLEANING OF STORMWATER MANAGEMENT FACILITIES SHALL BE THE RESPONSIBILITY OF THE HOMEOWNERS ASSOCIATION OR LOT OWNERS ASSOCIATION AND/OR PROPERTY OWNER OR OTHER RESPONSIBLE ENTITY, AND SHALL BE PERFORMED IN ACCORDANCE WITH THE CITY OF CHARLES TOWN STORMWATER MANAGEMENT ORDINANCE UNDER WHICH THE PROJECT WAS APPROVED.

(E) INSPECTION OF THE PRIMARY SPILLWAY ORIFICE MAY REQUIRE GREATER FREQUENCY DEPENDING UPON THE AMOUNT OF DEBRIS WHICH ACCUMULATES WITHIN THE STORMWATER MANAGEMENT FACILITY. ANY TRASH AND/OR DEBRIS WITHIN THE STORMWATER MANAGEMENT FACILITY SHALL BE REMOVED AND PROPERLY DISPOSED OF.

(F) THE HOMEOWNERS ASSOCIATION OR LOT OWNERS ASSOCIATION AND/OR PROPERTY OWNER OR OTHER RESPONSIBLE ENTITY SHALL BE RESPONSIBLE FOR ENGAGING A MANAGEMENT FIRM TRAINED IN PROPER MAINTENANCE AND INSPECTION OF STORMWATER MANAGEMENT FACILITIES. IT SHALL BE THE RESPONSIBILITY OF SAID FIRM TO MAINTAIN ALL REQUIRED RECORDS AND REPORT THESE FINDINGS TO THE WVDEP TO ENSURE PROTECTION OF THE GROUND WATER. THE PARAMETERS AND THE FREQUENCY OF THIS MONITORING SHALL BE DETERMINED BY WVDEP.

CUT-OFF TRENCH & IMPERVIOUS CORE NOTES:

1. A CUT-OFF TRENCH OF RELATIVELY IMPERVIOUS MATERIAL SHALL BE PROVIDED UNDER THE ENTIRE LENGTH OF THE EMBANKMENT AND SHALL BE LOCATED AT OR UPSTREAM FROM THE CENTERLINE OF THE EMBANKMENT. THE CUT-OFF TRENCH SHALL HAVE A BOTTOM WIDTH ADEQUATE TO ACCOMMODATE THE EQUIPMENT USED FOR EXCAVATION, BACKFILL, AND COMPACTION OPERATIONS, WITH A MINIMUM WIDTH BEING 4 FEET, AND SHALL HAVE SIDE SLOPES NO STEEPER THAN ONE HORIZONTAL TO ONE VERTICAL. THE CUT-OFF TRENCH SHALL HAVE A MINIMUM DEPTH OF 4 FEET.

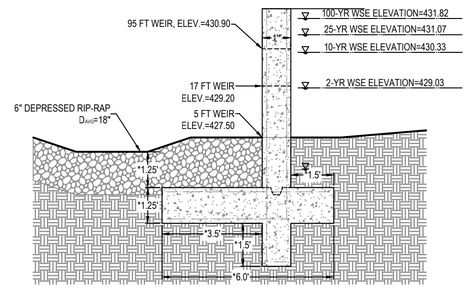
2. ANY IMPERVIOUS CORE WITHIN THE EMBANKMENT SHALL BE LOCATED AT OR UPSTREAM FROM THE CENTERLINE OF THE EMBANKMENT, AND SHALL EXTEND UP FROM THE ABUTMENTS TO THE 10-YEAR WATER SURFACE ELEVATION. THE IMPERVIOUS CORE SHALL EXTEND VERTICALLY FROM THE CUT-OFF TRENCH UP TO THE 10-YEAR WATER SURFACE ELEVATION THROUGHOUT THE EMBANKMENT.

POND LANDSCAPING NOTE:

1. THE SWM BASIN SHALL BE VEGETATED WITH GRASS TO ENHANCE WATER QUALITY. ADDITIONAL PLANTINGS MAY BE PROVIDED AT THE OWNERS DISCRETION, HOWEVER NO LANDSCAPING SHALL BE PERMITTED ALONG ANY PORTION OF THE POND EMBANKMENT.

SWM FACILITY A - SIDE VIEW OF WEIR:

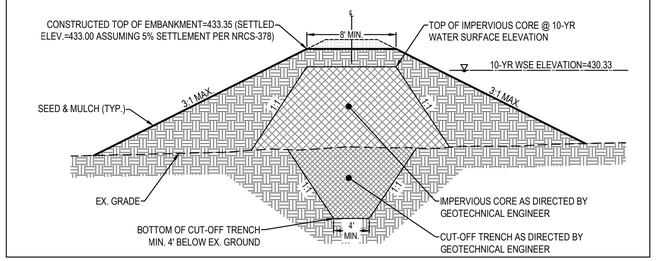
NOT TO SCALE



NOTES:
1. *REFER TO NOTE 3(B) OF STORMWATER MANAGEMENT NARRATIVE. STRUCTURAL DESIGN OF WEIR WALL BY OTHERS, UNDER SEPARATE COVER.
2. STRUCTURAL DESIGN OF WEIR WALL, IF NOT IN CONFORMANCE WITH DETAILS AS SHOWN, SHALL BE SUBMITTED BY CONTRACTOR TO THE CITY OF CHARLES TOWN FOR APPROVAL.

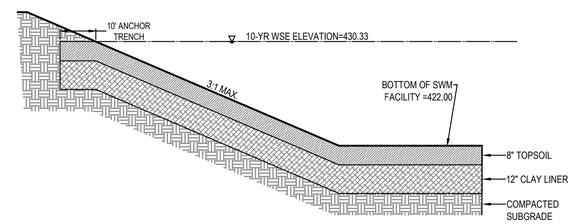
SECTION THRU DAM EMBANKMENT:

NOT TO SCALE



POND LINER DETAIL:

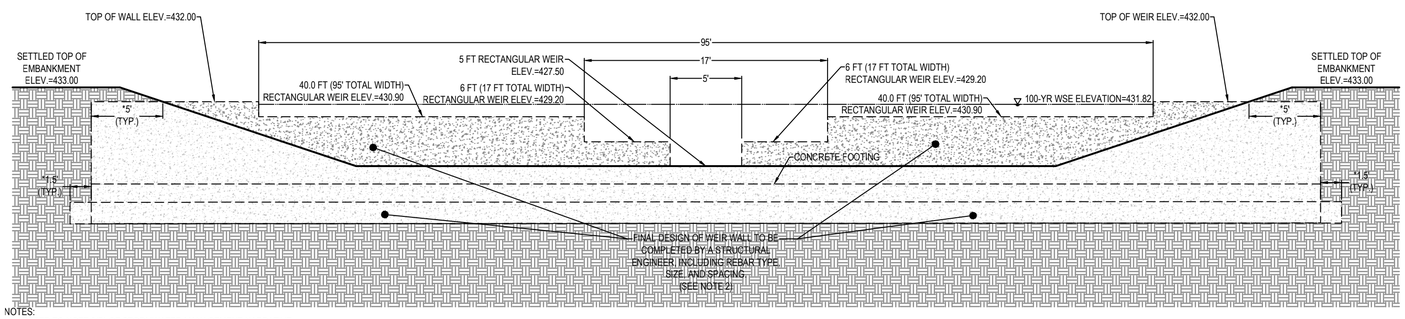
NOT TO SCALE



NOTES:
1. POND BOTTOM SHALL BE LINED WITH A MINIMUM OF 12" OF SUITABLE CLAY SOILS WITH A USGS SOIL CLASSIFICATION OF CL OR CH. THE APPROVED CLAY SHALL HAVE A MINIMUM LIQUID LIMIT OF 30%, A MINIMUM PLASTICITY INDEX OF 15%, AND A MAXIMUM HYDRAULIC CONDUCTIVITY OF 1 x 10-7 CM/SEC.
2. ALL MATERIALS SHALL BE PRE-APPROVED PRIOR TO PLACEMENT. SAMPLES SHALL BE TAKEN FOR EACH LIFT PLACED TO VERIFY THE APPROPRIATE HYDRAULIC CONDUCTIVITY RATE HAS BEEN ACHIEVED.
3. INSTALL CLAY LINER IN 6" LIFTS AND COMPACT USING A SHEEPSFOOT ROLLER TO 98% OF MAXIMUM DRY DENSITY AT 2% OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY STANDARD PROCTOR METHOD ASTM D-698.
4. PLACE 8" LAYER OF TOPSOIL OVER CLAY LINER.
5. SPECIAL ATTENTION MUST BE GIVEN TO SEALING AROUND PIPES AND STRUCTURES. COMPACT INTO A NOTCH IN THE SUBGRADE AND HAND COMPACT.

SWM FACILITY A- FRONT ELEVATION OF WEIR:

NOT TO SCALE



NOTES:
1. *REFER TO NOTE 3(B) OF STORMWATER MANAGEMENT NARRATIVE.
2. FINAL DESIGN OF WEIR WALL TO BE COMPLETED BY A STRUCTURAL ENGINEER. IF THE FINAL DESIGN DIFFERS FROM THE CRITERIA SHOWN ON THIS DETAIL, THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING TO THE CITY OF CHARLES TOWN FOR APPROVAL.

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JASON P. GERHART REGISTERED PROFESSIONAL ENGINEER NO. 19127 STATE OF WEST VIRGINIA
3-16-23

REVISIONS

1: 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORMWATER MANAGEMENT NARRATIVE & DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: AS NOTED VERT.:
DATE:	JANUARY 2023
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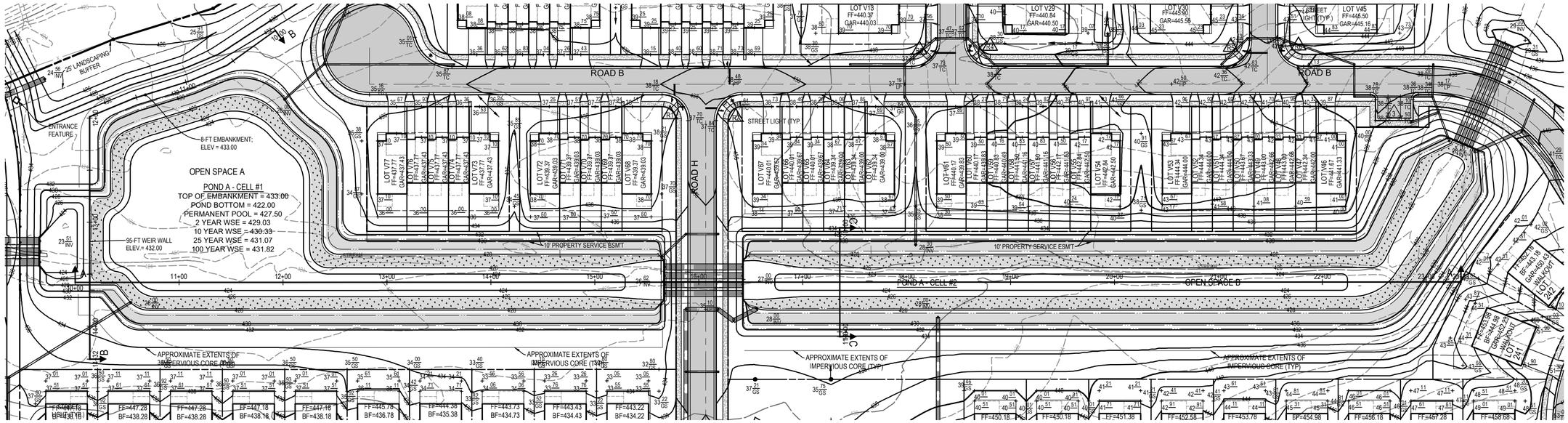
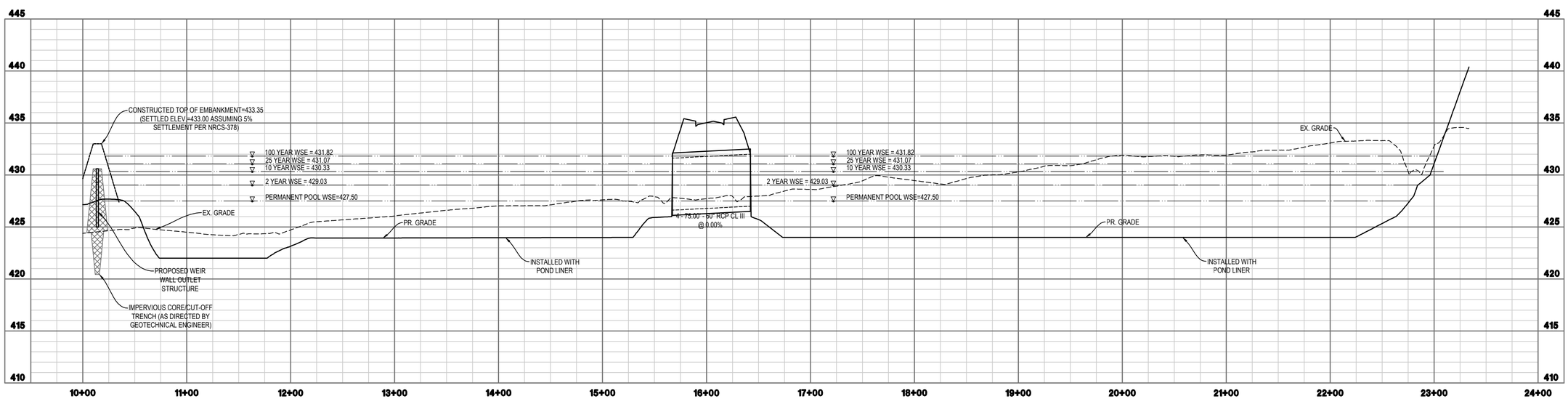
NCS:	
SHEET:	116 OF 134



POND A - CROSS SECTION A-A

10-FT SAFETY BENCH

10-FT AQUATIC BENCH



POND A XSEC (A-A) PROFILE

GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'

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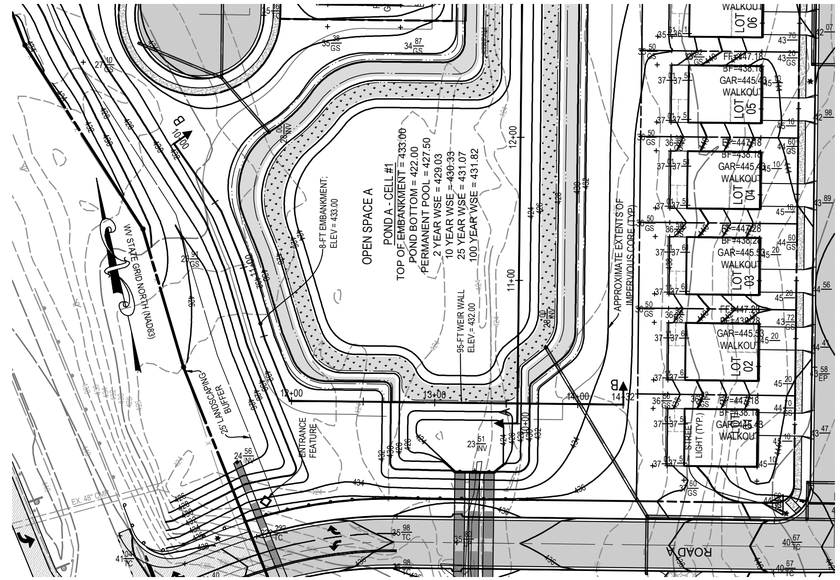
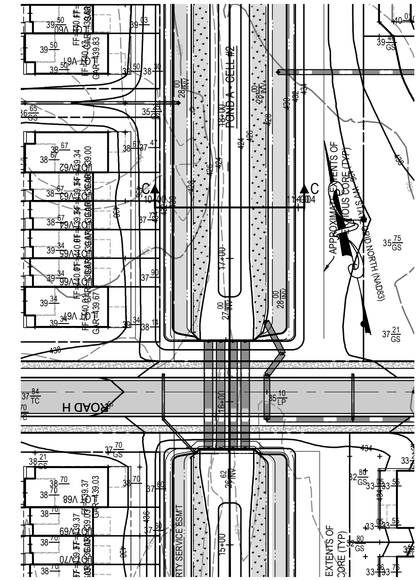
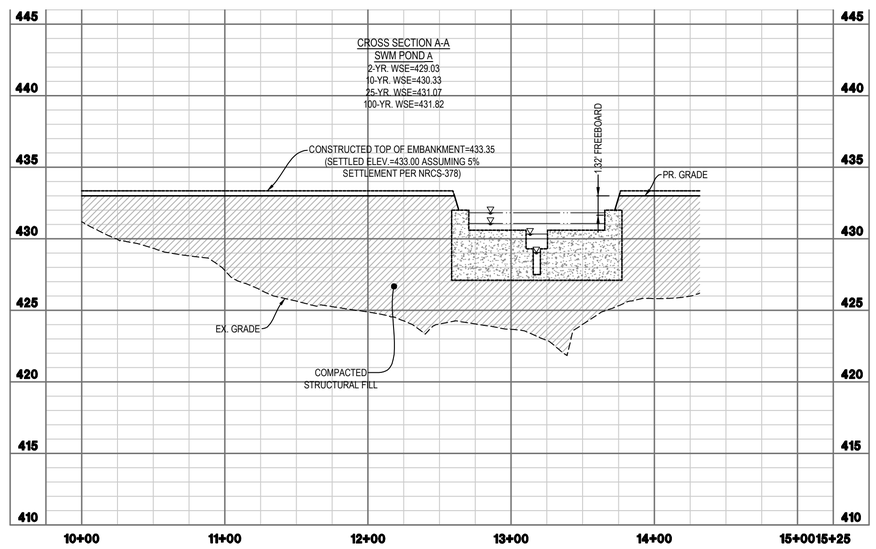


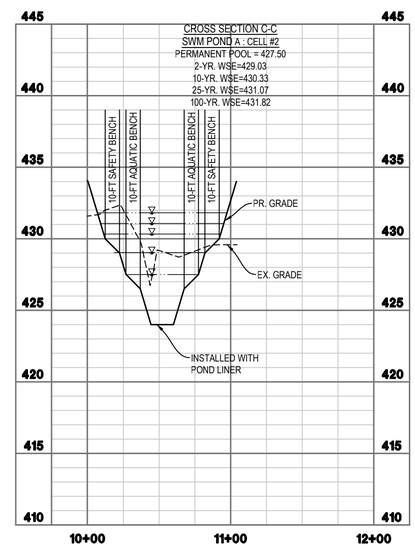
POND A - CROSS SECTION B-B



POND A - CROSS SECTION C-C



POND A EMBANKMENT (B-B) PROFILE



POND A XSEC (C-C) PROFILE

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

0 2.5 5 10 15
VERTICAL SCALE: 1"=5'

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POND A PLAN & PROFILE

STONE SPRING SUBDIVISON

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JEFFERSON COUNTY, WEST VIRGINIA

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NCS:	
SHEET: 118 OF 134	

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LEGEND:

STREET TREES:

- ACER RUBRUM "OCTOBER GLORY" TREE
- TILIA CORDATA TREE
- GREEN VASE ZELKOVA TREE

BUFFER TREES:

- THUJA OCCIDENTALIS NIGRA TREE
- PICEA ABIES TREE
- PINUS STROBUSTREE

MATCHLINE
SEE SHEET 120

JEFFERSON COUNTY LIMITS
CHARLES TOWN CITY LIMITS

ELECTRIC FENCE

MAGNOLIA SPRINGS
SUBDIVISION

WOVEN WIRE FENCE

N/F
WILSON
CTD M10 P8
D.B. 933 PG. 469
ZONING: RESIDENTIAL GROWTH

U.S. RTE. 340-WV RTE. 9 SBL
RIGHT-OF-WAY VARIES

U.S. RTE. 340-WV RTE. 9 NBL
RIGHT-OF-WAY VARIES

BOARD FENCE @ ENTRANCE

EX. EDGE OF CONCRETE (TYP.)

EX. GUARDRAIL (TYP.)

ENTRANCE FEATURE

INTERMITTENT STREAM

EX. SPRING BUILDING

PALUSTRINE WETLANDS (TYP.)

PERENNIAL STREAM

STREAM VALLEY PARK DEDICATION

INTERMITTENT STREAM

STREAM

APPROXIMATE LOCATION OF 100-YEAR FLOOD PLAIN (TYP.)

EX. CISTERN WITH CATTLE WATER FEEDER

COMMERCIAL LOT 1

ROAD A

STREET LIGHT (TYP.)
TYPE IV ADA RAMP (TYP.)

LOT 01

STOP SIGN (TYP.)

SINGLE SAN LAT (TYP.)

LOT 11

BUS SHELTER

LOT 51

LOT 52

LOT 53

LOT 54

LOT 21

MATCHLINE
SEE SHEET 122

WV STATE GRID NORTH (NAD83)

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

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LANDSCAPE AND LIGHTING PLAN

STONE SPRING SUBDIVISON

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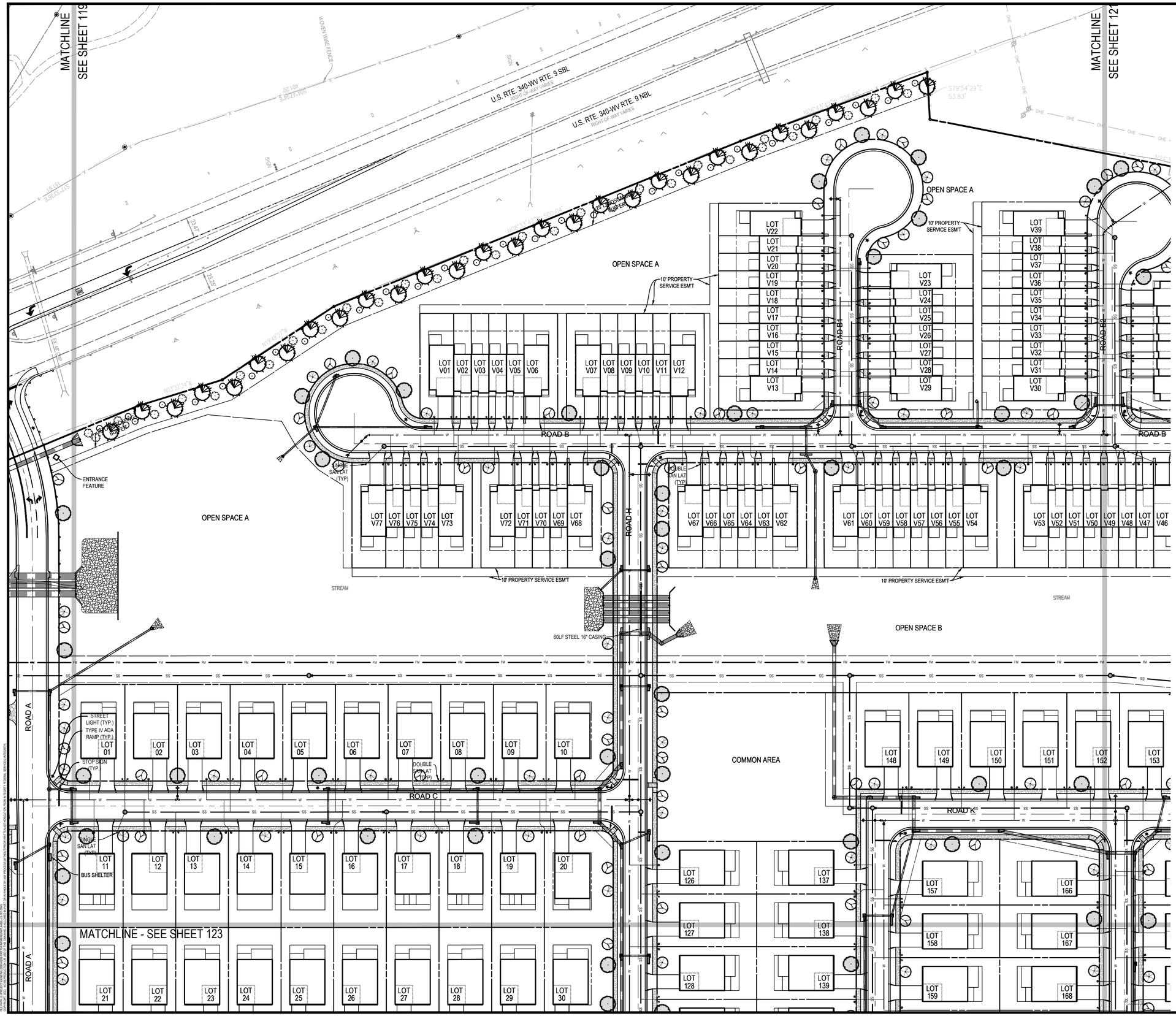

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STONE SPRING SUBDIVISON

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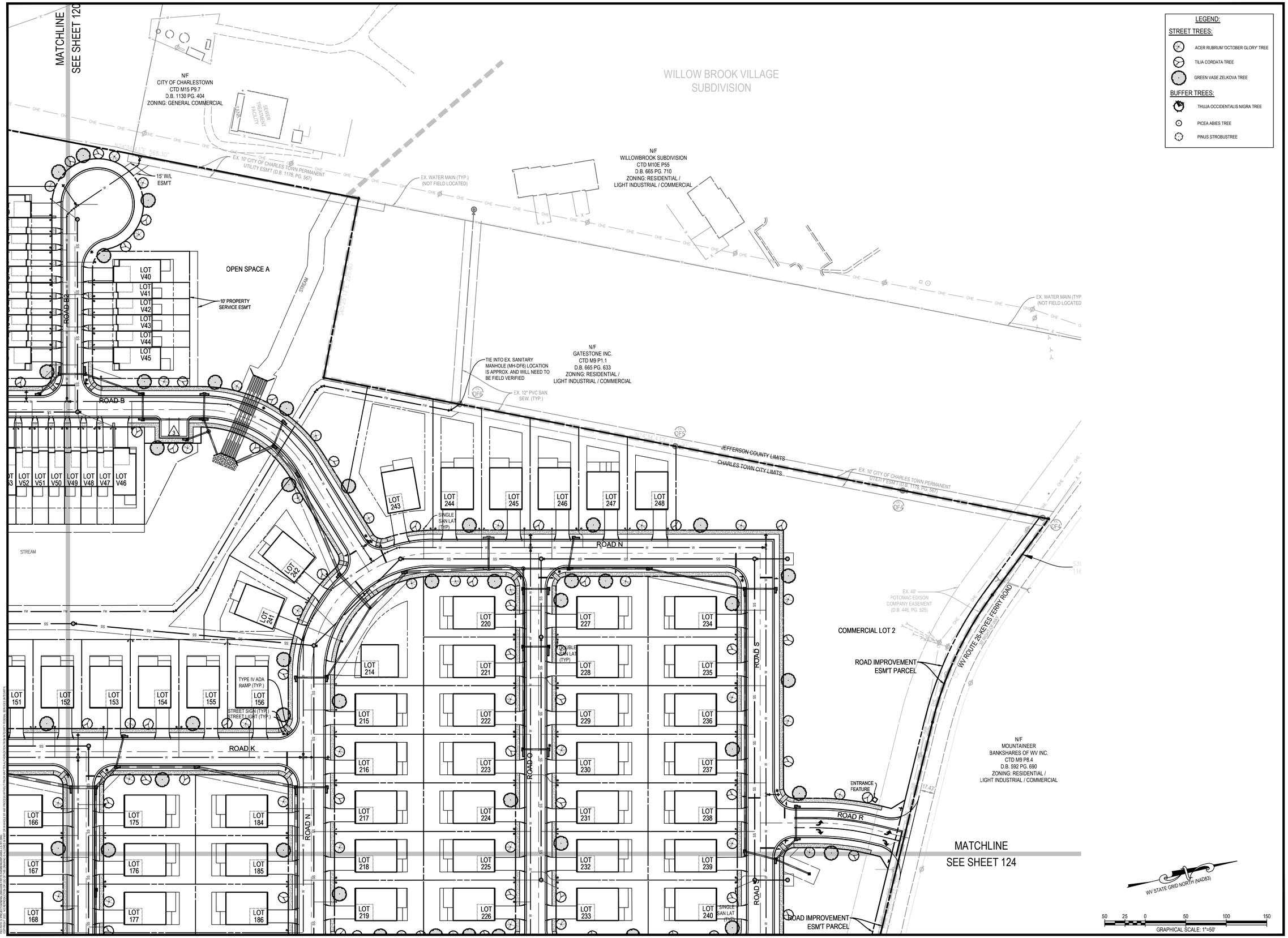

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LANDSCAPE AND LIGHTING PLAN

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: L-LS-101.DWG	
NCS:	
SHEET:	121 OF 134

MATCHLINE
SEE SHEET 119

N/F
WILSON
CTD M10 P8
D.B. 933 PG. 469
ZONING: RESIDENTIAL GROWTH

JEFFERSON COUNTY LIMITS
CHARLES TOWN CITY LIMITS

PALUSTRINE WETLANDS (TYP.)

STREAM

FEMA FLOOD ZONE A

APPROXIMATE LOCATION OF 100-YEAR FLOOD PLAIN (TYP.)

PERENNIAL STREAM

STREAM VALLEY PARK DEDICATION

EX. CISTERN WITH CATTLE WATER FEEDER

COMMERCIAL LOT 1

STREAM VALLEY PARK DEDICATION

ROAD A

ROAD E

ROAD F

DOUBLE SAN LAT

SINGLE SAN LAT (TYP.)

TYPE IV ADA RAMP (TYP.)
STOP SIGN (TYP.)

STREET LIGHT (TYP.)

BUS SHELTER

LOT 11
LOT 21
LOT 31
LOT 41
LOT 51
LOT 52
LOT 53
LOT 54
LOT 55
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LOT 103
LOT 104
LOT 105
LOT 106
LOT 107
LOT 108
LOT 109

CHARLES TOWN CITY LIMITS
JEFFERSON COUNTY LIMITS

N/F
LANGLET
CTCD M15 P7
D.B. 1030 PG. 343
ZONING: NEIGHBORHOOD RESIDENTIAL

N/F
LANGLET
CTCD M15 P4.8
D.B. 1030 PG. 343
ZONING: NEIGHBORHOOD RESIDENTIAL

N/F
MILLS
CTD M9 P4.20
D.B. 1032 PG. 76
ZONING: RURAL

N/F
KEEL
CTD M9 P4.16
D.B. 489 PG. 28
ZONING: RURAL

MATCHLINE
SEE SHEET 123

LEGEND:

STREET TREES:

- ACER RUBRUM "OCTOBER GLORY" TREE
- TILIA CORDATA TREE
- GREEN VASE ZELKOVA TREE

BUFFER TREES:

- THUJA OCCIDENTALIS NIGRA TREE
- PICEA ABIES TREE
- PINUS STROBUSTREE

WV STATE GRID NORTH (NAD83)

GRAPHICAL SCALE: 1"=50'

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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

LANDSCAPE AND LIGHTING PLAN

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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CADD: L-LS-101.DWG	
NCS:	
SHEET:	122 OF 134

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LEGEND:

STREET TREES:

- ACER RUBRUM "OCTOBER GLORY" TREE
- TILIA CORDATA TREE
- GREEN VASE ZELKOVA TREE

BUFFER TREES:

- THUJA OCCIDENTALIS NIGRA TREE
- PICEA ABIES TREE
- PINUS STROBUSTREE

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JASON P. GERMAN REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

LANDSCAPE AND LIGHTING PLAN

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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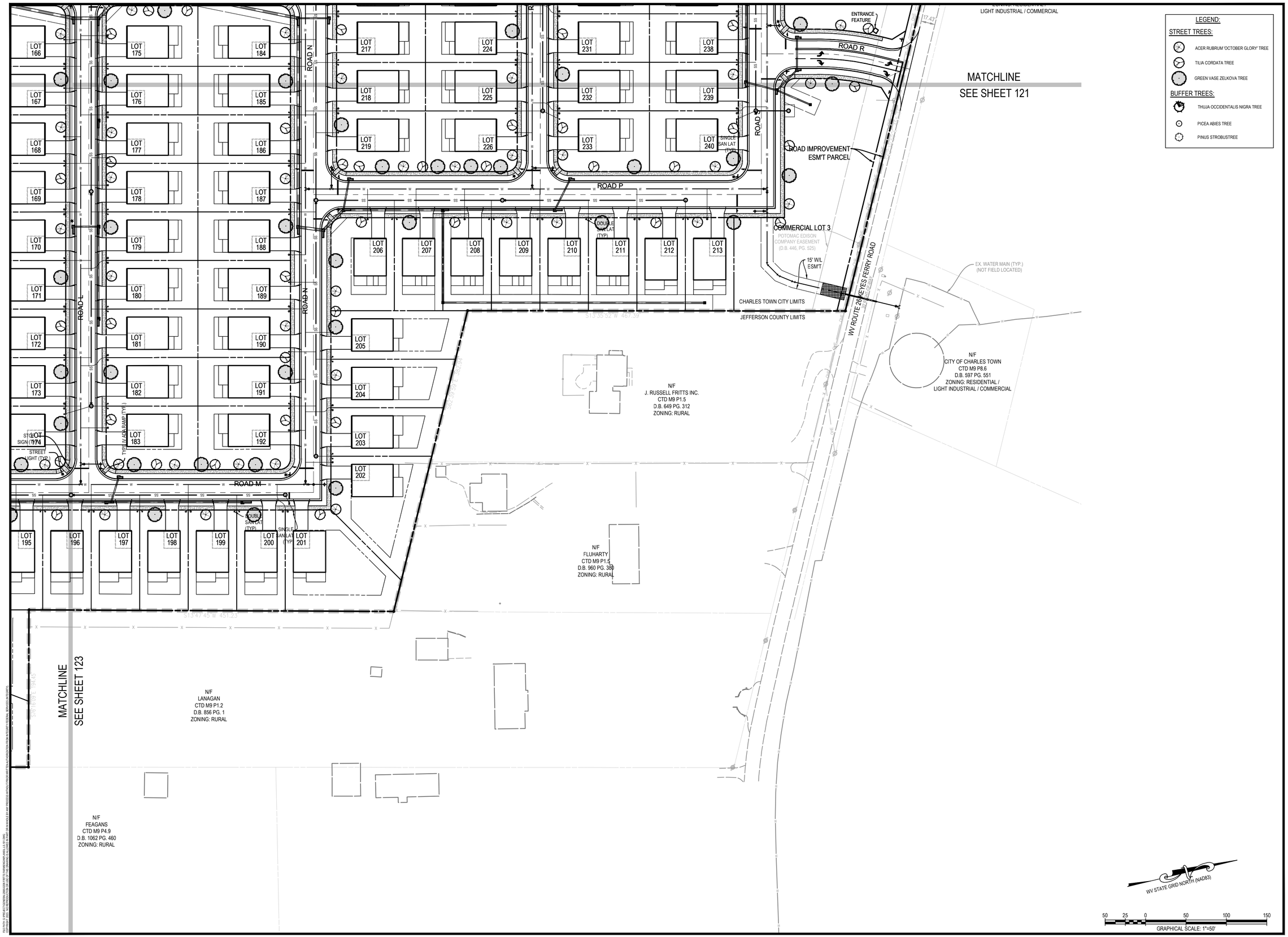
CADD: L-LS-101.DWG	
NCS:	
SHEET:	123 OF 134



LEGEND:

STREET TREES:

- ACER RUBRUM 'OCTOBER GLORY' TREE
- TILIA CORDATA TREE
- GREEN VASE ZELKOVA TREE

BUFFER TREES:

- THUJA OCCIDENTALIS NIGRA TREE
- PICEA ABIES TREE
- PINUS STROBUSTREE

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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

LANDSCAPE AND LIGHTING PLAN

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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NCS:	
SHEET:	124 OF 134

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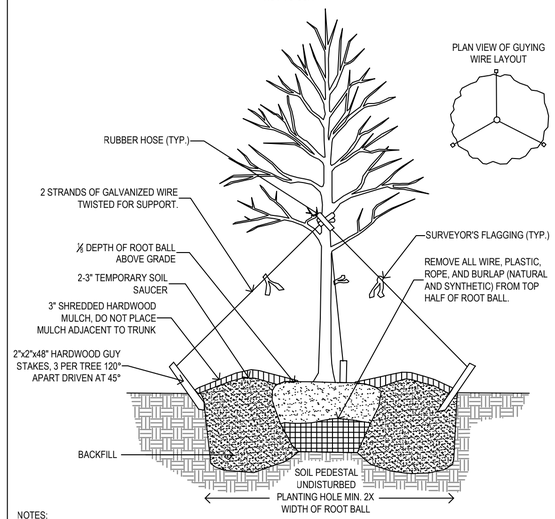
DECIDUOUS TREE PLANTING DETAIL (OVER 3" CAL.)

NOT TO SCALE

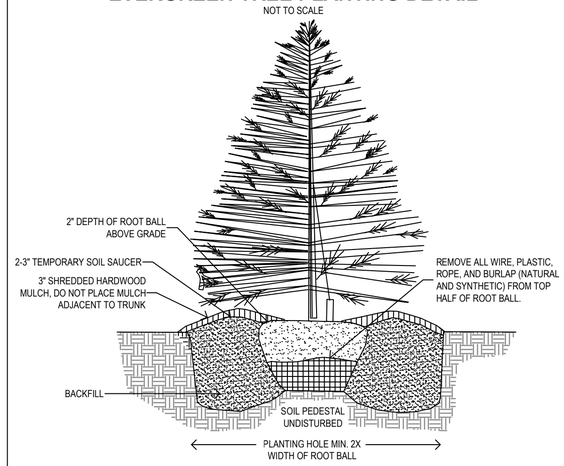


NOTES:

1. STAKING AND GUYING MAY BE REQUIRED TO COUNTER HIGH WINDS, SOIL SETTLEMENT, STEEP SLOPES, VANDALISM, OR OTHER CONDITIONS THREATENING TREE HEALTH OR SUITABLE GROWTH PATTERNS. STAKES TO BE DRIVEN INTO UNDISTURBED SOIL FOR STABILITY.

EVERGREEN TREE PLANTING DETAIL

NOT TO SCALE



Landscaping: Required and Provided

Street - Landscaping

Required	Total Street Frontage	# of Street Trees
1 Tree for every 50' of street frontage (SLDO 1333.16 2.a.)	26,600	532
Provided		**# of Street Trees**
		532

Planting Schedule Deciduous Shade Trees

Label	Quantity	Botanical Name	Common Name	Size (min.)	Container	Comments
AR	177	Acer rubrum 'October Glory'	October Glory Red Maple	2" Caliper	B&B	With Central Leader
GV	178	Green Vase Zelkova	Japanese zelkova	2" Caliper	B&B	
LL	177	Tilia cordata	Little-leaf Linden	2" Caliper	B&B	

Parking - Perimeter Landscaping

Required	Parking Impervious Area	# of Parking Perimeter Trees
1 Tree for every 2,000 SF of Parking Impervious Area (SLDO 1333.16 3.a.)	9,934	5
Provided		**# of Parking Perimeter Trees**
		5

Planting Schedule Deciduous Shade Trees

Label	Quantity	Botanical Name	Common Name	Size (min.)	Container	Comments
AR	2	Acer rubrum 'October Glory'	October Glory Red Maple	2" Caliper	B&B	With Central Leader
LL	3	Tilia cordata	Little-leaf Linden	2" Caliper	B&B	

Parking - Interior Landscaping

Required	# of Parking Spaces	# of Parking Interior Trees
1 Tree for every 10 Parking Spaces (SLDO 1333.16 3.b.)	25	3
Provided		**# of Parking Perimeter Trees**
		3

Planting Schedule Deciduous Shade Trees

Label	Quantity	Botanical Name	Common Name	Size (min.)	Container	Comments
AR	2	Acer rubrum 'October Glory'	October Glory Red Maple	2" Caliper	B&B	With Central Leader
LL	1	Tilia cordata	Little-leaf Linden	2" Caliper	B&B	

Buffer - Landscaping

Required	Length of Buffer Line (LF)	# of Req. Buffer Trees
Coniferous trees spaced a maximum of 12 feet on-center and two staggered rows (spaced a maximum of 8 feet apart) . (SLDO Appendix C Landscaping and Buffering Standards)	1,091	91
Provided		**# of Buffer Trees**
		91

Planting Schedule Evergreen Trees

Label	Quantity	Botanical Name	Common Name	Size (min.)	Container	Comments
TO	29	Thuja occidentalis 'Nigra'	Nigra Arborvitae	4' Height	B&B	
PA	31	Picea abies	Norway Spruce	4' Height	B&B	
PS	31	Pinus strobus	White Pine	4' Height	B&B	

Buffer - Tree Percentages

Required

Not more than 40% of any one type or specie of tree shall be permitted. (SLDO 1333.15 J)

Provided

Label	Quantity	Percentage
TO	29	31.87%
PA	31	34.07%
PS	31	34.07%
Total	91	100.00%

Maxium Coverage Required

Label	Quantity	Botanical Name	Common Name	Size (min.)	Container	Comments
AR	181	Acer rubrum 'October Glory'	October Glory Red Maple	2" Caliper	B&B	With Central Leader
GV	178	Green Vase Zelkova	Japanese zelkova	2" Caliper	B&B	
LL	181	Tilia cordata	Little-leaf Linden	2" Caliper	B&B	
TO	29	Thuja occidentalis 'Nigra'	Nigra Arborvitae	4' Height	B&B	
PA	31	Picea abies	Norway Spruce	4' Height	B&B	
PS	31	Pinus strobus	White Pine	4' Height	B&B	
Total	631					

Maxium Coverage Provided

Label	Quantity	Botanical Name	Common Name	Size (min.)	Container	Comments
TO	181	Acer rubrum 'October Glory'	October Glory Red Maple	2" Caliper	B&B	With Central Leader
GV	178	Green Vase Zelkova	Japanese zelkova	2" Caliper	B&B	
PA	181	Tilia cordata	Little-leaf Linden	2" Caliper	B&B	
PA	29	Thuja occidentalis 'Nigra'	Nigra Arborvitae	4' Height	B&B	
PS	31	Picea abies	Norway Spruce	4' Height	B&B	
Total	31	Pinus strobus	White Pine	4' Height	B&B	
Total	631					

NOTES:

1. PURSUANT TO LAND DEVELOPMENT ORDINANCE OF THE CITY OF CHARLES TOWN, WV SUBDIVISION ORDINANCE, LANDSCAPING, BUFFERING, AND SCREENING IS REQUIRED FOR MAJOR SUBDIVISION/LAND DEVELOPMENTS.
2. SPECIES LISTED ARE PRELIMINARY AND MAY CHANGE WITH AVAILABILITY.
3. INTERIOR PARKING LOT LANDSCAPING PROVIDED PURSUANT TO THE CITY OF CHARLES TOWN, WV SUBDIVISION ORDINANCE.
4. ALL NON-IMPERVIOUS AREAS WITHIN THE LIMITS OF CONSTRUCTION THAT ARE NOT SHOWN AS PLANTING BEDS SHALL BE SEEDED.
5. ALL LANDSCAPE PLANT MATERIALS SHALL CONFORM TO THE LATEST VERSION OF THE AMERICAN STANDARD OF NURSERY STOCK (ANSI Z60.1). PLANT MATERIALS SHALL BE OF STANDARD QUALITY OR BETTER, TRUE TO NAME AND TYPE OF THEIR SPECIES OR VARIETY.
6. THE CONTRACTOR SHALL COMPLY WITH THE LANDSCAPE SPECIFICATIONS GUIDELINES – 5th EDITION ADOPTED BY THE LANDSCAPE CONTRACTORS ASSOCIATION FOR PLANTING BED PREPARATION AND SOIL MIX GUIDELINES AND PROCEDURES.
7. THE EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON AVAILABLE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING MISS UTILITY TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK AND IS RESPONSIBLE FOR ANY DAMAGES WHICH OCCUR BY HIS FAILURE TO LOCATE OR PRESERVE THESE UNDERGROUND UTILITIES.
8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY FIELD CONDITIONS PRIOR TO CONSTRUCTION AND TO NOTIFY INTEGRITY FEDERAL SERVICES IF THE FIELD CONDITIONS ARE NOT IN CONFORMANCE WITH THE APPROVED PLANS.
9. IT SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR TO ENSURE THAT ALL TREES ARE NOT PLANTED WITHIN 5' OF ANY UNDERGROUND UTILITY.
10. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR EVALUATING INDIVIDUAL TREES FOR STABILITY AT THE TIME OF PLANTING. BASED ON THIS EVALUATION, TREES SHALL BE STAKED AND GUYED AS NECESSARY TO ENSURE THAT THEY REMAIN IN AN UPRIGHT POSITION. STAKES ARE TO BE REMOVED BY OWNER AFTER ONE GROWING SEASON.
11. ALL PLANT MATERIAL TO BE INSPECTED BY OWNER OR OWNERS REPRESENTATIVE PRIOR TO INSTALLATION. PLANTS THAT ARE DAMAGED OR DO NOT CONFORM TO THE REQUIRED SPECIFICATION SHALL BE REJECTED.
12. ALL PLANTING BEDS ADJACENT TO TURF AREAS SHALL HAVE A 6" SPADE EDGE.
13. EXISTING TREES TO BE SAVED WHEREVER PRACTICAL.

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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

LANDSCAPE DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: AS NOTED VERT.:
DATE: JANUARY 2023	
JOB: 2665-0206	
DRAWN: JCH	CHECK: JPG
CADD: L-LS-501.DWG	
NCS:	
SHEET: 125 OF 134	

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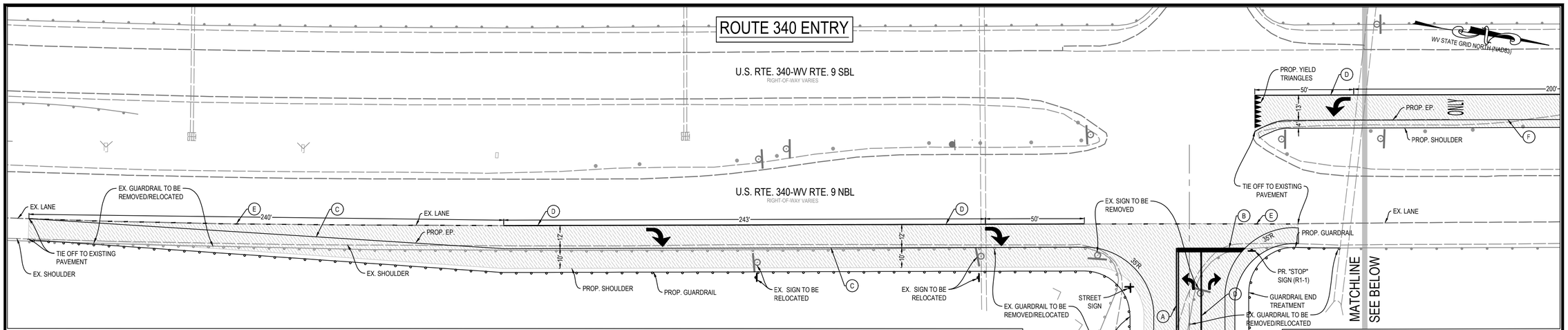
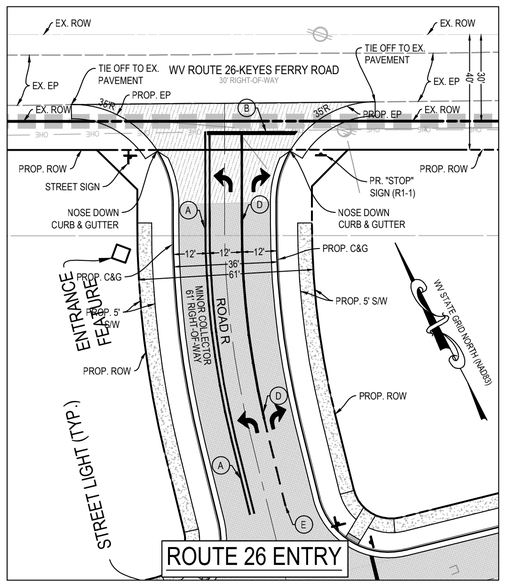
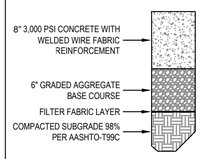




TYP. PAVEMENT SECTION ROAD WIDENING
(WVDOH ROAD)



NOTES:
1. SOILS TESTS OF SUBGRADE MUST BE SUBMITTED FOR ACTUAL DETERMINATION OF REQUIRED PAVEMENT SECTION THICKNESS PRIOR TO CONSTRUCTION.

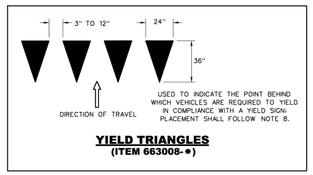
PAVEMENT MARKING LEGEND:

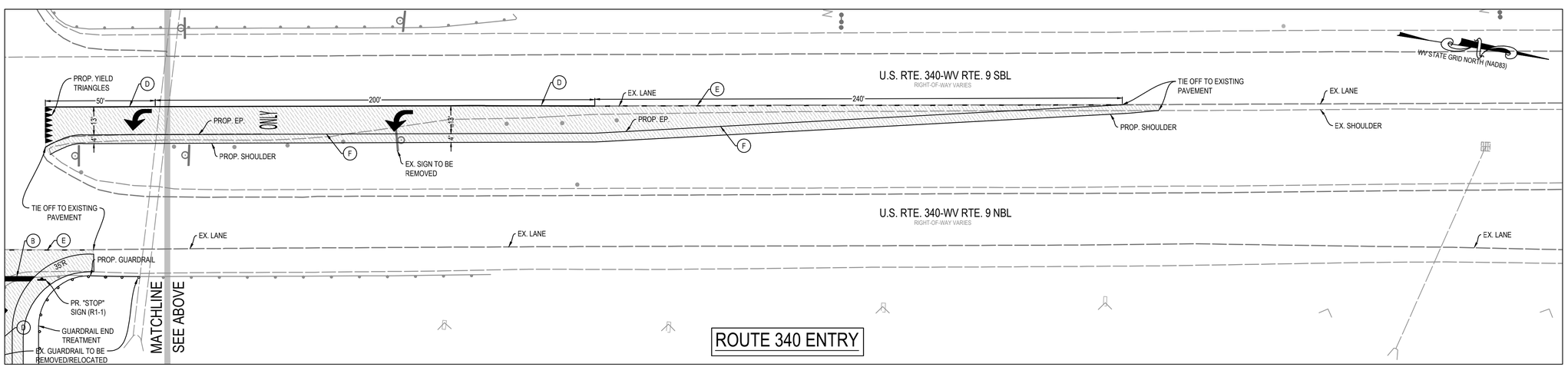
- (A) TYPE II, YELLOW, 6" WIDTH, SOLID DOUBLE LINE, SEPARATED BY A 6" SPACE
- (B) TYPE V, WHITE, 24" WIDTH, SOLID STOP LINE
- (C) TYPE II, WHITE, 6" WIDTH, SOLID EDGE LINE
- (D) TYPE V, WHITE, 8" WIDTH, SOLID CHANNELIZING LINE (MAX 200' IN LENGTH)
- (E) TYPE V, WHITE, 6" WIDTH, 2' LONG, 6' SPACES
- (F) TYPE V, YELLOW, 6" WIDTH, SOLID EDGE LINE
- TYPE V, WHITE, ARROWS (THERMOPLASTIC)
- ONLY TYPE V, WHITE, 8' TALL AND 7'11" MIN. WIDTH (THERMOPLASTIC)

PAVEMENT LEGEND:

- WVDOH ROAD WIDENING CONCRETE PAVEMENT
- ASPHALT PAVEMENT
- CONCRETE SIDEWALK

NOTES:
1. ALL DIMENSIONS SHOWN ARE MEASURED TO FACE OF CURB UNLESS OTHERWISE NOTED.





25 12.5 0 25 50 75
GRAPHICAL SCALE: 1"=25'

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3-16-23

REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

WVDOH ROAD IMPROVEMENTS SITE PLAN & PAVEMENT MARKINGS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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NCS:	
SHEET:	126 OF 134

ROAD A ENTRANCE PLAN & PROFILE
DESIGN SPEED: 35 MPH
POSTED SPEED: 25 MPH

ROAD R ENTRANCE PLAN & PROFILE
DESIGN SPEED: 35 MPH
POSTED SPEED: 25 MPH

GRAPHICAL SCALE: 1"=20'

VERTICAL SCALE: 1"=5'

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3-16-23

REVISIONS

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SITE ENTRANCE PLAN & PROFILES

STONE SPRING SUBDIVISON

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CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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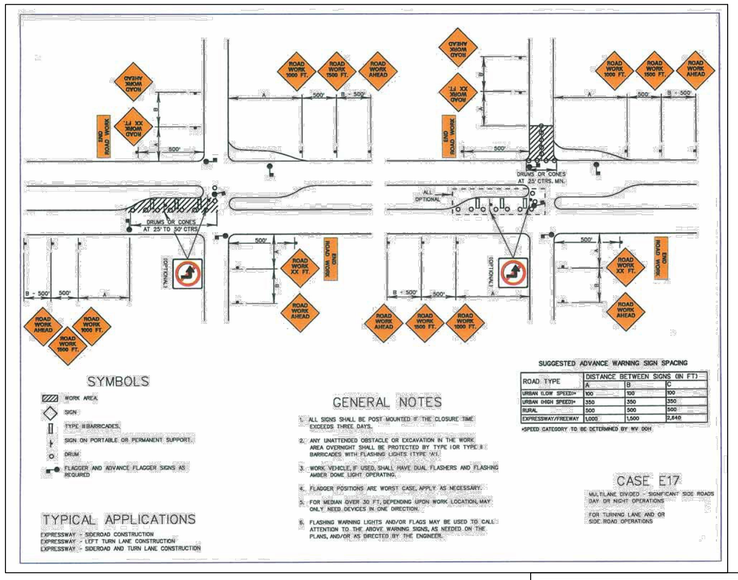
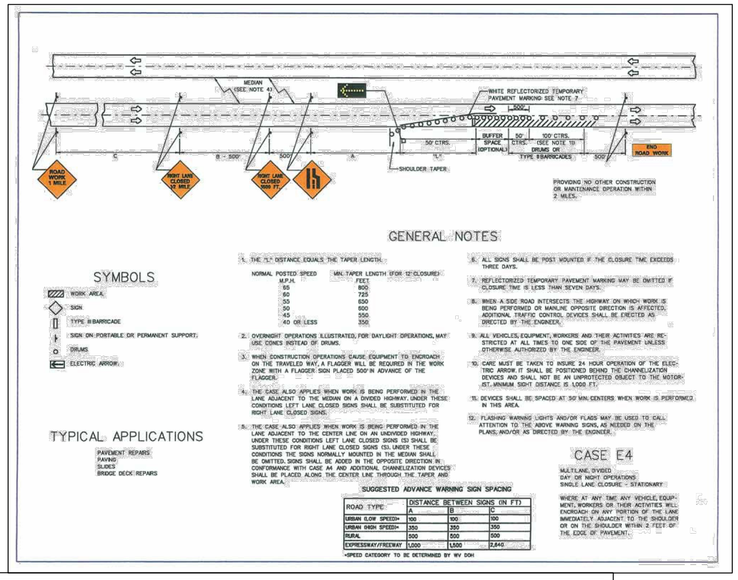
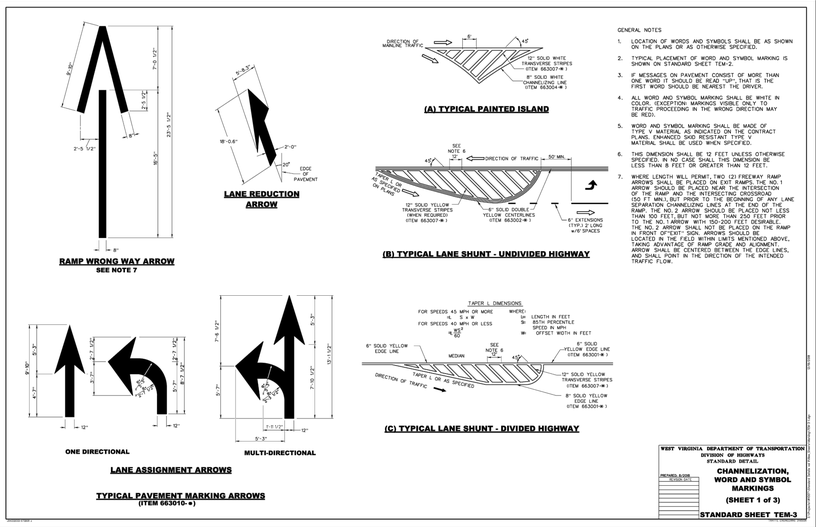
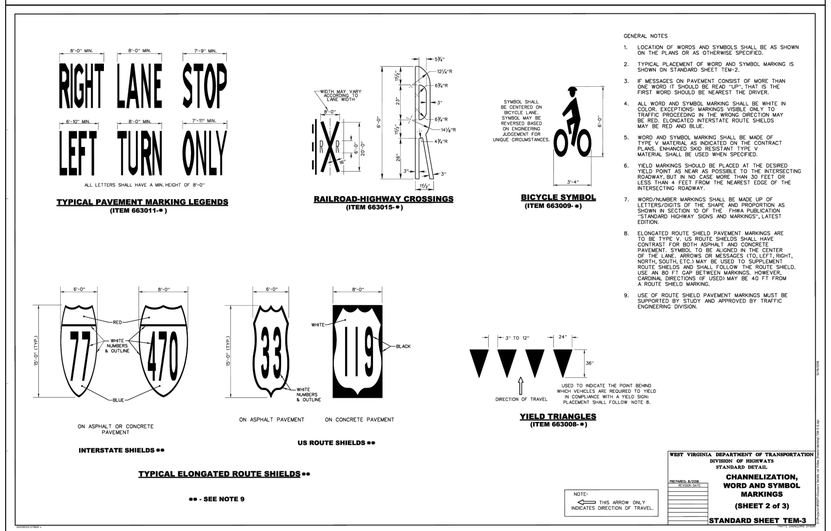
SHEET: 127 OF 134	









GENERAL NOTES:

1. ALL TRAFFIC CONTROL SHALL BE THE RESPONSIBILITY OF THE DEVELOPER. TRAFFIC CONTROL SIGNS AND MAINTENANCE OF TRAFFIC SHALL COMPLY WITH THE STANDARDS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION. STANDARD TEMPORARY TRAFFIC CONTROL CASE A6 FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, 2006 MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAYS SHALL BE UTILIZED FOR THIS PROJECT.
2. EXISTING PAVEMENT SHALL BE SAW CUT TO TIE IN NEW ENTRANCE APRON.
3. NO LANE CLOSURES ARE PERMITTED BETWEEN THE HOURS OF 6:00-9:00 AM & 3:00-6:00 PM.
4. SEE THIS SHEET FOR DETAILS SHOWING CASES FROM THE WEST VIRGINIA DIVISION OF HIGHWAYS, MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAYS, 2006 EDITION.
5. CONTRACTOR SHALL CONTACT KENNETH CLOHAN AT WVDOH (KENNETH.L.CLOHAN@WV.GOV OR 304-260-4392) PRIOR TO ANY PAVEMENT MARKINGS OR SIGNAGE BEING INSTALLED.
6. CONTRACTOR SHALL CONTACT KEVIN McDONALD AT WVDOH (KEVIN.A.MCDONALD@WV.GOV) AT LEAST 48 HOURS PRIOR TO BEGINNING WORK WITHIN WVDOH RIGHT-OF-WAY (AFTER OBTAINING APPROVED PERMITS).
7. CONTRACTOR SHALL CONTACT TOM CALDWELL AT WVDOH (TOM.N.CALDWELL@WV.GOV OR 681-320-2039) FOR UTILITY PERMITS.

MAINTENANCE OF TRAFFIC NOTES:

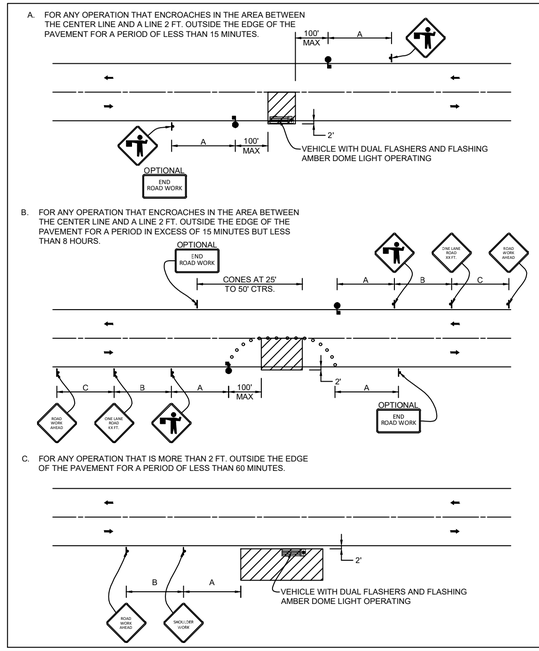
1. TRAFFIC CONTROL, SAFETY MEASURES, AND MAINTENANCE OF TRAFFIC SHALL BE IN ACCORDANCE WITH THE MOST CURRENT EDITION OF EACH OF THE FOLLOWING AND ANY REVISION THERETO:
   A. THE WEST VIRGINIA DIVISION OF HIGHWAYS STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES (2017) (WITH LATEST UPDATES REFERRED TO AS THE SUPPLEMENTAL SPECIFICATIONS (2020)).
   B. THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS, MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAYS, 2006 EDITION.
   C. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, 2009 EDITION (WITH UPDATES.
   D. THE AASHTO ROADSIDE DESIGN GUIDE, 4TH EDITION.
2. REFLECTIVE SHEETING ON TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE OF NEW CONDITION AT THE BEGINNING OF THE PROJECT LIFE. NIGHT VISIBILITY AND LEGIBILITY SHALL BE MAINTAINED.
3. ACCESS TO ALL HOUSES AND BUSINESSES SHALL BE MAINTAINED AT ALL TIMES.
4. FLAGGER: WHEN WORK IS PERFORMED AT NIGHT WITH A FLAGGER, THE FLAGGER STATIONS SHALL BE ADEQUATELY ILLUMINATED.
5. TEMPORARY TAPE: ANY TEMPORARY TAPE SHALL BE MECHANICALLY APPLIED. SOLID LINES SHALL HAVE A 2" GAP EVERY FIFTY FEET.
6. EXISTING SIGNS AND DELINEATORS: ANY SUCH EXISTING FACILITIES RELOCATED, REMOVED, OR DAMAGED BY THE CONTRACTOR SHALL BE REPLACED TO ITS ORIGINAL CONDITION BY THE CONTRACTOR AT THEIR EXPENSE, UNLESS REPLACED BY FINAL SIGNING.
7. WHEN COVERING EXISTING SIGNS, THE CONTRACTOR HAS THE OPTIONS OF USING:
   A. HEAVY DUTY BLOCK OVERLAY (PLASTIC OR BURLAP TYPE)
   B. THIN WOOD OVERLAY (E.G. PLYWOOD)
   C. TAKING SIGNS DOWN AND RE-INSTALLING WHEN APPROPRIATE
   D. ANY DAMAGES CAUSED BY ABOVE NAMED SHALL BE REPAIRED/REPLACED TO IT'S ORIGINAL CONDITION AT CONTRACTOR'S EXPENSE.
8. ANY TEMPORARY CONCRETE BARRIER SHALL HAVE TYPE 8" X 12" B-1 DELINEATORS (WHITE OR YELLOW AS APPROPRIATE) FACING TRAFFIC AT 20 FOOT CENTERS.
9. TYPE 'B' LIGHTS SHALL BE INSTALLED ON ALL LEAD-IN SIGNING AND BARRICADES.
10. FINAL LOCATIONS OF THE TRAFFIC CONTROL DEVICES SHALL BE ESTABLISHED IN THE FIELD.
11. RESTORE ANY PAVED, LANDSCAPED, CURBED, & SIDEWALK AREAS DISTURBED DURING CONSTRUCTION ACTIVITIES TO ITS ORIGINAL CONDITION.

DROP OFF GUIDANCE NOTES:

1. ALL EXCAVATION MUST BE FILLED WITH A SAFE SLOPE ADJACENT TO TRAFFIC AT THE END OF EACH WORK DAY OR WHEN LANE CLOSURES ARE NOT IN PLACE.

SIGNING & PAVEMENT MARKING NOTES:

1. ALL PROPOSED SIGNING, TEMPORARY AND PERMANENT, AND PAVEMENT MARKING SHALL BE IN ACCORDANCE WITH THE MOST CURRENT EDITION OF EACH OF THE FOLLOWING AND ANY REVISION THERETO:
   A. THE WEST VIRGINIA DIVISION OF HIGHWAYS DESIGN GUIDE FOR SIGNING.
   B. THE WEST VIRGINIA DIVISION OF HIGHWAYS SIGN FABRICATION DETAILS (REFERRED TO AS THE SIGN FABRICATION MANUAL).
   C. THE WEST VIRGINIA DIVISION OF HIGHWAYS STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES (2017) (WITH LATEST UPDATES REFERRED TO AS THE SUPPLEMENTAL SPECIFICATIONS (2020)).
   D. THE WEST VIRGINIA DIVISION OF HIGHWAYS STANDARD DETAILS BOOK, VOLUME II, SIGNING, SIGNALS, LIGHTING, MARKINGS AND ITS.
   E. THE WEST VIRGINIA DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIRECTIVES REGARDING SIGNING.
   F. THE WEST VIRGINIA DIVISION OF HIGHWAYS MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAYS 2006 EDITION).
   G. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS 2009 EDITION (WITH UPDATES)
   H. AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS (REFERRED TO AS THE AASHTO SUPPORT SPECIFICATIONS).
2. ALL PAVEMENT MARKINGS SHALL BE WVDOT TYPE II OR V PAVEMENT MARKINGS, UNLESS OTHERWISE NOTED.
3. PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND SHALL BE MODIFIED IN THE FIELD TO AVOID CONFLICT WITH UNDERGROUND UTILITIES OR OTHER OBSTRUCTIONS, AND TO COMPLY WITH STANDARDS REFERENCED IN GENERAL NOTE 1.
4. EXISTING STRIPING SHOWN IS APPROXIMATE. 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. NO MARKINGS SHALL BE PLACED ON EXPANSION JOINTS ON STRUCTURES OR ON LONGITUDINAL CONSTRUCTION JOINTS UNLESS SO DIRECTED BY THE ENGINEER.
7. POST REMOVAL FOR GROUND MOUNTED SIGNS ON EXISTING BREAKAWAY SUPPORTS SHALL INCLUDE EITHER CONCRETE REMOVAL OF THE EXISTING STUB(S) OR THE CUTTING OFF OF THE EXISTING STUB(S) TO A MINIMUM OF SIX (6) INCHES BELOW GROUND AND THE RESTORATION OF THE GROUND TO ITS ORIGINAL CONDITION.
8. REFER TO APPROVED TRAFFIC SIGNAL PLAN FOR PROPER LOCATIONS OF STOP LINES AND CROSSWALKS WHEN APPLICABLE.
9. CONTRACTOR SHALL ENSURE THAT ANY SIGNS TO BE RELOCATED ARE IN GOOD CONDITION. IF EXISTING SIGN ARE DAMAGED NEW SIGNS SHALL BE RELOCATED PER THIS PLAN AND SPECIFICATIONS INCLUDED HEREIN.
10. REFER TO WVDOH STANDARD DETAILS BOOK VOLUME II, DETAILS TEM-1, TEM-2, AND TEM-3 FOR PAVEMENT MARKING SPECIFICATIONS.
11. IF APPLICABLE, ALL PAVEMENT MARKINGS SHALL BE REDONE WHEN FINAL PAVING IS COMPLETED.
12. CONTRACTOR SHALL CONTACT WVDOH DISTRICT 5 TRAFFIC ENGINEER PRIOR TO PLACEMENT OF ANY STOP SIGNS AND/OR STOP BARS ON DEVELOPMENT APPROACHES TO WVDOH ROADWAYS, TO ENSURE THESE ARE PROPERLY PLACED IN THE FIELD.



GENERAL NOTES:

1. CONSTRUCTION OPERATIONS SHALL BE CONFINED TO ONE TRAFFIC LANE, LEAVING THE OPPOSITE LANE OPEN TO TRAFFIC. AT LEAST 500 FT. OF BOTH TRAFFIC LANES SHALL BE AVAILABLE FOR TRAFFIC MOVEMENT AT INTERVALS NOT GREATER THAN 1,000 FT. A COMPLETE TRAFFIC CONTROL PLAN MUST BE APPROVED FOR ANY PROJECT EXPECTING TO EXCEED 1,000 FT. IN LENGTH INCLUDING BOTH TAPER AND WORK AREAS.
2. FOR LOW-VOLUME SITUATIONS WITH SHORT WORK ZONES ON STRAIGHT ROADWAYS WHERE THE FLAGGER IS VISIBLE TO ROAD USERS APPROACHING FROM BOTH DIRECTIONS, A SINGLE FLAGGER, POSITIONED TO BE VISIBLE TO ROAD USERS APPROACHING FROM BOTH DIRECTIONS, MAY BE USED.
3. FLASHING WARNING LIGHTS AND/OR FLAGS MAY BE USED TO CALL ATTENTION TO THE ADVANCE WARNING SIGNS.
4. THE FLAGGERS SHALL BE IN SIGHT OF EACH OTHER OR IN DIRECT COMMUNICATION AT ALL TIMES.
5. ALL SIGNS ARE TO BE REMOVED AT COMPLETION OF THE DAY'S OPERATIONS.
6. FOR MULTILANE ROADWAYS THE ADVANCE WARNING SIGNS FOR TRAFFIC APPROACHING FROM THE OPPOSITE DIRECTION MAY BE OMITTED IF APPROVED BY THE ENGINEER.

SUGGESTED ADVANCE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS (IN FT.) A	B	C
URBAN (LOW SPEED)*	100	100	100
URBAN (HIGH SPEED)*	350	350	350
RURAL	500	500	500
EXPRESSWAY/FREEWAY	1,000	1,500	2,640

* SPEED CATEGORY TO BE DETERMINED BY WVDOH.

SYMBOLS

- WORK AREA
- SIGN
- SIGN ON PORTABLE OR PERMANENT SUPPORT
- FLAGGER WITH PADDLE
- CONES

TYPICAL APPLICATIONS

PATCHING PAVEMENT,
FIELD SURVEY,
CLEANING UP DEBRIS ON PAVEMENT,
CROSSWALK PAINTING.

CASE A6

TWO-LANE, TWO-WAY TRAFFIC,
SHORT TERM OPERATIONS,
DAYTIME ONLY

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JASON P. GERHART REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS
1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SITE ENTRANCE PLAN NOTES & DETAILS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CT-202.DWG	
NCS:	
SHEET:	128 OF 134

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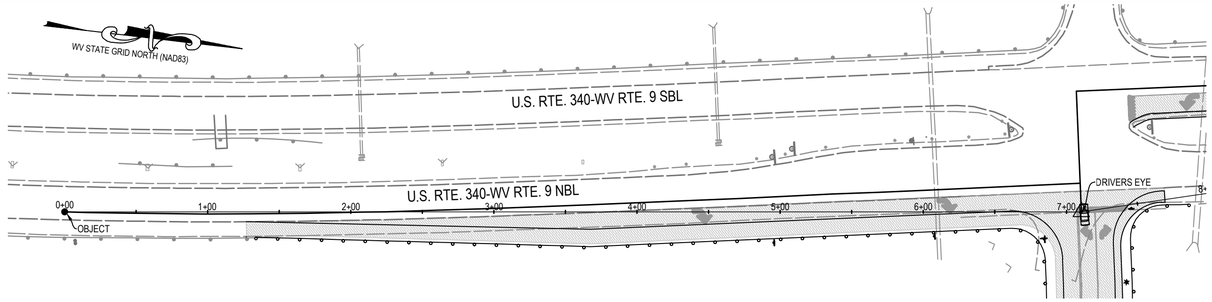
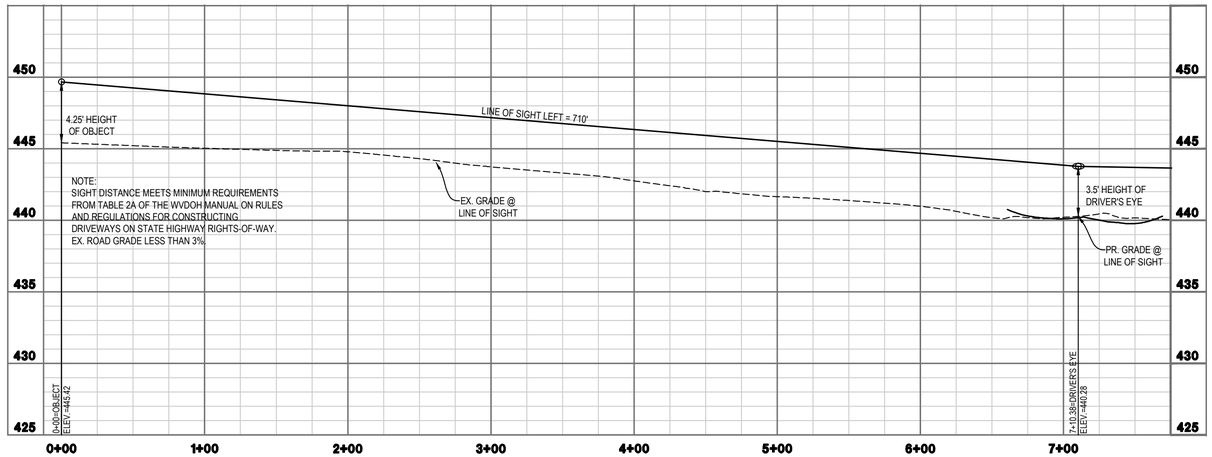
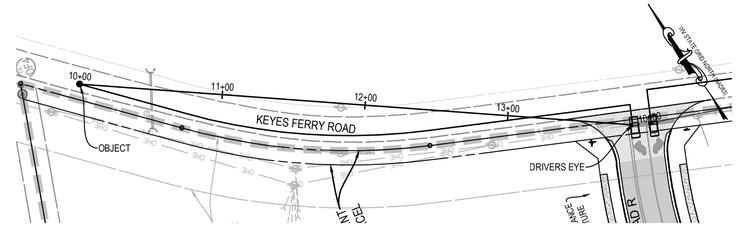
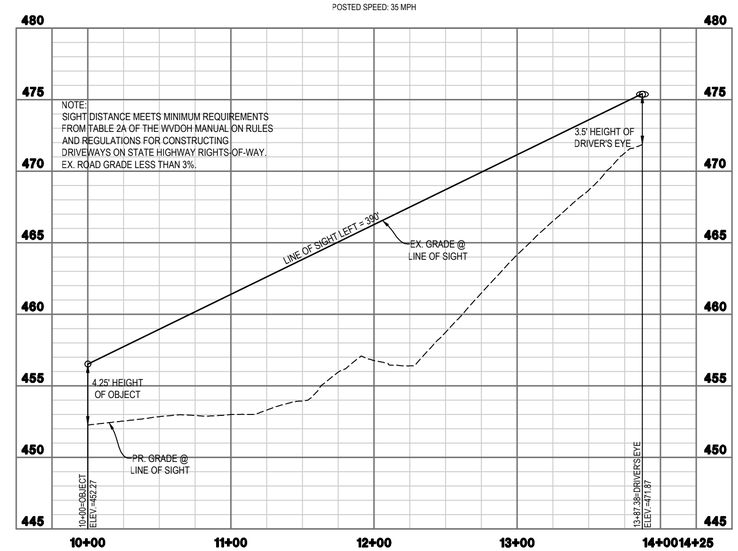


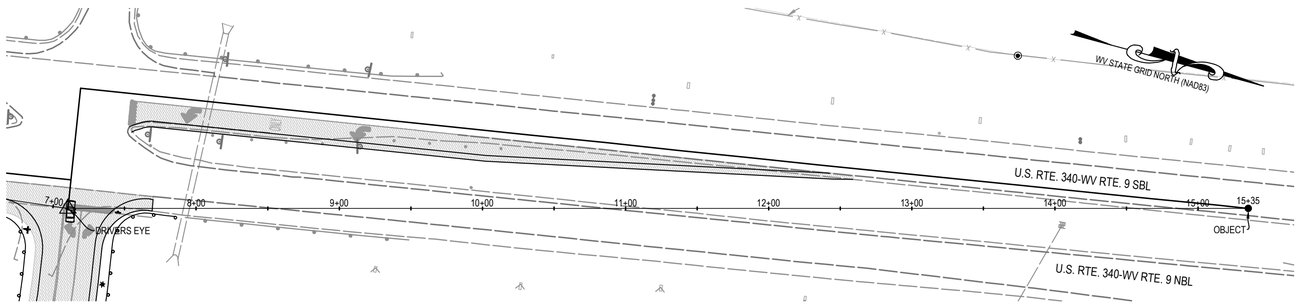
ROUTE 340 SIGHT DISTANCE LEFT
PROVIDED SIGHT DISTANCE RIGHT = 710'
POSTED SPEED: 60 MPH





KEYES FERRY ROAD SIGHT DISTANCE LEFT
PROVIDED SIGHT DISTANCE LEFT = 390'
POSTED SPEED: 35 MPH

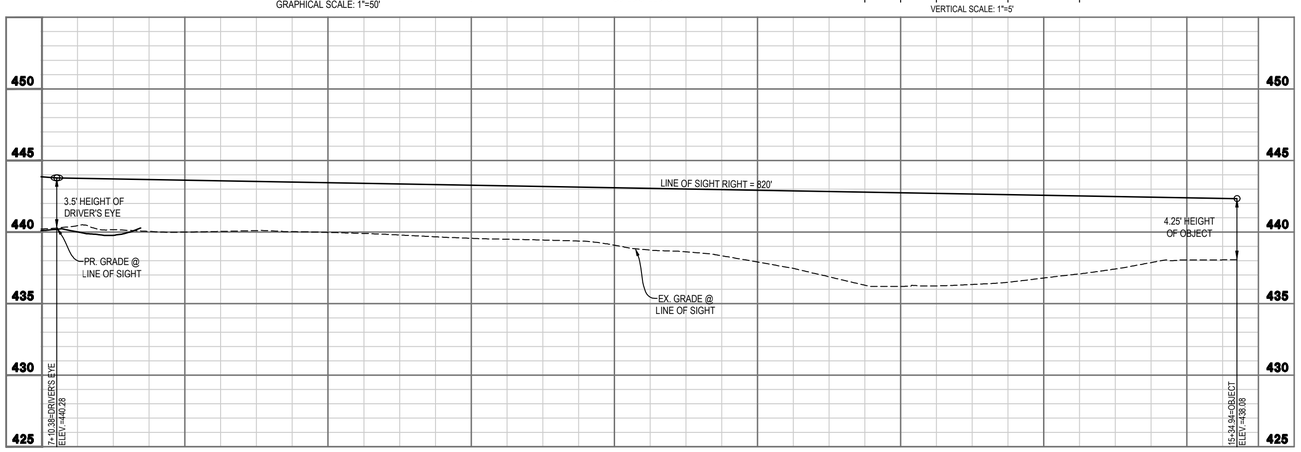


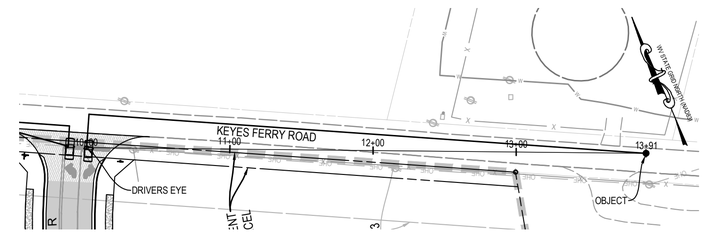


ROUTE 340 SIGHT DISTANCE RIGHT
PROVIDED SIGHT DISTANCE RIGHT = 820'
POSTED SPEED: 60 MPH

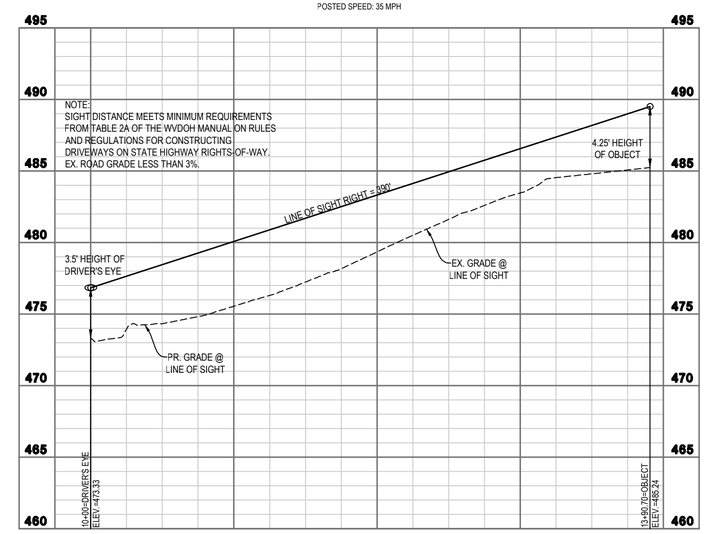
GRAPHICAL SCALE: 1"=50'

VERTICAL SCALE: 1"=5'





KEYES FERRY ROAD SIGHT DISTANCE RIGHT
PROVIDED SIGHT DISTANCE RIGHT = 390'
POSTED SPEED: 35 MPH



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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

SIGHT DISTANCE PLAN & PROFILES

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 50' VERT.: 1" = 5'
DATE: JANUARY 2023	
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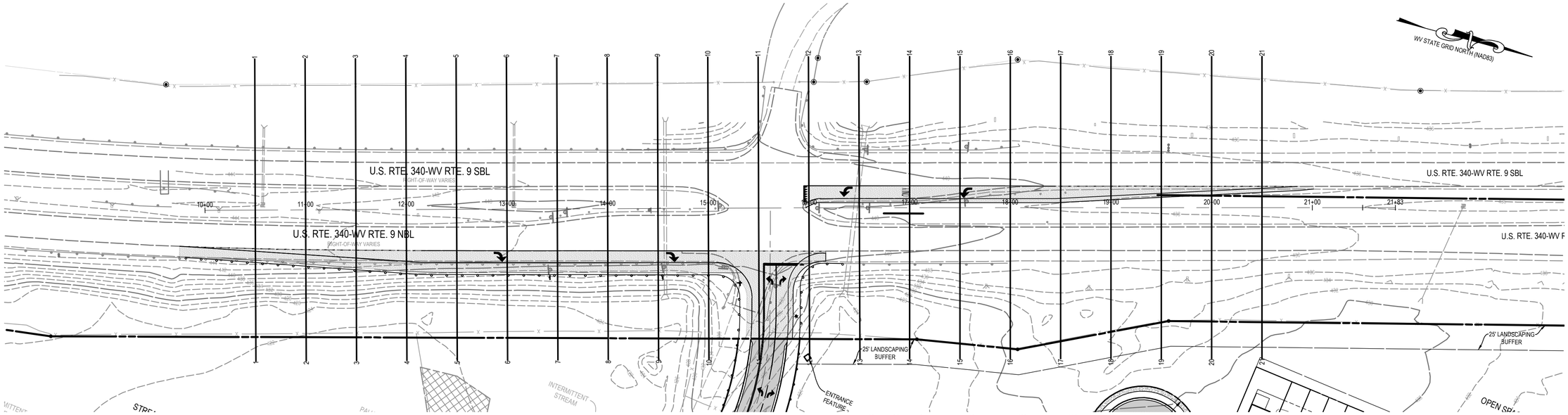
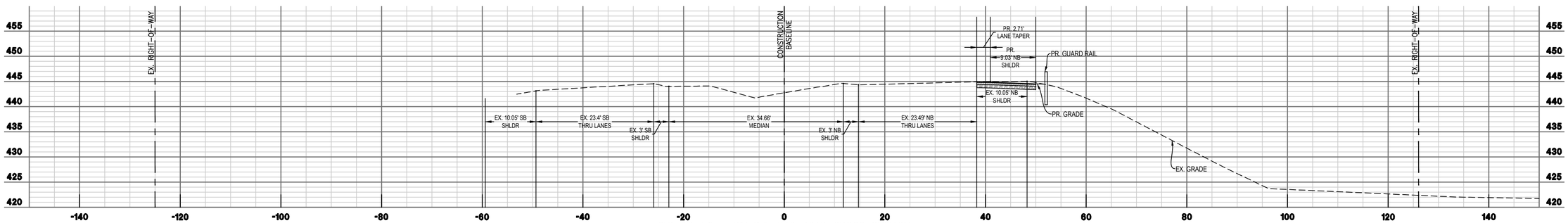
NCS:	
SHEET: 129 OF 134	

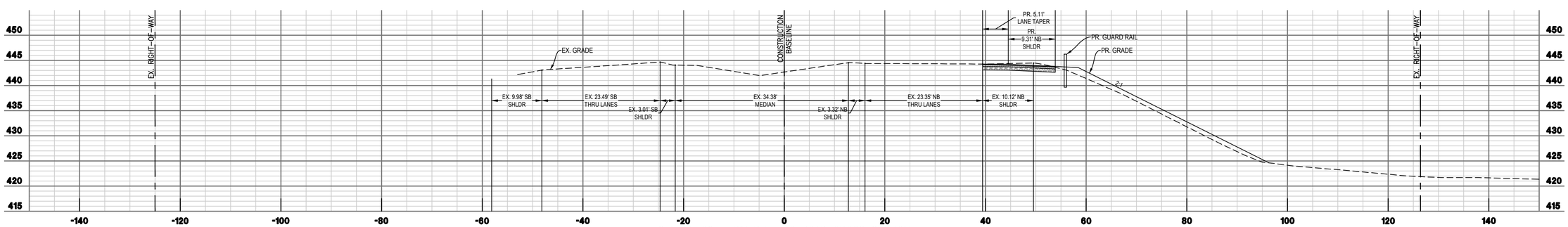


ROUTE 340 CROSS SECTION KEY MAP
SCALE: 1"=50' HORIZONTAL

GRAPHICAL SCALE: 1"=50'



STA 10+50 – WV RTE 340 ROAD CROSS SECTION
SCALE:
HORIZONTAL 1"=10'
VERTICAL 1"=10'



STA 11+00 – WV RTE 340 ROAD CROSS SECTION
SCALE:
HORIZONTAL 1"=10'
VERTICAL 1"=10'

GRAPHICAL SCALE: 1"=10'

VERTICAL SCALE: 1"=10'

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WV 340 CROSS SECTIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 10' VERT.: 1" = 10'
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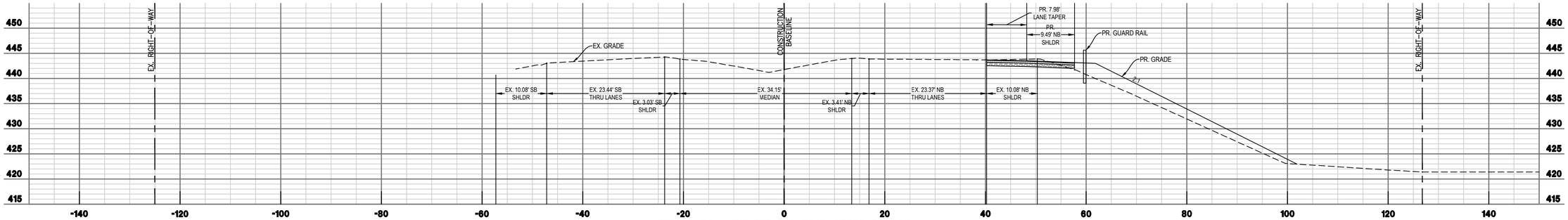
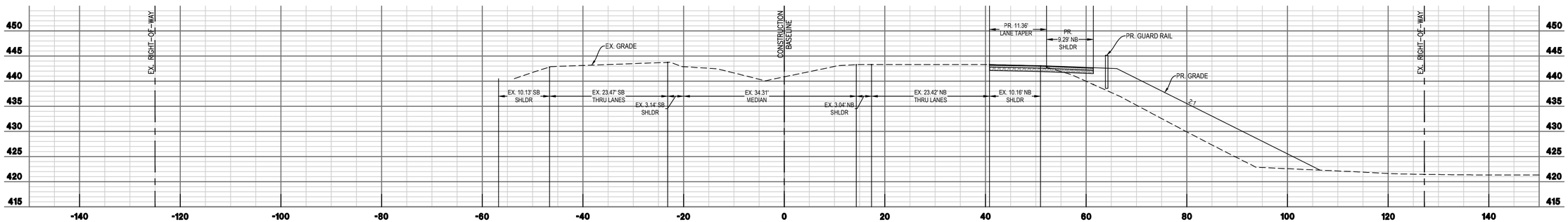


STA 11+50 – WV RTE 340 ROAD CROSS SECTION

SCALE:
HORIZONTAL 1"=10'
VERTICAL 1"=10'



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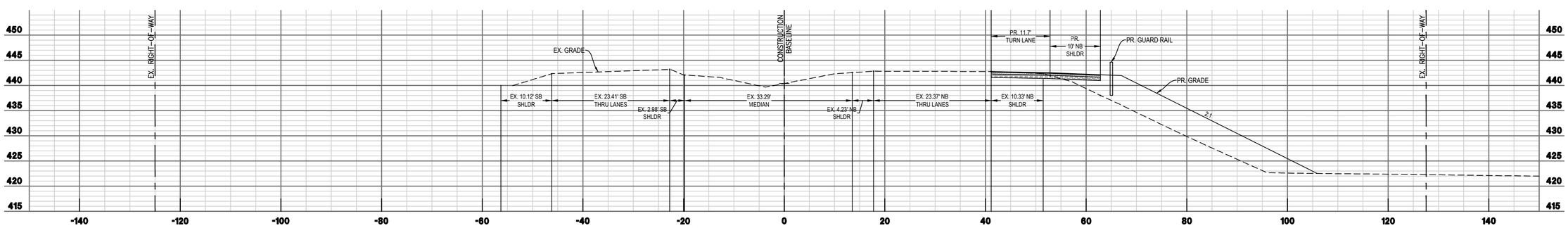

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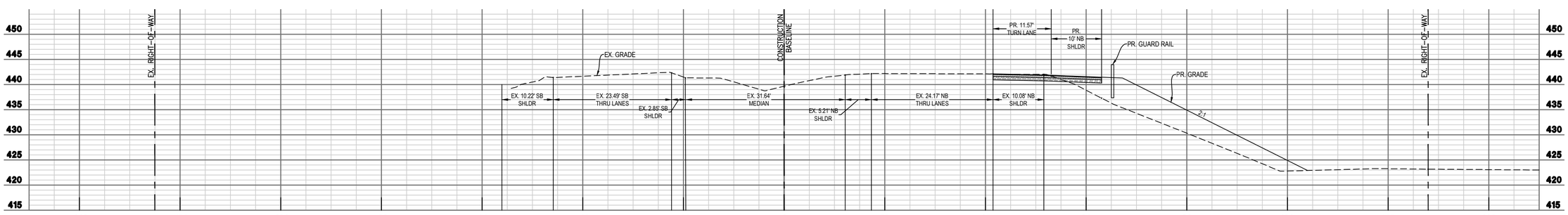

STA 13+00 – WV RTE 340 ROAD CROSS SECTION

SCALE:
HORIZONTAL 1"=10'
VERTICAL 1"=10'

10 5 0 10 20 30
GRAPHICAL SCALE: 1"=10'

0 5 10 20 30
VERTICAL SCALE: 1"=10'

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3-16-23

REVISIONS

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WV 340 CROSS SECTIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 10' VERT.: 1" = 10'
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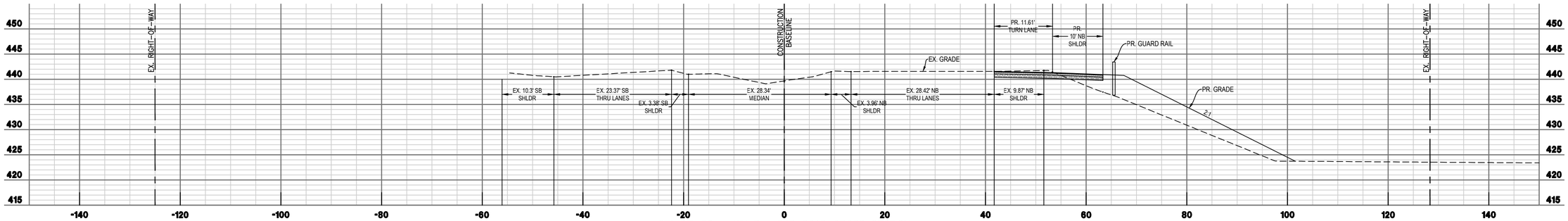

STA 13+50 – WV RTE 340 ROAD CROSS SECTION

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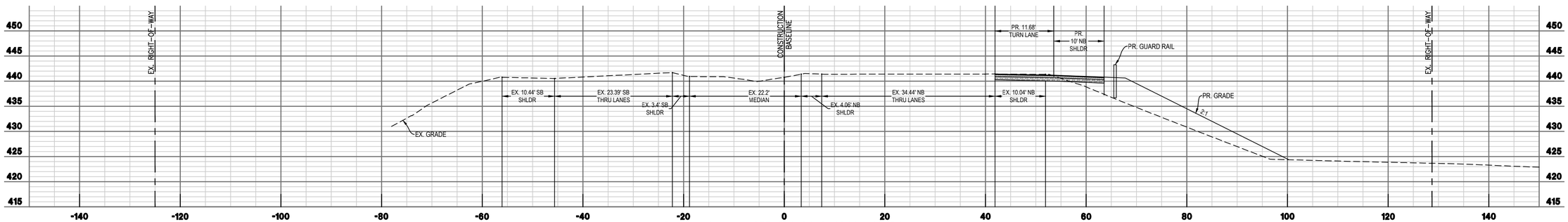
VERTICAL 1"=10'



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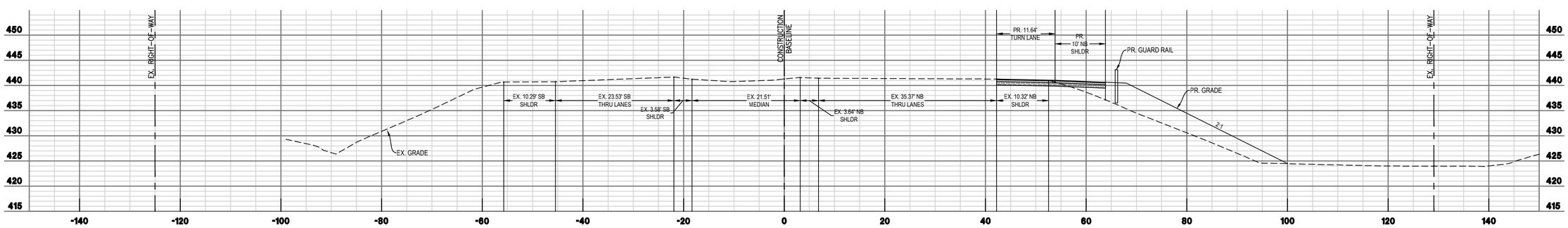

STA 14+50 – WV RTE 340 ROAD CROSS SECTION

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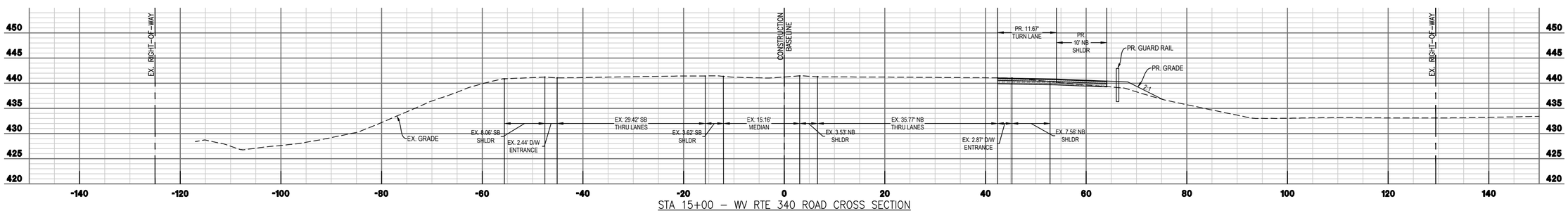

STA 15+00 – WV RTE 340 ROAD CROSS SECTION

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HORIZONTAL 1"=10'
VERTICAL 1"=10'

10 5 0 10 20 30
GRAPHICAL SCALE: 1"=10'

0 5 10 20 30
VERTICAL SCALE: 1"=10'

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WV 340 CROSS SECTIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 10 VERT.: 1" = 10'
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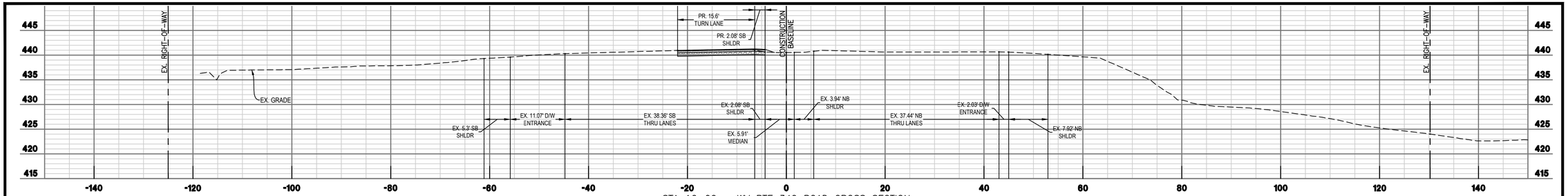

STA 16+00 – WV RTE 340 ROAD CROSS SECTION

SCALE:
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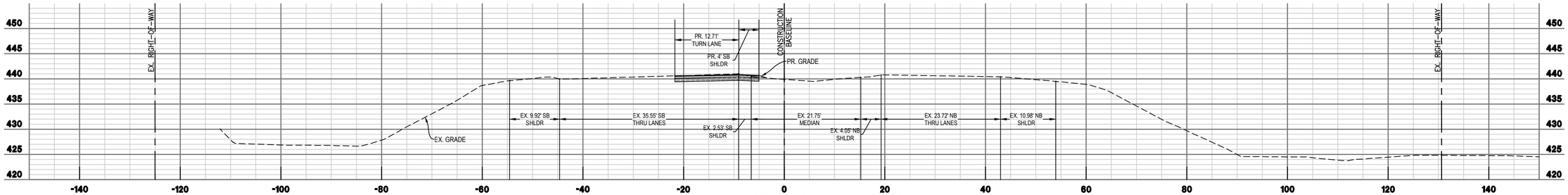
VERTICAL 1"=10'



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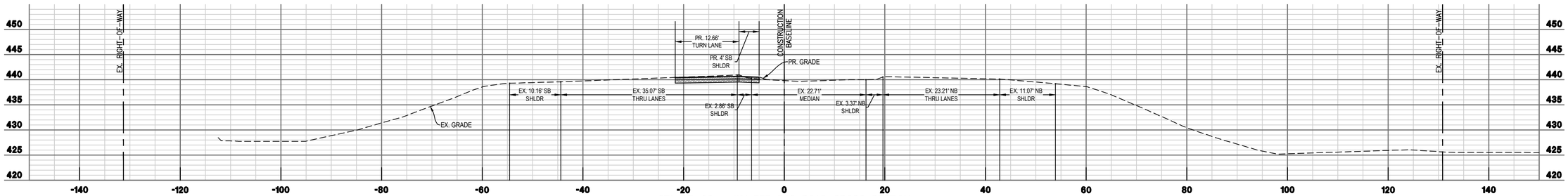

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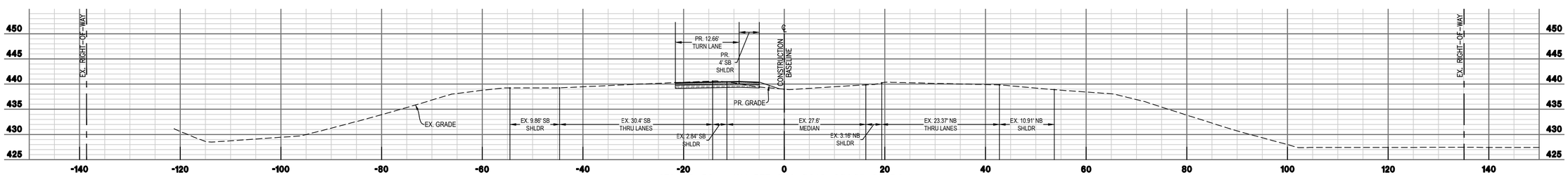

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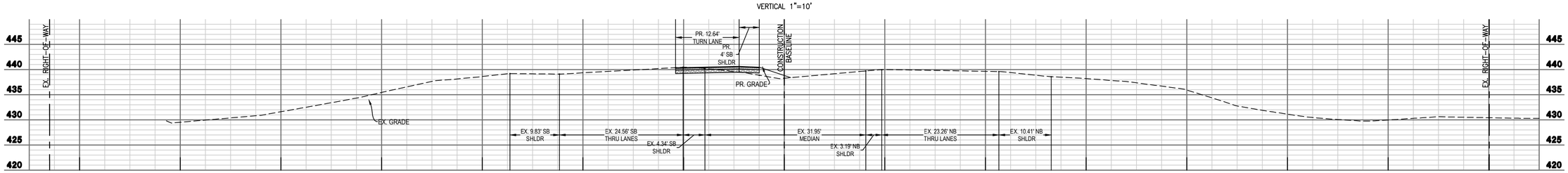

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VERTICAL SCALE: 1"=10'

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PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

WV 340 CROSS SECTIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 10' VERT.: 1" = 10'
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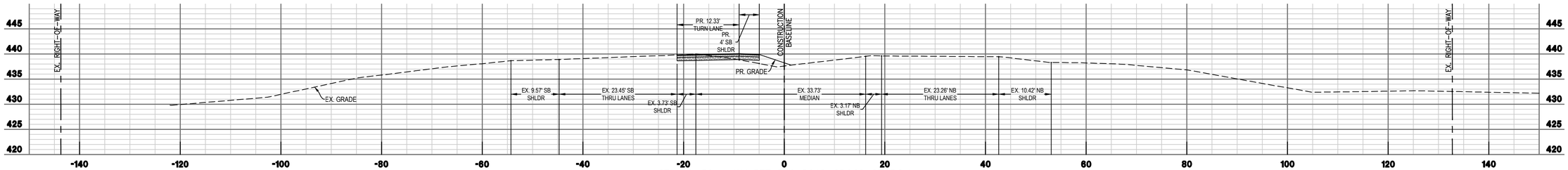

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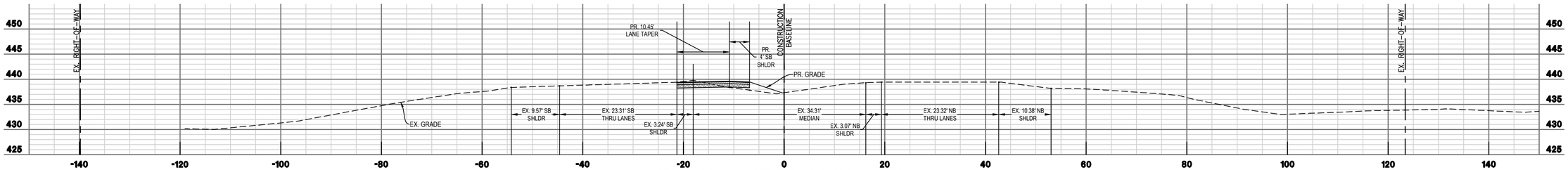

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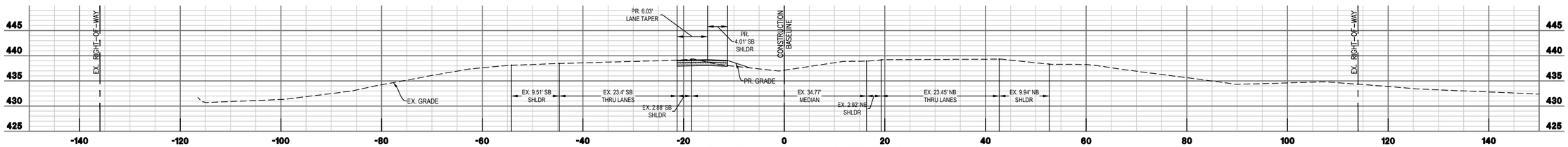

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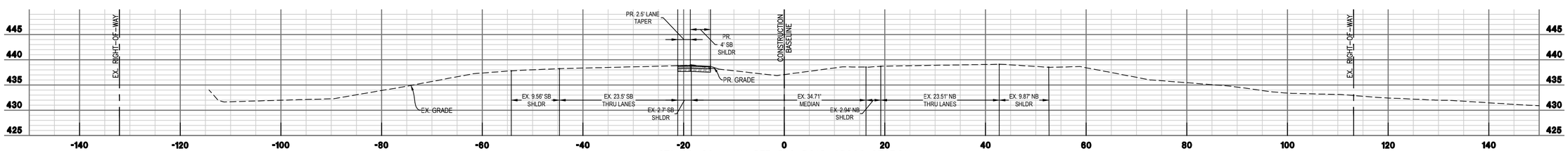

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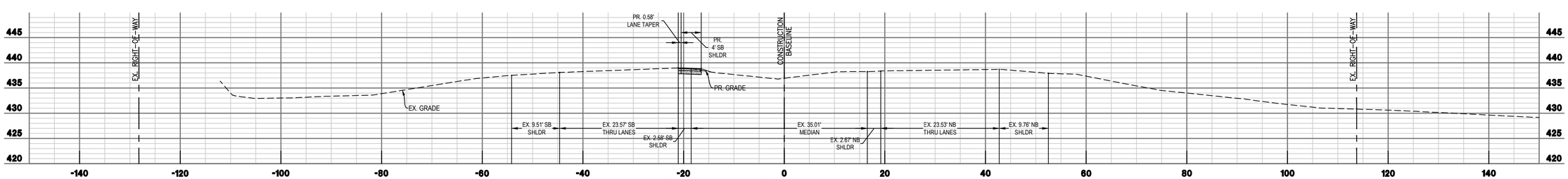

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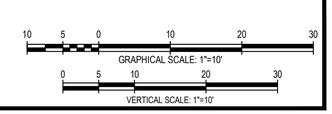

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Fritts Farm Residential Traffic Impact Study
Charles Town, Jefferson County, WV

AMT Project File 21-0282.001 | November 15, 2021

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EXECUTIVE SUMMARY

This report summarizes existing and future traffic analyses conducted in support of the proposed Fritts Farm Residential Development. Fritts Farm is proposed southeast of the interchange of WV 9 with US 340 and WV 51 in Charles Town, Jefferson County. The proposed site plan includes 255 single-family homes and 56 townhomes. Fritts Farm is expected to be built-out by 2025.

The proposed residential development is anticipated to be served by one site driveway utilizing an existing C/A access break to US 340/WV 9 and two site driveways intersecting directly with Keyes Ferry Road. Site Driveway #1 intersects with US 340/WV 9, Site Driveway #2 intersects with Keyes Ferry Road, and Site Driveway #3 intersects with Keyes Ferry Road. Site Driveway #1 is proposed to be located approximately 3,000 feet south of the interchange of US 340/WV 51 with WV 9 approaching US 340/WV 9 from the east and operates as a full movement approach with two-way stop-control (TWSC). Site Driveway #2 approaches Keyes Ferry Road from the south approximately 6,850 feet west of Cattail Run Road and operates as a full movement approach with TWSC. Site Driveway #3 approaches Keyes Ferry Road from the south approximately 6,450 feet west of Cattail Run Road and operates as a full movement approach with TWSC.

Traffic analysis will consider future conditions at the anticipated build-out year of 2025. This report summarizes analyses of 2021 Existing conditions, 2025 No-Build conditions (without the proposed development in place), 2025 Build conditions (with the entire proposed development in place), and 2025 Build Improved conditions (with the proposed development and recommended improvements in place) during the weekday AM and PM peak hours. The annual growth rate of 1.40% was obtained from WVDOH Performance Management Division for US 340 near the proposed site location in Jefferson County.

Five adjacent traffic impact studies have been included in this report as pending developments that will be partially or fully completed by the Build Year. These developments are the Flynn Property residential development located north of US 340 and west of Patrick Henry Way, Green Hill residential development located north of Daniel Road (CR 18) connecting with Flowing Springs Road, Aspen Greens residential development located east of Flowing Springs Road connecting with Old Country Club Road (CR 24), Country Club Commons residential development located north of US 340 and connecting with Old Country Club, and the US 340 Mixed-Use development located south of US 340 near Keyes Ferry Road. The Flynn Property, Green Hill, and Aspen Greens developments are anticipated to be complete in 2025 and the estimated traffic generated by the sites are included in background traffic volumes beginning in 2025 No-Build conditions. Currently, the Aspen Greens residential development is partially complete (46 of the approved 85 single-family lots built-out) thus site trips were estimated based on the 39 remaining lots to be built-out by 2025. The remaining Aspen Greens estimated traffic generated by the site is included in background traffic volumes beginning in 2025 No-Build conditions. The Country Club Commons and Phase 1 of the US 340 Mixed-Use developments are anticipated to be complete in 2024 and the estimated traffic generated by the site is included in background traffic volumes beginning in 2025 No-Build conditions. Information regarding pending development projects is located in **Appendix H**.

AMT (A. Morton Thomas and Associates, Inc.) was retained to determine the projected traffic impacts of the proposed development in accordance with the guidelines set forth by WVDOH (Division of Highways) Traffic Engineering Directive (TED) 106-2. The intent of the study is to fully examine the impacts of the traffic generated by the development on the existing transportation system and identify potential

mitigation measures. This report presents trip generation, trip distribution, intersection capacity analysis, queuing analysis, auxiliary lane analysis, signal warrant analysis, and recommendations for transportation improvements necessary to meet anticipated traffic demands.

Based upon a review of the site plan and adjacent transportation network and following scope of work coordination with WVDOH, the following nine (9) existing and two (2) proposed intersections are included within the scope of the Traffic Impact Study (TIS) for the proposed Fritts Farm residential development:

1) US 340/WV 51 with WV 9 Eastbound Ramps *(Signalized "T" type intersection)*
2) US 340/WV 51 with WV 9 Westbound Ramps *(Signalized Plus type intersection)*
3) US 340 with Keyes Ferry Road (CR 26)/Jefferson Terrace Road *(Signalized Plus type intersection)*
4) US 340 with Patrick Henry Way/Somerset Village Road *(Signalized Plus type intersection)*
5) Keyes Ferry Road/Somerset Blvd (CR 340/6) with Troy Drive *(TWSC Plus type intersection)*
6) Somerset Boulevard with Somerset Village Road *(TWSC Plus type intersection)*
7) Keyes Ferry Road with Cattail Run Road (CR 9/3)/Marlowe Road *(TWSC Plus type intersection)*
8) WV 9 with Cattail Run Road *(TWSC Plus type intersection)*
9) US 340/WV 9 with C/A Break (SD #1) *(TWSC Plus type intersection)*
10) Keyes Ferry Road with Site Driveway #2 *(Proposed TWSC "T" type intersection)*
11) Keyes Ferry Road with Site Driveway #3 *(Proposed TWSC "T" type intersection)*

Traffic Volume

Peak hour turning movement counts were collected for eight of the nine existing intersections on Friday April 30, 2021 between the hours of 7-9 AM and 3-6 PM. Additionally, a full 12-hour turning movement count was collected at the intersection of WV 9 with Cattail Run Road on Friday April 30, 2021 between the hours of 7 AM-7 PM. On this date, Jefferson County Schools were fully operational with in classroom instruction for all students. The turning movement counts were compared with the existing AADT and determined to be reasonable as a check and calibration for COVID-19 impacts.

The proposed development is expected to be complete by 2025. The 2025 No-Build traffic volumes include the existing 2021 traffic volumes, the anticipated traffic generated by the pending Flynn Property development, the anticipated traffic generated by the pending Green Hill development, the anticipated traffic generated by the pending Aspen Greens development, the anticipated traffic generated by the pending Country Club Commons development, the anticipated traffic generated by Phase 1 of the pending US 340 Mixed-Use development, and the anticipated annual traffic growth prior to 2025. The growth rate of 1.40% was applied to the existing peak hour traffic counts in order to develop 2025 No-Build conditions without the site development in place.

The 2025 Build Conditions include the existing 2021 traffic volume, the anticipated traffic generated by the pending Flynn Property development, the anticipated traffic generated by the pending Green Hill development, the anticipated traffic generated by the pending Aspen Greens development, the anticipated traffic generated by the pending Country Club Commons development, the anticipated traffic generated by Phase 1 of the pending US 340 Mixed-Use development, the anticipated annual traffic growth prior to 2025, and the traffic generated by build-out of the Fritts Farm development. Site generated traffic was distributed into the transportation network based upon existing traffic patterns and anticipated origin and destination of the new site trips.

Site Trip Generation and Distribution

The proposed Fritts Farm residential development includes 255 single-family homes and 56 townhomes. Trip generation "Peak Hour of Generator" rates from ITE Trip Generation Manual, 10th Edition, were utilized for Single-Family Detached Housing (LUC 210) and Multifamily Housing (LUC 220). Trip generation analysis indicates that a total of 2,817 new daily trips will be generated including, 225 AM peak hour trips, and 293 PM peak hour trips.

The AM and PM peak hour trips to/from the proposed site were distributed based upon interpolation from current traffic patterns with all trips entering the development via US 340/WV 9 and Keyes Ferry Road. Distribution of the new external trips are as follows:

- 20% to/from the east on WV 9 (Hillsboro, VA)
- 25% to/from the west on WV 9 (Martinsburg)
- 30% to/from the north on US 340 (Harpers Ferry)
- 20% to/from the south on US 340 (Berryville, VA)
- 5% to/from the west on WV 51 (Charles Town)

2021 Existing Conditions Analysis

The results of the 2021 existing conditions capacity analyses indicate that eight (8) traffic movements currently operate worse than LOS D, which is considered the minimum tolerable level. Traffic movements that currently operate worse than LOS D are as follows (movements shown in bold type indicate they first appear in the milestone analysis being discussed):

- ***WV 9 Eastbound exit ramp left-turn movement to US 340 LOS F during AM and PM peak hours***
- ***US 340 Northbound left-turn movement to WV 51 LOS E during AM and PM peak hours***
- ***WV 51 Eastbound left-turn movement to WV 9 Westbound entrance ramp LOS F during PM peak hour***
- ***Keyes Ferry Road shared left/thru lane to US 340 LOS E during AM and PM peak hours***
- ***US 340 Southbound left-turn movement to Keyes Ferry Road LOS E during AM and PM peak hours***
- ***Somerset Village Road left-turn movement to US 340 LOS E during PM peak hour***
- ***US 340 Southbound left-turn movement to Patrick Henry Way LOS E during AM and PM peak hours***
- ***Cattail Run Road Southbound left-turn movement to WV 9 LOS E during PM peak hour***

2025 No-Build Conditions Analysis

The results of the 2025 No-Build Conditions capacity analyses indicate that the traffic movements that operate worse than LOS D during the 2021 Existing conditions are expected to continue to operate worse than LOS D. Six (6) additional turning movements are expected to operate worse than LOS D during 2025 No-Build Conditions (shown in bold). Traffic movements that are anticipated to operate worse than LOS D include the following:

- *WV 9 Eastbound exit ramp left-turn movement to US 340 LOS F during AM and PM peak hours*
- *US 340 Northbound left-turn movement to WV 51 LOS E during AM and PM peak hours*

- *WV 51 Eastbound left-turn movement to WV 9 Westbound entrance ramp LOS F during PM peak hour*
- ***US 340 Southbound shared thru/right lane to WV 9 Westbound entrance ramp LOS F during PM peak hour***
- *Keyes Ferry Road shared left/thru lane to US 340 LOS E during AM and PM peak hours*
- *US 340 Southbound left-turn movement to Keyes Ferry Road LOS E during AM and PM peak hours*
- ***Patrick Henry Way left-turn movement to US 340 LOS E during AM peak hour***
- ***Patrick Henry Way shared left/thru lane to US 340 LOS E during AM peak hour***
- *Somerset Village Road left-turn movement to US 340 LOS E during AM and PM peak hours*
- *US 340 Southbound left-turn movement to Patrick Henry Way LOS E during AM and PM peak hours*
- ***Cattail Run Road Northbound left-turn movement to WV 9 LOS E during PM peak hour***
- ***Cattail Run Road Northbound shared thru/right lane to WV 9 LOS E during PM peak hour***
- *Cattail Run Road Southbound left-turn movement to WV 9 LOS F during PM peak hour*
- ***Cattail Run Road Southbound shared thru/right lane to WV 9 LOS E during PM peak hour***

2025 Build Conditions Analysis

The results of the 2025 Build Conditions capacity analyses indicate that the traffic movements that operate worse than LOS D during the 2025 No-Build conditions are expected to continue to operate worse than LOS D following build-out of Fritts Farm. Two (2) additional turning movement is expected to operate worse than LOS D during 2025 Build Conditions (shown in bold). Traffic movements that are anticipated to operate worse than LOS D include the following:

- *WV 9 Eastbound exit ramp left-turn movement to US 340 LOS F during AM and PM peak hours*
- *US 340 Northbound left-turn movement to WV 51 LOS E during AM and PM peak hours*
- *WV 51 Eastbound left-turn movement to WV 9 Westbound entrance ramp LOS F during PM peak hour*
- *US 340 Southbound shared thru/right lane to WV 9 Westbound entrance ramp LOS F during PM peak hour*
- *Keyes Ferry Road shared left/thru lane to US 340 LOS E during AM and PM peak hours*
- *US 340 Southbound left-turn movement to Keyes Ferry Road LOS E during AM and PM peak hours*
- *Patrick Henry Way left-turn movement to US 340 LOS E during AM peak hour*
- *Patrick Henry Way shared left/thru lane to US 340 LOS E during AM peak hour*
- *Somerset Village Road left-turn movement to US 340 LOS E during AM and PM peak hours*
- *US 340 Southbound left-turn movement to Patrick Henry Way LOS E during AM and PM peak hours*
- ***Keyes Ferry Road shared left/thru/right lane to Somerset Boulevard LOS E during PM peak hour***
- *Cattail Run Road Northbound left-turn movement to WV 9 LOS E during PM peak hour*
- *Cattail Run Road Northbound shared thru/right lane to WV 9 LOS E during PM peak hour*
- *Cattail Run Road Southbound left-turn movement to WV 9 LOS F during PM peak hour*
- *Cattail Run Road Southbound shared thru/right lane to WV 9 LOS E during PM peak hour*
- ***Site Drive #1 Westbound left-turn movement to US 340/WV 9 LOS F during AM and PM peak hours***

2025 Build Improved Conditions Analysis

Improvements included in the 2025 Build Improved Conditions consist of lengthening storage length on the WV 9 eastbound exclusive right-turn lane to US 340, lengthening storage length on the WV 9 westbound exclusive right-turn lane to US 340, lengthening storage length on the US 340 northbound exclusive left-turn lane to Jefferson Terrace Road, lengthening storage length on the US 340 southbound exclusive left-turn lane to Somerset Village Road, lengthening storage length on the US 340 southbound exclusive right-turn lane to Patrick Henry Way, lengthening storage length on the Patrick Henry southbound exclusive right-turn lane to US 340, lengthening storage length on the US 340 Southbound/WV 9 Eastbound left-turn lane to Site Driveway #1, construction of an additional exclusive left-turn lane on the WV 9 Ramp eastbound approach to US 340/WV 51, construction of an exclusive right-turn lane on the US 340 southbound approach to WV 9 WB Ramps, construction of an exclusive right-turn lane on the Jefferson Terrace Road eastbound approach to US 340, construction of an exclusive right-turn lane on the US 340/WV 9 westbound approach to Site Drive #1, and removal of split phasing at the US 340 with Patrick Henry Way/Somerset Village Road intersection. Additionally, cycle lengths, split timings, and offsets were optimized to improve operation at the Build Year.

The results of the 2025 Build Improved Conditions capacity analyses indicate that traffic movements that operate worse than LOS D during the 2025 Build Conditions are anticipated to continue. However, three (3) traffic movements that operate worse than LOS D during 2025 Build Conditions are resolved with proposed improvements in place. Traffic movements that are anticipated to operate worse than LOS D include the following:

- *WV 9 Eastbound left-turn movement to US 340 LOS E during PM peak hour*
- *US 340 Northbound left-turn movement to WV 51 LOS E during PM peak hour*
- *WV 51 Eastbound left-turn movement to WV 9 Westbound entrance ramp LOS E during PM peak hour*
- *Keyes Ferry Road shared left/thru lane to US 340 LOS E during AM peak hour and LOS F during PM peak hour*
- *US 340 Southbound left-turn movement to Keyes Ferry Road LOS E during AM and PM peak hours*
- *US 340 Southbound left-turn movement to Patrick Henry Way LOS E during PM peak hour*
- *Keyes Ferry Road shared left/thru/right lane to Somerset Boulevard LOS E during PM peak hour*
- *Cattail Run Road Northbound left-turn movement to WV 9 LOS E during PM peak hour*
- *Cattail Run Road Northbound shared thru/right lane to WV 9 LOS E during PM peak hour*
- *Cattail Run Road Southbound left-turn movement to WV 9 LOS F during PM peak hour*
- *Cattail Run Road Southbound shared thru/right lane to WV 9 LOS E during PM peak hour*
- *Site Drive #1 Westbound left-turn movement to US 340/WV 9 LOS F during AM and PM peak hours*

Conclusions/Recommendations

Based on the findings of this study, the following capacity infrastructure improvements are recommended to address issues noted as part of the Existing and No-Build analysis (Not related to the development of Fritts Farm) as well as issues documented during field review:

US 340 Traffic Signals

- Repair the various actuation failures for the traffic signals on US 340.

- Optimize traffic signal timings to improve efficiency prior to the 2025 Build Year. Based on analysis, cycle lengths can be reduced minimally with optimized split timings and offsets to provide more efficient signal operations along US 340.

US 340/WV 51 with WV 9 Eastbound Ramps (From Martinsburg/To Berryville, VA)

- Widen the existing WV 9 eastbound exit ramp (From Martinsburg) to include an additional exclusive left-turn lane creating a dual left-turn movement. Currently, the left-turn movement operates at a LOS F during the 2021 Existing Conditions AM and PM peak hours with a queue of approximately 571 feet during the PM peak hour. Creating a dual left-turn configuration improves LOS to E in the AM and PM peak hours. The additional left-turn lane should contain 400 feet of full-width storage plus appropriate taper.

- Extend the existing WV 9 eastbound exit ramp (From Martinsburg) exclusive right-turn lane approaching US 340/WV 51 to 400 feet of full-width storage with appropriate taper. Currently, the exclusive left-turn movement has a queue extending beyond the existing storage length of the right-turn lane. Following the construction of an additional left-turn lane, the left-turn movement is anticipated to have a queue length of approximately 331 feet during the 2025 Build Improved Conditions PM peak hour.

US 340/WV 51 with WV 9 Westbound Ramps (From Berryville, VA/To Martinsburg)

- Construct an exclusive right-turn lane on the US 340 southbound approach (From Harpers Ferry) to the WV 9 westbound ramps (From Berryville, VA/To Martinsburg) to include 350 feet of full-width storage plus appropriate taper. Currently, the approach has a through queue of 312 feet during the 2021 Existing Conditions AM peak hour which inhibits right-turning vehicles from accessing the WV 9 ramp. The exclusive right-turn movement is anticipated to have a queue length of approximately 91 feet during the 2025 Build Improved Conditions PM peak hour with the thru movement being approximately 280 feet.

- Extend the existing WV 9 westbound exit ramp (From Berryville, VA) exclusive right-turn lane to US 340 to 400 feet of full-width storage with appropriate taper. Currently, the exclusive left-turn movement has a queue extending beyond the existing storage length of the right-turn lane and does not allow right-turning vehicles to access the intersection.

- Modify signal phasing for the left-turn movement from WV 51 Eastbound to WV 9 Westbound Expressway from a lag to a lead phase. Analysis shows that the measure improves LOS.

US 340 with Keyes Ferry Road/Jefferson Terrace Road

- Extend the existing US 340 northbound (From Charles Town) exclusive left-turn lane to Jefferson Terrace Road to a minimum of 150 feet of full-width storage with appropriate taper. The exclusive left-turn movement is anticipated to extend beyond the existing storage length during the 2025 No-Build Conditions AM and PM peak hours.

- Extend the existing US 340 southbound (From Harpers Ferry) exclusive left-turn lane to Keyes Ferry Road to a minimum of 125 feet of full-width storage with appropriate taper. The exclusive

left-turn movement is anticipated to extend beyond the existing storage length during the 2025 No-Build Conditions PM peak hour.

US 340 with Patrick Henry Way/Somerset Village Road

- Extend the existing Patrick Henry Way exclusive right-turn lane to US 340 to a minimum of 275 feet of full-width storage with appropriate taper. Currently, the exclusive right-turn movement extends beyond the existing storage length during the 2021 Existing Conditions PM peak hour.

- Extend the existing US 340 southbound (From Harpers Ferry) exclusive left-turn lane to Somerset Village Road (opposite Patrick Henry Way) to a minimum of 450 feet of full-width storage with appropriate taper. Currently, the exclusive left-turn movement extends beyond the existing storage during the 2025 No-Build Conditions PM peak hour.

- Extend the existing US 340 southbound (From Harpers Ferry) exclusive right-turn lane to Patrick Henry Way to a minimum of 525 feet of full-width storage with appropriate taper. Currently, the exclusive right-turn movement extends beyond the existing storage during the 2025 No-Build Conditions PM peak hour.

- Modify the lane configuration on the Patrick Henry Way approach to US 340 to create a single left-turn lane so that the phasing can be modified to protected/permitted to eliminate split phasing. This modification improves LOS of the intersection in the build condition and there does not appear to be forecast traffic from Patrick Henry Way that necessitates a dual left-turn movement.

WV 9 with Cattail Run Road

- Extend the existing Cattail Run Road southbound exclusive left-turn lane to WV 9 to a minimum of 125 feet of full-width storage with appropriate taper. The exclusive left-turn movement is anticipated to extend beyond the existing storage length during the 2025 No-Build Conditions PM peak hour.

- Continue to monitor the intersection regarding the need for a traffic signal at the intersection, since Warrant 2 is met but Warrant 1 is not (6 of 12 hours meet Condition B). Further evaluate crash data to determine if Warrant 7 is potentially applicable at this location.

Based on the findings of this study, the following infrastructure improvements are recommended to accommodate the adjacent Flynn Property residential development and maintain acceptable operation of the existing transportation network in 2025:

US 340 with Keyes Ferry Road/Jefferson Terrace Road

- Widen Jefferson Terrace Road to construct an exclusive right-turn lane approach to US 340. The anticipated queuing from the right-turn movement is estimated to be approximately 61 feet during the 2025 Build Improved Conditions PM peak hour. The Jefferson Terrace Road southbound exclusive right-turn lane should be constructed to provide 125 feet of full-width storage with appropriate taper.

- Modify the lane configuration on the Jefferson Terrace Road approach to US 340 to create a shared left/thru and right-turn only lane to improve LOS.

Based on the findings of this study, the following infrastructure improvements are recommended to accommodate the Fritts Farm residential development and maintain acceptable operation of the existing transportation network in 2025:

US 340/WV 9 with Site Driveway #1

- Construct Site Driveway #1 as a full movement approach intersecting with US 340/WV 9 approximately 3,000 feet south of the interchange of US 340/WV 51 with WV 9. The site driveway is recommended to include one ingress and two egress lanes to provide separate left and right turn lanes exiting the development. Site Driveway #1 will operate under stop-control while US 340/WV 9 operates as free-flow.

- Construct an exclusive right-turn lane on the US 340/WV 9 northbound (From Berryville, VA) approach to Site Driveway #1. The US 340/WV 9 northbound exclusive right-turn lane should be constructed to provide 250 feet of full-width storage with appropriate taper. This measure is intended to remove right turning traffic from higher speed through traffic as a speed change lane and is not prompted by a LOS deficiency.

- Extend the existing US 340 Southbound/WV 9 Eastbound exclusive left-turn lane to Site Driveway #1 to a minimum of 250 feet of full-width storage. The exclusive left-turn movement is estimated to be approximately 213 feet during the 2025 Build Improved Conditions PM peak hour.

- Extend the taper length for the existing US 340 Southbound/WV 9 Eastbound exclusive left-turn lane to Site Driveway #1 to 240 feet. The existing turn lane has a full-width storage length of 125 feet with a taper of 100 feet. Per DD 622, the turn lane should have a minimum taper of 240 feet.

Keyes Ferry Road with Site Driveway #2

- Construct Site Driveway #2 as a full movement approach intersecting with Keyes Ferry Road approximately 6,850 feet west of Cattail Run Road. The site driveway is recommended to include one ingress and two egress lanes to provide separate left and right turn lanes exiting the development. Site Driveway #2 will operate under stop-control while Keyes Ferry Road operates as free-flow.

Keyes Ferry Road with Site Driveway #3

- Construct Site Driveway #3 as a full movement approach intersecting with Keyes Ferry Road approximately 6,450 feet west of Cattail Run Road. The site driveway is recommended to include one ingress and two egress lanes to provide separate left and right turn lanes exiting the development. Site Driveway #3 will operate under stop-control while Keyes Ferry Road operates as free-flow.

INTRODUCTION

This report summarizes existing and future traffic analyses conducted in support of the proposed Fritts Farm Residential Development. Fritts Farm is proposed southeast of the interchange of WV 9 with US 340 and WV 51 in Charles Town, Jefferson County. The proposed site plan includes 255 single-family homes and 56 townhomes. Fritts Farm is expected to be built-out by 2025.

The proposed residential development is anticipated to be served by one site driveway utilizing an existing C/A access break to US 340/WV 9 and two site driveways intersecting directly with Keyes Ferry Road. Site Driveway #1 intersects with US 340/WV 9, Site Driveway #2 intersects with Keyes Ferry Road, and Site Driveway #3 intersects with Keyes Ferry Road. Site Driveway #1 is proposed to be located approximately 3,000 feet south of the interchange of US 340/WV 51 with WV 9 approaching US 340/WV 9 from the east and operates as a full movement approach with two-way stop-control (TWSC). Site Driveway #2 approaches Keyes Ferry Road from the south approximately 6,850 feet west of Cattail Run Road and operates as a full movement approach with TWSC. Site Driveway #3 approaches Keyes Ferry Road from the south approximately 6,450 feet west of Cattail Run Road and operates as a full movement approach with TWSC.

Traffic analysis will consider future conditions at the anticipated build-out year of 2025. This report summarizes analyses of 2021 Existing conditions, 2025 No-Build conditions (without the proposed development in place), 2025 Build conditions (with the entire proposed development in place), and 2025 Build Improved conditions (with the proposed development and recommended improvements in place) during the weekday AM and PM peak hours. The annual growth rate of 1.40% was obtained from WVDOH Performance Management Division for US 340 near the proposed site location in Jefferson County.

Five adjacent traffic impact studies have been included in this report as pending developments that will be partially or fully completed by the Build Year. These developments are the Flynn Property residential development located north of US 340 and west of Patrick Henry Way, Green Hill residential development located north of Daniel Road (CR 18) connecting with Flowing Springs Road, Aspen Greens residential development located east of Flowing Springs Road connecting with Old Country Club Road (CR 24), Country Club Commons residential development located north of US 340 and connecting with Old Country Club, and the US 340 Mixed-Use development located south of US 340 near Keyes Ferry Road. The Flynn Property, Green Hill, and Aspen Greens developments are anticipated to be complete in 2025 and the estimated traffic generated by the sites are included in background traffic volumes beginning in 2025 No-Build conditions. Currently, the Aspen Greens residential development is partially complete (46 of the approved 85 single-family lots built-out) thus site trips were estimated based on the 39 remaining lots to be built-out by 2025. The remaining Aspen Greens estimated traffic generated by the site is included in background traffic volumes beginning in 2025 No-Build conditions. The Country Club Commons and Phase 1 of the US 340 Mixed-Use developments are anticipated to be complete in 2024 and the estimated traffic generated by the site is included in background traffic volumes beginning in 2025 No-Build conditions. Information regarding pending development projects is located in **Appendix H**.

AMT (A. Morton Thomas and Associates, Inc.) was retained to determine the projected traffic impacts of the proposed development in accordance with the guidelines set forth by WVDOH (Division of Highways) Traffic Engineering Directive (TED) 106-2. The intent of the study is to fully examine the impacts of the traffic generated by the development on the existing transportation system and identify potential

mitigation measures. This report presents trip generation, trip distribution, intersection capacity analysis, queuing analysis, auxiliary lane analysis, signal warrant analysis, and recommendations for transportation improvements necessary to meet anticipated traffic demands.

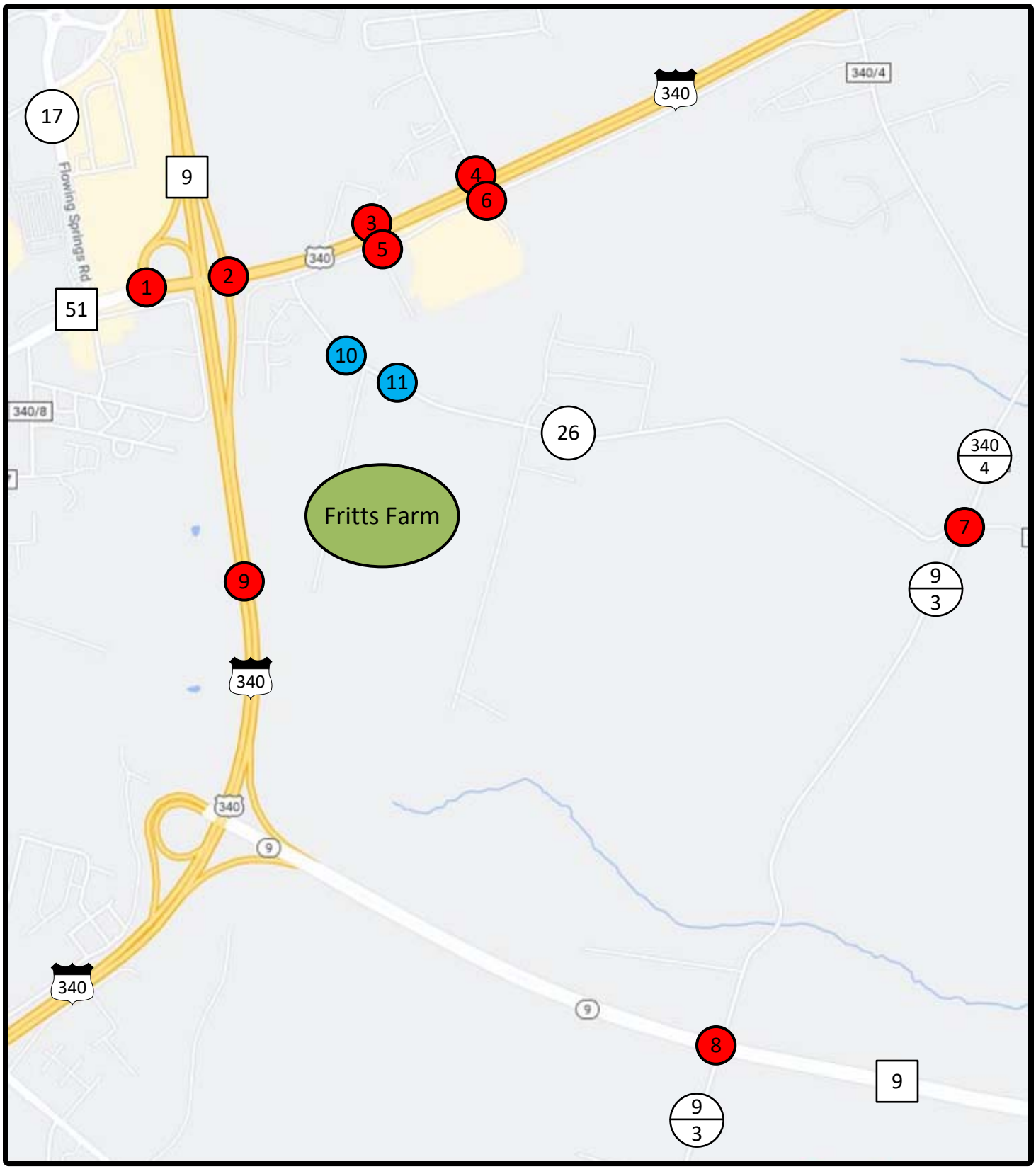
AMT coordinated with WVDOH to determine the intersections to be studied within the scope of work, preliminary trip generation, distribution, and study methodology for this Traffic Impact Study (TIS). A copy of the approved Scope of Work (SOW) is included in **Appendix I**.

STUDY AREA DESCRIPTION

Based upon a review of the site plan and adjacent transportation network and following the approved SOW document in coordination with WVDOH, the following nine (9) existing and two (2) proposed intersections are included within the scope of the Traffic Impact Study (TIS) for the proposed Fritts Farm residential development:

1) US 340/WV 51 with WV 9 Eastbound Ramps *(Signalized "T" type intersection)*
2) US 340/WV 51 with WV 9 Westbound Ramps *(Signalized Plus type intersection)*
3) US 340 with Keyes Ferry Road (CR 26)/Jefferson Terrace Road *(Signalized Plus type intersection)*
4) US 340 with Patrick Henry Way/Somerset Village Road *(Signalized Plus type intersection)*
5) Keyes Ferry Road/Somerset Blvd (CR 340/6) with Troy Drive *(TWSC Plus type intersection)*
6) Somerset Boulevard with Somerset Village Road *(TWSC Plus type intersection)*
7) Keyes Ferry Road with Cattail Run Road (CR 9/3)/Marlowe Road *(TWSC Plus type intersection)*
8) WV 9 with Cattail Run Road *(TWSC Plus type intersection)*
9) US 340/WV 9 with C/A Break *(TWSC Plus type intersection)*
10) Keyes Ferry Road with Site Driveway #2 *(Proposed TWSC "T" type intersection)*
11) Keyes Ferry Road with Site Driveway #3 *(Proposed TWSC "T" type intersection)*

The study area and key intersections are shown on **Figure 1** and the proposed site plan is shown on **Figure 2**.



LEGEND

= Development

= Existing Intersection

= Proposed Intersection

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

Site Location Map

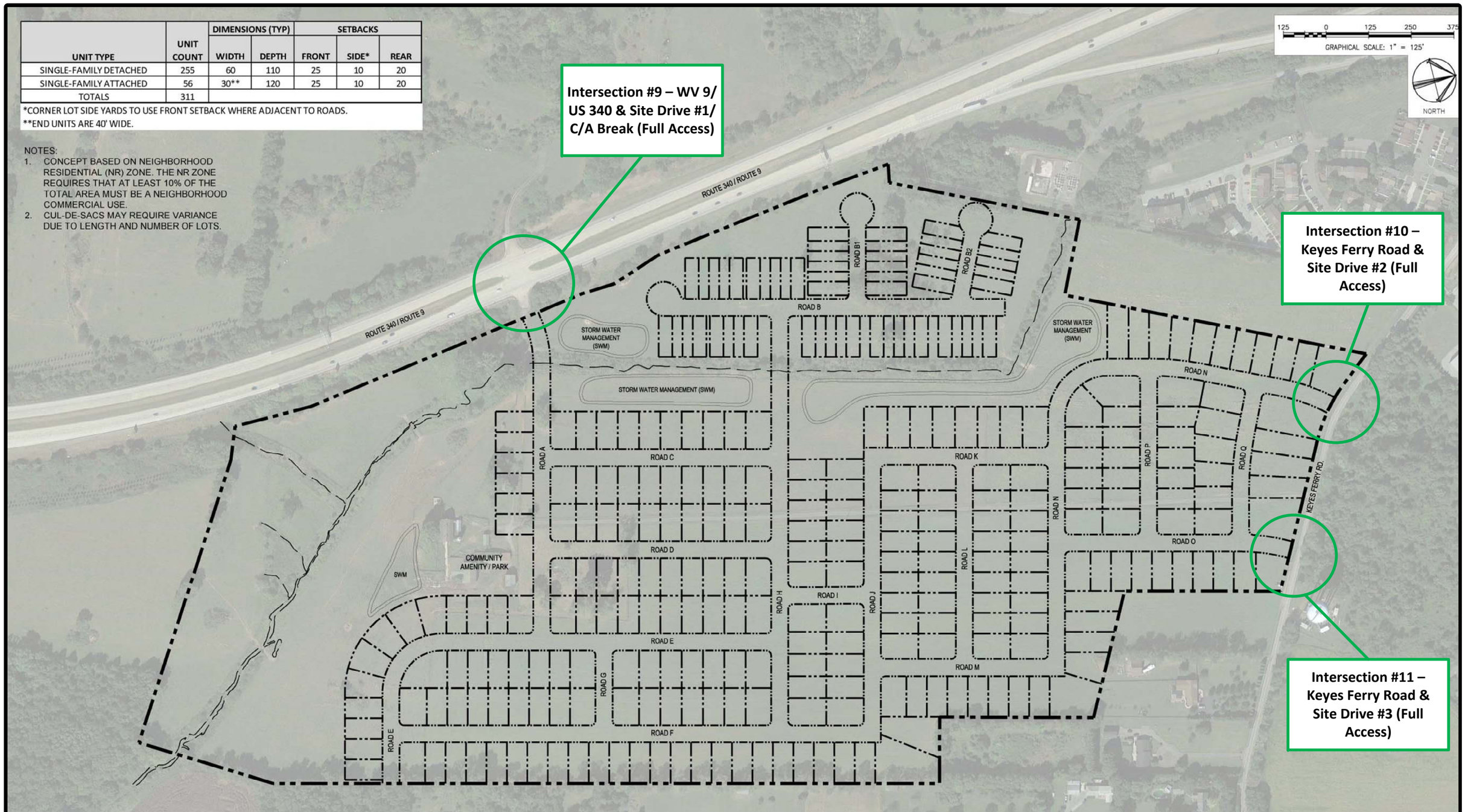
DATE: November 2021

FIGURE 1

UNIT TYPE	UNIT COUNT	DIMENSIONS (TYP)		SETBACKS		
		WIDTH	DEPTH	FRONT	SIDE*	REAR
SINGLE-FAMILY DETACHED	255	60	110	25	10	20
SINGLE-FAMILY ATTACHED	56	30**	120	25	10	20
TOTALS	311					

*CORNER LOT SIDE YARDS TO USE FRONT SETBACK WHERE ADJACENT TO ROADS.
**END UNITS ARE 40' WIDE.

NOTES:
1. CONCEPT BASED ON NEIGHBORHOOD RESIDENTIAL (NR) ZONE. THE NR ZONE REQUIRES THAT AT LEAST 10% OF THE TOTAL AREA MUST BE A NEIGHBORHOOD COMMERCIAL USE.
2. CUL-DE-SACS MAY REQUIRE VARIANCE DUE TO LENGTH AND NUMBER OF LOTS.



N

NOT TO SCALE

Fritts Farm Residential Dev TIS

Site Plan

DATE: November 2021

FIGURE 2

EXISTING ROADWAY CONDITIONS

Below is a detailed description of the existing study area roadway network. AADT (Annual Average Daily Traffic) volume information was obtained from the WVDOH GIS website.

US 340 (William L. Wilson Freeway) is a four-lane divided highway classified as a trunkline within the study area. US 340 forms an interchange with WV 9 and WV 51 north and west of the proposed residential site, serving as a major artery connecting Harpers Ferry and Charles Town and entering Virginia on both its northern and southern terminus. The speed limit on US 340 south of the interchange is 60 mph (miles per hour) and is 45 mph east of the interchange. The AADT is 30,001 vpd (vehicles per day) east of the interchange.

WV 9 (Veterans Memorial Highway) is a four-lane divided highway classified as an expressway within the study area. WV 9 overlaps with US 340 in the south of the Charles Town Interchange before splitting from US 340 and continuing east to Hillsboro VA, serving as a primary east/west facility through Jefferson, Berkeley, and Morgan Counties. The speed limit on this section of WV 9 is 60 mph and the AADT is 26,776 vpd.

WV 51 (E. Washington Street) is a four-lane two-way feeder within the study area. WV 51 begins at the interchange of US 340 with WV 9 and continues west to Charles Town and ultimately I-81 in Berkeley County. The speed limit on WV 51 is 45 mph and the AADT is 19,438 vpd.

Keyes Ferry Road (CR 26) is a two-lane two-way collector (state and local service) roadway within the study area. Keyes Ferry Road intersects with US 340 directly aligned with Jefferson Terrace Road providing access to commercial and residential properties. Keyes Ferry Road serves as a frontage road in close proximity to US 340. The speed limit on Keyes Ferry Road is 35 mph and the AADT is 654 vpd.

Cattail Run Road (CR 9/3) is a two-lane two-way essential arterial within the study area. Cattail Run Road intersects with Keyes Ferry Road to the north and WV 9 to the south serving residential properties and provides access to a rural area. The speed limit on Cattail Run Road is 35 mph and the AADT is 553 vpd.

Marlowe Road (CR 340/4) is a two-lane two-way low volume SLS route classified as an essential arterial within the study area. Marlowe Road intersects with Keyes Ferry Road opposite Cattail Run Road serving residential properties. The speed limit on Marlowe Road is 35 mph and the AADT is 20 vpd. The AADT for Marlowe Road was not available on WVDOH GIS website and thus was calculated based on collected turning movement counts.

Somerset Boulevard (CR 340/6) is a two-lane two-way collector (state and local service) roadway within the study area. Somerset Boulevard intersects with Somerset Village Road and intersects with Keyes Ferry Road (frontage road) providing access to commercial and residential properties. The speed limit on Somerset Boulevard is 35 mph and the AADT is 2,500 vpd. The AADT for Somerset Boulevard was not available on WVDOH GIS website and thus was calculated based on collected turning movement counts.

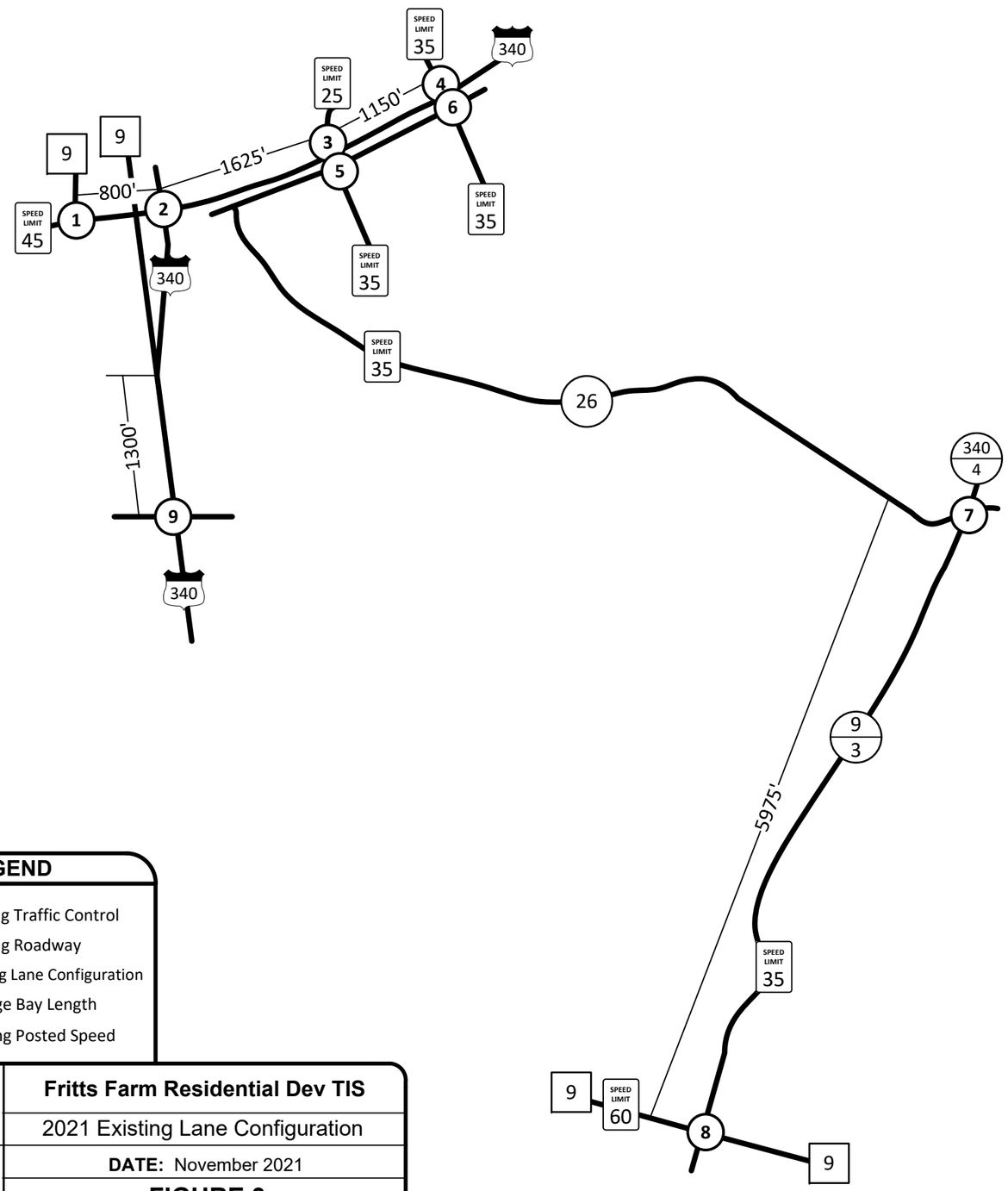
Patrick Henry Way is a two-lane two-way municipal roadway within the study area. Patrick Henry Way intersects with US 340 directly aligned with Somerset Village Road in the eastern end of the study area and serves commercial properties. The speed limit on Patrick Henry Way is 35 mph and the AADT is 9,330

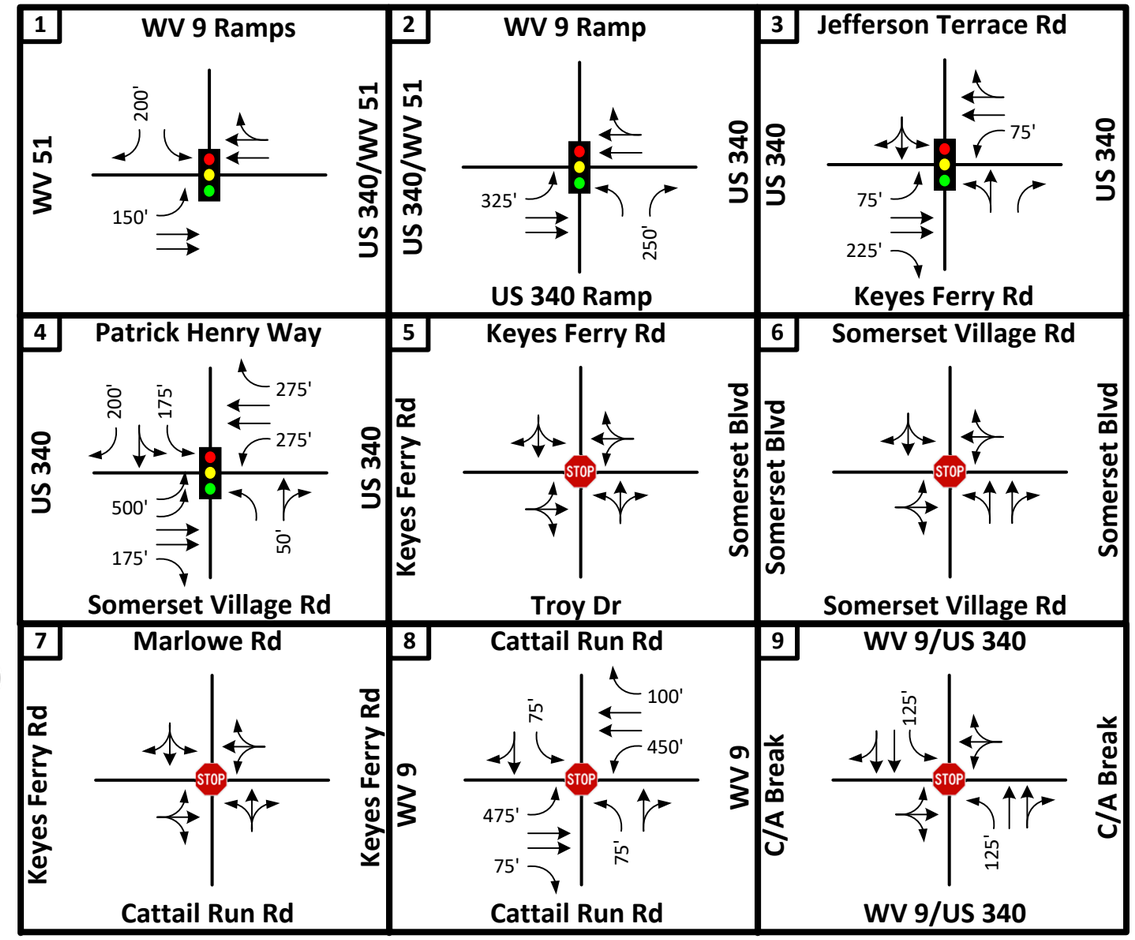
vpd. The AADT for Patrick Henry Way was not available on WVDOH GIS website and thus was calculated based on collected turning movement counts.

Table 1 below provides a detailed description of the existing study area roadway network. In addition, *Estimated* Build Year AADT is included in the table which contains Existing volume, Fritts Farm trips, approved background trips (Flynn Property, Aspen Greens, Green Hill, Country Club Commons, and Phase 1 of the US 340 Mixed-Use developments), and traffic inflation to 2025. The 2021 existing intersection lane configurations and intersection control are shown on **Figure 3**.

Table 1: Roadway Facility Summary

Name	Code	State Functional Classification	Area	Direction	Speed Limit	Typical Roadway Paved Width (ft)	AADT (Year)	**Estimated Build AADT (2025)**	Description
William L. Wilson Freeway	US 340	Trunkline	Jefferson County	N-S	45/60	72	30,001 (2017)	35,960	N-S Trunkline that runs perpendicular to WV 9 creating an interchange
Veterans Memorial Highway	WV 9	Expressway	Jefferson County	E-W	60	72	26,776 (2017)	34,510	E-W Expressway that runs parallel with CR 17 through study area and connects with US 340
E. Washington Street	WV 51	Feeder	Jefferson County	E-W	45	90	19,438 (2017)	24,070	E-W Feeder that connects with US 340 in the western end of the study area
Keyes Ferry Road	CR 26	Collector (SLS Route)	Jefferson County	N-S	35	22	654 (2017)	7,200	N-S Collector that intersects with US 340 in the eastern end of the study area
Cattail Run Road	CR 9/3	Essential Arterial	Jefferson County	N-S	35	20	553 (2017)	2,780	N-S Essential Arterial that intersects with WV 9 in southern end of study area
Marlowe Road	CR 340/4	Essential Arterial	Jefferson County	N-S	35	20	470 (2021)	540	N-S Essential Arterial that intersects with CR 26 & CR 9/3 in the eastern end of the study area
Somerset Boulevard	CR 340/6	Collector (SLS Route)	Jefferson County	E-W	35	22	2,500 (2021)	2,620	E-W Collector that runs parallel to US 340 and connects with Keyes Ferry Road
Patrick Henry Way	N/A	Municipal Street	Jefferson County	N-S	35	36	9,330 (2021)	11,110	N-S Municipal Street that intersects with US 340 in the eastern end of the study area





LEGEND

- STOP Existing Traffic Control
- Existing Roadway
- Existing Lane Configuration
- XXX' Storage Bay Length
- SPEED LIMIT XX Existing Posted Speed

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

2021 Existing Lane Configuration

DATE: November 2021

FIGURE 3

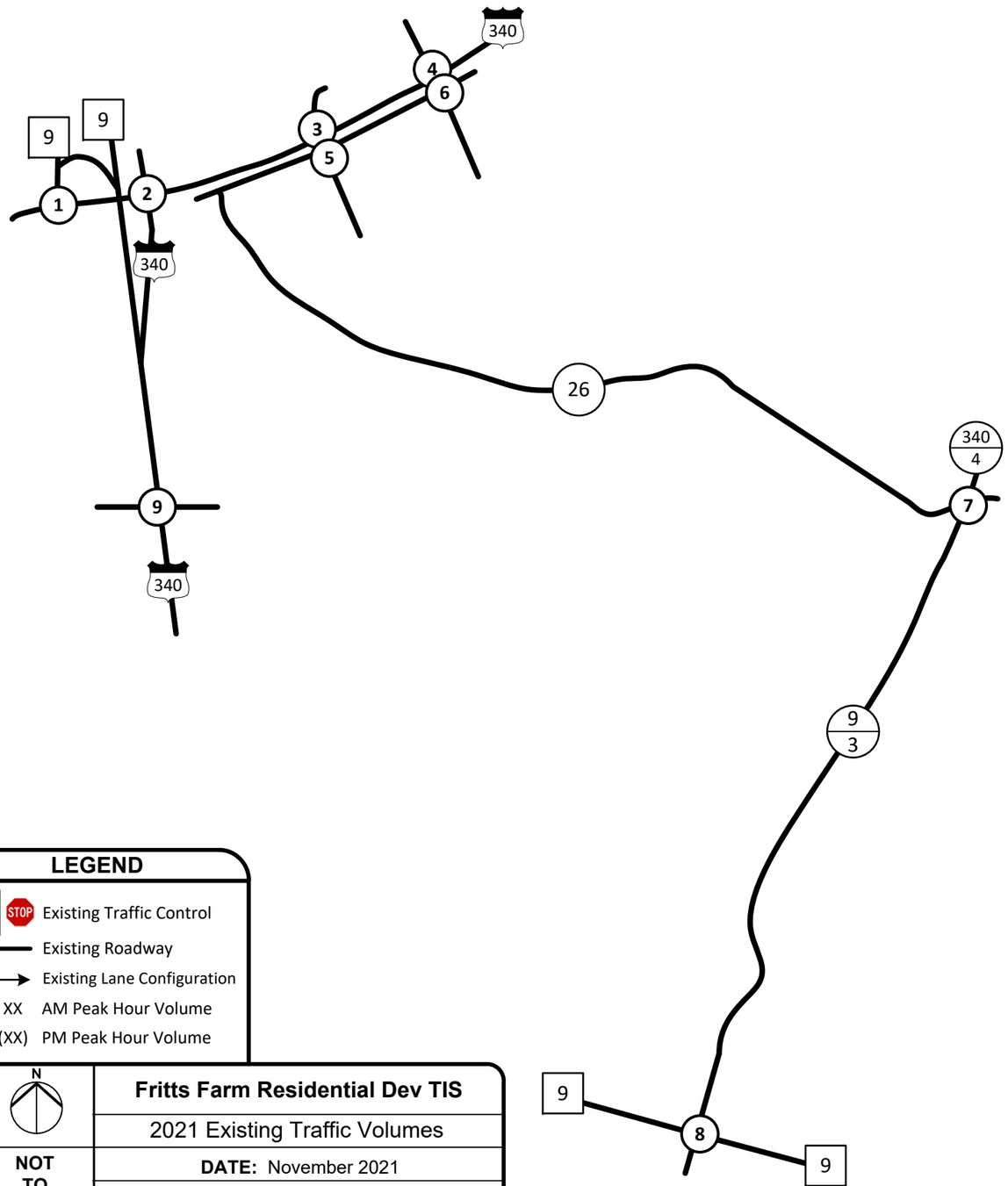
EXISTING & NO-BUILD PROJECT TRAFFIC VOLUMES

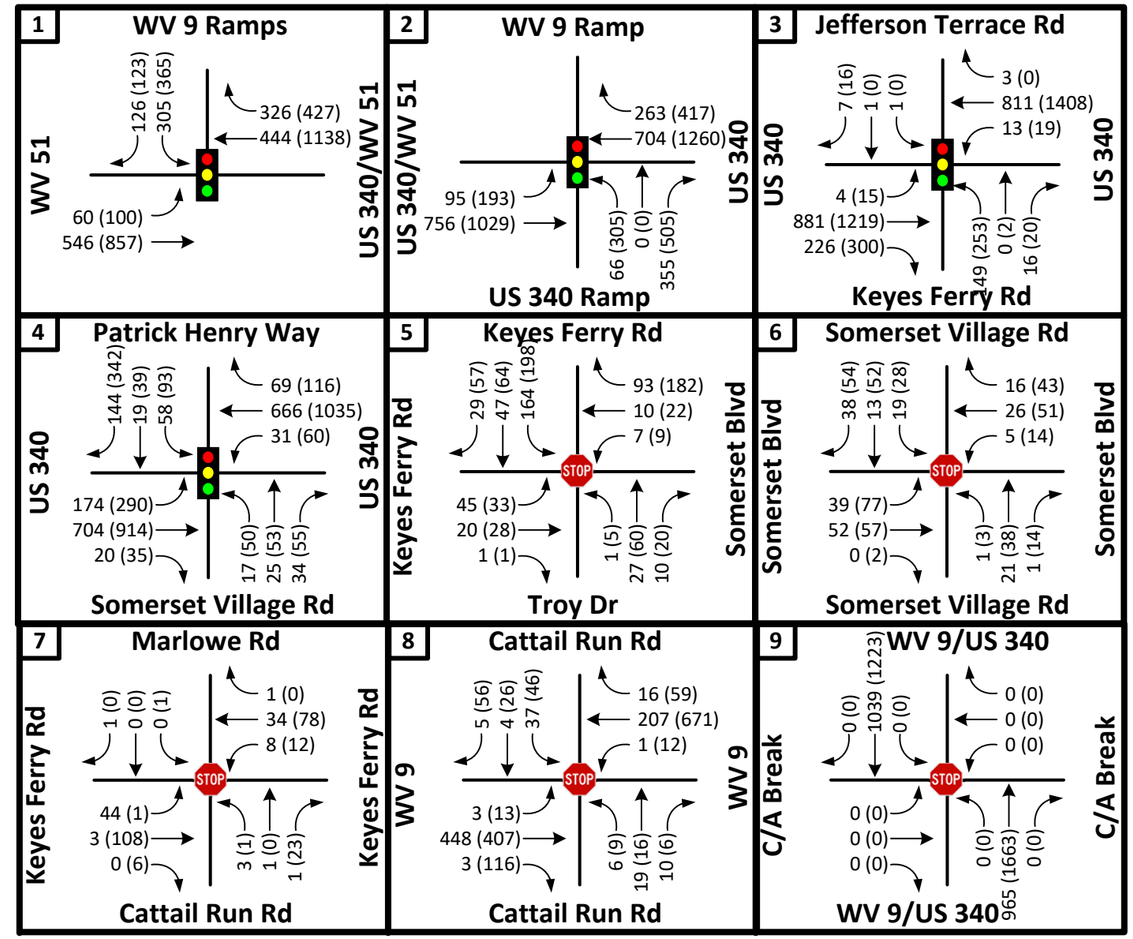
2021 Existing Conditions

Peak hour turning movement counts were collected for eight of the nine existing intersections on Friday April 30, 2021 between the hours of 7-9 AM and 3-6 PM. Additionally, a full 12-hour turning movement count was collected at the intersection of WV 9 with Cattail Run Road on Friday April 30, 2021 between the hours of 7 AM-7 PM. On this date, Jefferson County Schools were fully operational with in classroom instruction for all students. The turning movement counts were compared with the existing AADT and determined to be reasonable as a check and calibration for COVID-19 impacts. The traffic count data is located in **Appendix B** and the 2021 Existing Traffic Volumes for the weekday AM and PM peak hour volumes are shown in **Figure 4**.

2025 No-Build Conditions

The proposed development is expected to be complete by 2025. The 2025 No-Build traffic volumes include the existing 2021 traffic volumes, the anticipated traffic generated by the pending Flynn Property development, the anticipated traffic generated by the pending Green Hill development, the anticipated traffic generated by the ongoing Aspen Greens development, the anticipated traffic generated by the pending Country Club Commons development, the anticipated traffic generated by Phase 1 of the pending US 340 Mixed-Use development, and the anticipated annual traffic growth prior to 2025. The growth rate of 1.40% was applied to the existing peak hour traffic counts in order to develop 2025 No-Build conditions without the site development in place. The 2025 No-Build Traffic Volumes for the weekday AM and PM peak hour volumes are shown in **Figure 5**. **Figure 6** displays the approximate location of background developments included in relation to the proposed Fritts Farm development. The total background development trips for the weekday AM and PM peak hours are shown on **Figure 7** to illustrate the increase in traffic volume resulting from adjacent projects included within this study.





LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Lane Configuration
- XX AM Peak Hour Volume
- (XX) PM Peak Hour Volume

N

NOT TO SCALE

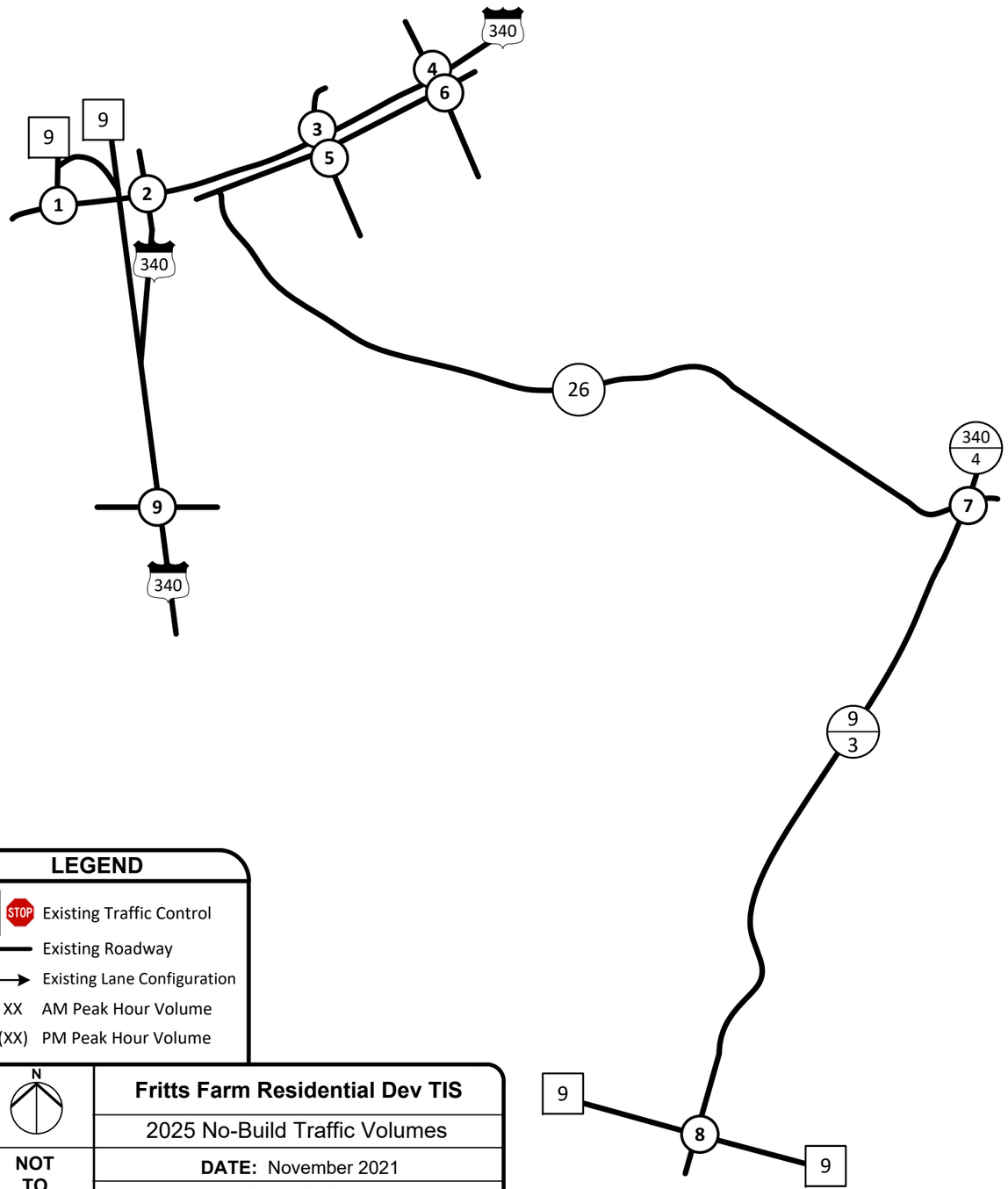
Fritts Farm Residential Dev TIS

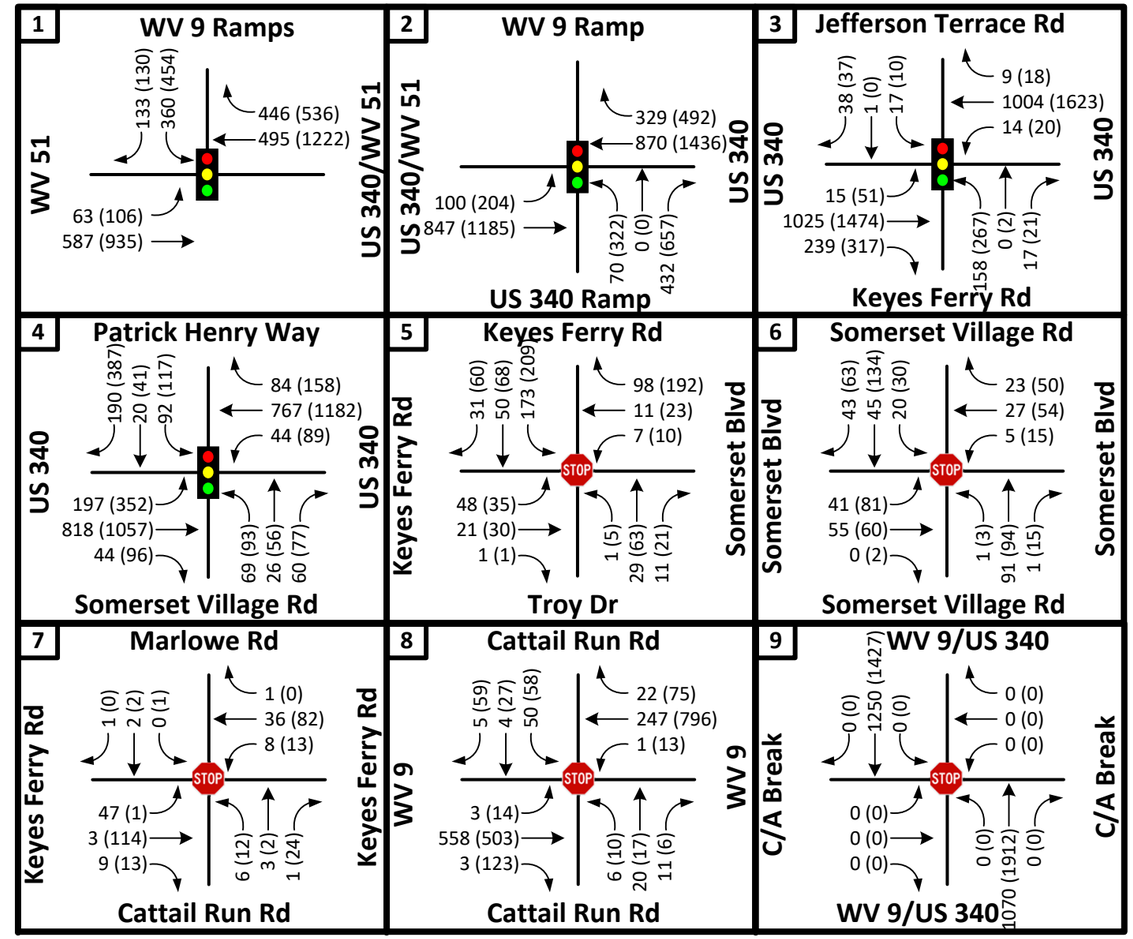
2021 Existing Traffic Volumes

DATE: November 2021

FIGURE 4

AMT





LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Lane Configuration
- XX AM Peak Hour Volume
- (XX) PM Peak Hour Volume

N

NOT TO SCALE

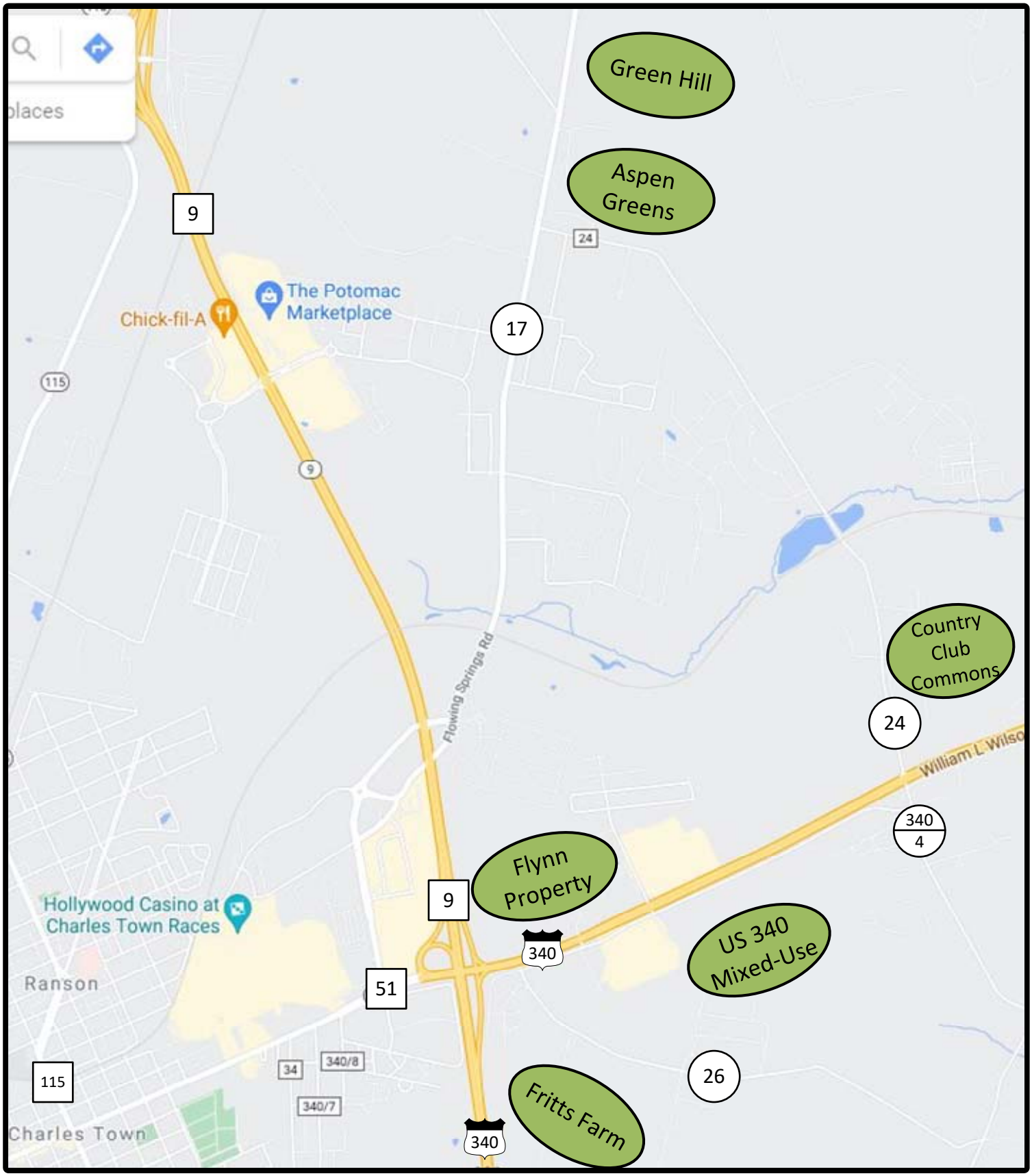
Fritts Farm Residential Dev TIS

2025 No-Build Traffic Volumes

DATE: November 2021

FIGURE 5

AMT



LEGEND

= Development

N

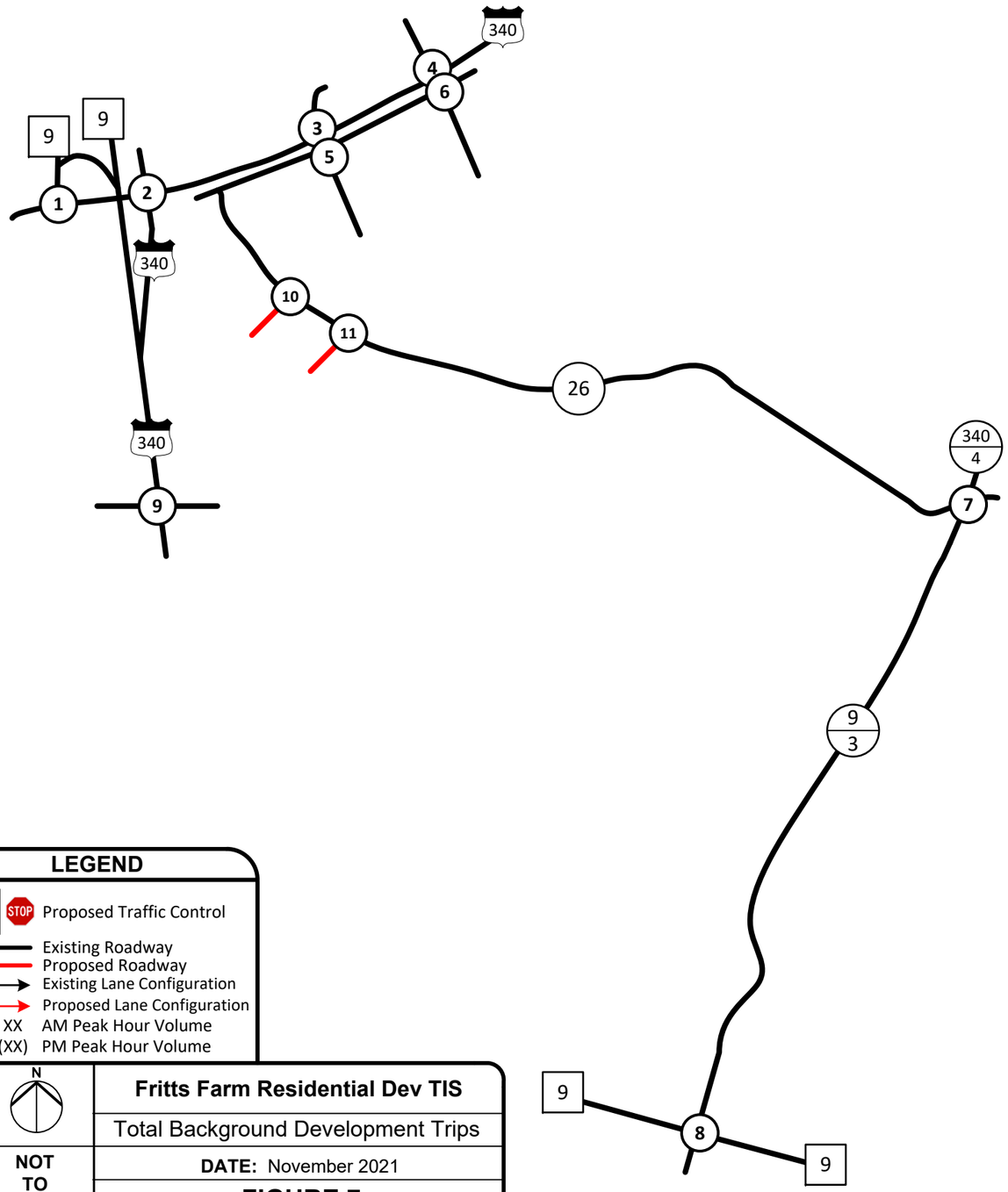
NOT TO SCALE

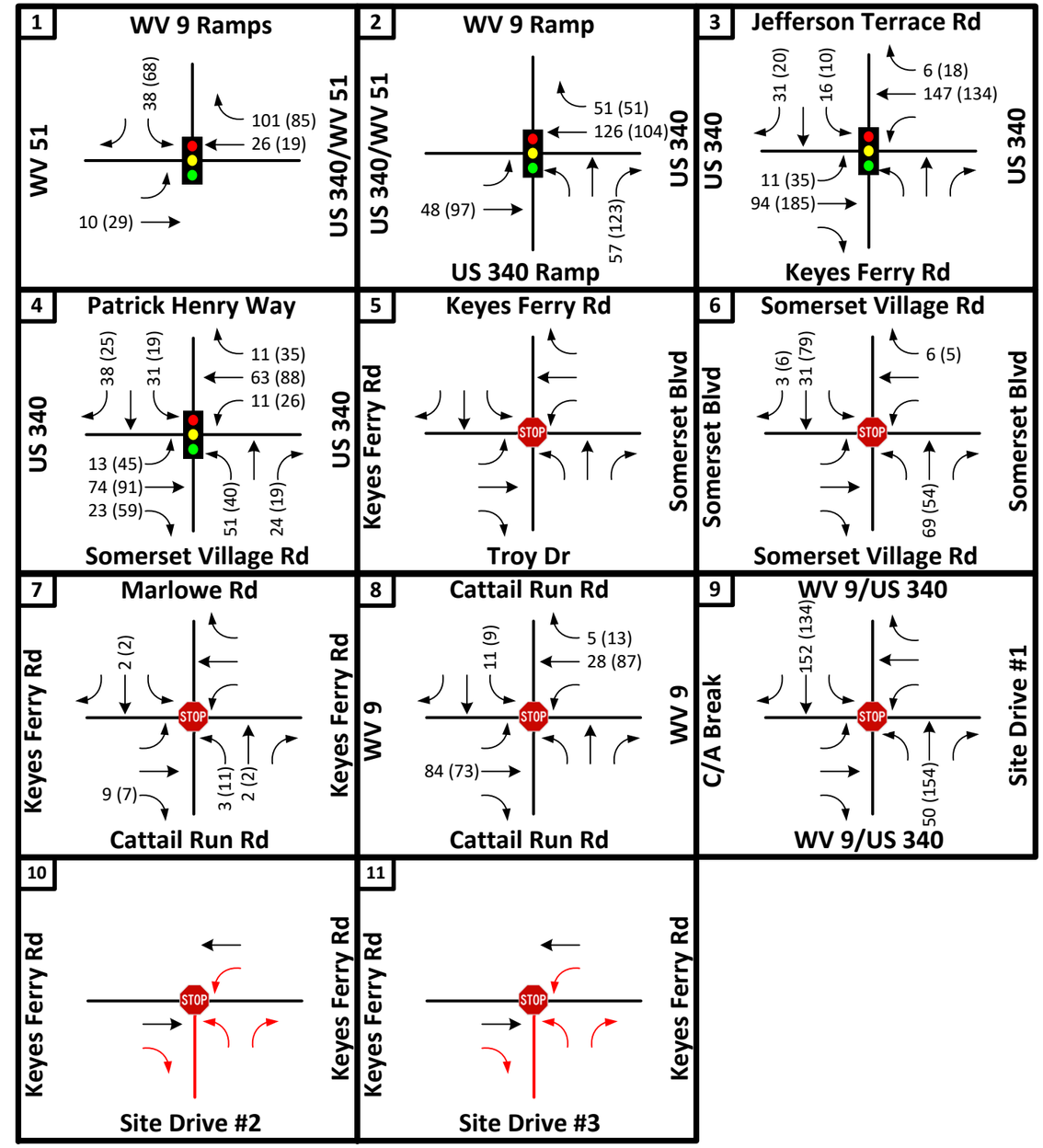
Fritts Farm Residential Dev TIS

Proposed Development Locations

DATE: November 2021

FIGURE 6





LEGEND

- STOP Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX AM Peak Hour Volume
- (XX) PM Peak Hour Volume

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

Total Background Development Trips

DATE: November 2021

FIGURE 7

AMT

TRIP GENERATION

The proposed Fritts Farm residential development is proposed southeast of the interchange of WV 9 with US 340 and WV 51 in Jefferson County and includes 255 single-family homes and 56 townhomes. Trip generation "Peak Hour of Generator" rates from ITE Trip Generation Manual, 10th Edition, were utilized for Single-Family Detached Housing (LUC 210) and Multifamily Housing (LUC 220).

As shown in **Table 2** below, the proposed development will generate a total of 2,817 new daily trips, including 225 AM peak hour trips, and 293 PM peak hour trips.

Table 2: Trip Generation Summary

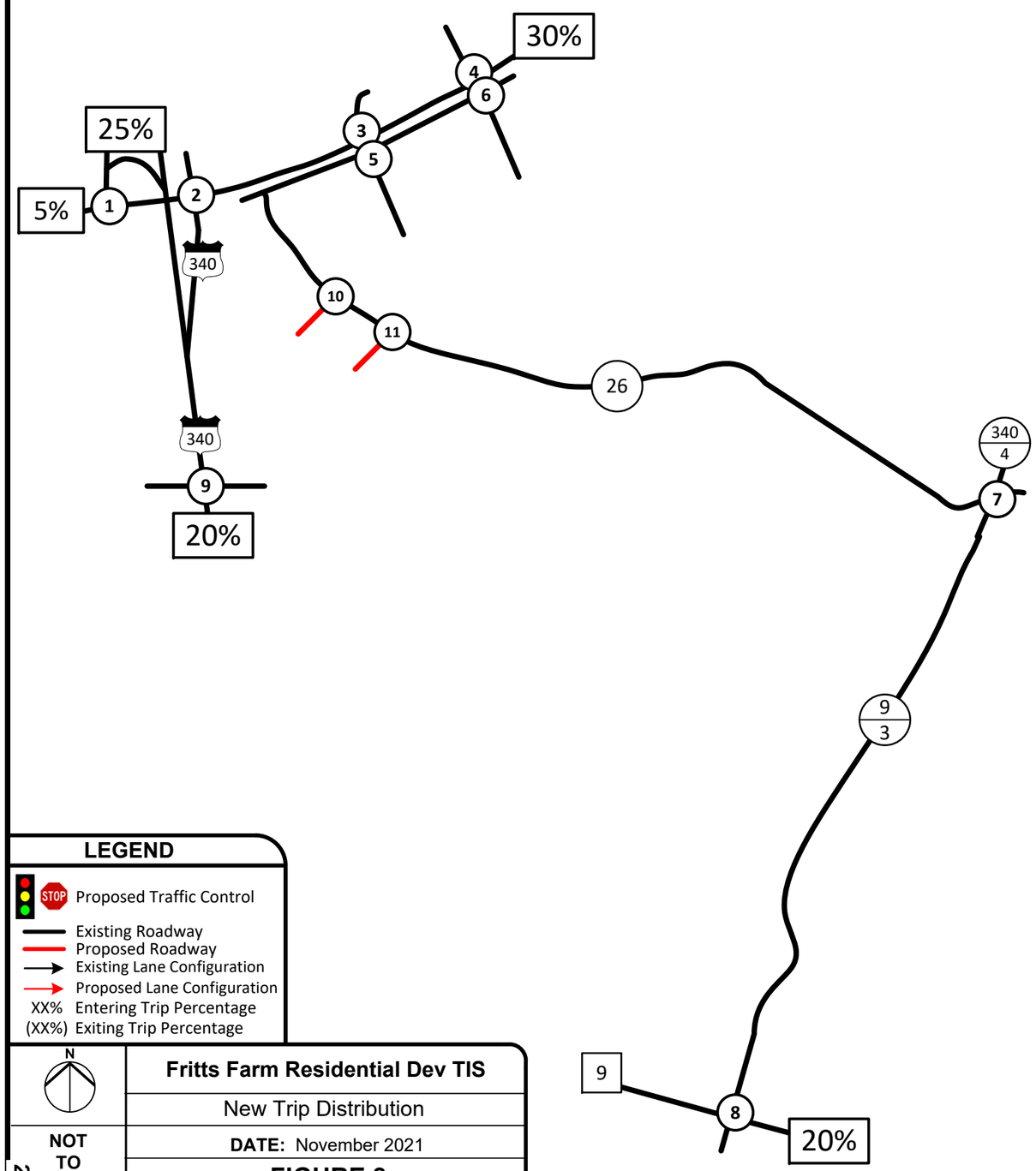
Description	LUC	Density		Daily Trips	AM Peak			PM Peak		
					Enter	Exit	Total	Enter	Exit	Total
Single-Family Homes	210	255	Units	2,407	50	144	194	163	92	255
Townhomes	220	56	Units	410	9	22	31	22	16	38
Total Net New External Trips				**2,817**	**59**	**166**	**225**	**185**	**108**	**293**

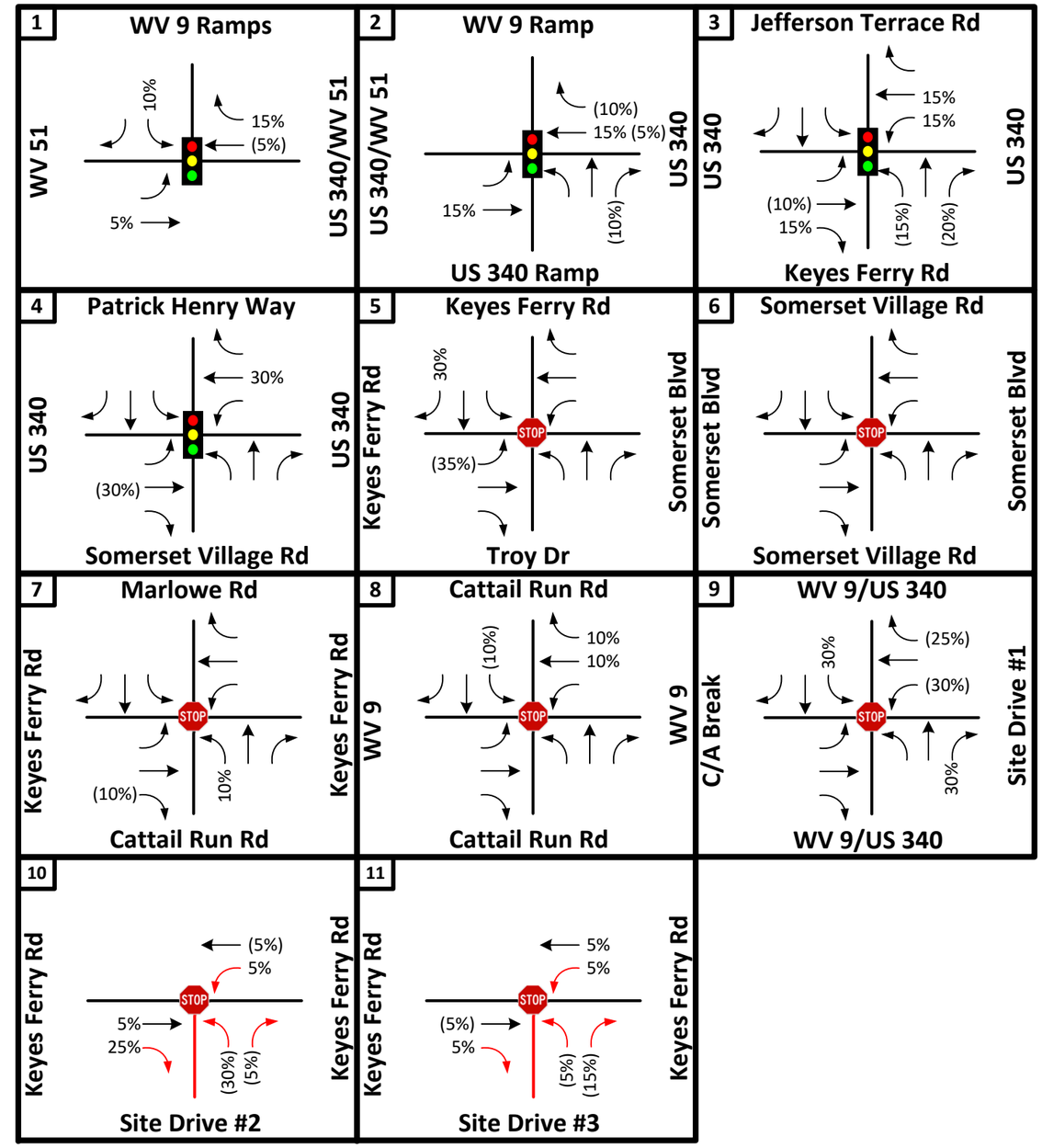
TRIP DISTRIBUTION

The AM and PM peak hour trips to/from the proposed site were distributed based upon interpolation from current traffic patterns with all trips entering the development via US 340/WV 9 and Keyes Ferry Road. Distribution of the new external trips are as follows:

- 20% to/from the east on WV 9 (Hillsboro, VA)
- 25% to/from the west on WV 9 (Martinsburg)
- 30% to/from the north on US 340 (Harpers Ferry)
- 20% to/from the south on US 340 (Berryville, VA)
- 5% to/from the west on WV 51 (Charles Town)

The external trip distribution percentages are shown in **Figure 8** and the AM and PM peak hour new site trip assignments are shown on **Figure 9**.





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX% Entering Trip Percentage
- (XX%) Exiting Trip Percentage

N

NOT TO SCALE

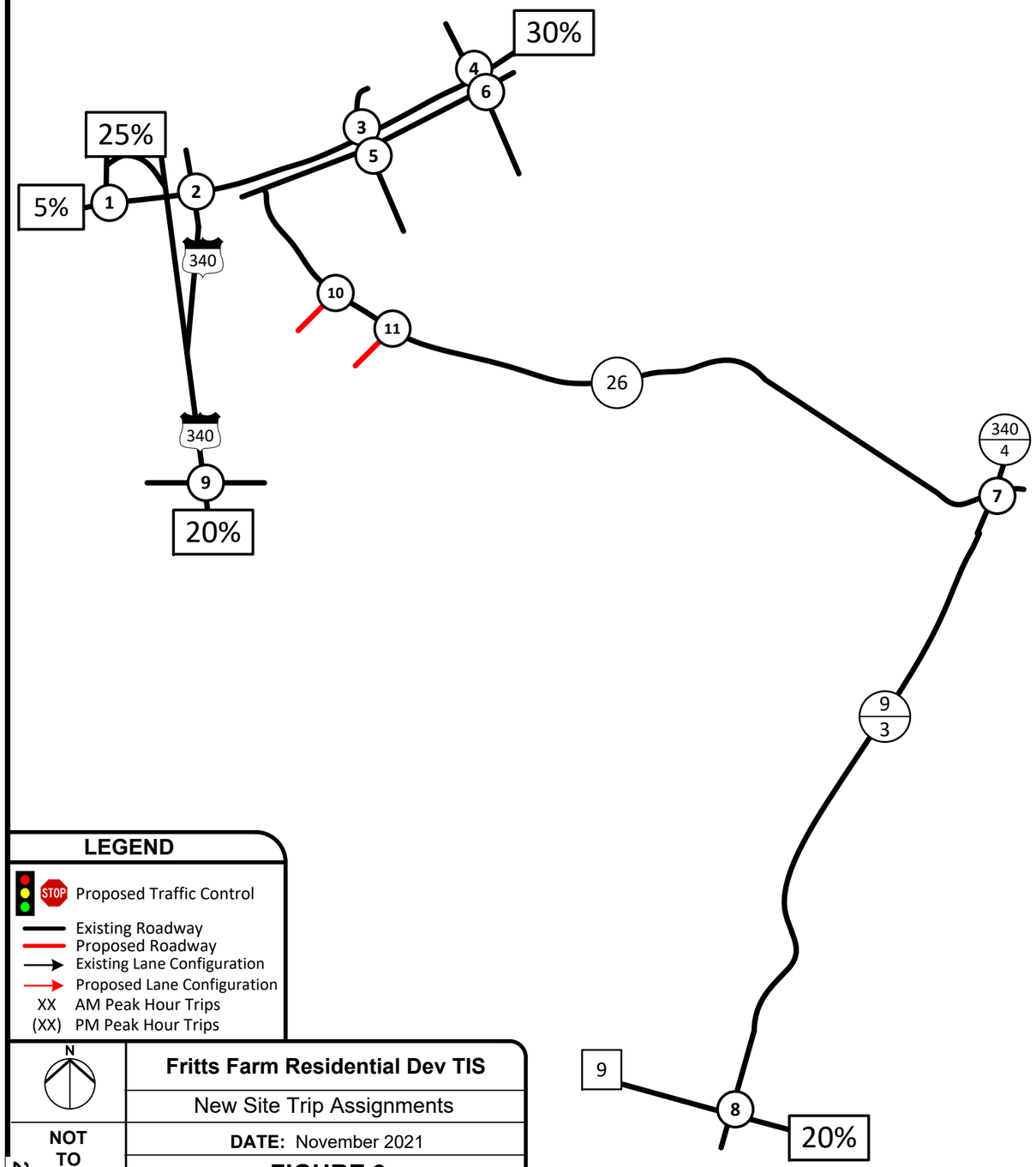
Fritts Farm Residential Dev TIS

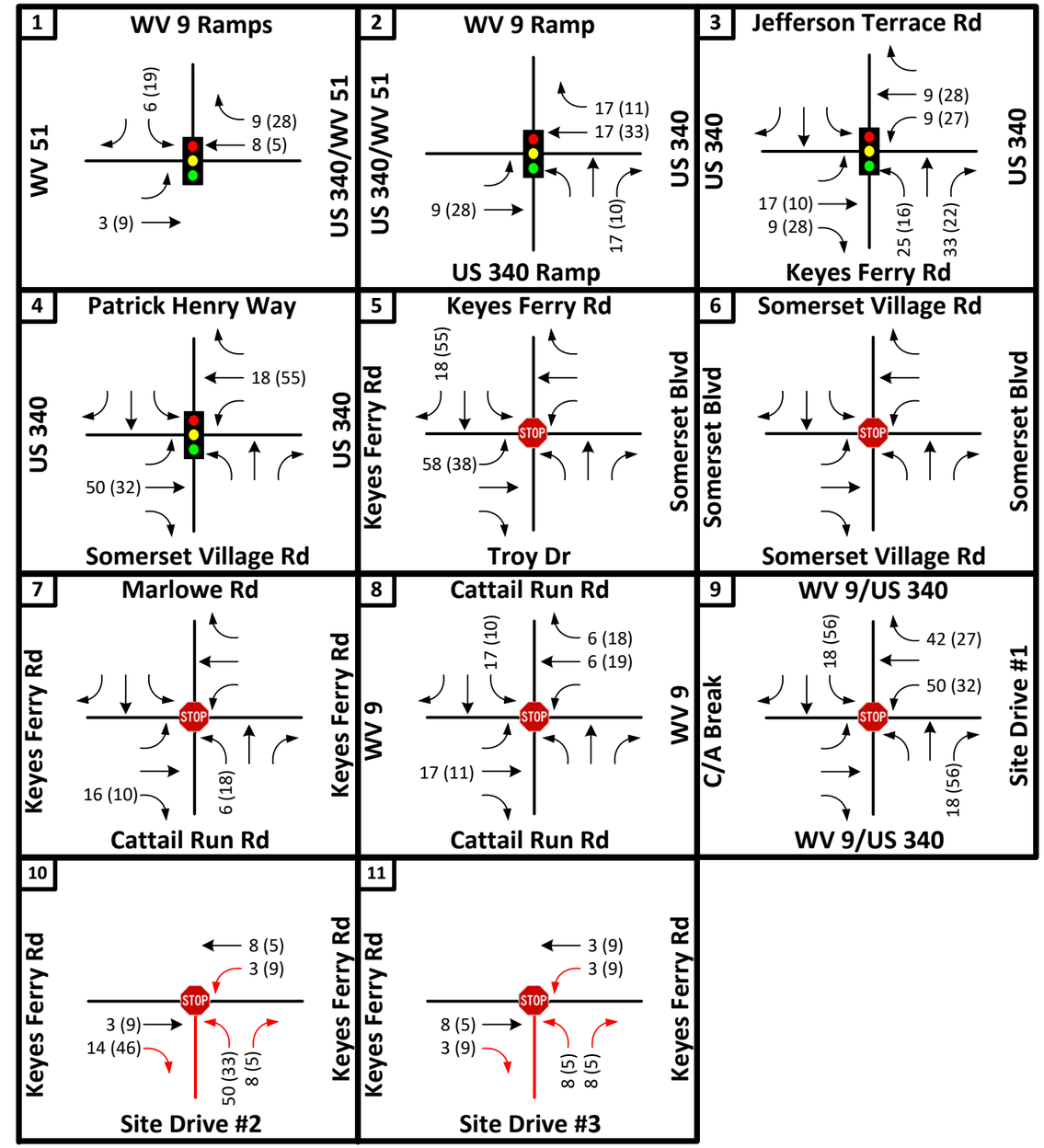
New Trip Distribution

DATE: November 2021

FIGURE 8

AMT





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX AM Peak Hour Trips
- (XX) PM Peak Hour Trips

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

New Site Trip Assignments

DATE: November 2021

FIGURE 9

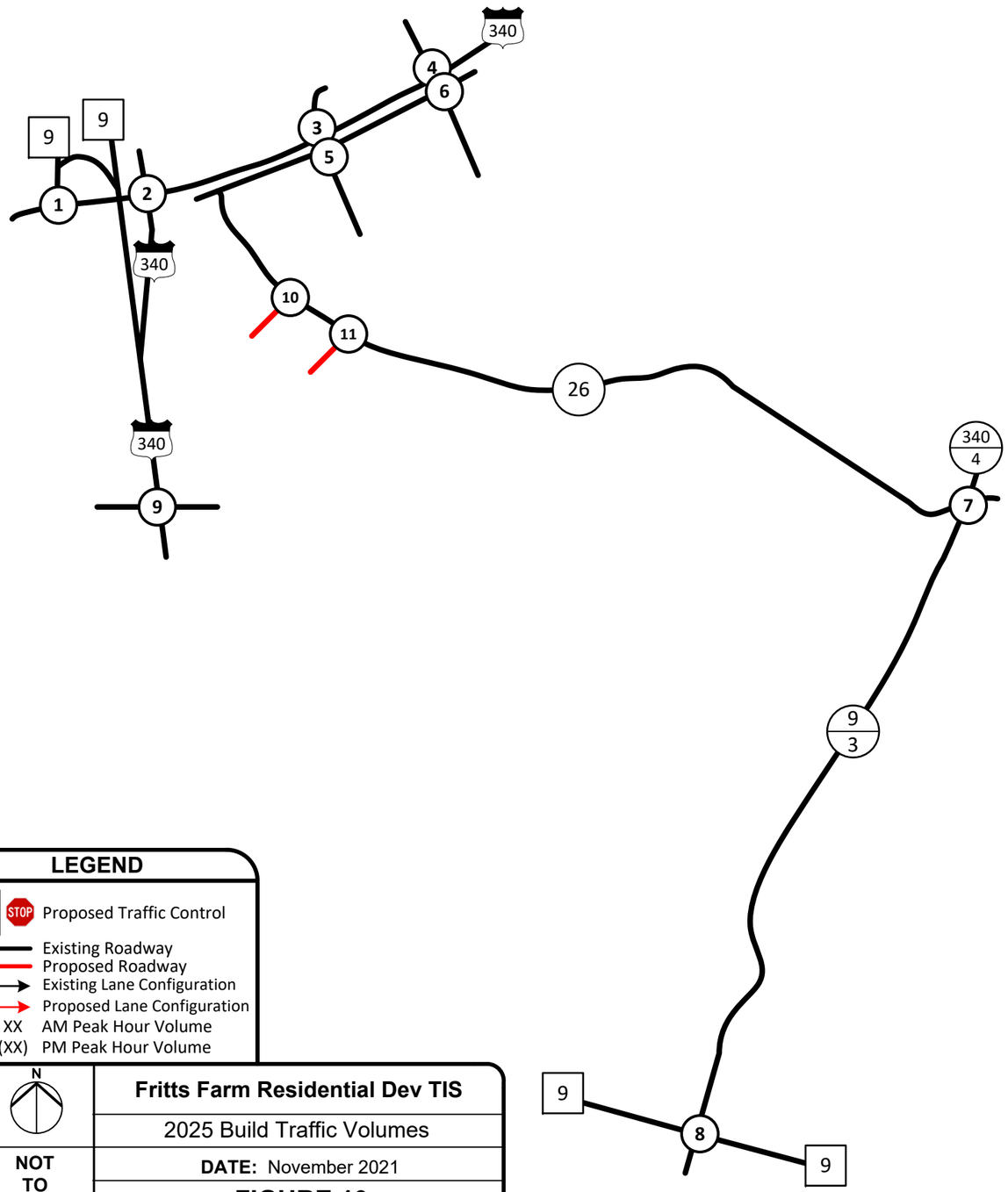
AMT

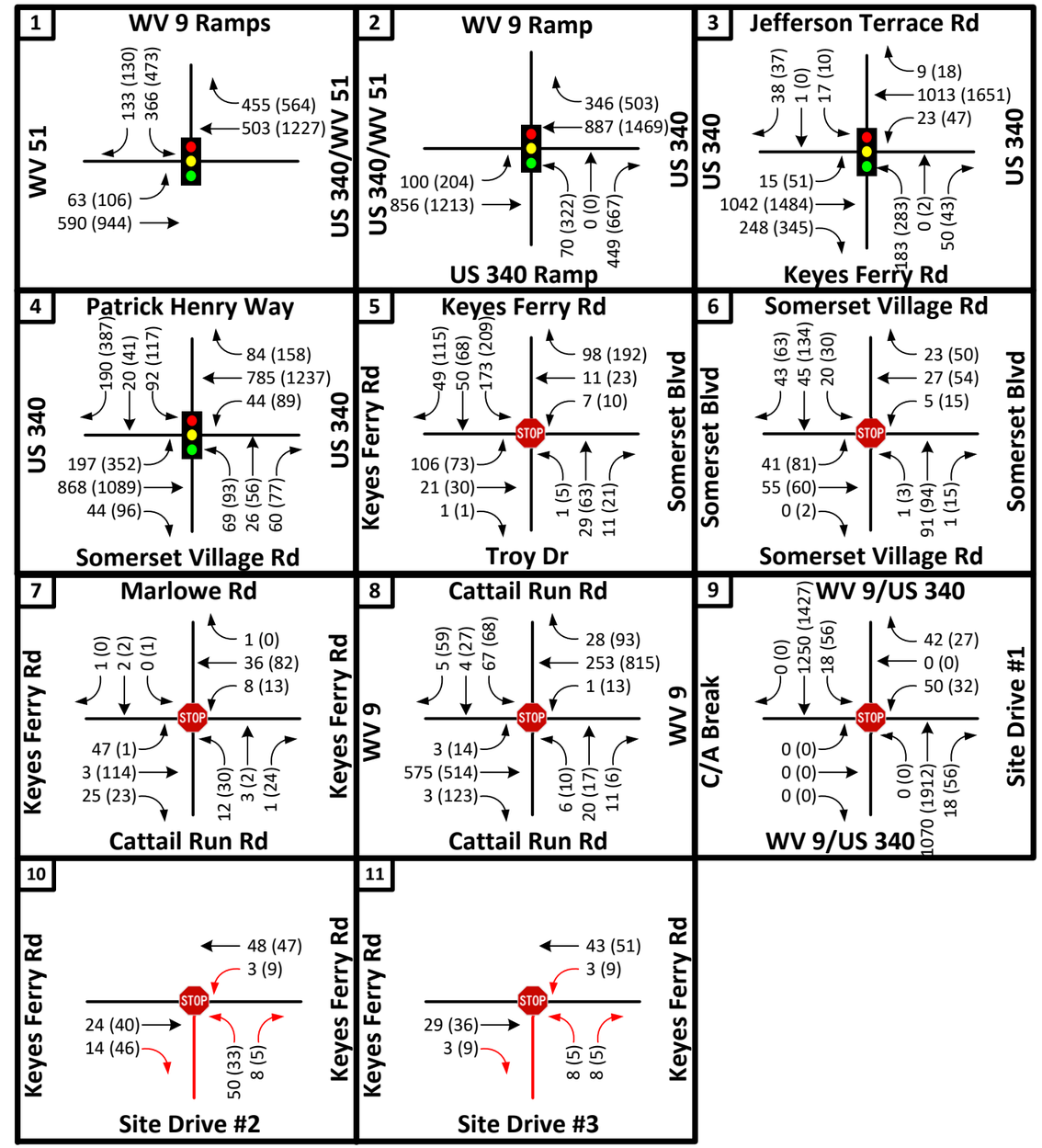
BUILD PROJECT TRAFFIC VOLUMES

2025 Build Conditions

The 2025 Build traffic volumes include the existing 2021 traffic volume, the anticipated traffic generated by the pending Flynn Property development, the anticipated traffic generated by the pending Green Hill development, the anticipated traffic generated by the pending Aspen Greens development, the anticipated traffic generated by the pending Country Club Commons development, the anticipated traffic generated by Phase 1 of the pending US 340 Mixed-Use development, the anticipated annual traffic growth prior to 2025, and the traffic generated by build-out of the Fritts Farm development. Site generated traffic was distributed into the transportation network based upon existing traffic patterns and anticipated origin and destination of the new site trips (see **Figure 8** and **Figure 9**). The 2025 Build Traffic Volumes for the weekday AM and PM peak hour are shown on **Figure 10**.

The peak hour traffic forecast calculations are provided in **Appendix B**.





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX AM Peak Hour Volume
- (XX) PM Peak Hour Volume

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

2025 Build Traffic Volumes

DATE: November 2021

FIGURE 10

AMT

CAPACITY ANALYSIS

The Highway Capacity Manual defines capacity as the maximum suitable flow rate at which vehicles reasonably can be expected to traverse a point during a specified time period. Capacity uses the measure of efficiency, Level-of-Service (LOS), to describe the traffic performance at intersections. LOS is defined for the overall intersection delay for signalized intersections. An acceptable LOS for a signalized intersection is considered to be LOS D or better (i.e. A, B, C or D).

At unsignalized intersections, the LOS is defined by the control delay for the movement that must yield right-of-way. It may be typical for stop-controlled minor streets to experience long delays during peak periods, while the majority of the traffic flows through the intersection on the major street travel unimpeded.

The procedures outlined in the Highway Capacity Manual; 6th Edition were used as guidelines for the analysis of the study area intersections. This manual provides procedures for the analysis of both signalized and unsignalized intersections. LOS categories range from LOS "A" (best) to "F" (worst) as shown in **Table 3**.

Table 3: Level of Service Criteria

Level of Service	SIGNALIZED Intersection Control Delay (sec/veh)	UNSIGNALIZED Intersection Control Delay (sec/veh)	Intersection LOS Description
A	≤ 10.0	≤ 10.0	Free flow, insignificant delays.
B	10.1-20.0	10.1-15.0	Stable operation, minimal delays.
C	20.1-35.0	15.1-25.0	Stable operation, acceptable delays.
D	35.1-55.0	25.1-35.0	Restricted flow, common delays.
E	55.1-80.0	35.1-50.0	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	> 80.0	> 50.0	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

LOS analysis was completed through the use of Synchro, version 10.3. The software package categorizes the LOS based on vehicular delay. According to industry standards, any signalized intersection or any approach of an unsignalized intersection is considered acceptable if the average delay is at LOS D or better with LOS A representing little or no delay. Any signalized intersection or approach with a LOS of E or F is considered substandard and may need solutions to improve the operational performance. Copies of the Synchro analyses outputs for each analysis year/scenario are shown in **Appendix C**. Due to non-NEMA phasing utilized at one intersection, all signalized analysis is reported using Synchro methodology in lieu of HCM.

2021 Existing Conditions Analysis

Traffic signal timing information provided by WVDOH was incorporated into the traffic analysis models. As previously described, analysis is prepared for the AM and PM weekday peak hours. Existing WVDOH signal timing information and signal plans are located in **Appendix F**.

US 340/WV 51 with WV 9 Eastbound Ramps (From Martinsburg/To Berryville VA) (I/S #1)

Capacity analysis indicates the WV 9 eastbound exit ramp (From Martinsburg) approach to US 340/WV 51 currently operates at LOS E during the AM peak hour and LOS F during the PM peak hour under signal control. The WV 51 eastbound approach (From Charles Town) to the WV 9 eastbound ramps currently operates at LOS A during both the AM and PM peak hours. The US 340 southbound approach (From Harpers Ferry) to the WV 9 eastbound ramps currently operates at LOS A during the AM peak hour and LOS B during the PM peak hour. The overall signalized intersection currently operates at LOS B during the AM peak hour and LOS C during the PM peak hour.

US 340/WV 51 with WV 9 Westbound Ramps (From Berryville VA/To Martinsburg) (I/S #2)

Analysis indicates the US 340 northbound exit ramp (From Berryville VA) approach to WV 51/US 340 currently operates at LOS A during the AM peak hour and LOS C during the PM peak hour under signal control. The WV 51 eastbound approach (From Charles Town) to the WV 9 westbound ramps currently operates at LOS A during the AM peak hour and LOS C during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to the WV 9 westbound ramps currently operates at LOS B during the AM peak hour and LOS D during the PM peak hour. The overall signalized intersection currently operates at LOS A during the AM peak hour and LOS C during the PM peak hour.

US 340 with Keyes Ferry Road and Jefferson Terrace Road (I/S #3)

Analysis indicates the Jefferson Terrace Road approach (southbound bearing) to US 340 currently operates at LOS C during the AM peak hour and LOS A during the PM peak hour under signal control. The Keyes Ferry Road approach (northbound bearing) to US 340 currently operates at LOS E during both the AM and PM peak hours. The US 340 northbound approach (From Charles Town) to Keyes Ferry Road/Jefferson Terrace Road currently operates at LOS A during the AM peak hour and LOS B during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to Keyes Ferry Road/Jefferson Terrace Road currently operates at LOS A during the AM peak hour and LOS B during the PM peak hour. The overall signalized intersection currently operates at LOS B during both the AM and PM peak hours.

US 340 with Patrick Henry Way and Somerset Village Road (I/S #4)

Analysis indicates the Patrick Henry Way approach (southbound bearing) to US 340 currently operates at LOS C during both the AM and PM peak hours under signal control. The Somerset Village Road approach (northbound bearing) to US 340 currently operates at LOS D during both the AM and PM peak hours. The US 340 northbound approach (From Charles Town) to Patrick Henry Way currently operates at LOS B during the AM peak hour and LOS C during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to Patrick Henry Way currently operates at LOS B during the AM peak hour and LOS C during the PM peak hour. The overall signalized intersection currently operates at LOS B during the AM peak hour and LOS C during the PM peak hour.

Keyes Ferry Road and Somerset Boulevard with Troy Drive (I/S #5)

The four-leg plus type intersection is stop controlled on all approaches except for the Keyes Ferry Road approach from US 340. In order to analyze the intersection utilizing HCM methodology, the Troy Drive approach from the south (shopping center) was modeled as free-flow to create a TWSC intersection. Analysis indicates the Keyes Ferry Road left-turn movement from US 340 (southbound bearing) to Somerset Boulevard currently operates at LOS A during both the AM and PM peak hours. The Troy Drive left-turn movement (northbound bearing) to Keyes Ferry Road currently operates at LOS A during both the AM and PM peak hours. The Keyes Ferry Road (frontage road) approach (eastbound bearing) to Somerset Boulevard currently operates at LOS C during both the AM and PM peak hours under stop control. The Somerset Boulevard approach (westbound bearing) to Keyes Ferry Road currently operates at LOS B during both the AM and PM peak hours under stop control.

Somerset Boulevard with Somerset Village Road (I/S #6)

The four-leg plus type intersection is stop controlled on both Somerset Boulevard approaches to Somerset Village Road. Analysis indicates the Somerset Village Road left-turn movement (southbound bearing) to Somerset Boulevard currently operates at LOS A during both the AM and PM peak hours. The Somerset Village Road left-turn movement (northbound bearing) to Somerset Boulevard currently operates at LOS A during both the AM and PM peak hours. The Somerset Boulevard approach (eastbound bearing) to Somerset Village Road currently operates at LOS B during both the AM and PM peak hours under stop control. The Somerset Boulevard approach (westbound bearing) to Somerset Village Road currently operates at LOS A during the AM peak hour and LOS B during the PM peak hour under stop control.

Keyes Ferry Road with Cattail Run Road and Marlowe Road (I/S #7)

Analysis indicates the Keyes Ferry Road eastbound approach to Cattail Run Road/Marlowe Road currently operates at LOS A during both the AM and PM peak hours under stop control. The Keyes Ferry Road westbound approach to Cattail Run Road/Marlowe Road currently operates at LOS A during both the AM and PM peak hours under stop control. The Cattail Run Road northbound left-turn movement to Keyes Ferry Road currently operates at LOS A during both the AM and PM peak hours. The Marlowe Road southbound left-turn movement to Keyes Ferry Road currently operates at LOS A during both the AM and PM peak hours.

WV 9 with Cattail Run Road (I/S #8)

Analysis indicates the WV 9 eastbound left-turn movement to Cattail Run Road currently operates at LOS A during both the AM and PM peak hours while the exclusive thru and right-turn movements operate as free-flow traveling unimpeded through the intersection. The WV 9 westbound left-turn movement to Cattail Run Road currently operates at LOS A during both the AM and PM peak hours while the exclusive thru and right-turn movements operate as free-flow traveling unimpeded through the intersection. The Cattail Run Road northbound approach to WV 9 currently operates at LOS B during the AM peak hour and LOS D during the PM peak hour under stop control. The Cattail Run Road southbound approach to WV 9 currently operates at LOS B during the AM peak hour and LOS D during the PM peak hour under stop control.

US 340/WV 9 with C/A Break (I/S #9)

Currently, there is a C/A (controlled access) break "stub" approach to US 340/WV 9 approximately 3,000 feet south of the US 340/WV 51 with WV 9 interchange utilized to access potentially landlocked parcels on both sides of the expressway. Currently, this intersection does not generate any traffic and US 340/WV 9 is not currently impacted by this "stub" constructed to serve future land use.

Figure 11 shows the LOS during the weekday AM and PM peak hours for the 2021 Existing Conditions for each lane group movement at each study intersection.

2025 No-Build Conditions Analysis

The 2025 No-Build traffic volumes include the existing 2021 traffic volumes, the anticipated traffic generated by the pending Flynn Property development, the anticipated traffic generated by the pending Green Hill development, the anticipated traffic generated by the pending Aspen Greens development, the anticipated traffic generated by the pending Country Club Commons development, the anticipated traffic generated by Phase 1 of the pending US 340 Mixed-Use development, and the anticipated annual traffic growth prior to 2025.

US 340/WV 51 with WV 9 Eastbound Ramps (From Martinsburg/To Berryville VA) (I/S #1)

Capacity analysis indicates the WV 9 eastbound exit ramp (From Martinsburg) approach to US 340/WV 51 is expected to operate at LOS F during both the AM and PM peak hours under signal control. The WV 51 eastbound approach (From Charles Town) to WV 9 eastbound ramps will continue to operate at LOS A during both the AM and PM peak hours. The US 340 southbound approach (From Harpers Ferry) to WV 9 eastbound ramps will continue to operate at LOS A during the AM peak hour and LOS B during the PM peak hour. The overall signalized intersection is expected to operate at LOS C during the AM peak hour and LOS D during the PM peak hour.

US 340/WV 51 with WV 9 Westbound Ramps (From Berryville VA/To Martinsburg) (I/S #2)

Analysis indicates the US 340 northbound exit ramp (From Berryville VA) approach to WV 51/US 340 will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour under signal control. The WV 51 eastbound approach (From Charles Town) to the WV 9 westbound ramps will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to the WV 9 westbound ramps is expected to operate at LOS B during the AM peak hour and LOS F during the PM peak hour. The overall signalized intersection is expected to operate at LOS A during the AM peak hour and LOS D during the PM peak hour.

US 340 with Keyes Ferry Road and Jefferson Terrace Road (I/S #3)

Analysis indicates the Jefferson Terrace Road approach (southbound bearing) to US 340 is expected to operate at LOS B during the AM peak hour and LOS A during the PM peak hour under signal control. The Keyes Ferry Road approach (northbound bearing) to US 340 will continue to operate at LOS E during both the AM and PM peak hours. The US 340 northbound approach (From Charles Town) to Keyes Ferry Road/Jefferson Terrace Road is expected to operate at LOS B during the AM peak hour and LOS C during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to Keyes Ferry Road/Jefferson Terrace Road will continue to operate at LOS A during the AM peak hour and LOS B during the PM peak

hour. The overall signalized intersection is expected to operate at LOS B during the AM peak hour and LOS C during the PM peak hour.

US 340 with Patrick Henry Way and Somerset Village Road (I/S #4)

Analysis indicates the Patrick Henry Way approach (southbound bearing) to US 340 will continue to operate at LOS C during both the AM and PM peak hours under signal control. The Somerset Village Road approach (northbound bearing) to US 340 will continue to operate at LOS D during both the AM and PM peak hours. The US 340 northbound approach (From Charles Town) to Patrick Henry Way is expected to operate at LOS C during the AM peak hour and LOS D during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to Patrick Henry Way is expected to operate at LOS B during the AM peak hour and LOS D during the PM peak hour. The overall signalized intersection is expected to operate at LOS C during the AM peak hour and LOS D during the PM peak hour.

Keyes Ferry Road and Somerset Boulevard with Troy Drive (I/S #5)

Analysis indicates the Keyes Ferry Road left-turn movement from US 340 (southbound bearing) to Somerset Boulevard will continue to operate at LOS A during both the AM and PM peak hours. The Troy Drive left-turn movement (northbound bearing) to Keyes Ferry Road will continue to operate at LOS A during both the AM and PM peak hours. The Keyes Ferry Road (frontage road) approach (eastbound bearing) to Somerset Boulevard is expected to operate at LOS C during the AM peak hour and LOS D during the PM peak hour under stop control. The Somerset Boulevard approach (westbound bearing) to Keyes Ferry Road will continue to operate at LOS B during both the AM and PM peak hours under stop control.

Somerset Boulevard with Somerset Village Road (I/S #6)

Analysis indicates the Somerset Village Road left-turn movement (southbound bearing) to Somerset Boulevard will continue to operate at LOS A during both the AM and PM peak hours. The Somerset Village Road left-turn movement (northbound bearing) to Somerset Boulevard will continue to operate at LOS A during both the AM and PM peak hours. The Somerset Boulevard approach (eastbound bearing) to Somerset Village Road is expected to operate at LOS B during the AM peak hour and LOS C during the PM peak hour under stop control. The Somerset Boulevard approach (westbound bearing) to Somerset Village Road is expected to operate at LOS B during both the AM and PM peak hours under stop control.

Keyes Ferry Road with Cattail Run Road and Marlowe Road (I/S #7)

Analysis indicates the Keyes Ferry Road eastbound approach to Cattail Run Road/Marlowe Road is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour under stop control. The Keyes Ferry Road westbound approach to Cattail Run Road/Marlowe Road is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour under stop control. The Cattail Run Road northbound left-turn movement to Keyes Ferry Road will continue to operate at LOS A during both the AM and PM peak hours. The Marlowe Road southbound left-turn movement to Keyes Ferry Road will continue to operate at LOS A during both the AM and PM peak hours.

WV 9 with Cattail Run Road (I/S #8)

Analysis indicates the WV 9 eastbound left-turn movement to Cattail Run Road is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour while the exclusive thru and right-turn movements operate as free-flow traveling unimpeded through the intersection. The WV 9 westbound left-turn movement to Cattail Run Road will continue to operate at LOS A during both the AM and PM peak hours while the exclusive thru and right-turn movements operate as free-flow traveling unimpeded through the intersection. The Cattail Run Road northbound approach to WV 9 is expected to operate at LOS C during the AM peak hour and LOS E during the PM peak hour under stop control. The Cattail Run Road southbound approach to WV 9 is expected to operate at LOS C during the AM peak hour and LOS F during the PM peak hour under stop control.

US 340/WV 9 with C/A Break (I/S #9)

The C/A break "stub" approach to US 340/WV 9 approximately 3,000 feet south of the US 340/WV 51 with WV 9 interchange will not generate any traffic in the No-Build conditions and US 340/WV 9 will continue to operate as free-flow without impact.

Figure 12 shows the LOS during the weekday AM and PM peak hours for the 2025 No-Build Conditions for each lane group movement at each study intersection.

2025 Build Conditions Analysis

The 2025 Build traffic volumes include the existing 2021 traffic volumes, the anticipated traffic generated by the pending Flynn Property development, the anticipated traffic generated by the pending Green Hill development, the anticipated traffic generated by the pending Aspen Greens development, the anticipated traffic generated by the pending Country Club Commons development, the anticipated traffic generated by Phase 1 of the pending US 340 Mixed-Use development, the anticipated annual traffic growth prior to 2025, and the traffic generated by build-out of the Fritts Farm development.

US 340/WV 51 with WV 9 Eastbound Ramps (From Martinsburg/To Berryville VA) (I/S #1)

Capacity analysis indicates the WV 9 eastbound exit ramp (From Berryville VA) approach (southbound bearing) to US 340/WV 51 will continue to operate at LOS F during both the AM and PM peak hours under signal control. The WV 51 eastbound approach (From Charles Town) to the WV 9 eastbound ramps will continue to operate at LOS A during both the AM and PM peak hours. The US 340 southbound approach (From Harpers Ferry) to WV 9 eastbound ramps will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The overall signalized intersection will continue to operate at LOS C during the AM peak hour and LOS D during the PM peak hour.

US 340/WV 51 with WV 9 Westbound Ramps (From Berryville VA/To Martinsburg) (I/S #2)

Analysis indicates the US 340 northbound exit ramp (From Berryville VA) approach to WV 51/US 340 will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour under signal control. The WV 51 eastbound approach (From Charles Town) to WV 9 westbound ramps will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to WV 9 westbound ramps is expected to operate at LOS B during the AM

peak hour and LOS F during the PM peak hour. The overall signalized intersection is expected to operate at LOS A during the AM peak hour and LOS E during the PM peak hour.

US 340 with Keyes Ferry Road and Jefferson Terrace Road (I/S #3)

Analysis indicates the Jefferson Terrace Road approach (southbound bearing) to US 340 will continue to operate at LOS B during the AM peak hour and LOS A during the PM peak hour under signal control. The Keyes Ferry Road approach (northbound bearing) to US 340 is expected to operate at LOS D during the AM peak hour and LOS E during the PM peak hour. The US 340 northbound approach (From Charles Town) to Keyes Ferry Road/Jefferson Terrace Road is expected to operate at LOS B during the AM peak hour and LOS D during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to Keyes Ferry Road/Jefferson Terrace Road is expected to operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The overall signalized intersection will continue to operate at LOS B during the AM peak hour and LOS C during the PM peak hour.

US 340 with Patrick Henry Way and Somerset Village Road (I/S #4)

Analysis indicates the Patrick Henry Way eastbound approach (southbound bearing) to US 340 will continue to operate at LOS C during both the AM and PM peak hours under signal control. The Somerset Village Road westbound approach (northbound bearing) to US 340 will continue to operate at LOS D during both the AM and PM peak hours. The US 340 northbound approach (eastbound bearing) to Patrick Henry Way will continue to operate at LOS C during the AM peak hour and LOS D during the PM peak hour. The US 340 southbound approach (westbound bearing) to Patrick Henry Way will continue to operate at LOS B during the AM peak hour and LOS D during the PM peak hour. The overall signalized intersection will continue to operate at LOS C during the AM peak hour and LOS D during the PM peak hour.

Keyes Ferry Road and Somerset Boulevard with Troy Drive (I/S #5)

Analysis indicates the Keyes Ferry Road left-turn movement from US 340 (southbound bearing) to Somerset Boulevard will continue to operate at LOS A during both the AM and PM peak hours. The Troy Drive left-turn movement (northbound bearing) to Keyes Ferry Road will continue to operate at LOS A during both the AM and PM peak hours. The Keyes Ferry Road approach (eastbound bearing) to Somerset Boulevard is expected to operate at LOS C during the AM peak hour and LOS E during the PM peak hour under stop control. The Somerset Boulevard approach (westbound bearing) to Keyes Ferry Road is expected to operate at LOS B during both the AM and PM peak hours under stop control.

Somerset Boulevard with Somerset Village Road (I/S #6)

Analysis indicates the Somerset Village Road left-turn movement (southbound bearing) to Somerset Boulevard will continue to operate at LOS A during both the AM and PM peak hours. The Somerset Village Road left-turn movement (northbound bearing) to Somerset Boulevard will continue to operate at LOS A during both the AM and PM peak hours. The Somerset Boulevard approach (eastbound bearing) to Somerset Village Road will continue to operate at LOS B during the AM peak hour and LOS C during the PM peak hour under stop control. The Somerset Boulevard approach (westbound bearing) to Somerset Village Road will continue to operate at LOS B during both the AM and PM peak hours under stop control.

Keyes Ferry Road with Cattail Run Road and Marlowe Road (I/S #7)

Analysis indicates the Keyes Ferry Road eastbound approach to Cattail Run Road/Marlowe Road will continue to operate at LOS A during the AM peak hour and LOS B during the PM peak hour under stop control. The Keyes Ferry Road westbound approach to Cattail Run Road/Marlowe Road will continue to operate at LOS A during the AM peak hour and LOS B during the PM peak hour under stop control. The Cattail Run Road northbound left-turn movement to Keyes Ferry Road will continue to operate at LOS A during both the AM and PM peak hours. The Marlowe Road southbound left-turn movement to Keyes Ferry Road will continue to operate at LOS A during both the AM and PM peak hours.

WV 9 with Cattail Run Road (I/S #8)

Analysis indicates the WV 9 eastbound left-turn movement to Cattail Run Road will continue to operate at LOS A during the AM peak hour and LOS B during the PM peak hour while the exclusive thru and right-turn movements operate as free-flow traveling unimpeded through the intersection. The WV 9 westbound left-turn movement to Cattail Run Road will continue to operate at LOS A during both the AM and PM peak hours while the exclusive thru and right-turn movements operate as free-flow traveling unimpeded through the intersection. The Cattail Run Road northbound approach to WV 9 will continue to operate at LOS C during the AM peak hour and LOS E during the PM peak hour under stop control. The Cattail Run Road southbound approach to WV 9 will continue to operate at LOS C during the AM peak hour and LOS F during the PM peak hour under stop control.

US 340/WV 9 with C/A Break and Site Drive #1 (I/S #9)

The C/A Break eastbound approach to US 340/WV 9 will not generate any vehicular traffic during either peak hour. Analysis indicates, the Site Drive #1 westbound approach to US 340/WV 9 is expected to operate at LOS F during both the AM and PM peak hours under stop control. The US 340/WV 9 northbound (From Berryville VA) left-turn movement to C/A Break will not generate any vehicular traffic during either peak hour while the thru and thru/right lanes operate as free-flow traveling unimpeded through the intersection. The US 340/WV 9 southbound (From Martinsburg) left-turn movement to Site Drive #1 is expected to operate at LOS B during the AM peak hour and LOS D during the PM peak hour while the thru and thru/right lanes operate as free-flow traveling unimpeded through the intersection.

Keyes Ferry Road with Site Drive #2 (I/S #10)

Analysis indicates the Keyes Ferry Road eastbound approach to Site Drive #2 is expected to operate as free-flow traveling unimpeded through the intersection. The Keyes Ferry Road westbound left-turn movement to Site Drive #2 is expected to operate at LOS A during both the AM and PM peak hours. The Site Drive #2 northbound approach to Keyes Ferry Road is expected to operate at LOS A during both the AM and PM peak hours under stop control.

Keyes Ferry Road with Site Drive #3 (I/S #11)

Analysis indicates the Keyes Ferry Road eastbound approach to Site Drive #3 is expected to operate as free-flow traveling unimpeded through the intersection. The Keyes Ferry Road westbound left-turn movement to Site Drive #3 is expected to operate at LOS A during both the AM and PM peak hours. The Site Drive #3 northbound approach to Keyes Ferry Road is expected to operate at LOS A during both the AM and PM peak hours under stop control.

Figure 13 shows the LOS during the weekday AM and PM peak hours for the 2025 Build Conditions for each lane group movement at each study intersection.

2025 Build Improved Conditions Analysis

The 2025 Build Improved traffic volumes include the existing 2021 traffic volume, the anticipated traffic generated by the pending Flynn Property development, the anticipated traffic generated by the pending Green Hill development, the anticipated traffic generated by the pending Aspen Greens development, the anticipated traffic generated by the pending Country Club Commons development, the anticipated traffic generated by Phase 1 of the pending US 340 Mixed-Use development, the anticipated annual traffic growth prior to 2025, and the traffic generated by build-out of the Fritts Farm development.

Improvements included in the 2025 Build Improved Conditions consist of lengthening storage length on the WV 9 eastbound exclusive right-turn lane to US 340, lengthening storage length on the WV 9 westbound exclusive right-turn lane to US 340, lengthening storage length on the US 340 northbound exclusive left-turn lane to Jefferson Terrace Road, lengthening storage length on the US 340 southbound exclusive left-turn lane to Somerset Village Road, lengthening storage length on the US 340 southbound exclusive right-turn lane to Patrick Henry Way, lengthening storage length on the Patrick Henry southbound exclusive right-turn lane to US 340, lengthening storage length on the US 340 Southbound/WV 9 Eastbound left-turn lane to Site Driveway #1, construction of an additional exclusive left-turn lane on the WV 9 Ramp eastbound approach to US 340/WV 51, construction of an exclusive right-turn lane on the US 340 southbound approach to WV 9 WB Ramps, construction of an exclusive right-turn lane on the Jefferson Terrace Road eastbound approach to US 340, construction of an exclusive right-turn lane on the US 340/WV 9 westbound approach to Site Drive #1, and removal of split phasing at the US 340 with Patrick Henry Way/Somerset Village Road intersection. Additionally, cycle lengths, split timings, and offsets were optimized as part of Build Year improvements.

Analysis is provided for the Build Improved scenario for the intersections of US 340/WV 51 with WV 9 Eastbound Ramps, US 340 with WV 9 Westbound Ramp, US 340 with Keyes Ferry Road/Jefferson Terrace Road, and US 340 with Patrick Henry Way and Somerset Village Road. Remaining intersections will operate as described in 2025 Build (Unimproved) Conditions and do not include proposed improvements.

US 340/WV 51 with WV 9 Eastbound Ramps (From Martinsburg/To Berryville VA) (I/S #1)

Following construction of an additional left-turn lane on the WV 9 eastbound exit ramp approach to US 340/WV 51, capacity analysis indicates the WV 9 eastbound exit ramp approach (From Martinsburg) to US 340/WV 51 is expected to operate at LOS D during both the AM and PM peak hours under signal control. The WV 51 eastbound approach (From Charles Town) to WV 9 eastbound ramps will continue to operate at LOS A during both the AM and PM peak hours. The US 340 southbound approach (From Harpers Ferry) to WV 9 eastbound ramps will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The overall signalized intersection is expected to operate at LOS B during the AM peak hour and LOS C during the PM peak hour.

US 340/WV 51 with WV 9 Westbound Ramps (From Berryville VA/To Martinsburg) (I/S #2)

Following construction of an exclusive right-turn lane on the US 340 southbound approach to WV 9 westbound exit ramp, analysis indicates the US 340 northbound exit ramp approach (From Berryville VA)

to WV 51/US 340 will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour under signal control. The WV 51 eastbound approach (From Charles Town) to WV 9 westbound ramps is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to WV 9 westbound ramps is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour. The overall signalized intersection is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour.

US 340 with Keyes Ferry Road and Jefferson Terrace Road (I/S #3)

Following construction of an exclusive right-turn lane on the Jefferson Terrace Road approach, analysis indicates the Jefferson Terrace Road approach (southbound bearing) to US 340 is expected to operate at LOS B during both the AM and PM peak hours under signal control. The Keyes Ferry Road approach (northbound bearing) to US 340 is expected to operate at LOS D during the AM peak hour and LOS E during the PM peak hour. The US 340 northbound approach (From Charles Town) to Keyes Ferry Road/Jefferson Terrace Road is expected to operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The US 340 southbound approach (From Harpers Ferry) to Keyes Ferry Road/Jefferson Terrace Road will continue to operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The overall signalized intersection will continue to operate at LOS B during the AM peak hour and LOS C during the PM peak hour.

US 340 with Patrick Henry Way and Somerset Village Road (I/S #4)

Following modification to the lane configuration on the Patrick Henry Way approach and removal of split phasing, analysis indicates the Patrick Henry Way eastbound approach (southbound bearing) to US 340 is expected to operate at LOS B during the AM peak hour and LOS C during the PM peak hour under signal control. The Somerset Village Road westbound approach (northbound bearing) to US 340 will continue to operate at LOS C during both the AM and PM peak hours. The US 340 northbound approach (eastbound bearing) to Patrick Henry Way is expected to operate at LOS B during the AM peak hour and LOS D during the PM peak hour. The US 340 southbound approach (westbound bearing) to Patrick Henry Way is expected to operate at LOS B during the AM peak hour and LOS D during the PM peak hour. The overall signalized intersection is expected to operate at LOS B during the AM peak hour and LOS D during the PM peak hour.

Figure 14 shows the LOS during the weekday AM and PM peak hours for the 2025 Build Improved Conditions for each lane group movement at each study intersection.

Table 4 shows the LOS results for the intersections within the study area during the weekday AM and PM peak hours for the 2021 Existing Conditions, 2025 No-Build Conditions, 2025 Build Conditions, and 2025 Build Improved Conditions.

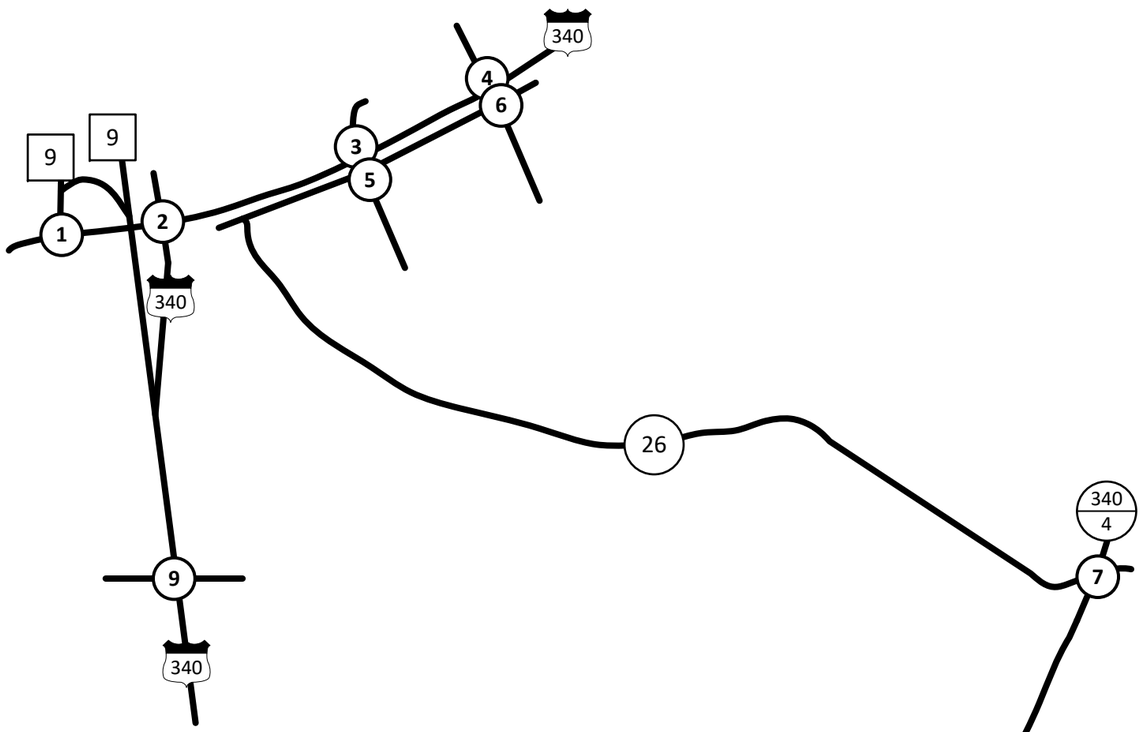
Table 4: Level of Service Analysis Summary

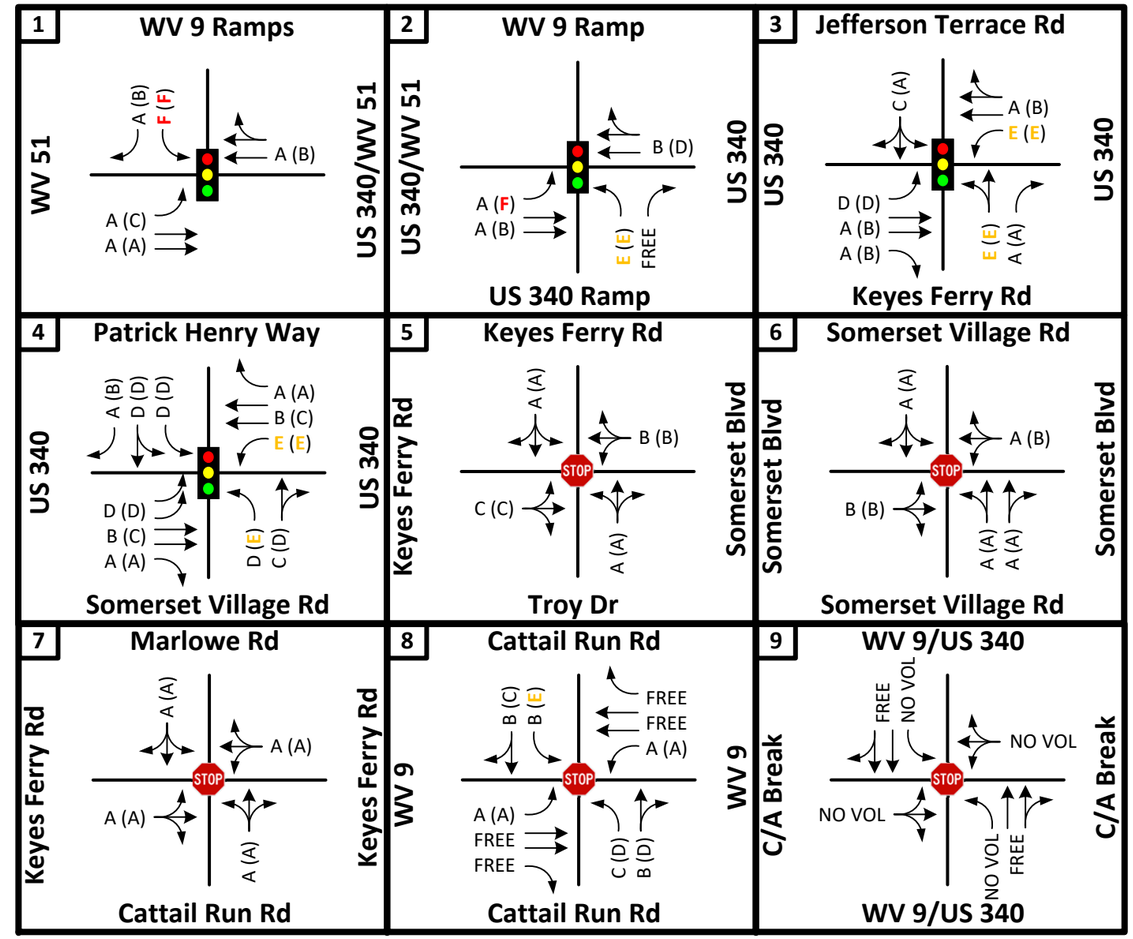
Intersection	Movement	2021 Existing Conditions				2025 No-Build Conditions				2025 Build Conditions				2025 Build Improved Conditions			
		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Intersection 1 - US 340/WV 51 with WV 9 EB Ramps	EB Left-Turn	F	87.4	F	123.0	F	133.1	F	**	F	139.8	F	**	D	48.2	E	59.3
	EB Right-Turn	A	8.5	B	11.2	B	11.8	B	16.1	B	12.2	B	17.1	A	8.6	A	9.0
	EB Approach	E	64.4	F	94.8	F	100.3	F	175.9	F	105.7	F	196.0	D	37.6	D	48.5
*Utilized Synchro Methodology	NB Left-Turn	A	6.1	C	21.4	A	6.5	C	28.5	A	6.6	C	28.5	A	5.7	C	29.2
	NB Thru	A	6.4	A	7.4	A	6.6	A	7.7	A	6.6	A	7.7	A	5.3	A	6.8
*Proposed additional EB Left-Turn Lane to US 340 in Build	NB Approach	A	6.4	A	8.8	A	6.6	A	9.8	A	6.6	A	9.8	A	5.3	A	9.1
Improved Conditions	SB Thru/Right	A	4.1	B	12.7	A	3.4	B	19.6	A	3.5	C	25.7	A	3.2	C	24.1
	SB Approach	A	4.1	B	12.7	A	3.4	B	19.6	A	3.5	C	25.7	A	3.2	C	24.1
Existing Three-Leg Signalized Intersection	Overall	B	19.3	C	24.8	C	27.3	D	43.6	C	28.6	D	50.7	B	12.0	C	23.8
Intersection 2 - US 340/WV 51 with US 340/WV 9 WB Ramps	WB Left-Turn	E	57.6	E	67.7	E	58.0	E	67.8	E	58.0	E	67.8	D	48.8	E	67.8
	WB Right-Turn	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
*Utilized Synchro Methodology	WB Approach	A	9.5	C	26.0	A	8.7	C	23.3	A	8.5	C	23.1	A	7.3	C	23.1
	NB Left-Turn	A	5.2	F	89.1	A	9.6	F	99.5	B	10.4	F	98.5	A	2.6	E	57.6
*Proposed SB Right-Turn Lane to WV 9 Ramp in Build	NB Thru	A	3.4	B	11.7	A	3.9	B	14.7	A	4.0	B	15.2	A	1.8	B	11.7
Improved Conditions	NB Approach	A	3.6	C	23.9	A	4.5	C	27.1	A	1.7	C	27.2	A	1.9	B	18.3
	SB Thru/Right	B	12.2	D	41.6	B	11.3	F	83.4	B	11.7	F	93.7	N/A	N/A	N/A	N/A
	SB Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	5.0	C	24.0
	SB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	0.4	A	0.4
	SB Approach	B	12.2	D	41.6	B	11.3	F	83.4	B	11.7	F	93.7	A	3.7	B	18.0
Existing Four-Leg Signalized Intersection	Overall	A	8.4	C	32.4	A	8.4	D	51.5	A	8.6	E	56.2	A	3.7	B	19.2
Intersection 3 - US 340 with Keyes Ferry Road/Jefferson	EB Left/Thru/Right	C	23.2	A	0.1	B	19.1	A	6.0	B	18.2	A	6.0	N/A	N/A	N/A	N/A
Terrace Road	EB Left/Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	C	32.7	D	37.0
	EB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	2.8	A	3.5
	EB Approach	C	23.2	A	0.1	B	19.1	A	6.0	B	18.2	A	6.0	B	12.3	B	10.4
*Utilized Synchro Methodology	WB Left/Thru	E	64.0	E	77.0	E	64.5	E	76.1	E	66.2	E	79.0	E	55.5	F	83.2
	WB Right-Turn	A	0.3	A	0.2	A	0.4	A	0.2	A	8.0	A	4.8	A	5.3	A	4.8
	WB Approach	E	57.8	E	71.3	E	58.4	E	70.5	D	53.7	E	69.4	D	44.7	E	73.0
	NB Left-Turn	D	53.2	D	48.0	D	54.5	D	52.0	D	52.5	D	48.5	D	50.4	D	51.9
	NB Thru	A	9.0	B	18.4	A	9.9	C	22.1	B	12.9	D	38.4	A	7.8	C	26.8
	NB Right-Turn	A	8.6	B	16.0	A	9.0	B	17.3	B	11.6	C	28.3	A	7.1	C	21.1
	NB Approach	A	9.1	B	18.2	B	10.3	C	22.1	B	13.1	D	36.8	A	8.1	C	26.5
	SB Left-Turn	E	71.5	E	75.5	E	77.7	E	72.0	E	75.9	E	75.5	E	55.3	E	75.5
	SB Thru/Right	A	4.9	B	10.7	A	6.3	B	18.3	A	7.2	B	19.3	A	6.0	B	19.7
	SB Approach	A	5.9	B	11.6	A	7.3	B	19.0	A	8.7	C	20.8	A	7.1	C	21.2
Existing Four-Leg Signalized Intersection	Overall	B	11.7	B	19.7	B	12.6	C	24.2	B	15.0	C	32.2	B	11.0	C	27.9
Intersection 4 - US 340 with Patrick Henry Way/Somerset	EB Left-Turn	D	54.1	D	48.4	E	56.2	D	45.0	E	56.2	D	45.0	D	36.1	C	34.9
Village Road	EB Left/Thru	D	53.8	D	48.2	E	56.3	D	44.9	E	56.2	D	44.9	N/A	N/A	N/A	N/A
	EB Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D	42.6	D	41.8
	EB Right-Turn	A	7.0	B	16.2	A	8.2	C	23.9	A	8.6	C	24.0	A	8.0	B	18.2
	EB Approach	C	23.4	C	25.1	C	26.0	C	30.0	C	26.2	C	30.1	B	18.9	C	23.5
*Utilized Synchro Methodology	WB Left-Turn	D	54.1	E	55.0	E	62.1	E	62.2	E	62.1	E	62.2	C	33.8	C	33.1
	WB Thru/Right	C	34.6	D	47.9	C	26.5	D	47.7	C	26.5	D	47.7	C	20.7	D	35.9
	WB Approach	D	38.9	D	50.2	D	42.4	D	53.7	D	42.4	D	53.7	C	26.6	C	34.8
	NB Left-Turn	D	46.9	D	45.9	D	45.8	D	49.0	D	44.2	D	47.2	D	53.9	D	40.6
	NB Thru	B	12.3	C	25.2	B	18.2	C	33.8	B	19.2	D	43.1	B	11.8	D	39.2
	NB Right-Turn	A	0.2	A	2.8	A	2.8	B	13.4	A	3.4	B	16.9	A	0.5	B	14.9
	NB Approach	B	18.7	C	29.4	C	22.7	D	36.1	C	23.0	D	42.4	B	18.8	D	38.0
	SB Left-Turn	E	58.6	E	62.8	E	60.5	E	69.7	E	60.5	E	69.7	D	51.4	E	68.6
*Proposed Removing Split Phasing in 2025 Build Improved	SB Thru	B	15.1	C	30.3	B	19.0	D	45.1	B	19.2	D	50.3	B	18.6	D	41.0
Conditions	SB Right-Turn	A	0.1	A	2.4	A	0.3	A	6.0	A	0.3	A	6.0	A	1.9	A	4.7
	SB Approach	B	15.5	C	29.3	B	19.3	D	42.3	B	19.5	D	46.8	B	18.6	D	38.8
Existing Four-Leg Signalized Intersection	Overall	B	18.8	C	29.8	C	23.1	D	38.6	C	23.3	D	43.0	B	19.2	D	36.0
Intersection 5 - Keyes Ferry Road (CR 26)/Somerset Blvd (CR	EB Left-Turn	A	7.6	A	7.8	A	7.6	A	7.8	A	7.6	A	7.8	A	7.6	A	7.8
340/6) with Troy Drive	EB Approach	N/A	5.2	N/A	4.8	N/A	5.2	N/A	4.8	N/A	4.9	N/A	4.2	N/A	4.9	N/A	4.2
	WB Left-Turn	A	7.4	A	7.5	A	7.4	A	7.5	A	7.4	A	7.6	A	7.4	A	7.6
	WB Approach	N/A	0.2	N/A	0.4	N/A	0.2	N/A	0.4	N/A	0.2	N/A	0.4	N/A	0.2	N/A	0.4
	NB Left/Thru/Right	C	16.8	C	22.8	C	18.0	D	25.3	C	23.1	E	38.3	C	23.1	E	38.3
	NB Approach	C	16.8	C	22.8	C	18.0	D	25.3	C	23.1	E	38.3	C	23.1	E	38.3
	SB Left/Thru/Right	B	10.0	B	11.8	B	10.2	B	12.2	B	10.2	B	12.6	B	10.2	B	12.6
Existing Four-Leg Unsignalized Intersection (TWSC)	SB Approach	B	10.0	B	11.8	B	10.2	B	12.2	B	10.2	B	12.6	B	10.2	B	12.6
Intersection 6 - Somerset Village Road with Somerset Blvd	EB Left-Turn	A	7.3	A	7.4	A	7.4	A	7.5	A	7.4	A	7.5	A	7.4	A	7.5
(CR 340/6)	EB Approach	N/A	2.0	N/A	1.5	N/A	1.4	N/A	1.0	N/A	1.4	N/A	1.0	N/A	1.4	N/A	1.0
	WB Left-Turn	A	7.3	A	7.5	A	7.4	A	7.7	A	7.4	A	7.7	A	7.4	A	7.7
	WB Approach	N/A	0.3	N/A	0.4	N/A	0.1	N/A	0.2	N/A	0.1	N/A	0.2	N/A	0.1	N/A	0.2
	NB Left/Thru/Right	B	10.1	B	12.3	B	11.1	C	15.3	B	11.1	C	15.3	B	11.1	C	15.3
	NB Approach	B	10.1	B	12.3	B	11.1	C	15.3	B	11.1	C	15.3	B	11.1	C	15.3
	SB Left/Thru/Right	A	9.5	B	10.7	B	10.1	B	12.3	B	10.1	B	12.3	B	10.1	B	12.3
Existing Four-Leg Unsignalized Intersection (TWSC)	SB Approach	A	9.5	B	10.7	B	10.1	B	12.3	B	10.1	B	12.3	B	10.1	B	12.3
Intersection 7 - Keyes Ferry Road (CR 26) with Cattail Run	EB Left/Thru/Right	A	9.1	A	9.9	A	9.2	B	10.2	A	9.2	B	10.5	A	9.2	B	10.5
Road (CR 9/3)/Marlowe Road (CR 340/4)	EB Approach	A	9.1	A	9.9	A	9.2	B	10.2	A	9.2	B	10.5	A	9.2	B	10.5
	WB Left/Thru/Right	A	9.2	A	9.7	A	9.3	B	10.1	A	9.5	B	10.5	A	9.5	B	10.5
	WB Approach	A	9.2	A	9.7	A	9.3	B	10.1	A	9.5	B	10.5	A	9.5	B	10.5
	NB Left-Turn	A	7.2	A	7.2	A	7.2	A	7.2	A	7.2	A	7.3	A	7.2	A	7.3
	NB Approach	N/A	4.3	N/A	0.3	N/A	4.3	N/A	2.3	N/A	5.4	N/A	3.9	N/A	5.4	N/A	3.9
	SB Left-Turn	NO VOL	N/A	A	7.3	NO VOL	N/A	A	7.3	NO VOL	N/A	A	7.3	NO VOL	N/A	A	7.3
Existing Four-Leg Unsignalized Intersection (TWSC)	SB Approach	N/A	0.0	N/A	3.6	N/A	0.0	N/A	2.4	N/A	0.0	N/A	2.4	N/A	0.0	N/A	2.4

Table 4 Continued

Intersection	Movement	2021 Existing Conditions				2025 No-Build Conditions				2025 Build Conditions				2025 Build Improved Conditions			
		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Intersection 8 - WV 9 with Cattail Run Road (CR 9/3)	EB Left-Turn	A	7.7	A	9.6	A	7.9	B	10.3	A	7.9	B	10.5	A	7.9	B	10.5
	EB Thru	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
	EB Right-Turn	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
	EB Approach	N/A	0.1	N/A	0.2	N/A	0.0	N/A	0.2	N/A	0.0	N/A	0.2	N/A	0.0	N/A	0.2
	WB Left-Turn	A	8.4	A	8.7	A	8.8	A	9.1	A	8.8	A	9.2	A	8.8	A	9.2
	WB Thru	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
	WB Right-Turn	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
	WB Approach	N/A	0.0	N/A	0.1	N/A	0.0	N/A	0.1	N/A	0.0	N/A	0.1	N/A	0.0	N/A	0.1
	NB Left-Turn	C	15.1	D	28.4	C	17.9	E	43.8	C	18.4	E	46.0	C	18.4	E	46.0
	NB Thru/Right	B	14.4	D	27.5	C	16.8	E	40.9	C	17.3	E	44.4	C	17.3	E	44.4
	NB Approach	B	14.5	D	27.8	C	17.0	E	41.8	C	17.5	E	44.9	C	17.5	E	44.9
	SB Left-Turn	B	14.4	E	39.6	C	17.2	F	87.9	C	18.5	F	120.4	C	18.5	F	120.4
	SB Thru/Right	B	12.0	C	23.6	B	13.3	E	35.7	B	13.5	E	37.9	B	13.5	E	37.9
	SB Approach	B	13.9	D	29.4	C	16.6	F	56.7	C	17.9	F	74.3	C	17.9	F	74.3
Existing Four-Leg Unsignalized Intersection (TWSC)	Overall	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Intersection 9 - WV 9/US 340 with C/A Break/Site Drive #1	EB Left/Thru/Right	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A
	EB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB Left/Thru/Right	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB Left-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	F	**	F	**	F	**	F	**
	WB Thru/Right	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	B	14.1	D	25.1	B	14.1	D	25.1
	WB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	F	**	F	**	F	**	F	**
	NB Left-Turn	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A
	NB Thru/Right	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
	NB Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	SB Left-Turn	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	NO VOL	N/A	B	11.5	D	25.3	B	11.5	D	25.3
	SB Thru/Right	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
Existing Four-Leg Unsignalized Intersection (TWSC)	SB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.2	N/A	0.4	N/A	0.2	N/A	0.4
Intersection 10 - Keyes Ferry Road (CR 26) with Site Drive #2	EB Thru/Right	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
	EB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0	N/A	0.0	N/A	0.0	N/A	0.0
	WB Left-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	7.3	A	7.4	A	7.3	A	7.4
	WB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.4	N/A	1.2	N/A	0.4	N/A	1.2
	NB Left-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	9.2	A	9.5	A	9.2	A	9.5
	NB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	8.5	A	8.6	A	8.5	A	8.6
Proposed Three-Leg Unsignalized Intersection (TWSC)	NB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	9.1	A	9.4	A	9.1	A	9.4
Intersection 11 - Keyes Ferry Road (CR 26) with Site Drive #3	EB Thru/Right	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FREE	N/A	FREE	N/A	FREE	N/A	FREE
	EB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0	N/A	0.0	N/A	0.0	N/A	0.0
	WB Left-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	7.3	A	7.3	A	7.3	A	7.3
	WB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.5	N/A	1.1	N/A	0.5	N/A	1.1
	NB Left-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	9.0	A	9.2	A	9.0	A	9.2
	NB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	8.5	A	8.5	A	8.5	A	8.5
Proposed Three-Leg Unsignalized Intersection (TWSC)	NB Approach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	8.7	A	8.9	A	8.7	A	8.9

** = Delay exceeding 200 sec/veh
*Direction of Minor Roads are based on US 340 being NB/SB





LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Lane Configuration
- A AM Level of Service
- (A) PM Level of Service

N

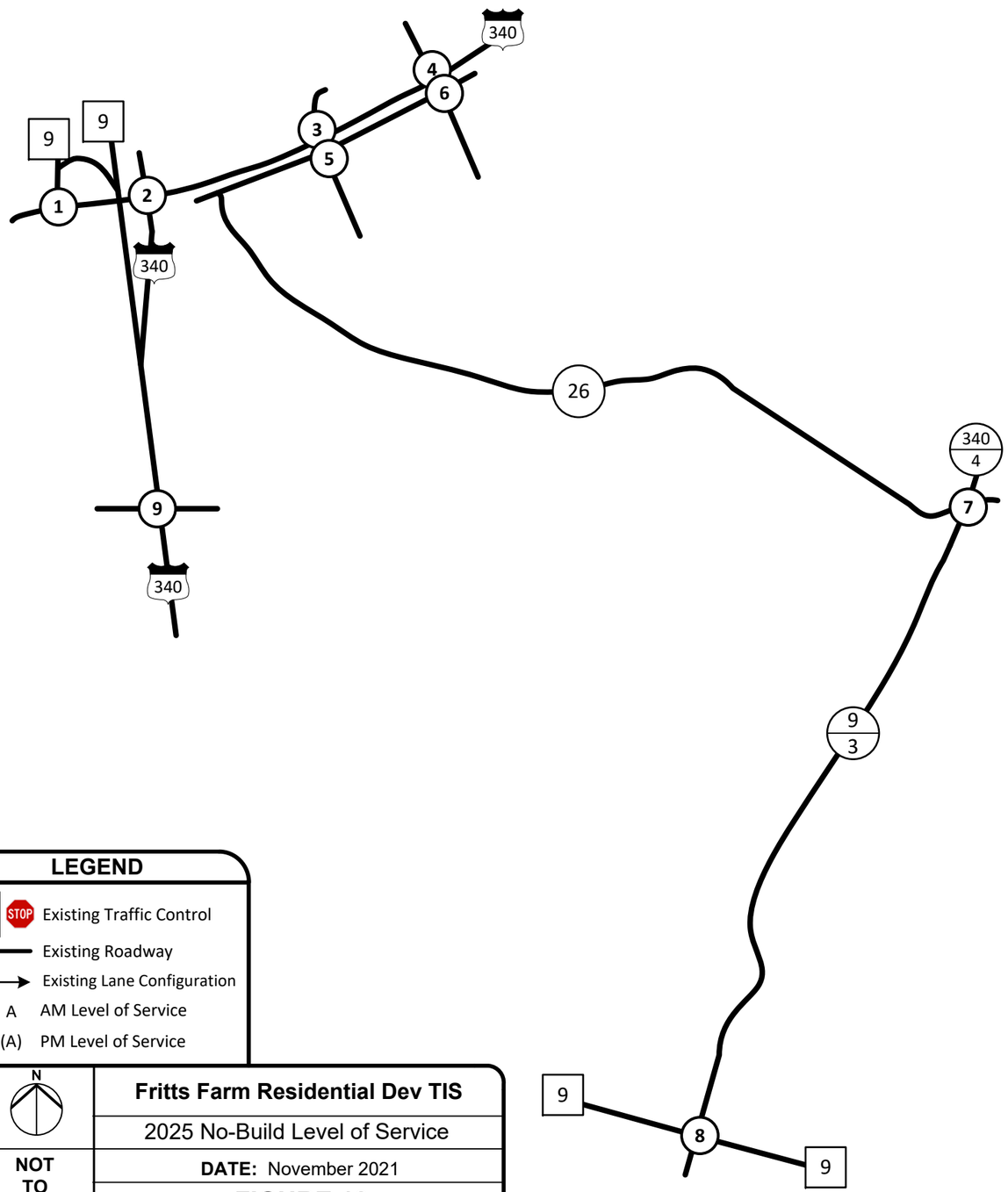
NOT TO SCALE

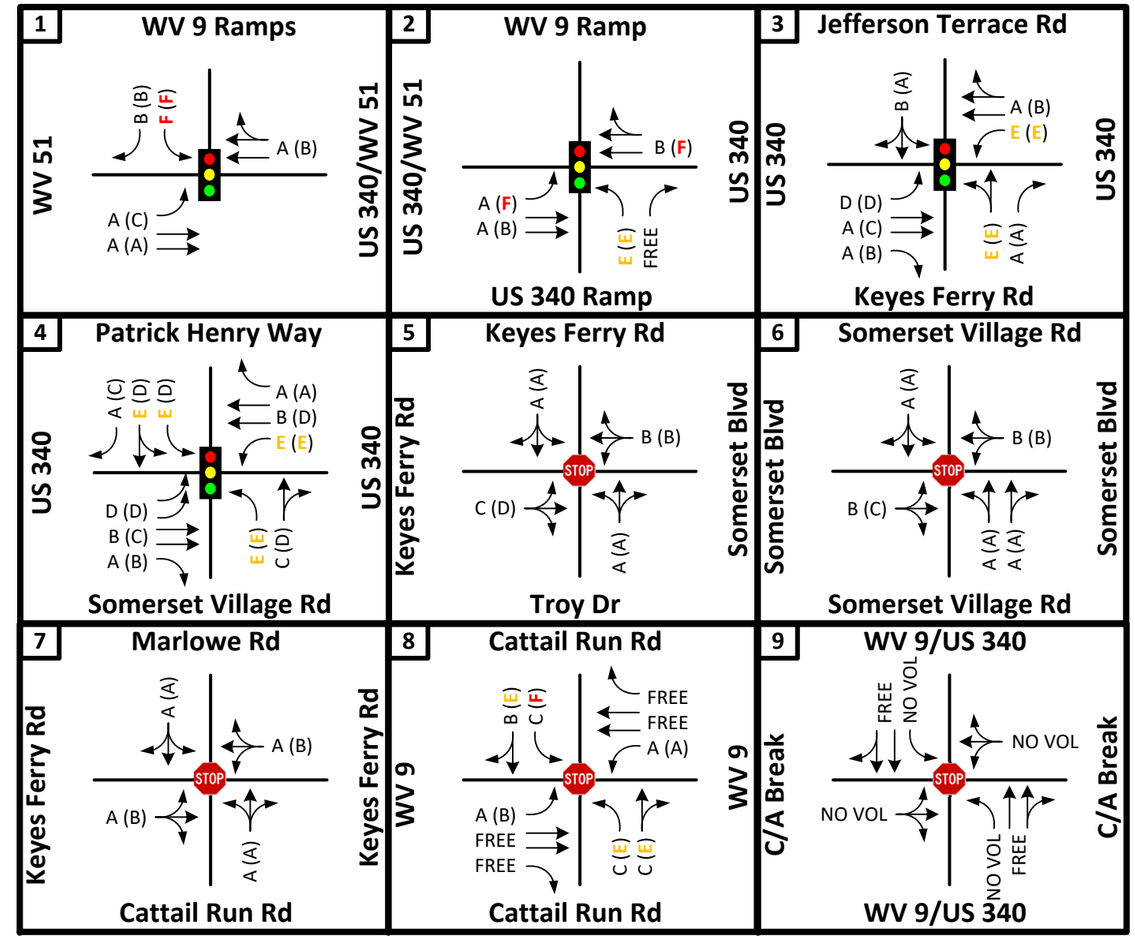
Fritts Farm Residential Dev TIS

2021 Existing Level of Service

DATE: November 2021

FIGURE 11





LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Lane Configuration
- A AM Level of Service
- (A) PM Level of Service

N

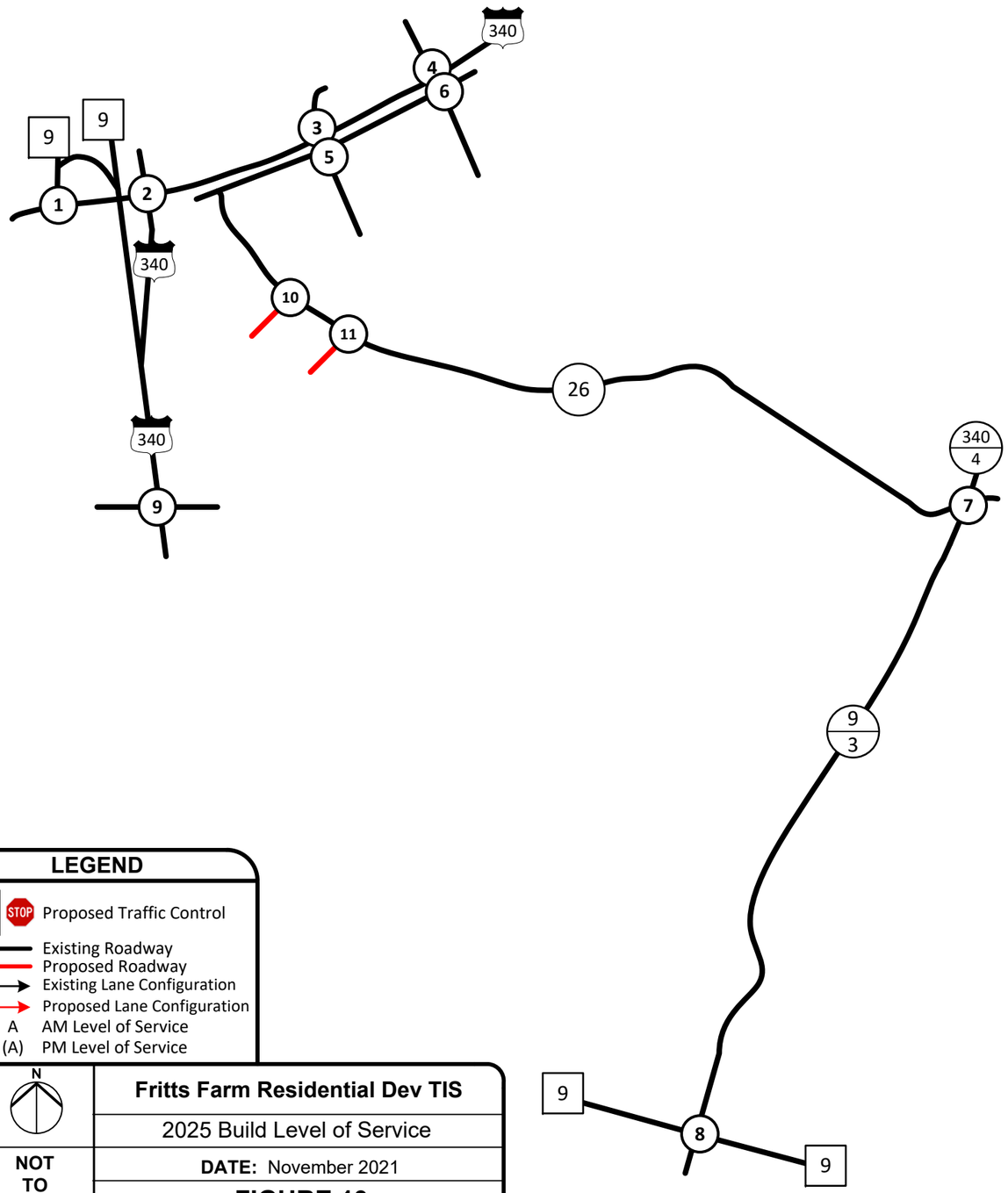
NOT TO SCALE

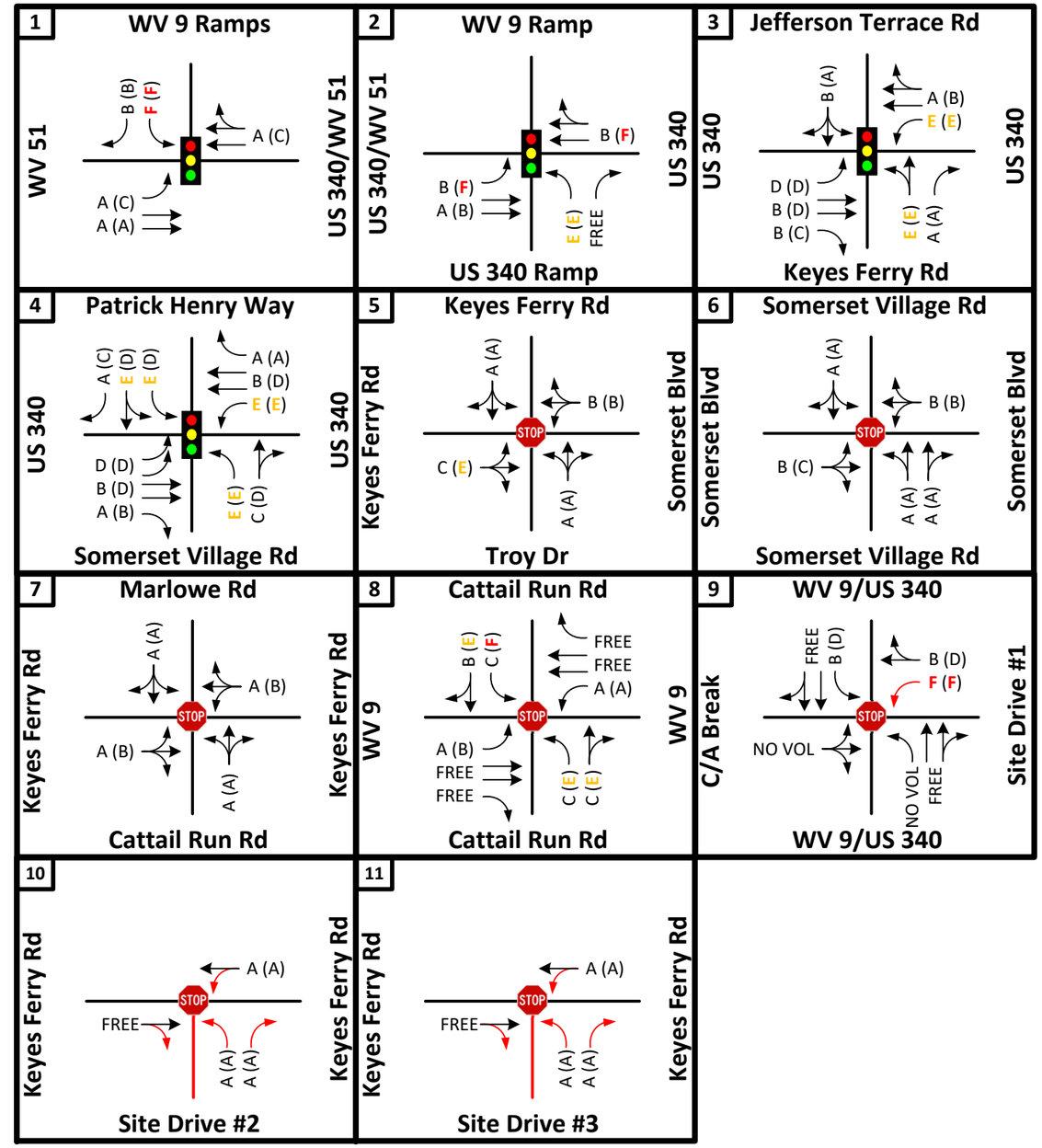
Fritts Farm Residential Dev TIS

2025 No-Build Level of Service

DATE: November 2021

FIGURE 12





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- A AM Level of Service
- (A) PM Level of Service

N

NOT TO SCALE

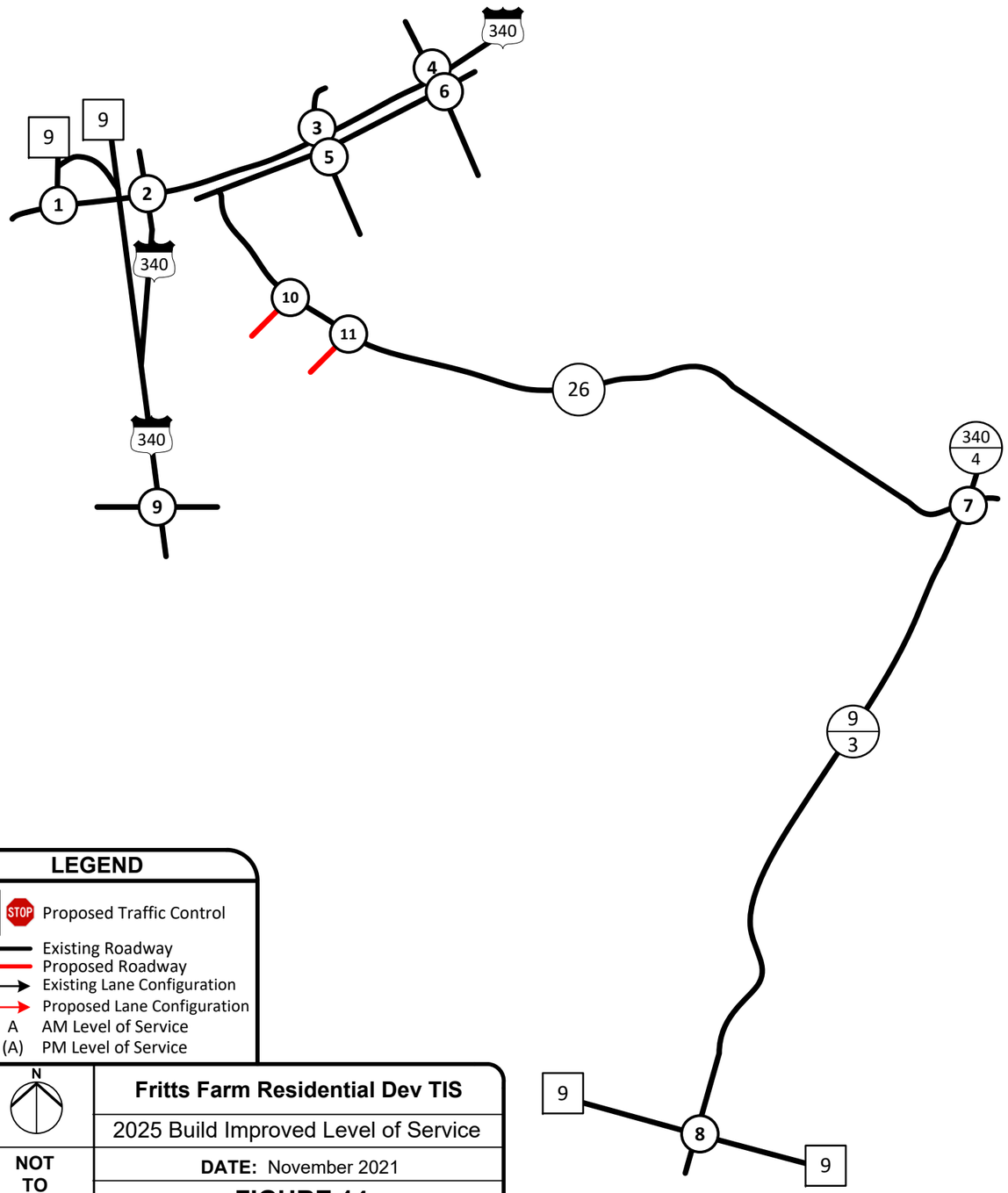
Fritts Farm Residential Dev TIS

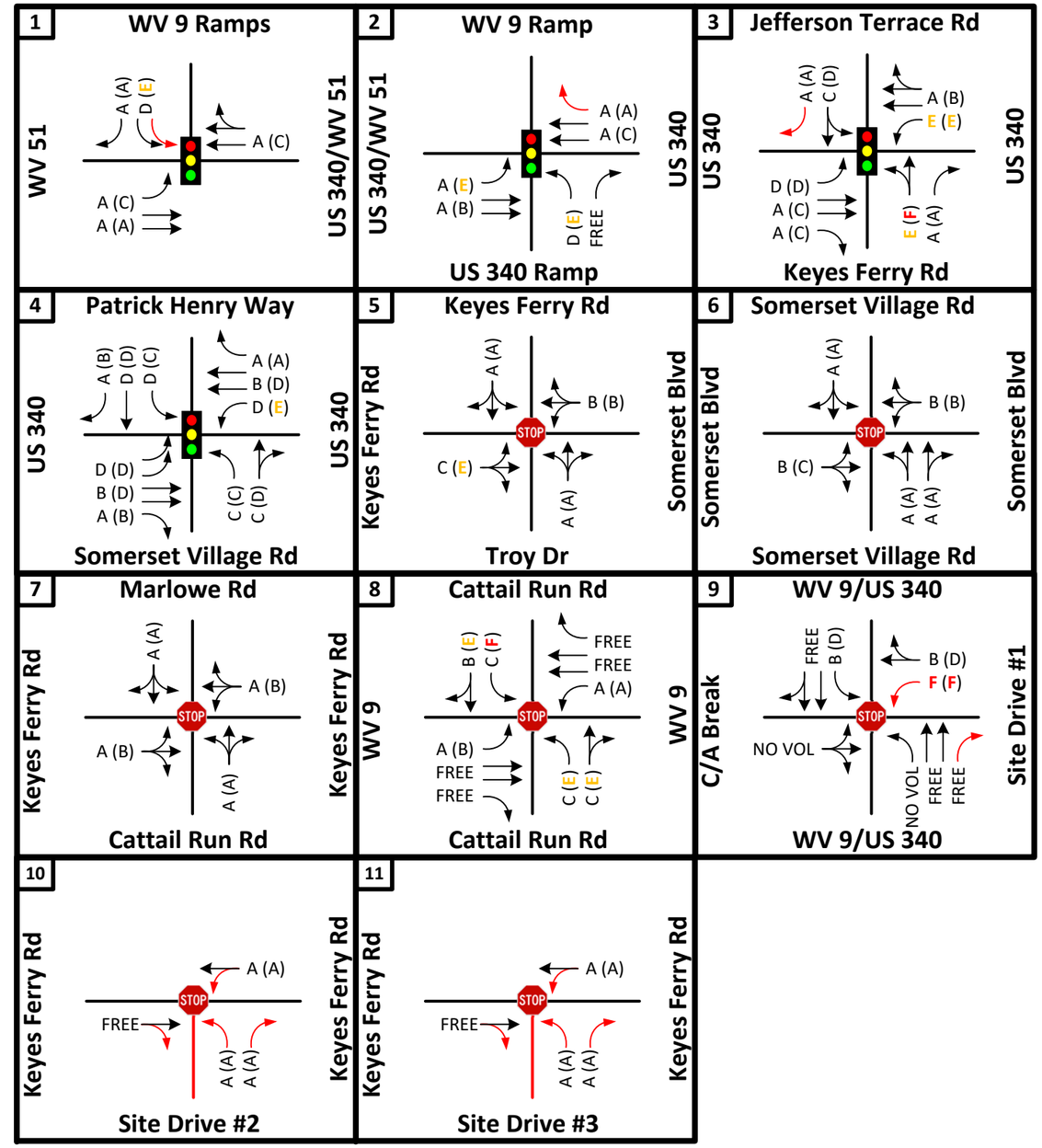
2025 Build Level of Service

DATE: November 2021

FIGURE 13

AMT





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- A AM Level of Service
- (A) PM Level of Service

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

2025 Build Improved Level of Service

DATE: November 2021

FIGURE 14

AMT

QUEUING ANALYSIS

2021 Existing Conditions Analysis

Queuing analysis was performed for all study intersections during the weekday AM and PM peak hours using the SimTraffic micro-simulation model, which is a simulation complement to the Synchro traffic analysis models utilized for the capacity analysis. The queuing calculations produced by SimTraffic are acknowledged within the industry to be a realistic replication of actual conditions. Each simulation model was seeded for 10 minutes and recorded for 60 minutes. The simulation was run five times and then averaged to estimate the 95th percentile queuing for all scenarios.

The queuing analysis indicates that one (1) existing lane group currently exceeds storage length during the peak periods analyzed. Those lane groups are as follows:

- *Patrick Henry Way right-turn movement from north to US 340 during PM peak hour*

In addition, queuing analysis indicates that eight (8) existing lane groups currently extend beyond adjacent auxiliary lane storage length during the peak periods analyzed. Those lane groups are as follows:

- *WV 51 Eastbound thru movement to WV 9 EB Ramps during PM peak hour*
- *WV 9 Eastbound exit ramp left-turn movement to US 340/WV 51 during AM and PM peak hours*
- *US 340 Northbound exit ramp left-turn movement to US 340/WV 51 during PM peak hour*
- *US 340 Northbound thru movement to Jefferson Terrace Road during PM peak hour*
- *US 340 Southbound thru movement to Keyes Ferry Road during PM peak hour*
- *Patrick Henry Way shared left/thru lane to US 340 during AM and PM peak hours*
- *US 340 Northbound thru movement to Patrick Henry Way during PM peak hour*
- *US 340 Southbound thru movement to Patrick Henry Way during PM peak hour*

2025 No-Build Conditions Analysis

Queuing analysis indicates that all conditions described in the 2021 Existing Conditions are expected to continue with similar queues with the increase in traffic due to regional growth in the study area and build-out of background developments. Analysis indicates that five (5) additional lane groups expected to exceed storage length (shown in bold). Lane groups that exceed storage length are as follows:

- ***US 340 Northbound left-turn movement to Jefferson Terrace Road during PM peak hour***
- ***US 340 Southbound left-turn movement to Keyes Ferry Road during PM peak hour***
- *Patrick Henry Way right-turn movement to US 340 during PM peak hour*
- ***US 340 Southbound left-turn movement to Somerset Village Road during PM peak hour***
- ***US 340 Southbound right-turn movement to Patrick Henry Way during PM peak hour***
- ***Cattail Run Road Southbound left-turn movement to WV 9 during PM peak hour***

In addition, queuing analysis indicates that one (1) additional lane group is expected to extend beyond adjacent auxiliary lane storage length during the peak periods analyzed (shown in bold). Lane groups that will continue to extend beyond adjacent auxiliary lane storage are as follows:

- *WV 51 Eastbound thru movement to WV 9 EB Ramps during PM peak hour*
- *WV 9 Eastbound exit ramp left-turn movement to US 340/WV 51 during AM and PM peak hours*
- *US 340 Northbound exit ramp left-turn movement to US 340/WV 51 during PM peak hour*
- *US 340 Northbound thru movement to Jefferson Terrace Road during PM peak hour*
- *US 340 Southbound thru movement to Keyes Ferry Road during PM peak hour*
- *Patrick Henry Way shared left/thru lane to US 340 during AM and PM peak hours*
- *US 340 Northbound thru movement to Patrick Henry Way during PM peak hour*
- *US 340 Southbound thru movement to Patrick Henry Way during PM peak hour*
- ***Cattail Run Road Southbound shared thru/right lane to WV 9 during PM peak hour***

2025 Build Conditions Analysis

Queuing analysis indicates that all conditions described in the 2025 No-Build Conditions are expected to continue with similar queueing following build-out of the Fritts Farm residential development. Analysis indicates that one (1) additional movement is expected to exceed storage length. Lane groups that exceed storage length are as follows:

- *US 340 Northbound left-turn movement to Jefferson Terrace Road during AM and PM peak hours*
- *US 340 Southbound left-turn movement to Keyes Ferry Road during PM peak hour*
- *Patrick Henry Way right-turn movement to US 340 during PM peak hour*
- *US 340 Southbound left-turn movement to Somerset Village Road during PM peak hour*
- *US 340 Southbound right-turn movement to Patrick Henry Way during PM peak hour*
- *Cattail Run Road Southbound left-turn movement to WV 9 during PM peak hour*
- ***US 340 SB/WV 9 EB left-turn movement to Site Drive #1 during PM peak hour***

In addition, queuing analysis indicates that no additional lane groups are expected to extend beyond adjacent auxiliary lane storage length during the peak periods analyzed. Lane groups that will continue to extend beyond adjacent auxiliary lane storage are as follows:

- *WV 51 Eastbound thru movement to WV 9 EB Ramps during PM peak hour*
- *WV 9 Eastbound exit ramp left-turn movement to US 340/WV 51 during AM and PM peak hours*
- *US 340 Northbound exit ramp left-turn movement to US 340/WV 51 during PM peak hour*
- *US 340 Northbound thru movement to Jefferson Terrace Road during PM peak hour*
- *US 340 Southbound thru movement to Keyes Ferry Road during PM peak hour*
- *Patrick Henry Way shared left/thru lane to US 340 during AM and PM peak hours*
- *US 340 Northbound thru movement to Patrick Henry Way during PM peak hour*
- *US 340 Southbound thru movement to Patrick Henry Way during PM peak hour*
- *Cattail Run Road Southbound shared thru/right lane to WV 9 during PM peak hour*

2025 Build Improved Conditions Analysis

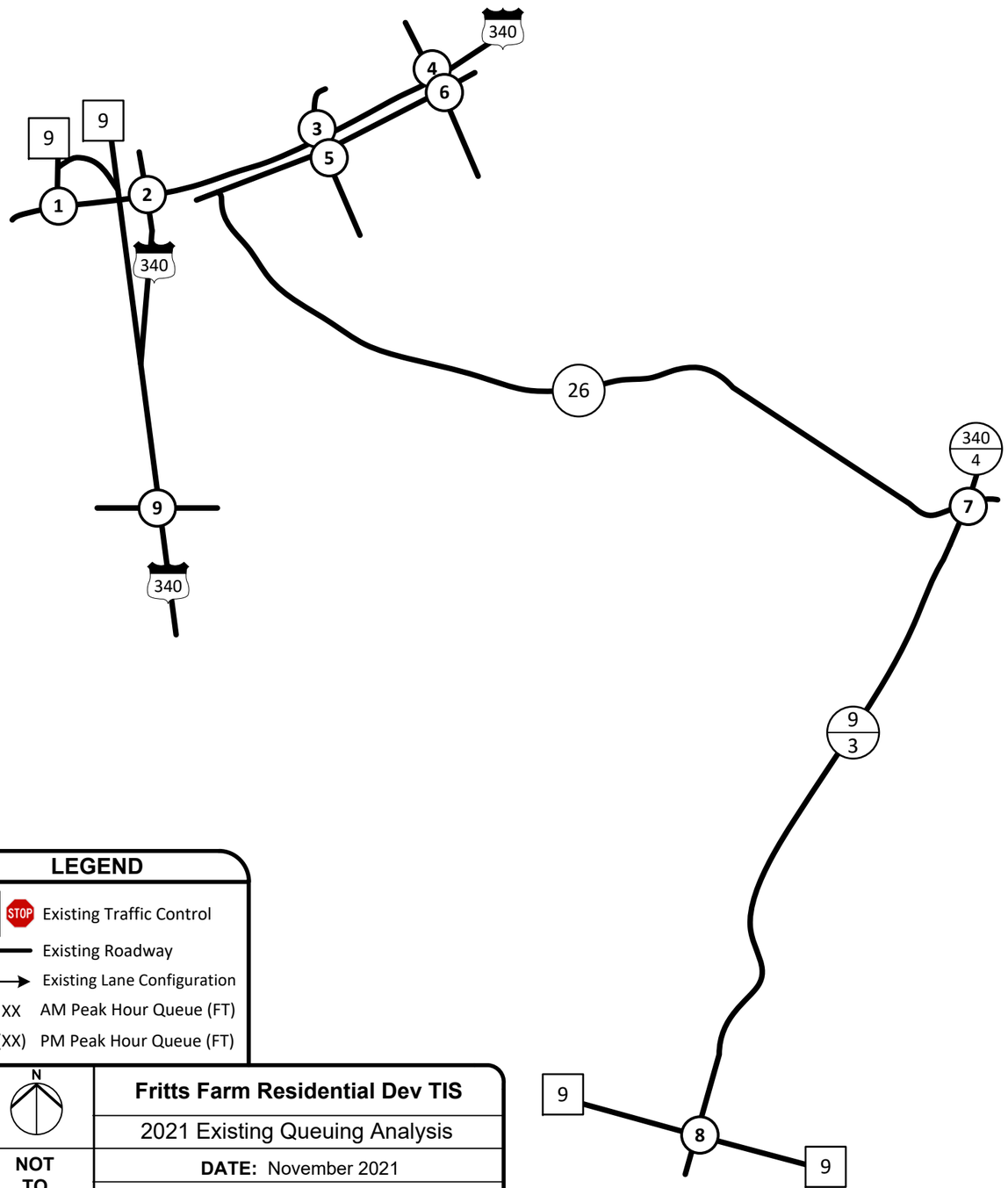
Queuing analysis indicates that all conditions described in the 2025 Build Conditions are expected to be resolved following build-out of the Fritts Farm residential development with proposed improvements in place. Analysis indicates that no additional movements are expected to exceed storage length.

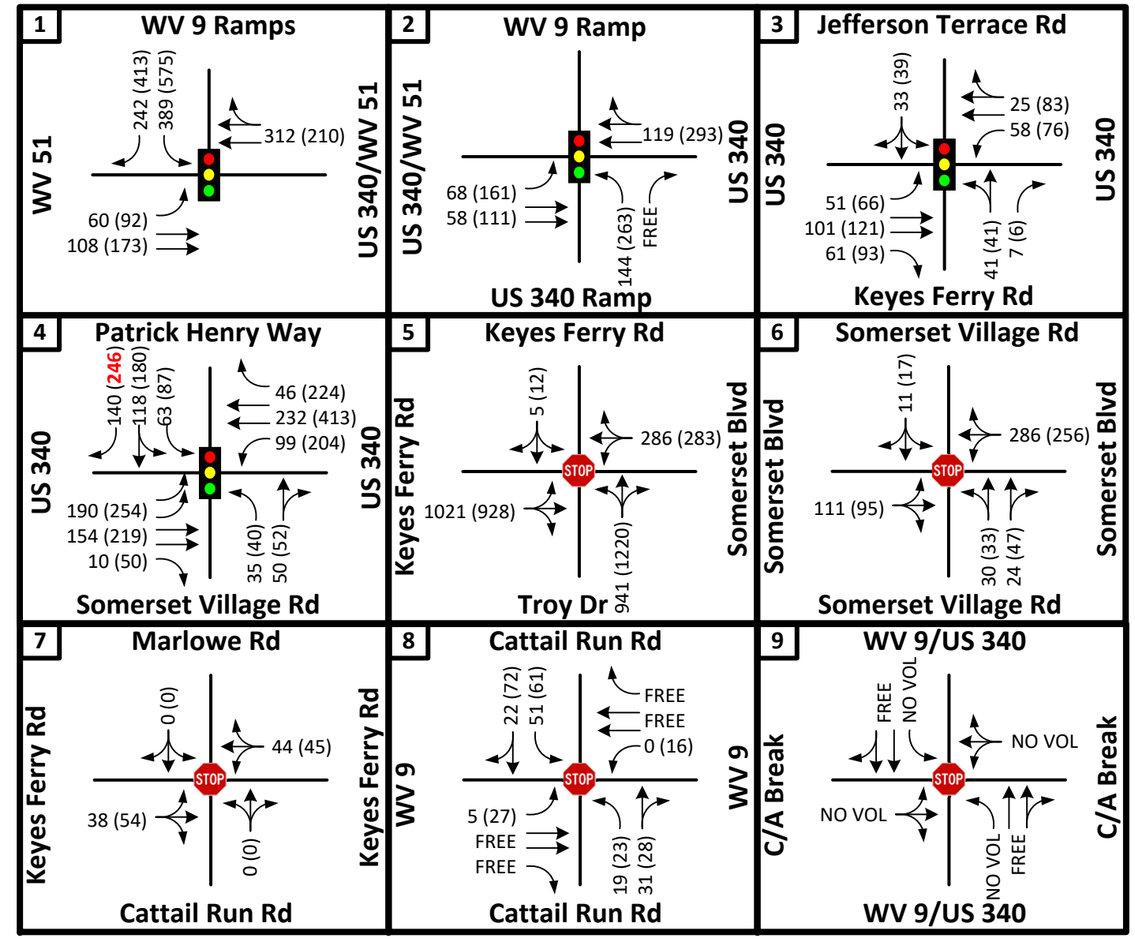
Table 5 presents the 95% queuing results for the intersections within the study during the weekday AM and PM peak hours for the 2021 Existing Conditions, 2025 No-Build Conditions, 2025 Build Conditions, and 2025 Build Improved Conditions. **Figure 15** shows the 2021 Existing Conditions Queuing Analysis for the weekday AM and PM peak periods; **Figure 16** shows the 2025 No-Build Queuing Analysis for the weekday AM and PM peak periods; **Figure 17** shows the 2025 Build Queuing Analysis for the weekday AM and PM peak periods; and **Figure 18** shows the 2025 Build Improved Queuing Analysis for the weekday AM and PM peak periods. Copies of the SimTraffic analyses outputs are included in **Appendix D**.

Table 5: Queueing Analysis Summary

Intersection	Movement	Existing Storage Length (ft)	2021 Existing		2025 No-Build		Proposed Storage Length (ft)	2025 Build		Proposed Storage Length (ft)	2025 Build Improved	
			AM	PM	AM	PM		AM	PM		AM	PM
Intersection 1 - US 340/WV 51 with WV 9 EB Ramps	EB Left-Turn	--	389	575	573	504	--	562	504	400/--	286	331
	EB Right-Turn	200	242	413	418	438	200	431	431	400	0	0
	NB Left-Turn	150	60	92	66	102	150	60	103	150	55	112
	NB Thru	--	108	173	127	189	--	133	200	--	121	179
	SB Thru/Right	--	312	210	407	532	--	427	335	--	133	311
Intersection 2 - US 340/WV 51 with WV 9 WB Ramps	WB Left-Turn	--	144	263	139	682	--	134	539	--	139	296
	WB Right-Turn	250	FREE	FREE	FREE	FREE	250	FREE	FREE	400	FREE	FREE
	NB Left-Turn	325	68	161	76	186	325	91	228	325	65	191
	NB Thru	--	58	111	57	125	--	54	169	--	62	140
	SB Thru/Right	--	119	293	177	478	--	167	612	N/A	N/A	N/A
	SB Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--	119	280
	SB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	350	0	91
Intersection 3 - US 340 with Keyes Ferry Road/Jefferson Terrace Road	EB Left/Thru/Right	--	33	39	75	64	--	91	77	N/A	N/A	N/A
	EB Left/Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--	43	33
	EB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	125	54	59
	WB Left/Thru	--	41	41	47	49	--	48	49	--	49	51
	WB Right-Turn	--	7	6	16	13	--	27	26	--	30	20
	NB Left-Turn	75	51	66	68	133	75	76	138	150	70	127
	NB Thru	--	101	121	167	284	--	189	308	--	136	273
	NB Right-Turn	225	61	93	125	165	225	133	199	225	87	192
	SB Left-Turn	75	58	76	67	84	75	79	106	125	79	106
	SB Thru/Right	--	25	83	113	186	--	104	175	--	95	197
Intersection 4 - US 340 with Patrick Henry Way/Somerset Village Road	EB Left-Turn	175	63	87	74	100	175	74	117	175	105	131
	EB Left/Thru	--	118	180	125	204	--	134	193	N/A	N/A	N/A
	EB Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--	34	119
	EB Right-Turn	200	140	246	176	256	200	183	259	275	183	234
	WB Left-Turn	--	35	40	37	41	--	36	44	--	40	38
	WB Thru/Right	--	50	52	43	49	--	43	52	--	47	41
	NB Left-Turn	500	190	254	195	298	500	180	254	500	185	256
	NB Thru	--	154	219	192	314	--	217	338	--	193	349
	NB Right-Turn	175	10	50	32	126	175	38	128	175	26	171
	SB Left-Turn	275	99	204	113	389	275	103	417	450	107	335
	SB Thru	--	232	413	259	548	--	272	559	--	212	521
	SB Right-Turn	275	46	224	55	479	275	58	507	525	50	441
Intersection 5 - Keyes Ferry Road (CR 26)/Somerset Blvd (CR 340/6) with Troy Drive	EB Left/Thru/Right	--	5	12	29	24	--	27	31	--	34	30
	WB Left/Thru/Right	--	941	1220	578	1197	--	445	1188	--	127	1134
	NB Left/Thru/Right	--	1021	928	824	701	--	1065	1047	--	1038	1024
	SB Left/Thru/Right	--	286	283	303	299	--	305	286	--	299	287
Intersection 6 - Somerset Village Road with Somerset Blvd (CR 340/6)	EB Left/Thru/Right	--	11	17	23	31	--	20	33	--	17	26
	WB Left/Thru	--	30	33	103	85	--	94	118	--	126	100
	WB Thru/Right	--	24	47	51	71	--	53	88	--	34	71
	NB Left/Thru/Right	--	111	95	121	118	--	117	149	--	121	143
	SB Left/Thru/Right	--	286	256	164	374	--	242	822	--	589	682
Intersection 7 - Keyes Ferry Road (CR 26) with Cattail Run Road (CR 9/3)/Marlowe Road (CR 340/4)	EB Left/Thru/Right	--	38	54	44	53	--	42	56	--	43	57
	WB Left/Thru/Right	--	44	45	44	49	--	41	47	--	40	45
	NB Left/Thru/Right	--	0	0	0	2	--	0	7	--	0	0
	SB Left/Thru/Right	--	0	0	1	0	--	0	3	--	0	0
Intersection 8 - WV 9 with Cattail Run Road (CR 9/3)	EB Left-Turn	475	5	27	8	28	475	8	27	475	7	26
	EB Thru	--	FREE	FREE	FREE	FREE	--	FREE	FREE	--	FREE	FREE
	EB Right-Turn	75	FREE	FREE	FREE	FREE	75	FREE	FREE	75	FREE	FREE
	WB Left-Turn	450	0	16	18	22	450	0	19	450	0	21
	WB Thru	--	FREE	FREE	FREE	FREE	--	FREE	FREE	--	FREE	FREE
	WB Right-Turn	100	FREE	FREE	FREE	FREE	100	FREE	FREE	100	FREE	FREE
	NB Left-Turn	75	19	23	18	29	75	19	26	75	16	27
	NB Thru/Right	--	31	28	28	33	--	31	30	--	31	32
	SB Left-Turn	75	51	61	49	83	75	60	87	125	70	111
	SB Thru/Right	--	22	72	27	106	--	36	225	--	26	170
Intersection 9 - WV 9/US 340 with C/A Break/Site Drive #1	EB Left/Thru/Right	--	0	0	0	0	--	0	0	--	0	0
	WB Left/Thru/Right	--	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A
	WB Left-Turn	N/A	N/A	N/A	N/A	N/A	--	552	726	--	602	639
	WB Thru/Right	N/A	N/A	N/A	N/A	N/A	--	201	510	--	298	300
	NB Left-Turn	125	0	0	0	0	125	0	0	125	0	0
	NB Thru/Right	--	FREE	FREE	FREE	FREE	--	FREE	FREE	N/A	N/A	N/A
	NB Thru	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--	FREE	FREE
	NB Right-Turn	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	250	FREE	FREE
	SB Left-Turn	125	0	0	0	0	125	24	235	250	27	213
	SB Thru/Right	--	FREE	FREE	FREE	FREE	--	FREE	FREE	--	FREE	FREE
Intersection 10 - Keyes Ferry Road (CR 26) with Site Drive #2	EB Thru/Right	N/A	N/A	N/A	N/A	N/A	--	FREE	FREE	--	FREE	FREE
	WB Left/Thru	N/A	N/A	N/A	N/A	N/A	--	97	10	--	68	6
	NB Left-Turn	N/A	N/A	N/A	N/A	N/A	--	180	44	--	89	42
	NB Right-Turn	N/A	N/A	N/A	N/A	N/A	--	31	24	--	29	20
Intersection 11 - Keyes Ferry Road (CR 26) with Site Drive #3	EB Thru/Right	N/A	N/A	N/A	N/A	N/A	--	FREE	FREE	--	FREE	FREE
	WB Left/Thru	N/A	N/A	N/A	N/A	N/A	--	4	4	--	0	4
	NB Left-Turn	N/A	N/A	N/A	N/A	N/A	--	24	18	--	25	20
	NB Right-Turn	N/A	N/A	N/A	N/A	N/A	--	31	23	--	29	23

*Direction of Minor Roads are based on US 340 being NB/SB





LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Lane Configuration
- XX AM Peak Hour Queue (FT)
- (XX) PM Peak Hour Queue (FT)

N

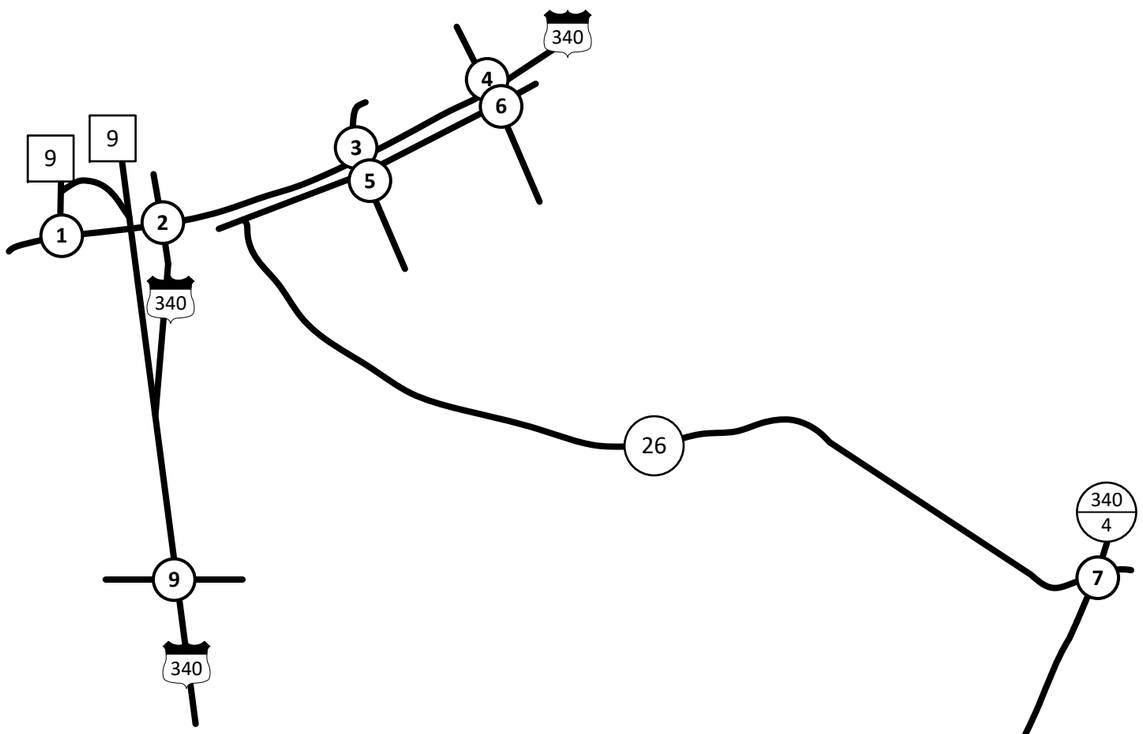
NOT TO SCALE

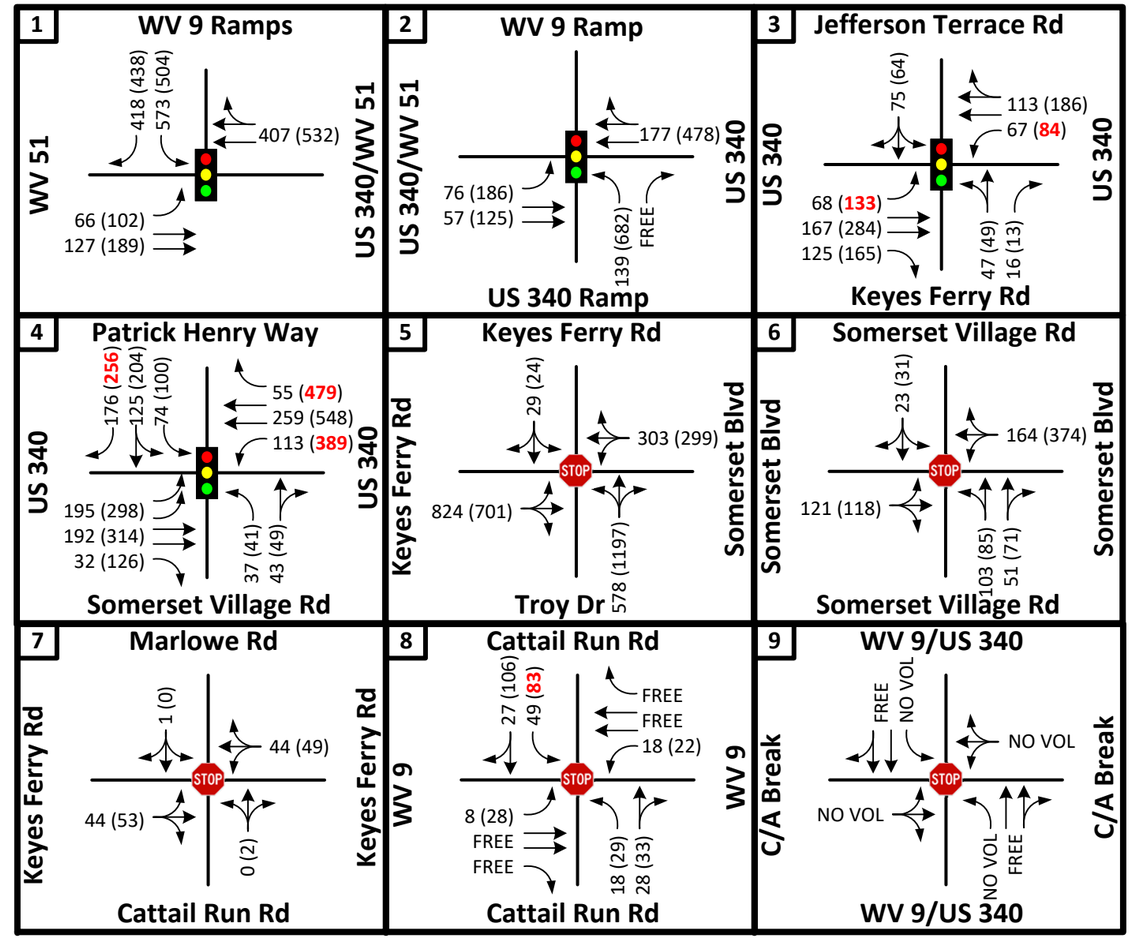
Fritts Farm Residential Dev TIS

2021 Existing Queuing Analysis

DATE: November 2021

FIGURE 15





LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Lane Configuration
- XX AM Peak Hour Queue (FT)
- (XX) PM Peak Hour Queue (FT)

N

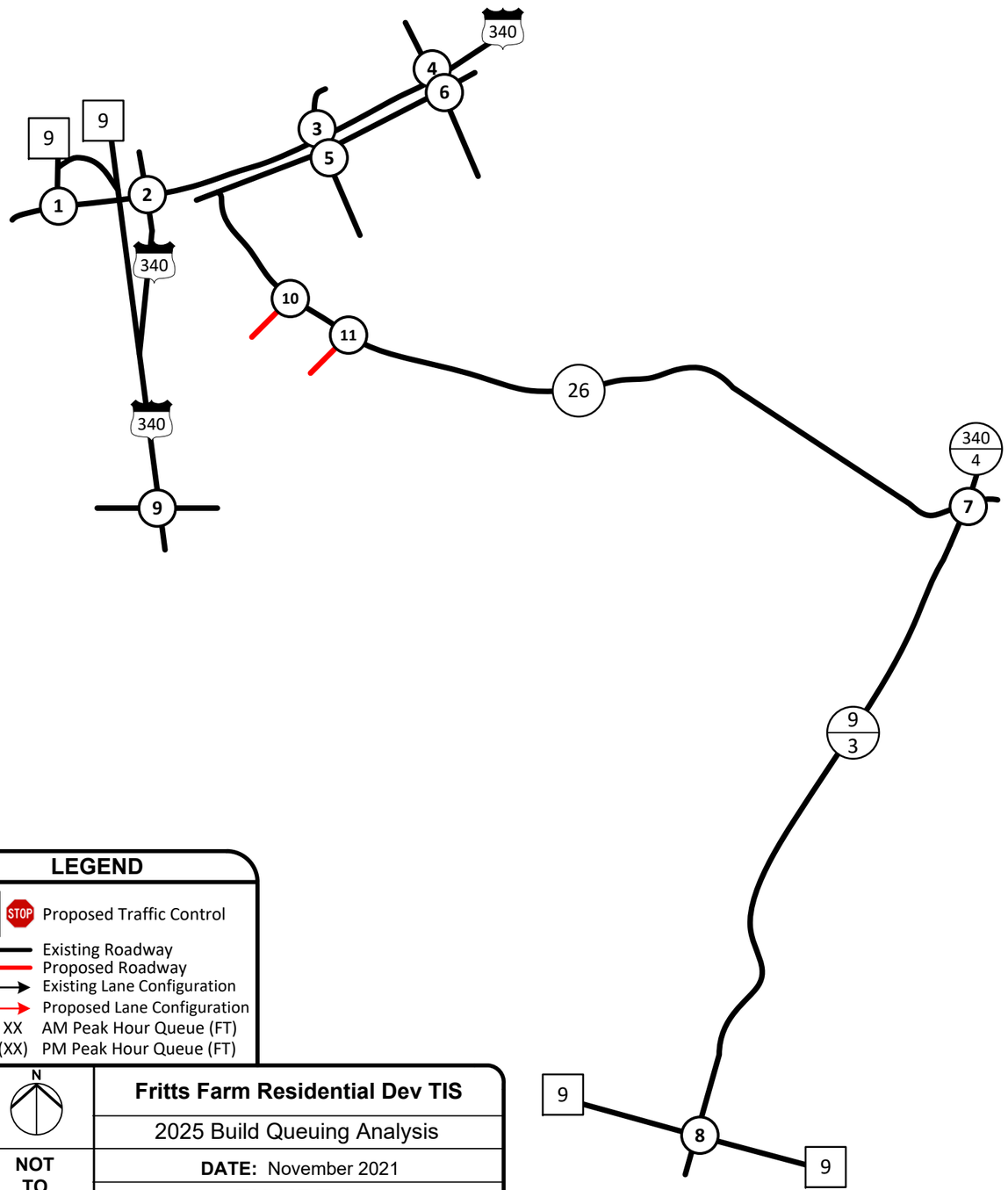
NOT TO SCALE

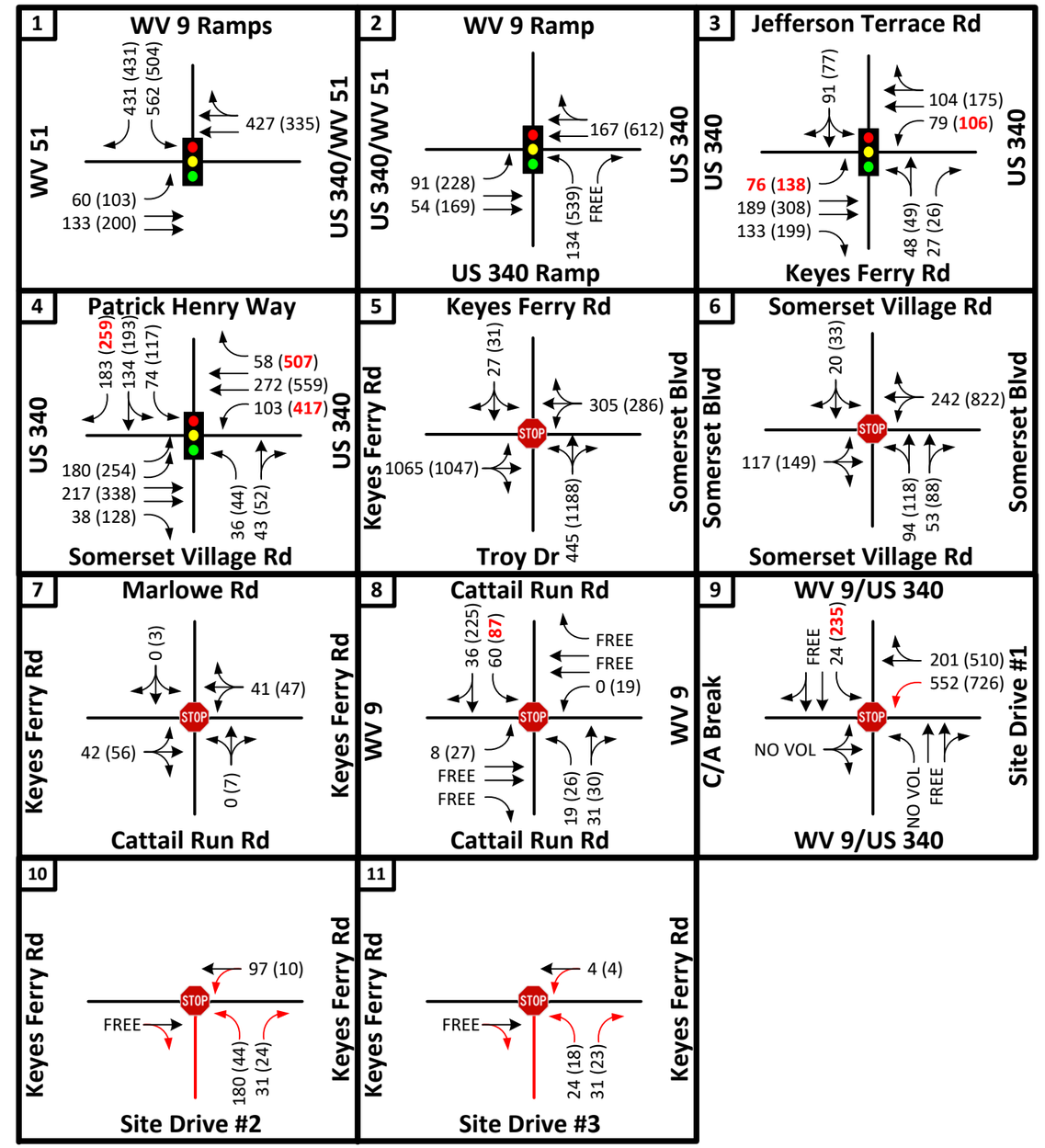
Fritts Farm Residential Dev TIS

2025 No-Build Queuing Analysis

DATE: November 2021

FIGURE 16





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX AM Peak Hour Queue (FT)
- (XX) PM Peak Hour Queue (FT)

N

NOT TO SCALE

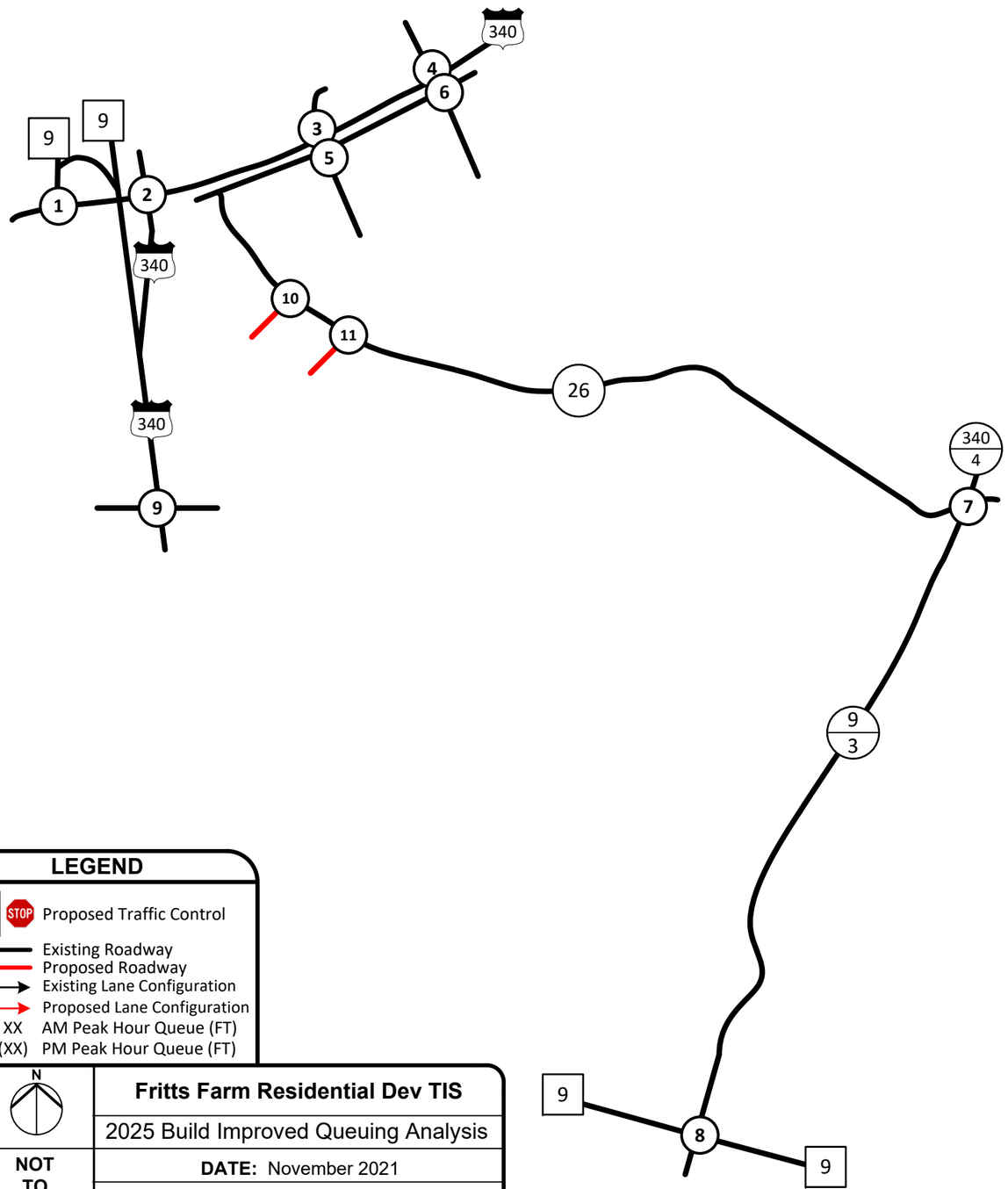
Fritts Farm Residential Dev TIS

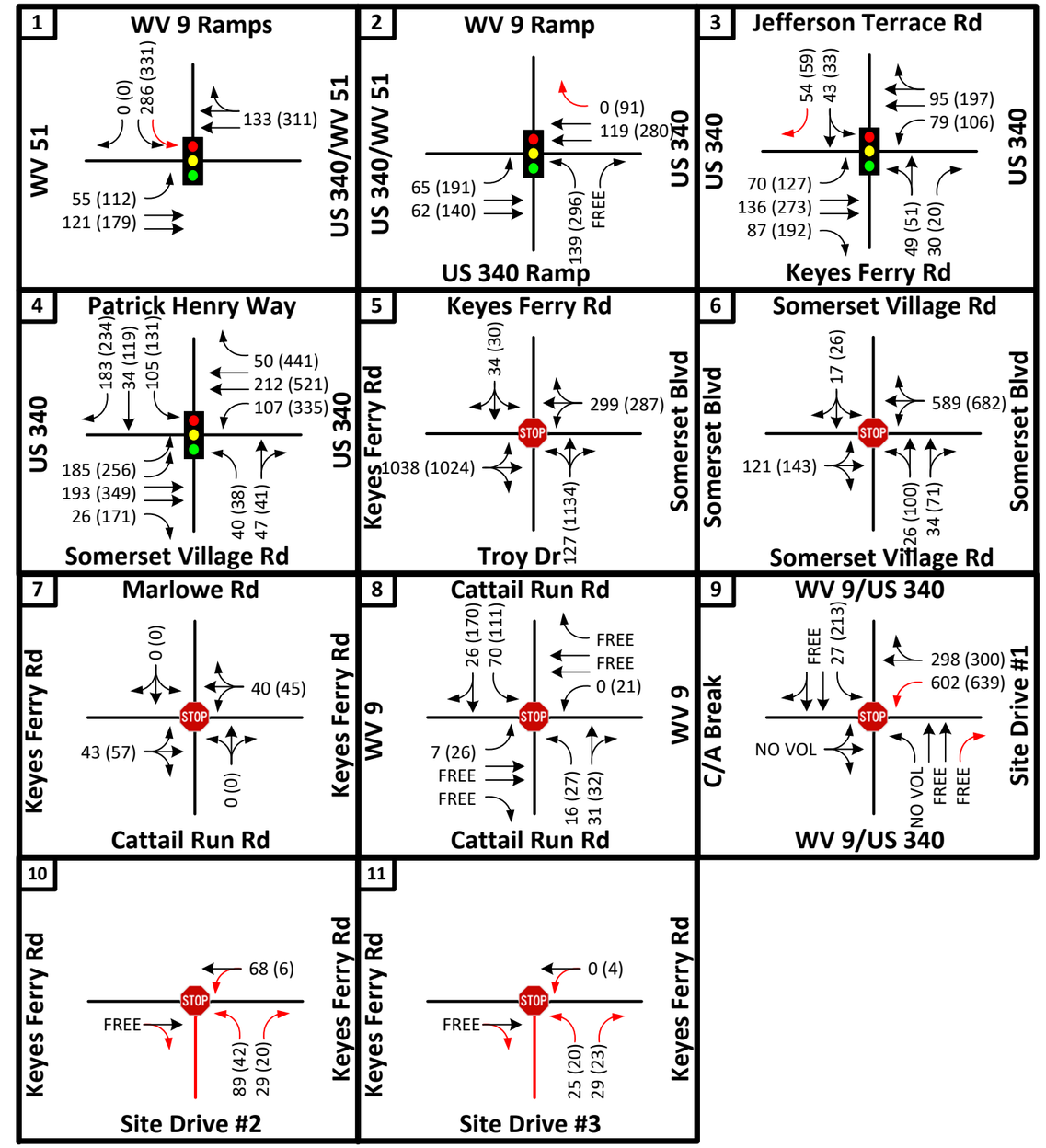
2025 Build Queuing Analysis

DATE: November 2021

FIGURE 17

AMT





LEGEND

- STOP Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX AM Peak Hour Queue (FT)
- (XX) PM Peak Hour Queue (FT)

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

2025 Build Improved Queuing Analysis

DATE: November 2021

FIGURE 18

AMT

HCS ANALYSIS

Weaving analysis was performed for the ramp junction of the US 340 Southbound entrance to US 340 Southbound/WV 9 Eastbound in advance of Site Drive #1.

HCS version 7.0, based upon the Highway Capacity Manual (HCM) 6th Edition, was utilized for this analysis. The US 340 entrance provides an acceleration lane of approximately 250 feet of full-width storage plus a taper of 500 feet and operates as a merge condition without Yield control. Proposed Site Drive #1 will result in a left-turn movement approximately 2,000 feet south of the merge point. Since the weaving tool is part of the Freeway package, an assumed merge to a managed lane on the left was modeled in place of the proposed intersection.

Weaving analysis indicates that the weaving area operates at LOS B during both the AM and PM peak hours.

Copies of the HCS7 analyses outputs are included in **Appendix G**.

AASHTO LEFT TURN LANE ANALYSIS

In accordance with WVDOH procedures outlined in TED 106-2, analysis comparing intersection volumes with the AASHTO (American Association of State Highway Transportation Officials) guidelines for left turn lanes on two lane highways is provided as guide to identify potential need for left turn lanes. The guideline is outlined in Table 9-23 of the 2011 AASHTO Green Book and is intended for comparison of rural two-lane roadways where the subject approach is free flow. The need for auxiliary lanes on signalized approaches or low speed stop control approaches is typically based upon capacity analysis. Comparison with the AASHTO criteria is provided for the Keyes Ferry Road westbound approach to Site Driveway #2 and Keyes Ferry Road westbound approach to Site Driveway #3.

Evaluation of AASHTO Table 9-23 indicates that the volume of approaching traffic will be well below the guideline and left-turn lanes are not needed based upon this methodology.

Copies of the review of AASHTO Table 9-23 for each approach are contained in **Appendix B**.

SIGNAL WARRANT ANALYSIS

The Manual on Uniform Traffic Control Devices (MUTCD) contains nine (9) warrants for investigating the need for a traffic signal at a particular intersection. The satisfaction of a signal warrant or warrants may indicate the need for the installation of a traffic signal. Three (3) of the warrants deal directly with traffic volumes; two (2) warrants focus on pedestrian issues; one (1) focuses on safety; one (1) on grade crossings; one (1) on traffic signal progression; and one (1) on a Planning level (non data-based) analysis. For this instance, Warrant 1 and 2 were considered at the intersection of WV 9 with Cattail Run Road and the ITE (Institute of Traffic Engineering) *Manual on Traffic Signal Design* signal warrant was considered at the intersection of US 340/WV 9 with Site Drive #1. Copies of signal warrant analysis are contained in **Appendix F**.

WV 9 with Cattail Run Road

Data Collection

A 12-hour turning movement count was collected for the intersection of WV 9 with Cattail Run Road on Friday April 30, 2021 between the hours of 7 AM-7 PM. On this date, Jefferson County Schools were fully operational with in classroom instruction for all students. The traffic count data is located in **Appendix B.**

MUTCD Warrant Evaluation

Warrant 1 – Eight-Hour Vehicular Volume

This warrant is intended for application at locations where there is a large volume of intersecting traffic. To meet Warrant 1, the major street traffic (total of both approaches) must meet or exceed 420 vehicles per hour while the minor street traffic (one direction only) must meet or exceed 105 vehicles per hour for any eight hours of the day (Condition A – Minimum Vehicular Volume), or the major street traffic (total of both approaches) must meet or exceed 630 vehicles per hour while the minor street traffic (one direction only) must meet or exceed 53 vehicles per hour for any 8 hours of the day (Condition B – Interruption of Continuous Traffic). Warranting volumes are reduced to the 70% column based upon the speed of traffic on WV 9. **Table 6** shows the MUTCD warranting criteria for Warrant 1.

It is intended that warrant 1 be treated as a single warrant. If condition A is satisfied, then the criteria for warrant 1 is satisfied and condition B and the combination of condition A and B are not needed. Also, if condition B is satisfied, then the criteria for Warrant 1 is satisfied and the combination of conditions A and B is not needed.

Table 6: MUTCD Table 4C-1, Warrant 1 Eight-Hour Volume

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

After applying the warrant criteria for 2021 Existing Conditions, two (2) of the twelve (12) hours meet the combined criteria set for Warrant 1A, six (6) hours meet the criteria for Warrant 1B, and two (2) hours meet the criteria for combination of Warrant 1A & 1B of the Major and Minor street volumes set in the "70%" conditions.

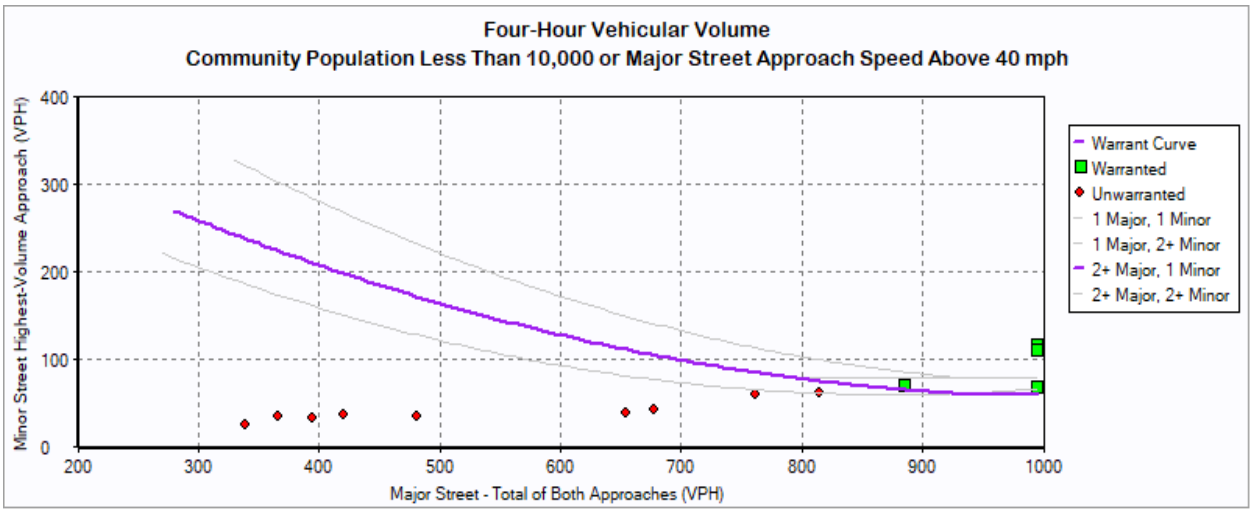
Pagones Theorem was utilized to reduce the number of right-turns included in the minor street approach volume. A detailed report containing the hourly volumes for Warrant 1 at the intersection of WV 9 with Cattail Run Road can be found in **Appendix F**.

Warrant 1 is **Not Met**.

<u>Warrant 2 – Four Hour Vehicular Volumes</u>

This warrant is intended for locations where, for a brief period of the day, minor road traffic experiences excessive delays in attempting to enter or cross the major street. Warrant 2 requires that the combination of the major street traffic (total of both approaches) and minor street traffic (one direction only) reaches a designated minimum volume during any four hours of any average day. **Figure 19** illustrates the threshold values and results for Warrant 2.

Figure 19: Warrant 2 - Four-Hour Vehicular Volumes – Analysis Results



After applying the warrant criteria for 2021 Existing Conditions, four (4) of the twelve (12) hours meet the combined criteria set for Warrant 2.

Pagones Theorem was utilized to reduce the number of right-turns included in the minor street approach volume. A detailed report containing the hourly volumes for Warrant 2 at the intersection of WV 9 with Cattail Run Road can be found in **Appendix F**.

Warrant 2 is **Met**.

US 340/WV 9 with Site Drive #1

ITE Warrant Evaluation

The ITE (Institute of Traffic Engineering) *Manual on Traffic Signal Design* outlines a signal warrant to be used only for new intersections or other locations where actual traffic volumes cannot be counted. This signal warrant is based on EADT (Estimated Annual Daily Traffic) volumes for the major and minor streets. The ITE methodology was utilized for this intersection during build conditions due to this being a new intersection.

After applying the ITE warrant criteria for 2025 Full Build Conditions, the EADT volumes do not meet the criteria set by the ITE Signal Warrant.

ITE Warrant is **Not Met**.

CONCLUSIONS/RECOMMENDATIONS

This report summarizes existing and future traffic analyses conducted in support of the proposed Fritts Farm Residential Development. Fritts Farm is proposed southeast of the interchange of WV 9 with US 340 and WV 51 in Jefferson County. The proposed site plan includes 255 single-family homes and 56 townhomes. Fritts Farm is expected to be built-out by 2025.

The proposed residential development is anticipated to be served by one site driveway utilizing an existing C/A access break to US 340/WV 9 and two site driveways intersecting directly with Keyes Ferry Road. Site Driveway #1 intersects with US 340/WV 9, Site Driveway #2 intersects with Keyes Ferry Road, and Site Driveway #3 intersects with Keyes Ferry Road. Site Driveway #1 is proposed to be located approximately 3,000 feet south of the interchange of US 340/WV 51 with WV 9 approaching US 340/WV 9 from the east and operates as a full movement approach with two-way stop-control (TWSC). Site Driveway #2 approaches Keyes Ferry Road from the south approximately 6,850 feet west of Cattail Run Road and operates as a full movement approach with TWSC. Site Driveway #3 approaches Keyes Ferry Road from the south approximately 6,450 feet west of Cattail Run Road and operates as a full movement approach with TWSC.

Based on the findings of this study, the following capacity infrastructure improvements are recommended to address issues noted as part of the Existing and No-Build analysis (Not related to the development of Fritts Farm) as well as issues documented during field review::

US 340 Traffic Signals

- Repair the various actuation failures for the traffic signals on US 340.
- Optimize traffic signal timings to improve efficiency prior to the 2025 Build Year. Based on analysis, cycle lengths can be reduced minimally with optimized split timings and offsets to provide more efficient signal operations along US 340.

US 340/WV 51 with WV 9 Eastbound Ramps (From Martinsburg/To Berryville, VA)

- Widen the existing WV 9 eastbound exit ramp (From Martinsburg) to include an additional exclusive left-turn lane creating a dual left-turn movement. Currently, the left-turn movement operates at a LOS F during the 2021 Existing Conditions AM and PM peak hours with a queue of approximately 571 feet during the PM peak hour. Creating a dual left-turn configuration improves LOS to E in the AM and PM peak hours. The additional left-turn lane should contain 400 feet of full-width storage plus appropriate taper.
- Extend the existing WV 9 eastbound exit ramp (From Martinsburg) exclusive right-turn lane approaching US 340/WV 51 to 400 feet of full-width storage with appropriate taper. Currently, the exclusive left-turn movement has a queue extending beyond the existing storage length of the right-turn lane. Following the construction of an additional left-turn lane, the left-turn movement is anticipated to have a queue length of approximately 331 feet during the 2025 Build Improved Conditions PM peak hour.

US 340/WV 51 with WV 9 Westbound Ramps (From Berryville, VA/To Martinsburg)

- Construct an exclusive right-turn lane on the US 340 southbound approach (From Harpers Ferry) to the WV 9 westbound ramps (From Berryville, VA/To Martinsburg) to include 350 feet of full-width storage plus appropriate taper. Currently, the approach has a through queue of 312 feet during the 2021 Existing Conditions AM peak hour which inhibits right-turning vehicles from accessing the WV 9 ramp. The exclusive right-turn movement is anticipated to have a queue length of approximately 91 feet during the 2025 Build Improved Conditions PM peak hour with the thru movement being approximately 280 feet.

- Extend the existing WV 9 westbound exit ramp (From Berryville, VA) exclusive right-turn lane to US 340 to 400 feet of full-width storage with appropriate taper. Currently, the exclusive left-turn movement has a queue extending beyond the existing storage length of the right-turn lane and does not allow right-turning vehicles to access the intersection.

- Modify signal phasing for the left-turn movement from WV 51 Eastbound to WV 9 Westbound Expressway from a lag to a lead phase. Analysis shows that the measure improves LOS.

US 340 with Keyes Ferry Road/Jefferson Terrace Road

- Extend the existing US 340 northbound (From Charles Town) exclusive left-turn lane to Jefferson Terrace Road to a minimum of 150 feet of full-width storage with appropriate taper. The exclusive left-turn movement is anticipated to extend beyond the existing storage length during the 2025 No-Build Conditions AM and PM peak hours.

- Extend the existing US 340 southbound (From Harpers Ferry) exclusive left-turn lane to Keyes Ferry Road to a minimum of 125 feet of full-width storage with appropriate taper. The exclusive left-turn movement is anticipated to extend beyond the existing storage length during the 2025 No-Build Conditions PM peak hour.

US 340 with Patrick Henry Way/Somerset Village Road

- Extend the existing Patrick Henry Way exclusive right-turn lane to US 340 to a minimum of 275 feet of full-width storage with appropriate taper. Currently, the exclusive right-turn movement extends beyond the existing storage length during the 2021 Existing Conditions PM peak hour.

- Extend the existing US 340 southbound (From Harpers Ferry) exclusive left-turn lane to Somerset Village Road (opposite Patrick Henry Way) to a minimum of 450 feet of full-width storage with appropriate taper. Currently, the exclusive left-turn movement extends beyond the existing storage during the 2025 No-Build Conditions PM peak hour.

- Extend the existing US 340 southbound (From Harpers Ferry) exclusive right-turn lane to Patrick Henry Way to a minimum of 525 feet of full-width storage with appropriate taper. Currently, the exclusive right-turn movement extends beyond the existing storage during the 2025 No-Build Conditions PM peak hour.

- Modify the lane configuration on the Patrick Henry Way approach to US 340 to create a single left-turn lane so that the phasing can be modified to protected/permitted to eliminate split

phasing. This modification improves LOS of the intersection in the build condition and there does not appear to be forecast traffic from Patrick Henry Way that necessitates a dual left-turn movement.

WV 9 with Cattail Run Road

- Extend the existing Cattail Run Road southbound exclusive left-turn lane to WV 9 to a minimum of 125 feet of full-width storage with appropriate taper. The exclusive left-turn movement is anticipated to extend beyond the existing storage length during the 2025 No-Build Conditions PM peak hour.

- Continue to monitor the intersection regarding the need for a traffic signal at the intersection, since Warrant 2 is met but Warrant 1 is not (6 of 12 hours meet Condition B). Further evaluate crash data to determine if Warrant 7 is potentially applicable at this location.

Based on the findings of this study, the following infrastructure improvements are recommended to accommodate the adjacent Flynn Property residential development and maintain acceptable operation of the existing transportation network in 2025:

US 340 with Keyes Ferry Road/Jefferson Terrace Road

- Widen Jefferson Terrace Road to construct an exclusive right-turn lane approach to US 340. The anticipated queuing from the right-turn movement is estimated to be approximately 61 feet during the 2025 Build Improved Conditions PM peak hour. The Jefferson Terrace Road southbound exclusive right-turn lane should be constructed to provide 125 feet of full-width storage with appropriate taper.

- Modify the lane configuration on the Jefferson Terrace Road approach to US 340 to create a shared left/thru and right-turn only lane to improve LOS.

Based on the findings of this study, the following infrastructure improvements are recommended to accommodate the Fritts Farm residential development and maintain acceptable operation of the existing transportation network in 2025:

US 340/WV 9 with Site Driveway #1

- Construct Site Driveway #1 as a full movement approach intersecting with US 340/WV 9 approximately 3,000 feet south of the interchange of US 340/WV 51 with WV 9. The site driveway is recommended to include one ingress and two egress lanes to provide separate left and right turn lanes exiting the development. Site Driveway #1 will operate under stop-control while US 340/WV 9 operates as free-flow.

- Construct an exclusive right-turn lane on the US 340/WV 9 northbound (From Berryville, VA) approach to Site Driveway #1. The US 340/WV 9 northbound exclusive right-turn lane should be constructed to provide 250 feet of full-width storage with appropriate taper. This measure is intended to remove right turning traffic from higher speed through traffic as a speed change lane and is not prompted by a LOS deficiency.

- Extend the existing US 340 Southbound/WV 9 Eastbound exclusive left-turn lane to Site Driveway #1 to a minimum of 250 feet of full-width storage. The exclusive left-turn movement is estimated to be approximately 213 feet during the 2025 Build Improved Conditions PM peak hour.

- Extend the taper length for the existing US 340 Southbound/WV 9 Eastbound exclusive left-turn lane to Site Driveway #1 to 240 feet. The existing turn lane has a full-width storage length of 125 feet with a taper of 100 feet. Per DD 622, the turn lane should have a minimum taper of 240 feet.

Keyes Ferry Road with Site Driveway #2

- Construct Site Driveway #2 as a full movement approach intersecting with Keyes Ferry Road approximately 6,850 feet west of Cattail Run Road. The site driveway is recommended to include one ingress and two egress lanes to provide separate left and right turn lanes exiting the development. Site Driveway #2 will operate under stop-control while Keyes Ferry Road operates as free-flow.

Keyes Ferry Road with Site Driveway #3

- Construct Site Driveway #3 as a full movement approach intersecting with Keyes Ferry Road approximately 6,450 feet west of Cattail Run Road. The site driveway is recommended to include one ingress and two egress lanes to provide separate left and right turn lanes exiting the development. Site Driveway #3 will operate under stop-control while Keyes Ferry Road operates as free-flow.

Appendix A

Study Area Photos

WV 51 Eastbound Approach to WV 9 Ramps

US 340 Westbound Approach to WV 9 Ramps

WV 9 Ramps Southbound Approach to US 340/WV 51

US 340 Eastbound Approach to WV 9 Ramps

US 340 Westbound Approach to WV 9 Ramps

WV 9 Ramps Northbound Approach to US 340

US 340 Eastbound Approach to Keyes Ferry Road/Jefferson Terrace Road

US 340 Westbound Approach to Keyes Ferry Road/Jefferson Terrace Road

Keyes Ferry Road Northbound Approach to US 340

Jefferson Terrace Road Southbound Approach to US 340

US 340 Eastbound Approach to Patrick Henry Way

US 340 Westbound Approach to Patrick Henry Way

Patrick Henry Way Northbound Approach to US 340

Patrick Henry Way Southbound Approach to US 340

Keyes Ferry Road Eastbound Approach to Cattail Run Road/Marlowe Road

Keyes Ferry Road Westbound Approach to Cattail Run Road/Marlowe Road

Cattail Run Road Northbound Approach to Keyes Ferry Road

Marlowe Road Southbound Approach to Keyes Ferry Road

WV 9 Eastbound Approach to Cattail Run Road

WV 9 Westbound Approach to Cattail Run Road

Cattail Run Road Northbound Approach to WV 9

Cattail Run Road Southbound Approach to WV 9

Looking at Proposed Site Driveway #1 Westbound Approach to US 340/WV 9

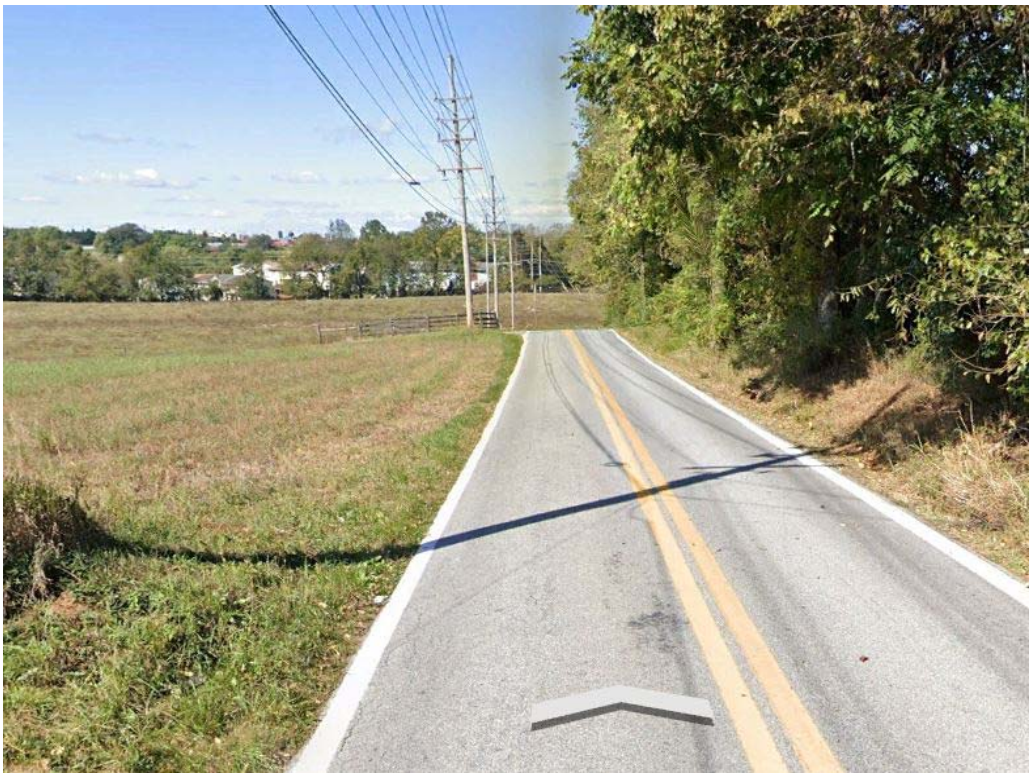
US 340/WV 9 Northbound Approach to Proposed Site Driveway #1

US 340/WV 9 Southbound Approach to Proposed Site Driveway #1

Keyes Ferry Road Eastbound Approach to Proposed Site Driveway #2

Keyes Ferry Road Westbound Approach to Proposed Site Driveway #2

Keyes Ferry Road Eastbound Approach to Proposed Site Driveway #3



Keyes Ferry Road Westbound Approach to Proposed Site Driveway #3

Appendix B

Traffic Data & Volume Calculations

Appendix B-1

Volume Calculations

21-0282.001 - Fritts Farm Residential Development TIS - Traffic Volume Calculations

	Balanced Existing Traffic (2021)		Future w/o App (2025)		Historical Growth (2021-2025)		Flynn Property Site Trips (2025)		Green Hill Site Trips (2025)		Aspen Greens Site Trips (2025)		US 340 Mixed-Use Site Trips Phase 1 (2024)		Country Club Commons Site Trips (2024)		No Build (2025)		Full Build Site Trip Distribution		Full Build Site Trip Assignment		Full Build (2025)		Site Impact	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Enter	Exit	AM	PM	AM	PM	AM	PM
Intersection 1 - US 340 (William L. Wilson Freeway)/WV 51 (E. Washington Street) with WV 9 (Veterans Memorial Highway) Ramps																										
EBL	60	100	63	106	3	6											63	106			0	0	63	106		
EBT	546	857	577	906	31	49	2	9					8	20			587	935	5%		3	9	590	944	0.5%	0.9%
EBR	0	0	0	0	0	0											0	0			0	0	0	0		
WBL	0	0	0	0	0	0											0	0			0	0	0	0		
WBT	444	1,138	469	1,203	25	65	8	5					18	14			495	1,222		5%	8	5	503	1,227	1.8%	1.8%
WBR	326	427	345	451	19	24	47	30					29	23	25	32	446	536	15%		9	28	455	564		
NBL	0	0	0	0	0	0											0	0			0	0	0	0		
NBT	0	0	0	0	0	0											0	0			0	0	0	0	0.0%	0.0%
NBR	0	0	0	0	0	0											0	0			0	0	0	0		
SBL	305	365	322	386	17	21	6	18					5	13	27	37	360	454	10%		6	19	366	473		
SBT	0	0	0	0	0	0											0	0			0	0	0	0	1.2%	3.2%
SBR	126	123	133	130	7	7											133	130			0	0	133	130		
Intersection 2 - US 340 (William L. Wilson Freeway)/WV 51 (E. Washington Street) with WV 9 (Veterans Memorial Highway)/US 340 Ramps																										
EBL	95	193	100	204	5	11											100	204			0	0	100	204		
EBT	756	1,029	799	1,088	43	59	8	27					13	33	27	37	847	1,185	15%		9	28	856	1,213	0.9%	2.0%
EBR	0	0	0	0	0	0											0	0			0	0	0	0		
WBL	0	0	0	0	0	0											0	0			0	0	0	0		
WBT	704	1,260	744	1,332	40	72	54	35					47	37	25	32	870	1,436	15%	5%	17	33	887	1,469	2.8%	2.2%
WBR	263	417	278	441	15	24	15	10					11	9	25	32	329	492		10%	17	11	346	503		
NBL	66	305	70	322	4	17											70	322			0	0	70	322		
NBT	0	0	0	0	0	0											0	0			0	0	0	0	3.3%	1.0%
NBR	355	505	375	534	20	29	16	53					13	32	28	38	432	657		10%	17	10	449	667		
SBL	0	0	0	0	0	0											0	0			0	0	0	0		
SBT	0	0	0	0	0	0											0	0			0	0	0	0	0.0%	0.0%
SBR	0	0	0	0	0	0											0	0			0	0	0	0		
Intersection 3 - US 340 (William L. Wilson Freeway) with Keyes Ferry Road (CR 26)/Jefferson Terrace Road																										
EBL	4	15	4	16	0	1	11	35									15	51			0	0	15	51		
EBT	881	1,219	931	1,289	50	70	13	45					26	65	55	75	1,025	1,474		10%	17	10	1,042	1,484	2.0%	2.0%
EBR	226	300	239	317	13	17											239	317	15%		9	28	248	345		
WBL	13	19	14	20	1	1											14	20	15%		9	27	23	47		
WBT	811	1,408	857	1,489	46	81	39	24					58	46	50	64	1,004	1,623	15%		9	28	1,013	1,651	1.7%	3.2%
WBR	3	0	3	0	0	0	6	18									9	18			0	0	9	18		
NBL	149	253	158	267	9	14											158	267		15%	25	16	183	283		
NBT	0	2	0	2	0	0											0	2			0	0	0	2	24.9%	11.6%
NBR	16	20	17	21	1	1											17	21		20%	33	22	50	43		
SBL	1	0	1	0	0	0	16	10									17	10			0	0	17	10		
SBT	1	0	1	0	0	0											1	0			0	0	1	0	0.0%	0.0%
SBR	7	16	7	17	0	1	31	20									38	37			0	0	38	37		
Intersection 4 - US 340 (William L. Wilson Freeway) with Patrick Henry Way/Somerset Village Road																										
EBL	174	290	184	307	10	17	13	45									197	352			0	0	197	352		
EBT	704	914	744	966	40	52	16	10					3	6	55	75	818	1,057		30%	50	32	868	1,089	4.5%	2.1%
EBR	20	35	21	37	1	2							23	59			44	96			0	0	44	96		
WBL	31	60	33	63	2	3							11	26			44	89			0	0	44	89		
WBT	666	1,035	704	1,094	38	59	6	18					7	6	50	64	767	1,182	30%		18	55	785	1,237	2.0%	3.7%
WBR	69	116	73	123	4	7	11	35									84	158			0	0	84	158		
NBL	17	50	18	53	1	3							51	40			69	93			0	0	69	93		
NBT	25	53	26	56	1	3											26	56			0	0	26	56	0.0%	0.0%
NBR	34	55	36	58	2	3							24	19			60	77			0	0	60	77		
SBL	58	93	61	98	3	5	31	19									92	117			0	0	92	117		
SBT	19	39	20	41	1	2											20	41			0	0	20	41	0.0%	0.0%
SBR	144	342	152	362	8	20	38	25									190	387			0	0	190	387		

Annual Growth Rate 1.40%

Existing Year 2021

Build Year 2025

	AM		PM	
	Full Build		Full Build	
	Enter	Exit	Enter	Exit
Net New Trips	59	166	185	108
Pass-By Trips	0	0	0	0

	Balanced Existing Traffic (2021)		Future w/o App (2025)		Historical Growth (2021-2025)		Flynn Property Site Trips (2025)		Green Hill Site Trips (2025)		Aspen Greens Site Trips (2025)		US 340 Mixed-Use Site Trips Phase 1 (2024)		Country Club Commons Site Trips (2024)		No Build (2025)		Full Build Site Trip Distribution		Full Build Site Trip Assignment		Full Build (2025)		Site Impact	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Enter	Exit	AM	PM	AM	PM	AM	PM
Intersection 5 - Keyes Ferry Road (CR 26)/Somerset Blvd (CR 340/6) with Troy Drive																										
EBL	45	33	48	35	3	2											48	35		35%	58	38	106	73		
EBT	20	28	21	30	1	2											21	30			0	0	21	30	45.3%	36.5%
EBR	1	1	1	1	0	0											1	1			0	0	1	1		
WBL	7	9	7	10	0	1											7	10			0	0	7	10		
WBT	10	22	11	23	1	1											11	23			0	0	11	23	0.0%	0.0%
WBR	93	182	98	192	5	10											98	192			0	0	98	192		
NBL	1	5	1	5	0	0											1	5			0	0	1	5		
NBT	27	60	29	63	2	3											29	63			0	0	29	63	0.0%	0.0%
NBR	10	20	11	21	1	1											11	21			0	0	11	21		
SBL	164	198	173	209	9	11											173	209			0	0	173	209		
SBT	47	64	50	68	3	4											50	68			0	0	50	68	6.6%	14.0%
SBR	29	57	31	60	2	3											31	60	30%		18	55	49	115		
Intersection 6 - Somerset Village Road with Somerset Blvd (CR 340/6)																										
EBL	39	77	41	81	2	4											41	81			0	0	41	81		
EBT	52	57	55	60	3	3											55	60			0	0	55	60	0.0%	0.0%
EBR	0	2	0	2	0	0											0	2			0	0	0	2		
WBL	5	14	5	15	0	1											5	15			0	0	5	15		
WBT	26	51	27	54	1	3											27	54			0	0	27	54	0.0%	0.0%
WBR	16	43	17	45	1	2							6	5			23	50			0	0	23	50		
NBL	1	3	1	3	0	0											1	3			0	0	1	3		
NBT	21	38	22	40	1	2							69	54			91	94			0	0	91	94	0.0%	0.0%
NBR	1	14	1	15	0	1											1	15			0	0	1	15		
SBL	19	28	20	30	1	2											20	30			0	0	20	30		
SBT	13	52	14	55	1	3							31	79			45	134			0	0	45	134	0.0%	0.0%
SBR	38	54	40	57	2	3							3	6			43	63			0	0	43	63		
Intersection 7 - Keyes Ferry Road (CR 26) with Cattail Run Road (CR 9/3)/Marlowe Road (CR 340/4)																										
EBL	44	1	47	1	3	0											47	1			0	0	47	1		
EBT	3	108	3	114	0	6											3	114			0	0	3	114	21.3%	7.2%
EBR	0	6	0	6	0	0							9	7			9	13		10%	16	10	25	23		
WBL	8	12	8	13	0	1											8	13			0	0	8	13		
WBT	34	78	36	82	2	4											36	82			0	0	36	82	0.0%	0.0%
WBR	1	0	1	0	0	0											1	0			0	0	1	0		
NBL	3	1	3	1	0	0							3	11			6	12	10%		6	18	12	30		
NBT	1	0	1	0	0	0							2	2			3	2			0	0	3	2	37.5%	32.1%
NBR	1	23	1	24	0	1											1	24			0	0	1	24		
SBL	0	1	0	1	0	0											0	1			0	0	0	1		
SBT	0	0	0	0	0	0							2	2			2	2			0	0	2	2	0.0%	0.0%
SBR	1	0	1	0	0	0											1	0			0	0	1	0		
Intersection 8 - WV 9 (Veterans Memorial Highway) with Cattail Run Road (CR 9/3)																										
EBL	3	13	3	14	0	1											3	14			0	0	3	14		
EBT	448	407	474	430	26	23	31	20	35	39			18	14			558	503		10%	17	11	575	514	2.9%	1.7%
EBR	3	116	3	123	0	7											3	123			0	0	3	123		
WBL	1	12	1	13	0	1											1	13			0	0	1	13		
WBT	207	671	219	709	12	38	11	35	10	32			8	20			247	796	10%		6	19	253	815	4.3%	4.0%
WBR	16	59	17	62	1	3							5	13			22	75	10%		6	18	28	93		
NBL	6	9	6	10	0	1											6	10			0	0	6	10		
NBT	19	16	20	17	1	1											20	17			0	0	20	17	0.0%	0.0%
NBR	10	6	11	6	1	0											11	6			0	0	11	6		
SBL	37	46	39	49	2	3							11	9			50	58		10%	17	10	67	68		
SBT	4	26	4	27	0	1											4	27			0	0	4	27	22.4%	6.5%
SBR	5	56	5	59	0	3											5	59			0	0	5	59		

	Balanced Existing Traffic (2021)		Future w/o App (2025)		Historical Growth (2021-2025)		Flynn Property Site Trips (2025)		Green Hill Site Trips (2025)		Aspen Greens Site Trips (2025)		US 340 Mixed-Use Site Trips Phase 1 (2024)		Country Club Commons Site Trips (2024)		No Build (2025)		Full Build Site Trip Distribution		Full Build Site Trip Assignment		Full Build (2025)		Site Impact	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Enter	Exit	AM	PM	AM	PM	AM	PM
Intersection 9 - US 340 (William L. Wilson Freeway)/WV 9 (Veterans Memorial Highway) with C/A Break/Site Drive #1																										
EBL	0	0	0	0	0	0											0	0			0	0	0	0		
EBT	0	0	0	0	0	0											0	0			0	0	0	0	0.0%	0.0%
EBR	0	0	0	0	0	0											0	0			0	0	0	0		
WBL	0	0	0	0	0	0											0	0		30%	50	32	50	32		
WBT	0	0	0	0	0	0											0	0			0	0	0	0	0.0%	0.0%
WBR	0	0	0	0	0	0											0	0		25%	42	27	42	27		
NBL	0	0	0	0	0	0											0	0			0	0	0	0		
NBT	965	1,663	1,020	1,758	55	95	16	53	19	63	2	6	13	32			1,070	1,912			0	0	1,070	1,912	1.7%	2.8%
NBR	0	0	0	0	0	0											0	0	30%		18	56	18	56		
SBL	0	0	0	0	0	0											0	0	30%		18	56	18	56		
SBT	1,039	1,223	1,098	1,293	59	70	47	30	69	77	7	4	29	23			1,250	1,427			0	0	1,250	1,427	1.4%	3.8%
SBR	0	0	0	0	0	0											0	0			0	0	0	0		
Intersection 10 - Keyes Ferry Road (CR 26) with Site Drive #2																										
EBL	0	0	0	0	0	0											0	0			0	0	0	0		
EBT	20	29	21	31	1	2											21	31	5%		3	9	24	40	44.7%	64.0%
EBR	0	0	0	0	0	0											0	0	25%		14	46	14	46		
WBL	0	0	0	0	0	0											0	0	5%		3	9	3	9		
WBT	38	40	40	42	2	2											40	42		5%	8	5	48	47	21.6%	25.0%
WBR	0	0	0	0	0	0											0	0			0	0	0	0		
NBL	0	0	0	0	0	0											0	0		30%	50	33	50	33		
NBT	0	0	0	0	0	0											0	0			0	0	0	0	100.0%	100.0%
NBR	0	0	0	0	0	0											0	0		5%	8	5	8	5		
SBL	0	0	0	0	0	0											0	0			0	0	0	0		
SBT	0	0	0	0	0	0											0	0			0	0	0	0	0.0%	0.0%
SBR	0	0	0	0	0	0											0	0			0	0	0	0		
Intersection 11 - Keyes Ferry Road (CR 26) with Site Drive #3																										
EBL	0	0	0	0	0	0											0	0			0	0	0	0		
EBT	20	29	21	31	1	2											21	31		5%	8	5	29	36	34.4%	31.1%
EBR	0	0	0	0	0	0											0	0	5%		3	9	3	9		
WBL	0	0	0	0	0	0											0	0	5%		3	9	3	9		
WBT	38	40	40	42	2	2											40	42	5%		3	9	43	51	13.0%	30.0%
WBR	0	0	0	0	0	0											0	0			0	0	0	0		
NBL	0	0	0	0	0	0											0	0		5%	8	5	8	5		
NBT	0	0	0	0	0	0											0	0			0	0	0	0	100.0%	100.0%
NBR	0	0	0	0	0	0											0	0		5%	8	5	8	5		
SBL	0	0	0	0	0	0											0	0			0	0	0	0		
SBT	0	0	0	0	0	0											0	0			0	0	0	0	0.0%	0.0%
SBR	0	0	0	0	0	0											0	0			0	0	0	0		

Appendix B-2

Turning Movement Counts

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 1: US 340/WV 51 @ WV 9
COUNT BY	AMT

Friday

STREET	WV 9								US 340				WV 51				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	80	0	17	97	0	0	0	0	0	58	48	106	13	115	0	128	97	234	331	331
0715 - 0730	65	0	29	94	0	0	0	0	0	70	70	140	19	152	0	171	94	311	405	736
0730 - 0745	84	0	25	109	0	0	0	0	0	77	51	128	16	151	0	167	109	295	404	1140
0745 - 0800	62	0	27	89	0	0	0	0	0	105	85	190	16	132	0	148	89	338	427	1567
0800 - 0815	**68**	**0**	**22**	**90**	**0**	**0**	**0**	**0**	**0**	**102**	**73**	**175**	**15**	**123**	**0**	**138**	**90**	**313**	**403**	1639
0815 - 0830	**65**	**0**	**29**	**94**	**0**	**0**	**0**	**0**	**0**	**112**	**80**	**192**	**16**	**133**	**0**	**149**	**94**	**341**	**435**	1669
0830 - 0845	**87**	**0**	**45**	**132**	**0**	**0**	**0**	**0**	**0**	**101**	**87**	**188**	**16**	**158**	**0**	**174**	**132**	**362**	**494**	1759
0845 - 0900	**85**	**0**	**30**	**115**	**0**	**0**	**0**	**0**	**0**	**135**	**86**	**221**	**13**	**132**	**0**	**145**	**115**	**366**	**481**	***1813***
1500 - 1515	87	0	36	123	0	0	0	0	0	200	89	289	33	225	0	258	123	547	670	670
1515 - 1530	77	0	42	119	0	0	0	0	0	239	131	370	26	204	0	230	119	600	719	1389
1530 - 1545	95	0	51	146	0	0	0	0	0	236	107	343	30	212	0	242	146	585	731	2120
1545 - 1600	83	0	46	129	0	0	0	0	0	231	119	350	24	211	0	235	129	585	714	2834
1600 - 1615	**90**	**0**	**27**	**117**	**0**	**0**	**0**	**0**	**0**	**227**	**116**	**343**	**27**	**218**	**0**	**245**	**117**	**588**	**705**	2869
1615 - 1630	**87**	**0**	**26**	**113**	**0**	**0**	**0**	**0**	**0**	**300**	**107**	**407**	**24**	**236**	**0**	**260**	**113**	**667**	**780**	2930
1630 - 1645	**103**	**0**	**42**	**145**	**0**	**0**	**0**	**0**	**0**	**311**	**99**	**410**	**23**	**206**	**0**	**229**	**145**	**639**	**784**	2983
1645 - 1700	**85**	**0**	**28**	**113**	**0**	**0**	**0**	**0**	**0**	**298**	**105**	**403**	**26**	**197**	**0**	**223**	**113**	**626**	**739**	***3008***
1700 - 1715	89	0	36	125	0	0	0	0	0	259	102	361	23	181	0	204	125	565	690	2993
1715 - 1730	69	0	48	117	0	0	0	0	0	330	82	412	12	234	0	246	117	658	775	2988
1730 - 1745	68	0	45	113	0	0	0	0	0	290	85	375	24	190	0	214	113	589	702	2906
1745 - 1800	55	0	35	90	0	0	0	0	0	293	84	377	25	191	0	216	90	593	683	2850
Peak HR AM																				
0800 - 0900	***305***	***0***	***126***	***431***	***0***	***0***	***0***	***0***	***0***	***450***	***326***	***776***	***60***	***546***	***0***	***606***	***431***	***1382***	***1813***	
Peak HR PM																				
1600 - 1700	***365***	***0***	***123***	***488***	***0***	***0***	***0***	***0***	***0***	***1136***	***427***	***1563***	***100***	***857***	***0***	***957***	***488***	***2520***	***3008***	
AM PHF	**0.816**				**0.000**				**0.878**				**0.871**				**0.918**			
PM PHF	**0.841**				**0.000**				**0.953**				**0.920**				**0.959**			

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 2: US 340 @ WV 9
COUNT BY	AMT

Friday

STREET					WV 9				US 340				US 340				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	0	0	0	0	8	0	65	73	0	96	58	154	22	182	0	204	73	358	431	431
0715 - 0730	0	0	0	0	10	0	70	80	0	122	84	206	21	195	0	216	80	422	502	933
0730 - 0745	0	0	0	0	13	0	74	87	0	133	65	198	20	205	0	225	87	423	510	1443
0745 - 0800	0	0	0	0	16	0	89	105	0	170	81	251	25	173	0	198	105	449	554	1997
0800 - 0815	**0**	**0**	**0**	**0**	**13**	**0**	**84**	**97**	**0**	**141**	**65**	**206**	**20**	**162**	**0**	**182**	**97**	**388**	**485**	2051
0815 - 0830	**0**	**0**	**0**	**0**	**16**	**0**	**86**	**102**	**0**	**187**	**75**	**262**	**30**	**172**	**0**	**202**	**102**	**464**	**566**	2115
0830 - 0845	**0**	**0**	**0**	**0**	**15**	**0**	**86**	**101**	**0**	**171**	**58**	**229**	**22**	**208**	**0**	**230**	**101**	**459**	**560**	2165
0845 - 0900	**0**	**0**	**0**	**0**	**22**	**0**	**99**	**121**	**0**	**200**	**65**	**265**	**23**	**198**	**0**	**221**	**121**	**486**	**607**	***2218***
1500 - 1515	0	0	0	0	39	0	130	169	0	280	91	371	55	255	0	310	169	681	850	850
1515 - 1530	0	0	0	0	44	0	120	164	0	291	92	383	46	224	0	270	164	653	817	1667
1530 - 1545	0	0	0	0	39	0	105	144	0	321	95	416	39	270	0	309	144	725	869	2536
1545 - 1600	0	0	0	0	38	0	109	147	0	286	102	388	39	258	0	297	147	685	832	3368
1600 - 1615	**0**	**0**	**0**	**0**	**42**	**0**	**125**	**167**	**0**	**325**	**102**	**427**	**47**	**261**	**0**	**308**	**167**	**735**	**902**	3420
1615 - 1630	**0**	**0**	**0**	**0**	**102**	**0**	**134**	**236**	**0**	**287**	**97**	**384**	**51**	**267**	**0**	**318**	**236**	**702**	**938**	3541
1630 - 1645	**0**	**0**	**0**	**0**	**103**	**0**	**127**	**230**	**0**	**332**	**113**	**445**	**47**	**261**	**0**	**308**	**230**	**753**	**983**	3655
1645 - 1700	**0**	**0**	**0**	**0**	**58**	**0**	**119**	**177**	**0**	**316**	**105**	**421**	**48**	**237**	**0**	**285**	**177**	**706**	**883**	***3706***
1700 - 1715	0	0	0	0	68	0	115	183	0	315	113	428	33	255	0	288	183	716	899	3703
1715 - 1730	0	0	0	0	96	0	125	221	0	299	109	408	42	248	0	290	221	698	919	3684
1730 - 1745	0	0	0	0	74	0	104	178	0	319	102	421	39	226	0	265	178	686	864	3565
1745 - 1800	0	0	0	0	71	0	89	160	0	276	125	401	42	199	0	241	160	642	802	3484
Peak HR AM																				
0800 - 0900	***0***	***0***	***0***	***0***	***66***	***0***	***355***	***421***	***0***	***699***	***263***	***962***	***95***	***740***	***0***	***835***	***421***	***1797***	***2218***	
Peak HR PM																				
1600 - 1700	***0***	***0***	***0***	***0***	***305***	***0***	***505***	***810***	***0***	***1260***	***417***	***1677***	***193***	***1026***	***0***	***1219***	***810***	***2896***	***3706***	
AM PHF	**0.000**				**0.870**				**0.908**				**0.908**				**0.914**			
PM PHF	**0.000**				**0.858**				**0.942**				**0.958**				**0.943**			

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 3: US 340 @ Keyes Ferry Road/Jefferson Terrace Road
COUNT BY	AMT

Friday

STREET	Jefferson Terrace Rd				Keyes Ferry Rd				US 340				US 340				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	0	0	0	0	16	0	2	18	1	154	0	155	3	201	32	236	18	391	409	409
0715 - 0730	0	0	0	0	28	0	4	32	6	172	0	178	1	229	39	269	32	447	479	888
0730 - 0745	0	0	2	2	33	0	5	38	1	171	0	172	1	210	52	263	40	435	475	1363
0745 - 0800	1	1	1	3	30	0	2	32	1	221	0	222	4	214	48	266	35	488	523	1886
0800 - 0815	**0**	**1**	**1**	**2**	**31**	**0**	**3**	**34**	**2**	**189**	**0**	**191**	**2**	**176**	**54**	**232**	**36**	**423**	**459**	1936
0815 - 0830	**1**	**0**	**4**	**5**	**40**	**0**	**4**	**44**	**2**	**206**	**1**	**209**	**1**	**221**	**45**	**267**	**49**	**476**	**525**	1982
0830 - 0845	**0**	**0**	**1**	**1**	**43**	**0**	**4**	**47**	**4**	**190**	**2**	**196**	**0**	**243**	**54**	**297**	**48**	**493**	**541**	2048
0845 - 0900	**0**	**0**	**1**	**1**	**35**	**0**	**5**	**40**	**5**	**226**	**0**	**231**	**1**	**216**	**73**	**290**	**41**	**521**	**562**	***2087***
1500 - 1515	0	0	1	1	68	0	4	72	2	328	1	331	1	312	76	389	73	720	793	793
1515 - 1530	1	0	1	2	55	0	3	58	9	349	0	358	0	265	69	334	60	692	752	1545
1530 - 1545	0	0	2	2	55	1	7	63	8	346	0	354	5	295	72	372	65	726	791	2336
1545 - 1600	1	0	3	4	73	0	6	79	7	359	2	368	3	288	71	362	83	730	813	3149
1600 - 1615	**0**	**0**	**4**	**4**	**69**	**2**	**1**	**72**	**7**	**336**	**0**	**343**	**2**	**311**	**64**	**377**	**76**	**720**	**796**	3152
1615 - 1630	**0**	**0**	**1**	**1**	**60**	**0**	**9**	**69**	**2**	**352**	**0**	**354**	**2**	**309**	**84**	**395**	**70**	**749**	**819**	3219
1630 - 1645	**0**	**0**	**6**	**6**	**58**	**0**	**2**	**60**	**6**	**366**	**0**	**372**	**7**	**300**	**87**	**394**	**66**	**766**	**832**	3260
1645 - 1700	**0**	**0**	**5**	**5**	**66**	**0**	**8**	**74**	**4**	**354**	**0**	**358**	**4**	**282**	**65**	**351**	**79**	**709**	**788**	***3235***
1700 - 1715	0	0	4	4	59	0	3	62	2	361	1	364	4	270	88	362	66	726	792	3231
1715 - 1730	1	0	2	3	62	0	4	66	3	362	0	365	3	288	74	365	69	730	799	3211
1730 - 1745	0	1	3	4	57	0	1	58	3	353	0	356	5	267	64	336	62	692	754	3133
1745 - 1800	0	1	3	4	62	0	1	63	2	350	1	353	7	216	67	290	67	643	710	3055
Peak HR AM																				
0800 - 0900	***1***	***1***	***7***	***9***	***149***	***0***	***16***	***165***	***13***	***811***	***3***	***827***	***4***	***856***	***226***	***1086***	***174***	***1913***	***2087***	
Peak HR PM																				
1600 - 1700	***0***	***0***	***16***	***16***	***253***	***2***	***20***	***275***	***19***	***1408***	***0***	***1427***	***15***	***1202***	***300***	***1517***	***291***	***2944***	***3235***	
AM PHF	**0.450**				**0.878**				**0.895**				**0.914**				**0.928**			
PM PHF	**0.667**				**0.929**				**0.959**				**0.960**				**0.972**			

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 4: US 340 @ Patrick Henry Way
COUNT BY	AMT

Friday

STREET	Patrick Henry Way				Patrick Henry Way				US 340				US 340				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	13	2	22	37	1	5	12	18	3	126	9	138	18	173	2	193	55	331	386	386
0715 - 0730	9	2	25	36	1	1	8	10	6	149	14	169	16	205	0	221	46	390	436	822
0730 - 0745	17	7	23	47	1	1	18	20	11	138	20	169	23	203	6	232	67	401	468	1290
0745 - 0800	11	2	29	42	2	4	10	16	13	181	13	207	33	164	7	204	58	411	469	1759
0800 - 0815	**9**	**6**	**33**	**48**	**4**	**5**	**8**	**17**	**6**	**171**	**13**	**190**	**24**	**163**	**4**	**191**	**65**	**381**	**446**	1819
0815 - 0830	**12**	**2**	**21**	**35**	**3**	**7**	**12**	**22**	**6**	**163**	**18**	**187**	**57**	**153**	**2**	**212**	**57**	**399**	**456**	1839
0830 - 0845	**18**	**4**	**42**	**64**	**5**	**7**	**8**	**20**	**10**	**158**	**19**	**187**	**41**	**176**	**7**	**224**	**84**	**411**	**495**	1866
0845 - 0900	**19**	**7**	**48**	**74**	**5**	**6**	**6**	**17**	**9**	**164**	**19**	**192**	**52**	**176**	**7**	**235**	**91**	**427**	**518**	***1915***
1500 - 1515	29	10	66	105	11	6	6	23	8	236	34	278	82	199	11	292	128	570	698	698
1515 - 1530	15	8	71	94	11	13	13	37	8	280	20	308	61	224	6	291	131	599	730	1428
1530 - 1545	20	8	81	109	10	13	8	31	14	245	30	289	77	188	6	271	140	560	700	2128
1545 - 1600	24	12	87	123	8	16	14	38	12	275	26	313	70	217	12	299	161	612	773	2901
1600 - 1615	**27**	**5**	**90**	**122**	**6**	**7**	**16**	**29**	**15**	**232**	**18**	**265**	**75**	**210**	**9**	**294**	**151**	**559**	**710**	2913
1615 - 1630	**15**	**9**	**85**	**109**	**15**	**16**	**13**	**44**	**16**	**266**	**28**	**310**	**71**	**261**	**6**	**338**	**153**	**648**	**801**	2984
1630 - 1645	**29**	**12**	**100**	**141**	**13**	**13**	**9**	**35**	**14**	**241**	**24**	**279**	**90**	**183**	**9**	**282**	**176**	**561**	**737**	3021
1645 - 1700	**22**	**13**	**67**	**102**	**16**	**17**	**17**	**50**	**15**	**282**	**46**	**343**	**54**	**226**	**11**	**291**	**152**	**634**	**786**	***3034***
1700 - 1715	27	11	105	143	26	8	19	53	21	234	35	290	62	175	8	245	196	535	731	3055
1715 - 1730	29	7	85	121	12	12	12	36	18	262	42	322	60	231	18	309	157	631	788	3042
1730 - 1745	33	5	84	122	16	11	15	42	13	240	51	304	72	184	10	266	164	570	734	3039
1745 - 1800	28	13	89	130	14	11	15	40	10	264	34	308	58	142	7	207	170	515	685	2938
Peak HR AM																				
0800 - 0900	***58***	***19***	***144***	***221***	***17***	***25***	***34***	***76***	***31***	***656***	***69***	***756***	***174***	***668***	***20***	***862***	***297***	***1618***	***1915***	
Peak HR PM																				
1600 - 1700	***93***	***39***	***342***	***474***	***50***	***53***	***55***	***158***	***60***	***1021***	***116***	***1197***	***290***	***880***	***35***	***1205***	***632***	***2402***	***3034***	
AM PHF	**0.747**				**0.864**				**0.984**				**0.917**				**0.924**			
PM PHF	**0.840**				**0.790**				**0.872**				**0.891**				**0.947**			

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 5: Keyes Ferry Road/Somerset Boulevard @ Troy Drive
COUNT BY	AMT

Friday

STREET	Keyes Ferry Rd				Troy Dr				Keyes Ferry Rd				Somerset Blvd				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	23	3	7	33	0	0	1	1	1	2	12	15	6	3	1	10	34	25	59	59
0715 - 0730	28	7	8	43	0	2	2	4	0	2	25	27	6	1	0	7	47	34	81	140
0730 - 0745	41	8	6	55	0	7	2	9	2	0	17	19	12	3	1	16	64	35	99	239
0745 - 0800	40	7	3	50	0	2	2	4	2	3	24	29	8	2	0	10	54	39	93	332
0800 - 0815	**40**	**11**	**10**	**61**	**0**	**6**	**1**	**7**	**2**	**4**	**18**	**24**	**10**	**8**	**0**	**18**	**68**	**42**	**110**	383
0815 - 0830	**33**	**6**	**8**	**47**	**0**	**7**	**1**	**8**	**1**	**2**	**24**	**27**	**13**	**6**	**1**	**20**	**55**	**47**	**102**	404
0830 - 0845	**41**	**11**	**6**	**58**	**1**	**9**	**2**	**12**	**3**	**3**	**25**	**31**	**13**	**4**	**0**	**17**	**70**	**48**	**118**	423
0845 - 0900	**50**	**19**	**9**	**78**	**0**	**5**	**6**	**11**	**1**	**1**	**29**	**31**	**9**	**2**	**0**	**11**	**89**	**42**	**131**	***461***
1500 - 1515	51	14	13	78	1	13	4	18	4	6	47	57	11	7	0	18	96	75	171	171
1515 - 1530	49	13	16	78	2	9	5	16	2	5	42	49	8	5	0	13	94	62	156	327
1530 - 1545	50	15	14	79	0	13	1	14	2	12	41	55	7	7	2	16	93	71	164	491
1545 - 1600	54	16	9	79	0	17	5	22	4	4	47	55	12	5	1	18	101	73	174	665
1600 - 1615	**40**	**17**	**11**	**68**	**2**	**12**	**3**	**17**	**1**	**2**	**52**	**55**	**8**	**7**	**0**	**15**	**85**	**70**	**155**	649
1615 - 1630	**59**	**12**	**18**	**89**	**0**	**15**	**7**	**22**	**3**	**5**	**46**	**54**	**8**	**12**	**0**	**20**	**111**	**74**	**185**	678
1630 - 1645	**53**	**25**	**16**	**94**	**2**	**9**	**4**	**15**	**3**	**10**	**45**	**58**	**4**	**4**	**0**	**8**	**109**	**66**	**175**	689
1645 - 1700	**46**	**10**	**13**	**69**	**1**	**24**	**6**	**31**	**2**	**5**	**38**	**45**	**13**	**5**	**1**	**19**	**100**	**64**	**164**	***679***
1700 - 1715	63	12	12	87	1	13	4	18	1	4	45	50	4	8	0	12	105	62	167	691
1715 - 1730	53	9	18	80	0	9	2	11	0	8	46	54	11	4	0	15	91	69	160	666
1730 - 1745	43	5	20	68	1	5	4	10	1	5	43	49	10	4	0	14	78	63	141	632
1745 - 1800	50	5	14	69	1	7	3	11	2	5	44	51	11	7	0	18	80	69	149	617
Peak HR AM																				
0800 - 0900	***164***	***47***	***33***	***244***	***1***	***27***	***10***	***38***	***7***	***10***	***96***	***113***	***45***	***20***	***1***	***66***	***282***	***179***	***461***	
Peak HR PM																				
1600 - 1700	***198***	***64***	***58***	***320***	***5***	***60***	***20***	***85***	***9***	***22***	***181***	***212***	***33***	***28***	***1***	***62***	***405***	***274***	***679***	
AM PHF	**0.782**				**0.792**				**0.911**				**0.825**				**0.880**			
PM PHF	**0.851**				**0.685**				**0.914**				**0.775**				**0.918**			

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 6: Somerset Boulevard @ Somerset Village Road
COUNT BY	AMT

Friday

STREET	Somerset Village Rd				Somerset Village Rd				Somerset Blvd				Somerset Blvd				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	0	2	5	7	0	1	1	2	1	4	0	5	17	0	0	17	9	22	31	31
0715 - 0730	0	3	6	9	0	2	0	2	1	4	0	5	8	8	0	16	11	21	32	63
0730 - 0745	5	4	14	23	0	3	2	5	1	3	1	5	17	13	0	30	28	35	63	126
0745 - 0800	7	3	12	22	0	4	3	7	3	11	1	15	10	9	0	19	29	34	63	189
0800 - 0815	**2**	**2**	**12**	**16**	**0**	**9**	**1**	**10**	**1**	**4**	**3**	**8**	**9**	**18**	**0**	**27**	**26**	**35**	**61**	219
0815 - 0830	**2**	**1**	**8**	**11**	**0**	**3**	**0**	**3**	**2**	**4**	**3**	**9**	**14**	**13**	**0**	**27**	**14**	**36**	**50**	237
0830 - 0845	**7**	**3**	**11**	**21**	**0**	**6**	**0**	**6**	**0**	**9**	**4**	**13**	**10**	**11**	**0**	**21**	**27**	**34**	**61**	235
0845 - 0900	**8**	**6**	**7**	**21**	**1**	**3**	**0**	**4**	**2**	**9**	**6**	**17**	**10**	**10**	**0**	**20**	**25**	**37**	**62**	***234***
1500 - 1515	9	10	10	29	0	10	3	13	0	18	6	24	11	18	1	30	42	54	96	96
1515 - 1530	4	11	9	24	4	15	5	24	5	10	5	20	15	23	0	38	48	58	106	202
1530 - 1545	4	7	16	27	4	8	2	14	2	11	10	23	16	12	0	28	41	51	92	294
1545 - 1600	8	14	13	35	1	10	6	17	5	17	8	30	21	13	0	34	52	64	116	410
1600 - 1615	**7**	**10**	**11**	**28**	**2**	**8**	**4**	**14**	**2**	**8**	**6**	**16**	**18**	**12**	**0**	**30**	**42**	**46**	**88**	402
1615 - 1630	**4**	**12**	**15**	**31**	**0**	**9**	**1**	**10**	**5**	**19**	**13**	**37**	**21**	**13**	**1**	**35**	**41**	**72**	**113**	409
1630 - 1645	**8**	**12**	**13**	**33**	**1**	**9**	**4**	**14**	**1**	**14**	**10**	**25**	**18**	**19**	**0**	**37**	**47**	**62**	**109**	426
1645 - 1700	**9**	**15**	**15**	**39**	**0**	**12**	**5**	**17**	**6**	**10**	**14**	**30**	**26**	**13**	**1**	**40**	**56**	**70**	**126**	***436***
1700 - 1715	8	20	9	37	0	12	4	16	7	11	14	32	24	14	1	39	53	71	124	472
1715 - 1730	13	21	12	46	0	13	2	15	7	12	7	26	17	16	0	33	61	59	120	479
1730 - 1745	7	11	9	27	2	16	3	21	7	10	5	22	23	13	3	39	48	61	109	479
1745 - 1800	4	13	12	29	1	12	11	24	6	10	6	22	22	20	1	43	53	65	118	471
Peak HR AM																				
0800 - 0900	***19***	***12***	***38***	***69***	***1***	***21***	***1***	***23***	***5***	***26***	***16***	***47***	***43***	***52***	***0***	***95***	***92***	***142***	***234***	
Peak HR PM																				
1600 - 1700	***28***	***49***	***54***	***131***	***3***	***38***	***14***	***55***	***14***	***51***	***43***	***108***	***83***	***57***	***2***	***142***	***186***	***250***	***436***	
AM PHF	**0.821**				**0.575**				**0.691**				**0.880**				**0.944**			
PM PHF	**0.840**				**0.809**				**0.730**				**0.888**				**0.865**			

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 7: Cattail Run Road @ Keyes Ferry Road
COUNT BY	AMT

Friday

STREET	Cattail Run Rd				Cattail Run Rd				Keyes Ferry Rd				Keyes Ferry Rd				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	0	1	0	1	1	0	1	2	1	10	0	11	8	0	0	8	3	19	22	22
0715 - 0730	0	0	1	1	3	0	2	5	0	10	0	10	13	0	0	13	6	23	29	51
0730 - 0745	0	0	0	0	2	0	0	2	0	12	0	12	15	1	0	16	2	28	30	81
0745 - 0800	0	0	1	1	0	0	8	8	0	6	0	6	15	0	0	15	9	21	30	111
0800 - 0815	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**3**	**3**	**9**	**1**	**13**	**13**	**0**	**0**	**13**	**3**	**26**	**29**	118
0815 - 0830	**0**	**0**	**1**	**1**	**2**	**0**	**0**	**2**	**2**	**8**	**0**	**10**	**12**	**1**	**0**	**13**	**3**	**23**	**26**	115
0830 - 0845	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**6**	**0**	**8**	**10**	**1**	**0**	**11**	**0**	**19**	**19**	104
0845 - 0900	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**11**	**0**	**12**	**9**	**1**	**0**	**10**	**0**	**22**	**22**	***96***
1500 - 1515	0	0	0	0	1	1	0	2	4	15	0	19	0	17	1	18	2	37	39	39
1515 - 1530	0	0	0	0	0	0	0	0	0	14	0	14	0	15	1	16	0	30	30	69
1530 - 1545	0	0	0	0	1	0	6	7	1	20	0	21	0	9	0	9	7	30	37	106
1545 - 1600	0	0	0	0	1	0	4	5	4	22	0	26	0	18	1	19	5	45	50	156
1600 - 1615	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**6**	**13**	**0**	**19**	**0**	**21**	**3**	**24**	**5**	**43**	**48**	165
1615 - 1630	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**2**	**24**	**0**	**26**	**0**	**25**	**1**	**26**	**5**	**52**	**57**	192
1630 - 1645	**0**	**0**	**0**	**0**	**1**	**0**	**4**	**5**	**0**	**23**	**0**	**23**	**1**	**29**	**1**	**31**	**5**	**54**	**59**	214
1645 - 1700	**1**	**0**	**0**	**1**	**0**	**0**	**9**	**9**	**4**	**18**	**0**	**22**	**0**	**33**	**1**	**34**	**10**	**56**	**66**	***230***
1700 - 1715	0	0	0	0	0	0	6	6	3	16	0	19	0	29	2	31	6	50	56	238
1715 - 1730	0	0	1	1	0	0	7	7	1	19	0	20	0	36	0	36	8	56	64	245
1730 - 1745	0	0	0	0	0	0	6	6	5	17	0	22	1	29	0	30	6	52	58	244
1745 - 1800	0	0	0	0	0	0	1	1	4	16	0	20	0	29	2	31	1	51	52	230
Peak HR AM																				
0800 - 0900	***0***	***0***	***1***	***1***	***3***	***1***	***1***	***5***	***8***	***34***	***1***	***43***	***44***	***3***	***0***	***47***	***6***	***90***	***96***	
Peak HR PM																				
1600 - 1700	***1***	***0***	***0***	***1***	***1***	***0***	***23***	***24***	***12***	***78***	***0***	***90***	***1***	***108***	***6***	***115***	***25***	***205***	***230***	
AM PHF	**0.250**				**0.417**				**0.827**				**0.904**				**0.828**			
PM PHF	**0.250**				**0.667**				**0.865**				**0.846**				**0.871**			

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 8: WV 9 @ Cattail Run Rd
COUNT BY	AMT

Friday - 12 Hour Count

STREET	Cattail Run Rd				Cattail Run Rd				WV 9				WV 9				Total			PEAK HR
	From North				From South				From East				From West							
TIME	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	13	1	1	15	0	7	1	8	0	33	2	35	0	155	0	155	23	190	213	213
0715 - 0730	9	0	3	12	1	3	6	10	0	48	4	52	1	143	0	144	22	196	218	431
0730 - 0745	13	0	2	15	1	2	2	5	0	48	10	58	0	133	2	135	20	193	213	644
0745 - 0800	16	4	2	22	1	1	2	4	0	58	3	61	2	119	0	121	26	182	208	852
0800 - 0815	**12**	**0**	**2**	**14**	**1**	**9**	**1**	**11**	**0**	**62**	**2**	**64**	**1**	**121**	**1**	**123**	**25**	**187**	**212**	851
0815 - 0830	**10**	**1**	**0**	**11**	**3**	**5**	**3**	**11**	**0**	**47**	**4**	**51**	**0**	**129**	**1**	**130**	**22**	**181**	**203**	836
0830 - 0845	**7**	**3**	**1**	**11**	**2**	**2**	**4**	**8**	**0**	**51**	**4**	**55**	**1**	**111**	**0**	**112**	**19**	**167**	**186**	809
0845 - 0900	**8**	**0**	**2**	**10**	**0**	**3**	**2**	**5**	**1**	**47**	**6**	**54**	**1**	**87**	**1**	**89**	**15**	**143**	**158**	***759***
0900 - 0915	2	3	1	6	2	2	1	5	0	56	2	58	0	41	2	43	11	101	112	659
0915 - 0930	5	2	0	7	1	8	1	10	0	23	1	24	0	33	1	34	17	58	75	531
0930 - 0945	1	1	0	2	2	4	0	6	1	42	1	44	0	50	1	51	8	95	103	448
0945 - 1000	4	2	1	7	1	3	2	6	0	40	4	44	0	41	0	41	13	85	98	388
1000 - 1015	5	1	0	6	1	4	4	9	0	43	5	48	1	39	1	41	15	89	104	380
1015 - 1030	5	1	2	8	1	8	2	11	0	44	2	46	1	45	0	46	19	92	111	416
1030 - 1045	9	1	1	11	4	6	2	12	0	40	6	46	0	39	2	41	23	87	110	423
1045 - 1100	6	2	2	10	2	4	1	7	1	48	3	52	0	44	2	46	17	98	115	440
1100 - 1115	10	2	3	15	1	1	3	5	0	57	4	61	0	43	1	44	20	105	125	461
1115 - 1130	4	1	1	6	4	7	0	11	0	43	4	47	0	41	0	41	17	88	105	455
1130 - 1145	4	3	1	8	1	7	0	8	1	47	2	50	3	39	0	42	16	92	108	453
1145 - 1200	3	1	2	6	0	4	0	4	0	56	4	60	0	49	1	50	10	110	120	458
1200 - 1215	6	4	2	12	0	3	1	4	0	36	4	40	1	47	1	49	16	89	105	438
1215 - 1230	5	6	4	15	2	8	4	14	2	49	5	56	0	39	1	40	29	96	125	458
1230 - 1245	4	2	1	7	3	3	0	6	0	48	4	52	3	51	1	55	13	107	120	470
1245 - 1300	3	2	2	7	2	9	1	12	0	67	5	72	0	56	0	56	19	128	147	497
1300 - 1315	5	3	0	8	1	2	2	5	0	59	5	64	0	50	2	52	13	116	129	521
1315 - 1330	1	5	2	8	0	4	0	4	2	45	3	50	4	48	0	52	12	102	114	510
1330 - 1345	8	1	3	12	3	3	1	7	1	57	2	60	2	63	2	67	19	127	146	536
1345 - 1400	7	1	2	10	1	1	1	3	0	67	7	74	2	58	2	62	13	136	149	538
1400 - 1415	8	0	1	9	5	2	2	9	2	86	4	92	1	66	1	68	18	160	178	587
1415 - 1430	6	4	3	13	0	5	0	5	2	127	7	136	2	54	0	56	18	192	210	683
1430 - 1445	13	7	2	22	2	6	2	10	2	123	18	143	1	70	1	72	32	215	247	784
1445 - 1500	12	8	2	22	0	5	0	5	0	153	12	165	1	80	2	83	27	248	275	910
1500 - 1515	11	4	3	18	2	6	1	9	0	131	11	142	2	86	0	88	27	230	257	989
1515 - 1530	8	6	3	17	2	4	1	7	1	133	13	147	1	79	1	81	24	228	252	1031
1530 - 1545	5	3	2	10	0	7	2	9	1	174	13	188	2	77	0	79	19	267	286	1070
1545 - 1600	14	8	2	24	0	8	3	11	2	145	16	163	1	86	1	88	35	251	286	1081
1600 - 1615	**12**	**5**	**5**	**22**	**2**	**5**	**2**	**9**	**5**	**143**	**12**	**160**	**5**	**103**	**7**	**115**	**31**	**275**	**306**	1130
1615 - 1630	**8**	**7**	**13**	**28**	**3**	**4**	**1**	**8**	**2**	**171**	**21**	**194**	**3**	**96**	**37**	**136**	**36**	**330**	**366**	1244
1630 - 1645	**16**	**6**	**16**	**38**	**2**	**1**	**2**	**5**	**2**	**183**	**16**	**201**	**1**	**122**	**43**	**166**	**43**	**367**	**410**	1368
1645 - 1700	**10**	**8**	**22**	**40**	**2**	**6**	**1**	**9**	**3**	**174**	**10**	**187**	**4**	**86**	**29**	**119**	**49**	**306**	**355**	***1437***
1700 - 1715	17	6	13	36	3	4	1	8	3	166	13	182	1	81	15	97	44	279	323	1454
1715 - 1730	18	10	15	43	0	5	0	5	3	149	15	167	0	56	10	66	48	233	281	1369
1730 - 1745	12	8	15	35	1	4	1	6	4	169	15	188	2	119	32	153	41	341	382	1341
1745 - 1800	11	8	14	33	1	3	2	6	1	149	15	165	2	85	33	120	39	285	324	1310
1800 - 1815	10	5	5	20	2	6	1	9	3	158	14	175	0	78	8	86	29	261	290	1277
1815 - 1830	7	5	3	15	0	1	0	1	1	158	15	174	2	70	0	72	16	246	262	1258
1830 - 1845	3	6	7	16	0	6	1	7	5	151	16	172	1	50	0	51	23	223	246	1122
1845 - 1900	6	5	2	13	1	2	0	3	0	129	11	140	1	44	0	45	16	185	201	999
Peak HR AM																				
0800 - 0900	***37***	***4***	***5***	***46***	***6***	***19***	***10***	***35***	***1***	***207***	***16***	***180***	***3***	***448***	***3***	***217***	***81***	***397***	***478***	
Peak HR PM																				
1600 - 1700	***46***	***26***	***56***	***128***	***9***	***16***	***6***	***31***	***12***	***671***	***59***	***742***	***13***	***407***	***116***	***536***	***159***	***1278***	***1437***	
AM PHF	**0.821**				**0.795**				**0.703**				**0.417**				**0.564**			
PM PHF	**0.800**				**0.861**				**0.923**				**0.807**				**0.876**			

Appendix C

Synchro Outputs

Appendix C-1

2021 Existing Conditions
AM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	305	126	60	546	444	326
Future Volume (vph)	305	126	60	546	444	326
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		250			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.937	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1656	1583	1736	3471	2969	0
Flt Permitted	0.950		0.272			
Satd. Flow (perm)	1656	1583	497	3471	2969	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		137			250	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	332	137	65	593	483	354
Shared Lane Traffic (%)						
Lane Group Flow (vph)	332	137	65	593	837	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	18.0	90.0	72.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	25.0	25.0	13.0	85.0	67.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	25.0	25.0	85.0	85.0	74.6	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.62	
v/c Ratio	0.96	0.31	0.15	0.24	0.43	
Control Delay	87.4	8.5	6.1	6.4	4.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	87.4	8.5	6.1	6.4	4.1	
LOS	F	A	A	A	A	
Approach Delay	64.4			6.4	4.1	
Approach LOS	E			A	A	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 19.3	Intersection LOS: B
Intersection Capacity Utilization 58.8%	ICU Level of Service B
Analysis Period (min) 15	

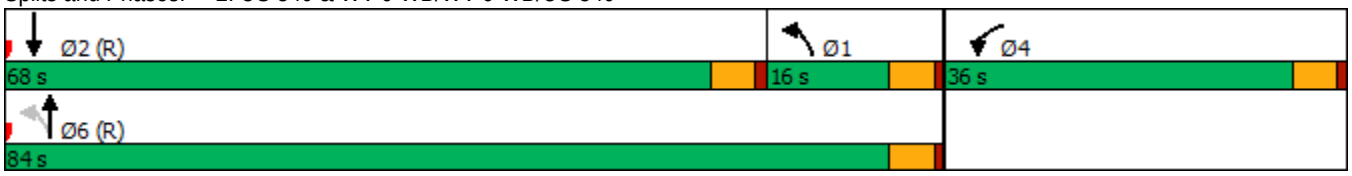
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	66	0	355	95	756	0	0	704	263
Future Volume (vph)	0	0	0	66	0	355	95	756	0	0	704	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		225	325		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25			25			125			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.959	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1346	1736	3343	0	0	3197	0
Flt Permitted				0.950			0.236					
Satd. Flow (perm)	0	0	0	1770	0	1346	431	3343	0	0	3197	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						390					68	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		797			1018			836			1046	
Travel Time (s)		18.1			23.1			12.7			15.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	20%	4%	8%	2%	2%	8%	9%
Adj. Flow (vph)	0	0	0	73	0	390	104	831	0	0	774	289
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	73	0	390	104	831	0	0	1063	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		0	1	1			1	
Detector Template												
Leading Detector (ft)				56		0	40	56			56	
Trailing Detector (ft)				50		0	0	50			50	
Detector 1 Position(ft)				50		0	0	50			50	
Detector 1 Size(ft)				6		20	40	6			6	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Free	pm+pt	NA			NA	
Protected Phases				4			1	6			2	
Permitted Phases						Free	6					
Detector Phase				4			1	6			2	
Switch Phase												
Minimum Initial (s)				12.0			8.0	20.0			20.0	
Minimum Split (s)				22.5			13.0	25.0			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)				36.0			16.0	84.0			68.0	
Total Split (%)				30.0%			13.3%	70.0%			56.7%	
Maximum Green (s)				31.0			11.0	79.0			63.0	
Yellow Time (s)				4.0			4.0	4.0			4.0	
All-Red Time (s)				1.0			1.0	1.0			1.0	
Lost Time Adjust (s)				0.0			0.0	0.0			0.0	
Total Lost Time (s)				5.0			5.0	5.0			5.0	
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0			3.0	3.0			3.0	
Recall Mode				None			None	C-Max			C-Max	
Act Effct Green (s)				12.2		120.0	101.2	102.2			85.2	
Actuated g/C Ratio				0.10		1.00	0.84	0.85			0.71	
v/c Ratio				0.41		0.29	0.22	0.29			0.46	
Control Delay				57.6		0.5	5.2	3.4			12.2	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				57.6		0.5	5.2	3.4			12.2	
LOS				E		A	A	A			B	
Approach Delay					9.5			3.6			12.2	
Approach LOS					A			A			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 8.4	Intersection LOS: A
Intersection Capacity Utilization 49.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/WV 9 WB/US 340



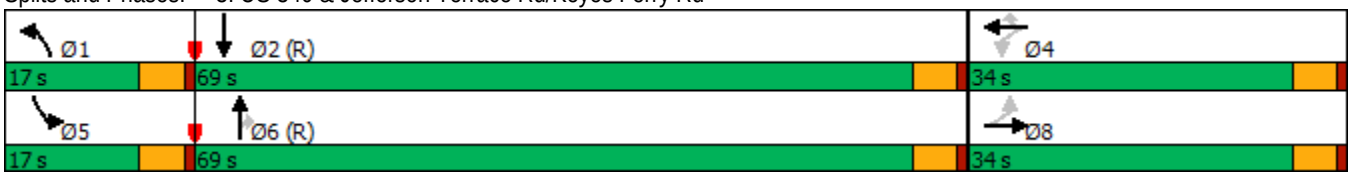
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	7	149	0	16	4	881	226	13	811	3
Future Volume (vph)	1	1	7	149	0	16	4	881	226	13	811	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		225	75		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.892				0.850			0.850		0.999	
Flt Protected		0.995			0.950		0.950			0.950		
Satd. Flow (prot)	0	1653	0	0	1770	1583	1770	3343	1583	1770	3340	0
Flt Permitted		0.979			0.751		0.950			0.950		
Satd. Flow (perm)	0	1627	0	0	1399	1583	1770	3343	1583	1770	3340	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		8				64						
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	1	1	8	160	0	17	4	947	243	14	872	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	160	17	4	947	243	14	875	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	4	1	1	4	
Detector Template	Left			Left								
Leading Detector (ft)	20	40		20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40		20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Detector Phase	8	8		4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0		10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	25.0	25.0		25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	34.0	34.0		34.0	34.0	34.0	17.0	69.0	69.0	17.0	69.0	
Total Split (%)	28.3%	28.3%		28.3%	28.3%	28.3%	14.2%	57.5%	57.5%	14.2%	57.5%	
Maximum Green (s)	29.0	29.0		29.0	29.0	29.0	12.0	64.0	64.0	12.0	64.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0	9.0						
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0						
Pedestrian Calls (#/hr)	0	0		0	0	0						
Act Effct Green (s)		19.5			19.5	19.5	8.0	85.3	85.3	8.0	87.9	
Actuated g/C Ratio		0.16			0.16	0.16	0.07	0.71	0.71	0.07	0.73	
v/c Ratio		0.04			0.71	0.05	0.03	0.40	0.22	0.12	0.36	
Control Delay		23.2			64.0	0.3	53.2	9.0	8.6	71.5	4.9	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		23.2			64.0	0.3	53.2	9.0	8.6	71.5	4.9	
LOS		C			E	A	D	A	A	E	A	
Approach Delay		23.2			57.8			9.1			5.9	
Approach LOS		C			E			A			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 33 (28%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 57.7%	ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

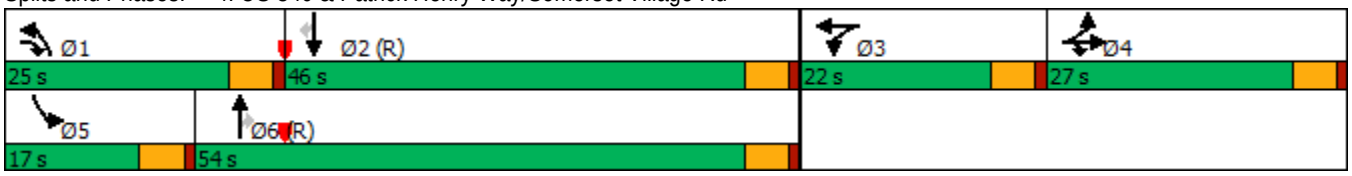


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	19	144	17	25	34	174	704	20	31	666	69
Future Volume (vph)	58	19	144	17	25	34	174	704	20	31	666	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	0		0	500		175	250		250
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.913				0.850			0.850
Flt Protected	0.950	0.976		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1727	1583	1770	1701	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.950	0.976		0.950			0.950			0.950		
Satd. Flow (perm)	1681	1727	1583	1770	1701	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			157		37				109			155
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	63	21	157	18	27	37	189	765	22	34	724	75
Shared Lane Traffic (%)	34%											
Lane Group Flow (vph)	42	42	157	18	64	0	189	765	22	34	724	75
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 1	3	3		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases									6			2
Detector Phase	4	4	4 1	3	3		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	12.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	17.0	17.0		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	27.0	27.0		22.0	22.0		25.0	54.0	54.0	17.0	46.0	46.0
Total Split (%)	22.5%	22.5%		18.3%	18.3%		20.8%	45.0%	45.0%	14.2%	38.3%	38.3%
Maximum Green (s)	22.0	22.0		17.0	17.0		20.0	49.0	49.0	12.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	12.0	12.0	28.9	8.7	8.7		11.9	78.7	78.7	8.4	70.0	70.0
Actuated g/C Ratio	0.10	0.10	0.24	0.07	0.07		0.10	0.66	0.66	0.07	0.58	0.58
v/c Ratio	0.25	0.24	0.31	0.14	0.41		0.56	0.35	0.02	0.28	0.37	0.08
Control Delay	54.1	53.8	7.0	54.1	34.6		46.9	12.3	0.2	58.6	15.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	53.8	7.0	54.1	34.6		46.9	12.3	0.2	58.6	15.1	0.1
LOS	D	D	A	D	C		D	B	A	E	B	A
Approach Delay		23.4			38.9			18.7			15.5	
Approach LOS		C			D			B			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 18.8	Intersection LOS: B
Intersection Capacity Utilization 50.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way/Somerset Village Rd



Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	164	47	29	1	27	10	45	20	1	7	10	93
Future Vol, veh/h	164	47	29	1	27	10	45	20	1	7	10	93
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	186	53	33	1	31	11	51	23	1	8	11	106

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	42	0	0	86	0	0	539	486	70	493	497	37
Stage 1	-	-	-	-	-	-	442	442	-	39	39	-
Stage 2	-	-	-	-	-	-	97	44	-	454	458	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1567	-	-	1510	-	-	453	481	993	486	475	1035
Stage 1	-	-	-	-	-	-	594	576	-	976	862	-
Stage 2	-	-	-	-	-	-	910	858	-	586	567	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1567	-	-	1510	-	-	360	420	993	421	415	1035
Mov Cap-2 Maneuver	-	-	-	-	-	-	360	420	-	421	415	-
Stage 1	-	-	-	-	-	-	520	504	-	854	861	-
Stage 2	-	-	-	-	-	-	805	857	-	489	496	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.2	0.2	16.8	10
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	380	1567	-	-	1510	-	-	842
HCM Lane V/C Ratio	0.197	0.119	-	-	0.001	-	-	0.148
HCM Control Delay (s)	16.8	7.6	0	-	7.4	0	-	10
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.7	0.4	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	13	38	1	21	1	39	52	0	5	26	16
Future Vol, veh/h	19	13	38	1	21	1	39	52	0	5	26	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	14	40	1	22	1	41	55	0	5	28	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	23	0	0	54	0	0	101	99	34	127	119	12
Stage 1	-	-	-	-	-	-	74	74	-	25	25	-
Stage 2	-	-	-	-	-	-	27	25	-	102	94	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1591	-	-	1550	-	-	875	791	1039	840	771	1066
Stage 1	-	-	-	-	-	-	935	833	-	990	874	-
Stage 2	-	-	-	-	-	-	987	874	-	903	817	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1591	-	-	1550	-	-	829	780	1039	786	760	1066
Mov Cap-2 Maneuver	-	-	-	-	-	-	829	780	-	786	760	-
Stage 1	-	-	-	-	-	-	923	822	-	977	873	-
Stage 2	-	-	-	-	-	-	940	873	-	831	806	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	0.3	10.1	9.5
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	800	1591	-	-	1550	-	-	846
HCM Lane V/C Ratio	0.121	0.013	-	-	0.001	-	-	0.059
HCM Control Delay (s)	10.1	7.3	0	-	7.3	0	-	9.5
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	44	3	0	8	34	1	3	1	1	0	0	1
Future Vol, veh/h	44	3	0	8	34	1	3	1	1	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	53	4	0	10	41	1	4	1	1	0	0	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	32	11	1	13	11	2	1	0	0	2	0	0
Stage 1	1	1	-	10	10	-	-	-	-	-	-	-
Stage 2	31	10	-	3	1	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	976	884	1084	1004	884	1082	1622	-	-	1620	-	-
Stage 1	1022	895	-	1011	887	-	-	-	-	-	-	-
Stage 2	986	887	-	1020	895	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	939	882	1084	999	882	1082	1622	-	-	1620	-	-
Mov Cap-2 Maneuver	939	882	-	999	882	-	-	-	-	-	-	-
Stage 1	1020	895	-	1009	885	-	-	-	-	-	-	-
Stage 2	937	885	-	1016	895	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.1	9.2	4.3	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1622	-	-	935	906	1620	-	-
HCM Lane V/C Ratio	0.002	-	-	0.061	0.057	-	-	-
HCM Control Delay (s)	7.2	0	-	9.1	9.2	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	448	3	1	207	16	6	19	10	37	4	5
Future Vol, veh/h	3	448	3	1	207	16	6	19	10	37	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	3	498	3	1	230	18	7	21	11	41	4	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	248	0	0	501	0	0	623	754	249	498	739	115
Stage 1	-	-	-	-	-	-	504	504	-	232	232	-
Stage 2	-	-	-	-	-	-	119	250	-	266	507	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1315	-	-	1059	-	-	370	337	751	455	344	916
Stage 1	-	-	-	-	-	-	518	539	-	750	711	-
Stage 2	-	-	-	-	-	-	873	699	-	716	538	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1315	-	-	1059	-	-	363	336	751	426	343	916
Mov Cap-2 Maneuver	-	-	-	-	-	-	363	336	-	426	343	-
Stage 1	-	-	-	-	-	-	517	538	-	749	710	-
Stage 2	-	-	-	-	-	-	861	698	-	676	537	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	14.5	13.9
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	363	415	1315	-	-	1059	-	-	426	526
HCM Lane V/C Ratio	0.018	0.078	0.003	-	-	0.001	-	-	0.097	0.019
HCM Control Delay (s)	15.1	14.4	7.7	-	-	8.4	-	-	14.4	12
HCM Lane LOS	C	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.1	0.3	0	-	-	0	-	-	0.3	0.1

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1039	0	0	965	0	0	0	0	0	0	0
Future Vol, veh/h	0	1039	0	0	965	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	0	1154	0	0	1072	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1072	0	0	1154	0	0	1690	2226	577	1649	2226	536
Stage 1	-	-	-	-	-	-	1154	1154	-	1072	1072	-
Stage 2	-	-	-	-	-	-	536	1072	-	577	1154	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	646	-	-	601	-	-	61	43	460	65	43	489
Stage 1	-	-	-	-	-	-	210	270	-	235	295	-
Stage 2	-	-	-	-	-	-	496	295	-	469	270	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	646	-	-	601	-	-	61	43	460	65	43	489
Mov Cap-2 Maneuver	-	-	-	-	-	-	61	43	-	65	43	-
Stage 1	-	-	-	-	-	-	210	270	-	235	295	-
Stage 2	-	-	-	-	-	-	496	295	-	469	270	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	646	-	-	601	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Appendix C-2

2021 Existing Conditions
PM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	365	123	100	857	1138	427
Future Volume (vph)	365	123	100	857	1138	427
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		250			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.959	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1656	1583	1736	3471	3096	0
Flt Permitted	0.950		0.062			
Satd. Flow (perm)	1656	1583	113	3471	3096	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		115			73	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	380	128	104	893	1185	445
Shared Lane Traffic (%)						
Lane Group Flow (vph)	380	128	104	893	1630	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	18.0	90.0	72.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	25.0	25.0	13.0	85.0	67.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	25.0	25.0	85.0	85.0	70.6	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.59	
v/c Ratio	1.10	0.30	0.50	0.36	0.88	
Control Delay	123.0	11.2	21.4	7.4	12.6	
Queue Delay	0.0	0.0	0.0	0.0	0.1	
Total Delay	123.0	11.2	21.4	7.4	12.7	
LOS	F	B	C	A	B	
Approach Delay	94.8			8.8	12.7	
Approach LOS	F			A	B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.10	
Intersection Signal Delay: 24.8	Intersection LOS: C
Intersection Capacity Utilization 84.5%	ICU Level of Service E
Analysis Period (min) 15	

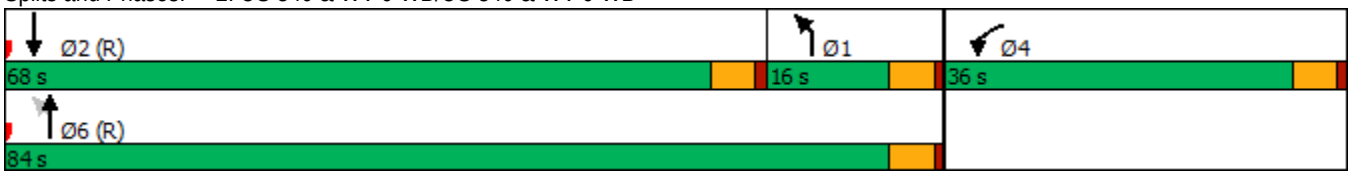
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations											
Traffic Volume (vph)	305	0	505	193	1029	0	0	1260	417	0	0
Future Volume (vph)	305	0	505	193	1029	0	0	1260	417	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	225		325		0	0		0	0	0
Storage Lanes	1	1		1		0	0		0	0	0
Taper Length (ft)	25			125			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00
Frt			0.850					0.963			
Flt Protected	0.950			0.950							
Satd. Flow (prot)	1770	0	1346	1736	3343	0	0	3212	0	0	0
Flt Permitted	0.950			0.054							
Satd. Flow (perm)	1770	0	1346	99	3343	0	0	3212	0	0	0
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)			407					57			
Link Speed (mph)	30				45			45		30	
Link Distance (ft)	1018				836			1046		797	
Travel Time (s)	23.1				12.7			15.8		18.1	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	20%	4%	8%	2%	2%	8%	9%	2%	2%
Adj. Flow (vph)	324	0	537	205	1095	0	0	1340	444	0	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	324	0	537	205	1095	0	0	1784	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				18			18		0	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1		0	1	1			1			
Detector Template											
Leading Detector (ft)	56		0	40	56			56			
Trailing Detector (ft)	50		0	0	50			50			
Detector 1 Position(ft)	50		0	0	50			50			
Detector 1 Size(ft)	6		20	40	6			6			
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex			
Detector 1 Channel											
Detector 1 Extend (s)	0.0		0.0	0.0	0.0			0.0			
Detector 1 Queue (s)	0.0		0.0	0.0	0.0			0.0			
Detector 1 Delay (s)	0.0		0.0	0.0	0.0			0.0			
Turn Type	Prot		Free	pm+pt	NA			NA			
Protected Phases	4			1	6			2			
Permitted Phases			Free	6							
Detector Phase	4			1	6			2			
Switch Phase											
Minimum Initial (s)	12.0			8.0	20.0			20.0			
Minimum Split (s)	22.5			13.0	25.0			25.0			

Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Total Split (s)	36.0			16.0	84.0			68.0			
Total Split (%)	30.0%			13.3%	70.0%			56.7%			
Maximum Green (s)	31.0			11.0	79.0			63.0			
Yellow Time (s)	4.0			4.0	4.0			4.0			
All-Red Time (s)	1.0			1.0	1.0			1.0			
Lost Time Adjust (s)	0.0			0.0	0.0			0.0			
Total Lost Time (s)	5.0			5.0	5.0			5.0			
Lead/Lag				Lag				Lead			
Lead-Lag Optimize?				Yes				Yes			
Vehicle Extension (s)	3.0			3.0	3.0			3.0			
Recall Mode	None			None	C-Max			C-Max			
Act Effct Green (s)	25.4		120.0	84.6	84.6			68.6			
Actuated g/C Ratio	0.21		1.00	0.70	0.70			0.57			
v/c Ratio	0.87		0.40	0.93	0.46			0.96			
Control Delay	67.7		0.9	89.1	11.7			38.4			
Queue Delay	0.0		0.0	0.0	0.0			3.2			
Total Delay	67.7		0.9	89.1	11.7			41.6			
LOS	E		A	F	B			D			
Approach Delay	26.0				23.9			41.6			
Approach LOS	C				C			D			

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 32.4	Intersection LOS: C
Intersection Capacity Utilization 88.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/US 340 & WV 9 WB



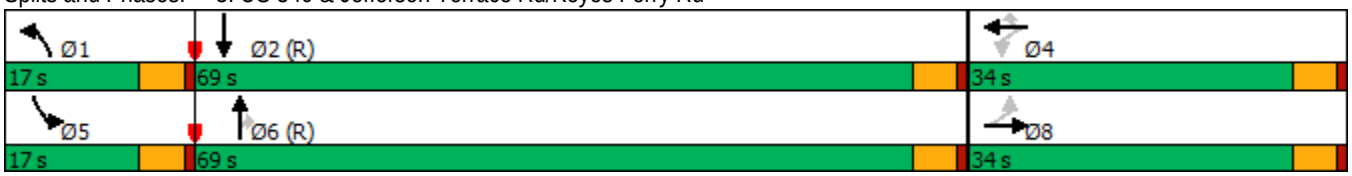
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	16	253	2	20	15	1219	300	19	1408	0
Future Volume (vph)	0	0	16	253	2	20	15	1219	300	19	1408	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		225	75		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.865				0.850			0.850			
Flt Protected					0.953		0.950			0.950		
Satd. Flow (prot)	0	1611	0	0	1775	1583	1770	3343	1583	1770	3343	0
Flt Permitted					0.716		0.950			0.950		
Satd. Flow (perm)	0	1611	0	0	1334	1583	1770	3343	1583	1770	3343	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		195				64						
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	0	0	16	261	2	21	15	1257	309	20	1452	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	16	0	0	263	21	15	1257	309	20	1452	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	4	1	1	4	
Detector Template	Left			Left								
Leading Detector (ft)	20	40		20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40		20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type		NA		Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Detector Phase	8	8		4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0		10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	22.5	22.5		25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	34.0	34.0		34.0	34.0	34.0	17.0	69.0	69.0	17.0	69.0	
Total Split (%)	28.3%	28.3%		28.3%	28.3%	28.3%	14.2%	57.5%	57.5%	14.2%	57.5%	
Maximum Green (s)	29.0	29.0		29.0	29.0	29.0	12.0	64.0	64.0	12.0	64.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)				9.0	9.0	9.0		9.0	9.0			
Flash Dont Walk (s)				11.0	11.0	11.0		11.0	11.0			
Pedestrian Calls (#/hr)				0	0	0		0	0			
Act Effct Green (s)		26.5			26.5	26.5	8.0	78.3	78.3	8.0	78.3	
Actuated g/C Ratio		0.22			0.22	0.22	0.07	0.65	0.65	0.07	0.65	
v/c Ratio		0.03			0.89	0.05	0.13	0.58	0.30	0.17	0.67	
Control Delay		0.1			77.0	0.2	48.0	18.4	16.0	75.5	10.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		0.1			77.0	0.2	48.0	18.4	16.0	75.5	10.7	
LOS		A			E	A	D	B	B	E	B	
Approach Delay		0.1			71.3			18.2			11.6	
Approach LOS		A			E			B			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 33 (28%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 68.0%	ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

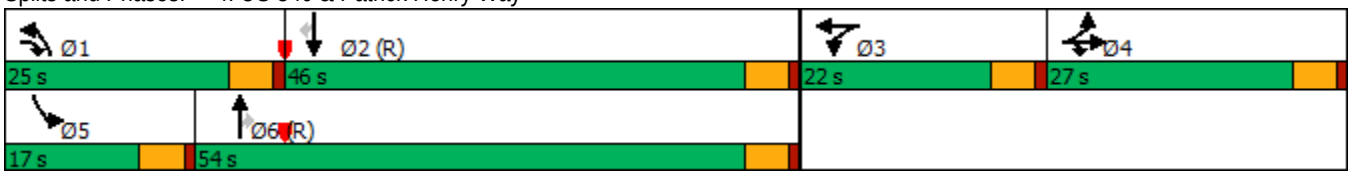


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	39	342	50	53	55	290	914	35	60	1035	116
Future Volume (vph)	93	39	342	50	53	55	290	914	35	60	1035	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	0		0	500		175	250		250
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.924				0.850			0.850
Flt Protected	0.950	0.980		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1734	1583	1770	1721	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.950	0.980		0.950			0.950			0.950		
Satd. Flow (perm)	1681	1734	1583	1770	1721	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			208		36				109			155
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	98	41	360	53	56	58	305	962	37	63	1089	122
Shared Lane Traffic (%)	30%											
Lane Group Flow (vph)	69	70	360	53	114	0	305	962	37	63	1089	122
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 1	3	3		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases									6			2
Detector Phase	4	4	4 1	3	3		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	12.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	22.5	22.5		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	27.0	27.0		22.0	22.0		25.0	54.0	54.0	17.0	46.0	46.0
Total Split (%)	22.5%	22.5%		18.3%	18.3%		20.8%	45.0%	45.0%	14.2%	38.3%	38.3%
Maximum Green (s)	22.0	22.0		17.0	17.0		20.0	49.0	49.0	12.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	16.5	16.5	37.7	11.1	11.1		16.2	65.5	65.5	9.5	56.2	56.2
Actuated g/C Ratio	0.14	0.14	0.31	0.09	0.09		0.14	0.55	0.55	0.08	0.47	0.47
v/c Ratio	0.30	0.30	0.56	0.32	0.60		0.66	0.53	0.04	0.45	0.70	0.15
Control Delay	48.4	48.2	16.2	55.0	47.9		45.9	25.2	2.8	62.8	30.3	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	48.2	16.2	55.0	47.9		45.9	25.2	2.8	62.8	30.3	2.4
LOS	D	D	B	E	D		D	C	A	E	C	A
Approach Delay		25.1			50.2			29.4			29.3	
Approach LOS		C			D			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 29.8	Intersection LOS: C
Intersection Capacity Utilization 69.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way



Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	198	64	57	5	60	20	33	28	1	9	22	182
Future Vol, veh/h	198	64	57	5	60	20	33	28	1	9	22	182
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	215	70	62	5	65	22	36	30	1	10	24	198

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	87	0	0	132	0	0	728	628	101	633	648	76
Stage 1	-	-	-	-	-	-	531	531	-	86	86	-
Stage 2	-	-	-	-	-	-	197	97	-	547	562	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1509	-	-	1453	-	-	339	400	954	392	389	985
Stage 1	-	-	-	-	-	-	532	526	-	922	824	-
Stage 2	-	-	-	-	-	-	805	815	-	521	510	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1509	-	-	1453	-	-	225	337	954	321	328	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	225	337	-	321	328	-
Stage 1	-	-	-	-	-	-	450	444	-	779	821	-
Stage 2	-	-	-	-	-	-	622	812	-	410	431	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.8	0.4	22.8	11.8
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	269	1509	-	-	1453	-	-	761
HCM Lane V/C Ratio	0.251	0.143	-	-	0.004	-	-	0.304
HCM Control Delay (s)	22.8	7.8	0	-	7.5	0	-	11.8
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1	0.5	-	-	0	-	-	1.3

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	52	54	3	38	14	77	57	2	14	51	43
Future Vol, veh/h	28	52	54	3	38	14	77	57	2	14	51	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	60	62	3	44	16	89	66	2	16	59	49

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	60	0	0	122	0	0	213	221	91	247	244	30
Stage 1	-	-	-	-	-	-	155	155	-	58	58	-
Stage 2	-	-	-	-	-	-	58	66	-	189	186	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1543	-	-	1464	-	-	734	677	966	696	657	1038
Stage 1	-	-	-	-	-	-	847	769	-	947	846	-
Stage 2	-	-	-	-	-	-	947	840	-	812	745	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1543	-	-	1464	-	-	639	661	966	630	641	1038
Mov Cap-2 Maneuver	-	-	-	-	-	-	639	661	-	630	641	-
Stage 1	-	-	-	-	-	-	828	752	-	926	844	-
Stage 2	-	-	-	-	-	-	838	838	-	723	729	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0.4	12.3	10.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	651	1543	-	-	1464	-	-	754
HCM Lane V/C Ratio	0.24	0.021	-	-	0.002	-	-	0.165
HCM Control Delay (s)	12.3	7.4	0	-	7.5	0	-	10.7
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	108	6	12	78	0	1	0	23	1	0	0
Future Vol, veh/h	1	108	6	12	78	0	1	0	23	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	124	7	14	90	0	1	0	26	1	0	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	62	30	0	83	17	13	0	0	0	26	0	0
Stage 1	2	2	-	15	15	-	-	-	-	-	-	-
Stage 2	60	28	-	68	2	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	933	863	-	904	877	1067	-	-	-	1588	-	-
Stage 1	1021	894	-	1005	883	-	-	-	-	-	-	-
Stage 2	951	872	-	942	894	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	859	862	-	-	876	1067	-	-	-	1588	-	-
Mov Cap-2 Maneuver	859	862	-	-	876	-	-	-	-	-	-	-
Stage 1	1021	893	-	1005	883	-	-	-	-	-	-	-
Stage 2	854	872	-	810	893	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s				7.3
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	-	-	-	1588	-	-
HCM Lane V/C Ratio	-	-	-	-	-	0.001	-	-
HCM Control Delay (s)	-	-	-	-	-	7.3	0	-
HCM Lane LOS	-	-	-	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	-	0	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	407	116	12	671	59	9	16	6	46	26	56
Future Vol, veh/h	13	407	116	12	671	59	9	16	6	46	26	56
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	15	463	132	14	763	67	10	18	7	52	30	64

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	830	0	0	595	0	0	918	1351	232	1062	1416	382
Stage 1	-	-	-	-	-	-	493	493	-	791	791	-
Stage 2	-	-	-	-	-	-	425	858	-	271	625	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	798	-	-	977	-	-	227	149	770	178	136	616
Stage 1	-	-	-	-	-	-	526	545	-	349	399	-
Stage 2	-	-	-	-	-	-	578	372	-	712	475	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	798	-	-	977	-	-	164	144	770	155	132	616
Mov Cap-2 Maneuver	-	-	-	-	-	-	164	144	-	155	132	-
Stage 1	-	-	-	-	-	-	516	535	-	342	393	-
Stage 2	-	-	-	-	-	-	472	367	-	669	466	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	27.8	29.4
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	164	185	798	-	-	977	-	-	155	285
HCM Lane V/C Ratio	0.062	0.135	0.019	-	-	0.014	-	-	0.337	0.327
HCM Control Delay (s)	28.4	27.5	9.6	-	-	8.7	-	-	39.6	23.6
HCM Lane LOS	D	D	A	-	-	A	-	-	E	C
HCM 95th %tile Q(veh)	0.2	0.5	0.1	-	-	0	-	-	1.4	1.4

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1223	0	0	1663	0	0	0	0	0	0	0
Future Vol, veh/h	0	1223	0	0	1663	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	0	1359	0	0	1848	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1848	0	0	1359	0	0	2283	3207	680	2528	3207	924
Stage 1	-	-	-	-	-	-	1359	1359	-	1848	1848	-
Stage 2	-	-	-	-	-	-	924	1848	-	680	1359	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	324	-	-	502	-	-	21	10	393	14	10	271
Stage 1	-	-	-	-	-	-	157	215	-	77	123	-
Stage 2	-	-	-	-	-	-	290	123	-	407	215	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	324	-	-	502	-	-	21	10	393	14	10	271
Mov Cap-2 Maneuver	-	-	-	-	-	-	21	10	-	14	10	-
Stage 1	-	-	-	-	-	-	157	215	-	77	123	-
Stage 2	-	-	-	-	-	-	290	123	-	407	215	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	324	-	-	502	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Appendix C-3

2025 No-Build Conditions
AM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	360	133	63	587	495	446
Future Volume (vph)	360	133	63	587	495	446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		250			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.929	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1656	1583	1736	3471	2925	0
Flt Permitted	0.950		0.210			
Satd. Flow (perm)	1656	1583	384	3471	2925	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		126			308	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	391	145	68	638	538	485
Shared Lane Traffic (%)						
Lane Group Flow (vph)	391	145	68	638	1023	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	18.0	90.0	72.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	25.0	25.0	13.0	85.0	67.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	25.0	25.0	85.0	85.0	74.6	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.62	
v/c Ratio	1.13	0.34	0.19	0.26	0.53	
Control Delay	133.1	11.8	6.5	6.6	3.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	133.1	11.8	6.5	6.6	3.4	
LOS	F	B	A	A	A	
Approach Delay	100.3			6.6	3.4	
Approach LOS	F			A	A	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.13	
Intersection Signal Delay: 27.3	Intersection LOS: C
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	

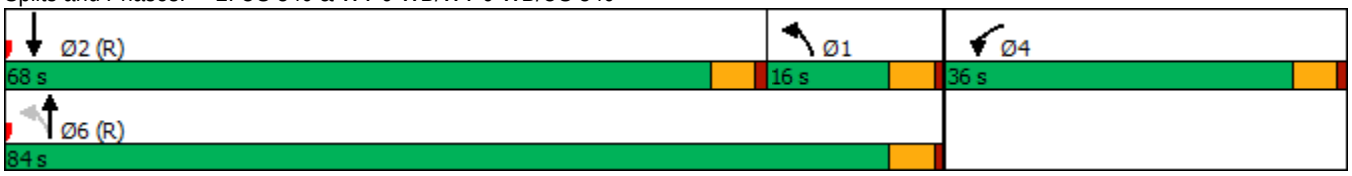
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	70	0	432	100	847	0	0	870	329
Future Volume (vph)	0	0	0	70	0	432	100	847	0	0	870	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		225	325		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25			25			125			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.959	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1346	1736	3343	0	0	3197	0
Flt Permitted				0.950			0.167					
Satd. Flow (perm)	0	0	0	1770	0	1346	305	3343	0	0	3197	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						442					69	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		797			1018			836			1046	
Travel Time (s)		18.1			23.1			12.7			15.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	20%	4%	8%	2%	2%	8%	9%
Adj. Flow (vph)	0	0	0	77	0	475	110	931	0	0	956	362
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	77	0	475	110	931	0	0	1318	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		0	1	1			1	
Detector Template												
Leading Detector (ft)				56		0	40	56			56	
Trailing Detector (ft)				50		0	0	50			50	
Detector 1 Position(ft)				50		0	0	50			50	
Detector 1 Size(ft)				6		20	40	6			6	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Free	pm+pt	NA			NA	
Protected Phases				4			1	6			2	
Permitted Phases						Free	6					
Detector Phase				4			1	6			2	
Switch Phase												
Minimum Initial (s)				12.0			8.0	20.0			20.0	
Minimum Split (s)				22.5			13.0	25.0			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)				36.0			16.0	84.0			68.0	
Total Split (%)				30.0%			13.3%	70.0%			56.7%	
Maximum Green (s)				31.0			11.0	79.0			63.0	
Yellow Time (s)				4.0			4.0	4.0			4.0	
All-Red Time (s)				1.0			1.0	1.0			1.0	
Lost Time Adjust (s)				0.0			0.0	0.0			0.0	
Total Lost Time (s)				5.0			5.0	5.0			5.0	
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0			3.0	3.0			3.0	
Recall Mode				None			None	C-Max			C-Max	
Act Effct Green (s)				12.3		120.0	101.1	102.1			85.1	
Actuated g/C Ratio				0.10		1.00	0.84	0.85			0.71	
v/c Ratio				0.42		0.35	0.28	0.33			0.58	
Control Delay				58.0		0.7	9.6	3.9			11.3	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				58.0		0.7	9.6	3.9			11.3	
LOS				E		A	A	A			B	
Approach Delay					8.7			4.5			11.3	
Approach LOS					A			A			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 8.4	Intersection LOS: A
Intersection Capacity Utilization 56.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/WV 9 WB/US 340



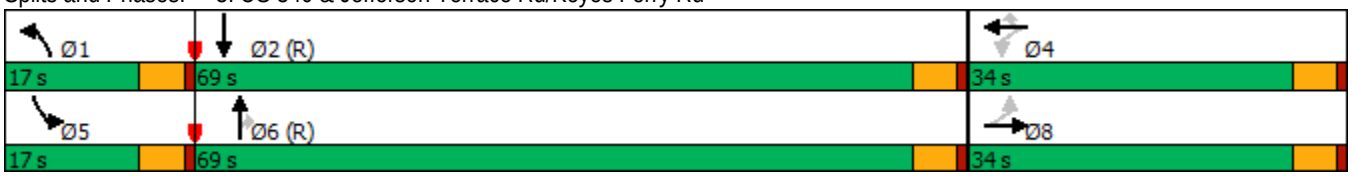
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1	38	158	0	17	15	1026	239	14	1004	9
Future Volume (vph)	17	1	38	158	0	17	15	1026	239	14	1004	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		225	75		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.908				0.850			0.850		0.999	
Flt Protected		0.985			0.950		0.950			0.950		
Satd. Flow (prot)	0	1666	0	0	1770	1583	1770	3343	1583	1770	3341	0
Flt Permitted		0.884			0.749		0.950			0.950		
Satd. Flow (perm)	0	1495	0	0	1395	1583	1770	3343	1583	1770	3341	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		41				64					1	
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	18	1	41	170	0	18	16	1103	257	15	1080	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	0	170	18	16	1103	257	15	1090	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	4	1	1	4	
Detector Template	Left			Left								
Leading Detector (ft)	20	40		20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40		20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Detector Phase	8	8		4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0		10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	25.0	25.0		25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	34.0	34.0		34.0	34.0	34.0	17.0	69.0	69.0	17.0	69.0	
Total Split (%)	28.3%	28.3%		28.3%	28.3%	28.3%	14.2%	57.5%	57.5%	14.2%	57.5%	
Maximum Green (s)	29.0	29.0		29.0	29.0	29.0	12.0	64.0	64.0	12.0	64.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0	9.0						
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0						
Pedestrian Calls (#/hr)	0	0		0	0	0						
Act Effct Green (s)		20.2			20.2	20.2	8.0	84.6	84.6	8.0	84.6	
Actuated g/C Ratio		0.17			0.17	0.17	0.07	0.70	0.70	0.07	0.70	
v/c Ratio		0.21			0.73	0.06	0.14	0.47	0.23	0.13	0.46	
Control Delay		19.1			64.5	0.4	54.5	9.9	9.0	77.7	6.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		19.1			64.5	0.4	54.5	9.9	9.0	77.7	6.3	
LOS		B			E	A	D	A	A	E	A	
Approach Delay		19.1			58.4			10.3			7.3	
Approach LOS		B			E			B			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 33 (28%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 61.7%	ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

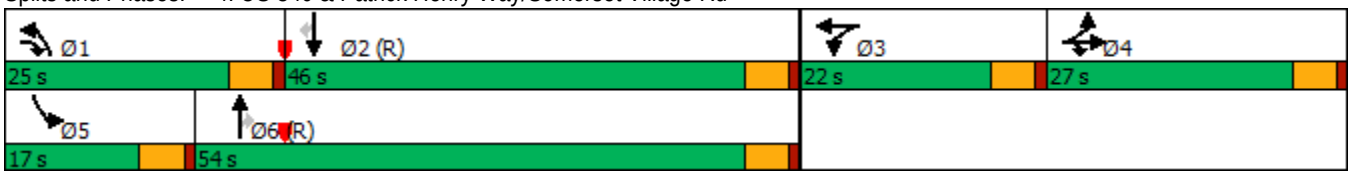


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	20	190	69	26	60	197	818	44	44	767	84
Future Volume (vph)	92	20	190	69	26	60	197	818	44	44	767	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	0		0	500		175	250		250
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.895				0.850			0.850
Flt Protected	0.950	0.969		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1715	1583	1770	1667	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.950	0.969		0.950			0.950			0.950		
Satd. Flow (perm)	1681	1715	1583	1770	1667	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191		65				109			155
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	100	22	207	75	28	65	214	889	48	48	834	91
Shared Lane Traffic (%)	40%											
Lane Group Flow (vph)	60	62	207	75	93	0	214	889	48	48	834	91
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 1	3	3		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases									6			2
Detector Phase	4	4	4 1	3	3		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	12.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	17.0	17.0		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	27.0	27.0		22.0	22.0		25.0	54.0	54.0	17.0	46.0	46.0
Total Split (%)	22.5%	22.5%		18.3%	18.3%		20.8%	45.0%	45.0%	14.2%	38.3%	38.3%
Maximum Green (s)	22.0	22.0		17.0	17.0		20.0	49.0	49.0	12.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	12.2	12.2	30.0	10.5	10.5		12.8	70.9	70.9	8.9	64.5	64.5
Actuated g/C Ratio	0.10	0.10	0.25	0.09	0.09		0.11	0.59	0.59	0.07	0.54	0.54
v/c Ratio	0.35	0.36	0.38	0.48	0.45		0.59	0.45	0.05	0.37	0.46	0.10
Control Delay	56.2	56.3	8.2	62.1	26.5		45.8	18.2	2.8	60.5	19.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.2	56.3	8.2	62.1	26.5		45.8	18.2	2.8	60.5	19.0	0.3
LOS	E	E	A	E	C		D	B	A	E	B	A
Approach Delay		26.0			42.4			22.7			19.3	
Approach LOS		C			D			C			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 23.1	Intersection LOS: C
Intersection Capacity Utilization 52.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way/Somerset Village Rd



Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	173	50	31	1	29	11	48	21	1	7	11	98
Future Vol, veh/h	173	50	31	1	29	11	48	21	1	7	11	98
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	197	57	35	1	33	13	55	24	1	8	13	111

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	46	0	0	92	0	0	573	517	75	523	528	40
Stage 1	-	-	-	-	-	-	469	469	-	42	42	-
Stage 2	-	-	-	-	-	-	104	48	-	481	486	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1562	-	-	1503	-	-	430	462	986	465	456	1031
Stage 1	-	-	-	-	-	-	575	561	-	972	860	-
Stage 2	-	-	-	-	-	-	902	855	-	566	551	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1562	-	-	1503	-	-	336	400	986	398	395	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	336	400	-	398	395	-
Stage 1	-	-	-	-	-	-	499	486	-	843	859	-
Stage 2	-	-	-	-	-	-	792	854	-	466	478	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.2	0.2	18	10.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	356	1562	-	-	1503	-	-	826
HCM Lane V/C Ratio	0.223	0.126	-	-	0.001	-	-	0.16
HCM Control Delay (s)	18	7.6	0	-	7.4	0	-	10.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.8	0.4	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	45	43	1	91	1	41	55	0	5	27	23
Future Vol, veh/h	20	45	43	1	91	1	41	55	0	5	27	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	48	46	1	97	1	44	59	0	5	29	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	98	0	0	94	0	0	178	213	71	243	236	49
Stage 1	-	-	-	-	-	-	113	113	-	100	100	-
Stage 2	-	-	-	-	-	-	65	100	-	143	136	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1494	-	-	1499	-	-	776	684	991	701	664	1009
Stage 1	-	-	-	-	-	-	891	802	-	896	812	-
Stage 2	-	-	-	-	-	-	938	812	-	859	783	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1494	-	-	1499	-	-	723	673	991	646	653	1009
Mov Cap-2 Maneuver	-	-	-	-	-	-	723	673	-	646	653	-
Stage 1	-	-	-	-	-	-	878	790	-	883	811	-
Stage 2	-	-	-	-	-	-	882	811	-	783	771	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.1	11.1	10.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	693	1494	-	-	1499	-	-	765
HCM Lane V/C Ratio	0.147	0.014	-	-	0.001	-	-	0.076
HCM Control Delay (s)	11.1	7.4	0	-	7.4	0	-	10.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	47	3	9	8	36	1	6	3	1	0	2	1
Future Vol, veh/h	47	3	9	8	36	1	6	3	1	0	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	4	11	10	43	1	7	4	1	0	2	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	44	22	3	29	22	5	3	0	0	5	0	0
Stage 1	3	3	-	19	19	-	-	-	-	-	-	-
Stage 2	41	19	-	10	3	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	958	872	1081	980	872	1078	1619	-	-	1616	-	-
Stage 1	1020	893	-	1000	880	-	-	-	-	-	-	-
Stage 2	974	880	-	1011	893	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	918	869	1081	964	869	1078	1619	-	-	1616	-	-
Mov Cap-2 Maneuver	918	869	-	964	869	-	-	-	-	-	-	-
Stage 1	1016	893	-	996	876	-	-	-	-	-	-	-
Stage 2	921	876	-	997	893	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	9.3	4.3	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1619	-	-	937	888	1616	-	-
HCM Lane V/C Ratio	0.004	-	-	0.076	0.061	-	-	-
HCM Control Delay (s)	7.2	0	-	9.2	9.3	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	558	3	1	247	22	6	20	11	50	4	5
Future Vol, veh/h	3	558	3	1	247	22	6	20	11	50	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	3	620	3	1	274	24	7	22	12	56	4	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	298	0	0	623	0	0	767	926	310	603	905	137
Stage 1	-	-	-	-	-	-	626	626	-	276	276	-
Stage 2	-	-	-	-	-	-	141	300	-	327	629	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1260	-	-	954	-	-	292	267	686	383	275	886
Stage 1	-	-	-	-	-	-	439	475	-	707	680	-
Stage 2	-	-	-	-	-	-	847	664	-	660	474	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1260	-	-	954	-	-	286	266	686	351	274	886
Mov Cap-2 Maneuver	-	-	-	-	-	-	286	266	-	351	274	-
Stage 1	-	-	-	-	-	-	438	474	-	706	679	-
Stage 2	-	-	-	-	-	-	835	663	-	616	473	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17	16.6
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	286	340	1260	-	-	954	-	-	351	445
HCM Lane V/C Ratio	0.023	0.101	0.003	-	-	0.001	-	-	0.158	0.022
HCM Control Delay (s)	17.9	16.8	7.9	-	-	8.8	-	-	17.2	13.3
HCM Lane LOS	C	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	0.3	0	-	-	0	-	-	0.6	0.1

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1250	0	0	1070	0	0	0	0	0	0	0
Future Vol, veh/h	0	1250	0	0	1070	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	0	1389	0	0	1189	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1189	0	0	1389	0	0	1984	2578	695	1884	2578	595
Stage 1	-	-	-	-	-	-	1389	1389	-	1189	1189	-
Stage 2	-	-	-	-	-	-	595	1189	-	695	1389	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	583	-	-	489	-	-	36	25	385	43	25	447
Stage 1	-	-	-	-	-	-	150	208	-	199	260	-
Stage 2	-	-	-	-	-	-	458	260	-	399	208	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	583	-	-	489	-	-	36	25	385	43	25	447
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	25	-	43	25	-
Stage 1	-	-	-	-	-	-	150	208	-	199	260	-
Stage 2	-	-	-	-	-	-	458	260	-	399	208	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	583	-	-	489	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Appendix C-4

2025 No-Build Conditions
PM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	454	130	106	935	1222	536
Future Volume (vph)	454	130	106	935	1222	536
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		250			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.954	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1656	1583	1736	3471	3068	0
Flt Permitted	0.950		0.053			
Satd. Flow (perm)	1656	1583	97	3471	3068	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		97			93	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	473	135	110	974	1273	558
Shared Lane Traffic (%)						
Lane Group Flow (vph)	473	135	110	974	1831	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	18.0	90.0	72.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	25.0	25.0	13.0	85.0	67.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	25.0	25.0	85.0	85.0	70.5	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.59	
v/c Ratio	1.37	0.33	0.56	0.40	1.00	
Control Delay	221.5	16.1	28.5	7.7	17.7	
Queue Delay	0.0	0.0	0.0	0.0	1.9	
Total Delay	221.5	16.1	28.5	7.7	19.6	
LOS	F	B	C	A	B	
Approach Delay	175.9			9.8	19.6	
Approach LOS	F			A	B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.37	
Intersection Signal Delay: 43.6	Intersection LOS: D
Intersection Capacity Utilization 95.2%	ICU Level of Service F
Analysis Period (min) 15	

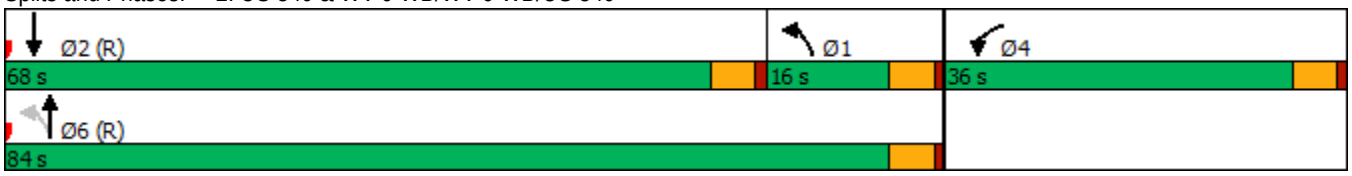
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	322	0	657	204	1185	0	0	1436	492
Future Volume (vph)	0	0	0	322	0	657	204	1185	0	0	1436	492
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		225	325		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25			25			125			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.962	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1346	1736	3343	0	0	3208	0
Flt Permitted				0.950			0.055					
Satd. Flow (perm)	0	0	0	1770	0	1346	100	3343	0	0	3208	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						382					59	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		797			1018			836			1046	
Travel Time (s)		18.1			23.1			12.7			15.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	20%	4%	8%	2%	2%	8%	9%
Adj. Flow (vph)	0	0	0	343	0	699	217	1261	0	0	1528	523
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	343	0	699	217	1261	0	0	2051	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		0	1	1			1	
Detector Template												
Leading Detector (ft)				56		0	40	56			56	
Trailing Detector (ft)				50		0	0	50			50	
Detector 1 Position(ft)				50		0	0	50			50	
Detector 1 Size(ft)				6		20	40	6			6	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Free	pm+pt	NA			NA	
Protected Phases				4			1	6			2	
Permitted Phases						Free	6					
Detector Phase				4			1	6			2	
Switch Phase												
Minimum Initial (s)				12.0			8.0	20.0			20.0	
Minimum Split (s)				22.5			13.0	25.0			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)				36.0			16.0	84.0			68.0	
Total Split (%)				30.0%			13.3%	70.0%			56.7%	
Maximum Green (s)				31.0			11.0	79.0			63.0	
Yellow Time (s)				4.0			4.0	4.0			4.0	
All-Red Time (s)				1.0			1.0	1.0			1.0	
Lost Time Adjust (s)				0.0			0.0	0.0			0.0	
Total Lost Time (s)				5.0			5.0	5.0			5.0	
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0			3.0	3.0			3.0	
Recall Mode				None			None	C-Max			C-Max	
Act Effct Green (s)				26.6		120.0	83.4	83.4			67.4	
Actuated g/C Ratio				0.22		1.00	0.70	0.70			0.56	
v/c Ratio				0.88		0.52	0.99	0.54			1.12	
Control Delay				67.8		1.4	99.5	14.7			83.2	
Queue Delay				0.0		0.0	0.0	0.0			0.2	
Total Delay				67.8		1.4	99.5	14.7			83.4	
LOS				E		A	F	B			F	
Approach Delay					23.3			27.1			83.4	
Approach LOS					C			C			F	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 51.5	Intersection LOS: D
Intersection Capacity Utilization 96.2%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/WV 9 WB/US 340



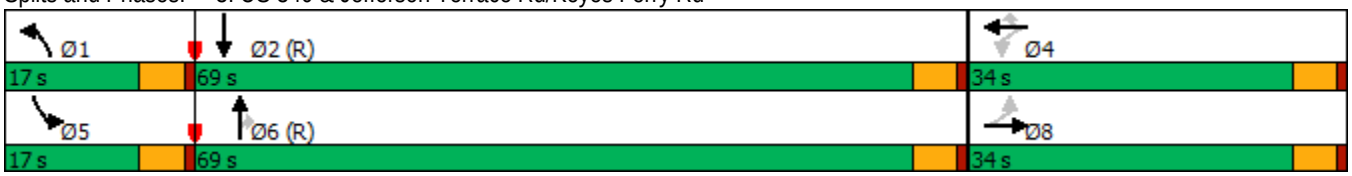
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	37	267	2	21	51	1474	317	20	1623	18
Future Volume (vph)	10	0	37	267	2	21	51	1474	317	20	1623	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		225	75		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.893				0.850			0.850		0.998	
Flt Protected		0.990			0.953		0.950			0.950		
Satd. Flow (prot)	0	1647	0	0	1775	1583	1770	3343	1583	1770	3338	0
Flt Permitted		0.920			0.748		0.950			0.950		
Satd. Flow (perm)	0	1530	0	0	1393	1583	1770	3343	1583	1770	3338	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		64				64					1	
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	10	0	38	275	2	22	53	1520	327	21	1673	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	277	22	53	1520	327	21	1692	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	4	1	1	4	
Detector Template	Left			Left								
Leading Detector (ft)	20	40		20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40		20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Detector Phase	8	8		4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0		10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	22.5	22.5		25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	34.0	34.0		34.0	34.0	34.0	17.0	69.0	69.0	17.0	69.0	
Total Split (%)	28.3%	28.3%		28.3%	28.3%	28.3%	14.2%	57.5%	57.5%	14.2%	57.5%	
Maximum Green (s)	29.0	29.0		29.0	29.0	29.0	12.0	64.0	64.0	12.0	64.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)				9.0	9.0	9.0		9.0	9.0			
Flash Dont Walk (s)				11.0	11.0	11.0		11.0	11.0			
Pedestrian Calls (#/hr)				0	0	0		0	0			
Act Effct Green (s)		26.6			26.6	26.6	9.1	78.1	78.1	8.1	71.8	
Actuated g/C Ratio		0.22			0.22	0.22	0.08	0.65	0.65	0.07	0.60	
v/c Ratio		0.12			0.90	0.05	0.39	0.70	0.32	0.18	0.85	
Control Delay		6.0			76.1	0.2	52.0	22.1	17.3	72.0	18.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		6.0			76.1	0.2	52.0	22.1	17.3	72.0	18.3	
LOS		A			E	A	D	C	B	E	B	
Approach Delay		6.0			70.5			22.1			19.0	
Approach LOS		A			E			C			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 33 (28%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 24.2	Intersection LOS: C
Intersection Capacity Utilization 75.3%	ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

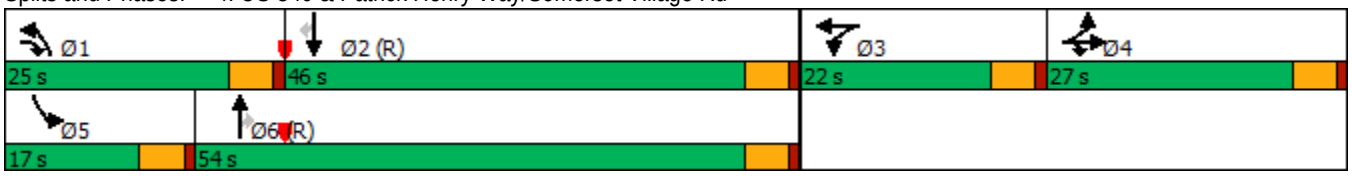


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	41	387	93	56	77	352	1057	96	89	1182	158
Future Volume (vph)	117	41	387	93	56	77	352	1057	96	89	1182	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	0		0	500		175	250		250
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.913				0.850			0.850
Flt Protected	0.950	0.976		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1727	1583	1770	1701	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.950	0.976		0.950			0.950			0.950		
Satd. Flow (perm)	1681	1727	1583	1770	1701	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			136		48				109			155
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	123	43	407	98	59	81	371	1113	101	94	1244	166
Shared Lane Traffic (%)	33%											
Lane Group Flow (vph)	82	84	407	98	140	0	371	1113	101	94	1244	166
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 1	3	3		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases									6			2
Detector Phase	4	4	4 1	3	3		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	12.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	22.5	22.5		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	27.0	27.0		22.0	22.0		25.0	54.0	54.0	17.0	46.0	46.0
Total Split (%)	22.5%	22.5%		18.3%	18.3%		20.8%	45.0%	45.0%	14.2%	38.3%	38.3%
Maximum Green (s)	22.0	22.0		17.0	17.0		20.0	49.0	49.0	12.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	20.6	20.6	43.5	12.1	12.1		17.9	56.9	56.9	10.4	49.4	49.4
Actuated g/C Ratio	0.17	0.17	0.36	0.10	0.10		0.15	0.47	0.47	0.09	0.41	0.41
v/c Ratio	0.28	0.28	0.62	0.55	0.65		0.72	0.70	0.13	0.61	0.90	0.22
Control Delay	45.0	44.9	23.9	62.2	47.7		49.0	33.8	13.4	69.7	45.1	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	44.9	23.9	62.2	47.7		49.0	33.8	13.4	69.7	45.1	6.0
LOS	D	D	C	E	D		D	C	B	E	D	A
Approach Delay		30.0			53.7			36.1			42.3	
Approach LOS		C			D			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 38.6	Intersection LOS: D
Intersection Capacity Utilization 77.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way/Somerset Village Rd



Intersection	
Int Delay, s/veh	8.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	209	68	60	5	63	21	35	30	1	10	23	192
Future Vol, veh/h	209	68	60	5	63	21	35	30	1	10	23	192
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	227	74	65	5	68	23	38	33	1	11	25	209

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	91	0	0	139	0	0	768	662	107	668	683	80
Stage 1	-	-	-	-	-	-	561	561	-	90	90	-
Stage 2	-	-	-	-	-	-	207	101	-	578	593	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1504	-	-	1445	-	-	319	382	947	372	372	980
Stage 1	-	-	-	-	-	-	512	510	-	917	820	-
Stage 2	-	-	-	-	-	-	795	811	-	501	493	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1504	-	-	1445	-	-	205	318	947	299	310	980
Mov Cap-2 Maneuver	-	-	-	-	-	-	205	318	-	299	310	-
Stage 1	-	-	-	-	-	-	428	426	-	766	817	-
Stage 2	-	-	-	-	-	-	604	808	-	386	412	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.8	0.4	25.3	12.2
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	248	1504	-	-	1445	-	-	741
HCM Lane V/C Ratio	0.289	0.151	-	-	0.004	-	-	0.33
HCM Control Delay (s)	25.3	7.8	0	-	7.5	0	-	12.2
HCM Lane LOS	D	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.2	0.5	-	-	0	-	-	1.4

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	134	63	3	94	15	81	60	2	15	54	50
Future Vol, veh/h	30	134	63	3	94	15	81	60	2	15	54	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	154	72	3	108	17	93	69	2	17	62	57

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	125	0	0	226	0	0	349	389	190	417	417	63
Stage 1	-	-	-	-	-	-	258	258	-	123	123	-
Stage 2	-	-	-	-	-	-	91	131	-	294	294	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1460	-	-	1341	-	-	593	545	851	533	526	989
Stage 1	-	-	-	-	-	-	746	694	-	869	794	-
Stage 2	-	-	-	-	-	-	907	787	-	713	669	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1460	-	-	1341	-	-	496	529	851	468	511	989
Mov Cap-2 Maneuver	-	-	-	-	-	-	496	529	-	468	511	-
Stage 1	-	-	-	-	-	-	726	675	-	846	792	-
Stage 2	-	-	-	-	-	-	786	785	-	621	651	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.2	15.3	12.3
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	512	1460	-	-	1341	-	-	632
HCM Lane V/C Ratio	0.321	0.024	-	-	0.003	-	-	0.216
HCM Control Delay (s)	15.3	7.5	0	-	7.7	0	-	12.3
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.4	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	8.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	114	13	13	82	0	12	2	24	1	2	0
Future Vol, veh/h	1	114	13	13	82	0	12	2	24	1	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	131	15	15	94	0	14	2	28	1	2	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	95	62	2	121	48	16	2	0	0	30	0	0
Stage 1	4	4	-	44	44	-	-	-	-	-	-	-
Stage 2	91	58	-	77	4	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	888	829	1082	854	844	1063	1620	-	-	1583	-	-
Stage 1	1018	892	-	970	858	-	-	-	-	-	-	-
Stage 2	916	847	-	932	892	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	805	821	1082	734	836	1063	1620	-	-	1583	-	-
Mov Cap-2 Maneuver	805	821	-	734	836	-	-	-	-	-	-	-
Stage 1	1009	891	-	961	850	-	-	-	-	-	-	-
Stage 2	807	839	-	783	891	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	10.1	2.3	2.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1620	-	-	841	820	1583	-	-
HCM Lane V/C Ratio	0.009	-	-	0.175	0.133	0.001	-	-
HCM Control Delay (s)	7.2	0	-	10.2	10.1	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.5	0	-	-

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	503	123	13	796	75	10	17	6	58	27	59
Future Vol, veh/h	14	503	123	13	796	75	10	17	6	58	27	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	16	572	140	15	905	85	11	19	7	66	31	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	990	0	0	712	0	0	1102	1624	286	1263	1679	453
Stage 1	-	-	-	-	-	-	604	604	-	935	935	-
Stage 2	-	-	-	-	-	-	498	1020	-	328	744	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	694	-	-	884	-	-	166	102	711	126	94	554
Stage 1	-	-	-	-	-	-	452	486	-	285	342	-
Stage 2	-	-	-	-	-	-	523	312	-	659	420	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	694	-	-	884	-	-	104	98	711	103	90	554
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	98	-	103	90	-
Stage 1	-	-	-	-	-	-	442	475	-	278	336	-
Stage 2	-	-	-	-	-	-	411	307	-	612	410	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	41.8	56.7
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	104	126	694	-	-	884	-	-	103	212
HCM Lane V/C Ratio	0.109	0.207	0.023	-	-	0.017	-	-	0.64	0.461
HCM Control Delay (s)	43.8	40.9	10.3	-	-	9.1	-	-	87.9	35.7
HCM Lane LOS	E	E	B	-	-	A	-	-	F	E
HCM 95th %tile Q(veh)	0.4	0.7	0.1	-	-	0.1	-	-	3.2	2.2

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1427	0	0	1912	0	0	0	0	0	0	0
Future Vol, veh/h	0	1427	0	0	1912	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	0	1586	0	0	2124	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2124	0	0	1586	0	0	2648	3710	793	2917	3710	1062
Stage 1	-	-	-	-	-	-	1586	1586	-	2124	2124	-
Stage 2	-	-	-	-	-	-	1062	2124	-	793	1586	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	253	-	-	410	-	-	11	4	331	7	4	220
Stage 1	-	-	-	-	-	-	113	166	-	51	89	-
Stage 2	-	-	-	-	-	-	239	89	-	348	166	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	253	-	-	410	-	-	11	4	331	7	4	220
Mov Cap-2 Maneuver	-	-	-	-	-	-	11	4	-	7	4	-
Stage 1	-	-	-	-	-	-	113	166	-	51	89	-
Stage 2	-	-	-	-	-	-	239	89	-	348	166	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	253	-	-	410	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Appendix C-5

2025 Build Conditions
AM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	366	133	63	590	503	455
Future Volume (vph)	366	133	63	590	503	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		250			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.929	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1656	1583	1736	3471	2925	0
Flt Permitted	0.950		0.204			
Satd. Flow (perm)	1656	1583	373	3471	2925	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		124			308	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	398	145	68	641	547	495
Shared Lane Traffic (%)						
Lane Group Flow (vph)	398	145	68	641	1042	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	18.0	90.0	72.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	25.0	25.0	13.0	85.0	67.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	25.0	25.0	85.0	85.0	74.6	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.62	
v/c Ratio	1.15	0.34	0.19	0.26	0.54	
Control Delay	139.8	12.2	6.6	6.6	3.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	139.8	12.2	6.6	6.6	3.5	
LOS	F	B	A	A	A	
Approach Delay	105.7			6.6	3.5	
Approach LOS	F			A	A	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.15	
Intersection Signal Delay: 28.6	Intersection LOS: C
Intersection Capacity Utilization 68.0%	ICU Level of Service C
Analysis Period (min) 15	

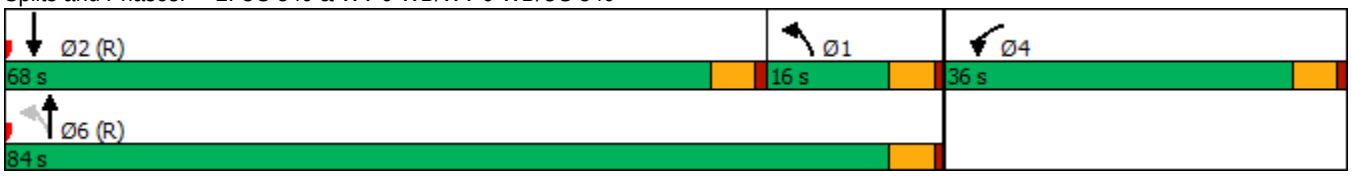
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	70	0	449	100	856	0	0	887	346
Future Volume (vph)	0	0	0	70	0	449	100	856	0	0	887	346
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		225	325		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25			25			125			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.958	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1346	1736	3343	0	0	3194	0
Flt Permitted				0.950			0.159					
Satd. Flow (perm)	0	0	0	1770	0	1346	290	3343	0	0	3194	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						440					72	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		797			1018			836			1046	
Travel Time (s)		18.1			23.1			12.7			15.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	20%	4%	8%	2%	2%	8%	9%
Adj. Flow (vph)	0	0	0	77	0	493	110	941	0	0	975	380
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	77	0	493	110	941	0	0	1355	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		0	1	1			1	
Detector Template												
Leading Detector (ft)				56		0	40	56			56	
Trailing Detector (ft)				50		0	0	50			50	
Detector 1 Position(ft)				50		0	0	50			50	
Detector 1 Size(ft)				6		20	40	6			6	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Free	pm+pt	NA			NA	
Protected Phases				4			1	6			2	
Permitted Phases						Free	6					
Detector Phase				4			1	6			2	
Switch Phase												
Minimum Initial (s)				12.0			8.0	20.0			20.0	
Minimum Split (s)				22.5			13.0	25.0			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)				36.0			16.0	84.0			68.0	
Total Split (%)				30.0%			13.3%	70.0%			56.7%	
Maximum Green (s)				31.0			11.0	79.0			63.0	
Yellow Time (s)				4.0			4.0	4.0			4.0	
All-Red Time (s)				1.0			1.0	1.0			1.0	
Lost Time Adjust (s)				0.0			0.0	0.0			0.0	
Total Lost Time (s)				5.0			5.0	5.0			5.0	
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0			3.0	3.0			3.0	
Recall Mode				None			None	C-Max			C-Max	
Act Effct Green (s)				12.3		120.0	101.1	102.1			85.1	
Actuated g/C Ratio				0.10		1.00	0.84	0.85			0.71	
v/c Ratio				0.42		0.37	0.29	0.33			0.59	
Control Delay				58.0		0.8	10.4	4.0			11.7	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				58.0		0.8	10.4	4.0			11.7	
LOS				E		A	B	A			B	
Approach Delay					8.5			4.7			11.7	
Approach LOS					A			A			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 8.6	Intersection LOS: A
Intersection Capacity Utilization 57.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/WV 9 WB/US 340



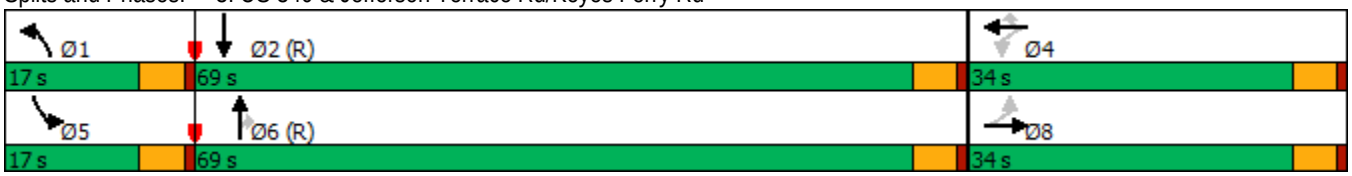
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1	38	183	0	50	15	1042	248	23	1013	9
Future Volume (vph)	17	1	38	183	0	50	15	1042	248	23	1013	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		225	75		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.908				0.850			0.850		0.999	
Flt Protected		0.985			0.950		0.950			0.950		
Satd. Flow (prot)	0	1666	0	0	1770	1583	1770	3343	1583	1770	3341	0
Flt Permitted		0.869			0.749		0.950			0.950		
Satd. Flow (perm)	0	1470	0	0	1395	1583	1770	3343	1583	1770	3341	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		41				64					1	
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	18	1	41	197	0	54	16	1120	267	25	1089	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	0	197	54	16	1120	267	25	1099	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	4	1	1	4	
Detector Template	Left			Left								
Leading Detector (ft)	20	40		20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40		20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Detector Phase	8	8		4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0		10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	25.0	25.0		25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	34.0	34.0		34.0	34.0	34.0	17.0	69.0	69.0	17.0	69.0	
Total Split (%)	28.3%	28.3%		28.3%	28.3%	28.3%	14.2%	57.5%	57.5%	14.2%	57.5%	
Maximum Green (s)	29.0	29.0		29.0	29.0	29.0	12.0	64.0	64.0	12.0	64.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0	9.0						
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0						
Pedestrian Calls (#/hr)	0	0		0	0	0						
Act Effct Green (s)		21.9			21.9	21.9	8.0	80.1	80.1	8.1	82.9	
Actuated g/C Ratio		0.18			0.18	0.18	0.07	0.67	0.67	0.07	0.69	
v/c Ratio		0.20			0.78	0.16	0.14	0.50	0.25	0.21	0.48	
Control Delay		18.2			66.2	8.0	52.5	12.9	11.6	75.9	7.2	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		18.2			66.2	8.0	52.5	12.9	11.6	75.9	7.2	
LOS		B			E	A	D	B	B	E	A	
Approach Delay		18.2			53.7			13.1			8.7	
Approach LOS		B			D			B			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 33 (28%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 15.0	Intersection LOS: B
Intersection Capacity Utilization 62.1%	ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

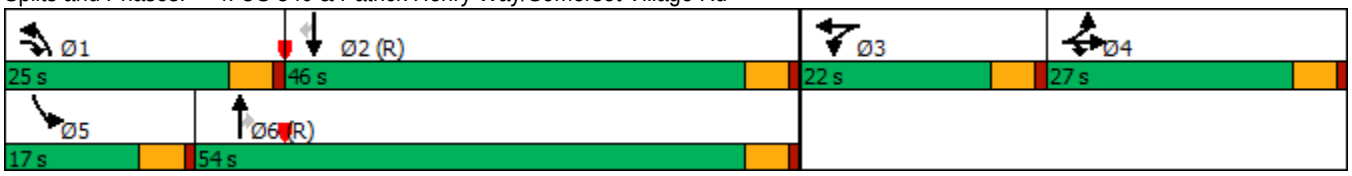


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	20	190	69	26	60	197	868	44	44	785	84
Future Volume (vph)	92	20	190	69	26	60	197	868	44	44	785	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	0		0	500		175	250		250
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.895				0.850			0.850
Flt Protected	0.950	0.969		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1715	1583	1770	1667	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.950	0.969		0.950			0.950			0.950		
Satd. Flow (perm)	1681	1715	1583	1770	1667	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			188		65				109			155
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	100	22	207	75	28	65	214	943	48	48	853	91
Shared Lane Traffic (%)	40%											
Lane Group Flow (vph)	60	62	207	75	93	0	214	943	48	48	853	91
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 1	3	3		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases									6			2
Detector Phase	4	4	4 1	3	3		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	12.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	17.0	17.0		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	27.0	27.0		22.0	22.0		25.0	54.0	54.0	17.0	46.0	46.0
Total Split (%)	22.5%	22.5%		18.3%	18.3%		20.8%	45.0%	45.0%	14.2%	38.3%	38.3%
Maximum Green (s)	22.0	22.0		17.0	17.0		20.0	49.0	49.0	12.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	12.3	12.3	30.0	10.5	10.5		12.8	70.9	70.9	8.9	64.5	64.5
Actuated g/C Ratio	0.10	0.10	0.25	0.09	0.09		0.11	0.59	0.59	0.07	0.54	0.54
v/c Ratio	0.35	0.35	0.39	0.48	0.45		0.59	0.48	0.05	0.37	0.48	0.10
Control Delay	56.2	56.2	8.6	62.1	26.5		44.2	19.2	3.4	60.5	19.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.2	56.2	8.6	62.1	26.5		44.2	19.2	3.4	60.5	19.2	0.3
LOS	E	E	A	E	C		D	B	A	E	B	A
Approach Delay		26.2			42.4			23.0			19.5	
Approach LOS		C			D			C			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 23.3	Intersection LOS: C
Intersection Capacity Utilization 53.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way/Somerset Village Rd



Intersection	
Int Delay, s/veh	9.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	173	50	49	1	29	11	106	21	1	7	11	98
Future Vol, veh/h	173	50	49	1	29	11	106	21	1	7	11	98
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	197	57	56	1	33	13	120	24	1	8	13	111

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	46	0	0	113	0	0	583	527	85	534	549	40
Stage 1	-	-	-	-	-	-	479	479	-	42	42	-
Stage 2	-	-	-	-	-	-	104	48	-	492	507	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1562	-	-	1476	-	-	424	456	974	457	443	1031
Stage 1	-	-	-	-	-	-	568	555	-	972	860	-
Stage 2	-	-	-	-	-	-	902	855	-	558	539	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1562	-	-	1476	-	-	331	394	974	390	383	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	331	394	-	390	383	-
Stage 1	-	-	-	-	-	-	491	480	-	841	859	-
Stage 2	-	-	-	-	-	-	792	854	-	458	466	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.9	0.2	23.1	10.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	342	1562	-	-	1476	-	-	818
HCM Lane V/C Ratio	0.425	0.126	-	-	0.001	-	-	0.161
HCM Control Delay (s)	23.1	7.6	0	-	7.4	0	-	10.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2	0.4	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	45	43	1	91	1	41	55	0	5	27	23
Future Vol, veh/h	20	45	43	1	91	1	41	55	0	5	27	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	48	46	1	97	1	44	59	0	5	29	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	98	0	0	94	0	0	178	213	71	243	236	49
Stage 1	-	-	-	-	-	-	113	113	-	100	100	-
Stage 2	-	-	-	-	-	-	65	100	-	143	136	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1494	-	-	1499	-	-	776	684	991	701	664	1009
Stage 1	-	-	-	-	-	-	891	802	-	896	812	-
Stage 2	-	-	-	-	-	-	938	812	-	859	783	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1494	-	-	1499	-	-	723	673	991	646	653	1009
Mov Cap-2 Maneuver	-	-	-	-	-	-	723	673	-	646	653	-
Stage 1	-	-	-	-	-	-	878	790	-	883	811	-
Stage 2	-	-	-	-	-	-	882	811	-	783	771	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.1	11.1	10.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	693	1494	-	-	1499	-	-	765
HCM Lane V/C Ratio	0.147	0.014	-	-	0.001	-	-	0.076
HCM Control Delay (s)	11.1	7.4	0	-	7.4	0	-	10.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	47	3	25	8	36	1	12	3	1	0	2	1
Future Vol, veh/h	47	3	25	8	36	1	12	3	1	0	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	4	30	10	43	1	14	4	1	0	2	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	58	36	3	53	36	5	3	0	0	5	0	0
Stage 1	3	3	-	33	33	-	-	-	-	-	-	-
Stage 2	55	33	-	20	3	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	939	856	1081	946	856	1078	1619	-	-	1616	-	-
Stage 1	1020	893	-	983	868	-	-	-	-	-	-	-
Stage 2	957	868	-	999	893	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	895	848	1081	910	848	1078	1619	-	-	1616	-	-
Mov Cap-2 Maneuver	895	848	-	910	848	-	-	-	-	-	-	-
Stage 1	1011	893	-	974	860	-	-	-	-	-	-	-
Stage 2	900	860	-	967	893	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	9.5	5.4	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1619	-	-	947	863	1616	-	-
HCM Lane V/C Ratio	0.009	-	-	0.095	0.063	-	-	-
HCM Control Delay (s)	7.2	0	-	9.2	9.5	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	575	3	1	253	28	6	20	11	67	4	5
Future Vol, veh/h	3	575	3	1	253	28	6	20	11	67	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	3	639	3	1	281	31	7	22	12	74	4	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	312	0	0	642	0	0	790	959	320	620	931	141
Stage 1	-	-	-	-	-	-	645	645	-	283	283	-
Stage 2	-	-	-	-	-	-	145	314	-	337	648	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1245	-	-	939	-	-	281	256	676	372	265	881
Stage 1	-	-	-	-	-	-	427	466	-	700	676	-
Stage 2	-	-	-	-	-	-	843	655	-	651	464	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1245	-	-	939	-	-	275	255	676	340	264	881
Mov Cap-2 Maneuver	-	-	-	-	-	-	275	255	-	340	264	-
Stage 1	-	-	-	-	-	-	426	465	-	699	675	-
Stage 2	-	-	-	-	-	-	831	654	-	607	463	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.5	17.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	275	327	1245	-	-	939	-	-	340	432
HCM Lane V/C Ratio	0.024	0.105	0.003	-	-	0.001	-	-	0.219	0.023
HCM Control Delay (s)	18.4	17.3	7.9	-	-	8.8	-	-	18.5	13.5
HCM Lane LOS	C	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	0.3	0	-	-	0	-	-	0.8	0.1

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	1250	0	0	1070	18	0	0	0	50	0	42
Future Vol, veh/h	18	1250	0	0	1070	18	0	0	0	50	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	20	1389	0	0	1189	20	0	0	0	56	0	47

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1209	0	0	1389	0	0	2024	2638	695	1934	2628	605
Stage 1	-	-	-	-	-	-	1429	1429	-	1199	1199	-
Stage 2	-	-	-	-	-	-	595	1209	-	735	1429	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	573	-	-	489	-	-	34	23	385	~ 40	23	441
Stage 1	-	-	-	-	-	-	142	199	-	197	257	-
Stage 2	-	-	-	-	-	-	458	254	-	377	199	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	573	-	-	489	-	-	30	22	385	~ 39	22	441
Mov Cap-2 Maneuver	-	-	-	-	-	-	30	22	-	~ 39	22	-
Stage 1	-	-	-	-	-	-	137	192	-	190	257	-
Stage 2	-	-	-	-	-	-	410	254	-	364	192	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	0	253.3
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	573	-	-	489	-	-	39	441
HCM Lane V/C Ratio	-	0.035	-	-	-	-	-	1.425	0.106
HCM Control Delay (s)	0	11.5	-	-	0	-	-	$ 454.2	14.1
HCM Lane LOS	A	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	5.7	0.4

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	24	14	3	48	50	8
Future Vol, veh/h	24	14	3	48	50	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	16	3	53	56	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	43	0	94	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	59	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1566	-	906	1038
Stage 1	-	-	-	-	987	-
Stage 2	-	-	-	-	964	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1566	-	904	1038
Mov Cap-2 Maneuver	-	-	-	-	904	-
Stage 1	-	-	-	-	987	-
Stage 2	-	-	-	-	962	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	904	1038	-	-	1566	-
HCM Lane V/C Ratio	0.061	0.009	-	-	0.002	-
HCM Control Delay (s)	9.2	8.5	-	-	7.3	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	29	3	3	43	8	8
Future Vol, veh/h	29	3	3	43	8	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	3	3	48	9	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	35	0	88	34
Stage 1	-	-	-	-	34	-
Stage 2	-	-	-	-	54	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1576	-	913	1039
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	969	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1576	-	911	1039
Mov Cap-2 Maneuver	-	-	-	-	911	-
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	967	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	8.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	911	1039	-	-	1576	-
HCM Lane V/C Ratio	0.01	0.009	-	-	0.002	-
HCM Control Delay (s)	9	8.5	-	-	7.3	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-

Appendix C-6

2025 Build Conditions
PM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	473	130	106	944	1227	564
Future Volume (vph)	473	130	106	944	1227	564
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		250			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.953	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1656	1583	1736	3471	3060	0
Flt Permitted	0.950		0.053			
Satd. Flow (perm)	1656	1583	97	3471	3060	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		93			101	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	493	135	110	983	1278	588
Shared Lane Traffic (%)						
Lane Group Flow (vph)	493	135	110	983	1866	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	18.0	90.0	72.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	25.0	25.0	13.0	85.0	67.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	25.0	25.0	85.0	85.0	70.5	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.59	
v/c Ratio	1.43	0.33	0.56	0.40	1.01	
Control Delay	245.0	17.1	28.5	7.7	23.1	
Queue Delay	0.0	0.0	0.0	0.0	2.6	
Total Delay	245.0	17.1	28.5	7.7	25.7	
LOS	F	B	C	A	C	
Approach Delay	196.0			9.8	25.7	
Approach LOS	F			A	C	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.43	
Intersection Signal Delay: 50.7	Intersection LOS: D
Intersection Capacity Utilization 97.3%	ICU Level of Service F
Analysis Period (min) 15	

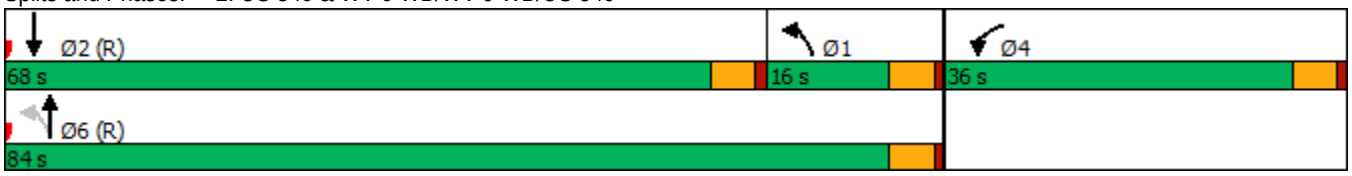
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	322	0	667	204	1213	0	0	1469	503
Future Volume (vph)	0	0	0	322	0	667	204	1213	0	0	1469	503
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		225	325		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25			25			125			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.962	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1346	1736	3343	0	0	3208	0
Flt Permitted				0.950			0.055					
Satd. Flow (perm)	0	0	0	1770	0	1346	100	3343	0	0	3208	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						379					59	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		797			1018			836			1046	
Travel Time (s)		18.1			23.1			12.7			15.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	20%	4%	8%	2%	2%	8%	9%
Adj. Flow (vph)	0	0	0	343	0	710	217	1290	0	0	1563	535
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	343	0	710	217	1290	0	0	2098	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		0	1	1			1	
Detector Template												
Leading Detector (ft)				56		0	40	56			56	
Trailing Detector (ft)				50		0	0	50			50	
Detector 1 Position(ft)				50		0	0	50			50	
Detector 1 Size(ft)				6		20	40	6			6	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Free	pm+pt	NA			NA	
Protected Phases				4			1	6			2	
Permitted Phases						Free	6					
Detector Phase				4			1	6			2	
Switch Phase												
Minimum Initial (s)				12.0			8.0	20.0			20.0	
Minimum Split (s)				22.5			13.0	25.0			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)				36.0			16.0	84.0			68.0	
Total Split (%)				30.0%			13.3%	70.0%			56.7%	
Maximum Green (s)				31.0			11.0	79.0			63.0	
Yellow Time (s)				4.0			4.0	4.0			4.0	
All-Red Time (s)				1.0			1.0	1.0			1.0	
Lost Time Adjust (s)				0.0			0.0	0.0			0.0	
Total Lost Time (s)				5.0			5.0	5.0			5.0	
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				3.0			3.0	3.0			3.0	
Recall Mode				None			None	C-Max			C-Max	
Act Effct Green (s)				26.6		120.0	83.4	83.4			67.4	
Actuated g/C Ratio				0.22		1.00	0.70	0.70			0.56	
v/c Ratio				0.88		0.53	0.99	0.56			1.15	
Control Delay				67.8		1.5	98.5	15.2			93.5	
Queue Delay				0.0		0.0	0.0	0.0			0.2	
Total Delay				67.8		1.5	98.5	15.2			93.7	
LOS				E		A	F	B			F	
Approach Delay					23.1			27.2			93.7	
Approach LOS					C			C			F	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.15	
Intersection Signal Delay: 56.2	Intersection LOS: E
Intersection Capacity Utilization 97.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/WV 9 WB/US 340



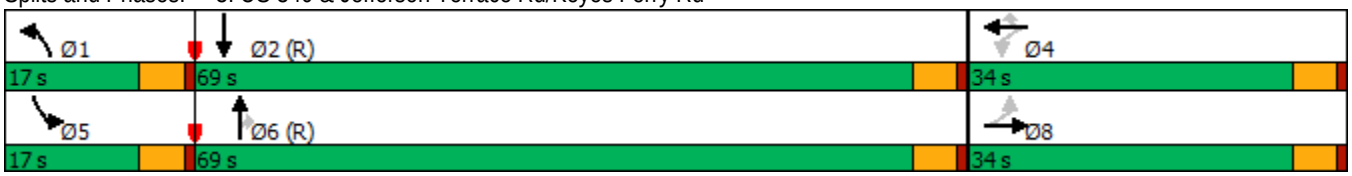
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	37	283	2	43	51	1484	345	47	1651	18
Future Volume (vph)	10	0	37	283	2	43	51	1484	345	47	1651	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		225	75		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.893				0.850			0.850		0.998	
Flt Protected		0.990			0.953		0.950			0.950		
Satd. Flow (prot)	0	1647	0	0	1775	1583	1770	3343	1583	1770	3338	0
Flt Permitted		0.915			0.747		0.950			0.950		
Satd. Flow (perm)	0	1522	0	0	1391	1583	1770	3343	1583	1770	3338	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		64				64					1	
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	10	0	38	292	2	44	53	1530	356	48	1702	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	294	44	53	1530	356	48	1721	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	4	1	1	4	
Detector Template	Left			Left								
Leading Detector (ft)	20	40		20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0		0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40		20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Detector Phase	8	8		4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0		10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	22.5	22.5		25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	34.0	34.0		34.0	34.0	34.0	17.0	69.0	69.0	17.0	69.0	
Total Split (%)	28.3%	28.3%		28.3%	28.3%	28.3%	14.2%	57.5%	57.5%	14.2%	57.5%	
Maximum Green (s)	29.0	29.0		29.0	29.0	29.0	12.0	64.0	64.0	12.0	64.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)				9.0	9.0	9.0		9.0	9.0			
Flash Dont Walk (s)				11.0	11.0	11.0		11.0	11.0			
Pedestrian Calls (#/hr)				0	0	0		0	0			
Act Effct Green (s)		27.6			27.6	27.6	9.1	71.1	71.1	8.9	70.9	
Actuated g/C Ratio		0.23			0.23	0.23	0.08	0.59	0.59	0.07	0.59	
v/c Ratio		0.12			0.92	0.11	0.39	0.77	0.38	0.37	0.87	
Control Delay		6.0			79.0	4.8	48.5	38.4	28.3	75.5	19.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		6.0			79.0	4.8	48.5	38.4	28.3	75.5	19.3	
LOS		A			E	A	D	D	C	E	B	
Approach Delay		6.0			69.4			36.8			20.8	
Approach LOS		A			E			D			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 33 (28%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 32.2	Intersection LOS: C
Intersection Capacity Utilization 77.0%	ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

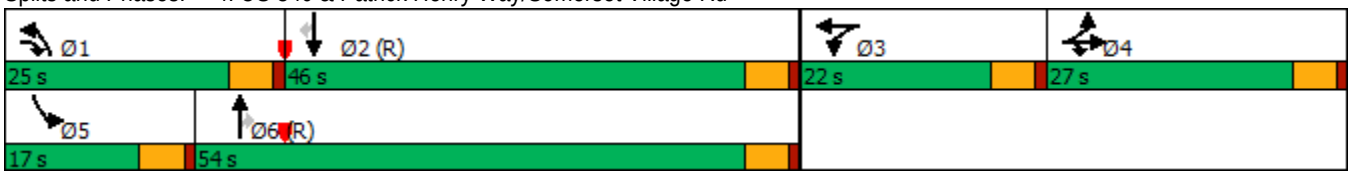


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	41	387	93	56	77	352	1089	96	89	1237	158
Future Volume (vph)	117	41	387	93	56	77	352	1089	96	89	1237	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	0		0	500		175	250		250
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.913				0.850			0.850
Flt Protected	0.950	0.976		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1727	1583	1770	1701	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.950	0.976		0.950			0.950			0.950		
Satd. Flow (perm)	1681	1727	1583	1770	1701	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			135		48				109			155
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	123	43	407	98	59	81	371	1146	101	94	1302	166
Shared Lane Traffic (%)	33%											
Lane Group Flow (vph)	82	84	407	98	140	0	371	1146	101	94	1302	166
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4	4 1	3	3		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases									6			2
Detector Phase	4	4	4 1	3	3		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	12.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	22.5	22.5		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	27.0	27.0		22.0	22.0		25.0	54.0	54.0	17.0	46.0	46.0
Total Split (%)	22.5%	22.5%		18.3%	18.3%		20.8%	45.0%	45.0%	14.2%	38.3%	38.3%
Maximum Green (s)	22.0	22.0		17.0	17.0		20.0	49.0	49.0	12.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	20.6	20.6	43.5	12.1	12.1		17.9	56.9	56.9	10.4	49.3	49.3
Actuated g/C Ratio	0.17	0.17	0.36	0.10	0.10		0.15	0.47	0.47	0.09	0.41	0.41
v/c Ratio	0.28	0.28	0.62	0.55	0.65		0.72	0.72	0.13	0.61	0.95	0.22
Control Delay	45.0	44.9	24.0	62.2	47.7		47.2	43.1	16.9	69.7	50.3	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	44.9	24.0	62.2	47.7		47.2	43.1	16.9	69.7	50.3	6.0
LOS	D	D	C	E	D		D	D	B	E	D	A
Approach Delay		30.1			53.7			42.4			46.8	
Approach LOS		C			D			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 43.0	Intersection LOS: D
Intersection Capacity Utilization 78.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way/Somerset Village Rd



Intersection	
Int Delay, s/veh	10.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	209	68	115	5	63	21	73	30	1	10	23	192
Future Vol, veh/h	209	68	115	5	63	21	73	30	1	10	23	192
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	227	74	125	5	68	23	79	33	1	11	25	209

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	91	0	0	199	0	0	798	692	137	698	743	80
Stage 1	-	-	-	-	-	-	591	591	-	90	90	-
Stage 2	-	-	-	-	-	-	207	101	-	608	653	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1504	-	-	1373	-	-	304	367	911	355	343	980
Stage 1	-	-	-	-	-	-	493	494	-	917	820	-
Stage 2	-	-	-	-	-	-	795	811	-	483	464	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1504	-	-	1373	-	-	193	303	911	282	283	980
Mov Cap-2 Maneuver	-	-	-	-	-	-	193	303	-	282	283	-
Stage 1	-	-	-	-	-	-	408	409	-	759	817	-
Stage 2	-	-	-	-	-	-	604	808	-	368	384	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.2	0.4	38.3	12.6
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	217	1504	-	-	1373	-	-	720
HCM Lane V/C Ratio	0.521	0.151	-	-	0.004	-	-	0.34
HCM Control Delay (s)	38.3	7.8	0	-	7.6	0	-	12.6
HCM Lane LOS	E	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.7	0.5	-	-	0	-	-	1.5

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	134	63	3	94	15	81	60	2	15	54	50
Future Vol, veh/h	30	134	63	3	94	15	81	60	2	15	54	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	154	72	3	108	17	93	69	2	17	62	57

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	125	0	0	226	0	0	349	389	190	417	417	63
Stage 1	-	-	-	-	-	-	258	258	-	123	123	-
Stage 2	-	-	-	-	-	-	91	131	-	294	294	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1460	-	-	1341	-	-	593	545	851	533	526	989
Stage 1	-	-	-	-	-	-	746	694	-	869	794	-
Stage 2	-	-	-	-	-	-	907	787	-	713	669	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1460	-	-	1341	-	-	496	529	851	468	511	989
Mov Cap-2 Maneuver	-	-	-	-	-	-	496	529	-	468	511	-
Stage 1	-	-	-	-	-	-	726	675	-	846	792	-
Stage 2	-	-	-	-	-	-	786	785	-	621	651	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.2	15.3	12.3
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	512	1460	-	-	1341	-	-	632
HCM Lane V/C Ratio	0.321	0.024	-	-	0.003	-	-	0.216
HCM Control Delay (s)	15.3	7.5	0	-	7.7	0	-	12.3
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.4	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	114	23	13	82	0	30	2	24	1	2	0
Future Vol, veh/h	1	114	23	13	82	0	30	2	24	1	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	131	26	15	94	0	34	2	28	1	2	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	135	102	2	167	88	16	2	0	0	30	0	0
Stage 1	4	4	-	84	84	-	-	-	-	-	-	-
Stage 2	131	98	-	83	4	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	836	788	1082	797	802	1063	1620	-	-	1583	-	-
Stage 1	1018	892	-	924	825	-	-	-	-	-	-	-
Stage 2	873	814	-	925	892	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	747	771	1082	665	784	1063	1620	-	-	1583	-	-
Mov Cap-2 Maneuver	747	771	-	665	784	-	-	-	-	-	-	-
Stage 1	997	891	-	905	808	-	-	-	-	-	-	-
Stage 2	755	797	-	769	891	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	10.5	3.9	2.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1620	-	-	810	765	1583	-	-
HCM Lane V/C Ratio	0.021	-	-	0.196	0.143	0.001	-	-
HCM Control Delay (s)	7.3	0	-	10.5	10.5	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.5	0	-	-

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	514	123	13	815	93	10	17	6	68	27	59
Future Vol, veh/h	14	514	123	13	815	93	10	17	6	68	27	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	16	584	140	15	926	106	11	19	7	77	31	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1032	0	0	724	0	0	1125	1678	292	1290	1712	463
Stage 1	-	-	-	-	-	-	616	616	-	956	956	-
Stage 2	-	-	-	-	-	-	509	1062	-	334	756	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	669	-	-	874	-	-	160	94	704	121	90	546
Stage 1	-	-	-	-	-	-	445	480	-	277	335	-
Stage 2	-	-	-	-	-	-	515	298	-	653	414	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	669	-	-	874	-	-	99	90	704	97	86	546
Mov Cap-2 Maneuver	-	-	-	-	-	-	99	90	-	97	86	-
Stage 1	-	-	-	-	-	-	434	468	-	270	329	-
Stage 2	-	-	-	-	-	-	403	293	-	605	404	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	44.9	74.3
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	99	117	669	-	-	874	-	-	97	204
HCM Lane V/C Ratio	0.115	0.223	0.024	-	-	0.017	-	-	0.797	0.479
HCM Control Delay (s)	46	44.4	10.5	-	-	9.2	-	-	120.4	37.9
HCM Lane LOS	E	E	B	-	-	A	-	-	F	E
HCM 95th %tile Q(veh)	0.4	0.8	0.1	-	-	0.1	-	-	4.3	2.3

Intersection	
Int Delay, s/veh	48.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	1427	0	0	1912	56	0	0	0	32	0	27
Future Vol, veh/h	56	1427	0	0	1912	56	0	0	0	32	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	62	1586	0	0	2124	62	0	0	0	36	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2186	0	0	1586	0	0	2772	3896	793	3072	3865	1093
Stage 1	-	-	-	-	-	-	1710	1710	-	2155	2155	-
Stage 2	-	-	-	-	-	-	1062	2186	-	917	1710	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	239	-	-	410	-	-	9	3	331	~ 5	3	209
Stage 1	-	-	-	-	-	-	94	144	-	49	86	-
Stage 2	-	-	-	-	-	-	239	83	-	293	144	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	239	-	-	410	-	-	6	2	331	~ 4	2	209
Mov Cap-2 Maneuver	-	-	-	-	-	-	6	2	-	~ 4	2	-
Stage 1	-	-	-	-	-	-	70	107	-	36	86	-
Stage 2	-	-	-	-	-	-	205	83	-	217	107	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0	0	$ 2874.2
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	239	-	-	410	-	-	4	209
HCM Lane V/C Ratio	-	0.26	-	-	-	-	-	8.889	0.144
HCM Control Delay (s)	0	25.3	-	-	0	-	$	5278.2	25.1
HCM Lane LOS	A	D	-	-	A	-	-	F	D
HCM 95th %tile Q(veh)	-	1	-	-	0	-	-	6.1	0.5

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	40	46	9	47	33	5
Future Vol, veh/h	40	46	9	47	33	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	51	10	52	37	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	95	0	142	70
Stage 1	-	-	-	-	70	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1499	-	851	993
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1499	-	845	993
Mov Cap-2 Maneuver	-	-	-	-	845	-
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	944	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	845	993	-	-	1499	-
HCM Lane V/C Ratio	0.043	0.006	-	-	0.007	-
HCM Control Delay (s)	9.5	8.6	-	-	7.4	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	36	9	9	51	5	5
Future Vol, veh/h	36	9	9	51	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	10	10	57	6	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	50	0	122	45
Stage 1	-	-	-	-	45	-
Stage 2	-	-	-	-	77	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1557	-	873	1025
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	946	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1557	-	867	1025
Mov Cap-2 Maneuver	-	-	-	-	867	-
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	939	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	867	1025	-	-	1557	-
HCM Lane V/C Ratio	0.006	0.005	-	-	0.006	-
HCM Control Delay (s)	9.2	8.5	-	-	7.3	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-

Appendix C-7

2025 Build Improved Conditions
AM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	366	133	63	590	503	455
Future Volume (vph)	366	133	63	590	503	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400	400	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	100		250			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.929	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3213	1583	1736	3471	2925	0
Flt Permitted	0.950		0.207			
Satd. Flow (perm)	3213	1583	378	3471	2925	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		145			327	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	398	145	68	641	547	495
Shared Lane Traffic (%)						
Lane Group Flow (vph)	398	145	68	641	1042	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	15.0	75.0	60.0	
Total Split (%)	28.6%	28.6%	14.3%	71.4%	57.1%	
Maximum Green (s)	25.0	25.0	10.0	70.0	55.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	18.2	18.2	76.8	76.8	66.4	
Actuated g/C Ratio	0.17	0.17	0.73	0.73	0.63	
v/c Ratio	0.72	0.37	0.18	0.25	0.53	
Control Delay	48.2	8.6	5.7	5.3	3.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	48.2	8.6	5.7	5.3	3.2	
LOS	D	A	A	A	A	
Approach Delay	37.6			5.3	3.2	
Approach LOS	D			A	A	

Intersection Summary	
Area Type: Other	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 12 (11%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 12.0	Intersection LOS: B
Intersection Capacity Utilization 58.1%	ICU Level of Service B
Analysis Period (min) 15	

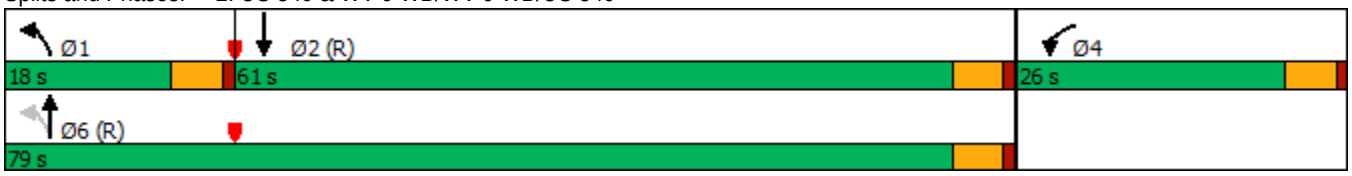
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	70	0	449	100	856	0	0	887	346
Future Volume (vph)	0	0	0	70	0	449	100	856	0	0	887	346
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		225	325		0	0		350
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25			25			125			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1346	1736	3343	0	0	3343	1482
Flt Permitted				0.950			0.244					
Satd. Flow (perm)	0	0	0	1770	0	1346	446	3343	0	0	3343	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						400						380
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		797			1018			836			1046	
Travel Time (s)		18.1			23.1			12.7			15.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	20%	4%	8%	2%	2%	8%	9%
Adj. Flow (vph)	0	0	0	77	0	493	110	941	0	0	975	380
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	77	0	493	110	941	0	0	975	380
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		0	1	1			1	1
Detector Template												Right
Leading Detector (ft)				56		0	40	56			56	20
Trailing Detector (ft)				50		0	0	50			50	0
Detector 1 Position(ft)				50		0	0	50			50	0
Detector 1 Size(ft)				6		20	40	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Turn Type				Prot		Free	pm+pt	NA			NA	Free
Protected Phases				4			1	6			2	
Permitted Phases						Free	6					Free
Detector Phase				4			1	6			2	
Switch Phase												
Minimum Initial (s)				12.0			8.0	20.0			20.0	
Minimum Split (s)				22.5			13.0	25.0			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)				26.0			18.0	79.0			61.0	
Total Split (%)				24.8%			17.1%	75.2%			58.1%	
Maximum Green (s)				21.0			13.0	74.0			56.0	
Yellow Time (s)				4.0			4.0	4.0			4.0	
All-Red Time (s)				1.0			1.0	1.0			1.0	
Lost Time Adjust (s)				0.0			0.0	0.0			0.0	
Total Lost Time (s)				5.0			5.0	5.0			5.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0			3.0	3.0			3.0	
Recall Mode				None			None	C-Max			C-Max	
Act Effct Green (s)				12.1		105.0	86.3	87.3			73.2	105.0
Actuated g/C Ratio				0.12		1.00	0.82	0.83			0.70	1.00
v/c Ratio				0.38		0.37	0.24	0.34			0.42	0.26
Control Delay				48.8		0.8	2.6	1.8			5.0	0.4
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				48.8		0.8	2.6	1.8			5.0	0.4
LOS				D		A	A	A			A	A
Approach Delay					7.3			1.9			3.7	
Approach LOS					A			A			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 4 (4%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 3.7	Intersection LOS: A
Intersection Capacity Utilization 46.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/WV 9 WB/US 340



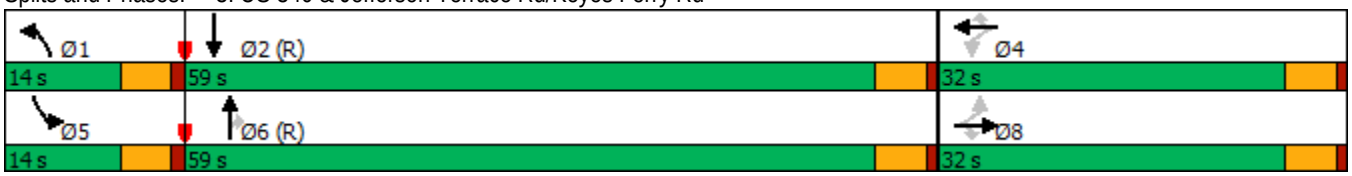
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1	38	183	0	50	15	1042	248	23	1013	9
Future Volume (vph)	17	1	38	183	0	50	15	1042	248	23	1013	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		0	150		225	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.955			0.950		0.950			0.950		
Satd. Flow (prot)	0	1779	1583	0	1770	1583	1770	3343	1583	1770	3341	0
Flt Permitted		0.729			0.745		0.950			0.950		
Satd. Flow (perm)	0	1358	1583	0	1388	1583	1770	3343	1583	1770	3341	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			73			73					1	
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	18	1	41	197	0	54	16	1120	267	25	1089	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	19	41	0	197	54	16	1120	267	25	1099	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	4	1	1	4	
Detector Template	Left		Right	Left								
Leading Detector (ft)	20	40	20	20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0	0	0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0	0	0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40	20	20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4			6			
Detector Phase	8	8	8	4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0	10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	32.0	32.0	32.0	32.0	32.0	32.0	14.0	59.0	59.0	14.0	59.0	
Total Split (%)	30.5%	30.5%	30.5%	30.5%	30.5%	30.5%	13.3%	56.2%	56.2%	13.3%	56.2%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	9.0	54.0	54.0	9.0	54.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)	9.0	9.0	9.0	9.0	9.0	9.0						
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0						
Pedestrian Calls (#/hr)	0	0	0	0	0	0						
Act Effct Green (s)		20.3	20.3		20.3	20.3	8.0	69.4	69.4	8.1	69.5	
Actuated g/C Ratio		0.19	0.19		0.19	0.19	0.08	0.66	0.66	0.08	0.66	
v/c Ratio		0.07	0.11		0.74	0.15	0.12	0.51	0.26	0.19	0.50	
Control Delay		32.7	2.8		55.5	5.3	50.4	7.8	7.1	55.3	6.0	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		32.7	2.8		55.5	5.3	50.4	7.8	7.1	55.3	6.0	
LOS		C	A		E	A	D	A	A	E	A	
Approach Delay		12.3			44.7			8.1			7.1	
Approach LOS		B			D			A			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 94 (90%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 11.0	Intersection LOS: B
Intersection Capacity Utilization 63.4%	ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

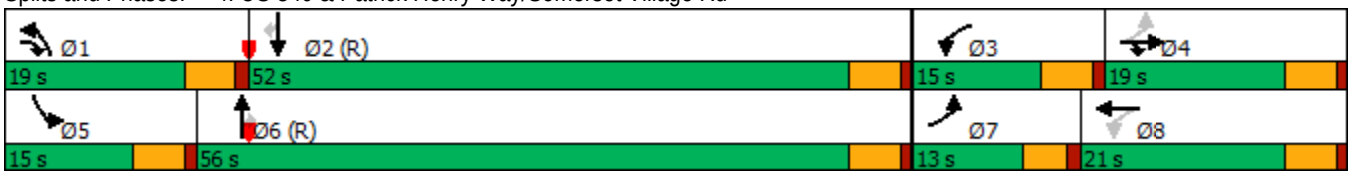


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	20	190	69	26	60	197	868	44	44	785	84
Future Volume (vph)	92	20	190	69	26	60	197	868	44	44	785	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		275	0		0	500		175	450		525
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.895				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1667	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.603			0.743			0.950			0.950		
Satd. Flow (perm)	1123	1863	1583	1384	1667	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			180		65				119			119
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	100	22	207	75	28	65	214	943	48	48	853	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	22	207	75	93	0	214	943	48	48	853	91
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	4 1	3	8		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8					6			2
Detector Phase	7	4	4 1	3	8		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	9.5	17.0		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	13.0	19.0		15.0	21.0		19.0	56.0	56.0	15.0	52.0	52.0
Total Split (%)	12.4%	18.1%		14.3%	20.0%		18.1%	53.3%	53.3%	14.3%	49.5%	49.5%
Maximum Green (s)	8.5	14.0		10.0	16.0		14.0	51.0	51.0	10.0	47.0	47.0
Yellow Time (s)	3.5	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	19.3	12.2	29.0	19.3	12.2		11.8	60.7	60.7	8.7	54.9	54.9
Actuated g/C Ratio	0.18	0.12	0.28	0.18	0.12		0.11	0.58	0.58	0.08	0.52	0.52
v/c Ratio	0.38	0.10	0.37	0.26	0.37		0.56	0.49	0.05	0.33	0.49	0.10
Control Delay	36.1	42.6	8.0	33.8	20.7		53.9	11.8	0.5	51.4	18.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.1	42.6	8.0	33.8	20.7		53.9	11.8	0.5	51.4	18.6	1.9
LOS	D	D	A	C	C		D	B	A	D	B	A
Approach Delay		18.9			26.6			18.8			18.6	
Approach LOS		B			C			B			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 93 (89%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 54.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way/Somerset Village Rd



Intersection	
Int Delay, s/veh	9.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	173	50	49	1	29	11	106	21	1	7	11	98
Future Vol, veh/h	173	50	49	1	29	11	106	21	1	7	11	98
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	197	57	56	1	33	13	120	24	1	8	13	111

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	46	0	0	113	0	0	583	527	85	534	549	40
Stage 1	-	-	-	-	-	-	479	479	-	42	42	-
Stage 2	-	-	-	-	-	-	104	48	-	492	507	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1562	-	-	1476	-	-	424	456	974	457	443	1031
Stage 1	-	-	-	-	-	-	568	555	-	972	860	-
Stage 2	-	-	-	-	-	-	902	855	-	558	539	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1562	-	-	1476	-	-	331	394	974	390	383	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	331	394	-	390	383	-
Stage 1	-	-	-	-	-	-	491	480	-	841	859	-
Stage 2	-	-	-	-	-	-	792	854	-	458	466	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.9	0.2	23.1	10.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	342	1562	-	-	1476	-	-	818
HCM Lane V/C Ratio	0.425	0.126	-	-	0.001	-	-	0.161
HCM Control Delay (s)	23.1	7.6	0	-	7.4	0	-	10.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2	0.4	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	45	43	1	91	1	41	55	0	5	27	23
Future Vol, veh/h	20	45	43	1	91	1	41	55	0	5	27	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	48	46	1	97	1	44	59	0	5	29	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	98	0	0	94	0	0	178	213	71	243	236	49
Stage 1	-	-	-	-	-	-	113	113	-	100	100	-
Stage 2	-	-	-	-	-	-	65	100	-	143	136	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1494	-	-	1499	-	-	776	684	991	701	664	1009
Stage 1	-	-	-	-	-	-	891	802	-	896	812	-
Stage 2	-	-	-	-	-	-	938	812	-	859	783	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1494	-	-	1499	-	-	723	673	991	646	653	1009
Mov Cap-2 Maneuver	-	-	-	-	-	-	723	673	-	646	653	-
Stage 1	-	-	-	-	-	-	878	790	-	883	811	-
Stage 2	-	-	-	-	-	-	882	811	-	783	771	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.1	11.1	10.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	693	1494	-	-	1499	-	-	765
HCM Lane V/C Ratio	0.147	0.014	-	-	0.001	-	-	0.076
HCM Control Delay (s)	11.1	7.4	0	-	7.4	0	-	10.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	47	3	25	8	36	1	12	3	1	0	2	1
Future Vol, veh/h	47	3	25	8	36	1	12	3	1	0	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	4	30	10	43	1	14	4	1	0	2	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	58	36	3	53	36	5	3	0	0	5	0	0
Stage 1	3	3	-	33	33	-	-	-	-	-	-	-
Stage 2	55	33	-	20	3	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	939	856	1081	946	856	1078	1619	-	-	1616	-	-
Stage 1	1020	893	-	983	868	-	-	-	-	-	-	-
Stage 2	957	868	-	999	893	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	895	848	1081	910	848	1078	1619	-	-	1616	-	-
Mov Cap-2 Maneuver	895	848	-	910	848	-	-	-	-	-	-	-
Stage 1	1011	893	-	974	860	-	-	-	-	-	-	-
Stage 2	900	860	-	967	893	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	9.5	5.4	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1619	-	-	947	863	1616	-	-
HCM Lane V/C Ratio	0.009	-	-	0.095	0.063	-	-	-
HCM Control Delay (s)	7.2	0	-	9.2	9.5	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	575	3	1	253	28	6	20	11	67	4	5
Future Vol, veh/h	3	575	3	1	253	28	6	20	11	67	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	3	639	3	1	281	31	7	22	12	74	4	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	312	0	0	642	0	0	790	959	320	620	931	141
Stage 1	-	-	-	-	-	-	645	645	-	283	283	-
Stage 2	-	-	-	-	-	-	145	314	-	337	648	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1245	-	-	939	-	-	281	256	676	372	265	881
Stage 1	-	-	-	-	-	-	427	466	-	700	676	-
Stage 2	-	-	-	-	-	-	843	655	-	651	464	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1245	-	-	939	-	-	275	255	676	340	264	881
Mov Cap-2 Maneuver	-	-	-	-	-	-	275	255	-	340	264	-
Stage 1	-	-	-	-	-	-	426	465	-	699	675	-
Stage 2	-	-	-	-	-	-	831	654	-	607	463	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.5	17.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	275	327	1245	-	-	939	-	-	340	432
HCM Lane V/C Ratio	0.024	0.105	0.003	-	-	0.001	-	-	0.219	0.023
HCM Control Delay (s)	18.4	17.3	7.9	-	-	8.8	-	-	18.5	13.5
HCM Lane LOS	C	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	0.3	0	-	-	0	-	-	0.8	0.1

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	1250	0	0	1070	18	0	0	0	50	0	42
Future Vol, veh/h	18	1250	0	0	1070	18	0	0	0	50	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	125	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	20	1389	0	0	1189	20	0	0	0	56	0	47

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1209	0	0	1389	0	0	2024	2638	695	1924	2618	595
Stage 1	-	-	-	-	-	-	1429	1429	-	1189	1189	-
Stage 2	-	-	-	-	-	-	595	1209	-	735	1429	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	573	-	-	489	-	-	34	23	385	~ 40	24	447
Stage 1	-	-	-	-	-	-	142	199	-	199	260	-
Stage 2	-	-	-	-	-	-	458	254	-	377	199	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	573	-	-	489	-	-	30	22	385	~ 39	23	447
Mov Cap-2 Maneuver	-	-	-	-	-	-	30	22	-	~ 39	23	-
Stage 1	-	-	-	-	-	-	137	192	-	192	260	-
Stage 2	-	-	-	-	-	-	410	254	-	364	192	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	0	253.2
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	573	-	-	489	-	-	39	447
HCM Lane V/C Ratio	-	0.035	-	-	-	-	-	1.425	0.104
HCM Control Delay (s)	0	11.5	-	-	0	-	-	$ 454.2	14
HCM Lane LOS	A	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	5.7	0.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	24	14	3	48	50	8
Future Vol, veh/h	24	14	3	48	50	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	16	3	53	56	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	43	0	94	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	59	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1566	-	906	1038
Stage 1	-	-	-	-	987	-
Stage 2	-	-	-	-	964	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1566	-	904	1038
Mov Cap-2 Maneuver	-	-	-	-	904	-
Stage 1	-	-	-	-	987	-
Stage 2	-	-	-	-	962	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	904	1038	-	-	1566	-
HCM Lane V/C Ratio	0.061	0.009	-	-	0.002	-
HCM Control Delay (s)	9.2	8.5	-	-	7.3	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	29	3	3	43	8	8
Future Vol, veh/h	29	3	3	43	8	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	3	3	48	9	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	35	0	88	34
Stage 1	-	-	-	-	34	-
Stage 2	-	-	-	-	54	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1576	-	913	1039
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	969	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1576	-	911	1039
Mov Cap-2 Maneuver	-	-	-	-	911	-
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	967	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	8.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	911	1039	-	-	1576	-
HCM Lane V/C Ratio	0.01	0.009	-	-	0.002	-
HCM Control Delay (s)	9	8.5	-	-	7.3	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-

Appendix C-8

2025 Build Improved Conditions
PM Peak

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	473	130	106	944	1227	564
Future Volume (vph)	473	130	106	944	1227	564
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400	400	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	100		250			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.953	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3213	1583	1736	3471	3060	0
Flt Permitted	0.950		0.051			
Satd. Flow (perm)	3213	1583	93	3471	3060	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		135			101	
Link Speed (mph)	30			45	45	
Link Distance (ft)	506			556	836	
Travel Time (s)	11.5			8.4	12.7	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	9%	2%	4%	4%	8%	22%
Adj. Flow (vph)	493	135	110	983	1278	588
Shared Lane Traffic (%)						
Lane Group Flow (vph)	493	135	110	983	1866	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			18	18	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	3	3	
Detector Template						
Leading Detector (ft)	56	40	40	356	356	
Trailing Detector (ft)	50	0	0	50	50	
Detector 1 Position(ft)	50	0	0	50	50	
Detector 1 Size(ft)	6	40	40	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				200	200	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Detector 3 Position(ft)				350	350	
Detector 3 Size(ft)				6	6	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 3 Type				Cl+Ex	Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)				0.0	0.0	
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	4	4	1	6	2	
Permitted Phases			6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	8.0	20.0	20.0	
Minimum Split (s)	22.5	22.5	13.0	25.0	25.0	
Total Split (s)	30.0	30.0	18.0	90.0	72.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	25.0	25.0	13.0	85.0	67.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	22.3	22.3	87.7	87.7	73.2	
Actuated g/C Ratio	0.19	0.19	0.73	0.73	0.61	
v/c Ratio	0.83	0.33	0.56	0.39	0.98	
Control Delay	59.3	9.0	29.2	6.8	23.3	
Queue Delay	0.0	0.0	0.0	0.0	0.8	
Total Delay	59.3	9.0	29.2	6.8	24.1	
LOS	E	A	C	A	C	
Approach Delay	48.5			9.1	24.1	
Approach LOS	D			A	C	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 84.6%	ICU Level of Service E
Analysis Period (min) 15	

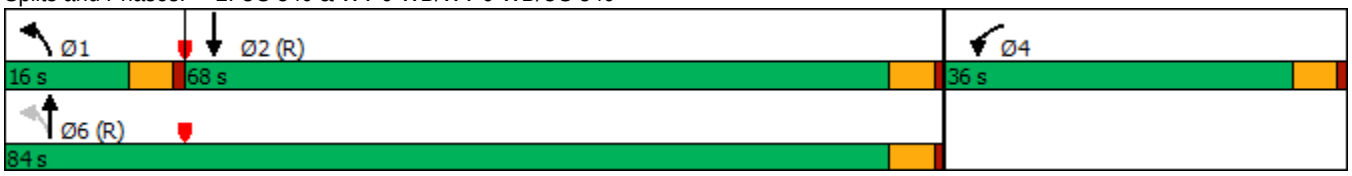
Splits and Phases: 1: WV 51/US 340 & WV 9 EB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	322	0	667	204	1213	0	0	1469	503
Future Volume (vph)	0	0	0	322	0	667	204	1213	0	0	1469	503
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		400	325		0	0		350
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25			25			125			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	0	1346	1736	3343	0	0	3343	1482
Flt Permitted				0.950			0.057					
Satd. Flow (perm)	0	0	0	1770	0	1346	104	3343	0	0	3343	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						379						293
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		797			1018			836			1046	
Travel Time (s)		18.1			23.1			12.7			15.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	20%	4%	8%	2%	2%	8%	9%
Adj. Flow (vph)	0	0	0	343	0	710	217	1290	0	0	1563	535
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	343	0	710	217	1290	0	0	1563	535
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		0	1	1			1	1
Detector Template												Right
Leading Detector (ft)				56		0	40	56			56	20
Trailing Detector (ft)				50		0	0	50			50	0
Detector 1 Position(ft)				50		0	0	50			50	0
Detector 1 Size(ft)				6		20	40	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Turn Type				Prot		Free	pm+pt	NA			NA	Free
Protected Phases				4			1	6			2	
Permitted Phases						Free	6					Free
Detector Phase				4			1	6			2	
Switch Phase												
Minimum Initial (s)				12.0			8.0	20.0			20.0	
Minimum Split (s)				22.5			13.0	25.0			25.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)				36.0			16.0	84.0			68.0	
Total Split (%)				30.0%			13.3%	70.0%			56.7%	
Maximum Green (s)				31.0			11.0	79.0			63.0	
Yellow Time (s)				4.0			4.0	4.0			4.0	
All-Red Time (s)				1.0			1.0	1.0			1.0	
Lost Time Adjust (s)				0.0			0.0	0.0			0.0	
Total Lost Time (s)				5.0			5.0	5.0			5.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0			3.0	3.0			3.0	
Recall Mode				None			None	C-Max			C-Max	
Act Effct Green (s)				26.6		120.0	83.4	83.4			64.8	120.0
Actuated g/C Ratio				0.22		1.00	0.70	0.70			0.54	1.00
v/c Ratio				0.88		0.53	0.84	0.56			0.87	0.36
Control Delay				67.8		1.5	57.6	11.7			23.4	0.4
Queue Delay				0.0		0.0	0.0	0.0			0.6	0.0
Total Delay				67.8		1.5	57.6	11.7			24.0	0.4
LOS				E		A	E	B			C	A
Approach Delay					23.1			18.3			18.0	
Approach LOS					C			B			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 2:SBT and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 81.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: US 340 & WV 9 WB/WV 9 WB/US 340



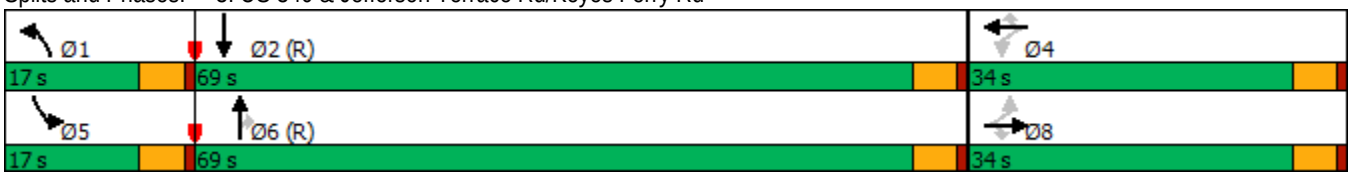
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	37	283	2	43	51	1484	345	47	1651	18
Future Volume (vph)	10	0	37	283	2	43	51	1484	345	47	1651	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		0	150		225	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			125			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.998	
Flt Protected		0.950			0.953		0.950			0.950		
Satd. Flow (prot)	0	1770	1583	0	1775	1583	1770	3343	1583	1770	3338	0
Flt Permitted		0.312			0.721		0.950			0.950		
Satd. Flow (perm)	0	581	1583	0	1343	1583	1770	3343	1583	1770	3338	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			64			64					1	
Link Speed (mph)		30			35			45			45	
Link Distance (ft)		443			132			561			1146	
Travel Time (s)		10.1			2.6			8.5			17.4	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	10	0	38	292	2	44	53	1530	356	48	1702	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	38	0	294	44	53	1530	356	48	1721	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	4	1	1	4	
Detector Template	Left		Right	Left								
Leading Detector (ft)	20	40	20	20	56	40	56	606	56	56	606	
Trailing Detector (ft)	0	0	0	0	50	0	50	50	50	50	50	
Detector 1 Position(ft)	0	0	0	0	50	0	50	50	50	50	50	
Detector 1 Size(ft)	20	40	20	20	6	40	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Detector 3 Position(ft)								400			400	
Detector 3 Size(ft)								6			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type								Cl+Ex			Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)								0.0			0.0	
Detector 4 Position(ft)								600			600	
Detector 4 Size(ft)								6			6	
Detector 4 Type								Cl+Ex			Cl+Ex	
Detector 4 Channel												
Detector 4 Extend (s)								0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4			6			
Detector Phase	8	8	8	4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0	10.0	10.0	10.0	8.0	20.0	20.0	8.0	20.0	
Minimum Split (s)	22.5	22.5	22.5	25.0	25.0	25.0	14.0	26.0	26.0	14.0	26.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0	34.0	17.0	69.0	69.0	17.0	69.0	
Total Split (%)	28.3%	28.3%	28.3%	28.3%	28.3%	28.3%	14.2%	57.5%	57.5%	14.2%	57.5%	
Maximum Green (s)	29.0	29.0	29.0	29.0	29.0	29.0	12.0	64.0	64.0	12.0	64.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)				9.0	9.0	9.0		9.0	9.0			
Flash Dont Walk (s)				11.0	11.0	11.0		11.0	11.0			
Pedestrian Calls (#/hr)				0	0	0		0	0			
Act Effct Green (s)		28.0	28.0		28.0	28.0	9.1	70.7	70.7	8.9	70.5	
Actuated g/C Ratio		0.23	0.23		0.23	0.23	0.08	0.59	0.59	0.07	0.59	
v/c Ratio		0.07	0.09		0.94	0.11	0.39	0.78	0.38	0.37	0.88	
Control Delay		37.0	3.5		83.2	4.8	51.9	26.8	21.1	75.5	19.7	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		37.0	3.5		83.2	4.8	51.9	26.8	21.1	75.5	19.7	
LOS		D	A		F	A	D	C	C	E	B	
Approach Delay		10.4			73.0			26.5			21.2	
Approach LOS		B			E			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 33 (28%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 27.9	Intersection LOS: C
Intersection Capacity Utilization 87.0%	ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

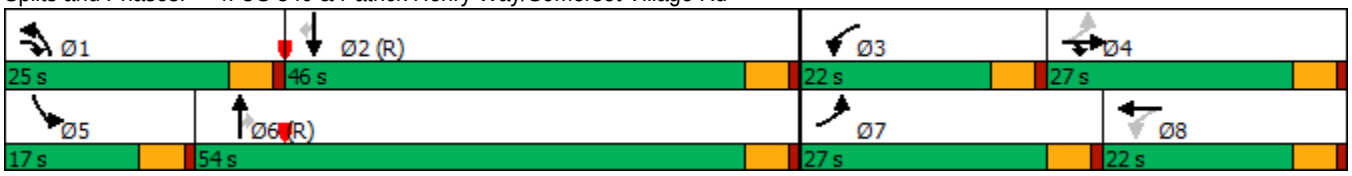


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	41	387	93	56	77	352	1089	96	89	1237	158
Future Volume (vph)	117	41	387	93	56	77	352	1089	96	89	1237	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		275	0		0	500		175	450		525
Storage Lanes	1		1	1		0	2		1	1		1
Taper Length (ft)	50			25			250			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.913				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1701	0	3433	3343	1583	1770	3343	1583
Flt Permitted	0.449			0.729			0.950			0.950		
Satd. Flow (perm)	836	1863	1583	1358	1701	0	3433	3343	1583	1770	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			198		48				109			166
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		492			123			1146			472	
Travel Time (s)		9.6			2.4			17.4			7.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	8%	2%	2%	8%	2%
Adj. Flow (vph)	123	43	407	98	59	81	371	1146	101	94	1302	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	123	43	407	98	140	0	371	1146	101	94	1302	166
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			40			40	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	2	1	1	2	1
Detector Template												
Leading Detector (ft)	56	56	40	56	40		56	206	56	56	206	56
Trailing Detector (ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Position(ft)	50	50	0	50	0		50	50	50	50	50	50
Detector 1 Size(ft)	6	6	40	6	40		6	6	6	6	6	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)								200			200	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	4 1	3	8		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8					6			2
Detector Phase	7	4	4 1	3	8		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	12.0	12.0		8.0	8.0		8.0	25.0	25.0	8.0	25.0	25.0
Minimum Split (s)	22.5	22.5		13.0	13.0		13.0	30.0	30.0	13.0	30.0	30.0
Total Split (s)	27.0	27.0		22.0	22.0		25.0	54.0	54.0	17.0	46.0	46.0
Total Split (%)	22.5%	22.5%		18.3%	18.3%		20.8%	45.0%	45.0%	14.2%	38.3%	38.3%
Maximum Green (s)	22.0	22.0		17.0	17.0		20.0	49.0	49.0	12.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	31.8	19.3	42.4	26.5	16.6		18.1	60.3	60.3	10.6	52.8	52.8
Actuated g/C Ratio	0.26	0.16	0.35	0.22	0.14		0.15	0.50	0.50	0.09	0.44	0.44
v/c Ratio	0.39	0.14	0.59	0.29	0.51		0.72	0.68	0.12	0.60	0.89	0.21
Control Delay	34.9	41.8	18.2	33.1	35.9		40.6	39.2	14.9	68.6	41.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	41.8	18.2	33.1	35.9		40.6	39.2	14.9	68.6	41.0	4.7
LOS	C	D	B	C	D		D	D	B	E	D	A
Approach Delay		23.5			34.8			38.0			38.8	
Approach LOS		C			C			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 36.0	Intersection LOS: D
Intersection Capacity Utilization 78.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: US 340 & Patrick Henry Way/Somerset Village Rd



Intersection	
Int Delay, s/veh	10.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	209	68	115	5	63	21	73	30	1	10	23	192
Future Vol, veh/h	209	68	115	5	63	21	73	30	1	10	23	192
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	227	74	125	5	68	23	79	33	1	11	25	209

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	91	0	0	199	0	0	798	692	137	698	743	80
Stage 1	-	-	-	-	-	-	591	591	-	90	90	-
Stage 2	-	-	-	-	-	-	207	101	-	608	653	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1504	-	-	1373	-	-	304	367	911	355	343	980
Stage 1	-	-	-	-	-	-	493	494	-	917	820	-
Stage 2	-	-	-	-	-	-	795	811	-	483	464	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1504	-	-	1373	-	-	193	303	911	282	283	980
Mov Cap-2 Maneuver	-	-	-	-	-	-	193	303	-	282	283	-
Stage 1	-	-	-	-	-	-	408	409	-	759	817	-
Stage 2	-	-	-	-	-	-	604	808	-	368	384	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.2	0.4	38.3	12.6
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	217	1504	-	-	1373	-	-	720
HCM Lane V/C Ratio	0.521	0.151	-	-	0.004	-	-	0.34
HCM Control Delay (s)	38.3	7.8	0	-	7.6	0	-	12.6
HCM Lane LOS	E	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.7	0.5	-	-	0	-	-	1.5

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	134	63	3	94	15	81	60	2	15	54	50
Future Vol, veh/h	30	134	63	3	94	15	81	60	2	15	54	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	154	72	3	108	17	93	69	2	17	62	57

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	125	0	0	226	0	0	349	389	190	417	417	63
Stage 1	-	-	-	-	-	-	258	258	-	123	123	-
Stage 2	-	-	-	-	-	-	91	131	-	294	294	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.23	7.33	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1460	-	-	1341	-	-	593	545	851	533	526	989
Stage 1	-	-	-	-	-	-	746	694	-	869	794	-
Stage 2	-	-	-	-	-	-	907	787	-	713	669	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1460	-	-	1341	-	-	496	529	851	468	511	989
Mov Cap-2 Maneuver	-	-	-	-	-	-	496	529	-	468	511	-
Stage 1	-	-	-	-	-	-	726	675	-	846	792	-
Stage 2	-	-	-	-	-	-	786	785	-	621	651	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.2	15.3	12.3
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	512	1460	-	-	1341	-	-	632
HCM Lane V/C Ratio	0.321	0.024	-	-	0.003	-	-	0.216
HCM Control Delay (s)	15.3	7.5	0	-	7.7	0	-	12.3
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.4	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	114	23	13	82	0	30	2	24	1	2	0
Future Vol, veh/h	1	114	23	13	82	0	30	2	24	1	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	131	26	15	94	0	34	2	28	1	2	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	135	102	2	167	88	16	2	0	0	30	0	0
Stage 1	4	4	-	84	84	-	-	-	-	-	-	-
Stage 2	131	98	-	83	4	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	836	788	1082	797	802	1063	1620	-	-	1583	-	-
Stage 1	1018	892	-	924	825	-	-	-	-	-	-	-
Stage 2	873	814	-	925	892	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	747	771	1082	665	784	1063	1620	-	-	1583	-	-
Mov Cap-2 Maneuver	747	771	-	665	784	-	-	-	-	-	-	-
Stage 1	997	891	-	905	808	-	-	-	-	-	-	-
Stage 2	755	797	-	769	891	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	10.5	3.9	2.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1620	-	-	810	765	1583	-	-
HCM Lane V/C Ratio	0.021	-	-	0.196	0.143	0.001	-	-
HCM Control Delay (s)	7.3	0	-	10.5	10.5	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.5	0	-	-

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	514	123	13	815	93	10	17	6	68	27	59
Future Vol, veh/h	14	514	123	13	815	93	10	17	6	68	27	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	75	450	-	100	75	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	5	2	2	5	2	2	2	2	2	2	2
Mvmt Flow	16	584	140	15	926	106	11	19	7	77	31	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1032	0	0	724	0	0	1125	1678	292	1290	1712	463
Stage 1	-	-	-	-	-	-	616	616	-	956	956	-
Stage 2	-	-	-	-	-	-	509	1062	-	334	756	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	669	-	-	874	-	-	160	94	704	121	90	546
Stage 1	-	-	-	-	-	-	445	480	-	277	335	-
Stage 2	-	-	-	-	-	-	515	298	-	653	414	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	669	-	-	874	-	-	99	90	704	97	86	546
Mov Cap-2 Maneuver	-	-	-	-	-	-	99	90	-	97	86	-
Stage 1	-	-	-	-	-	-	434	468	-	270	329	-
Stage 2	-	-	-	-	-	-	403	293	-	605	404	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	44.9	74.3
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	99	117	669	-	-	874	-	-	97	204
HCM Lane V/C Ratio	0.115	0.223	0.024	-	-	0.017	-	-	0.797	0.479
HCM Control Delay (s)	46	44.4	10.5	-	-	9.2	-	-	120.4	37.9
HCM Lane LOS	E	E	B	-	-	A	-	-	F	E
HCM 95th %tile Q(veh)	0.4	0.8	0.1	-	-	0.1	-	-	4.3	2.3

Intersection	
Int Delay, s/veh	48.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	1427	0	0	1912	56	0	0	0	32	0	27
Future Vol, veh/h	56	1427	0	0	1912	56	0	0	0	32	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	125	-	125	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	7	2	2	7	2	2	2	2	2	2	2
Mvmt Flow	62	1586	0	0	2124	62	0	0	0	36	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2186	0	0	1586	0	0	2772	3896	793	3041	3834	1062
Stage 1	-	-	-	-	-	-	1710	1710	-	2124	2124	-
Stage 2	-	-	-	-	-	-	1062	2186	-	917	1710	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	239	-	-	410	-	-	9	3	331	~ 5	4	220
Stage 1	-	-	-	-	-	-	94	144	-	51	89	-
Stage 2	-	-	-	-	-	-	239	83	-	293	144	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	239	-	-	410	-	-	6	2	331	~ 4	3	220
Mov Cap-2 Maneuver	-	-	-	-	-	-	6	2	-	~ 4	3	-
Stage 1	-	-	-	-	-	-	70	107	-	38	89	-
Stage 2	-	-	-	-	-	-	206	83	-	217	107	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0	0	$ 2873.7
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	239	-	-	410	-	-	4	220
HCM Lane V/C Ratio	-	0.26	-	-	-	-	-	8.889	0.136
HCM Control Delay (s)	0	25.3	-	-	0	-	$	5278.2	23.9
HCM Lane LOS	A	D	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	-	1	-	-	0	-	-	6.1	0.5

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	40	46	9	47	33	5
Future Vol, veh/h	40	46	9	47	33	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	51	10	52	37	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	95	0	142	70
Stage 1	-	-	-	-	70	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1499	-	851	993
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1499	-	845	993
Mov Cap-2 Maneuver	-	-	-	-	845	-
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	944	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	845	993	-	-	1499	-
HCM Lane V/C Ratio	0.043	0.006	-	-	0.007	-
HCM Control Delay (s)	9.5	8.6	-	-	7.4	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	36	9	9	51	5	5
Future Vol, veh/h	36	9	9	51	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	10	10	57	6	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	50	0	122	45
Stage 1	-	-	-	-	45	-
Stage 2	-	-	-	-	77	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1557	-	873	1025
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	946	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1557	-	867	1025
Mov Cap-2 Maneuver	-	-	-	-	867	-
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	939	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	867	1025	-	-	1557	-
HCM Lane V/C Ratio	0.006	0.005	-	-	0.006	-
HCM Control Delay (s)	9.2	8.5	-	-	7.3	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-

Appendix D

SimTraffic Outputs

Appendix D-1

2021 Existing Conditions
AM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	440	300	80	137	91	102	560
Average Queue (ft)	249	53	27	55	27	36	64
95th Queue (ft)	389	242	60	108	70	83	312
Link Distance (ft)	457			538	538	781	781
Upstream Blk Time (%)	1						0
Queuing Penalty (veh)	0						0
Storage Bay Dist (ft)		200	150				
Storage Blk Time (%)	22			0			
Queuing Penalty (veh)	27			0			

Intersection: 2: US 340 & WV 9 WB/WV 9 WB/US 340

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	156	70	91	86	77	97	197
Average Queue (ft)	83	3	33	16	13	13	43
95th Queue (ft)	144	27	68	58	49	54	119
Link Distance (ft)	941			781	781	985	985
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		225	325				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	39	46	15	56	173	170	102	69	30	45
Average Queue (ft)	9	37	1	24	18	17	12	23	2	4
95th Queue (ft)	33	41	7	51	101	94	61	58	19	25
Link Distance (ft)	390	36	36		503	503			1061	1061
Upstream Blk Time (%)		98	0		0					
Queuing Penalty (veh)		82	0		0					
Storage Bay Dist (ft)				75			225	75		
Storage Blk Time (%)				0	1	0	0	1	0	
Queuing Penalty (veh)				1	0	1	2	3	0	

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	99	144	170	31	61	195	231	186	198	15	114	288
Average Queue (ft)	14	57	73	16	23	47	107	60	64	2	48	124
95th Queue (ft)	63	118	140	35	50	134	190	146	154	10	99	232
Link Distance (ft)		389		22	22			1061	1061			398
Upstream Blk Time (%)				53	24							
Queuing Penalty (veh)				20	9							
Storage Bay Dist (ft)	150		200			500	500			175	250	
Storage Blk Time (%)		0	0						0			1
Queuing Penalty (veh)		0	0						0			0

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	263	57
Average Queue (ft)	117	17
95th Queue (ft)	223	46
Link Distance (ft)	398	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		250
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	7	822	874	284
Average Queue (ft)	0	517	687	282
95th Queue (ft)	5	941	1021	286
Link Distance (ft)	37	1010	867	282
Upstream Blk Time (%)	0	5	33	99
Queuing Penalty (veh)	0	0	13	109
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Somerset Village Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	24	46	48	97	223
Average Queue (ft)	1	6	4	54	83
95th Queue (ft)	11	30	24	111	286
Link Distance (ft)	22	471	471	94	754
Upstream Blk Time (%)	0			33	
Queuing Penalty (veh)	0			30	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	47	52
Average Queue (ft)	18	22
95th Queue (ft)	38	44
Link Distance (ft)	307	415
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	NB	NB	SB	SB
Directions Served	L	L	TR	L	TR
Maximum Queue (ft)	9	28	40	62	26
Average Queue (ft)	0	4	13	22	5
95th Queue (ft)	5	19	31	51	22
Link Distance (ft)			550		2417
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	475	75		75	
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			0	0	

Intersection: 9: Undeveloped Rd & WV 9/US 340

Movement	WB
Directions Served	TR
Maximum Queue (ft)	791
Average Queue (ft)	40
95th Queue (ft)	497
Link Distance (ft)	1826
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Appendix D-2

2021 Existing Conditions
PM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	510	300	110	212	174	236	316
Average Queue (ft)	411	168	51	98	62	103	107
95th Queue (ft)	575	413	92	173	130	187	210
Link Distance (ft)	457			538	538	781	781
Upstream Blk Time (%)	34						
Queuing Penalty (veh)	0						
Storage Bay Dist (ft)		200	150				
Storage Blk Time (%)	61			1			
Queuing Penalty (veh)	75			1			

Intersection: 2: US 340 & WV 9 WB/US 340 & WV 9 WB

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	>	L	T	T	T	TR
Maximum Queue (ft)	341	250	177	134	129	316	372
Average Queue (ft)	167	26	90	55	43	118	157
95th Queue (ft)	263	142	161	111	102	239	293
Link Distance (ft)	941			781	781	992	992
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		225	325				
Storage Blk Time (%)	2	0					
Queuing Penalty (veh)	10	0					

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	47	46	14	72	200	169	156	88	110	146
Average Queue (ft)	13	38	1	29	35	30	26	33	11	18
95th Queue (ft)	39	41	6	66	121	107	93	76	57	83
Link Distance (ft)	390	37	37		503	503			1061	1061
Upstream Blk Time (%)		98	0							
Queuing Penalty (veh)		135	0							
Storage Bay Dist (ft)				75			225	75		
Storage Blk Time (%)				6	1	0	0	3	0	
Queuing Penalty (veh)				39	0	0	0	20	0	

Intersection: 4: US 340 & Patrick Henry Way

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	136	230	235	34	70	248	272	206	238	99	231	459
Average Queue (ft)	21	87	157	22	30	87	156	115	130	7	82	279
95th Queue (ft)	87	180	246	40	52	213	254	199	219	50	204	413
Link Distance (ft)		390		22	22			1061	1061			398
Upstream Blk Time (%)				53	46							2
Queuing Penalty (veh)				42	36							0
Storage Bay Dist (ft)	150		200			500	500			175	250	
Storage Blk Time (%)	0	1	8						2			13
Queuing Penalty (veh)	0	4	11						1			8

Intersection: 4: US 340 & Patrick Henry Way

Movement	SB	SB	B21	B21
Directions Served	T	R	T	T
Maximum Queue (ft)	458	318	33	42
Average Queue (ft)	265	64	1	1
95th Queue (ft)	403	224	15	19
Link Distance (ft)	398		1174	1174
Upstream Blk Time (%)	1			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		250		
Storage Blk Time (%)	11			
Queuing Penalty (veh)	13			

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	27	1017	834	284
Average Queue (ft)	1	834	552	281
95th Queue (ft)	12	1220	928	283
Link Distance (ft)	37	1008	868	281
Upstream Blk Time (%)	0	51	9	99
Queuing Penalty (veh)	0	0	3	211
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Patrick Henry Way

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	34	51	78	96	264
Average Queue (ft)	2	7	12	46	96
95th Queue (ft)	17	33	47	95	256
Link Distance (ft)	22	471	471	94	754
Upstream Blk Time (%)	1			10	
Queuing Penalty (veh)	1			14	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	63	54	0
Average Queue (ft)	31	27	0
95th Queue (ft)	54	45	0
Link Distance (ft)	307	415	3308
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	39	21	21	401	392	14	31	32	88	107
Average Queue (ft)	7	1	3	27	25	1	6	10	30	34
95th Queue (ft)	27	10	16	279	274	7	23	28	61	72
Link Distance (ft)				2884	2884			550		2417
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	475	75	450			100	75		75	
Storage Blk Time (%)				2	3				2	3
Queuing Penalty (veh)				0	2				1	1

Intersection: 9: Undeveloped Rd & WV 9/US 340

Movement	WB	WB
Directions Served	T	TR
Maximum Queue (ft)	1862	1938
Average Queue (ft)	1511	1576
95th Queue (ft)	2407	2390
Link Distance (ft)	1826	1826
Upstream Blk Time (%)	8	11
Queuing Penalty (veh)	66	94
Storage Bay Dist (ft)		
Storage Blk Time (%)	49	
Queuing Penalty (veh)	0	

Appendix D-3

2025 No-Build Conditions
AM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	500	300	105	154	131	117	847
Average Queue (ft)	417	175	27	66	37	46	97
95th Queue (ft)	573	418	66	127	95	97	407
Link Distance (ft)	457			538	538	781	781
Upstream Blk Time (%)	34						0
Queuing Penalty (veh)	0						0
Storage Bay Dist (ft)		200	150				
Storage Blk Time (%)	62		0	0			
Queuing Penalty (veh)	82		0	0			

Intersection: 2: US 340 & WV 9 WB/WV 9 WB/US 340

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	155	64	95	82	67	148	249
Average Queue (ft)	84	5	41	16	11	31	72
95th Queue (ft)	139	36	76	57	44	101	177
Link Distance (ft)	941			781	781	985	985
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		225	325				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	97	47	28	76	168	171	170	76	148	164
Average Queue (ft)	37	41	3	31	74	75	46	31	25	39
95th Queue (ft)	75	47	16	68	162	167	125	67	88	113
Link Distance (ft)	390	37	37		503	503			1061	1061
Upstream Blk Time (%)		90	0							
Queuing Penalty (veh)		79	0							
Storage Bay Dist (ft)				75			225	75		
Storage Blk Time (%)				6	5		0	1	1	
Queuing Penalty (veh)				29	1		0	7	0	

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	105	149	201	38	39	200	217	197	210	53	130	302
Average Queue (ft)	18	67	91	26	28	58	116	97	100	6	56	166
95th Queue (ft)	74	125	176	37	43	153	195	177	192	32	113	259
Link Distance (ft)		390		22	22			1061	1061			398
Upstream Blk Time (%)				78	36							
Queuing Penalty (veh)				61	28							
Storage Bay Dist (ft)	150		200			500	500			175	250	
Storage Blk Time (%)		0	1						1			1
Queuing Penalty (veh)		1	1						0			1

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	297	65
Average Queue (ft)	160	26
95th Queue (ft)	255	55
Link Distance (ft)	398	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		250
Storage Blk Time (%)	1	
Queuing Penalty (veh)	1	

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	41	443	743	284
Average Queue (ft)	6	259	516	269
95th Queue (ft)	29	578	824	303
Link Distance (ft)	37	1017	867	270
Upstream Blk Time (%)	0		5	90
Queuing Penalty (veh)	1		2	105
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Somerset Village Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	42	123	77	98	223
Average Queue (ft)	4	44	15	75	63
95th Queue (ft)	23	103	51	121	164
Link Distance (ft)	22	471	471	93	754
Upstream Blk Time (%)	1			49	
Queuing Penalty (veh)	1			47	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	56	53	2
Average Queue (ft)	23	22	0
95th Queue (ft)	44	44	1
Link Distance (ft)	307	415	532
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	WB	NB	NB	SB	SB
Directions Served	L	L	L	TR	L	TR
Maximum Queue (ft)	18	8	28	32	56	27
Average Queue (ft)	1	0	4	12	23	8
95th Queue (ft)	8	5	18	28	49	27
Link Distance (ft)				550		2417
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	475	450	75		75	
Storage Blk Time (%)					0	
Queuing Penalty (veh)					0	

Intersection: 9: Undeveloped Rd & WV 9/US 340

Movement	WB
Directions Served	TR
Maximum Queue (ft)	1150
Average Queue (ft)	38
95th Queue (ft)	481
Link Distance (ft)	1827
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Appendix D-4

2025 No-Build Conditions
PM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	514	300	117	226	196	330	858
Average Queue (ft)	483	220	57	110	75	140	203
95th Queue (ft)	504	438	102	189	150	238	532
Link Distance (ft)	457			538	538	781	781
Upstream Blk Time (%)	79						0
Queuing Penalty (veh)	0						2
Storage Bay Dist (ft)		200	150				
Storage Blk Time (%)	79		0	2			
Queuing Penalty (veh)	102		0	2			

Intersection: 2: US 340 & WV 9 WB/WV 9 WB/US 340

Movement	WB	WB	B14	NB	NB	NB	SB	SB
Directions Served	L	R	T	L	T	T	T	TR
Maximum Queue (ft)	924	250	37	204	150	152	450	553
Average Queue (ft)	324	119	1	109	64	58	202	267
95th Queue (ft)	682	321	19	186	125	123	365	478
Link Distance (ft)	941		600		781	781	985	985
Upstream Blk Time (%)	1							
Queuing Penalty (veh)	5							
Storage Bay Dist (ft)		225		325				
Storage Blk Time (%)	12	0						
Queuing Penalty (veh)	76	1						

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	WB	WB	NB	NB	NB	NB	B23	B23	SB	SB	SB
Directions Served	LTR	LT	R	L	T	T	R	T	T	L	T	TR
Maximum Queue (ft)	81	52	24	169	420	401	249	340	353	102	182	234
Average Queue (ft)	28	41	2	65	124	119	58	17	17	37	58	82
95th Queue (ft)	64	49	13	133	283	284	165	207	213	84	149	186
Link Distance (ft)	390	37	37		503	503		985	985		1061	1061
Upstream Blk Time (%)		90	0		0	0						
Queuing Penalty (veh)		130	0		0	0						
Storage Bay Dist (ft)				75			225			75		
Storage Blk Time (%)				23	7	1				2	3	
Queuing Penalty (veh)				171	4	5				16	1	

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	150	234	242	46	69	291	314	340	359	223	375	499
Average Queue (ft)	27	104	169	28	32	130	192	169	181	30	169	412
95th Queue (ft)	100	204	256	41	49	263	298	299	314	126	389	548
Link Distance (ft)		390		22	22			1061	1061			398
Upstream Blk Time (%)				65	58							22
Queuing Penalty (veh)				73	65							0
Storage Bay Dist (ft)	150		200			500	500			175	250	
Storage Blk Time (%)	0	2	12						7		0	42
Queuing Penalty (veh)	0	8	20						7		1	37

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	SB	SB	B21	B21
Directions Served	T	R	T	T
Maximum Queue (ft)	501	375	378	360
Average Queue (ft)	413	209	78	73
95th Queue (ft)	545	479	267	251
Link Distance (ft)	398		1174	1174
Upstream Blk Time (%)	21			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		250		
Storage Blk Time (%)	41			
Queuing Penalty (veh)	65			

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	44	1031	653	302
Average Queue (ft)	4	729	391	292
95th Queue (ft)	24	1197	701	299
Link Distance (ft)	37	1006	867	290
Upstream Blk Time (%)	0	33		96
Queuing Penalty (veh)	1	0		216
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Somerset Village Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	44	118	87	97	400
Average Queue (ft)	7	26	27	68	154
95th Queue (ft)	31	85	71	118	374
Link Distance (ft)	22	471	471	94	754
Upstream Blk Time (%)	1			35	
Queuing Penalty (veh)	2			51	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	67	59	2
Average Queue (ft)	31	30	0
95th Queue (ft)	53	49	2
Link Distance (ft)	307	415	3308
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	R	L	TR	L	TR
Maximum Queue (ft)	36	4	21	32	13	43	36	97	161
Average Queue (ft)	8	0	2	6	1	9	12	42	46
95th Queue (ft)	28	3	15	22	6	29	33	83	106
Link Distance (ft)		3179					550		2417
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	475		75	450	100	75		75	
Storage Blk Time (%)							0	7	2
Queuing Penalty (veh)							0	6	1

Intersection: 9: Undeveloped Rd & WV 9/US 340

Movement	WB
Directions Served	TR
Maximum Queue (ft)	1949
Average Queue (ft)	181
95th Queue (ft)	1109
Link Distance (ft)	1826
Upstream Blk Time (%)	0
Queuing Penalty (veh)	3
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Appendix D-5

2025 Build Conditions
AM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	498	300	82	162	100	151	602
Average Queue (ft)	428	197	27	71	37	50	102
95th Queue (ft)	562	431	60	133	81	107	427
Link Distance (ft)	457			538	538	781	781
Upstream Blk Time (%)	41						0
Queuing Penalty (veh)	0						1
Storage Bay Dist (ft)		200	150				
Storage Blk Time (%)	64			0			
Queuing Penalty (veh)	84			0			

Intersection: 2: US 340 & WV 9 WB/WV 9 WB/US 340

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	146	44	118	76	96	106	204
Average Queue (ft)	83	1	44	14	14	23	78
95th Queue (ft)	134	17	91	49	54	75	167
Link Distance (ft)	941			781	781	985	985
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		225	325				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	131	47	41	77	213	230	179	89	132	167
Average Queue (ft)	40	41	7	34	80	84	55	36	28	38
95th Queue (ft)	91	48	27	76	180	189	133	79	87	104
Link Distance (ft)	390	37	37		503	503			1061	1061
Upstream Blk Time (%)		90	1							
Queuing Penalty (veh)		105	1							
Storage Bay Dist (ft)				75			225	75		
Storage Blk Time (%)				7	5	0		2	1	
Queuing Penalty (veh)				34	1	0		12	0	

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	122	181	214	39	43	204	209	238	252	66	131	306
Average Queue (ft)	18	66	102	26	29	53	108	101	111	6	50	169
95th Queue (ft)	74	134	183	36	43	138	180	199	217	38	103	272
Link Distance (ft)		392		21	21			1061	1061			398
Upstream Blk Time (%)				77	34							
Queuing Penalty (veh)				60	27							
Storage Bay Dist (ft)	150		200			500	500			175	250	
Storage Blk Time (%)	0	1	1						2			1
Queuing Penalty (veh)	0	1	1						1			0

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	282	68
Average Queue (ft)	159	26
95th Queue (ft)	257	58
Link Distance (ft)	398	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		250
Storage Blk Time (%)	1	
Queuing Penalty (veh)	1	

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	40	349	879	289
Average Queue (ft)	6	180	783	282
95th Queue (ft)	27	445	1065	305
Link Distance (ft)	37	1017	868	284
Upstream Blk Time (%)	0		68	91
Queuing Penalty (veh)	1		66	106
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Somerset Village Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	31	120	76	97	296
Average Queue (ft)	4	38	16	71	86
95th Queue (ft)	20	94	53	117	242
Link Distance (ft)	21	472	472	91	754
Upstream Blk Time (%)	0			46	
Queuing Penalty (veh)	0			44	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	52	40
Average Queue (ft)	24	21
95th Queue (ft)	42	41
Link Distance (ft)	307	415
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	L	TR	L	TR
Maximum Queue (ft)	14	8	7	24	36	75	53
Average Queue (ft)	1	0	0	5	14	32	9
95th Queue (ft)	8	4	5	19	31	60	36
Link Distance (ft)					550		2417
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	475	450	100	75		75	
Storage Blk Time (%)					0	1	
Queuing Penalty (veh)					0	0	

Intersection: 9: Undeveloped Rd/Site Drive #1 & WV 9/US 340

Movement	EB	WB	SB	SB
Directions Served	L	TR	L	TR
Maximum Queue (ft)	36	384	478	177
Average Queue (ft)	7	13	272	45
95th Queue (ft)	24	271	552	201
Link Distance (ft)		1821	617	617
Upstream Blk Time (%)		0	4	0
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)	125			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Site Drive #2 & Keyes Ferry Rd

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	118	199	30
Average Queue (ft)	18	52	9
95th Queue (ft)	97	180	31
Link Distance (ft)	373	322	322
Upstream Blk Time (%)		4	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Site Drive #3 & Keyes Ferry Rd

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	6	28	30
Average Queue (ft)	0	6	9
95th Queue (ft)	4	24	31
Link Distance (ft)	1481	307	307
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Appendix D-6

2025 Build Conditions
PM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	511	300	124	256	214	269	484
Average Queue (ft)	483	198	60	115	73	108	140
95th Queue (ft)	504	431	103	200	155	209	335
Link Distance (ft)	457			538	538	781	781
Upstream Blk Time (%)	79						
Queuing Penalty (veh)	0						
Storage Bay Dist (ft)		200	150				
Storage Blk Time (%)	79		0	2			
Queuing Penalty (veh)	103		1	2			

Intersection: 2: US 340 & WV 9 WB/WV 9 WB/US 340

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	742	250	249	173	196	599	701
Average Queue (ft)	270	101	138	71	83	255	311
95th Queue (ft)	539	301	228	142	169	512	612
Link Distance (ft)	941			781	781	985	985
Upstream Blk Time (%)	0						0
Queuing Penalty (veh)	2						0
Storage Bay Dist (ft)		225	325				
Storage Blk Time (%)	10	0	0				
Queuing Penalty (veh)	66	1	0				

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	WB	WB	NB	NB	NB	NB	B23	B23	SB	SB	SB
Directions Served	LTR	LT	R	L	T	T	R	T	T	L	T	TR
Maximum Queue (ft)	98	49	38	170	363	350	275	545	896	124	191	216
Average Queue (ft)	34	42	6	68	147	142	69	29	81	54	66	82
95th Queue (ft)	77	49	26	138	308	305	199	285	497	106	153	175
Link Distance (ft)	390	37	37		503	503		985	985		1061	1061
Upstream Blk Time (%)		87	2						0			
Queuing Penalty (veh)		143	4						0			
Storage Bay Dist (ft)				75			225			75		
Storage Blk Time (%)				18	10	2	0			7	4	
Queuing Penalty (veh)				135	5	7	0			57	2	

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	159	233	253	50	72	257	275	391	387	225	375	510
Average Queue (ft)	35	98	169	29	29	111	162	186	196	34	182	454
95th Queue (ft)	117	193	259	44	52	223	254	326	338	128	417	555
Link Distance (ft)		391		21	21			1061	1061			398
Upstream Blk Time (%)				73	50							47
Queuing Penalty (veh)				82	57							0
Storage Bay Dist (ft)	150		200			500	500			175	250	
Storage Blk Time (%)	0	2	11						10	0		54
Queuing Penalty (veh)	0	9	17						9	0		48

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	SB	SB	B21	B21
Directions Served	T	R	T	T
Maximum Queue (ft)	507	375	1096	1068
Average Queue (ft)	453	234	593	580
95th Queue (ft)	559	507	1312	1287
Link Distance (ft)	398		1174	1174
Upstream Blk Time (%)	48		12	12
Queuing Penalty (veh)	0		0	0
Storage Bay Dist (ft)		250		
Storage Blk Time (%)	54			
Queuing Penalty (veh)	85			

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	40	1018	876	288
Average Queue (ft)	7	680	666	284
95th Queue (ft)	31	1188	1047	286
Link Distance (ft)	37	1007	870	284
Upstream Blk Time (%)	0	21	38	95
Queuing Penalty (veh)	1	0	30	213
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Somerset Village Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	47	151	137	121	502
Average Queue (ft)	8	39	27	94	347
95th Queue (ft)	33	118	88	149	822
Link Distance (ft)	21	472	472	103	754
Upstream Blk Time (%)	3			58	17
Queuing Penalty (veh)	7			83	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	71	54	13	4
Average Queue (ft)	32	30	1	0
95th Queue (ft)	56	47	7	3
Link Distance (ft)	307	415	3308	532
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	35	28	21	70	62	20	31	36	93	238
Average Queue (ft)	8	1	5	2	2	1	7	11	44	62
95th Queue (ft)	27	12	19	49	43	10	26	30	87	225
Link Distance (ft)				2884	2884			550		2417
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	475	75	450			100	75		75	
Storage Blk Time (%)					0		0	0	12	2
Queuing Penalty (veh)					0		0	0	10	1

Intersection: 9: Undeveloped Rd/Site Drive #1 & WV 9/US 340

Movement	EB	EB	EB	WB	SB	SB
Directions Served	L	T	TR	TR	L	TR
Maximum Queue (ft)	209	495	464	1564	633	524
Average Queue (ft)	108	143	129	80	428	130
95th Queue (ft)	235	572	568	706	726	510
Link Distance (ft)		1011	1011	1820	624	624
Upstream Blk Time (%)				0	24	15
Queuing Penalty (veh)				1	0	0
Storage Bay Dist (ft)	125					
Storage Blk Time (%)	38	0				
Queuing Penalty (veh)	274	0				

Intersection: 10: Site Drive #2 & Keyes Ferry Rd

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	22	47	30
Average Queue (ft)	1	20	5
95th Queue (ft)	10	44	24
Link Distance (ft)	375	281	281
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Site Drive #3 & Keyes Ferry Rd

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	6	28	30
Average Queue (ft)	0	3	5
95th Queue (ft)	4	18	23
Link Distance (ft)	1465	264	264
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Appendix D-7

2025 Build Improved Conditions
AM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	L	L	T	T	T	TR
Maximum Queue (ft)	272	337	61	144	109	125	182
Average Queue (ft)	125	179	27	61	31	54	58
95th Queue (ft)	237	286	55	121	77	106	133
Link Distance (ft)		457		532	532	775	775
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	400		150				
Storage Blk Time (%)				0			
Queuing Penalty (veh)				0			

Intersection: 2: US 340 & WV 9 WB/WV 9 WB/US 340

Movement	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	T
Maximum Queue (ft)	158	68	94	94	67	108	156
Average Queue (ft)	83	5	30	18	11	21	43
95th Queue (ft)	139	35	65	62	43	72	119
Link Distance (ft)	941			775	775	985	985
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		225	325				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	52	68	47	38	83	175	188	117	86	105	150
Average Queue (ft)	17	24	42	8	32	44	49	33	38	23	31
95th Queue (ft)	43	54	49	30	70	123	136	87	79	73	95
Link Distance (ft)	390		37	37		493	493			1061	1061
Upstream Blk Time (%)			87	1							
Queuing Penalty (veh)			102	1							
Storage Bay Dist (ft)		125			150			225	125		
Storage Blk Time (%)						0	0		0	0	
Queuing Penalty (veh)						0	0		0	0	

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	126	44	198	44	54	166	231	216	218	44	120	226
Average Queue (ft)	56	11	100	29	28	48	113	95	111	7	57	123
95th Queue (ft)	105	34	183	40	47	117	185	177	193	26	107	205
Link Distance (ft)		392		22	22			1061	1061			398
Upstream Blk Time (%)				70	25							
Queuing Penalty (veh)				54	20							
Storage Bay Dist (ft)	150		275			500	500			175	450	
Storage Blk Time (%)	0								1			
Queuing Penalty (veh)	0								0			

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	240	65
Average Queue (ft)	128	20
95th Queue (ft)	212	50
Link Distance (ft)	398	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		525
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	48	159	881	285
Average Queue (ft)	8	48	781	273
95th Queue (ft)	34	127	1038	299
Link Distance (ft)	37	1016	868	271
Upstream Blk Time (%)	0		61	90
Queuing Penalty (veh)	1		60	105
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Somerset Village Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	31	154	56	97	478
Average Queue (ft)	3	55	9	83	220
95th Queue (ft)	17	126	34	121	589
Link Distance (ft)	22	471	471	94	754
Upstream Blk Time (%)	0			66	3
Queuing Penalty (veh)	0			63	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	57	35
Average Queue (ft)	24	19
95th Queue (ft)	43	40
Link Distance (ft)	307	415
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	NB	NB	SB	SB
Directions Served	L	L	TR	L	TR
Maximum Queue (ft)	9	23	41	92	27
Average Queue (ft)	1	3	12	35	8
95th Queue (ft)	7	16	31	70	26
Link Distance (ft)			550		2417
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	475	75		100	
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			0	0	

Intersection: 9: Undeveloped Rd/Site Drive #1 & WV 9/US 340

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	TR
Maximum Queue (ft)	40	8	1172	4	571	272
Average Queue (ft)	9	0	65	0	349	57
95th Queue (ft)	27	6	639	3	602	298
Link Distance (ft)		1010	1821		605	605
Upstream Blk Time (%)			0		10	5
Queuing Penalty (veh)			0		0	0
Storage Bay Dist (ft)	250			125		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 10: Site Drive #2 & Keyes Ferry Rd

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	84	120	30
Average Queue (ft)	10	33	8
95th Queue (ft)	68	89	29
Link Distance (ft)	373	322	322
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Site Drive #3 & Keyes Ferry Rd

Movement	NB	NB
Directions Served	L	R
Maximum Queue (ft)	28	30
Average Queue (ft)	6	8
95th Queue (ft)	25	29
Link Distance (ft)	307	307
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Appendix D-8

2025 Build Improved Conditions
PM Peak

Intersection: 1: WV 51/US 340 & WV 9 EB

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	L	L	T	T	T	TR
Maximum Queue (ft)	317	369	128	212	184	359	412
Average Queue (ft)	187	230	60	103	67	134	155
95th Queue (ft)	284	331	112	179	139	262	311
Link Distance (ft)		457		532	532	775	775
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	400		150				
Storage Blk Time (%)		0	0	1			
Queuing Penalty (veh)		0	0	2			

Intersection: 2: US 340 & WV 9 WB/WV 9 WB/US 340

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	T	T	T	T	R
Maximum Queue (ft)	359	228	156	177	291	349	129
Average Queue (ft)	188	110	61	58	108	143	9
95th Queue (ft)	296	191	134	140	226	280	91
Link Distance (ft)	941		775	775	985	985	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		325					350
Storage Blk Time (%)	0					0	0
Queuing Penalty (veh)	0					1	0

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	B23	B23	B23	SB
Directions Served	LT	R	LT	R	L	T	T	R	T	T		L
Maximum Queue (ft)	35	71	54	29	179	336	370	234	181	675	163	110
Average Queue (ft)	9	25	42	5	63	132	130	79	6	34	5	57
95th Queue (ft)	33	59	51	20	127	272	273	192	105	301	115	106
Link Distance (ft)	390		37	37		493	493		985	985	985	
Upstream Blk Time (%)			87	1			0					
Queuing Penalty (veh)			143	1			2					
Storage Bay Dist (ft)		125			150			225				125
Storage Blk Time (%)					0	4	1	1				0
Queuing Penalty (veh)					0	2	3	5				3

Intersection: 3: US 340 & Jefferson Terrace Rd/Keyes Ferry Rd

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	234	234
Average Queue (ft)	65	90
95th Queue (ft)	163	197
Link Distance (ft)	1061	1061
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	1	
Queuing Penalty (veh)	1	

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	L	T	T	R	L	T
Maximum Queue (ft)	163	216	237	42	40	254	281	383	393	225	372	489
Average Queue (ft)	64	34	146	27	29	109	156	176	196	46	140	367
95th Queue (ft)	131	119	234	38	41	229	256	337	349	171	335	509
Link Distance (ft)		391		21	21			1061	1061			398
Upstream Blk Time (%)				62	39						0	12
Queuing Penalty (veh)				70	44						0	0
Storage Bay Dist (ft)	150		275			500	500			175	450	
Storage Blk Time (%)	0	0	0						9		0	12
Queuing Penalty (veh)	1	0	0						9		1	11

Intersection: 4: US 340 & Patrick Henry Way/Somerset Village Rd

Movement	SB	SB	B21	B21
Directions Served	T	R	T	T
Maximum Queue (ft)	492	398	348	378
Average Queue (ft)	375	164	67	75
95th Queue (ft)	521	441	346	358
Link Distance (ft)	398		1174	1174
Upstream Blk Time (%)	13	1		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)		525		
Storage Blk Time (%)	13	1		
Queuing Penalty (veh)	21	3		

Intersection: 5: Keyes Ferry Rd & Troy Dr & Somerset Blvd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	45	1012	878	288
Average Queue (ft)	6	705	695	282
95th Queue (ft)	30	1134	1024	287
Link Distance (ft)	37	1007	870	279
Upstream Blk Time (%)	0	23	35	95
Queuing Penalty (veh)	1	0	28	214
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Somerset Blvd & Somerset Village Rd

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	31	138	93	118	556
Average Queue (ft)	6	37	26	89	298
95th Queue (ft)	26	100	71	143	682
Link Distance (ft)	21	472	472	103	754
Upstream Blk Time (%)	1			45	8
Queuing Penalty (veh)	3			64	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Cattail Run Rd/Marlowe Rd & Keyes Ferry Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	70	59	0
Average Queue (ft)	33	30	0
95th Queue (ft)	57	45	0
Link Distance (ft)	307	415	3308
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Cattail Run Rd & WV 9

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	R	L	TR	L	TR
Maximum Queue (ft)	35	4	30	27	10	39	36	118	215
Average Queue (ft)	7	0	1	5	0	8	12	57	55
95th Queue (ft)	26	3	12	21	7	27	32	111	170
Link Distance (ft)		3179					550		2417
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	475		75	450	100	75		125	
Storage Blk Time (%)							0	10	1
Queuing Penalty (veh)							0	9	1

Intersection: 9: Undeveloped Rd/Site Drive #1 & WV 9/US 340

Movement	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	L	T	TR	T	T	R	L	TR
Maximum Queue (ft)	287	254	60	49	860	15	498	298
Average Queue (ft)	79	20	2	3	30	1	332	60
95th Queue (ft)	213	131	42	43	410	11	639	300
Link Distance (ft)		1011	1011	1820	1820		611	611
Upstream Blk Time (%)					0		15	4
Queuing Penalty (veh)					1		0	0
Storage Bay Dist (ft)	250					125		
Storage Blk Time (%)	4	0		0	0			
Queuing Penalty (veh)	31	0		0	0			

Intersection: 10: Site Drive #2 & Keyes Ferry Rd

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	6	41	30
Average Queue (ft)	0	20	4
95th Queue (ft)	6	42	20
Link Distance (ft)	375	281	281
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Site Drive #3 & Keyes Ferry Rd

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	6	28	24
Average Queue (ft)	0	4	5
95th Queue (ft)	4	20	23
Link Distance (ft)	1465	264	264
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Appendix E

WVDOH Existing Signal Timings

Appendix E-1

Int 1: US 340/WV 51 with WV 9

PUBLIC ROADS DIV.	STATE DIST. NO.	STATE PROJECT NO.	FEDERAL PROJECT NO.	FISCAL YEAR	COUNTY	SHEET NO.	TOTAL SHEETS
W.V.	5	U319 -340- 8.37	CMAQ-0340 (050)E	2005	JEFFERSON	12	15

NOTES:

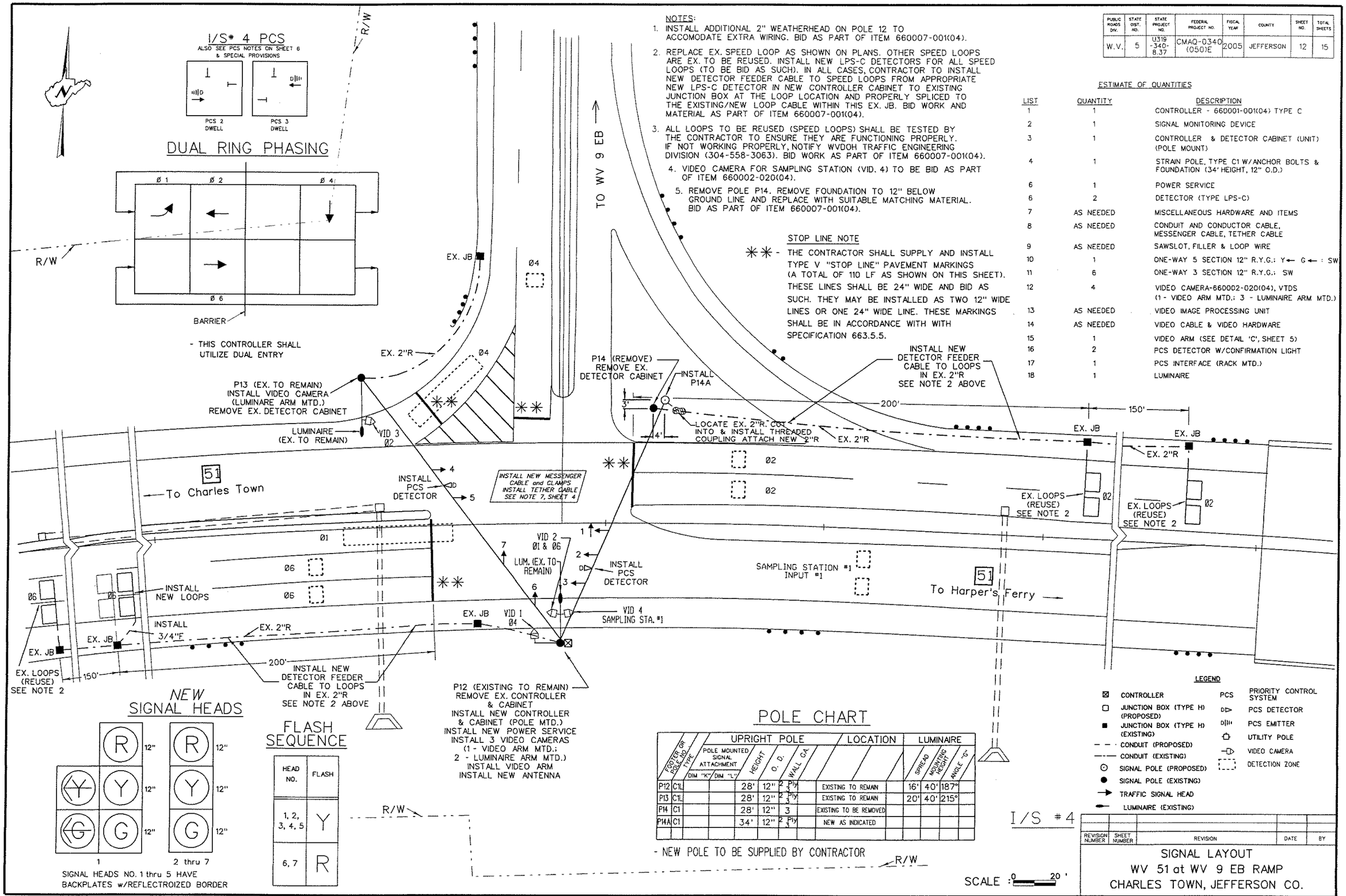
1. INSTALL ADDITIONAL 2" WEATHERHEAD ON POLE 12 TO ACCOMODATE EXTRA WIRING. BID AS PART OF ITEM 660007-001(04).
2. REPLACE EX. SPEED LOOP AS SHOWN ON PLANS. OTHER SPEED LOOPS ARE EX. TO BE REUSED. INSTALL NEW LPS-C DETECTORS FOR ALL SPEED LOOPS (TO BE BID AS SUCH). IN ALL CASES, CONTRACTOR TO INSTALL NEW DETECTOR FEEDER CABLE TO SPEED LOOPS FROM APPROPRIATE NEW LPS-C DETECTOR IN NEW CONTROLLER CABINET TO EXISTING JUNCTION BOX AT THE LOOP LOCATION AND PROPERLY SPLICED TO THE EXISTING/NEW LOOP CABLE WITHIN THIS EX. JB. BID WORK AND MATERIAL AS PART OF ITEM 660007-001(04).
3. ALL LOOPS TO BE REUSED (SPEED LOOPS) SHALL BE TESTED BY THE CONTRACTOR TO ENSURE THEY ARE FUNCTIONING PROPERLY. IF NOT WORKING PROPERLY, NOTIFY WVDOH TRAFFIC ENGINEERING DIVISION (304-558-3063). BID WORK AS PART OF ITEM 660007-001(04).
4. VIDEO CAMERA FOR SAMPLING STATION (VID. 4) TO BE BID AS PART OF ITEM 660002-020(04).
5. REMOVE POLE P14. REMOVE FOUNDATION TO 12" BELOW GROUND LINE AND REPLACE WITH SUITABLE MATCHING MATERIAL. BID AS PART OF ITEM 660007-001(04).

STOP LINE NOTE

✱✱ - THE CONTRACTOR SHALL SUPPLY AND INSTALL TYPE V "STOP LINE" PAVEMENT MARKINGS (A TOTAL OF 110 LF AS SHOWN ON THIS SHEET). THESE LINES SHALL BE 24" WIDE AND BID AS SUCH. THEY MAY BE INSTALLED AS TWO 12" WIDE LINES OR ONE 24" WIDE LINE. THESE MARKINGS SHALL BE IN ACCORDANCE WITH WITH SPECIFICATION 663.5.5.

ESTIMATE OF QUANTITIES

LIST	QUANTITY	DESCRIPTION
1	1	CONTROLLER - 660001-001(04) TYPE C
2	1	SIGNAL MONITORING DEVICE
3	1	CONTROLLER & DETECTOR CABINET (UNIT) (POLE MOUNT)
4	1	STRAIN POLE, TYPE C1 W/ ANCHOR BOLTS & FOUNDATION (34' HEIGHT, 12" O.D.)
6	1	POWER SERVICE
6	2	DETECTOR (TYPE LPS-C)
7	AS NEEDED	MISCELLANEOUS HARDWARE AND ITEMS
8	AS NEEDED	CONDUIT AND CONDUCTOR CABLE, MESSENGER CABLE, TETHER CABLE
9	AS NEEDED	SAWSLOT, FILLER & LOOP WIRE
10	1	ONE-WAY 5 SECTION 12" R.Y.G.: Y← G← : SW
11	6	ONE-WAY 3 SECTION 12" R.Y.G.: SW
12	4	VIDEO CAMERA-660002-020(04), VTDS (1 - VIDEO ARM MTD.: 3 - LUMINAIRE ARM MTD.)
13	AS NEEDED	VIDEO IMAGE PROCESSING UNIT
14	AS NEEDED	VIDEO CABLE & VIDEO HARDWARE
15	1	VIDEO ARM (SEE DETAIL 'C', SHEET 5)
16	2	PCS DETECTOR W/CONFIRMATION LIGHT
17	1	PCS INTERFACE (RACK MTD.)
18	1	LUMINAIRE



FOOTER OR POLE NO.	TYPE	POLE MOUNTED SIGNAL ATTACHMENT DIM "K"	DIM "L"	UPRIGHT POLE HEIGHT	O. D.	WALL GA.	LOCATION	LUMINAIRE SPREAD	MOUNTING HEIGHT	ANGLE "G"
P12	C1L			28'	12"	2 3 Ply	EXISTING TO REMAIN	16'	40'	187°
P13	C1L			28'	12"	2 3 Ply	EXISTING TO REMAIN	20'	40'	215°
P14	C1			28'	12"	3	EXISTING TO BE REMOVED			
P14A	C1			34'	12"	2 3 Ply	NEW AS INDICATED			

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Vehicle Basic Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min. Green	8	20	10	12	10	20	10	15	0	0	0	0	0	0	0	0
Passage	2	5	4	5	4	5	4	5	0	0	0	0	0	0	0	0
Maximum 1	12	65	25	18	25	65	25	35	0	0	0	0	0	0	0	0
Maximum 2	12	80	30	30	30	80	30	50	0	0	0	0	0	0	0	0
Yellow Change	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
Red Clearance	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Green Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vehicle Density Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Added Init/Act	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Init	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Gap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flashing Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Extended Pedestrian Clear	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm
Actuated Rest In Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Walk Offset Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Offset Mode	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv

General Control

Phase	Initial	Non-Actuated Response	Vehicle Recalls	Ped Recalls	Recall Delay
1	1 - Inactive	0 - None	0 - None	0 - None	0
2	4 - Green	3 - Both	3 - Max	0 - None	0
3	0 - None	0 - None	0 - None	0 - None	0
4	1 - Inactive	0 - None	0 - None	0 - None	0
5	0 - None	0 - None	0 - None	0 - None	0
6	4 - Green	3 - Both	3 - Max	0 - None	0
7	0 - None	0 - None	0 - None	0 - None	0
8	0 - None	0 - None	0 - None	0 - None	0
9	0 - None	0 - None	0 - None	0 - None	0
10	0 - None	0 - None	0 - None	0 - None	0
11	0 - None	0 - None	0 - None	0 - None	0
12	0 - None	0 - None	0 - None	0 - None	0
13	0 - None	0 - None	0 - None	0 - None	0
14	0 - None	0 - None	0 - None	0 - None	0
15	0 - None	0 - None	0 - None	0 - None	0
16	0 - None	0 - None	0 - None	0 - None	0

Miscellaneous

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Locking Memory	✓															
Dual Entry		✓				✓										
Last Car Passage																
Conditional Service																
No Simultaneous Gap Out																

Dial 3/Split 1

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	16	68	0	36	0	84	0	0
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	26		18		26		
Min Ped Time	0	0		0		0		

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	73	19	64
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	1	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 2

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	16	68	0	36	0	84	0	0
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	26		18		26		
Min Ped Time	0	0		0		0		

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	73	19	64
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	1	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Appendix E-2

Int 2: US 340 with WV 9

PUBLIC ROADS DIV.	STATE DIST. NO.	STATE PROJECT NO.	FEDERAL PROJECT NO.	FISCAL YEAR	COUNTY	SHEET NO.	TOTAL SHEETS
W.V.	5	U319 -340- 8.37	CMAQ-0340 (050)E	2005	JEFFERSON	13	15

✱ - THE CONTRACTOR SHALL SUPPLY AND INSTALL TYPE V "CHANNELIZING LINE" (A TOTAL OF 100 LF) AS SHOWN ON THIS SHEET.

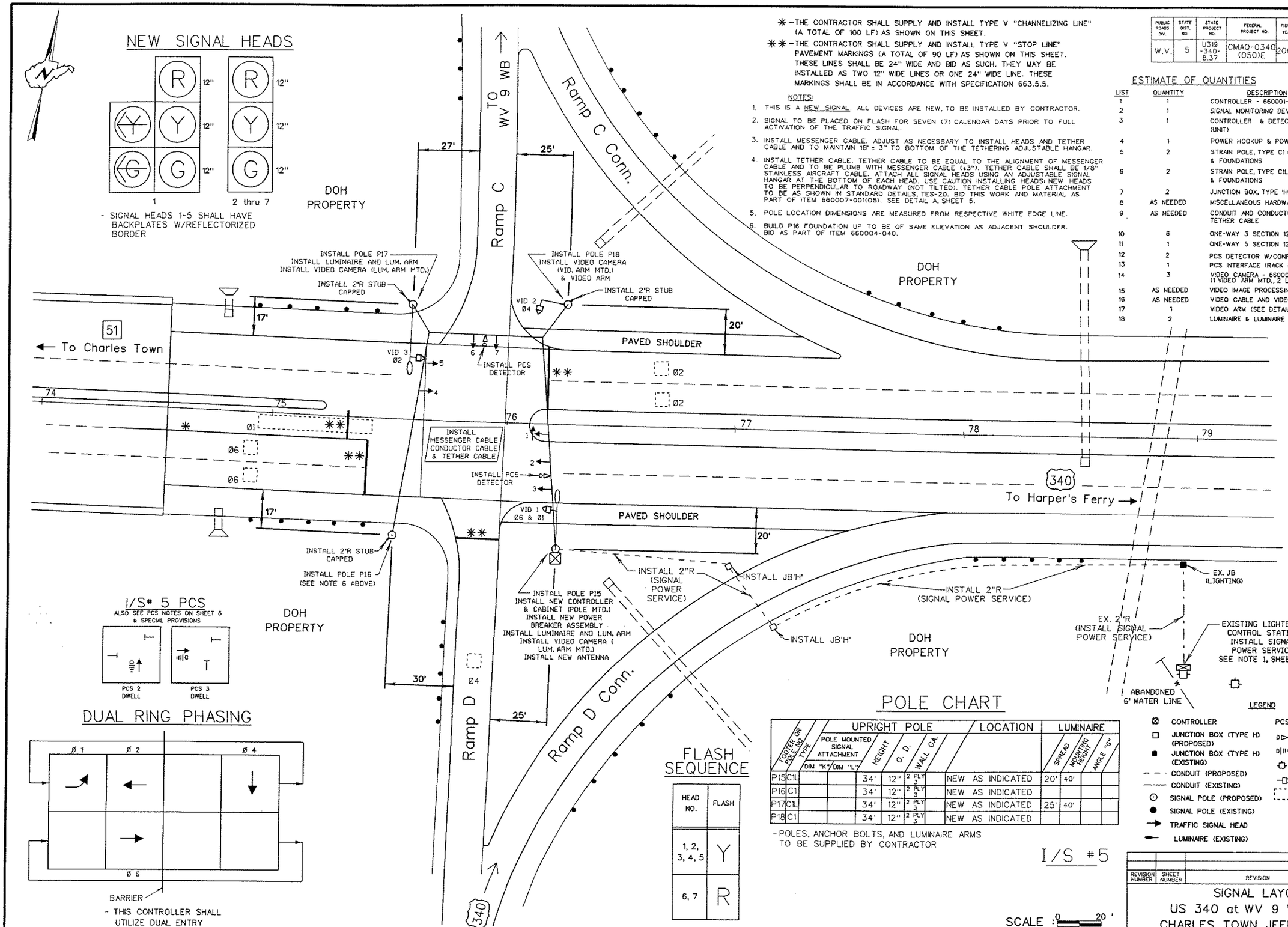
✱✱ - THE CONTRACTOR SHALL SUPPLY AND INSTALL TYPE V "STOP LINE" PAVEMENT MARKINGS (A TOTAL OF 90 LF) AS SHOWN ON THIS SHEET. THESE LINES SHALL BE 24" WIDE AND BID AS SUCH. THEY MAY BE INSTALLED AS TWO 12" WIDE LINES OR ONE 24" WIDE LINE. THESE MARKINGS SHALL BE IN ACCORDANCE WITH SPECIFICATION 663.5.5.

NOTES:

1. THIS IS A NEW SIGNAL. ALL DEVICES ARE NEW, TO BE INSTALLED BY CONTRACTOR.
2. SIGNAL TO BE PLACED ON FLASH FOR SEVEN (7) CALENDAR DAYS PRIOR TO FULL ACTIVATION OF THE TRAFFIC SIGNAL.
3. INSTALL MESSENGER CABLE. ADJUST AS NECESSARY TO INSTALL HEADS AND TETHER CABLE AND TO MAINTAIN 18' ± 3" TO BOTTOM OF THE TETHERING ADJUSTABLE HANGAR.
4. INSTALL TETHER CABLE. TETHER CABLE TO BE EQUAL TO THE ALIGNMENT OF MESSENGER CABLE AND TO BE PLUMB WITH MESSENGER CABLE (±3"). TETHER CABLE SHALL BE 1/8" STAINLESS AIRCRAFT CABLE. ATTACH ALL SIGNAL HEADS USING AN ADJUSTABLE SIGNAL HANGAR AT THE BOTTOM OF EACH HEAD. USE CAUTION INSTALLING HEADS: NEW HEADS TO BE PERPENDICULAR TO ROADWAY (NOT TILTED). TETHER CABLE POLE ATTACHMENT TO BE AS SHOWN IN STANDARD DETAILS, TES-20. BID THIS WORK AND MATERIAL AS PART OF ITEM 660007-001(05). SEE DETAIL A, SHEET 5.
5. POLE LOCATION DIMENSIONS ARE MEASURED FROM RESPECTIVE WHITE EDGE LINE.
6. BUILD P16 FOUNDATION UP TO BE OF SAME ELEVATION AS ADJACENT SHOULDER. BID AS PART OF ITEM 660004-040.

ESTIMATE OF QUANTITIES

LIST	QUANTITY	DESCRIPTION
1	1	CONTROLLER - 660001-001(05) TYPE C
2	1	SIGNAL MONITORING DEVICE
3	1	CONTROLLER & DETECTOR CABINET (POLE MTD.) (UNIT)
4	1	POWER HOOKUP & POWER BREAKER ASSEMBLY
5	2	STRAIN POLE, TYPE C1 (34' HEIGHT) W/ANCHOR BOLTS & FOUNDATIONS
6	2	STRAIN POLE, TYPE C1L (34' HEIGHT) W/ANCHOR BOLTS & FOUNDATIONS
7	2	JUNCTION BOX, TYPE 'H'
8	AS NEEDED	MISCELLANEOUS HARDWARE AND ITEMS
9	AS NEEDED	CONDUIT AND CONDUCTOR CABLE, MESSENGER CABLE, TETHER CABLE
10	6	ONE-WAY 3 SECTION 12" R.Y.G.; SW
11	1	ONE-WAY 5 SECTION 12" R.Y.G.; Y← G← : SW
12	2	PCS DETECTOR W/CONFIRMATION LIGHT
13	1	PCS INTERFACE (RACK MTD.)
14	3	VIDEO CAMERA - 660002-020(05) VTDS (1 VIDEO ARM MTD., 2 LUM. ARM MTD.)
15	AS NEEDED	VIDEO IMAGE PROCESSING UNIT
16	AS NEEDED	VIDEO CABLE AND VIDEO HARDWARE
17	1	VIDEO ARM (SEE DETAIL B, SHEET 5)
18	2	LUMINAIRE & LUMINAIRE ARM



REVISION NUMBER	SHEET NUMBER	REVISION	DATE	BY

SIGNAL LAYOUT
US 340 at WV 9 WB RAMPS
CHARLES TOWN, JEFFERSON CO.

C:\Users\Default\Signals\District 5\Jefferson\US 340 System\trf_sgl_US 340 at WV 9 WB Ramp (*5).dgn cchandler 21-MAR-2005 11:33 TRAFFIC ENGINEERING DIVISION

Vehicle Basic Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min. Green	8	20	10	12	10	20	10	15	0	0	0	0	0	0	0	0
Passage	2	5	4	5	4	5	4	5	0	0	0	0	0	0	0	0
Maximum 1	25	35	25	35	25	35	25	35	0	0	0	0	0	0	0	0
Maximum 2	30	50	30	50	30	50	30	50	0	0	0	0	0	0	0	0
Yellow Change	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
Red Clearance	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Green Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vehicle Density Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Added Init/Act	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Init	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Gap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flashing Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Extended Pedestrian Clear	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm
Actuated Rest In Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Walk Offset Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Offset Mode	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv

General Control

Phase	Initial	Non-Actuated Response	Vehicle Recalls	Ped Recalls	Recall Delay
1	1 - Inactive	0 - None	0 - None	0 - None	0
2	4 - Green	0 - None	2 - Min	0 - None	0
3	0 - None	0 - None	0 - None	0 - None	0
4	1 - Inactive	0 - None	0 - None	0 - None	0
5	0 - None	0 - None	0 - None	0 - None	0
6	4 - Green	0 - None	2 - Min	0 - None	0
7	0 - None	0 - None	0 - None	0 - None	0
8	0 - None	0 - None	0 - None	0 - None	0
9	0 - None	0 - None	0 - None	0 - None	0
10	0 - None	0 - None	0 - None	0 - None	0
11	0 - None	0 - None	0 - None	0 - None	0
12	0 - None	0 - None	0 - None	0 - None	0
13	0 - None	0 - None	0 - None	0 - None	0
14	0 - None	0 - None	0 - None	0 - None	0
15	0 - None	0 - None	0 - None	0 - None	0
16	0 - None	0 - None	0 - None	0 - None	0

Miscellaneous

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Locking Memory	✓															
Dual Entry		✓				✓										
Last Car Passage																
Conditional Service																
No Simultaneous Gap Out																

Dial 3/Split 1

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	18	72	0	30	0	90	0	0
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	26		18		26		
Min Ped Time	0	0		0		0		

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	74	35	45
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	1	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 2

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	18	72	0	30	0	90	0	0
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	26		18		26		
Min Ped Time	0	0		0		0		

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	74	35	45
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	1	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Appendix E-3

Int 3: US 340 with Keyes Ferry Road/Jefferson Terrace Road

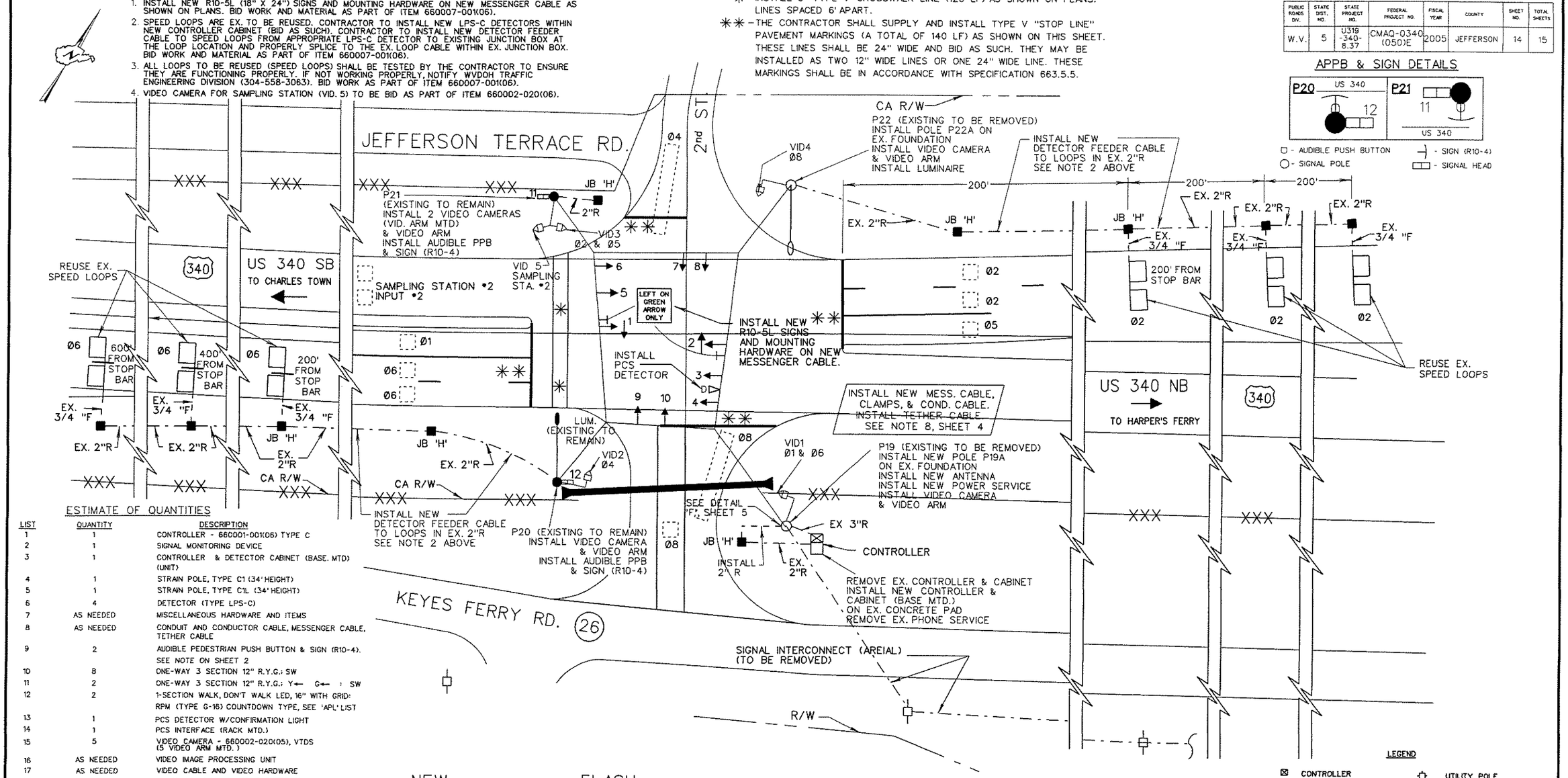
NOTES:

1. INSTALL NEW R10-5L (18" X 24") SIGNS AND MOUNTING HARDWARE ON NEW MESSENGER CABLE AS SHOWN ON PLANS. BID WORK AND MATERIAL AS PART OF ITEM 660007-001(06).
2. SPEED LOOPS ARE EX. TO BE REUSED. CONTRACTOR TO INSTALL NEW LPS-C DETECTORS WITHIN NEW CONTROLLER CABINET (BID AS SUCH). CONTRACTOR TO INSTALL NEW DETECTOR FEEDER CABLE TO SPEED LOOPS FROM APPROPRIATE LPS-C DETECTOR TO EXISTING JUNCTION BOX AT THE LOOP LOCATION AND PROPERLY SPLICE TO THE EX. LOOP CABLE WITHIN EX. JUNCTION BOX. BID WORK AND MATERIAL AS PART OF ITEM 660007-001(06).
3. ALL LOOPS TO BE REUSED (SPEED LOOPS) SHALL BE TESTED BY THE CONTRACTOR TO ENSURE THEY ARE FUNCTIONING PROPERLY. IF NOT WORKING PROPERLY, NOTIFY WVDOH TRAFFIC ENGINEERING DIVISION (304-558-3063). BID WORK AS PART OF ITEM 660007-001(06).
4. VIDEO CAMERA FOR SAMPLING STATION (VID. 5) TO BE BID AS PART OF ITEM 660002-020(06).

✳ - INSTALL 8" TYPE V CROSSWALK LINE (120 LF) AS SHOWN ON PLANS. LINES SPACED 6' APART.

✳✳ - THE CONTRACTOR SHALL SUPPLY AND INSTALL TYPE V "STOP LINE" PAVEMENT MARKINGS (A TOTAL OF 140 LF) AS SHOWN ON THIS SHEET. THESE LINES SHALL BE 24" WIDE AND BID AS SUCH. THEY MAY BE INSTALLED AS TWO 12" WIDE LINES OR ONE 24" WIDE LINE. THESE MARKINGS SHALL BE IN ACCORDANCE WITH SPECIFICATION 663.5.5.

PUBLIC ROADS DIV.	STATE DIST. NO.	STATE PROJECT NO.	FEDERAL PROJECT NO.	FISCAL YEAR	COUNTY	SHEET NO.	TOTAL SHEETS
W.V.	5	U319 -340- 8.37	CMAQ-0340 (050)E	2005	JEFFERSON	14	15

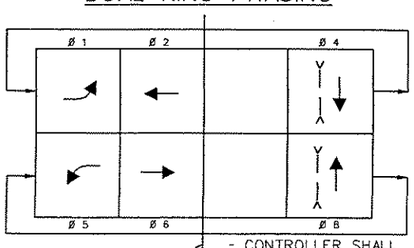


APPB & SIGN DETAILS

ESTIMATE OF QUANTITIES

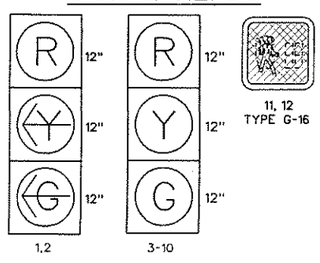
LIST	QUANTITY	DESCRIPTION
1	1	CONTROLLER - 660001-001(06) TYPE C
2	1	SIGNAL MONITORING DEVICE
3	1	CONTROLLER & DETECTOR CABINET (BASE. MTD) (UNIT)
4	1	STRAIN POLE, TYPE C1 (34' HEIGHT)
5	1	STRAIN POLE, TYPE C1L (34' HEIGHT)
6	4	DETECTOR (TYPE LPS-C)
7	AS NEEDED	MISCELLANEOUS HARDWARE AND ITEMS
8	AS NEEDED	CONDUIT AND CONDUCTOR CABLE, MESSENGER CABLE, TETHER CABLE
9	2	AUDIBLE PEDESTRIAN PUSH BUTTON & SIGN (R10-4). SEE NOTE ON SHEET 2
10	8	ONE-WAY 3 SECTION 12" R.Y.G.: SW
11	2	ONE-WAY 3 SECTION 12" R.Y.G.: Y← G← : SW
12	2	1-SECTION WALK, DON'T WALK LED, 16" WITH GRID: RPM (TYPE G-16) COUNTDOWN TYPE, SEE 'APL' LIST
13	1	PCS DETECTOR W/CONFIRMATION LIGHT
14	1	PCS INTERFACE (RACK MTD.)
15	5	VIDEO CAMERA - 660002-020(05), VTDS (5 VIDEO ARM MTD.)
16	AS NEEDED	VIDEO IMAGE PROCESSING UNIT
17	AS NEEDED	VIDEO CABLE AND VIDEO HARDWARE
18	4	VIDEO ARM (SEE DETAIL B, SHEET 5)
19	2	R10-5L SIGN, 18" X 24" 0.080 IN. FLAT SHEET ALUM. & MTG. HARDWARE

DUAL RING PHASING



- CONTROLLER SHALL UTILIZE DUAL ENTRY
- Ø4 & Ø8 IS PPB AND VIDEO ACTUATED

NEW SIGNAL HEADS



SIGNAL HEADS NO. 1 thru 6 HAVE BACKPLATES w/REFLECTROIZED BORDER

FLASH SEQUENCE

HEAD NO.	FLASH
1-6	Y
7-10	R
11, 12	DARK

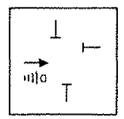
POLE CHART

	FOOTER OR POLE TYPE	POLE MOUNTED SIGNAL ATTACHMENT DIM "K"	DIM "L"	UPRIGHT POLE HEIGHT	O. D.	WALL GA.	LOCATION	LUMINAIRE SPREAD	MOUNTING HEIGHT	ARM LE "G"	
P19	C1			32'	12"	2/3 ply	EX. TO BE REMOVED				
P19A	C1			34'	12"	2/3 ply	NEW AS INDICATED				← NEW POLE
P20	C1			33.5'	12"	2/3 ply	EXISTING TO REMAIN	25'	40'	130'	
P21	C1			33.5'	12"	2/3 ply	EX. TO BE REMOVED				
P22	C1			32'	12"	2/3 ply	EXISTING TO REMAIN	25'	40'	135'	
P22A	C1L			34'	12"	2/3 ply	NEW AS INDICATED	25'	40'	135'	← NEW POLE

CONTRACTOR TO SUPPLY TWO (2) NEW POLES

I/S #6 PCS

ALSO SEE PCS NOTES ON SHEET 6 AND SPECIAL PROVISIONS



PCS 2 DWELL

LEGEND

- CONTROLLER
- JUNCTION BOX (TYPE H) (PROPOSED)
- JUNCTION BOX (TYPE H) (EXISTING)
- CONDUIT (PROPOSED)
- SIGNAL POLE (PROPOSED)
- TRAFFIC SIGNAL HEAD
- UTILITY POLE
- LOOP DETECTOR
- LUMINAIRE
- SI SIGNAL INTERCONNECT
- PCS PRIORITY CONTROL SYSTEM
- PCS DETECTOR
- PCS EMITTER
- VIDEO CAMERA
- DETECTION ZONE

I/S #6

SCALE : 0 — 20 '

REVISION NUMBER	SHEET NUMBER	REVISION	DATE	BY

SIGNAL LAYOUT
US 340 AT KEYES FERRY RD.
CHARLES TOWN, JEFFERSON CO.

C:\Users\Default\Signals\District 5\Jefferson\US 340 System\trf_sgl_US 340 at Keyes Ferry Rd(*6).dgn cchandler 21-MAR-2005 10:34 TRAFFIC ENGINEERING DIVISION

Vehicle Basic Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min. Green	8	20	10	10	8	20	10	15	0	0	0	0	0	0	0	0
Passage	4	5	4	5	4	5	4	5	0	0	0	0	0	0	0	0
Maximum 1	15	70	25	12	15	70	25	30	0	0	0	0	0	0	0	0
Maximum 2	11	100	30	15	11	100	30	35	0	0	0	0	0	0	0	0
Yellow Change	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
Red Clearance	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Green Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vehicle Density Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Added Init/Act	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Init	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Gap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0
Pedestrian Clear	0	0	0	20	0	0	0	20	0	0	0	0	0	0	0	0
Flashing Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Extended Pedestrian Clear	0 - Nrm	0 - Nrm	0 - Nrm	1 - Ex1	0 - Nrm	0 - Nrm	0 - Nrm	1 - Ex1	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm
Actuated Rest In Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Walk Offset Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Offset Mode	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv

General Control

Phase	Initial	Non-Actuated Response	Vehicle Recalls	Ped Recalls	Recall Delay
1	1 - Inactive	0 - None	0 - None	0 - None	0
2	4 - Green	3 - Both	2 - Min	0 - None	0
3	0 - None	0 - None	0 - None	0 - None	0
4	1 - Inactive	0 - None	0 - None	0 - None	0
5	1 - Inactive	0 - None	0 - None	0 - None	0
6	4 - Green	3 - Both	2 - Min	0 - None	0
7	0 - None	0 - None	0 - None	0 - None	0
8	1 - Inactive	0 - None	0 - None	0 - None	0
9	0 - None	0 - None	0 - None	0 - None	0
10	0 - None	0 - None	0 - None	0 - None	0
11	0 - None	0 - None	0 - None	0 - None	0
12	0 - None	0 - None	0 - None	0 - None	0
13	0 - None	0 - None	0 - None	0 - None	0
14	0 - None	0 - None	0 - None	0 - None	0
15	0 - None	0 - None	0 - None	0 - None	0
16	0 - None	0 - None	0 - None	0 - None	0

Miscellaneous

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Locking Memory	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dual Entry	☐	✓	☐	✓	☐	✓	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐
Last Car Passage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Conditional Service	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
No Simultaneous Gap Out	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Dial 3/Split 1

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	17	69	0	34	17	69	0	34
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	26		16	14	26		21
Min Ped Time	0	0		20	0	0		20

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	33	15	83
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 2

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	17	69	0	34	17	69	0	34
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	26		16	14	26		21
Min Ped Time	0	0		20	0	0		20

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	33	15	83
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

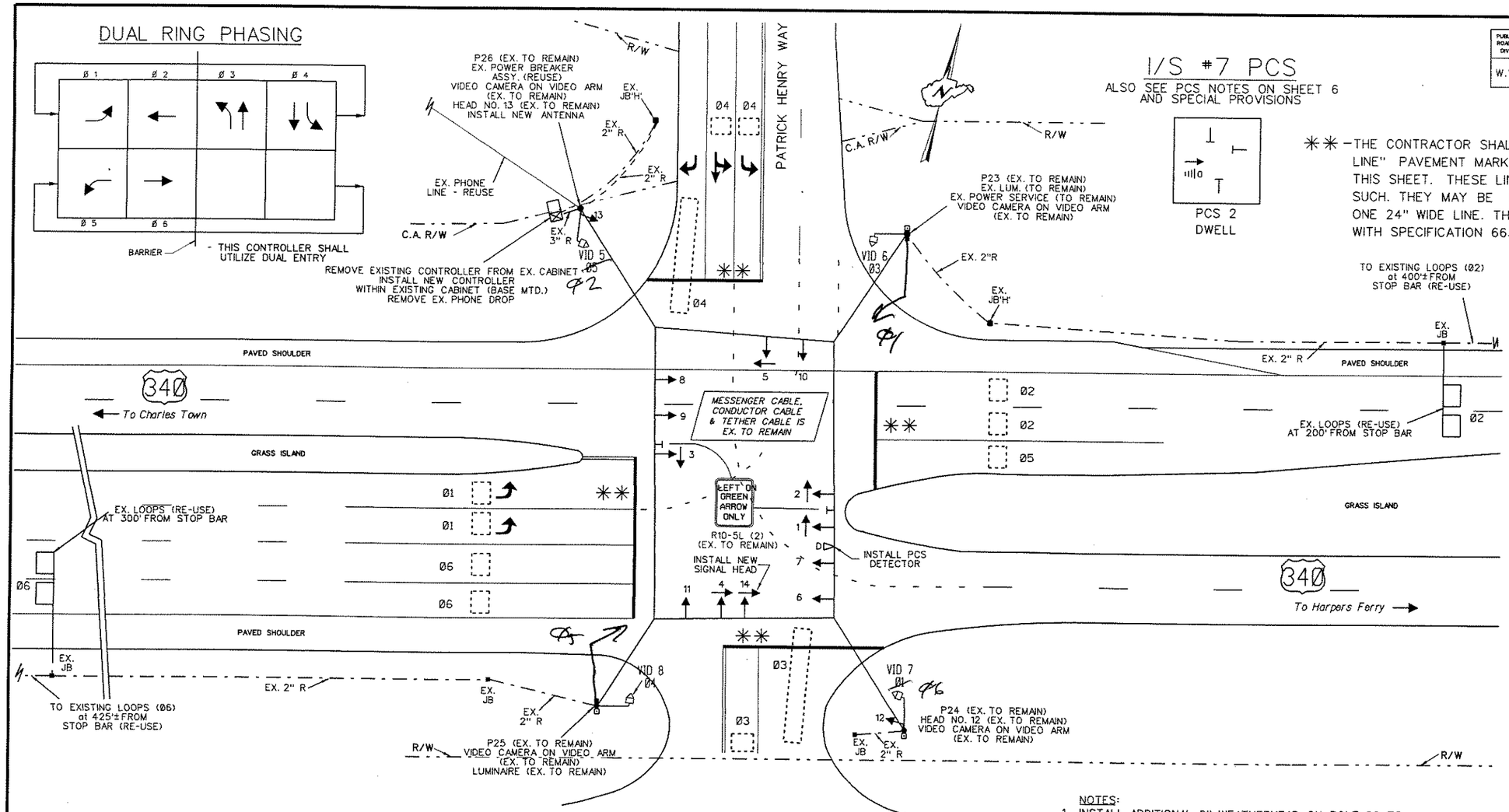
Appendix E-4

Int 4: US 340 with Patrick Henry Way

PUBLIC ROADS DIV.	STATE DIST. NO.	STATE PROJECT NO.	FEDERAL PROJECT NO.	FISCAL YEAR	COUNTY	SHEET NO.	TOTAL SHEETS
W.V.	5	U319 340 8.37	CMAQ-0340 (050)E	2005	JEFFERSON	15	15

I/S #7 PCS

ALSO SEE PCS NOTES ON SHEET 6 AND SPECIAL PROVISIONS

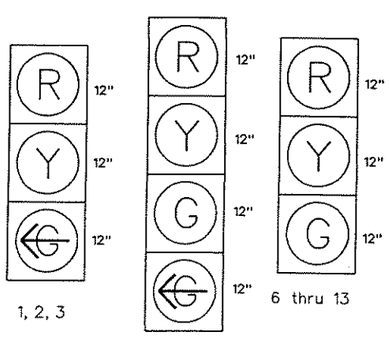


** - THE CONTRACTOR SHALL SUPPLY AND INSTALL TYPE V "STOP LINE" PAVEMENT MARKINGS (A TOTAL OF 190 LF) AS SHOWN ON THIS SHEET. THESE LINES SHALL BE 24" WIDE AND BID AS SUCH. THEY MAY BE INSTALLED AS TWO 12" WIDE LINES OR ONE 24" WIDE LINE. THESE MARKINGS SHALL BE IN ACCORDANCE WITH SPECIFICATION 663.5.5.

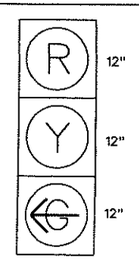
SIGNAL ESTIMATE OF QUANTITIES

LIST	QUANTITY	DESCRIPTION
1	1	CONTROLLER - 660001-001(07) TYPE C (INSTALL IN EX. CABINET)
2	1	SIGNAL MONITORING DEVICE
3	AS NEEDED	MISCELLANEOUS HARDWARE AND ITEMS
4	1	PCS DETECTOR W/CONFIRMATION LIGHT
5	1	PCS INTERFACE (RACK MTD.)
6	1	ONE-WAY 3-SECTION 12" R, Y, G, : G ← : SW

SIGNAL HEADS EXISTING TO REMAIN



NEW SIGNAL HEAD



NEW SIGNAL HEAD #14 TO BE NON-METALLIC

FLASH SEQUENCE

HEAD NO.	FLASH
6, 7 8, 9 12, 13, 14	Y
1, 2 3, 4, 5 10, 11, 15	R

NOTES:

1. INSTALL ADDITIONAL 2" WEATHERHEAD ON POLE 22 TO ACCOMODATE EXTRA WIRING. BID AS PART OF ITEM 660007-001(07).
2. ALL SPEED LOOPS ARE EX. AND SHALL BE REUSED. REWIRE EX. LPS-C DETECTORS TO NEW CONTROLLER TO MAKE FUNCTION PROPERLY. REUSE EX. DETECTOR FEEDER CABLE.
3. ALL LOOPS TO BE REUSED (SPEED LOOPS) SHALL BE TESTED BY THE CONTRACTOR TO ENSURE THEY ARE FUNCTIONING PROPERLY. IF NOT WORKING PROPERLY, NOTIFY WVDOH TRAFFIC ENGINEERING DIVISION (304-558-3063). BID WORK AS PART OF ITEM 660007-001(07).

POLE CHART

	FOOTER OR POLE NO.	TYPE	UPRIGHT POLE: POLE MOUNTED SIGNAL ATTACHMENT DIM "K"	DIM "L"	HEIGHT	O. D.	WALL GA.	LOCATION
P23	C1				30'	12"	2 ply 3	Exisiting To Remain As Is
P24	C1		15'	3'-10"	30'	12"	2 ply 3	Exisiting To Remain As Is
P25	C1				30'	12"	2 ply 3	Exisiting To Remain As Is
P26	C1		15'	3'-10"	30'	12"	2 ply 3	Exisiting To Remain As Is

LEGEND

- CONTROLLER
- JUNCTION BOX (TYPE H) (EXISTING)
- CONDUIT (PROPOSED)
- CONDUIT (EXISTING)
- SIGNAL POLE (EXISTING)
- TRAFFIC SIGNAL HEAD
- VIDEO CAMERA
- DETECTION ZONE
- LUMINAIRE (EXISTING)
- UTILITY POLE

I/S #7

SCALE : 0 — 20'

REVISION NUMBER	SHEET NUMBER	REVISION	DATE	BY

SIGNAL LAYOUT
US 340 at PATRICK HENRY WAY
CHARLES TOWN, JEFFERSON CO.

C:\Users\Default\Signals\District 5\Jefferson\US 340 System\trf_sgl_US 340 at Patrick Henry Way(*7).dgn cchandler 21-MAR-2005 10:56 TRAFFIC ENGINEERING DIVISION

Vehicle Basic Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min. Green	8	25	8	12	8	25	10	15	0	0	0	0	0	0	0	0
Passage	4	5	4	5	4	5	4	5	0	0	0	0	0	0	0	0
Maximum 1	20	35	16	20	12	35	25	35	0	0	0	0	0	0	0	0
Maximum 2	25	60	18	25	12	60	30	50	0	0	0	0	0	0	0	0
Yellow Change	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
Red Clearance	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0

Vehicle Density Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Added Init/Act	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Init	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Gap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flashing Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Extended Pedestrian Clear	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm
Actuated Rest In Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

General Control

Phase	Initial	Non-Actuated Response	Vehicle Recalls	Ped Recalls	Recall Delay
1	1 - Inactive	0 - None	0 - None	0 - None	0
2	4 - Green	3 - Both	2 - Min	0 - None	0
3	1 - Inactive	0 - None	0 - None	0 - None	0
4	1 - Inactive	0 - None	0 - None	0 - None	0
5	1 - Inactive	0 - None	0 - None	0 - None	0
6	4 - Green	3 - Both	2 - Min	0 - None	0
7	0 - None	0 - None	0 - None	0 - None	0
8	0 - None	0 - None	0 - None	0 - None	0
9	0 - None	0 - None	0 - None	0 - None	0
10	0 - None	0 - None	0 - None	0 - None	0
11	0 - None	0 - None	0 - None	0 - None	0
12	0 - None	0 - None	0 - None	0 - None	0
13	0 - None	0 - None	0 - None	0 - None	0
14	0 - None	0 - None	0 - None	0 - None	0
15	0 - None	0 - None	0 - None	0 - None	0
16	0 - None	0 - None	0 - None	0 - None	0

Miscellaneous

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Locking Memory	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dual Entry	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Last Car Passage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Conditional Service	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
No Simultaneous Gap Out	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Dial 3/Split 1

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	25	46	22	27	17	54	0	0
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	31	14	18	14	31		
Min Ped Time	0	0	0	0	0	0		

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	18	0	2
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 2

Cycle Length	120

Phase	1	2	3	4	5	6	7	8
Time	25	46	22	27	17	54	0	0
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	14	31	14	18	14	31		
Min Ped Time	0	0	0	0	0	0		

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	18	0	2
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Appendix F

Signal Warrant Analysis

Appendix F-1

Int 6: WV 9 with Cattail Run Road Signal Warrant 1 – Eight Hour Vehicular Volume

WARRANT 1 -- EIGHT-HOUR VEHICULAR VOLUME

2021 Existing Year

Major Street	**WV 9**
Minor Street	**Cattail Run Road**
Jurisdiction	**Ranson**
85% Speed > 40 mph	**YES**
Population < 10K	**YES**
# of Lanes on Major Street	**2**
# of Lanes on Minor Street	**1**
Minor St. Right Turns Discounted	**YES**
Have five (5) correctable crashes occurred in 1 year?	**UNKOWN**

HOUR	MAJOR ST VOLUME	MINOR ST VOLUME
7-8 AM	**761**	**61**
8-9 AM	**678**	**44**
9-10 AM	**339**	**25**
10-11 AM	**366**	**35**
11-12 PM	**395**	**32**
12-1 PM	**420**	**37**
1-2 PM	**481**	**35**
2-3 PM	**815**	**63**
3-4 PM	**976**	**65**
4-5 PM	**1278**	**106**
5-6 PM	**1138**	**124**
6-7 PM	**915**	**57**

FINDINGS:

Condition 'A' Satisfied	**NO**
Condition 'B' Satisfied	**NO**
Combination 'A' & 'B' Satisfied	**NO**
WARRANT 1 Satisfied?	**NO**

COMMENTS:

Pagones Theorem was utilized to adjust the right turn volume on Cattail Run Road (40% reduction in right turns)

WARRANT 1 -- EIGHT-HOUR VEHICULAR VOLUME
CONDITION 'A' -- MINIMUM VEHICULAR VOLUME

Major Street	WV 9
Minor Street	Cattail Run Road
Jurisdiction	Ranson
85% Speed > 40 mph	YES
Population < 10K	YES
# of Lanes on Major Street	2
# of Lanes on Minor Street	1
Minor St. Right Turns Discounted	YES
Major St. Warranting Volume	600
Minor St. Warranting Volume	150
30% Warrant Volume Reduction	YES

HOUR	MAJOR STREET VOLUME	MINOR STREET VOLUME	MAJOR ST WARRANT VOLUME	MINOR ST WARRANT VOLUME	HOUR MET
7-8 AM	761	61	420	105	NO
8-9 AM	678	44	420	105	NO
9-10 AM	339	25	420	105	NO
10-11 AM	366	35	420	105	NO
11-12 PM	395	32	420	105	NO
12-1 PM	420	37	420	105	NO
1-2 PM	481	35	420	105	NO
2-3 PM	815	63	420	105	NO
3-4 PM	976	65	420	105	NO
4-5 PM	1278	106	420	105	YES
5-6 PM	1138	124	420	105	YES
6-7 PM	915	57	420	105	NO

FINDINGS:

Number of Hours Condition 'A' Met	2
Condition 'A' Satisfied?	**NO**

COMMENTS:

WARRANT 1 -- EIGHT-HOUR VEHICULAR VOLUME
CONDITION 'B' -- INTERRUPTION OF CONTINUOUS TRAFFIC

Major Street	WV 9
Minor Street	Cattail Run Road
Jurisdiction	Ranson
85% Speed > 40 mph	YES
Population < 10K	YES
# of Lanes on Major Street	2
# of Lanes on Minor Street	1
Minor St. Right Turns Discounted	YES
Major St. Warranting Volume	900
Minor St. Warranting Volume	75
30% Warrant Volume Reduction	YES

HOUR	MAJOR STREET VOLUME	MINOR STREET VOLUME	MAJOR ST WARRANT VOLUME	MINOR ST WARRANT VOLUME	HOUR MET
7-8 AM	761	61	630	53	YES
8-9 AM	678	44	630	53	NO
9-10 AM	339	25	630	53	NO
10-11 AM	366	35	630	53	NO
11-12 PM	395	32	630	53	NO
12-1 PM	420	37	630	53	NO
1-2 PM	481	35	630	53	NO
2-3 PM	815	63	630	53	YES
3-4 PM	976	65	630	53	YES
4-5 PM	1278	106	630	53	YES
5-6 PM	1138	124	630	53	YES
6-7 PM	915	57	630	53	YES

FINDINGS:

Number of Hours Condition 'B' Met	6
Condition 'B' Satisfied?	**NO**

COMMENTS:

WARRANT 1 -- EIGHT-HOUR VEHICULAR VOLUME
COMBINATION OF CONDITION 'A' & 'B' (80% VOLUME)

Major Street	WV 9
Minor Street	Cattail Run Road
Jurisdiction	Ranson

CONDITION 'A'

HOUR	MAJOR STREET VOLUME	MINOR STREET VOLUME	MAJOR ST WARRANT VOLUME	MINOR ST WARRANT VOLUME	HOUR MET
7-8 AM	761	61	336	84	NO
8-9 AM	678	44	336	84	NO
9-10 AM	339	25	336	84	NO
10-11 AM	366	35	336	84	NO
11-12 PM	395	32	336	84	NO
12-1 PM	420	37	336	84	NO
1-2 PM	481	35	336	84	NO
2-3 PM	815	63	336	84	NO
3-4 PM	976	65	336	84	NO
4-5 PM	1278	106	336	84	YES
5-6 PM	1138	124	336	84	YES
6-7 PM	915	57	336	84	NO

CONDITION 'B'

HOUR	MAJOR STREET VOLUME	MINOR STREET VOLUME	MAJOR ST WARRANT VOLUME	MINOR ST WARRANT VOLUME	HOUR MET
7-8 AM	761	61	504	42	YES
8-9 AM	678	44	504	42	YES
9-10 AM	339	25	504	42	NO
10-11 AM	366	35	504	42	NO
11-12 PM	395	32	504	42	NO
12-1 PM	420	37	504	42	NO
1-2 PM	481	35	504	42	NO
2-3 PM	815	63	504	42	YES
3-4 PM	976	65	504	42	YES
4-5 PM	1278	106	504	42	YES
5-6 PM	1138	124	504	42	YES
6-7 PM	915	57	504	42	YES

FINDINGS:

Number of Hours Combination A&B Met	2
Combination of A&B Satisfied?	**NO**

COMMENTS:

Pagones Theorem* provided by IDOT (modified for WVDOT)

First, determine which lane configuration represents the leg that is being studied. Then, based on the movements for each hour, find the percent reduction for each hour with Pagones Theorem.

Pagones Theorem

Situation	Approach configuration	Condition	Reduction of right turns
1	Shared Left/ Through/Right	$R > 0.7A$ $0.7A$ ε $R > 0.35A$ R δ $0.35A$	Reduce R by 60 percent Reduce R by 40 percent Reduce R by 20 percent
2	Exclusive Left, Shared Through/ Right	$R > 3T$ $3T$ ε $R > T/3$ R δ $T/3$	Reduce R by 60 percent Reduce R by 40 percent Reduce R by 20 percent
3	Any configuration with an exclusive right turn lane (min 125' for WVDOT)		Reduce R by 75 percent in all cases
4	Shared Left/Through and Shared Through/Right	$R > (T + L)$ $L > (T + R)$ $L = T = R$ (±10 vehicles) $L = T > 3R$ $R = T > 3L$ All other cases	Reduce R by 65 percent Use Situation 2 Reduce R by 40 percent Reduce R by 20 percent Reduce R by 50 percent Reduce R by 30 percent
5	Exclusive Left, Exclusive Through and Shared Through/Right	$R > T$ T ε $R > T/2$ $T/2$ ε $R > T/4$ R δ $T/4$	Reduce R by 75 percent Reduce R by 50 percent Reduce R by 30 percent Reduce R by 15 percent

Where: L = number of left turning vehicles in approach;
T = number of through vehicles in approach;
R = number of right turning vehicles in approach; and
$A = (L + T + R)$.

VEHICLE AND PEDESTRIAN VOLUME SUMMARY

COUNT LOCATION	
CITY	Ranson
STATE	WV
DATE	4/30/2021
INTERSECTION	Int 6: WV 9 @ Cattail Run Rd
COUNT BY	AMT

Friday - 12 Hour Count

STREET	Cattail Run Rd					Cattail Run Rd					WV 9				WV 9				Total			PEAK HR
	From North					From South					From East				From West							
TIME	L	T	R	R*	TOT	L	T	R	R*	TOT	L	T	R	TOT	L	T	R	TOT	N-S	E-W	ALL	
0700 - 0715	13	1	1	1	15	0	7	1	1	8	0	33	2	35	0	155	0	155	23	190	213	213
0715 - 0730	9	0	3	2	12	1	3	6	4	10	0	48	4	52	1	143	0	144	22	196	218	431
0730 - 0745	13	0	2	1	15	1	2	2	1	5	0	48	10	58	0	133	2	135	20	193	213	644
0745 - 0800	16	4	2	1	22	1	1	2	1	4	0	58	3	61	2	119	0	121	26	182	208	852
0800 - 0815	**12**	**0**	**2**	**1**	**14**	**1**	**9**	**1**	**1**	**11**	**0**	**62**	**2**	**64**	**1**	**121**	**1**	**123**	**25**	**187**	**212**	851
0815 - 0830	**10**	**1**	**0**	**0**	**11**	**3**	**5**	**3**	**2**	**11**	**0**	**47**	**4**	**51**	**0**	**129**	**1**	**130**	**22**	**181**	**203**	836
0830 - 0845	**7**	**3**	**1**	**1**	**11**	**2**	**2**	**4**	**2**	**8**	**0**	**51**	**4**	**55**	**1**	**111**	**0**	**112**	**19**	**167**	**186**	809
0845 - 0900	**8**	**0**	**2**	**1**	**10**	**0**	**3**	**2**	**1**	**5**	**1**	**47**	**6**	**54**	**1**	**87**	**1**	**89**	**15**	**143**	**158**	***759***
0900 - 0915	2	3	1	1	6	2	2	1	1	5	0	56	2	58	0	41	2	43	11	101	112	659
0915 - 0930	5	2	0	0	7	1	8	1	1	10	0	23	1	24	0	33	1	34	17	58	75	531
0930 - 0945	1	1	0	0	2	2	4	0	0	6	1	42	1	44	0	50	1	51	8	95	103	448
0945 - 1000	4	2	1	1	7	1	3	2	1	6	0	40	4	44	0	41	0	41	13	85	98	388
1000 - 1015	5	1	0	0	6	1	4	4	2	9	0	43	5	48	1	39	1	41	15	89	104	380
1015 - 1030	5	1	2	1	8	1	8	2	1	11	0	44	2	46	1	45	0	46	19	92	111	416
1030 - 1045	9	1	1	1	11	4	6	2	1	12	0	40	6	46	0	39	2	41	23	87	110	423
1045 - 1100	6	2	2	1	10	2	4	1	1	7	1	48	3	52	0	44	2	46	17	98	115	440
1100 - 1115	10	2	3	2	15	1	1	3	2	5	0	57	4	61	0	43	1	44	20	105	125	461
1115 - 1130	4	1	1	1	6	4	7	0	0	11	0	43	4	47	0	41	0	41	17	88	105	455
1130 - 1145	4	3	1	1	8	1	7	0	0	8	1	47	2	50	3	39	0	42	16	92	108	453
1145 - 1200	3	1	2	1	6	0	4	0	0	4	0	56	4	60	0	49	1	50	10	110	120	458
1200 - 1215	6	4	2	1	12	0	3	1	1	4	0	36	4	40	1	47	1	49	16	89	105	438
1215 - 1230	5	6	4	2	15	2	8	4	2	14	2	49	5	56	0	39	1	40	29	96	125	458
1230 - 1245	4	2	1	1	7	3	3	0	0	6	0	48	4	52	3	51	1	55	13	107	120	470
1245 - 1300	3	2	2	1	7	2	9	1	1	12	0	67	5	72	0	56	0	56	19	128	147	497
1300 - 1315	5	3	0	0	8	1	2	2	1	5	0	59	5	64	0	50	2	52	13	116	129	521
1315 - 1330	1	5	2	1	8	0	4	0	0	4	2	45	3	50	4	48	0	52	12	102	114	510
1330 - 1345	8	1	3	2	12	3	3	1	1	7	1	57	2	60	2	63	2	67	19	127	146	536
1345 - 1400	7	1	2	1	10	1	1	1	1	3	0	67	7	74	2	58	2	62	13	136	149	538
1400 - 1415	8	0	1	1	9	5	2	2	1	9	2	86	4	92	1	66	1	68	18	160	178	587
1415 - 1430	6	4	3	2	13	0	5	0	0	5	2	127	7	136	2	54	0	56	18	192	210	683
1430 - 1445	13	7	2	1	22	2	6	2	1	10	2	123	18	143	1	70	1	72	32	215	247	784
1445 - 1500	12	8	2	1	22	0	5	0	0	5	0	153	12	165	1	80	2	83	27	248	275	910
1500 - 1515	11	4	3	2	18	2	6	1	1	9	0	131	11	142	2	86	0	88	27	230	257	989
1515 - 1530	8	6	3	2	17	2	4	1	1	7	1	133	13	147	1	79	1	81	24	228	252	1031
1530 - 1545	5	3	2	1	10	0	7	2	1	9	1	174	13	188	2	77	0	79	19	267	286	1070
1545 - 1600	14	8	2	1	24	0	8	3	2	11	2	145	16	163	1	86	1	88	35	251	286	1081
1600 - 1615	**12**	**5**	**5**	**3**	**22**	**2**	**5**	**2**	**1**	**9**	**5**	**143**	**12**	**160**	**5**	**103**	**7**	**115**	**31**	**275**	**306**	1130
1615 - 1630	**8**	**7**	**13**	**8**	**28**	**3**	**4**	**1**	**1**	**8**	**2**	**171**	**21**	**194**	**3**	**96**	**37**	**136**	**36**	**330**	**366**	1244
1630 - 1645	**16**	**6**	**16**	**10**	**38**	**2**	**1**	**2**	**1**	**5**	**2**	**183**	**16**	**201**	**1**	**122**	**43**	**166**	**43**	**367**	**410**	1368
1645 - 1700	**10**	**8**	**22**	**13**	**40**	**2**	**6**	**1**	**1**	**9**	**3**	**174**	**10**	**187**	**4**	**86**	**29**	**119**	**49**	**306**	**355**	***1437***
1700 - 1715	17	6	13	8	36	3	4	1	1	8	3	166	13	182	1	81	15	97	44	279	323	1454
1715 - 1730	18	10	15	9	43	0	5	0	0	5	3	149	15	167	0	56	10	66	48	233	281	1369
1730 - 1745	12	8	15	9	35	1	4	1	1	6	4	169	15	188	2	119	32	153	41	341	382	1341
1745 - 1800	11	8	14	8	33	1	3	2	1	6	1	149	15	165	2	85	33	120	39	285	324	1310
1800 - 1815	10	5	5	3	20	2	6	1	1	9	3	158	14	175	0	78	8	86	29	261	290	1277
1815 - 1830	7	5	3	2	15	0	1	0	0	1	1	158	15	174	2	70	0	72	16	246	262	1258
1830 - 1845	3	6	7	4	16	0	6	1	1	7	5	151	16	172	1	50	0	51	23	223	246	1122
1845 - 1900	6	5	2	1	13	1	2	0	0	3	0	129	11	140	1	44	0	45	16	185	201	999

R* = Reduced Right-Turn volume utilizing Pagones Threorem

Appendix F-2

Int 6: WV 9 with Cattail Run Road Signal Warrant 2 – Four Hour Vehicular Volume

Warrant 2: Four-hour Vehicular Volume

6: WV 9 with Cattail Run Road

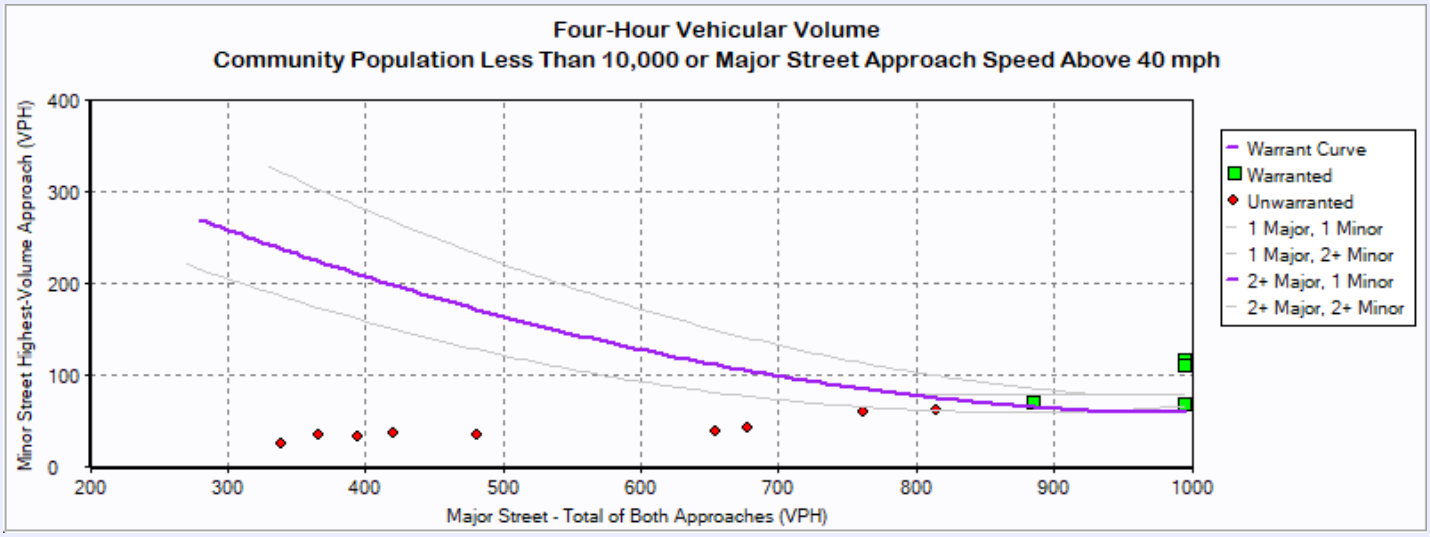
Intersection Informatior

	Major Street	Minor Street
Street Name	WV 9	Cattail Run Rd
Direction	EB/WB	NB/SB
Number of Lanes	2	1
Approch Speed	60	35

Warrant 2 Met? **Yes**

Details:

Notes	4 Hours met (4 required)
Low populatior	Yes



Hourly Volumes

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
00:00:00 - 01:00:00	0	0
01:00:00 - 02:00:00	0	0
02:00:00 - 03:00:00	0	0
03:00:00 - 04:00:00	0	0
04:00:00 - 05:00:00	0	0
05:00:00 - 06:00:00	0	0
06:00:00 - 07:00:00	0	0
07:00:00 - 08:00:00	761	61
08:00:00 - 09:00:00	678	44
09:00:00 - 10:00:00	339	26
10:00:00 - 11:00:00	366	35
11:00:00 - 12:00:00	395	33
12:00:00 - 13:00:00	420	37
13:00:00 - 14:00:00	481	35
14:00:00 - 15:00:00	815	63
15:00:00 - 16:00:00	976	65
16:00:00 - 17:00:00	1,278	106
17:00:00 - 18:00:00	1,138	124
18:00:00 - 19:00:00	915	57
19:00:00 - 20:00:00	0	0
20:00:00 - 21:00:00	0	0
21:00:00 - 22:00:00	0	0
22:00:00 - 23:00:00	0	0

23:00:00 - 00:00:00	0	0

Warranted Hours

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
14:15:00 - 15:15:00	885.00	71.00
15:15:00 - 16:15:00	1,021.00	68.00
16:15:00 - 17:15:00	1,282.00	117.00
17:15:00 - 18:15:00	1,120.00	111.00

Note: Only data of hours warranted is represented in the above table.

Appendix G

HCS Weaving Analysis

Appendix G-1

2025 Build Conditions
AM Peak Hour

HCS7 Freeway Weaving Report

Project Information

Analyst	AMT	Date	10/28/2021
Agency		Analysis Year	2025
Jurisdiction	Charles Town	Time Analyzed	AM Peak
Project Description	Fritts Farm TIS	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (L_S), ft	750	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	750	518	0	0
Peak Hour Factor (PHF)	0.90	0.90	0.94	0.94
Total Trucks, %	7.00	7.00	0.00	0.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.935	1.000	1.000
Flow Rate (v_i), pc/h	891	616	0	0
Weaving Flow Rate (v_W), pc/h	616	Freeway Max Capacity (c_{IFL}), pc/h/ln		2400
Non-Weaving Flow Rate (v_{NW}), pc/h	891	Density-Based Capacity (c_{IWL}), pc/h/ln		1939
Total Flow Rate (v), pc/h	1507	Demand Flow-Based Capacity (c_{IW}), pc/h		5868
Volume Ratio (VR)	0.409	Weaving Segment Capacity (c_W), veh/h		3626
Minimum Lane Change Rate (LC_{MIN}), lc/h	616	Adjusted Weaving Area Capacity, pc/h		3754
Maximum Weaving Length (L_{MAX}), ft	6782	Volume-to-Capacity Ratio (v/c)		0.40

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	67	Average Weaving Speed (S_W), mi/h	61.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	205	Average Non-Weaving Speed (S_{NW}), mi/h	65.4
Weaving Lane Change Rate (LC_W), lc/h	674	Average Speed (S), mi/h	63.8
Weaving Lane Change Rate (LC_{All}), lc/h	879	Density (D), pc/mi/ln	11.8
Weaving Intensity Factor (W)	0.256	Level of Service (LOS)	B

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Appendix G-2

2025 Build Conditions
PM Peak Hour

HCS7 Freeway Weaving Report

Project Information

Analyst	AMT	Date	10/28/2021
Agency		Analysis Year	2025
Jurisdiction	Charles Town	Time Analyzed	PM Peak
Project Description	Fritts Farm TIS	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (L_S), ft	750	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	813	670	0	0
Peak Hour Factor (PHF)	0.90	0.90	0.94	0.94
Total Trucks, %	7.00	7.00	0.00	0.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.935	1.000	1.000
Flow Rate (v_i), pc/h	966	796	0	0
Weaving Flow Rate (v_W), pc/h	796	Freeway Max Capacity (c_{IFL}), pc/h/ln		2400
Non-Weaving Flow Rate (v_{NW}), pc/h	966	Density-Based Capacity (c_{IWL}), pc/h/ln		1901
Total Flow Rate (v), pc/h	1762	Demand Flow-Based Capacity (c_{IW}), pc/h		5310
Volume Ratio (VR)	0.452	Weaving Segment Capacity (c_W), veh/h		3555
Minimum Lane Change Rate (LC_{MIN}), lc/h	796	Adjusted Weaving Area Capacity, pc/h		3680
Maximum Weaving Length (L_{MAX}), ft	7271	Volume-to-Capacity Ratio (v/c)		0.48

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	72	Average Weaving Speed (S_W), mi/h	60.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	220	Average Non-Weaving Speed (S_{NW}), mi/h	63.5
Weaving Lane Change Rate (LC_W), lc/h	854	Average Speed (S), mi/h	61.9
Weaving Lane Change Rate (LC_{All}), lc/h	1074	Density (D), pc/mi/ln	14.2
Weaving Intensity Factor (W)	0.300	Level of Service (LOS)	B

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Appendix H

Adjacent Background Developments

Appendix H-1

Pending Flynn Property TIS

Proposed TIS Scope of Work (SOW)

Flynn Property Residential Development TIS
Ranson, Jefferson County
July 8, 2021

Purpose

The purpose of this SOW document is to delineate the assumptions of the Traffic Impact Study (TIS) for the proposed development project. Confirming assumptions at the beginning of the project helps to assure that the TIS will be completed only once and in a timely matter. This memorandum aims to create a communicative line between the WVDOH, the client, and the traffic engineer to discuss all of the issues involved with completing the TIS. This document will cover the following topics:

- Study Methodology
- Intersections to be studied
- Trip Generation
- Trip Distribution
- Site Access
- Approved Developments

Client Information

AMT is preparing this study on behalf of *DR Horton* from the following business address:

181 Harry S Truman Parkway, Suite 250
Annapolis, MD 21401

Study Methodology

The site is located northeast of the interchange of WV 9 with US 340 and WV 51 within the City of Ranson, Jefferson County. Site access is proposed via two connections to Jefferson Terrace, an access to Patrick Henry Way via the undeveloped Captain Chews Trace, and to Deep Creek Road and Shallow Creek Road in the Shenandoah Springs neighborhood. No new driveways are proposed to the state highway system. Both the AM (7-9 AM) and PM (3-6 PM) peak hours will be studied.

The analysis will follow the TED 106-2 along with applicable ITE and Highway Capacity methodologies which include four (4) individual analyses of each intersection:

- 2021 Existing Conditions
- 2025 Future No-Build Conditions (without proposed development and without any approved adjacent development in place)
- 2025 Future No-Build Conditions (without proposed development and with any approved adjacent development in place)
- 2025 Future Build Conditions (without the proposed development in place)
- 2025 Future Build Conditions (with the proposed development in place)
- 2025 Future Build Improved Conditions (with the proposed development and recommended improvements in place)

Traffic analysis will consider Future Build conditions at the build-out year. Based upon current information, the development is assumed to fully built by 2025. A growth rate has been requested from WVDOH Planning Division and will be utilized to determine future traffic volumes.

The analyses will be performed using the Synchro 10.3 and Sidra 9.0 software packages. Synchro will be utilized for signalized and stop controlled intersections and Sidra will be utilized for all roundabout controlled intersections. SimTraffic based upon the Synchro models will be utilized for queuing analyses.

Number of Intersections to be Studied

The following nine (9) existing intersections will be included in the study for capacity analysis:

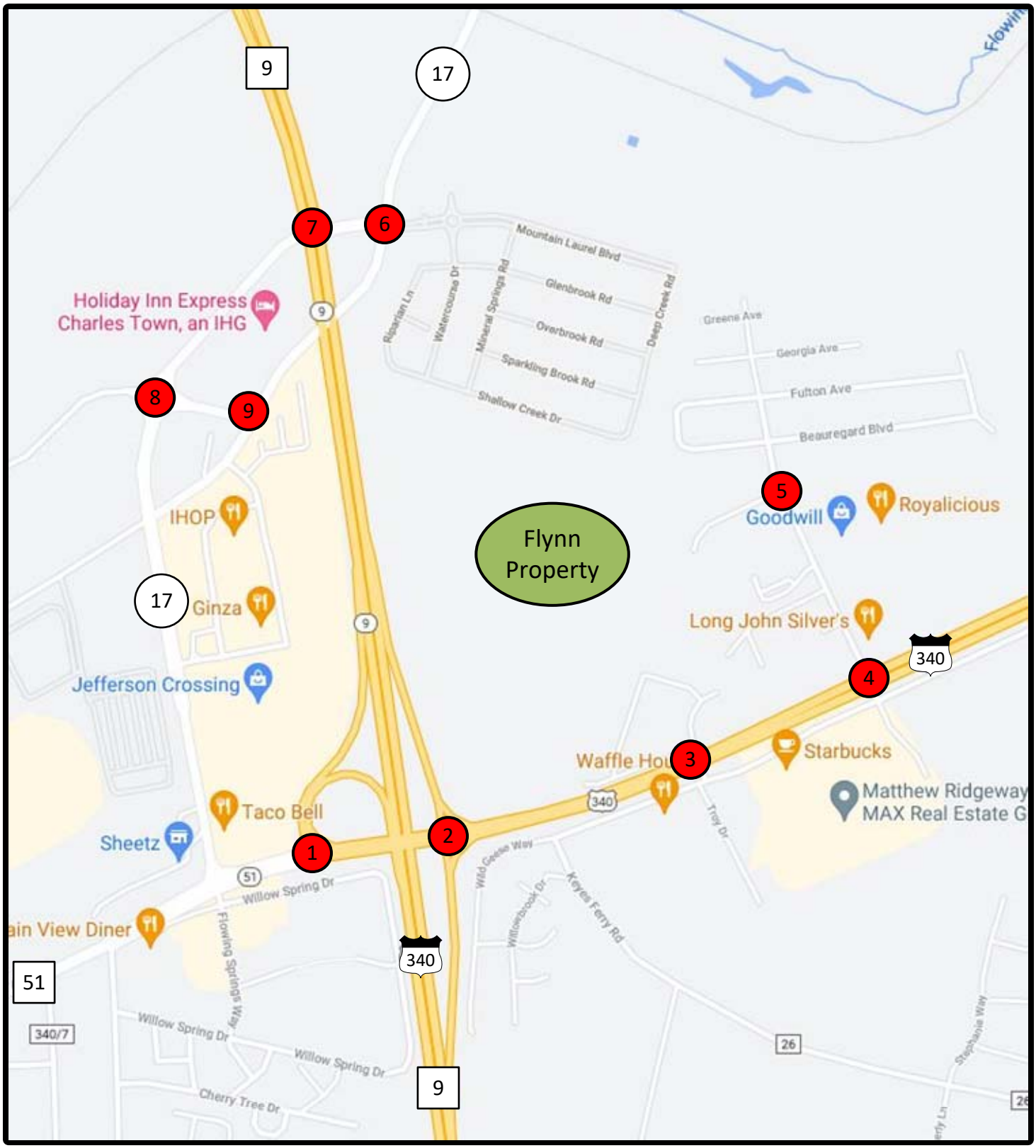
1) US 340 with WV 9 Eastbound
    - Existing: Signalized "T" Intersection
2) US 340 with WV 9 Westbound
    - Existing: Signalized Plus Intersection
3) US 340 with Keyes Ferry Road (CR 26)/Jefferson Terrace Road
    - Existing: Signalized Plus Intersection
4) US 340 with Patrick Henry Way
    - Existing: Signalized Plus Intersection
5) Patrick Henry Way with Captain Chews Trace/Patrick Henry Apartments Driveway
    - Existing: Stop Controlled Plus Intersection
6) Flowing Springs Road with Mount Laurel Boulevard
    - Existing: Stop Controlled Plus Intersection
7) Mount Laurel Boulevard/5th Avenue with WV 9
    - Existing: Stop Controlled Plus Intersection
8) Flowing Springs Road with 5th Avenue
    - Existing: Roundabout Plus Intersection
9) Flowing Springs Road with Pacesetter Way
    - Existing: Stop Controlled "T" Intersection

Site access will be provided by the following connections:

- Site Access #1 is a connection to the current dead end of Jefferson Terrace – Jefferson Terrace intersects with US 340 opposite Keyes Ferry Road
- Site Access #2 is a connection to Jefferson Terrace at the 90 degree turn at the north end of this neighborhood creating a "T" Intersection
- Site Access #3 is a connection to the dead end of undeveloped Captain Chews Trace – Captain Chews Trace intersects with Patrick Henry Way opposite the Patrick Henry Apartments north of the Wal-Mart shopping center
- Site Access #4 is a connection to Shallow Creek Drive and Deep Creek Road creating a "T" Intersection

None of the proposed site access roadways create new intersections with the state highway system and the connection points appear to simple and do not merit analysis. All site connections will be within the City of Ranson.

Figure 1 shows the study area and key intersections. Figure 2 shows the current conceptual site plan with proposed access.



LEGEND

= Development

= Existing Intersection

= Proposed Intersection

AMT

N

NOT TO SCALE

Flynn Property Residential Dev TIS

Site Location Map

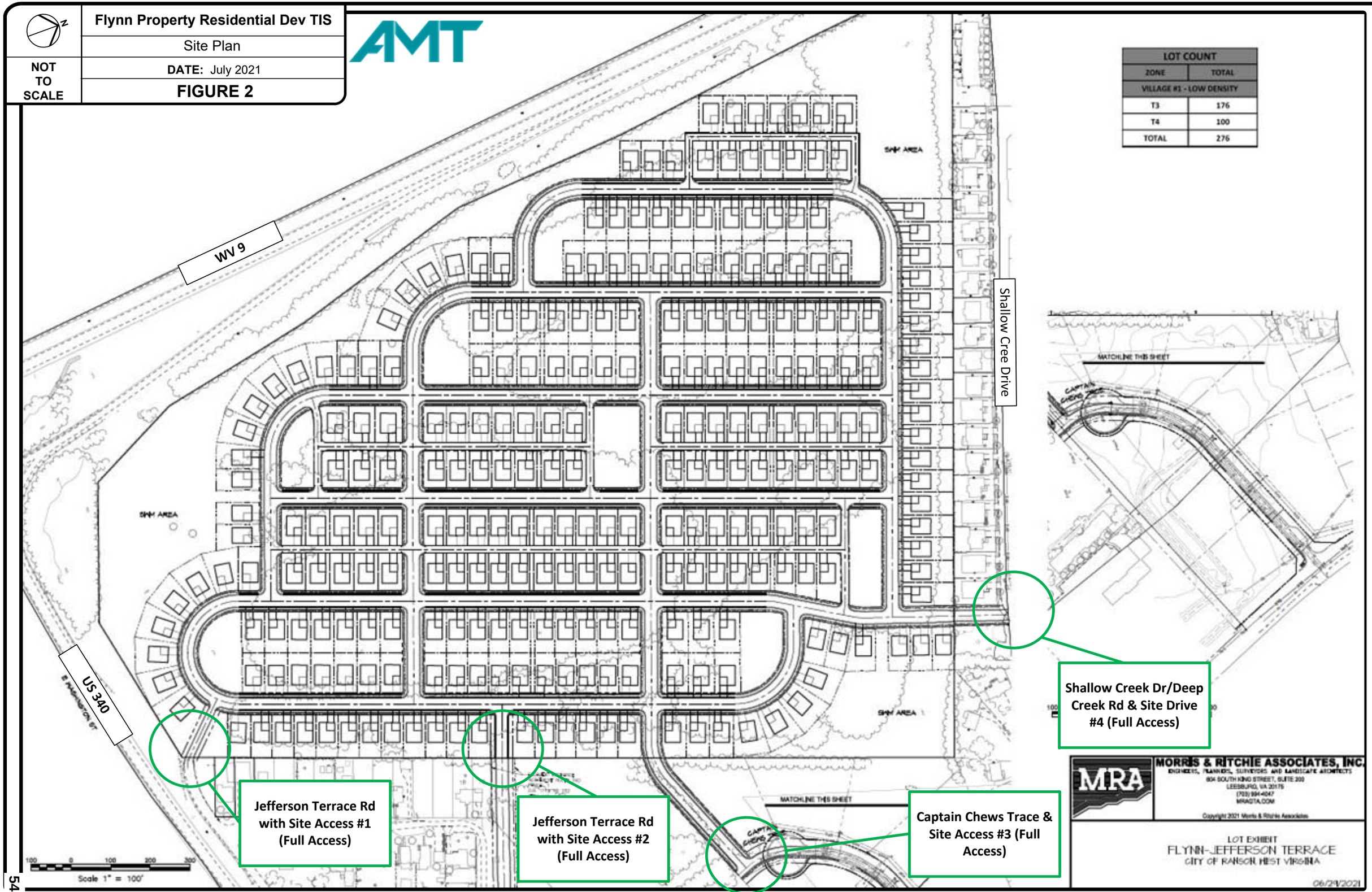
DATE: July 2021

FIGURE 1

NOT TO SCALE	**Flynn Property Residential Dev TIS**
	Site Plan
	DATE: July 2021
	FIGURE 2

AMT

LOT COUNT	
ZONE	TOTAL
VILLAGE #1 - LOW DENSITY	
T3	176
T4	100
TOTAL	276



Existing Traffic Data Collection

With the reopening of public schools and traffic volumes returning to normal levels, collection of new turning movement counts are suggested. Peak hour turning movement counts at each existing intersection will be collected on a typical Friday when Jefferson County Schools are in session between the hours of 7AM to 9AM and 3PM to 6PM. New Turning Movement counts will be collected at the following locations:

- Patrick Henry Way with Patrick Henry Apartments Driveway
- Flowing Springs Road with Mount Laurel Boulevard
- Mount Laurel Boulevard/5th Avenue with WV 9
- Flowing Springs Road with 5th Avenue
- Flowing Springs Road with Pacesetter Way

The remaining existing intersections are to be collected in part with the proposed Fritts Farm TIS project. The collected data will be compared with previous turning movement data and the current AADT value for US 340 with any noted potential decrease in traffic from Covid-19 impacts will be discussed with WVDOH for potential volume modification.

Trip Generation

The proposed site will be a 276 single-family homes (See Figure 2). Peak hour trip generation will be determined using trip rate data from the latest version of the ITE Trip Generation Manual using Land Use Codes (LUC) 210 (Single-Family Detached Housing).

Trip Distribution

The site-generated trips to and from the proposed residential development will be distributed in accordance with the existing traffic patterns and land uses in the vicinity of the study area. Proposed trip distribution based upon current conditions is as follows:

- 30% to/from the south on WV 9/US 340
- 35% to/from the north on WV 9 (West)
- 30% to/from the east on US 340
- 5% to/from the west on WV 51

Trip distribution will be confirmed once turning movement data is collected and discussed with WVDOH prior to submission of the preliminary TIS document.

Site Access

Access to the site is proposed to be provided by four (4) site access points. Each of these are detailed below:

- Site Access #1 is a connection to the current dead end of Jefferson Terrace – Jefferson Terrace intersects with US 340 opposite Keyes Ferry Road
- Site Access #2 is a connection to Jefferson Terrace at the 90 degree turn at the north end of this neighborhood creating a "T" Intersection
- Site Access #3 is a connection to the dead end of undeveloped Captain Chews Trace – Captain Chews Trace intersects with Patrick Henry Way opposite the Patrick Henry Apartments north of the Wal-Mart shopping center
- Site Access #4 is a connection to Shallow Creek Drive and Deep Creek Road creating a "T" Intersection

Approved Developments

The TIS will potentially include any applicable approved or pending TIS documents for projects in the vicinity of this proposed development, as determined by WVDOH. Preliminary adjacent pending developments will include the following:

- *Pending* Flynn Property TIS (parcel north of US 340 and east of WV 9)
- *Pending* US 340 Mixed Use TIS (parcel south of US 340 near Keyes Ferry Rd)
- *Pending* Country Club Commons TIS (parcel east of Old Country Club Rd and north of US 340)
- Aspen Greens TIS (parcel north of Old Country Club Rd and east of Flowing Springs Rd)

Additional Data Needs

The following information is requested in order to complete the analysis for this project:

- US 340 signal plans including WV 9 EB Ramps, WV 9 WB Ramps, Keyes Ferry Road, and Patrick Henry Way
- Signal timing information for the US 340 signals including coordination plans
- Any potential improvement projects planned in this area

Local Government Coordination

AMT will provide the preliminary and final TIS reports to local government in accordance with the pending Development Agreement with *DR Horton*. Unless directed otherwise by WVDOH, the TIS will be provided to the following entities for comment:

- City of Ranson
- Jefferson County Commission
- Hagerstown Eastern Panhandle MPO

Trip Generation Summary

Alternative: Alternative 1
Phase:
Project: Flynn Property Residential Development TIS

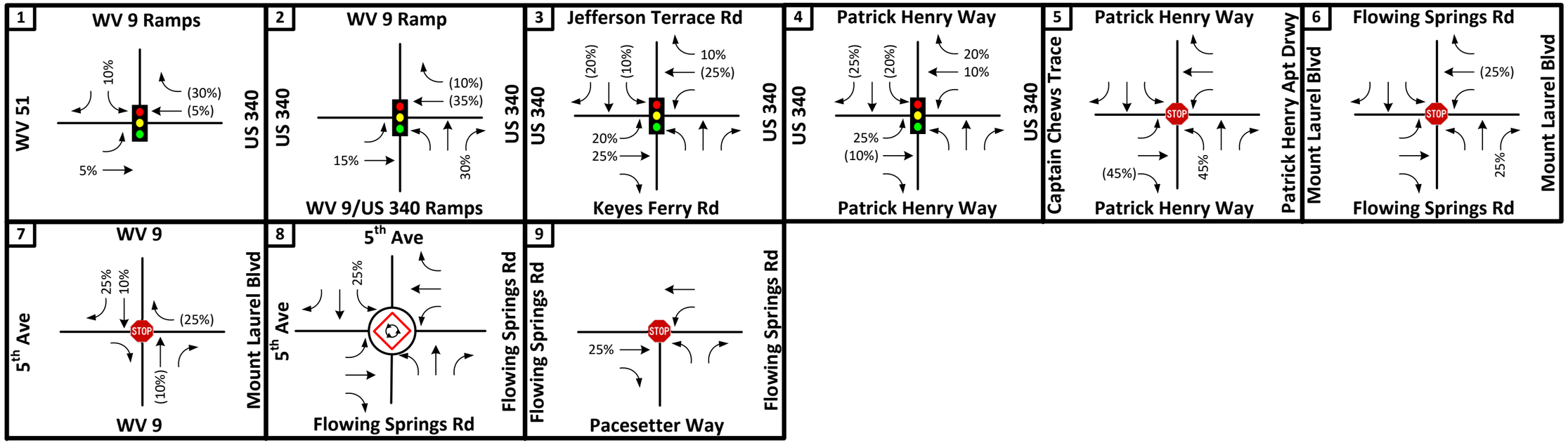
Open Date: 5/21/2021
Analysis Date: 5/21/2021

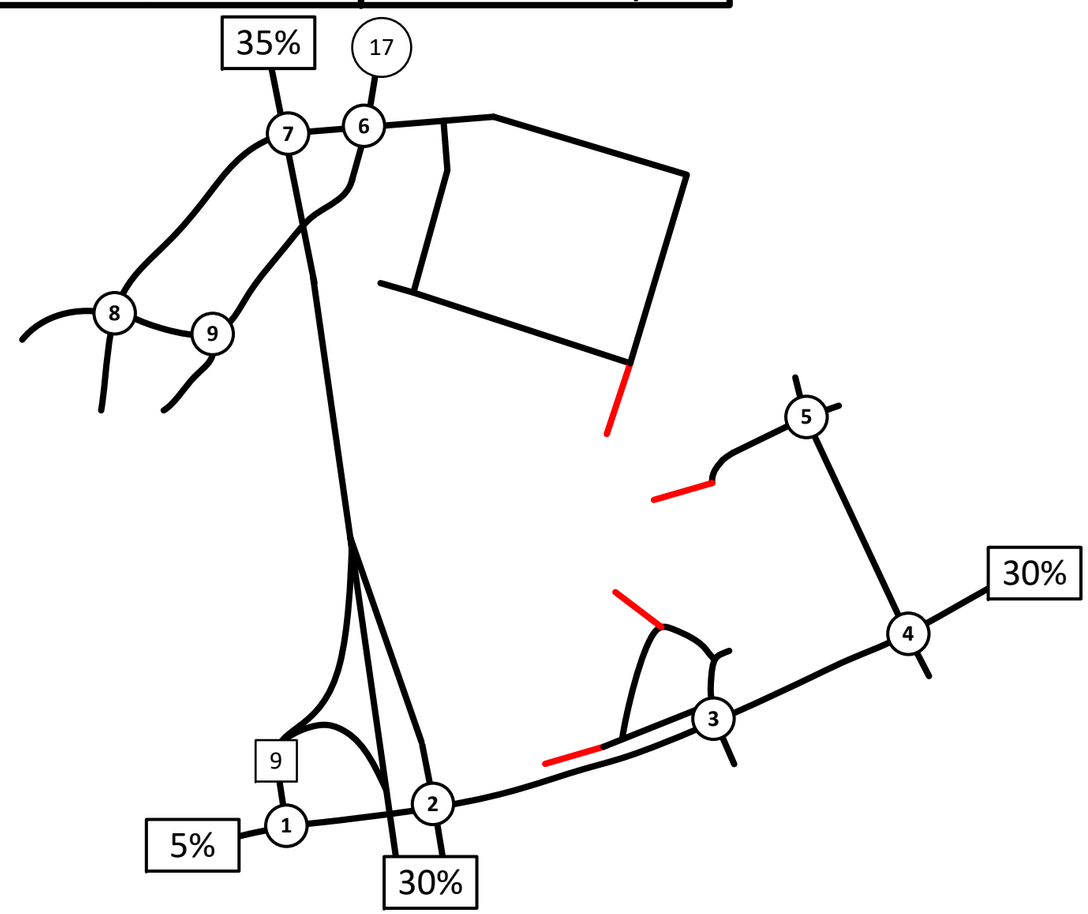
ITE	Land Use	Weekday Average Daily Trips *	Enter	Exit	Total	Weekday AM Peak Hour of Generator *	Enter	Exit	Total	Weekday PM Peak Hour of Generator *	Enter	Exit	Total
210	Single-Family Homes		1308	1307	2615		55	156	211		177	100	277
	277 Dwelling Units												
Unadjusted Volume			1308	1307	2615		55	156	211		177	100	277
Internal Capture Trips			0	0	0		0	0	0		0	0	0
Pass-By Trips			0	0	0		0	0	0		0	0	0
Volume Added to Adjacent Streets			1308	1307	2615		55	156	211		177	100	277

Total Weekday Average Daily Trips Internal Capture = 0 Percent
Total Weekday AM Peak Hour of Generator Internal Capture = 0 Percent
Total Weekday PM Peak Hour of Generator Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 10th Edition





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX% Entering Trip Percentage
- (XX%) Exiting Trip Percentage

N

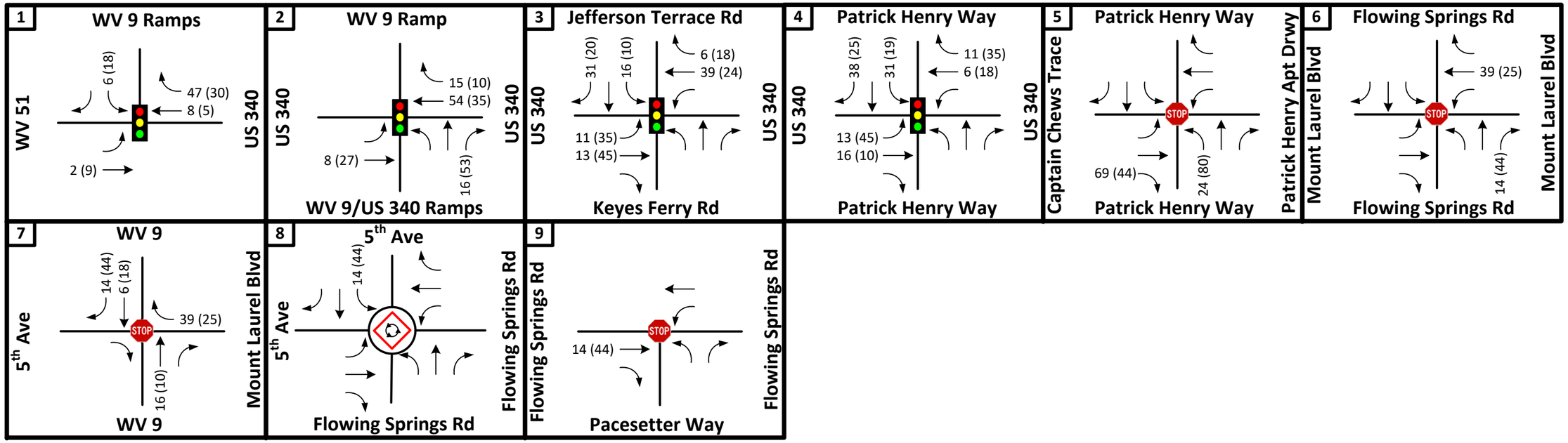
NOT TO SCALE

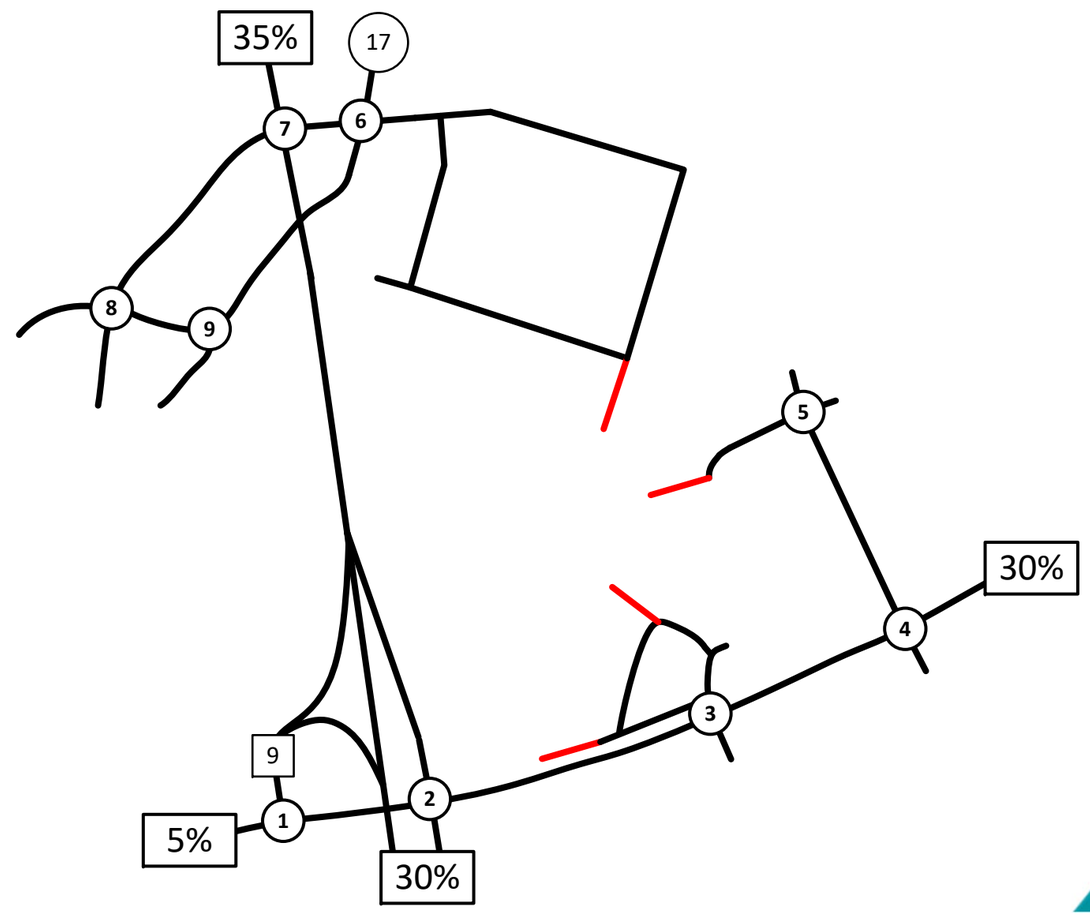
Flynn Property Residential Dev TIS

New Trip Distribution

DATE: August 2021

FIGURE 8





LEGEND

- Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX AM Peak Hour Trips
- (XX) PM Peak Hour Trips

N

NOT TO SCALE

Flynn Property Residential Dev TIS

New Site Trip Assignments

DATE: August 2021

FIGURE 9

Appendix H-2

Pending Green Hill TIS

Proposed TIS Scope of Work (SOW)

Stonecrest Residential Development TIS
Ranson, Jefferson County
June 9, 2021

Purpose

The purpose of this SOW document is to delineate the assumptions of the Traffic Impact Study (TIS) for the proposed development project. Confirming assumptions at the beginning of the project helps to assure that the TIS will be completed only once and in a timely matter. This memorandum aims to create a communicative line between the WVDOH, the client, and the traffic engineer to discuss all of the issues involved with completing the TIS. This document will cover the following topics:

- Client Information
- Study Methodology
- Intersections to be studied
- Trip Generation
- Trip Distribution
- Site Access
- Approved Developments

Client Information

AMT is preparing this study on behalf of *DR Horton* and our contact is *Matt Muddiman.* The business address and phone number for *DR Horton* is as follows:

181 Harry S. Truman Parkway Suite 250
Annapolis, MD 21401
(301)407-2600

Study Methodology

The site is located on the east side of Flowing Springs Road (CR 17) north of Old Country Club Road (CR 24) and south of Job Corps Road (CR 22), approximately 1.4 miles south of Jefferson High School in Jefferson County. Site access is proposed directly to Flowing Springs Road. Both the AM (7-9 AM) and PM (3-6 PM) peak hours will be studied.

The analysis will follow the TED 106-2 along with applicable ITE and Highway Capacity methodologies which include four (4) individual analyses of each intersection:

- 2021 Existing Conditions
- 2025 Future No-Build Conditions (without proposed development and with any approved adjacent development in place)
- 2025 Future Build Conditions (with the proposed development in place)
- 2025 Future Build Improved Conditions (with the proposed development and Recommended Improvements in place)

Traffic analysis will consider Future Build conditions at the build-out year. Based upon current information, the development is assumed to fully built by 2025. A growth rate has been requested from WVDOH Planning Division and will be utilized to determine future traffic volumes.

The analyses will be performed using the SYNCHRO 10.3 and Sidra 9.0 software packages. Synchro will be utilized for signalized and stop controlled intersections and Sidra will be utilized for all roundabout controlled intersections. SimTraffic based upon the Synchro models will be utilized for queuing analyses.

Number of Intersections to be Studied

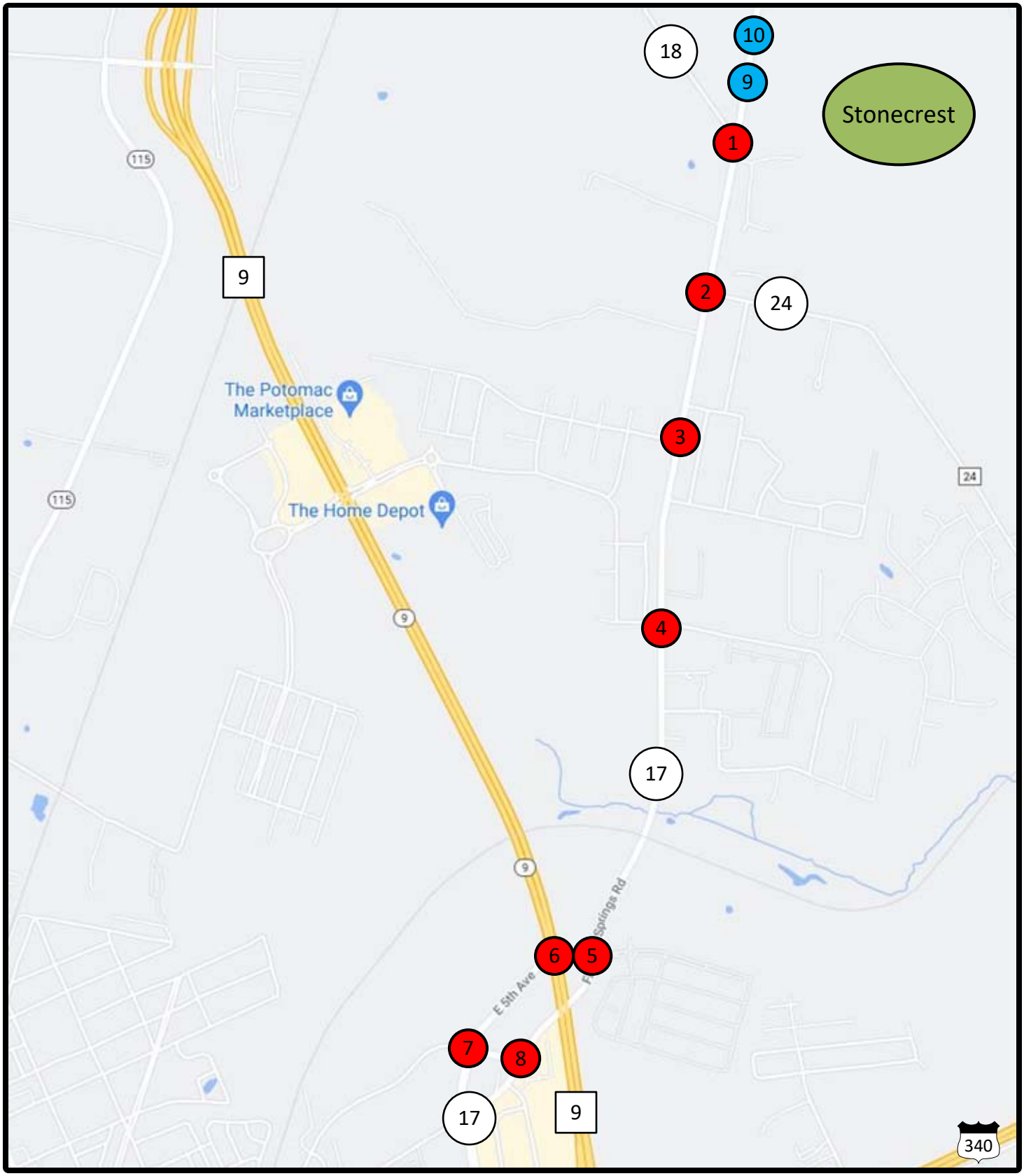
The following eight (8) existing intersections will be included in the study for capacity analysis:

1. Flowing Springs Road (CR 17) with Daniel Road (CR 18)
    - Existing: Stop Controlled "T" Intersection
2. Flowing Springs Road with Country Club Road (CR 24)
    - Existing: Stop Controlled "T" Intersection
3. Flowing Springs Road with Thumper Drive
    - Existing: Stop Controlled "T" Intersection
4. Flowing Springs Road with Briar Run Drive/Flowing Acres Road
    - Existing: Stop Controlled Plus Intersection
5. Flowing Springs Road with Mount Laurel Boulevard
    - Existing: Stop Controlled Plus Intersection
6. Mount Laurel Boulevard/5th Avenue with WV 9
    - Existing: Stop Controlled Plus Intersection
7. Flowing Springs Road with 5th Avenue
    - Existing: Roundabout Plus Intersection
8. Flowing Springs Road with Pacesetter Way
    - Existing: Stop Controlled "T" Intersection

The following two (2) new intersections will be included in the study for capacity analysis:

9. Flowing Springs Road with Site Drive #1
    - Proposed: Stop Controlled "T" Intersection
10. Flowing Springs Road with Site Drive #2
    - Proposed: Stop Controlled "T" Intersection

Figure 1 shows the study area and key intersections. **Figure 2** shows the current conceptual site plan with proposed access.



LEGEND

= Development

= Existing Intersection

= Proposed Intersection

N

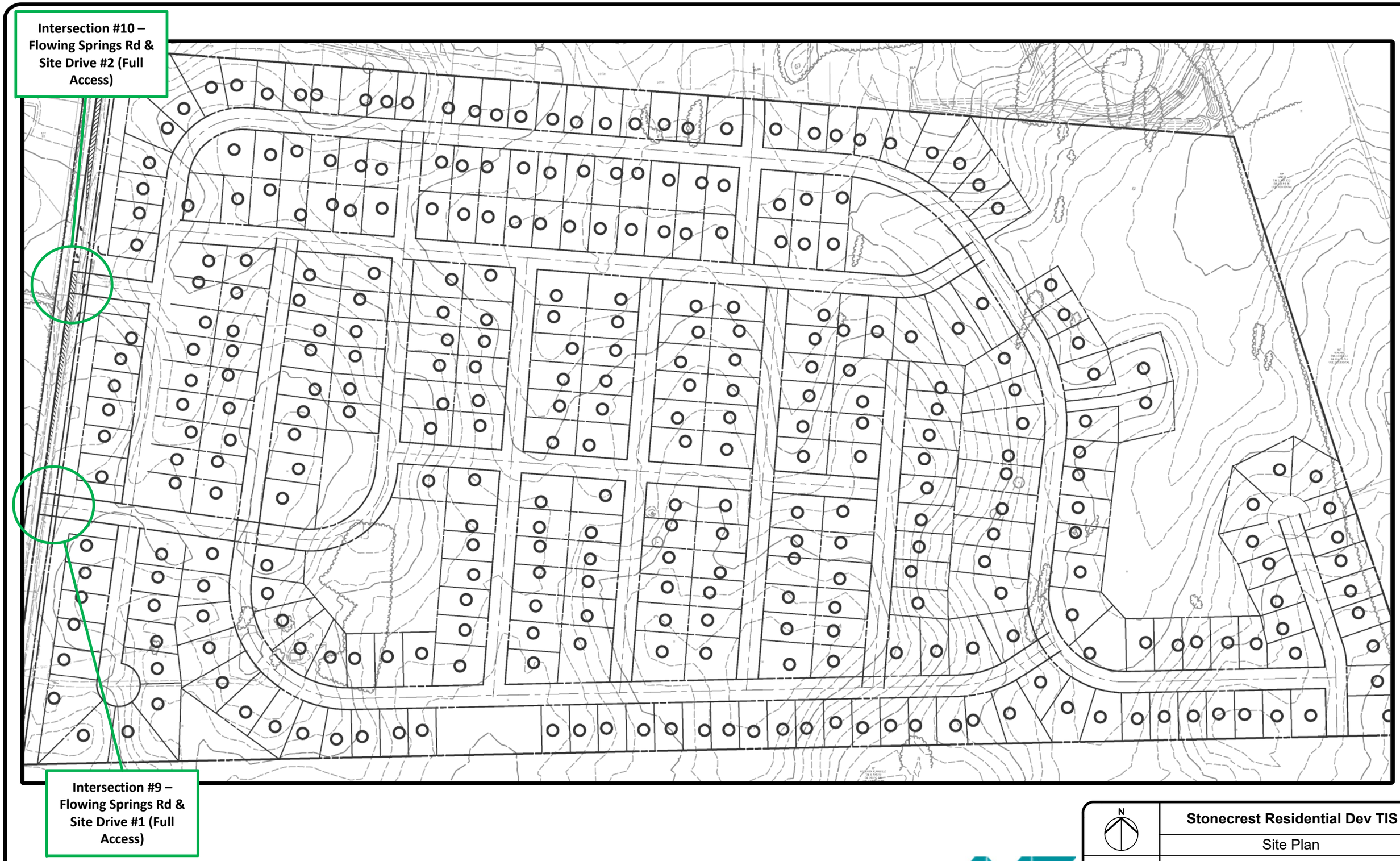
NOT TO SCALE

Stonecrest Residential Dev TIS

Site Location Map

DATE: June 2021

FIGURE 1



N

NOT TO SCALE

Stonecrest Residential Dev TIS

Site Plan

DATE: June 2021

FIGURE 2

AMT

Existing Traffic Data Collection

With the reopening of public schools and traffic volumes returning to normal levels, collection of new turning movement counts are suggested. Peak hour turning movement counts at each existing intersection will be collected on a typical Friday when Jefferson County Schools are in session between the hours of 7AM to 9AM and 3PM to 6PM. New Turning Movement counts will be collected at the following locations:

- Flowing Springs Road (CR 17) with Daniel Road (CR 18)
- Flowing Springs Road with Country Club Road (CR 24)
- Flowing Springs Road with Thumper Drive
- Flowing Springs Road with Briar Run Drive/Flowing Acres Road
- Flowing Springs Road with Mt. Laurel (Shenandoah Springs Subdivision)
- Flowing Springs Road with WV 9
- Flowing Springs Road with 5th Ave (Roundabout)
- Flowing Springs Road with Pacessetter Way

The collected data will be compared with previous turning movement data and the current AADT value for Flowing Springs Road with any noted potential decrease in traffic from Covid-19 impacts will be discussed with WVDOH for potential volume modification.

Trip Generation

The proposed site will be a 329 single-family homes (See Figure 2). Peak hour trip generation will be determined using trip rate data from the latest version of the ITE Trip Generation Manual using Land Use Codes (LUC) 210 (Single-Family Detached Housing).

Trip Distribution

The site-generated trips to and from the proposed residential development will be distributed in accordance with the existing traffic patterns and land uses in the vicinity of the study area. *Preliminary* trip distribution based upon current conditions is as follows:

- 35% to/from the east on WV 9 - (Berryville/Harpers Ferry/Hillsboro)
- 40% to/from the west on WV 9 - (Martinsburg)
- 15% to/from the north on Flowing Springs Road (CR 17) – (Duffields MARC Station/Jefferson HS)
- 10% to/from the south on Flowing Springs Road (CR 17) – (from Charles Town)

Trip distribution will be confirmed once turning movement data is collected and discussed with WVDOH prior to submission of the preliminary TIS document.

Site Access

Access to the site is proposed to be provided by two (2) site access points. Each of these are detailed below:

Site Drive #1

Site Drive #1 is proposed as a full movement two-way approach to Flowing Springs Road near the southern end of the parcel.

Site Drive #2

Site Drive #2 is proposed as a full movement two-way approach to Flowing Springs Road near the northern end of the parcel.

Approved Developments

The TIS will potentially include any applicable approved or pending TIS documents for projects in the vicinity of this proposed development, as determined by WVDOH. Preliminary adjacent pending developments will include the following

- *Pending* Flynn Property TIS (parcel north of US 340 and east of WV 9)

Additional Data Needs

The following information is requested in order to complete the analysis for this project:

- Any potential DOH improvement projects planned in this area

Local Government Coordination

AMT will provide the preliminary and final TIS reports to local government in accordance with the pending Development Agreement with *DR Horton*. Unless directed otherwise by WVDOH, the TIS will be provided to the following entities for comment:

- Jefferson County Commission
- Hagerstown Eastern Panhandle MPO

This site is currently outside the city limits of Ranson. We will confirm if this property is to be annexed and would include the City if necessitated by annexation or proximity.

Trip Generation Summary

Alternative: Alternative 1
Phase:
Project: Stonecrest Residential Development TIS

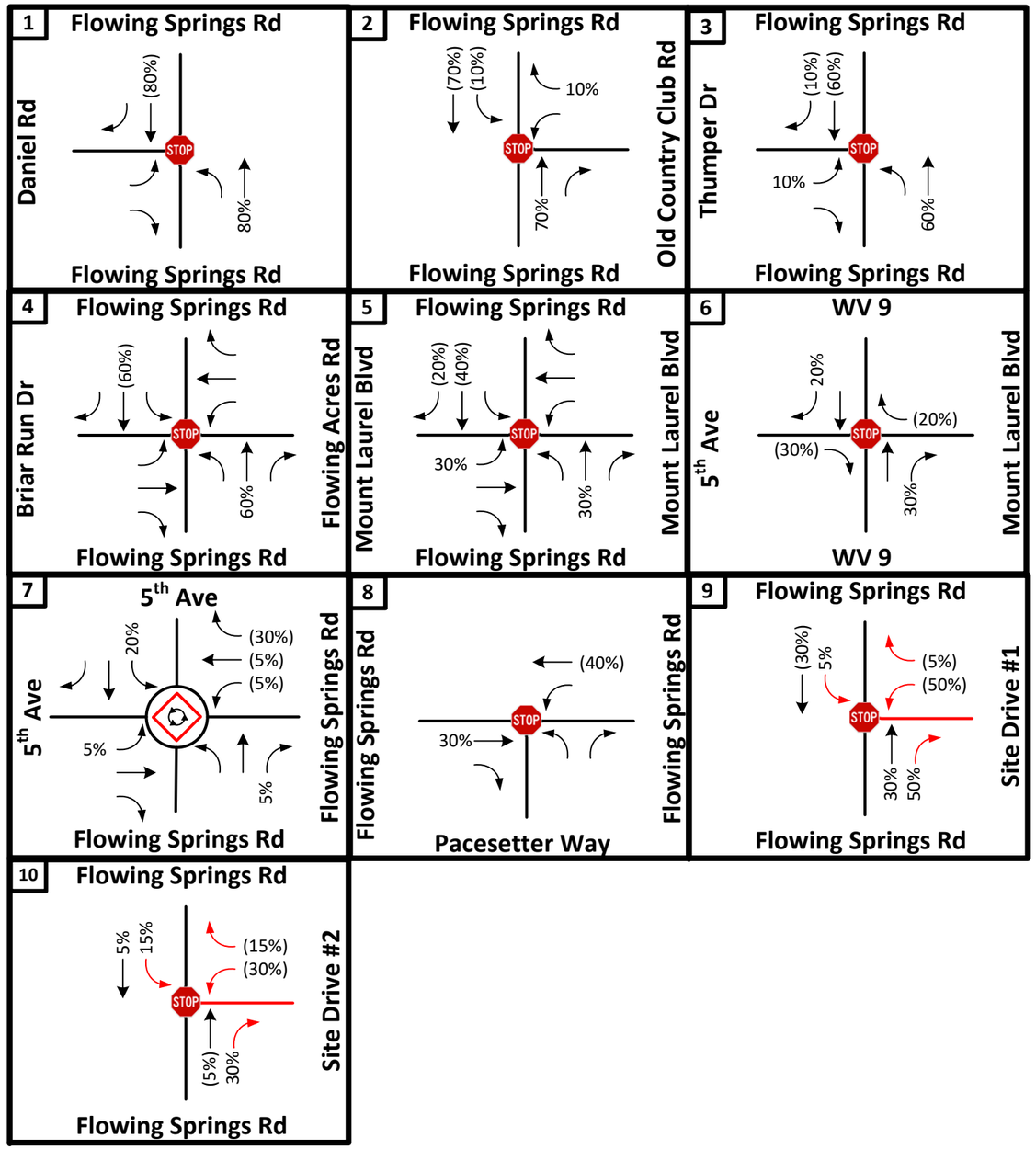
Open Date: 5/21/2021
Analysis Date: 5/21/2021

ITE	Land Use	Weekday Average Daily Trips *	Enter	Exit	Total	Weekday AM Peak Hour of Generator *	Enter	Exit	Total	Weekday PM Peak Hour of Generator *	Enter	Exit	Total
210	Single-Family Homes		1553	1553	3106		65	185	250		211	118	329
	329 Dwelling Units												
Unadjusted Volume			1553	1553	3106		65	185	250		211	118	329
Internal Capture Trips			0	0	0		0	0	0		0	0	0
Pass-By Trips			0	0	0		0	0	0		0	0	0
Volume Added to Adjacent Streets			1553	1553	3106		65	185	250		211	118	329

Total Weekday Average Daily Trips Internal Capture = 0 Percent
Total Weekday AM Peak Hour of Generator Internal Capture = 0 Percent
Total Weekday PM Peak Hour of Generator Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 10th Edition



LEGEND

- STOP Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX% Entering Trip Percentage
- (XX%) Exiting Trip Percentage

N

NOT TO SCALE

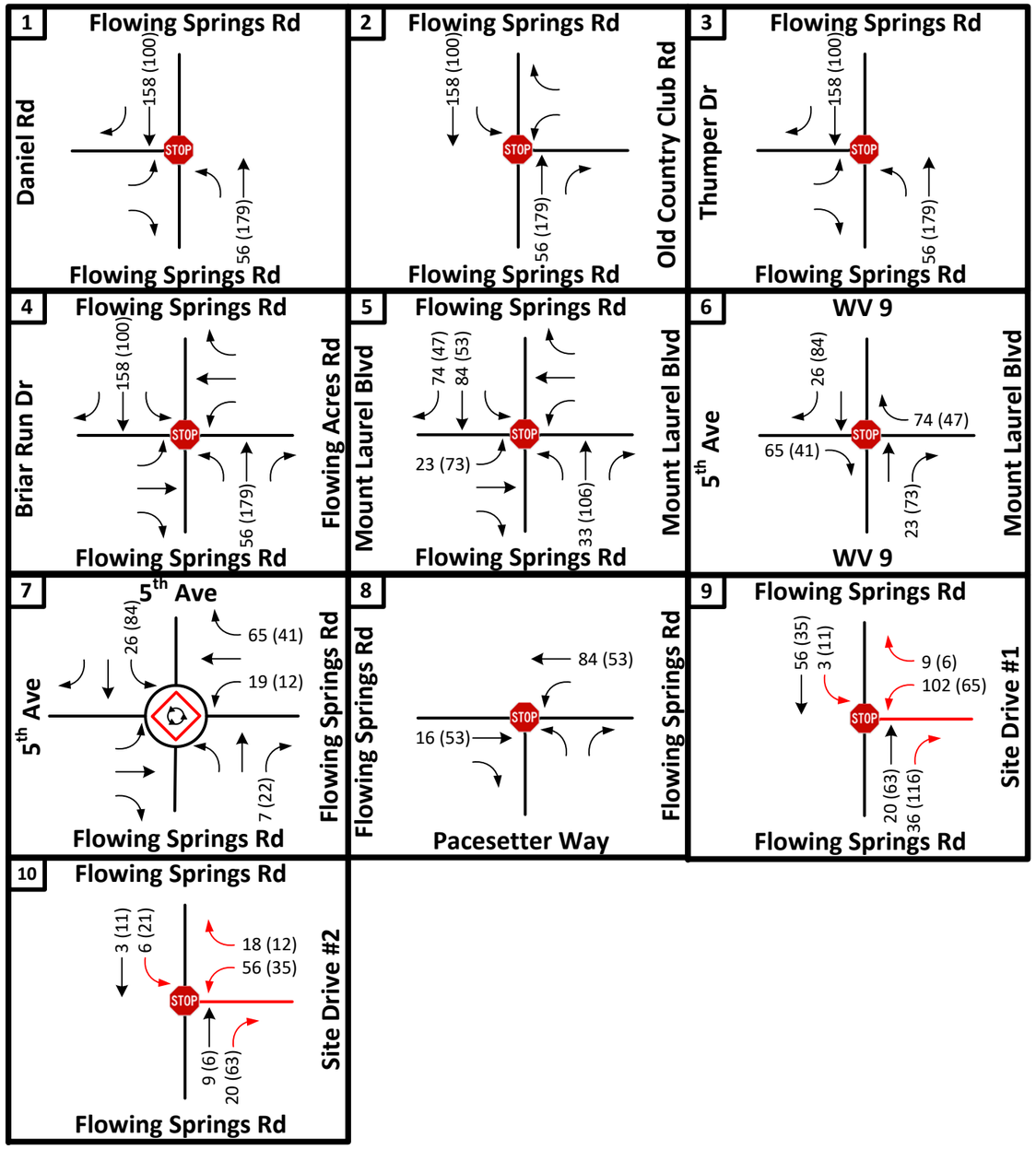
Green Hill Residential Dev TIS

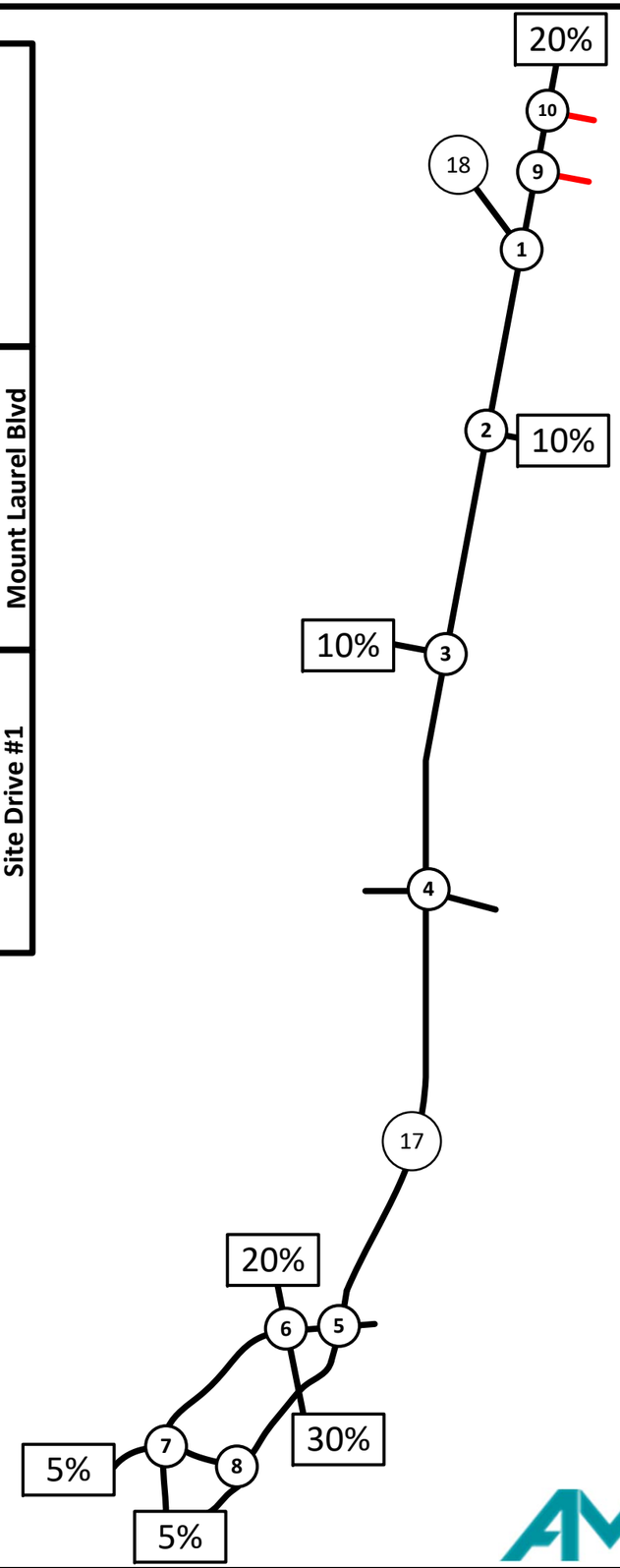
New Trip Distribution

DATE: June 2021

FIGURE 7

AMT





LEGEND

- STOP Proposed Traffic Control
- Existing Roadway
- Proposed Roadway
- Existing Lane Configuration
- Proposed Lane Configuration
- XX AM Peak Hour Trips
- (XX) PM Peak Hour Trips

N

NOT TO SCALE

Green Hill Residential Dev TIS

New Site Trip Assignments

DATE: June 2021

FIGURE 8

AMT

Appendix H-3

Country Club Commons TIS

TRAFFIC SOLUTIONS INC.

Country Club Commons

Traffic Impact Study

April 21, 2021

Prepared for:

Dan Snyder, P.E.
Vice President, North
Pleasants Development
24024 Frederick Road
Clarksburg, MD 20871

Prepared by:

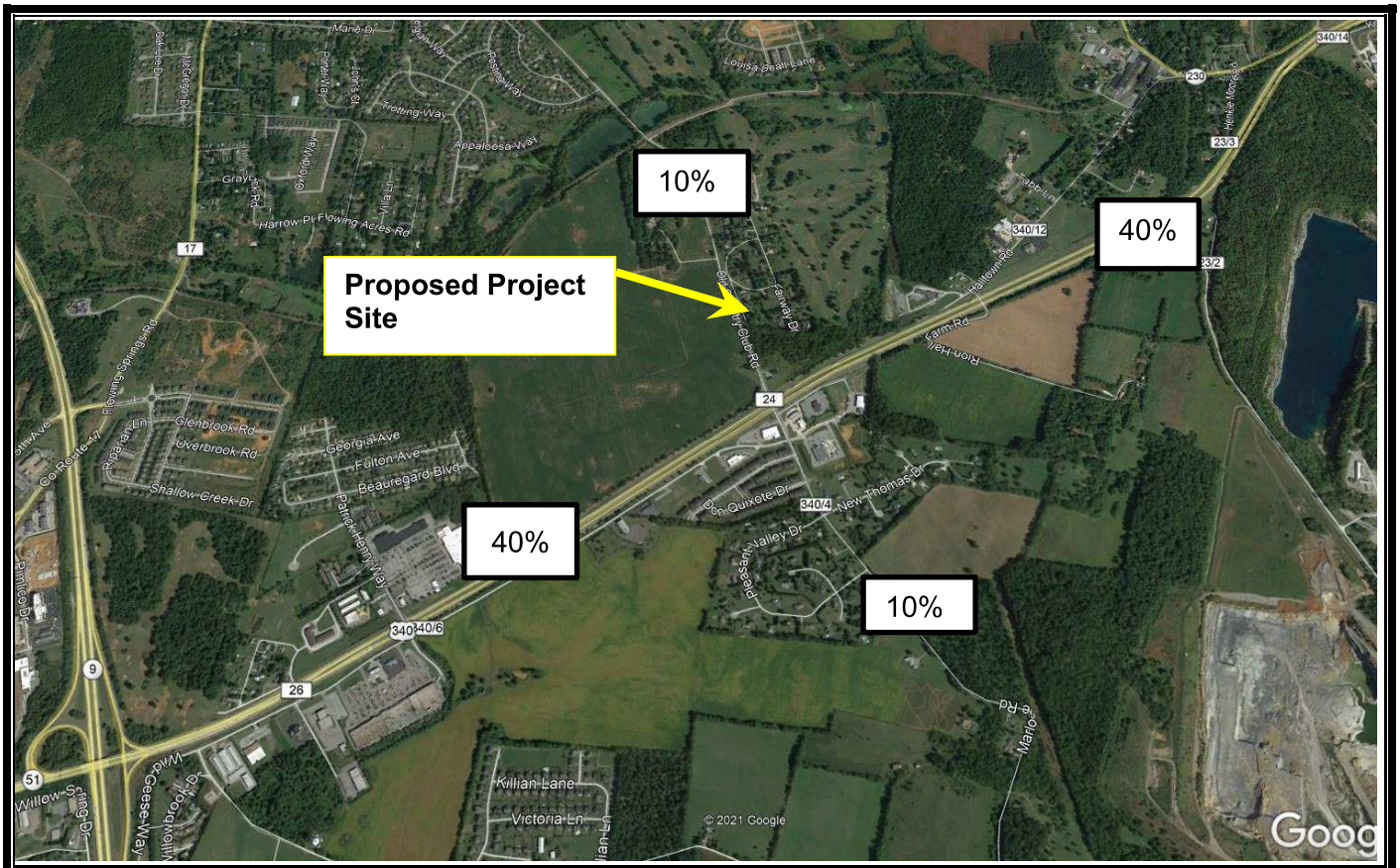
Neil Parrott, P.E., PTOE
Traffic Solutions, inc.
www.TRSImidatlantic.com
20005 Lindenhurst Ct.
Hagerstown, MD 21742

westbound left-turn lanes along US 340 mostly become acceptable. The westbound left-turn in the afternoon peak period is still projected to exceed the storage length.

5.0 TOTAL TRAFFIC CONDITIONS

5.1 Development Description

The Country Club Commons Project is a proposed development includes the construction of a 11,000 SF pharmacy, a 6,000 SF gas with convenience store, a 6,000 SF fast-turnover sit-down restaurant, and a 3,200 SF bank. Access to the site is planned via a right-in only access from US 340 westbound and a full access from Old Country Club Road. An aerial photograph showing the location of the site as well as the trip distribution percentages is shown in Figure 9.



TRSI	Black Rectangles show the percent Trip Origin/Destination to and from that location.	Figure 9 Trip Distribution

5.2 Trip Generation Methodology and Rates

The ITE Trip Generation Manual 10th Edition was used to determine the trips that are projected to use the site access in the total traffic conditions. These trip Generation calculations are shown in Appendix G, and a Table showing the summary of the trips is provided in Table 7.

Table 7 – Trip Generation Calculations

LAND USE	ITE CODE	UNITS	AM PEAK HOUR			PM PEAK HOUR			SAT PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Pharmacy with Drive Through	881	11									
		D.U.	22	20	42	57	56	113	47	49	96
Bank	911	3.2									
		D.U.	17	13	30	33	32	65	43	41	84
Restaurant	932	6									
		D.U.	33	27	60	37	22	59	34	33	67
Gas Station Supermart	960	6									
		KSF GLA	233	233	466	270	260	530	366	366	732
Subtotal			305	293	598	397	370	767	490	489	979
Internal Capture			5	5	10	20	20	40	17	17	34
Total IC Removed			300	288	588	377	350	727	473	472	945
Passby			162	162	324	190	190	380	230	230	460
New Trips added to Network			138	126	264	187	160	347	243	242	485

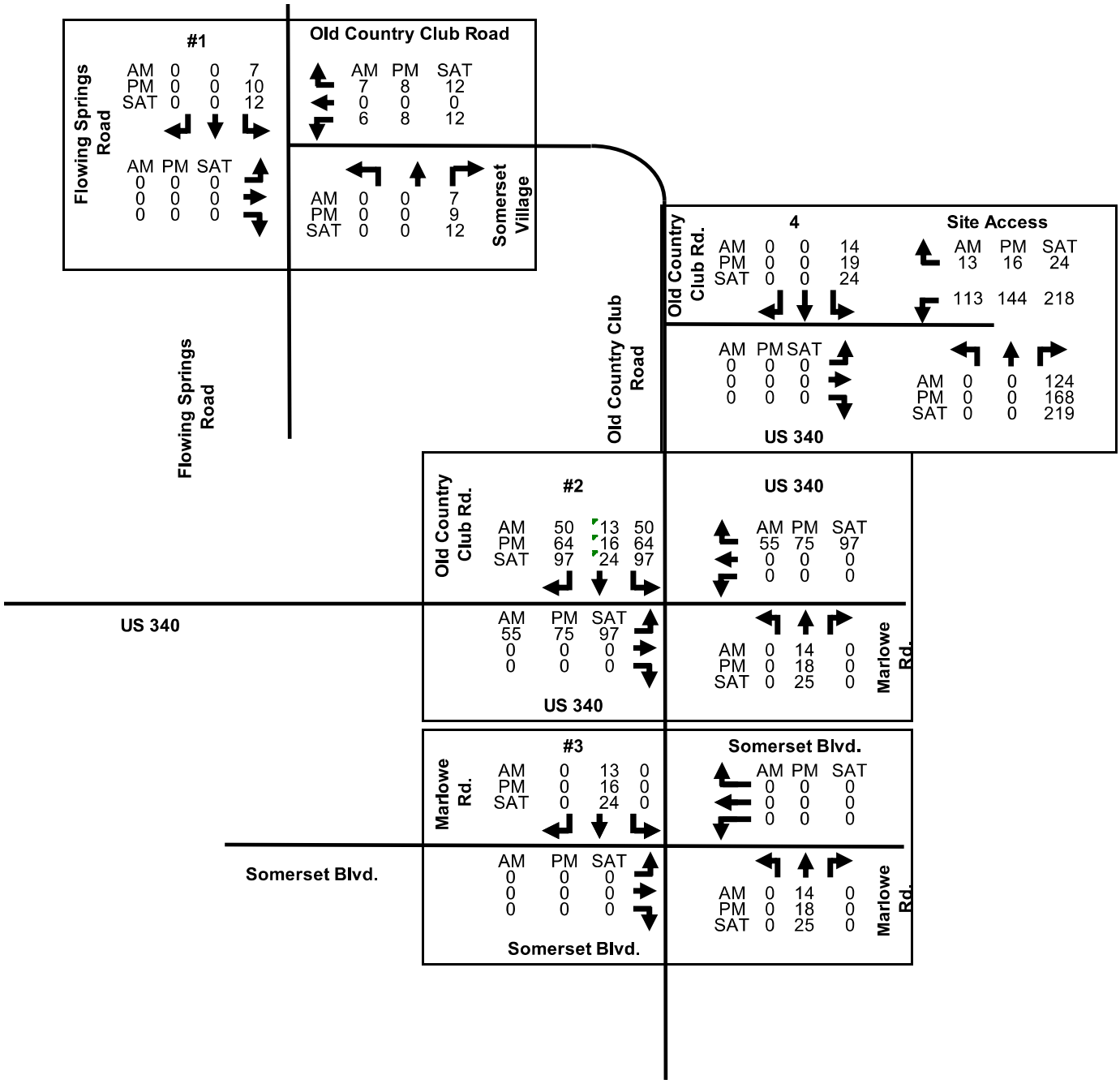
Please note that the pass-by trip rates follow ITE Standards where most of the pass-by rates used are the default rates provided in the TripGen 10 software provided by TrafficWare. Appendix G shows the exact rates used for Land Use during each period, AM, PM, and Saturday. The appendix also specifies which rates were the default from the program based on many specific studies for that land use and which were obtained based on the summarized afternoon observations for each use from ITE Trip Generation Handbook , 3rd Edition. Where rates were applied that were not filled in by the program, a lower rate was used than was observed for the PM observations.

The internal capture rate was calculated by the TripGen 10 software based on NCHRP Standards for the morning and evening peak periods. No internal capture rate was provided for Saturday, but it would not be appropriate to not have a rate for Saturday.

The Saturday internal capture rate is most likely similar to the higher internal capture rate in the afternoon peak period. To err on the side of being conservative, however, the Saturday internal capture rate was calculated by averaging the morning and afternoon peak-hour rates and applying this rate to the Saturday projected trip generation traffic volumes. This is shown in Appendix G and summarized on Table 7.

the trip distribution provided in Figure 9, the site-generated traffic peak hour volumes have been determined and are shown in Figure 10. The pass-by trips are shown in Figure 11.

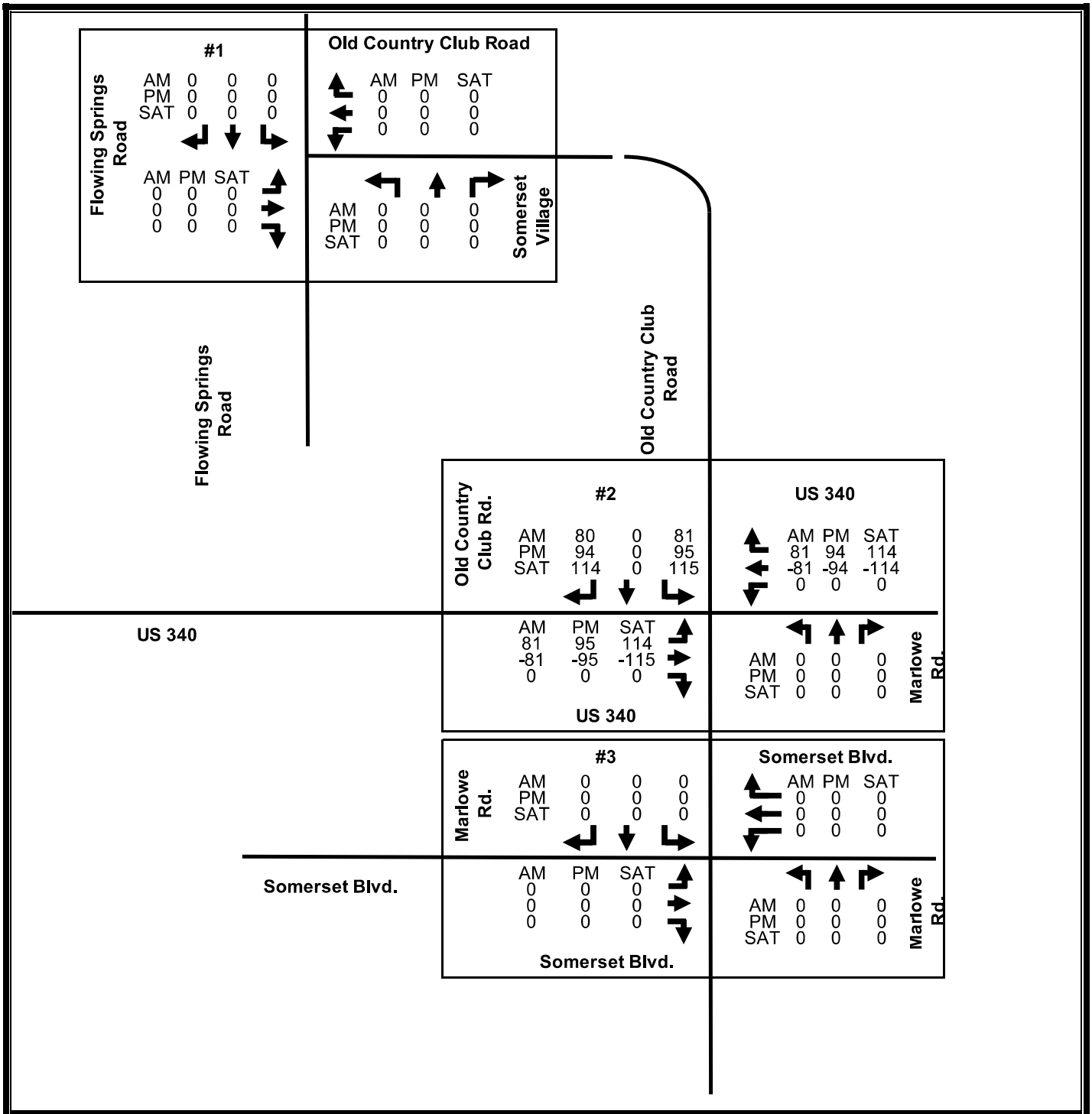
The site-generated traffic (Figure 10) combined with the pass-by trips (Figure 11) and the total background traffic condition (Figure 8) result in the total projected 2024 traffic condition shown in Figure 12.



NOT TO SCALE

Figure 10

Site-Generated Traffic
Peak-Hour Volumes
No-Right Turn Lane into site



NOT TO SCALE

Figure 11
Pass-By Peak-Hour Volumes

Appendix H-4

US 340 Mixed-Use TIS

US 340

Development

Traffic Impact Study

January 25, 2021

Prepared for:

Lynch Christian
Somerset Properties
1000 Church Street
P.O. Box 638
Lynchburg, Virginia 24504

Prepared by:

Neil C. Parrott
Traffic Solutions, Inc.
www.TRSImidatlantic.com
20005 Lindenhurst Ct.
Hagerstown, MD 21742

5.0 PROPOSED DEVELOPMENT TRAFFIC IMPACT ANALYSIS – PHASE 1

5.1 Phase 1 Development Description

The US 340 Development is a proposed residential and commercial development planned to be built along US 340 (E. Washington Street) in Jefferson County, WV. The development will be constructed on the south side of US 340, east of Keyes Ferry Road, West of Marlowe Road, and north of WV 9 (Charles Town Pike).

The total development will consist of 215 single-family homes, 143 townhomes, 245 apartments, and 133,000 square feet of retail to be built in three phases. The first phase is projected to be completed in 2024. Phase 1 is proposed to consist of 75 single-family homes, 75 townhomes, and 180 apartments. The retail space is not planned to be constructed in Phase 1.

5.2 Trip Generation Methodology and Rates

The projected trip generation for the site was obtained from the Institute of Transportation Engineers (ITE) Trip Generation 10th Edition for Single-family homes (ITE-210, Single Family Detached), Townhomes (ITE-220, Multifamily Housing – Low Rise), and Apartments (ITE-221, Multifamily Housing – Mid Rise).

The trip generation also accounts for internal capture as well as pass-by trips that would use the site. The total trips projected to be generated in Phase 1 are 168 morning peak-hour trips, 221 evening peak-hour trips, and 267 Saturday peak-hour trips.

Table 6 shows the results of the trip generation calculations. To calculate the trip assignments based on the trips generated, the trip distribution was established with the WVDOH. The email showing the WVDOH trip distribution agreement is provided in Appendix H. Figure 6 shows an aerial photograph showing the trip distribution based on local conditions.

Figure 6B shows the details trip distribution from the proposed access points. Please note that three of the actual six access points were selected to place the traffic on. This allowed for a more conservative analysis of the minor roads at the back of the subdivision and accurately portrays the trips through the system.

Table 6 – Site-Generated Trips – Phase 1

LAND USE	ITE CODE	UNITS	AM PEAK HOUR			PM PEAK HOUR			SAT PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family Detached Housing	210	75	25%	75%		63%	37%		63%	37%	
		D.U.	14	42	56	47	27	74	38	32	70
Multifamily Housing (Low-Rise)	220	75	26%	74%		64%	36%		64%	36%	
		D.U.	8	27	35	26	16	42	26	16	42
Multifamily Housing (Mid-Rise)	221	180	26%	74%		64%	36%		64%	36%	
		D.U.	17	48	65	48	31	79	39	40	79
Shopping Center	820	33	62%	38%		48%	52%		48%	52%	
		KSF GLA	19	12	31	60	66	126	77	72	149
Subtotal			58	129	187	181	140	321	180	160	340
Internal Capture			2	2	4	32	32	64	17	18	35
Pass-by Trips			4	11	15	18	18	36	19	19	38
Grand Total			52	116	168	131	90	221	144	123	267

FIGURE 6A – AERIAL SHOWING TRIP DISTRIBUTION

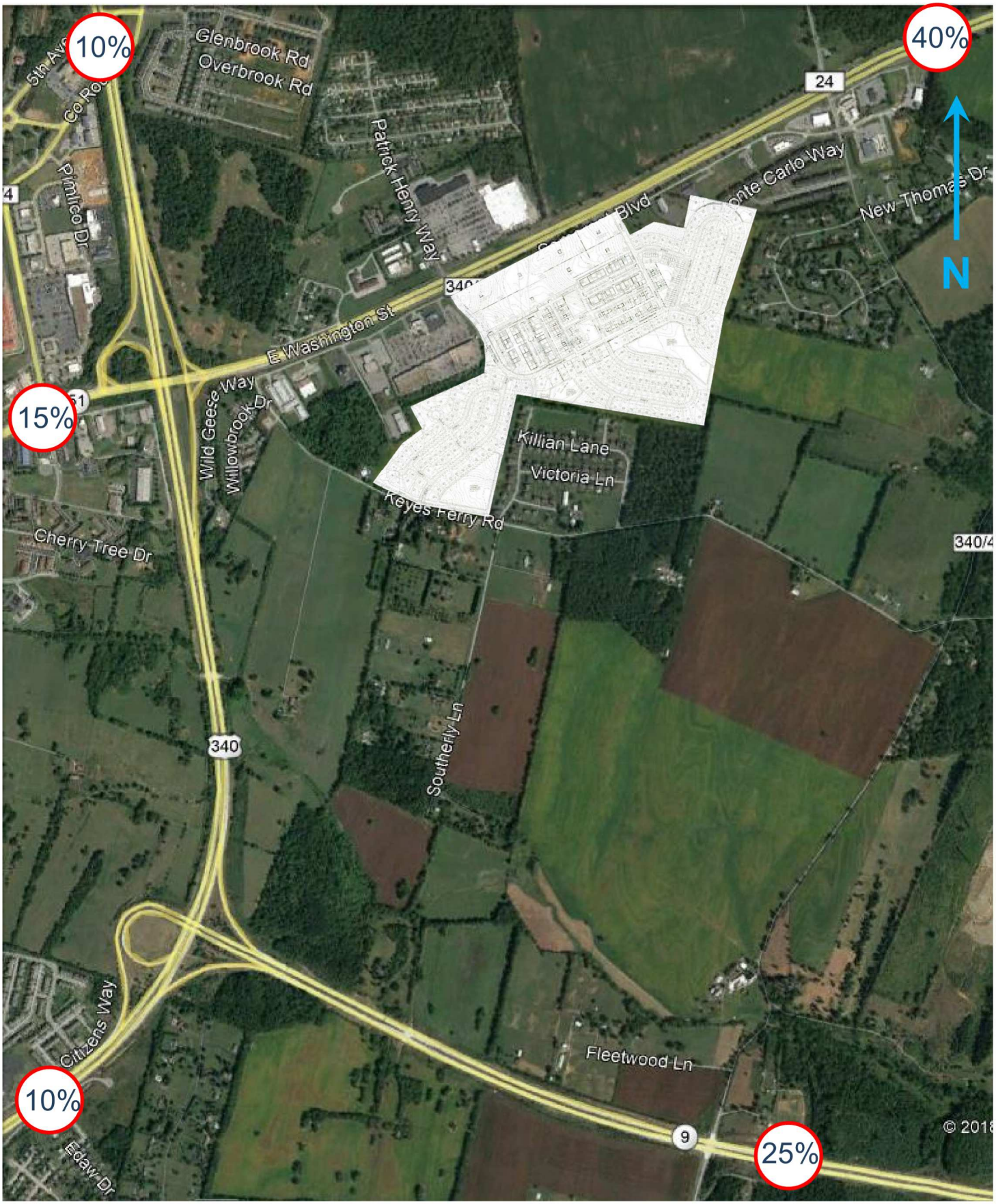


FIGURE 6B – AERIAL SHOWING TRIP DISTRIBUTION FROM SITE ACCESS POINTS

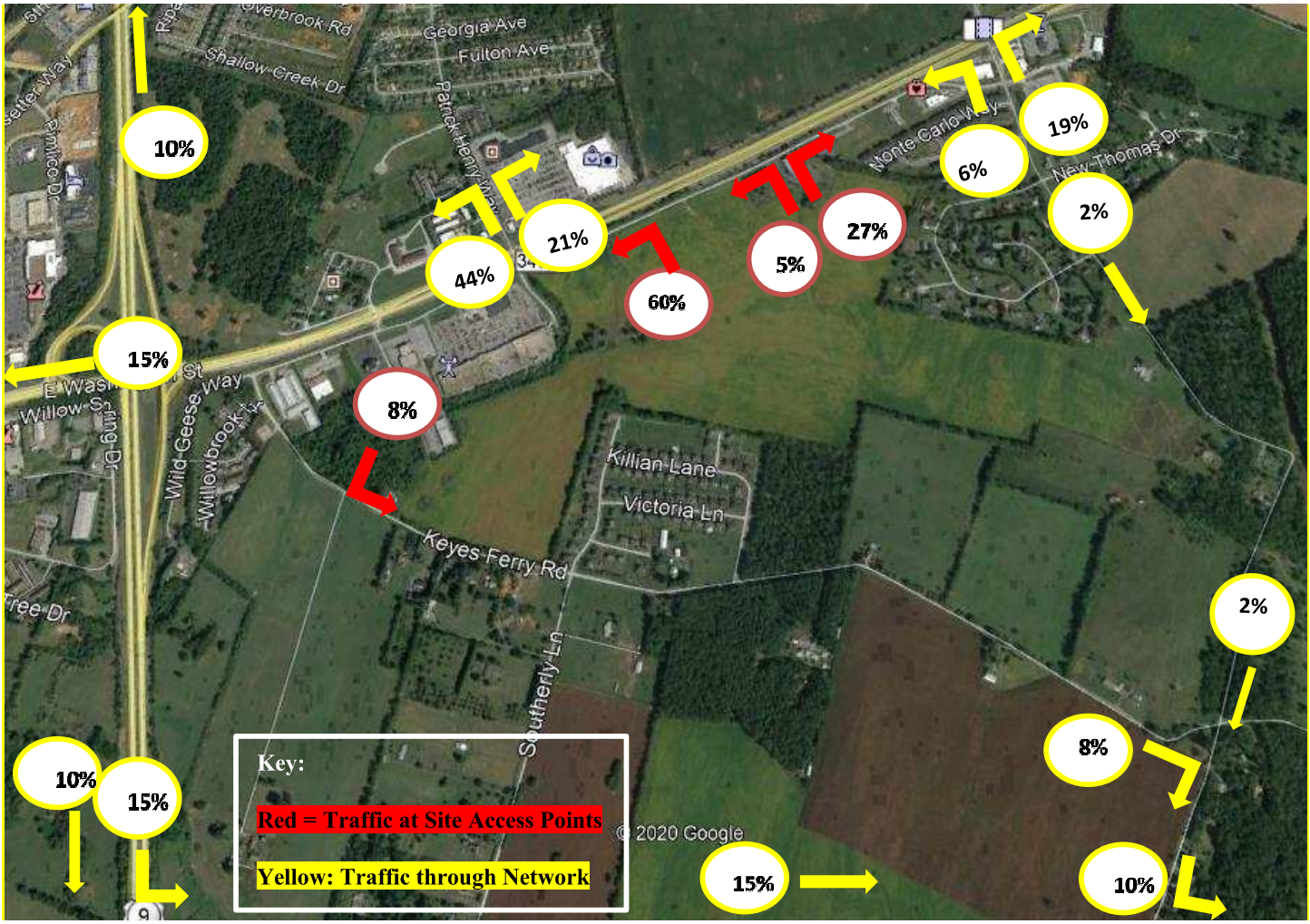
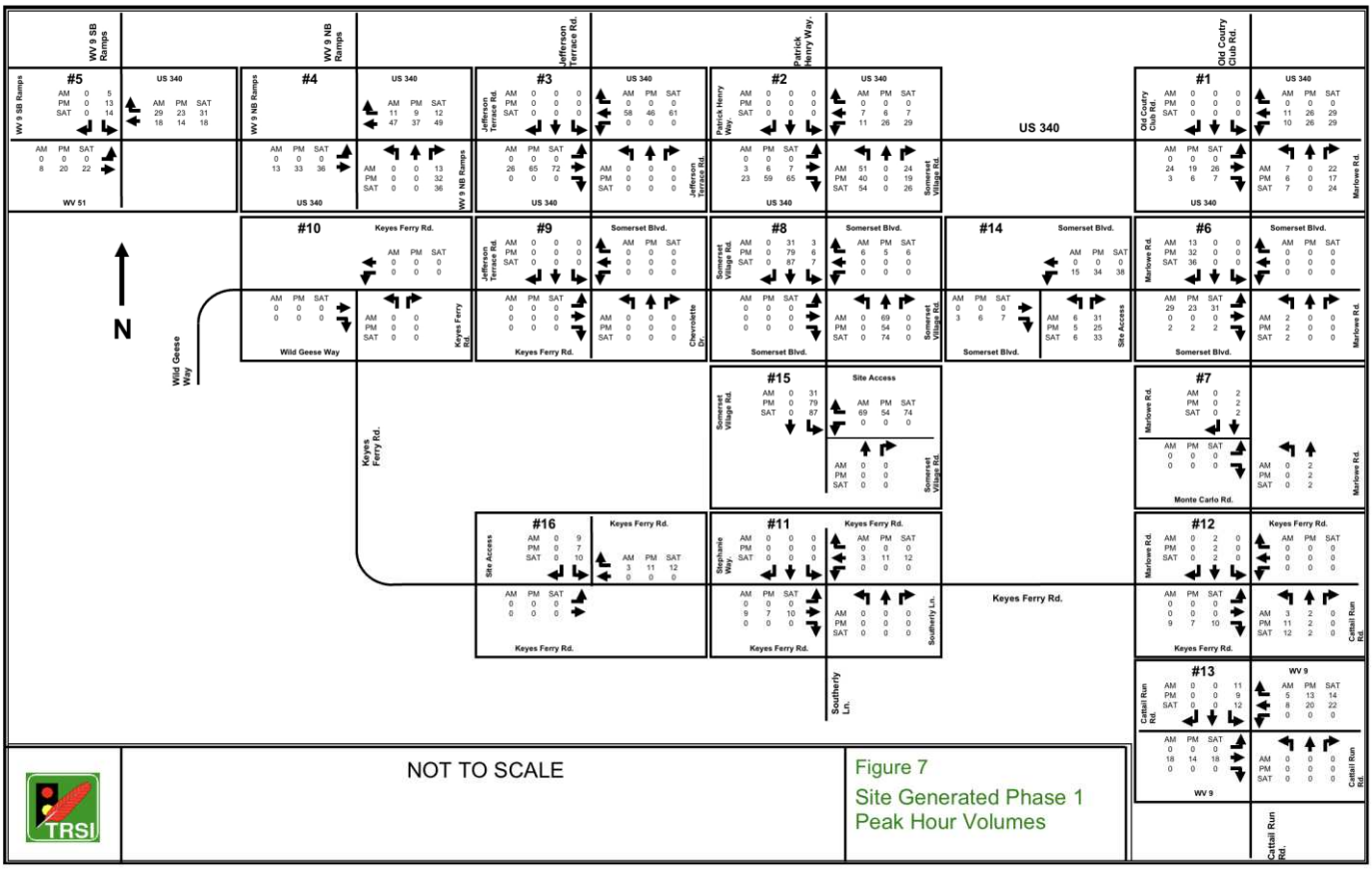
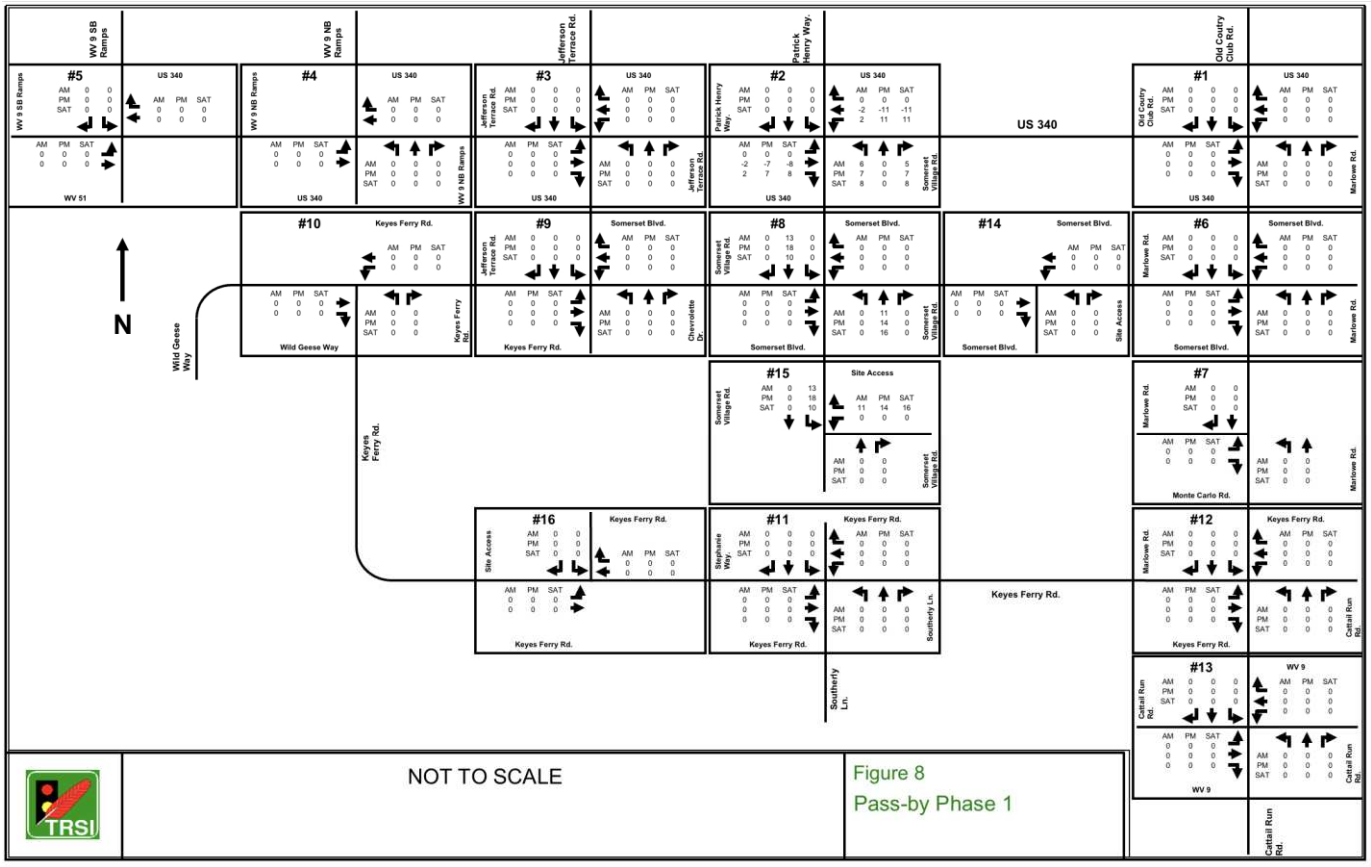


Figure 7 shows the site generated peak-hour volumes. Figure 8 shows the pass-by trip changes, and Figure 9 shows the total trips in the Phase 1 condition which is the background trip totals added to the site generated trips and pass-by trips.


WV 9 SB Ramps
WV 9 NB Ramps
Jefferson Terrace Rd.
Patrick Henry Way.
Old Coutry Club Rd.
US 340
#5
#4
#3
#2
#1
WV 51
WV 9 NB Ramps
Jefferson Terrace Rd.
Patrick Henry Way.
Old Country Club Rd.
Marlowe Rd.
N
#10
Keyes Ferry Rd.
#9
Somerset Blvd.
#8
#14
#6
Wild Geese Way
Wild Geese Way
Keyes Ferry Rd.
Chevrolette Dr.
Somerset Village Rd.
Site Access
#15
#7
Monte Carlo Rd.
#16
#11
#12
Stephanie Way.
Southerly Ln.
Cattail Run Rd.
#13
WV 9
NOT TO SCALE
Figure 7
Site Generated Phase 1
Peak Hour Volumes
TRSI


WV 9 SB Ramps
WV 9 NB Ramps
Jefferson Terrace Rd.
Patrick Henry Way.
Old Coutry Club Rd.
US 340
#5
#4
#3
#2
#1
WV 51
WV 9 NB Ramps
Jefferson Terrace Rd.
Patrick Henry Way.
Old Country Club Rd.
Marlowe Rd.
N
#10
Keyes Ferry Rd.
#9
Somerset Blvd.
#8
#14
#6
Wild Geese Way
Wild Geese Way
Keyes Ferry Rd.
Chevrolette Dr.
Somerset Village Rd.
Site Access
#15
#7
Monte Carlo Rd.
#16
#11
#12
Stephanie Way.
Southerly Ln.
Cattail Run Rd.
#13
WV 9
NOT TO SCALE
Figure 8
Pass-by Phase 1
TRSI

7.0 PROPOSED DEVELOPMENT TRAFFIC IMPACT ANALYSIS - PHASE 2

7.1 Phase 2 Development Description

The US 340 Development is planning to consist of 215 single-family homes, 143 townhomes, 245 apartments, and 133,000 square feet of retail to be built in three phases. The first phase is projected to be completed in 2024. Phase 1 is proposed to consist of 75 single-family homes, 75 townhomes, and 180 apartments.

This phase, Phase 2, is projected to be completed in 2028. Phase 2 is proposed to add 100 additional single-family homes, 68 townhomes, 65 apartments, and 33,000 square feet of retail in addition to the Phase 1 construction.

7.2 Trip Generation Methodology and Rates

The projected trip generation for the site was obtained from the Institute of Transportation Engineers (ITE) Trip Generation 10th Edition for Single-family homes (ITE-210, Single Family Detached), Townhomes (ITE-220, Multifamily Housing – Low Rise), Apartments (ITE-221, Multifamily Housing – Mid Rise), and Shopping Center (ITE 820).

The trip generation also accounts for internal capture as well as pass-by trips that would use the site. The total trips projected to be generated in Phase 2 are 144 morning peak-hour trips, 190 evening peak-hour trips, and 237 Saturday peak-hour trips.

Table 11 shows the results of the trip generation calculations. To calculate the trip assignments based on the trips generated, the trip distribution was established with the WVDOH. The email showing the WVDOH trip distribution agreement is provided in Appendix H. Figure 6 shows an aerial photograph showing the trip distribution based on local conditions, which is used for each of the development phases.

Figure 10 shows the background traffic in the year 2028 without any development traffic from this project in either phase 1 or phase 2. Figure 11 shows the site generated peak-hour volumes for Phase 2. Figure 12 shows the pass-by trip changes, and Figure 13 shows the total trips in the Phase 2 condition which is the background trip totals added to the site generated trips and pass-by trips.

Table 11 – Site-Generated Trips – Phase 2

LAND USE	ITE CODE	UNITS	AM PEAK HOUR			PM PEAK HOUR			SAT PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family Detached Housing	210	100	25%	75%		63%	37%		63%	37%	
		D.U.	18	55	73	62	37	99	50	43	93
Multifamily Housing (Low-Rise)	220	68	26%	74%		64%	36%		64%	36%	
		D.U.	7	24	31	24	14	38	24	14	38
Multifamily Housing (Mid-Rise)	221	65	26%	74%		64%	36%		64%	36%	
		D.U.	6	17	23	18	11	29	14	15	29
Shopping Center	820	33	62%	38%		48%	52%		48%	52%	
		KSF GLA	19	12	31	60	66	126	77	72	149
Subtotal			50	108	158	164	128	292	165	144	309
Internal Capture			2	2	4	33	33	66	15	19	34
Pass-by			2	8	10	18	18	36	19	19	38
Grand Total			46	98	144	113	77	190	131	106	237

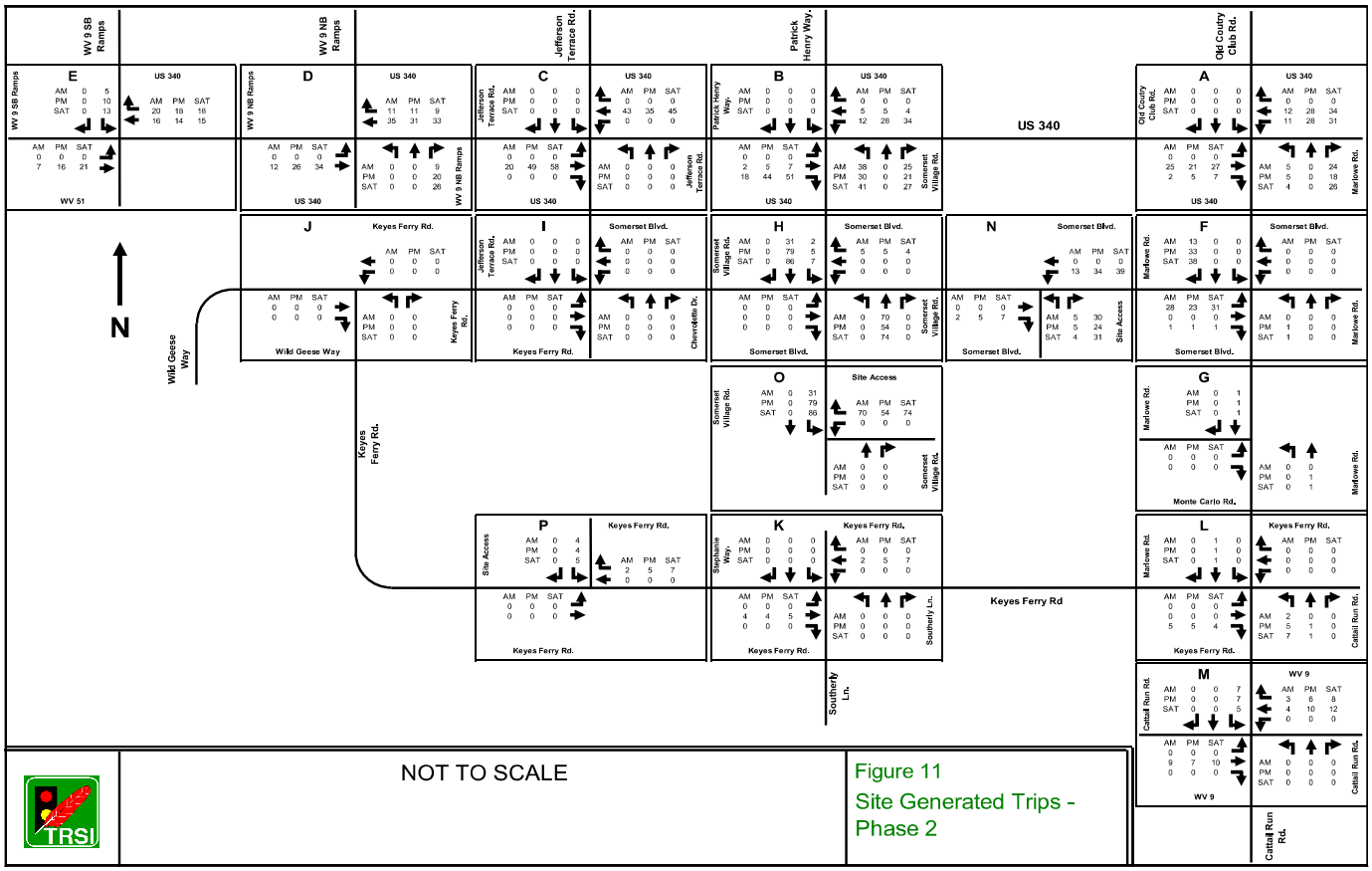


Figure 11
Site Generated Trips - Phase 2

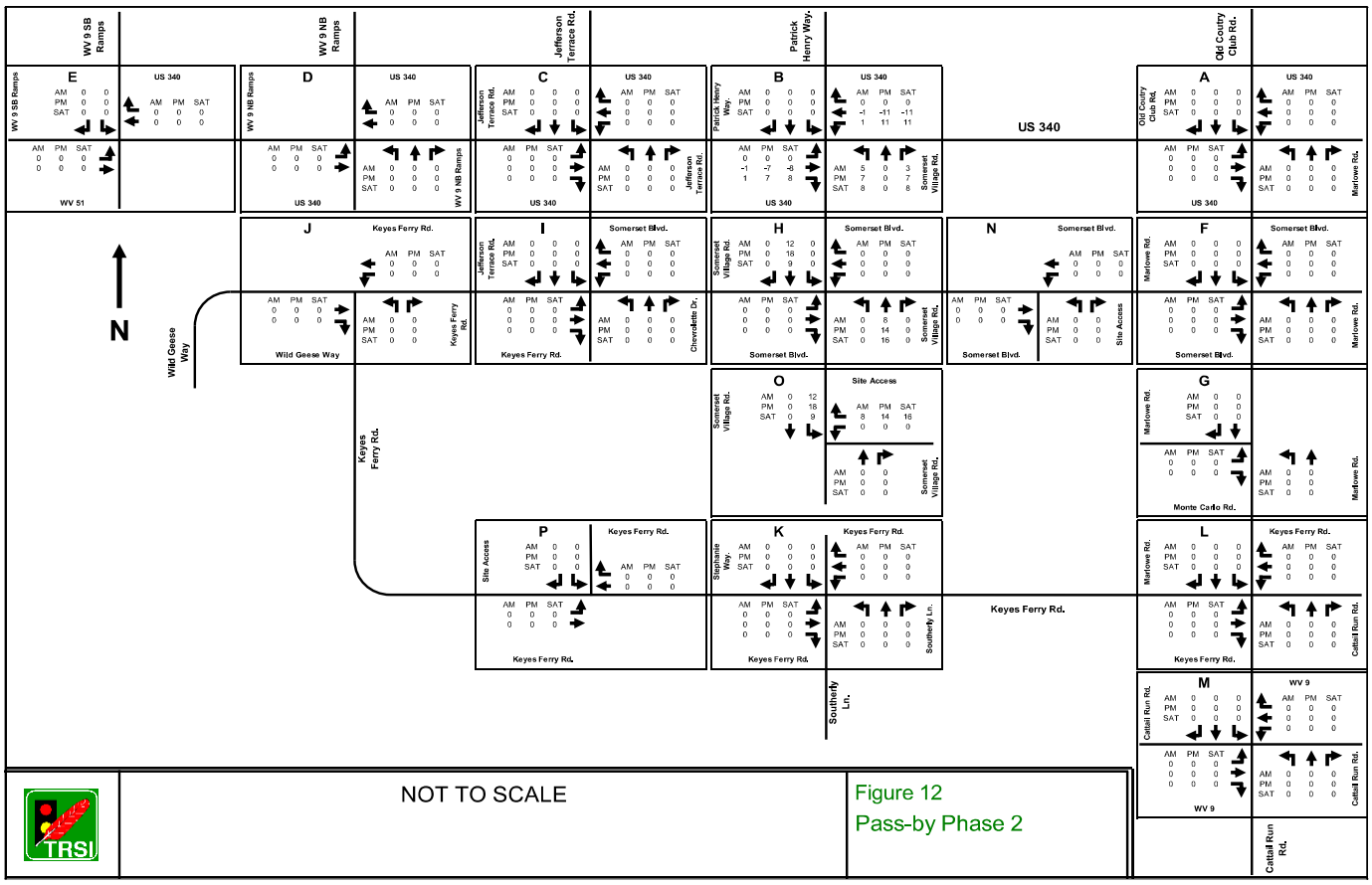


Figure 12
Pass-by Phase 2

9.0 PROPOSED DEVELOPMENT TRAFFIC IMPACT ANALYSIS - PHASE 3

9.1 Phase 3 Development Description

The US 340 Development is planning to consist of 215 single-family homes, 143 townhomes, 245 apartments, and 133,000 square feet of retail to be built in three phases. This phase, Phase 3, is projected to be completed in 2032 and will complete the planned development. Phase 3 is proposed to add 40 additional single-family homes 33,000 square feet of retail in addition to Phase 1 and Phase 2.

9.2 Trip Generation Methodology and Rates

The projected trip generation for the site was obtained from the Institute of Transportation Engineers (ITE) Trip Generation 10th Edition for Single-family homes (ITE-210, Single Family Detached), Townhomes (ITE-220, Multifamily Housing – Low Rise), Apartments (ITE-221, Multifamily Housing – Mid Rise), and Shopping Center (ITE 820).

The trip generation also accounts for internal capture as well as pass-by trips that would use the site. The total trips projected to be generated in Phase 3 are 84 morning peak-hour trips, 171 evening peak-hour trips, and 226 Saturday peak-hour trips.

Table 16 shows the results of the trip generation calculations. To calculate the trip assignments based on the trips generated, the trip distribution was established with the WVDOH. The email showing the WVDOH trip distribution agreement is provided in Appendix H. Figure 6 shows an aerial photograph showing the trip distribution based on local conditions.

Figure 14 shows the background traffic in the year 2032 without any development traffic from this project in either phase 1, phase 2, or phase 3. Figure 15 shows the site generated peak-hour volumes for Phase 3. Figure 16 shows the pass-by trip changes, and Figure 17 shows the total trips in the Phase 3 condition which is the background trip totals added to the site generated trips and pass-by trips.

Table 16 – Site-Generated Trips – Phase 3

LAND USE	ITE CODE	UNITS	AM PEAK HOUR			PM PEAK HOUR			SAT PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family Detached Housing	210	40	25%	75%		63%	37%		63%	37%	
		D.U.	8	22	30	25	15	40	20	17	37
Shopping Center	820	67	62%	38%		48%	52%		48%	52%	
		KSF GLA	40	23	63	123	132	255	157	144	301
Subtotal			48	45	93	148	147	295	177	161	338
Internal Capture			0	0	0	28	28	56	17	15	32
Pass-by			5	5	9	34	34	68	40	40	80
Grand Total			43	40	84	86	85	171	120	106	226

Figure 18 shows the total traffic condition where the intersection of Somerset Blvd. at Somerset Village Road is modified. At the intersection, the roadway on the east side of the intersection is relocated south. In addition, the access on the west side of the road is modified to a right-in, right-out only access. This change helps take care of queuing issues that started in Phase 2. The change also brings the main intersection further away from the US 340 at Somerset Blvd, intersection so that traffic operations in the vicinity improve and operate more smoothly.

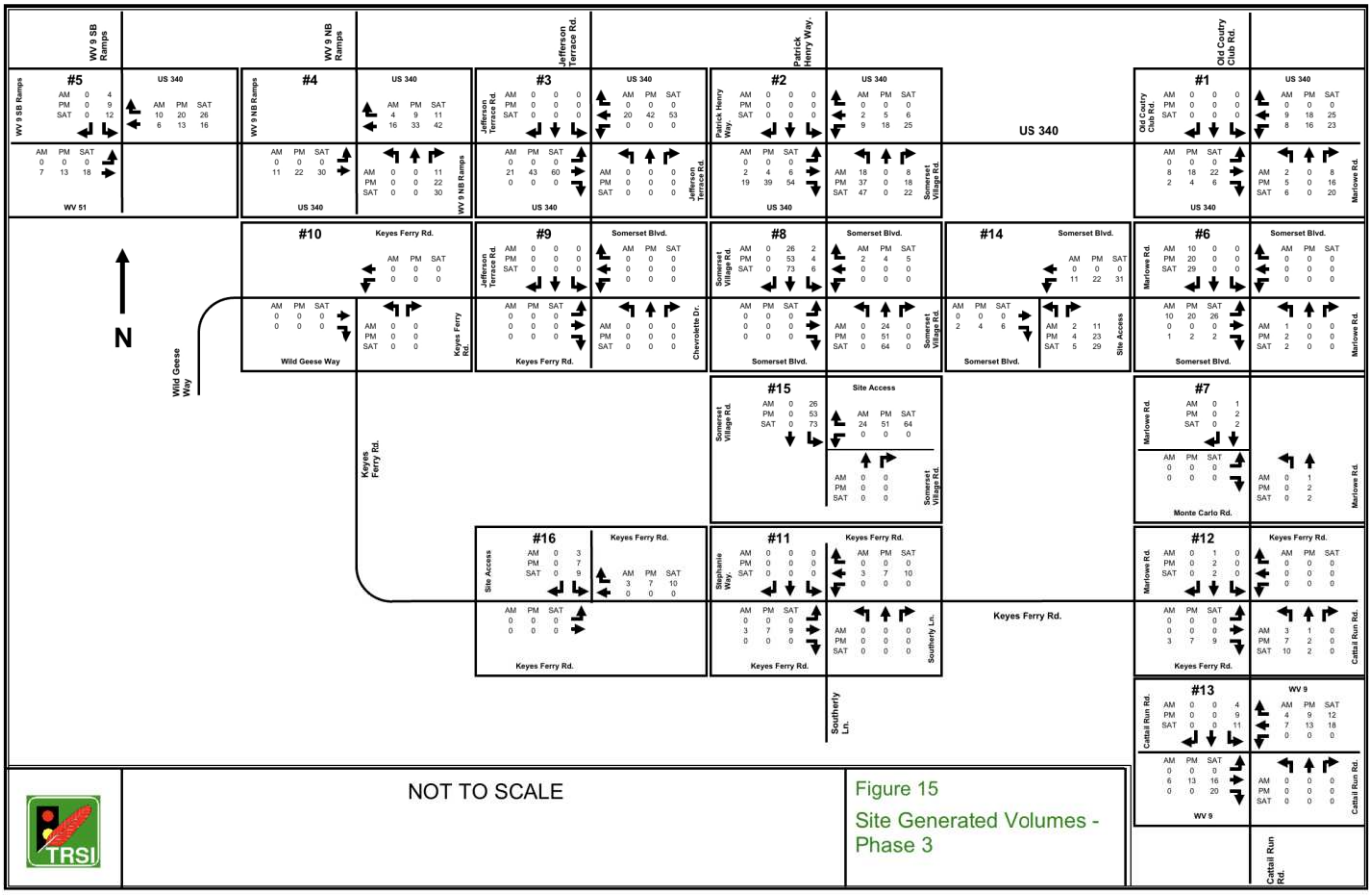


Figure 15
Site Generated Volumes - Phase 3

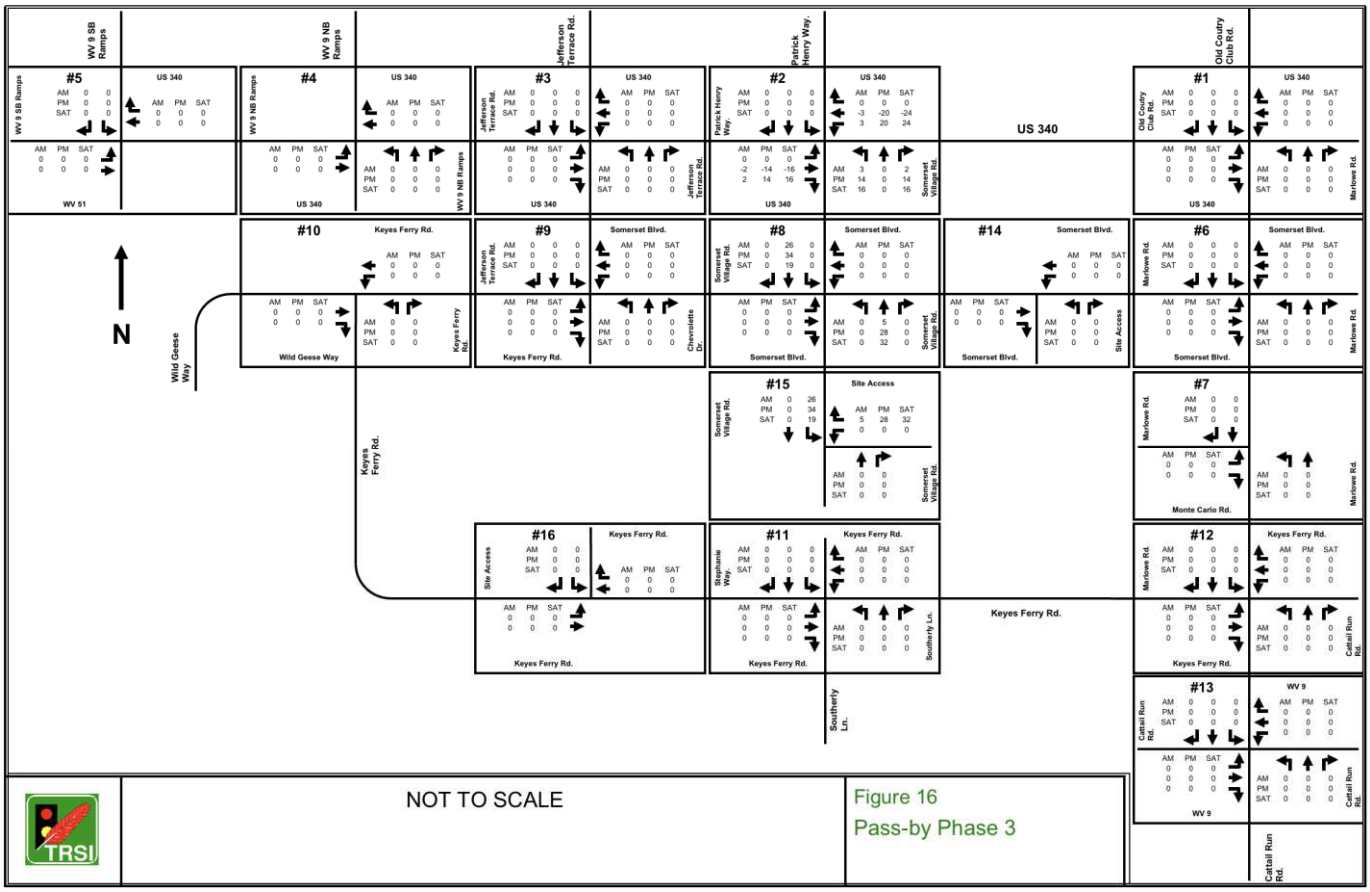


Figure 16
Pass-by Phase 3

Appendix H-5

Aspen Greens TIS

TRIP GENERATION

PHR+A determined the number of trips entering and exiting the site using equations and rates provided in the 7th Edition of the Instituté of Transportation Engineers' (ITE) *Trip Generation Report*. **Table 2** (Page 11) is provided to summarize the total trip generation associated with the proposed Aspen Greens development. A conceptual plan is provided in **Figure 6** (Page 12).

Table 2
Proposed Development: Aspen Greens
Trip Generation Summary

Code	Land Use	Amount	AM Peak Hour			PM Peak Hour			ADT
			In	Out	Total	In	Out	Total	
210	Single-Family Detached	203 units	38	114	152	130	73	203	1,995
		Total	**38**	**114**	**152**	**130**	**73**	**203**	**1,995**

TRIP DISTRIBUTION AND TRIP ASSIGNMENT

The distribution of trips was based upon local travel patterns for the roadway network surrounding the proposed site. PHR+A utilized the trip distribution percentages shown in **Figure 7** (Page 13) to assign the proposed Aspen Greens development trips (Table 2) throughout the study area. **Figure 8** (Page 14) shows the corresponding development-generated ADT as well as AM/PM peak hour traffic assignments.

2010 BUILD-OUT CONDITIONS

The proposed Aspen Greens development assigned trips (Figure 8) were added to the 2010 background traffic volumes (Figure 4) to obtain 2010 build-out conditions. **Figure 9** (Page 15) shows the 2010 build-out ADT as well as AM/PM peak hour traffic volumes at key locations throughout the study area. **Figure 10** (Page 16) shows the respective 2010 build-out lane geometry and Synchro levels of service. All Synchro levels of service worksheets are included in the Appendix section of this report.

N

No Scale

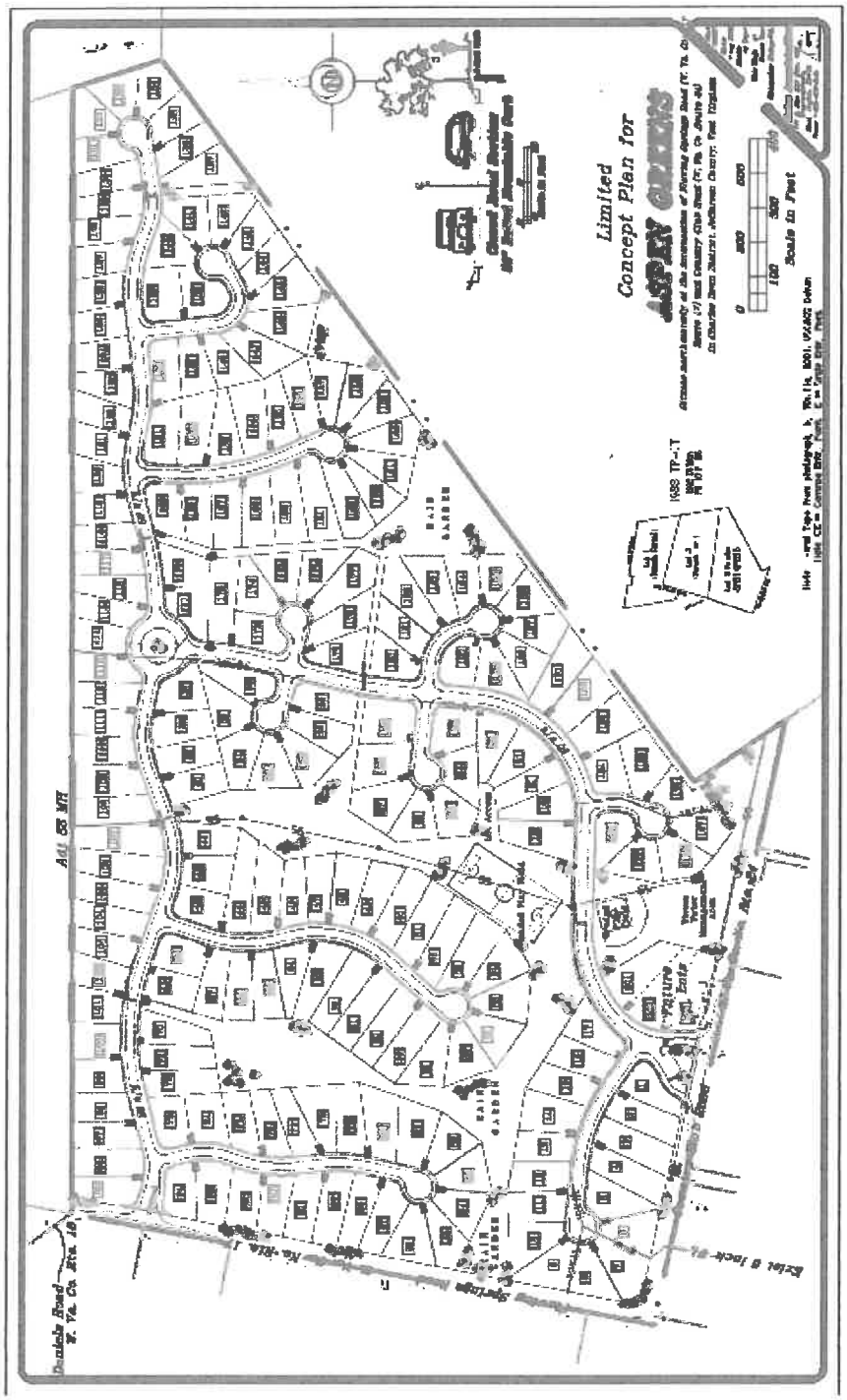


Figure 6 Conceptual Plan: Aspen Greens Development, in Jefferson County, WV

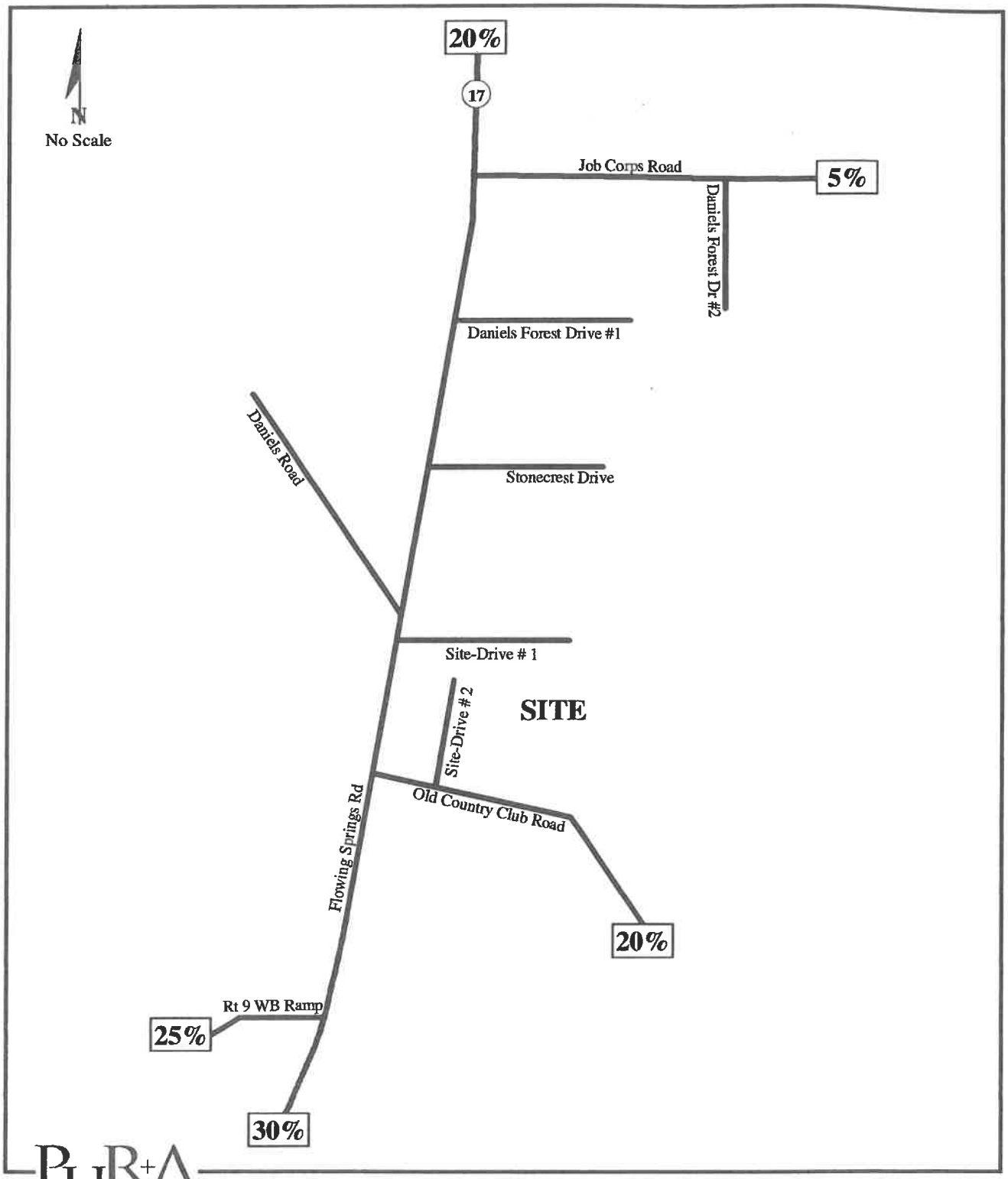


Figure 7 **Trip Distribution Percentages**

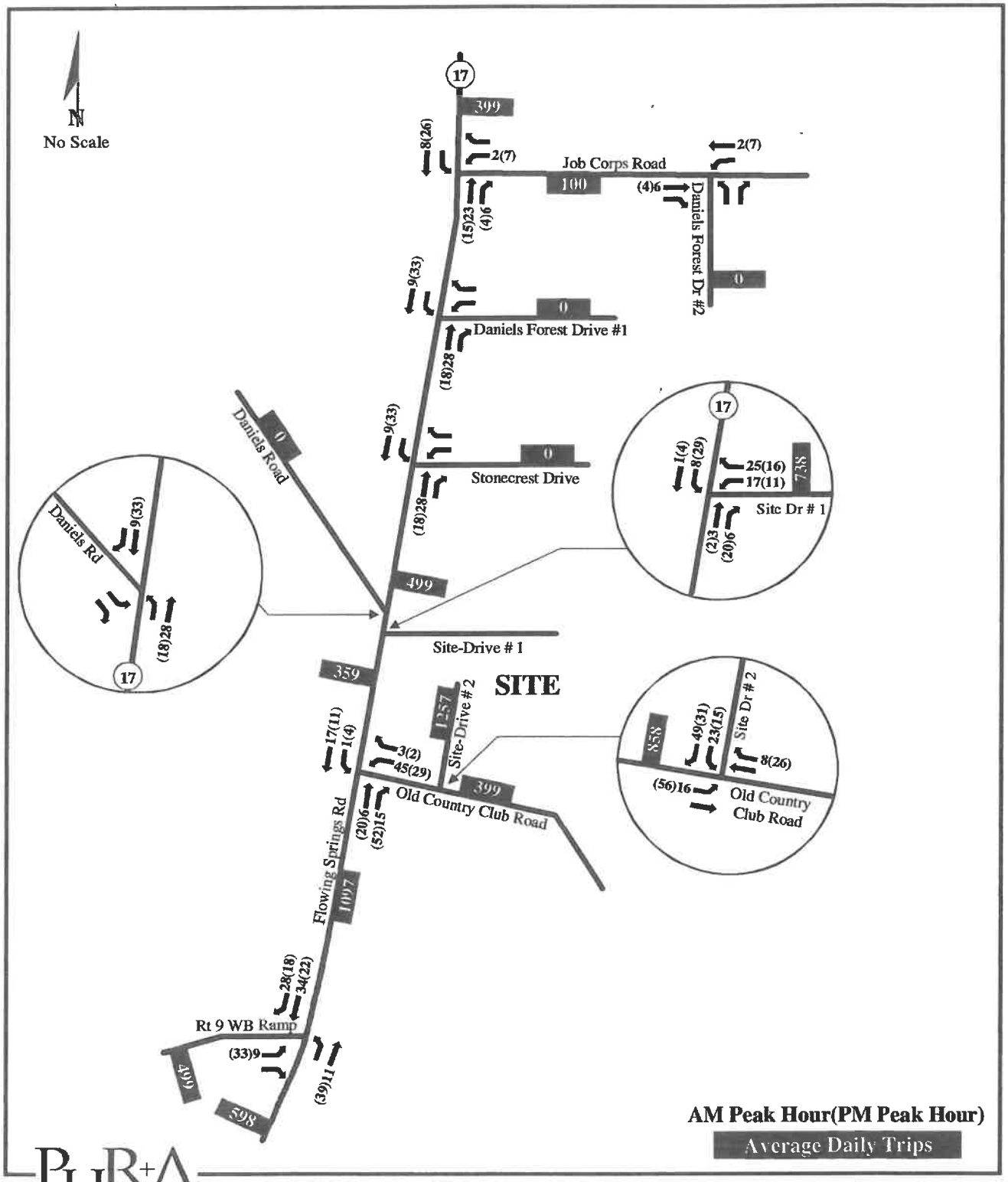


Figure 8 **Development-Generated Trip Assignments**

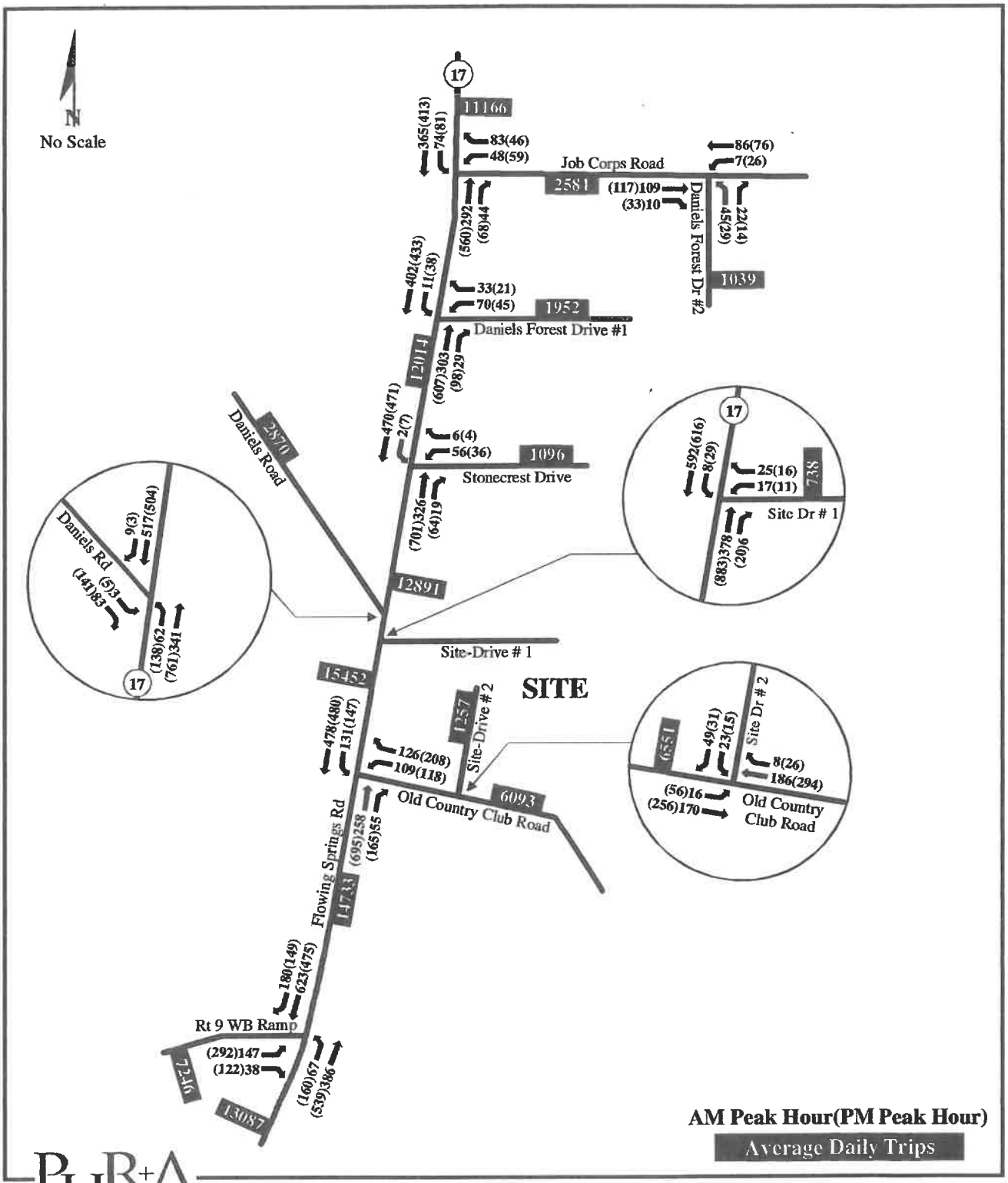


Figure 9 **2010 Build-out ADT and AM/PM Peak Hour Traffic Volumes**

Glaser, Caleb

From: Kirk, Tim
Sent: Friday, July 9, 2021 11:34 AM
To: Glaser, Caleb; Airhart, Ethan
Subject: FW: [External] RE: Aspen Greens Trip Gen

Gordon indicates 46 lots are built out in Aspen Green.

Tim Kirk PE, PTOE, RSP1
Associate

P 304-400-4952 | **D** 304-903-7008 | **C** 304-488-6031
W www.amtengineering.com

From: Jason Gerhart <jgerhart@gordon.us.com>
Sent: Friday, July 9, 2021 11:18 AM
To: Kirk, Tim <tkirk@amtengineering.com>
Subject: RE: [External] RE: Aspen Greens Trip Gen

I counted what was built on the 2020 aerial and added the handful of lots that weren't built but show up on the tax map. I don't know that they have more than that final plat approved yet.

From: Kirk, Tim <tkirk@amtengineering.com>
Sent: Friday, July 9, 2021 10:52 AM
To: Jason Gerhart <jgerhart@gordon.us.com>
Subject: RE: [External] RE: Aspen Greens Trip Gen

Ken had indicated 85

Tim Kirk PE, PTOE, RSP1
Associate

P 304-400-4952 | **D** 304-903-7008 | **C** 304-488-6031
W www.amtengineering.com

From: Jason Gerhart <jgerhart@gordon.us.com>
Sent: Friday, July 9, 2021 9:12 AM
To: Kirk, Tim <tkirk@amtengineering.com>
Subject: RE: [External] RE: Aspen Greens Trip Gen

I believe they had 46 lots permitted and platted, and built.

I'll give you a call back in a few minutes once I get off my call at 9:30.

Thanks,
Jason

From: Kirk, Tim <tkirk@amtengineering.com>
Sent: Thursday, July 8, 2021 4:38 PM
To: Jason Gerhart <jgerhart@gordon.us.com>
Subject: FW: [External] RE: Aspen Greens Trip Gen

Jason – do you know how many remaining lots there are in the Aspen Green development original approval?

Tim Kirk PE, PTOE, RSP1
Associate

P 304-400-4952 | **D** 304-903-7008 | **C** 304-488-6031
W www.amtengineering.com

From: Clohan, Kenneth L <Kenneth.L.Clohan@wv.gov>
Sent: Tuesday, July 6, 2021 3:58 PM
To: Glaser, Caleb <cglaser@amtengineering.com>
Cc: Kirk, Tim <tkirk@amtengineering.com>; Meadows, Donald R <Donald.R.Meadows@wv.gov>
Subject: RE: [External] RE: Aspen Greens Trip Gen

Caleb,

I apologize for the delay getting back with you. Aspen Greens has been one of those projects that has been out there for a long time and I just wanted to make sure that I have accurate information.

Phases IA, IIA and IIB have been approved for a total of 85 single family lots. They seem to be filling fast so there may not be many empty lots left of the three approved phases.

Ken
Kenneth L. Clohan, Jr., P.E.
District Five Traffic Engineer
West Virginia Division of Highways
304-260-4392

From: Glaser, Caleb <cglaser@amtengineering.com>
Sent: Tuesday, July 6, 2021 1:57 PM
To: Clohan, Kenneth L <Kenneth.L.Clohan@wv.gov>
Cc: Kirk, Tim <tkirk@amtengineering.com>; Meadows, Donald R <Donald.R.Meadows@wv.gov>
Subject: [External] RE: Aspen Greens Trip Gen

CAUTION: External email. Do not click links or open attachments unless you verify sender.

Good Afternoon Ken,

Don Meadows asked us to include the Aspen Greens development as part of background trips for our traffic studies near Ranson. In his message below, he mentioned that the project is partially complete but did not have any concrete information regarding where the project currently stands and told us to reach out to you. Would you be able to provide me info on how far along this project is? If it is partially complete do you have an idea of how many homes are currently built? Any information you could provide would be very helpful!

Thank you,

Caleb Glaser EIT
Engineer

P 304-400-4952 | **D** 304-903-7010 | **C** 216-640-5970
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From: Meadows, Donald R <Donald.R.Meadows@wv.gov>
Sent: Wednesday, June 30, 2021 6:36 AM
To: Kirk, Tim <tkirk@amtengineering.com>
Cc: Glaser, Caleb <cglaser@amtengineering.com>
Subject: Aspen Greens Trip Gen

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you verify that the attachment and content are safe.

Tim,
Please find attached pages from a 2007/08 TIS for Aspen Greens subdivision related to their proposed Trip Generation and Trip Distribution. I would still recommend confirming with Ken exactly what you should include as background within your current TIS. The attached pages are based on a full build-out of 203 single family homes, however, its my understanding that they are currently permitted to construct up to 85 homes and that anything beyond that number will require submission of a new/revised TIS. If this is indeed the case, I personally think that your study should only include performing trip generation for the number of homes not constructed out of the currently permitted 85, not the full 203. Hope you find the information useful, let me know if you have any questions or if you need any additional information. THANKS>DON

Donald R. Meadows
West Virginia Division of Highways
Traffic Engineering - Operations
Building 5, Room A-550
1900 Kanawha Blvd. E.
Charleston, WV 25305
Office Ph: (304) 414-7354
Cell Ph: (304) 382-3160
Fax: (304) 558-1209

Appendix I

Project Correspondence

Appendix I-1

SOW Documentation

Proposed TIS Scope of Work (SOW)

Fritts Farm Residential Development TIS

Ranson, Jefferson County

Purpose

The purpose of this SOW document is to delineate the assumptions of the Traffic Impact Study (TIS) for the proposed development project. Confirming assumptions at the beginning of the project helps to assure that the TIS will be completed only once and in a timely manner. This memorandum aims to create a communicative line between the WVDOH, the client, and the traffic engineer to discuss all of the issues involved with completing the TIS. This document will cover the following topics:

- Study Methodology
- Intersections to be studied
- Trip Generation
- Trip Distribution
- Site Access
- Approved Developments

Study Methodology

The site is located southeast of the interchange of WV 9 with US 340 and WV 51 in Jefferson County. Site access is proposed to WV 9 and Keyes Ferry Road. Both the AM (7-9 AM) and PM (3-6 PM) peak hours will be studied.

The analysis will follow the TED 106-2 along with applicable ITE and Highway Capacity methodologies which include four (4) individual analyses of each intersection:

- 2021 Existing Conditions
- 2025 Future No-Build Conditions (without proposed development and with any approved adjacent development in place)
- 2025 Future Build Conditions (with the proposed development in place)
- 2025 Future Build Improved Conditions (with the proposed development and Recommended Improvements in place)

Traffic analysis will consider Future Build conditions at the build-out year. Based upon current information, the development is assumed to be built by 2025. A growth rate has been requested from WVDOH Planning Division and will be utilized to determine future traffic volumes.

The analyses will be performed using the SYNCHRO 10.3 software package. The use of this software helps to ensure that the intersections will be analyzed in real life situations with intersections in coordination in all conditions.

Number of Intersections to be Studied

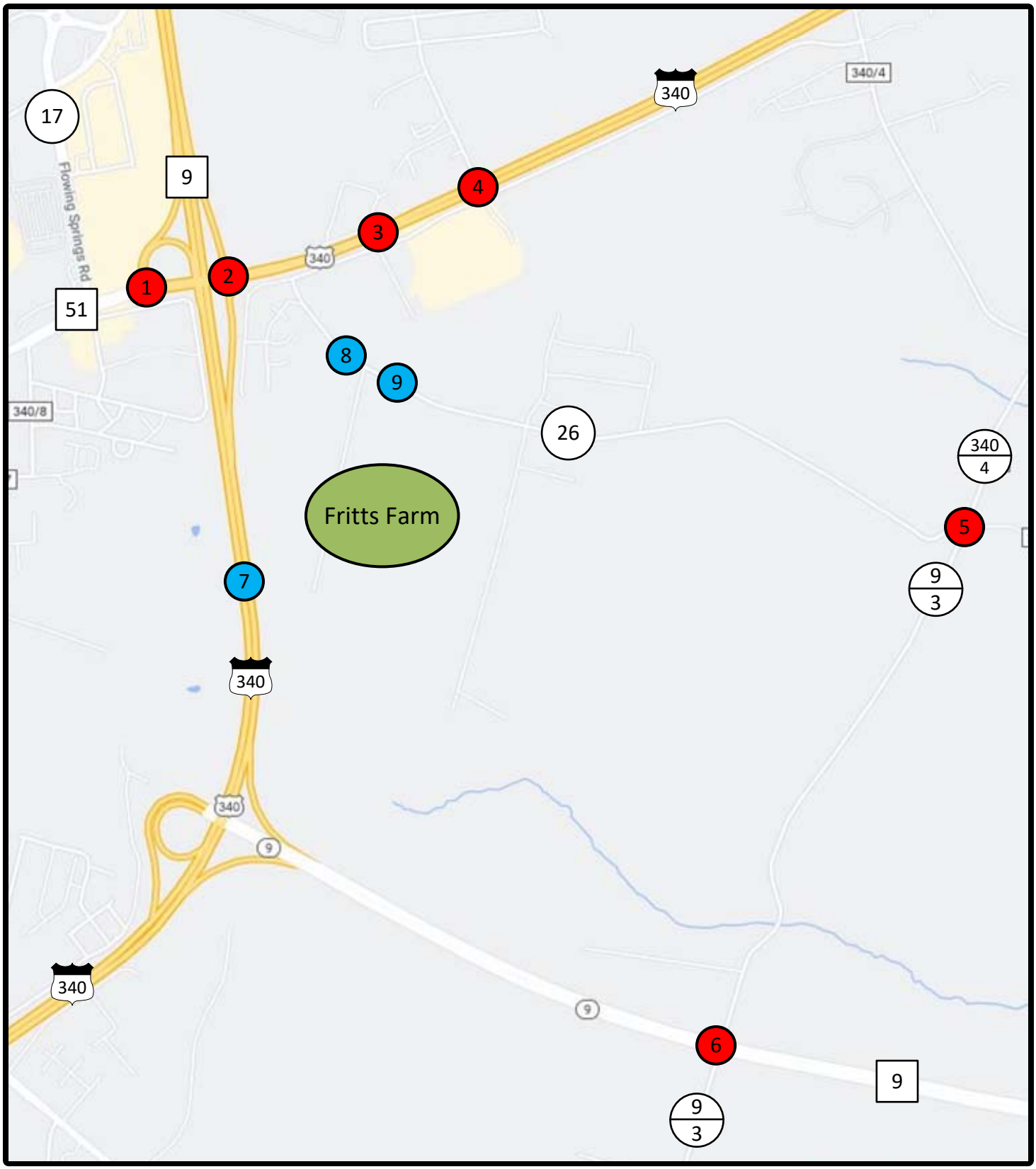
The following six (6) existing intersections will be included in the study for capacity analysis:

1. US 340/WV 51 with WV 9 Eastbound
    - Existing: Signalized "T" Intersection
2. US 340 with WV 9 Westbound
    - Existing: Signalized Plus Intersection
3. US 340 with Keyes Ferry Road (CR 26)/Jefferson Terrace Road
    - Existing: Signalized Plus Intersection
4. US 340 with Patrick Henry Way
    - Existing: Signalized Plus Intersection
5. Keyes Ferry Road with Cattail Run Road/Marlowe Road (CR 340/4)
    - Existing: Stop Controlled Plus Intersection
6. WV 9 with Cattail Run Road (CR 9/3)
    - Existing: Stop Controlled Plus Intersection

The following three (3) new intersections will be included in the study for capacity analysis:

7. US 340/WV 9 with Site Drive #1
    - Proposed: Stop Controlled "T" Intersection
8. Keyes Ferry Road with Site Drive #2
    - Proposed: Stop Controlled "T" Intersection
9. Keyes Ferry Road with Site Drive #3
    - Proposed: Stop Controlled "T" Intersection

Figure 1 shows the study area and key intersections. Figure 2 shows the current conceptual site plan with proposed access.



LEGEND

= Development

= Existing Intersection

= Proposed Intersection

AMT

N

NOT TO SCALE

Fritts Farm Residential Dev TIS

Site Location Map

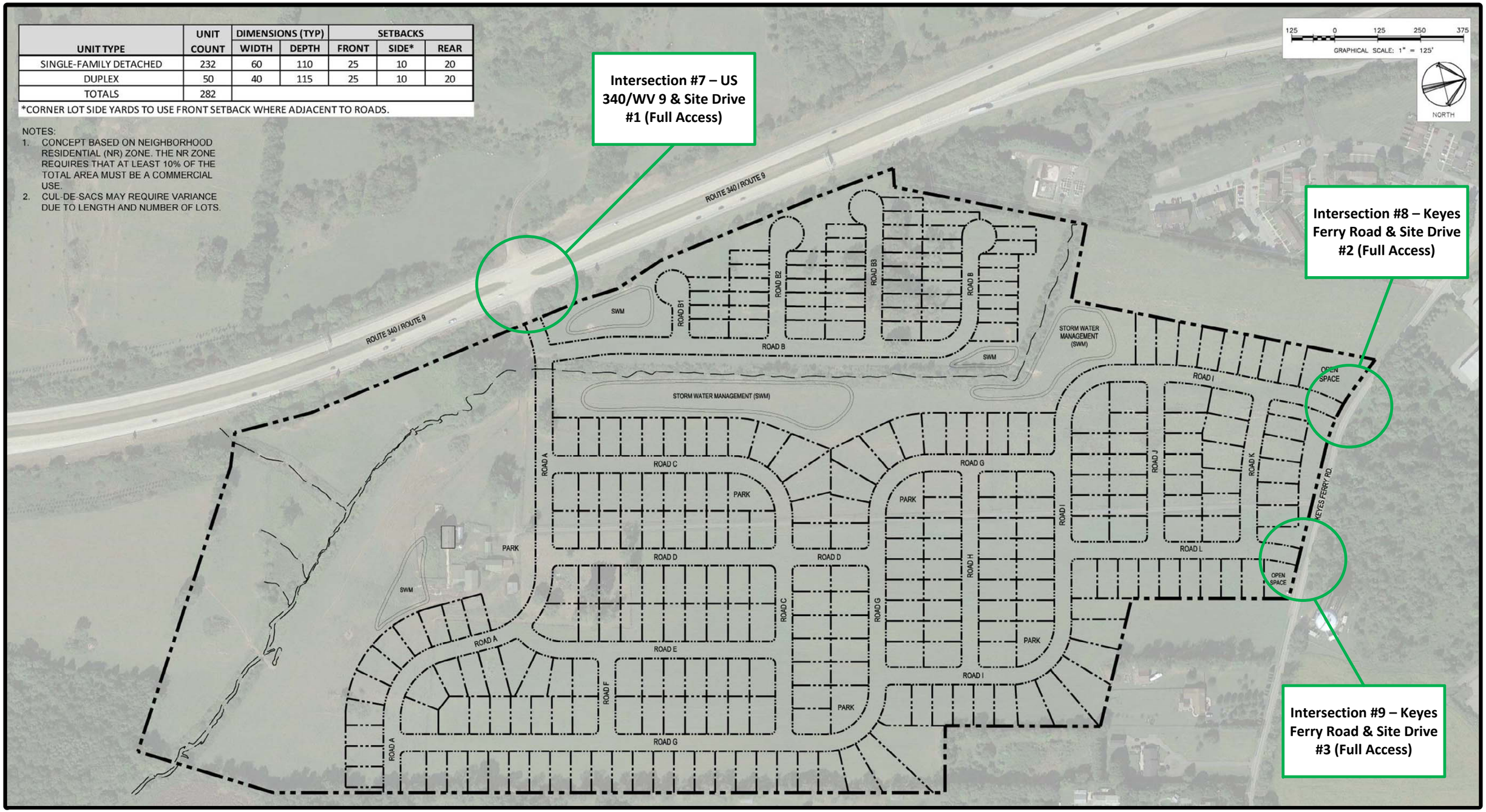
DATE: June 2021

FIGURE 1

UNIT TYPE	UNIT COUNT	DIMENSIONS (TYP)		SETBACKS		
		WIDTH	DEPTH	FRONT	SIDE*	REAR
SINGLE-FAMILY DETACHED	232	60	110	25	10	20
DUPLEX	50	40	115	25	10	20
TOTALS	282					

*CORNER LOT SIDE YARDS TO USE FRONT SETBACK WHERE ADJACENT TO ROADS.

NOTES:
1. CONCEPT BASED ON NEIGHBORHOOD RESIDENTIAL (NR) ZONE. THE NR ZONE REQUIRES THAT AT LEAST 10% OF THE TOTAL AREA MUST BE A COMMERCIAL USE.
2. CUL-DE-SACS MAY REQUIRE VARIANCE DUE TO LENGTH AND NUMBER OF LOTS.



N

NOT TO SCALE

Fritts Farm Residential Dev TIS

Site Plan

DATE: June 2021

FIGURE 2

AMT

Existing Traffic Data Collection

With the reopening of public schools and traffic volumes returning to normal levels, collection of new turning movement counts is suggested. Peak hour turning movement counts at each existing intersection will be collected on a typical Friday when Jefferson County Schools are in session between the hours of 7AM to 9AM and 3PM to 6PM. New Turning Movement counts will be collected at the following location:

- US 340/WV 51 with WV 9 Eastbound
- US 340 with WV 9 Westbound
- US 340 with Keyes Ferry Road (CR 26)/Jefferson Terrace Road
- US 340 with Patrick Henry Way
- Keyes Ferry Road with Cattail Run Road/Marlowe Road (CR 340/4)

Full 12-hour turning movement count will be collected at the following intersection between the hours of 7AM to 7PM on a typical Friday when Jefferson County Schools are in session. As directed by WVDOH, this full turning movement count will be utilized for traffic signal warrant analysis of the existing condition. New Turning Movement counts will be collected at the following location:

- WV 9 with Cattail Run Road (CR 9/3)

The collected data will be compared with previous turning movement data and the current AADT value for US 340 and WV 9 with any noted potential decrease in traffic from Covid-19 impacts will be discussed with WVDOH for potential volume modification.

Trip Generation

The proposed site will be a 232 single-family homes and 50 townhomes (See Figure 2). Peak hour trip generation will be determined using trip rate data from the latest version of the ITE Trip Generation Manual using Land Use Codes (LUC) 210 (Single-Family Detached Housing) and 220 (Multi-Family Housing).

Trip Distribution

The site-generated trips to and from the proposed residential development will be distributed in accordance with the existing traffic patterns and land uses in the vicinity of the study area. Proposed trip distribution based upon current conditions is as follows:

- 20% to/from the east on WV 9
- 25% to/from the west on WV 9
- 30% to/from the east on US 340
- 20% to/from the west on US 340
- 5% to/from the west on WV 51

This proposed distribution results in an 20/30 east/west split for traffic entering the site from WV 9/US 340 and 30/20 east/west split for traffic entering the site from US 340. Trip distribution will be confirmed once turning movement data is collected and discussed with WVDOH prior to submission of the preliminary TIS document.

Site Access

Access to the site is proposed to be provided by three (3) site access points. Each of these are detailed below:

Site Drive #1 (Site Access 1)
Site Drive #1 is proposed as a full movement two-way approach to US 340/WV 9 near the western end of the parcel.

Site Drive #2 (Site Access 2)
Site Drive #2 is proposed as a full movement two-way approach to Keyes Ferry Road near the northern end of the parcel.

Site Drive #3 (Site Access 3)
Site Drive #3 is proposed as a full movement two-way approach to Keyes Ferry Road near the northern end of the parcel.

Approved Developments

The TIS will potentially include any applicable approved or pending TIS documents for projects in the vicinity of this proposed development, as determined by WVDOH. Preliminary adjacent pending developments will include the following:

- *Pending* Flynn Property TIS (parcel north of US 340 and east of WV 9)
- *Pending* US 340 Mixed Use TIS (parcel south of US 340 near Keyes Ferry Rd)

Additional Data Needs

The following information is requested in order to complete the analysis for this project:

- US 340 signal plans including WV 9 EB Ramps, WV 9 WB Ramps, Keyes Ferry Road, and Patrick Henry Way
- Signal timing information for the US 340 signals including coordination plans
- Any potential improvement projects planned in this area

Appendix I-2

Growth Rate

Glaser, Caleb

From: Skeen, Jeremy P <Jeremy.P.Skeen@wv.gov>
Sent: Thursday, May 27, 2021 2:55 PM
To: Glaser, Caleb
Cc: Johnson, Leland W
Subject: RE: [External] Flowing Springs Road Growth Rate - Jefferson County

Caleb,

Flowing Springs Rd near Daniel Rd Growth Rate: 2.9406%
US 340 Near Keyes Ferry and Patrick Henry Road: 1.4008%

-Jeremy

From: Glaser, Caleb <cglaser@amtengineering.com>
Sent: Thursday, May 27, 2021 2:32 PM
To: Johnson, Leland W <Leland.W.Johnson@wv.gov>; Skeen, Jeremy P <Jeremy.P.Skeen@wv.gov>
Subject: [External] Flowing Springs Road Growth Rate - Jefferson County

CAUTION: External email. Do not click links or open attachments unless you verify sender.

Leland/Jeremy – AMT is performing a Traffic Impact Study for a project on Flowing Springs Road (CR 18) north of the US 340 with WV 9 interchange in Ranson, Jefferson County. Could you provide the anticipated growth rate for this location to develop forecast build year volumes?

Thank you,

Caleb Glaser EIT
Engineer

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W www.amtengineering.com

Appendix I-3

Comment Resolution

Glaser, Caleb

From: Cramer, David E <david.e.cramer@wv.gov>
Sent: Friday, October 8, 2021 11:41 AM
To: Kirk, Tim
Cc: donald.r.meadows@wv.gov; Ken Clohan; Glaser, Caleb; Miller, Luke I; Willis, Trixie A
Subject: Re: 2021_09_03, Fritts Farm TIS, Jefferson County, Initial

The results of DOH review of the TIS indicate that certain issues need to be addressed before approval can be provided. To that end, please review and address each of the following comments and if desired, submit a revised TIS accompanied by a written response indicating the manner in which each comment has been addressed:

1. In Table 1: Roadway Facility Summary, in the estimated build AADT for WV 51, the number is reduced from the 2017 AADT. Please review/verify.
2. In Table 1, pavement widths should be discussed and how the increase in AADT affects the roadway classification, as mentioned on page five of TED 106-2.
3. The dimensions of the existing left-turn lane on US 340 into the site should be reviewed to determine conformity with Design Directive 622.
4. For the proposed US 340 NB RTL approaching Site Drive 1, review DD-622 to verify appropriate lengths. Revise as needed.
5. On Figure 3, 2021 Existing Lane Configuration, a dual left-turn lane should be shown on US 340 NB at the intersection with Patrick Henry Way.
6. On Figure 8, New Trip Distribution,
    - About half of the 30 percent to/from the northeast (US 340 north) likely will access the site via intersection no. 9 and trips should be assigned in that manner.
    - At intersection no. 4, US 340 at Patrick Henry Way/Somerset Village Rd., the turning traffic to/from the site should be moved to intersection no. 3, US 340 at Jefferson Terrace Rd./Keyes Ferry Rd.
    - About half of the 20 percent trips to/from WV 9 east likely will use intersection no. 9 to access the site so trips should be assigned in that manner.
7. At intersection no. 2, US 340 at the WV 9 WB entrance ramp, the left-turn phase operates as a lagging left-turn phase but does not appear to be shown as such in analysis.
8. For clarification, when discussing/describing the US 340 Mixed Use development, Phase 1 is to be completed by 2024. The Development ultimately includes 3 phases, with Phase 2 completion in 2028 and full build out in 2032. This would affect only the narrative, as Phase 1 was the only phase to be included within this study.
9. While the report appropriately describes recommended improvements based on whether they are related to this Development or pre-development, if any improvements may be directly related to the background developments provided or specifically mentioned in the provided background TIS documents, that improvement is to be included in the narrative (e.g., recommended extension of US 340 SB LTL approaching Somerset Blvd is based on the pending US 340 Mixed Use development).
10. For motorists utilizing Keyes Ferry Rd to travel toward US 340 NB, what is the reasoning for showing all motorists to go north on US 340 via the US 340/Somerset Village Rd intersection and none to utilize the US 340/Keyes Ferry Rd intersection?
11. Based on the volumes shown on the WV 9 WB Exit Ramp approach to WV 51/US 340 NB, to what extent was consideration given or review performed whether a WV 9 WB Exit Ramp dual left-turn lane would provide any benefit to the approach operations?
12. Considering the continued poor LOS in the US 340 SB LTL approach to Somerset Blvd, what might be suggested mitigation measures to improve the operations at this location?
13. Considering the intersections of Keyes Ferry Rd/Somerset Blvd and Somerset Blvd/Somerset Village Rd have traffic control that is not able to be accurately modeled with current software, report/tables should likely include a denotation/statement indicating intersections are not able to be modeled in current form, therefore

the results for these two intersections do not truly represent the operations, which may be better or worse than reported.

14. 2025 Build Improved Conditions narrative and Table 4 indicate that the intersection of WV 9 with Cattail Run Rd is proposed to be signalized, however, report recommendations indicate only that further evaluation of the warrants should be performed and does not provide a recommendation for signalization. Is signalization recommended?
15. The WV 9 EB Exit Ramp approach to WV 51/US 340 is shown to be free-low, and while some motorists possibly may treat it in this manner due to the adjacent right-turn lane on WV 51 approaching Flowing Springs Rd, this movement currently is not intended to be free-flow (there is an existing Stop bar on this approach) and is intended to be controlled as part of the traffic signal at the intersection. If motorists were witnessed treating this as free-flow, the analyses potentially could remain as currently shown, but additional narrative then is to be provided describing this scenario. Otherwise, the analyses need to be revised to match the intended traffic control.
16. Considering several movements still would be expected to operate at a poor LOS even after suggested mitigations within the WV 9/WV 51/US 340 interchange area, might a recommendation be appropriate for a full design study at the interchange to determine potential/feasible improvements?
17. 10. While LOS and queuing values for the US 340 SB LTL approach to Site Drive 1 would appear to be within acceptable limits, considering the existing turn lane provides approximately 125' of storage plus taper; the queuing results indicate this lane to have queues over 100'; and it is located on a high speed corridor, it would seem appropriate to extend the turn lane to provide additional deceleration length. Since motorists would enter this lane from the "fast" (left) lane, a 125' turn lane with queues over 100' would not provide much room for entering motorists to decelerate upon entering the turn lane.
18. Based on the volume distribution shown for the Patrick Henry Way approach to US 340, to what extent was review performed to determine whether changing the lane configuration from the existing, left, left/thru, and right to a left, thru/right, and right would be beneficial? Appears that even during the PM peak fewer than 100 vehicles turn left from this approach, while nearly 350 turn right. Because the signal already is operating on split phase for the side road approaches, such a change would not be anticipated to be detrimental to US 340 operations.
19. Appears the same cycle length was utilized throughout each study scenario. Was the potential for any cycle length changes reviewed to determine if additional improvements to signal operations would be achievable?
20. On page 436 of the pdf document (Warrant Analysis section), the figures representing the number of hours met for Condition A and B appear to be reversed.
21. Although it appears the number of side road right turns has been appropriately reduced per Pagones Theorem when comparing to warranting criteria, the Pagones info sheet and calculations are to be included in the Appendices to show how reduction percentage was determined.
22. Considering existing turning movement data for the intersection of WV 9 with Cattail Run Rd do not meet either Condition A or B of Warrant 1 (the primary warrant utilized by the DOH), and signalization of this intersection is included in the build improved conditions (although recommendations indicate only to further evaluate need for signal), when and by whom is the proposed future evaluation recommended to be performed? If such future evaluation indicates the need for signalization or other modification, what is the Developer's intended method of implementing and funding such signalization or other modification?
23. Appropriate weaving analysis is to be included for US 340 SB traffic entering the expressway from the on-ramp and then crossing two lanes to turn left into the site (as mentioned in the email response to the Scope of Work approval).
24. Provide a summary of TIS submission to and responses/review results of the other agencies (such as the MPO) denoted in the executed agreement.

If additional information is needed, please let us know.

Dave

On Thu, Sep 9, 2021 at 5:01 PM Kirk, Tim <tkirk@amtengineering.com> wrote:

Dave,

On behalf of Springfield Partners, LLC, attached is submission of the TIS for the Fritts Farm residential development in Charles Town, Jefferson County. Also attached for reference is the scope of work document for this project.

Copies of this study are also being provided to Jefferson County, HEPMPO, and Charles Town in accordance with the development agreement.

Related project information including analysis files are loaded in ProjectWise at the following location - Fritts Farm TIS, Jefferson County<pw://DOTB6PWHQ.executive.stateofwv.gov:PW-Primary/Documents/P%7bb923b04a-f1f6-4afe-a838-21719eedf782%7d/>

We look forward to your feedback and I am available as you need to address any questions or provide additional information as needed.

Tim Kirk PE, PTOE, RSP1
Associate
P 304-400-4952 | D 304-903-7008 | C 304-488-6031
W www.amtengineering.com<http://www.amtengineering.com>

Glaser, Caleb

From: Kirk, Tim
Sent: Friday, December 3, 2021 2:31 PM
To: Stephen Plescow
Cc: Glaser, Caleb
Subject: FW: 2021_09_03, Fritts Farm TIS, Jefferson County, Initial

The revised TIS was approved by DOH

Tim Kirk PE, PTOE, RSP1
Associate

P 304-400-4952 | **D** 304-903-7008 | **C** 304-488-6031
W www.amtengineering.com

From: Cramer, David E <david.e.cramer@wv.gov>
Sent: Friday, December 3, 2021 2:28 PM
To: Kirk, Tim <tkirk@amtengineering.com>
Cc: Donald R Meadows <donald.r.meadows@wv.gov>; Kenneth L Clohan <kenneth.l.clohan@wv.gov>; Trixie A Willis <trixie.a.willis@wv.gov>
Subject: Re: 2021_09_03, Fritts Farm TIS, Jefferson County, Initial

The results of DOH review of the revised TIS indicate you have addressed our previous concerns and the revised TIS is approved. The Developer may submit Plans (electronic to me; printed set to District Five permits) when desired, with those Plans incorporating the recommendations of the approved TIS. If additional information is needed, let us know.

Dave

On Mon, Nov 15, 2021 at 11:26 AM Kirk, Tim <tkirk@amtengineering.com> wrote:

> Dave,
>
> In response to you email dated 10/8/21, attached is a copy of the Revised TIS for the Fritts Farm Project and documentation of our comment resolution. This study is also being provided to Jefferson County, Charles Town, and HEPMPO per the development agreement. Related project files have been provided via ProjectWise.
>
> Please let me know if you have any questions or need additional information. We look forward to your feedback.
>
> **Tim Kirk** PE, PTOE, RSP1
> Associate
>
> **P** 304-400-4952 | **D** 304-903-7008 | **C** 304-488-6031
> **W** www.amtengineering.com

From: Cramer, David E <david.e.cramer@wv.gov>
Sent: Friday, October 8, 2021 11:41 AM
To: Kirk, Tim <tkirk@amtengineering.com>
Cc: donald.r.meadows@wv.gov; Ken Clohan <kenneth.l.clohan@wv.gov>; Glaser, Caleb <cglaser@amtengineering.com>; Miller, Luke I <Luke.I.Miller@wv.gov>; Willis, Trixie A <trixie.a.willis@wv.gov>
Subject: Re: 2021_09_03, Fritts Farm TIS, Jefferson County, Initial

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2. In Table 1, pavement widths should be discussed and how the increase in AADT affects the roadway classification, as mentioned on page five of TED 106-2.
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4. For the proposed US 340 NB RTL approaching Site Drive 1, review DD-622 to verify appropriate lengths. Revise as needed.
5. On Figure 3, 2021 Existing Lane Configuration, a dual left-turn lane should be shown on US 340 NB at the intersection with Patrick Henry Way.
6. On Figure 8, New Trip Distribution,

    - About half of the 30 percent to/from the northeast (US 340 north) likely will access the site via intersection no. 9 and trips should be assigned in that manner.
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8. For clarification, when discussing/describing the US 340 Mixed Use development, Phase 1 is to be completed by 2024. The Development ultimately includes 3 phases, with Phase 2 completion in 2028 and full build out in 2032. This would affect only the narrative, as Phase 1 was the only phase to be included within this study.
9. While the report appropriately describes recommended improvements based on whether they are related to this Development or pre-development, if any improvements may be directly related to the background developments provided or specifically mentioned in the provided background TIS documents, that improvement is to be included in the narrative (e.g., recommended extension of US 340 SB LTL approaching Somerset Blvd is based on the pending US 340 Mixed Use development).
10. For motorists utilizing Keyes Ferry Rd to travel toward US 340 NB, what is the reasoning for showing all motorists to go north on US 340 via the US 340/Somerset Village Rd intersection and none to utilize the US 340/Keyes Ferry Rd intersection?
11. Based on the volumes shown on the WV 9 WB Exit Ramp approach to WV 51/US 340 NB, to what extent was consideration given or review performed whether a WV 9 WB Exit Ramp dual left-turn lane would provide any benefit to the approach operations?
12. Considering the continued poor LOS in the US 340 SB LTL approach to Somerset Blvd, what might be suggested mitigation measures to improve the operations at this location?

13. Considering the intersections of Keyes Ferry Rd/Somerset Blvd and Somerset Blvd/Somerset Village Rd have traffic control that is not able to be accurately modeled with current software, report/tables should likely include a denotation/statement indicating intersections are not able to be modeled in current form, therefore the results for these two intersections do not truly represent the operations, which may be better or worse than reported.
14. 2025 Build Improved Conditions narrative and Table 4 indicate that the intersection of WV 9 with Cattail Run Rd is proposed to be signalized, however, report recommendations indicate only that further evaluation of the warrants should be performed and does not provide a recommendation for signalization. Is signalization recommended?
15. The WV 9 EB Exit Ramp approach to WV 51/US 340 is shown to be free-low, and while some motorists possibly may treat it in this manner due to the adjacent right-turn lane on WV 51 approaching Flowing Springs Rd, this movement currently is not intended to be free-flow (there is an existing Stop bar on this approach) and is intended to be controlled as part of the traffic signal at the intersection. If motorists were witnessed treating this as free-flow, the analyses potentially could remain as currently shown, but additional narrative then is to be provided describing this scenario. Otherwise, the analyses need to be revised to match the intended traffic control.
16. Considering several movements still would be expected to operate at a poor LOS even after suggested mitigations within the WV 9/WV 51/US 340 interchange area, might a recommendation be appropriate for a full design study at the interchange to determine potential/feasible improvements?
17. 10. While LOS and queuing values for the US 340 SB LTL approach to Site Drive 1 would appear to be within acceptable limits, considering the existing turn lane provides approximately 125' of storage plus taper; the queuing results indicate this lane to have queues over 100'; and it is located on a high speed corridor, it would seem appropriate to extend the turn lane to provide additional deceleration length. Since motorists would enter this lane from the "fast" (left) lane, a 125' turn lane with queues over 100' would not provide much room for entering motorists to decelerate upon entering the turn lane.
18. Based on the volume distribution shown for the Patrick Henry Way approach to US 340, to what extent was review performed to determine whether changing the lane configuration from the existing, left, left/thru, and right to a left, thru/right, and right would be beneficial? Appears that even during the PM peak fewer than 100 vehicles turn left from this approach, while nearly 350 turn right. Because the signal already is operating on split phase for the side road approaches, such a change would not be anticipated to be detrimental to US 340 operations.
19. Appears the same cycle length was utilized throughout each study scenario. Was the potential for any cycle length changes reviewed to determine if additional improvements to signal operations would be achievable?
20. On page 436 of the pdf document (Warrant Analysis section), the figures representing the number of hours met for Condition A and B appear to be reversed.
21. Although it appears the number of side road right turns has been appropriately reduced per Pagones Theorem when comparing to warranting criteria, the Pagones info sheet and calculations are to be included in the Appendices to show how reduction percentage was determined.
22. Considering existing turning movement data for the intersection of WV 9 with Cattail Run Rd do not meet either Condition A or B of Warrant 1 (the primary warrant utilized by the DOH), and signalization of this intersection is included in the build improved conditions (although recommendations indicate only to further evaluate need for signal), when and by whom is the proposed future evaluation recommended to be performed? If such future evaluation indicates the need for signalization or other modification, what is the Developer's intended method of implementing and funding such signalization or other modification?
23. Appropriate weaving analysis is to be included for US 340 SB traffic entering the expressway from the on-ramp and then crossing two lanes to turn left into the site (as mentioned in the email response to the Scope of Work approval).
24. Provide a summary of TIS submission to and responses/review results of the other agencies (such as the MPO) denoted in the executed agreement.

If additional information is needed, please let us know.

Dave

On Thu, Sep 9, 2021 at 5:01 PM Kirk, Tim <tkirk@amtengineering.com> wrote:

> Dave,
>
> On behalf of Springfield Partners, LLC, attached is submission of the TIS for the Fritts Farm residential development in Charles Town, Jefferson County. Also attached for reference is the scope of work document for this project.
>
> Copies of this study are also being provided to Jefferson County, HEPMPO, and Charles Town in accordance with the development agreement.
>
> Related project information including analysis files are loaded in ProjectWise at the following location - Fritts Farm TIS, Jefferson County<pw://DOTB6PWHQ.executive.stateofwv.gov:PW-Primary/Documents/P%7bb923b04a-f1f6-4afe-a838-21719eedf782%7d/>
>
> We look forward to your feedback and I am available as you need to address any questions or provide additional information as needed.
>
> Tim Kirk PE, PTOE, RSP1
> Associate
> P 304-400-4952 | D 304-903-7008 | C 304-488-6031
> W www.amtengineering.com<http://www.amtengineering.com>

INTEGRITY
FEDERAL SERVICES

Storm Water Management Report

Stone Springs

City of Charles Town
Jefferson County, West Virginia
COCT File No.:

Prepared For:
Stanley Martin Homes, LLC
14200 Park Meadow Drive, Suite 100 N
Chantilly, VA 20151

Prepared By:
Integrity Federal Services
148 S. Queen Street, Suite 201
Martinsburg, WV 25401
(304) 725-8456

Prepared: January 2023
Revised: March 2023

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APPENDICES

Existing Runoff Calculations: **Appendix A**

- Pre-Development Drainage Area Map
- Runoff Curve Number Calculations
- Tc Calculations
- 2-Year Hydrographs
- 10-Year Hydrographs
- 25-Year Hydrographs

Proposed Runoff Calculations: **Appendix B**

- Post-Development Drainage Area Map
- Runoff Curve Number Calculations
- 2-Year Hydrographs
- 10-Year Hydrographs
- 25-Year Hydrographs
- 100-Year Hydrographs
- Forebay Calculations

Water Quality Calculations: **Appendix C**

- Water Quality Map
- Water Quality Sizing Calculations
- WV MS4 Spreadsheet

Soils **Appendix D**

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PROJECT OVERVIEW

Stone Springs Subdivision is a +/- 99-acre residential development. The proposed site improvements include, but are not limited to, the construction of 248 Single-family detached dwellings, 77 Single-family attached dwellings, associated roadways, utilities, and stormwater management facilities. This report will summarize the stormwater infrastructure improvements designed to service the property. Stormwater management quantity and quality control requirements for this site are being provided through the construction of a permanent stormwater retention basin (wet pond) in accordance with the *Subdivision and Land Development Ordinance of the City of Charles Town, WV* (Part 13, Article 1334).

SITE CHARACTERISTICS

The Stone Springs Subdivision development is located within the City of Charles Town, West Virginia; bounded by Keyes Ferry Road (WV - Route 26) to the north and Veterans Memorial Highway (WV - Route 9) to the west. East Washington Street (WV – Route 34) is located about 0.20 miles north of the site. Adjacent residential/agricultural uses are located to the east, south, and west of the property; with vacant commercial land to the north. The subject property consists of an existing farm; which includes gravel accessways, agricultural buildings, row crops, undeveloped open space with field grass, and vegetated/forested space. A FEMA flood zone and field delineated wetlands exist onsite.

This overall drainage area contains the following soils pursuant to the USDA *Natural Resources Conservation Service (NRCS), Web Soil Survey*. (See Appendix D)

Soil Type	Name	Hydrologic Soil Groups
PmC	Poplimento Silt Loam, 8-15% slopes	B
PmB	Poplimento Silt Loam, 3-8% slopes	B
Tm	Toms Silt Loam	B/D
HbC	Hagerstown Silt Loam, 8-15% slopes	B
HeC	Hagerstown Silt Loam, 8-15% slopes	B
Fk	Funkstown Silt Loam	C
Uu	Urban land-Udorthents	-
Ua	Udorthents, smoothed	-

STORMWATER MANAGEMENT REQUIREMENTS

The Stormwater Management Plan for the Stone Springs Subdivision shall comply with the requirements of the *Subdivision and Land Development Ordinance of the City of Charles Town*, WV (Part 13, Article 1334) and *The Virginia Stormwater Management Handbook*; namely: (1) Impounding Structures are engineered for structural integrity during the 100-year storm event (2) The 2-year and 10-year storm post-development peak discharges at the point of interest are less than the pre-development discharge rates and (3) sufficient quality treatment volume is provided. Additionally, a 25-year storm analysis is provided to show the post-development peak discharge rates are less than the pre-development discharge rates in compliance with WV DOH requirements.

EXISTING CONDITIONS HYDROLOGY

The onsite watershed boundaries were delineated using a site-specific topographic survey. Offsite watershed boundaries were delineated using available topographic survey and GIS topography. The existing runoff curve number (RCN) for each sub-area was determined based on the Urban Hydrology for Small Watersheds TR-55 (Technical Release 55) manual. Hydraflow Hydrographs were utilized to model the existing drainage conditions.

There is one (1) primary onsite existing drainage shed which is associated with the onsite Cattail Run. This onsite drainage shed and all analyzed offsite drainage sheds outfall at the southeastern corner of the subject property within the existing floodplain. Existing undeveloped drainage sheds are assumed to be in karst conditions (see Proposed Conditions Hydrology: Karst Adjustment).

PROPOSED CONDITIONS HYDROLOGY

The drainage shed conditions post-development are very similar to the existing conditions, with one (1) primary outfall. A retention basin (wet pond) is proposed onsite to meet quality and quantity stormwater management requirements. The drainage for the majority of the site has been routed towards this stormwater management facility. While portions of the site are not routed towards any SWM facility, being left untreated and undetained, these areas are accounted for in quality & quantity control through the over-design of the onsite stormwater management facility.

Water Quality is met by treating the first flush of runoff with the water quality facilities. The proposed Retention Basin is designed to accommodate four (4) times the required Water Quality Volume and utilizes an aquatic bench, required to utilize a 65% phosphorus removal efficiency. Water quantity is met by controlling the 2-year, 10-year, and 25-years storm events to less than the pre-development discharge rate.

The proposed curve number (RCN) for each subarea was determined based upon the Urban Hydrology for Small Watersheds (TR-55) manual. The proposed curve number for the proposed development area was calculated based upon the proposed impervious and open space areas. See Appendix B for RCN Calculations for each sub area.

The time of concentration (Tc) was determined based on the Urban Hydrology for small Watersheds (TR-55) manual. Sheet flow and shallow concentrated flow was utilized in determining the Tc for each subbasin. See Appendix A for Pre-development time of concentrations and Appendix B for post-development time of concentrations.

Hydraflow Hydrographs are utilized to model the proposed drainage conditions. Pre-development hydrographs are found in Appendix A, and post-development hydrographs are found in Appendix B. Drainage Area Maps can be found in Appendix A for predevelopment and Appendix B for post development.

KARST ADJUSTMENT

For pre-development calculations, the entire onsite area for the watershed is assumed to be in karst geology. Correction factors of 0.33 and 0.43 are applied per Virginia SWM requirements for the 2 and 10-year storm events respectively. Off-site areas that have not been developed are also assumed to be in karst geology. Varying adjustment factors were used based on the ratio of karst and regular soil. Developed portions of off-site areas are assumed to be non-karst and have not been adjusted.

For post development calculations, onsite areas are assumed to be no longer in karst geology. For off-site areas, like the pre-development calculations, undeveloped areas are assumed to be karst. Adjustments that were applied are included within the hydrograph reports in Appendix A & B.

QUALITY CONTROL

The project includes impervious areas for houses, driveways, and roadways and sidewalks. The remaining areas will be modeled as pervious managed turf. The water quality control volume was determined using Performance Based Water Quality Calculations, as required with the *Virginia Stormwater Management Handbook.* 31.38 acres of impervious area are shown to be directed towards a “Retention Basin III”, this includes 3.00 acres of impervious area for future commercial development and 0.50 acres of impervious area for future H.O.A. parkland. Approximately, 6.26 acres of impervious are left untreated.

The Performance Based BMP computations (Appendix C) show a required quality volume of 227,819 cubic feet, which includes the 4xWQV factor required to utilize the 65% efficiency removal rate. The provided pond surface elevation of 427.50 feet results in 228,620 cubic feet provided treatment volume. As shown within the performance-based computations, this satisfies all quality requirements for the development. Additionally, the pond is designed with an aquatic bench for additional water quality treatment and an impermeable liner due to potential karst geology onsite.

QUANTITY CONTROL

The stormwater management retention facility controls the increase in flow for the 2, 10, & 25-year post development conditions; and allows the 100-year storm to be routed through the stormwater management detention facility with 1-ft minimum of freeboard from the 100-year water surface to the top of the pond embankment. See calculations in Appendix B. The 2-year, 10-year, and 25-year flow is controlled by a proposed concrete weir, which also passes the 100-year storm.

STORMWATER CONVEYANCE & DRAINAGE DESIGN

Storm Sewers

Storm sewer pipe system has been designed for the 10-year storm event. Storm sewer inlets have been designed for the 2-year storm event. Drainage gutter and storm drain inlet devices have been designed to carry the peak flow from a 2-year Frequency, 24-hour storm event with a maximum spread of one-half the travel way. 10-year flows were computed using the Rational Method, and Hydraflow Storm Sewers software was used to model the storm sewer system. Calculations are provided on Site Plan sheets 103-106.

Roadway Culverts

Roadway culverts have been designed to pass the 10-year, 24-hour storm event without overtopping the roadway at the edge of the shoulder. 10-year flows were computed using the Rational Method. Culvert Master software culvert calculations are provided on Site Plan sheet 103-106.

SUMMARY

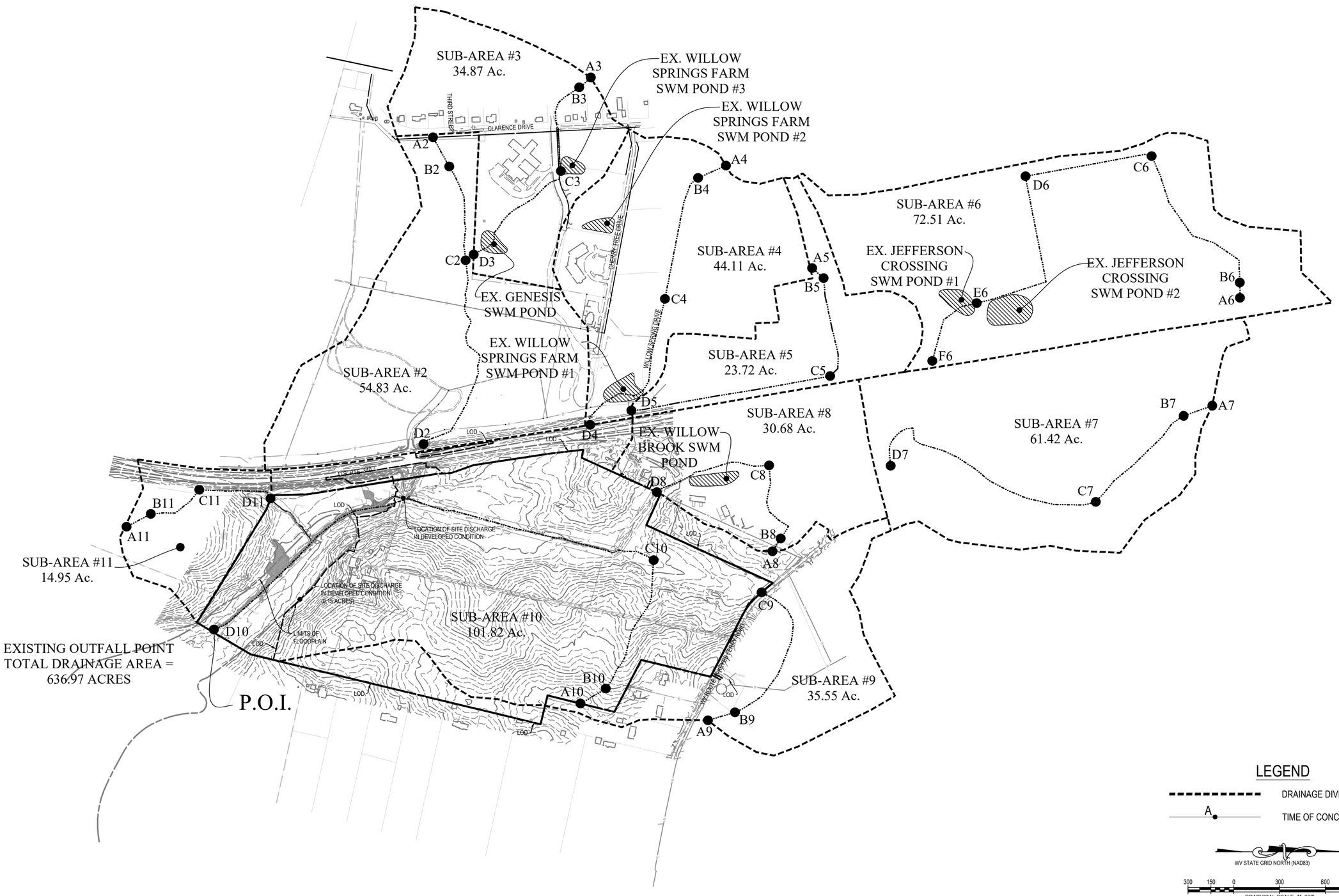
In conclusion, the proposed stormwater management facilities control the increase in flow for the 2-year, 10-year, and 25-year storm events. The overall site plan promotes pollutant reduction, and water quality enhancement. The stormwater management facilities reduce the post-development flow to an amount that is lower than that of the pre-development site. Additionally, the proposed BMP measures minimize any impact on the downstream systems. Water quality control is provided by capturing the first flush of runoff from a 24-hour storm in a retention basin. The stormwater management facilities will minimize any impact to the water resources of the area.

SWM Summary				
	2-YR	**10-YR**	**25-YR**	**100-YR**
Pre-Development Total Flow (cfs)	46.89	200.80	361.81	-
Post-Development Total Flow (cfs)	41.33	188.82	359.51	-
Post-Development Discharge from SWM Facility (cfs)	31.49	147.79	283.70	669.16
Water Surface Elevation (ft)	429.03	430.33	431.07	431.82

Appendix A

Existing Runoff Calculations

- Pre-Development Drainage Map
- Runoff Curve Number Calculations
- Tc Calculations
- 2-Year Hydrographs
- 10-Year Hydrographs
- 25-Year Hydrographs



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JASON P. GERMAN REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1: 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

PRE DEVELOPMENT DRAINAGE MAP

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 300' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CJ-101.DWG	
NCS:	
SHEET:	113 OF 134

FILE PATH: Z:\PROJECT\GERMAN,JASON\2665-0206 FIRETTS FARM\DRAWINGS\C-CJ-101.DWG
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Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #2	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Meadow	58	50.24	2,914
	B	Open space, Good condition	61	3.38	206
	B	Impervious Areas	98	1.21	119
			Totals =	54.83	3,239

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{3{,}239}{54.83}$ = 59 Use CN = **59**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.15	0.34	1.21	1.66	2.51

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #2	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A2-B2			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	219			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.055			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.30		=	
			Hr.	0.30
			Min.	18.11

Shallow Concentrated Flow

Segment ID	B2-C2			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	640			
9. Watercourse slope, s ……...ft/ft	0.042			
10. Average velocity, V (figure 3-1)……ft/s	3.31			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.05	+	=	
			Hr.	0.05
			Min.	3.23

Channel Flow

Segment ID	C2-D2			
12. Cross sectional flow area, a……ft2	11.63			
13. Wetted perimeter, Pw……ft	20.83			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.56			
15. Channel Slope, s……ft/ft	0.034			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	6.21			
18. Flow Length, L……ft	1,432			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.06	+	=	
			Hr.	0.06
			Min.	3.84

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.42**
	Min.	**25.18**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #3	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Residential District (1/3 Acre)	72	18.85	1,357
	B	Meadow	58	16.02	929
			Totals =	34.87	2,286

CN (weighted)= total product / total area = 2,286 / 34.87 = 66 Use CN = **66**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.31	0.58	1.66	2.18	3.16

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #3	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A3-B3			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.035			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.19		=	
			Hr.	0.19
			Min.	11.59

Shallow Concentrated Flow

Segment ID	B3-C3			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	624			
9. Watercourse slope, s ……...ft/ft	0.037			
10. Average velocity, V (figure 3-1)……ft/s	3.10			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.06	+	=	
			Hr.	0.06
			Min.	3.35

Channel Flow

Segment ID	C3-D3			
12. Cross sectional flow area, a……ft2	9.33			
13. Wetted perimeter, Pw……ft	15.23			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.61			
15. Channel Slope, s……ft/ft	0.038			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	6.98			
18. Flow Length, L……ft	828			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.03	+	=	
			Hr.	0.03
			Min.	1.98

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.28**
	Min.	**16.92**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #4	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Meadow	58	43.36	2,515
	B	Open space, Good condition	61	0.53	32
	B	Impervious Areas	98	0.22	22
			Totals =	44.11	2,569

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{2,569}{44.11} =$ 58 Use CN = **58**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.14	0.31	1.16	1.59	2.43

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #4	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A4-B4			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	200			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.080			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.24			=
			Hr.	0.24
			Min.	14.50

Shallow Concentrated Flow

Segment ID	B4-C4			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	836			
9. Watercourse slope, s ……...ft/ft	0.049			
10. Average velocity, V (figure 3-1)……ft/s	3.57			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.07	+		=
			Hr.	0.07
			Min.	3.90

Channel Flow

Segment ID	C4-D4			
12. Cross sectional flow area, a……ft2	9.4			
13. Wetted perimeter, Pw……ft	19.01			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.49			
15. Channel Slope, s……ft/ft	0.031			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	5.47			
18. Flow Length, L……ft	1,093			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.06	+		=
			Hr.	0.06
			Min.	3.33

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.36**
	Min.	**21.73**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #5	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	11.02	672
	B	Impervious Areas	98	10.11	991
	B	Woods, Good Condition	55	2.59	142
			Totals =	23.72	1,805

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{1{,}805}{23.72} =$ 76 Use CN = **76**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.70	1.09	2.50	3.13	4.27

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #5	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A5-B5			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.070			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.15			=
			Hr.	0.15
			Min.	8.78

Shallow Concentrated Flow

Segment ID				
7. Surface description (paved or unpaved)……..				
8. Flow length, L ……...ft				
9. Watercourse slope, s ……...ft/ft				
10. Average velocity, V (figure 3-1)……ft/s				
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.00	+		=
			Hr.	0.00
			Min.	0.00

Channel Flow

Segment ID	B5-C5		C5-D5	
12. Cross sectional flow area, a……ft2	9.26		13.11	
13. Wetted perimeter, Pw……ft	16.9		15.06	
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.55		0.87	
15. Channel Slope, s……ft/ft	0.052		0.014	
16. Manning's Roughness coefficient, n…….	0.030		0.030	
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	7.58		5.36	
18. Flow Length, L……ft	674		1,323	
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.02	+	0.07	=
			Hr.	0.09
			Min.	5.60

20. Watershed or subarea T_c or T_t …….……..……..	Hr.	**0.24**
	Min.	**14.38**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #6	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	14.87	907
	B	Impervious Areas	98	6.39	626
	B	Meadow	58	51.25	2,973
			Totals =	72.51	4,506

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{4{,}506}{72.51} =$ 62 Use CN = **62**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.22	0.44	1.42	1.90	2.81

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #6	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A6-B6			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.026			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.22			=
			Hr.	0.22
			Min.	13.05

Shallow Concentrated Flow

Segment ID	B6-C6		D6-E6	
7. Surface description (paved or unpaved)……..	UNPAVED		PAVED	
8. Flow length, L ……...ft	1,087		1,182	
9. Watercourse slope, s ……...ft/ft	0.022		0.012	
10. Average velocity, V (figure 3-1)……ft/s	2.39		2.23	
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.13	+	0.15	=
			Hr.	0.27
			Min.	16.42

Channel Flow

Segment ID	C6-D6		E6-F6	
12. Cross sectional flow area, a……ft2	30.47		14.33	
13. Wetted perimeter, Pw……ft	35.49		22.76	
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.86		0.63	
15. Channel Slope, s……ft/ft	0.006		0.041	
16. Manning's Roughness coefficient, n…….	0.030		0.030	
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V……ft/s	3.48		7.39	
18. Flow Length, L……ft	843		527	
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.07	+	0.02	=
			Hr.	0.09
			Min.	5.23

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.58**
	Min.	**34.70**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #7	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	11.72	715
	B	Woods and Grass, Good Condition	58	45.06	2,613
	B	Impervious Areas	98	4.64	455
			Totals =	61.42	3,783

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{3{,}783}{61.42} = 62$ Use CN = **62**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.21	0.42	1.38	1.86	2.76

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #7	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A7-B7			
1. Surface description (table 3-1)……..	SHORT GRASS PRAIRIE			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.15			
3. Flow Length, L (total L<= 300 ft)……ft	200			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.045			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.21		=	
			Hr.	0.21
			Min.	12.53

Shallow Concentrated Flow

Segment ID	B7-C7			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	811			
9. Watercourse slope, s ……...ft/ft	0.030			
10. Average velocity, V (figure 3-1)……ft/s	2.79			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.08	+	=	
			Hr.	0.08
			Min.	4.84

Channel Flow

Segment ID	C7-D7			
12. Cross sectional flow area, a……ft2	30.15			
13. Wetted perimeter, Pw……ft	60.14			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.50			
15. Channel Slope, s……ft/ft	0.009			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	2.97			
18. Flow Length, L……ft	1,712			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.16	+	=	
			Hr.	0.16
			Min.	9.60

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.45**
	Min.	**26.96**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #8	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	7.65	467
	B	Meadow	58	19.80	1,148
	B	Impervious Areas	98	3.23	317
			Totals =	30.68	1,932

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{1,932}{30.68}$ = 63 Use CN = **63**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.24	0.47	1.47	1.97	2.90

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #8	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A8-B8			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.025			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.22			=
			Hr.	0.22
			Min.	13.26

Shallow Concentrated Flow

Segment ID	B8-C8			
7. Surface description (paved or unpaved)……..	PAVED			
8. Flow length, L ……...ft	563			
9. Watercourse slope, s ……...ft/ft	0.027			
10. Average velocity, V (figure 3-1)……ft/s	3.34			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.05	+		=
			Hr.	0.05
			Min.	2.81

Channel Flow

Segment ID	C8-D8			
12. Cross sectional flow area, a……ft2	11.9			
13. Wetted perimeter, Pw……ft	19.92			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.60			
15. Channel Slope, s……ft/ft	0.014			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	4.17			
18. Flow Length, L……ft	787			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.05	+		=
			Hr.	0.05
			Min.	3.15

20. Watershed or subarea T_c or T_t …….……..……..	Hr.	**0.32**
	Min.	**19.22**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #9	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	0.19	12
	B	Meadow	58	31.39	1,821
	B	Impervious Areas	98	3.97	389
			Totals =	35.55	2,221

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{2{,}221}{35.55} =$ 62 Use CN = **62**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.23	0.46	1.44	1.93	2.85

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #9	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A9-B9			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	185			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.043			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.29		=	
			Hr.	0.29
			Min.	17.46

Shallow Concentrated Flow

Segment ID	B9-C9			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	1,038			
9. Watercourse slope, s ……...ft/ft	0.029			
10. Average velocity, V (figure 3-1)……ft/s	2.75			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.10	+	=	
			Hr.	0.10
			Min.	6.30

Channel Flow

Segment ID				
12. Cross sectional flow area, a……ft2				
13. Wetted perimeter, Pw……ft				
14. Hydraulic Radius, r= a/Pw Compute r……ft				
15. Channel Slope, s……ft/ft				
16. Manning's Roughness coefficient, n…….				
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V……ft/s				
18. Flow Length, L……ft				
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr		+	=	
			Hr.	0.00
			Min.	0.00

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.40**
	Min.	**23.76**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #10	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Meadow	58	74.85	4,341
	B	Open space, Good condition	61	5.47	334
	B	Impervious Areas	98	4.56	447
	C	Meadow	71	16.94	1,203
			Totals =	101.82	6,325

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{6{,}325}{101.82} =$ 62 Use CN = **62**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.22	0.44	1.42	1.90	2.81

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #10	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A10-B10			
1. Surface description (table 3-1)……..	SHORT GRASS PRAIRIE			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.15			
3. Flow Length, L (total L<= 300 ft)……ft	193			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.062			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.18			=
			Hr.	0.18
			Min.	10.71

Shallow Concentrated Flow

Segment ID	B10-C10			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	922			
9. Watercourse slope, s ……...ft/ft	0.047			
10. Average velocity, V (figure 3-1)……ft/s	3.50			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.07	+		=
			Hr.	0.07
			Min.	4.39

Channel Flow

Segment ID	C10-D10			
12. Cross sectional flow area, a……ft2	29.02			
13. Wetted perimeter, Pw……ft	21.77			
14. Hydraulic Radius, r= a/Pw Compute r……ft	1.33			
15. Channel Slope, s……ft/ft	0.007			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	5.03			
18. Flow Length, L……ft	3,256			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.18	+		=
			Hr.	0.18
			Min.	10.78

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.43**
	Min.	**25.89**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #11	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Meadow	58	11.65	676
	B	Open space, Good condition	61	2.32	142
	B	Impervious Areas	98	0.98	96
			Totals =	14.95	913

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{913}{14.95} = 61$ Use CN = **61**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.20	0.41	1.35	1.81	2.71

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #11	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A11-B11			
1. Surface description (table 3-1)……..	SHORT GRASS PRAIRIE			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.15			
3. Flow Length, L (total L<= 300 ft)……ft	181			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.066			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.17			=
			Hr.	0.17
			Min.	9.93

Shallow Concentrated Flow

Segment ID	B11-C11			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	381			
9. Watercourse slope, s ……...ft/ft	0.052			
10. Average velocity, V (figure 3-1)……ft/s	3.68			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.03	+		=
			Hr.	0.03
			Min.	1.73

Channel Flow

Segment ID	C11-D11			
12. Cross sectional flow area, a……ft2	4.71			
13. Wetted perimeter, Pw……ft	16.2			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.29			
15. Channel Slope, s……ft/ft	0.041			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	4.41			
18. Flow Length, L……ft	493			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.03	+		=
			Hr.	0.03
			Min.	1.86

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.23**
	Min.	**13.51**

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	6.400	-------	-------	35.18	62.51	-------	-------	Existing Sub-Area #2
2	SCS Runoff	------	-------	15.55	-------	-------	47.36	72.57	-------	-------	Existing Sub-Area #3
3	SCS Runoff	------	-------	4.468	-------	-------	28.37	51.62	-------	-------	Existing Sub-Area #4
4	SCS Runoff	------	-------	28.67	-------	-------	60.14	83.07	-------	-------	Existing Sub-Area #5
5	SCS Runoff	------	-------	11.81	-------	-------	47.82	79.83	-------	-------	Existing Sub-Area #6
6	SCS Runoff	------	-------	12.10	-------	-------	49.30	81.88	-------	-------	Existing Sub-Area #7
7	SCS Runoff	------	-------	8.637	-------	-------	32.27	52.11	-------	-------	Existing Sub-Area #8
8	SCS Runoff	------	-------	7.314	-------	-------	29.79	49.39	-------	-------	Existing Sub-Area #9
9	SCS Runoff	------	-------	20.05	-------	-------	81.73	135.73	-------	-------	Existing Sub-Area #10
10	SCS Runoff	------	-------	3.684	-------	-------	16.08	26.73	-------	-------	Existing Sub-Area #11
11	Reach	10	-------	2.271	-------	-------	11.80	20.81	-------	-------	Reach Area 11
12	Reach	2	-------	13.95	-------	-------	44.36	68.96	-------	-------	Reach Area 3
13	Reach	1	-------	4.738	-------	-------	28.16	52.15	-------	-------	Reach Area 2
14	Reach	12	-------	9.857	-------	-------	34.87	56.18	-------	-------	Reach Area 3
15	Reach	3	-------	2.537	-------	-------	18.35	35.76	-------	-------	Reach Area 4
16	Reach	4	-------	27.64	-------	-------	58.70	81.46	-------	-------	Reach Area 5
17	Reach	5	-------	10.52	-------	-------	43.62	73.92	-------	-------	Reach Area 6
18	Reach	6	-------	10.83	-------	-------	45.74	77.04	-------	-------	Reach Area 7
19	Combine	7, 16, 17,	-------	38.32	-------	-------	108.51	168.89	-------	-------	Combine Areas 5, 6, & 8
20	Reach	19	-------	23.18	-------	-------	77.67	127.76	-------	-------	Reach Areas 5, 6, & 8
21	Reach	18	-------	6.917	-------	-------	32.45	57.25	-------	-------	Reach Area 7
22	Reach	8	-------	4.105	-------	-------	19.28	33.99	-------	-------	Reach Area 9
23	Combine	9, 11, 13, 21,	-------	28.63	-------	-------	135.57	238.44	-------	-------	Combined Karst 2, 7, 10, & 11
24	Diversion1	23	-------	9.449	-------	-------	44.74	78.69	-------	-------	Areas 2, 7, 10, & 11 2-Yr 100% Karst
25	Diversion1	23	-------	12.31	-------	-------	58.30	102.53	-------	-------	Areas 2, 7, 10, & 11 10-Yr 100% Kars
26	Diversion1	23	-------	14.32	-------	-------	67.79	119.22	-------	-------	Areas 2, 7, 10, & 11 25-Yr 100% Kars
27	Diversion1	22	-------	2.628	-------	-------	12.34	21.75	-------	-------	Area 9 2-Yr 50% Karst Adjustment
28	Diversion1	22	-------	2.997	-------	-------	14.07	24.81	-------	-------	Area 9 10-Yr 50% Karst Adjustment
29	Diversion1	22	-------	3.284	-------	-------	15.42	27.19	-------	-------	Area 9 25-Yr 50% Karst Adjustment
30	Combine	14, 15, 20,	-------	35.15	-------	-------	130.07	218.40	-------	-------	Combined non-karst 3, 4, 5, 6, & 8
31	Combine	24, 27, 30	-------	46.89	-------	-------	185.77	316.68	-------	-------	Combined Total Existing Flow 2-Yr
32	Combine	25, 28, 30,	-------	50.07	-------	-------	200.80	343.09	-------	-------	Combined Total Existing Flow 10-Yr
33	Combine	26, 29, 30,	-------	52.33	-------	-------	211.45	361.81	-------	-------	Combined Total Existing Flow 25-Yr

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
89	Diversion2	22	-------	0.821	-------	-------	3.856	6.798	-------	-------	Area 9 Exc 25-Yr 50% Karst Adjustm
90	Diversion2	22	-------	1.108	-------	-------	5.205	9.177	-------	-------	Area 9 Exc 10-Yr 50% Karst Adjustm
91	Diversion2	22	-------	1.478	-------	-------	6.940	12.24	-------	-------	Area 9 Exc 2-Yr 50% Karst Adjustme
92	Diversion2	24	-------	19.18	-------	-------	90.83	159.76	-------	-------	Areas 2, 7, 10, & 11 25-Yr 100% Kars
94	Diversion2	26	-------	19.18	-------	-------	90.83	0.000	-------	-------	Areas 7, 10, & 11 Exc 10-Yr 10% Kar
96	Diversion2	24	-------	7.731	-------	-------	36.60	0.000	-------	-------	Area 9 Exc 10-Yr 50% Karst Adjustm
98	Diversion2	24	-------	10.31	-------	-------	48.81	0.000	-------	-------	Area 9 Exc 10-Yr 50% Karst Adjustm

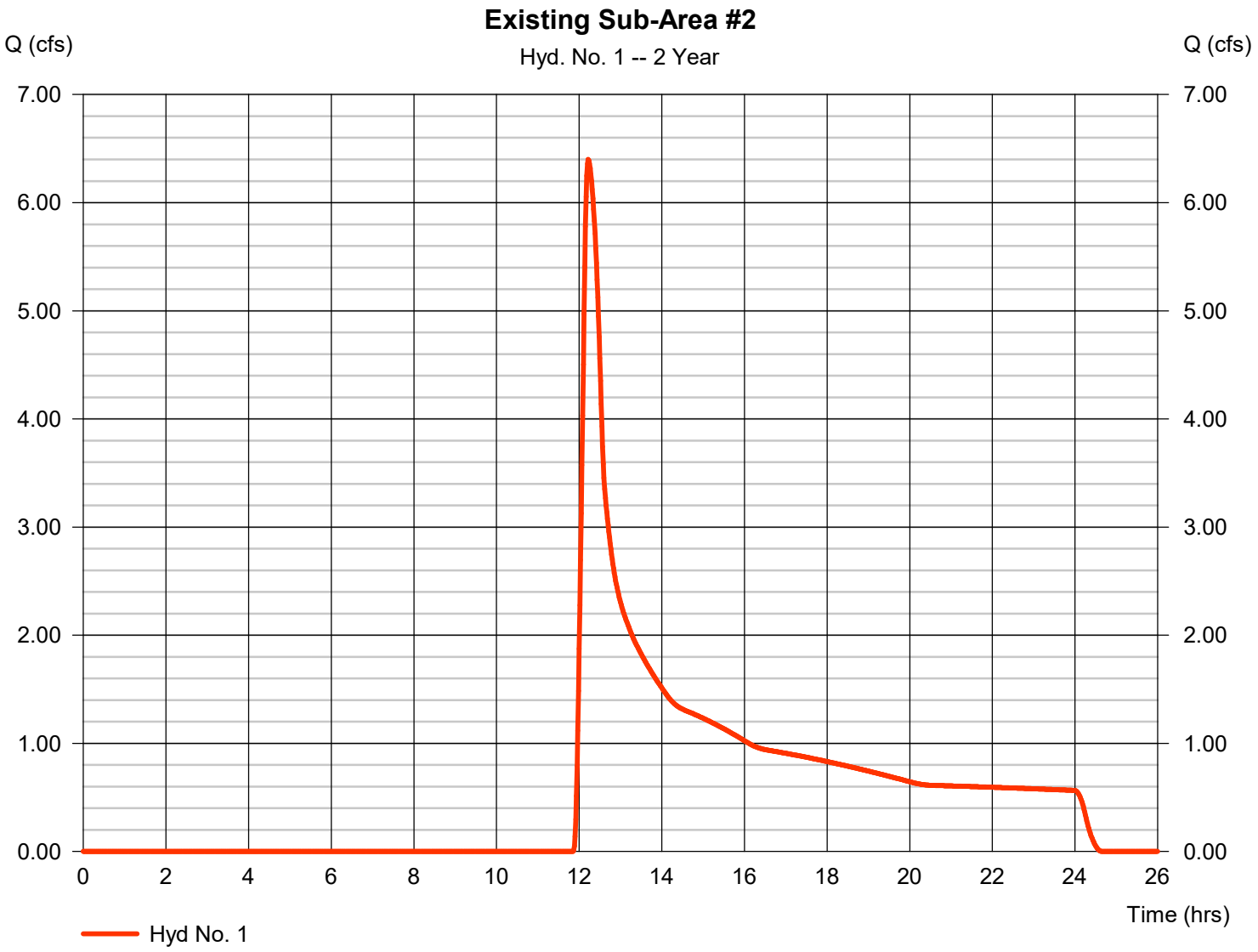
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 1

Existing Sub-Area #2

Hydrograph type	= SCS Runoff	Peak discharge	= 6.400 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 51,721 cuft
Drainage area	= 54.830 ac	Curve number	= 59
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.20 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



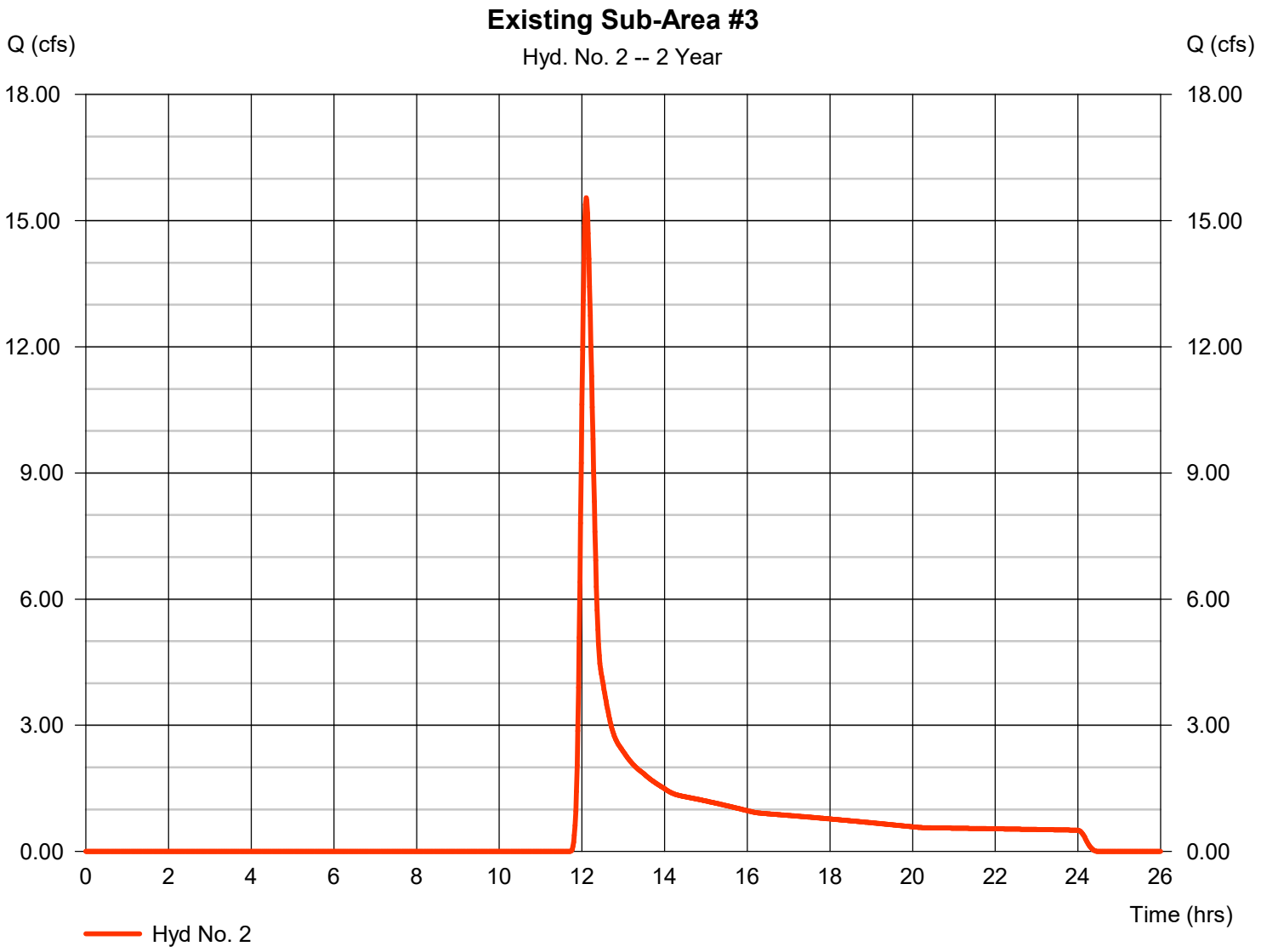
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 2

Existing Sub-Area #3

Hydrograph type	= SCS Runoff	Peak discharge	= 15.55 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 60,577 cuft
Drainage area	= 34.870 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 16.92 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



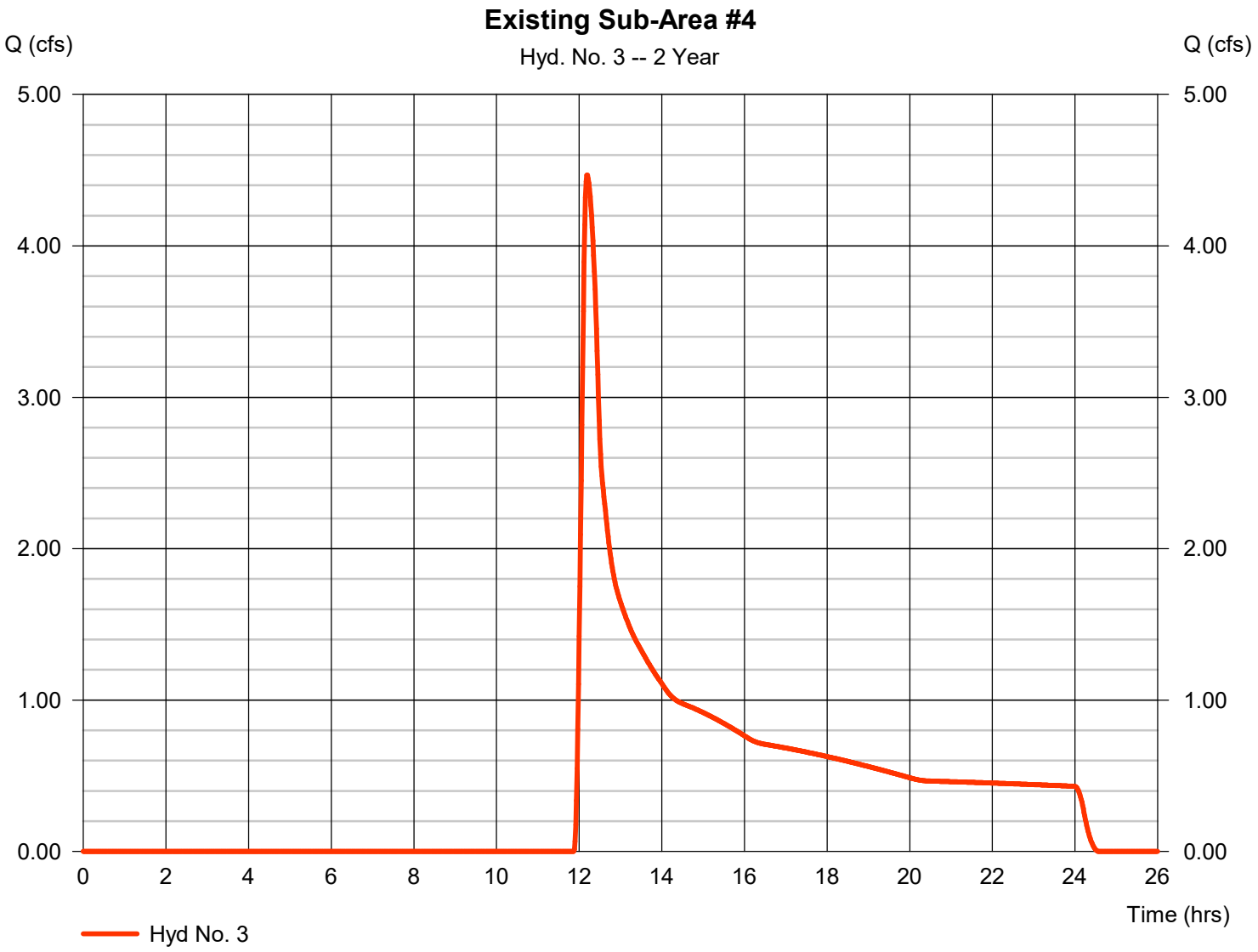
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 3

Existing Sub-Area #4

Hydrograph type	= SCS Runoff	Peak discharge	= 4.468 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.18 hrs
Time interval	= 1 min	Hyd. volume	= 37,700 cuft
Drainage area	= 44.110 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 21.73 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



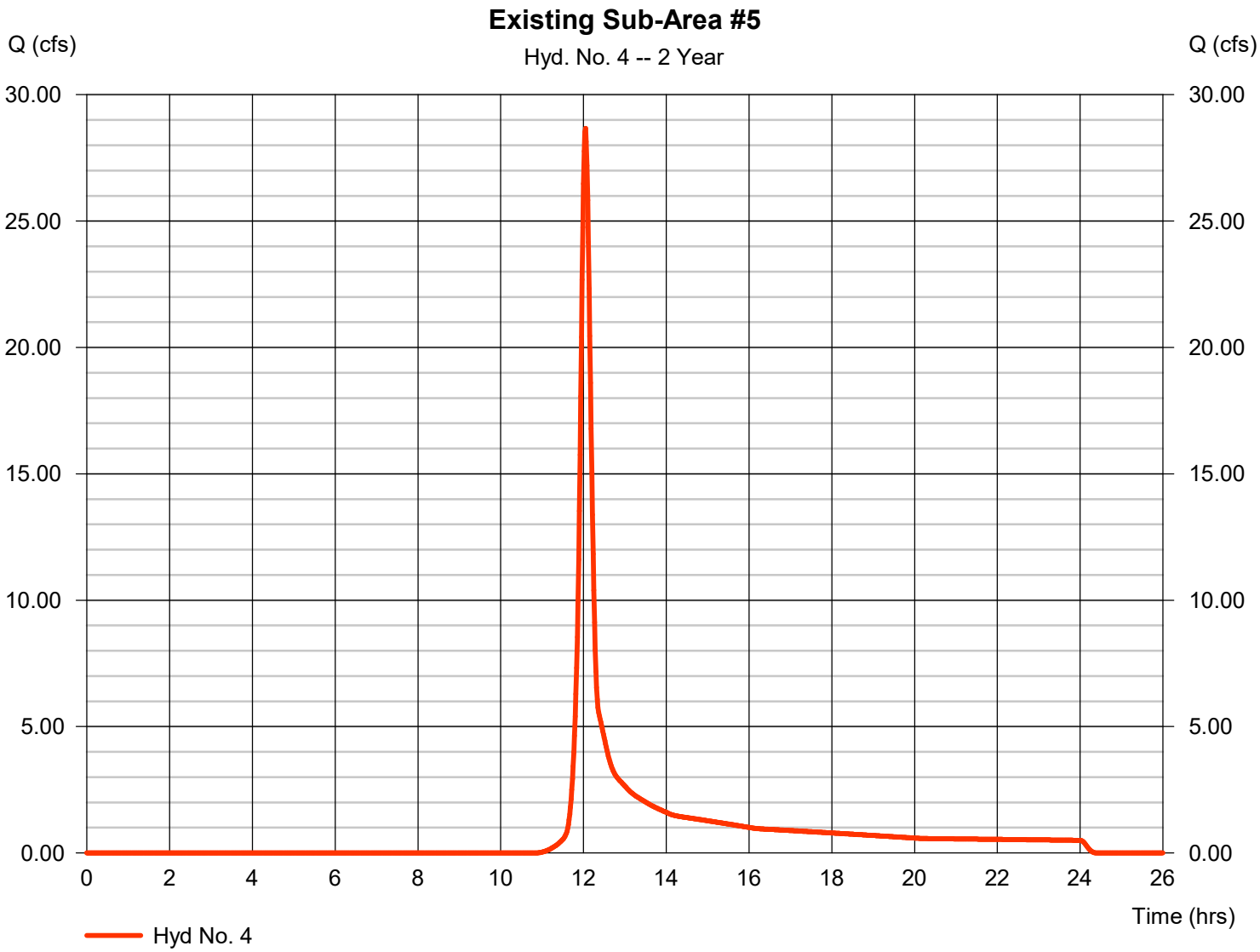
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 4

Existing Sub-Area #5

Hydrograph type	= SCS Runoff	Peak discharge	= 28.67 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 79,948 cuft
Drainage area	= 23.720 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 14.38 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



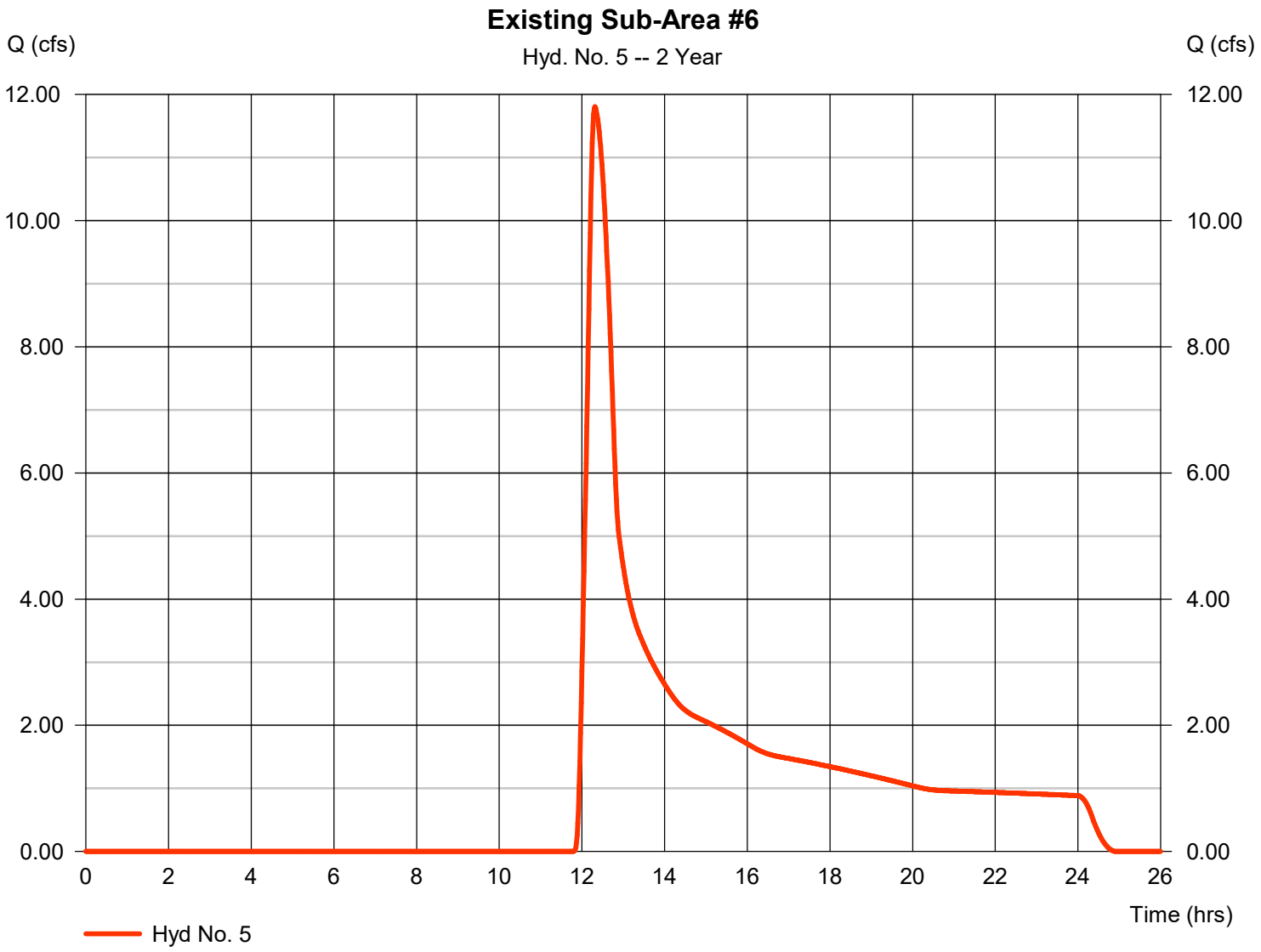
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 5

Existing Sub-Area #6

Hydrograph type	= SCS Runoff	Peak discharge	= 11.81 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.32 hrs
Time interval	= 1 min	Hyd. volume	= 91,535 cuft
Drainage area	= 72.510 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 34.70 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



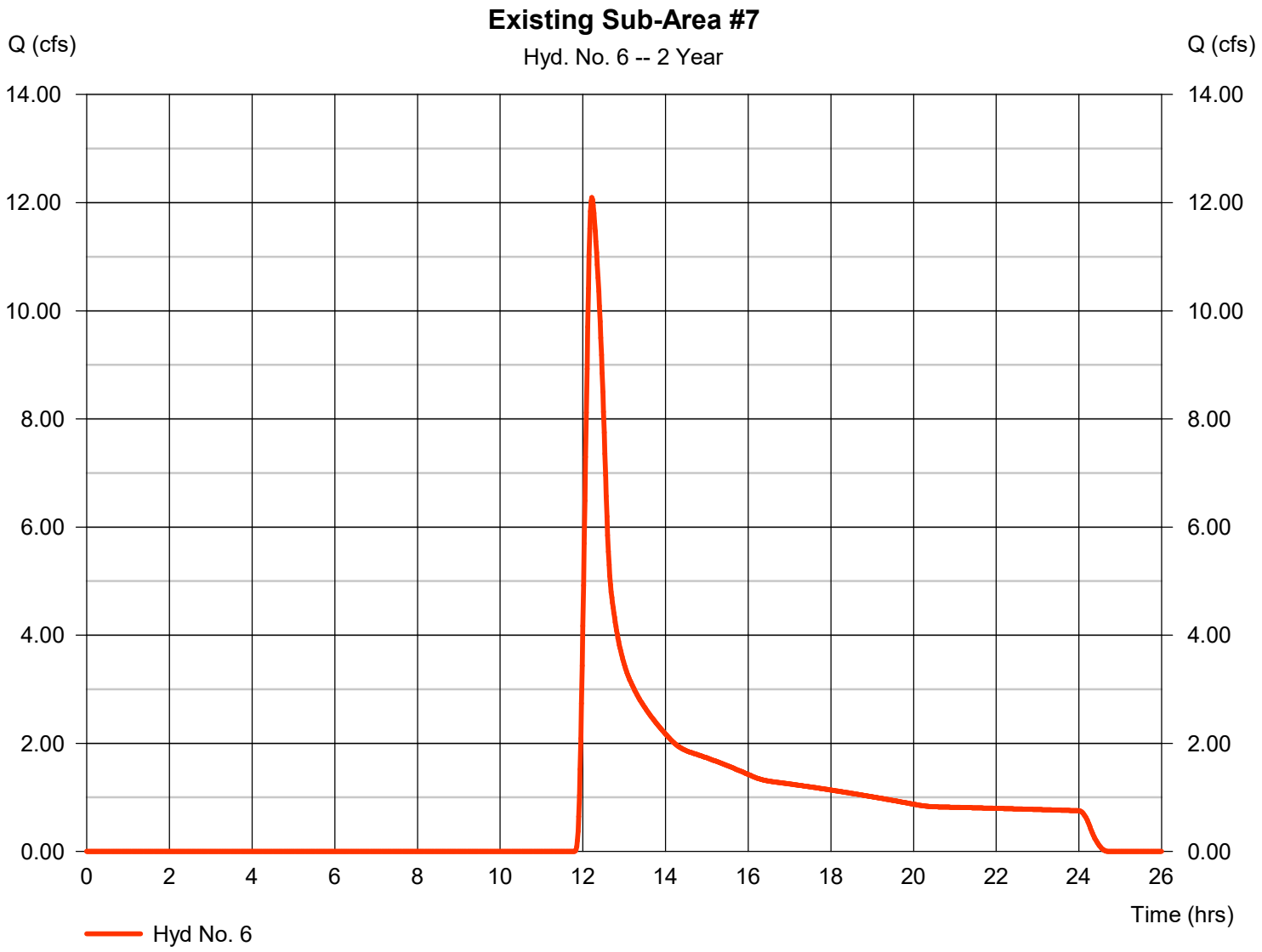
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 6

Existing Sub-Area #7

Hydrograph type	= SCS Runoff	Peak discharge	= 12.10 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 78,141 cuft
Drainage area	= 61.420 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 26.96 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



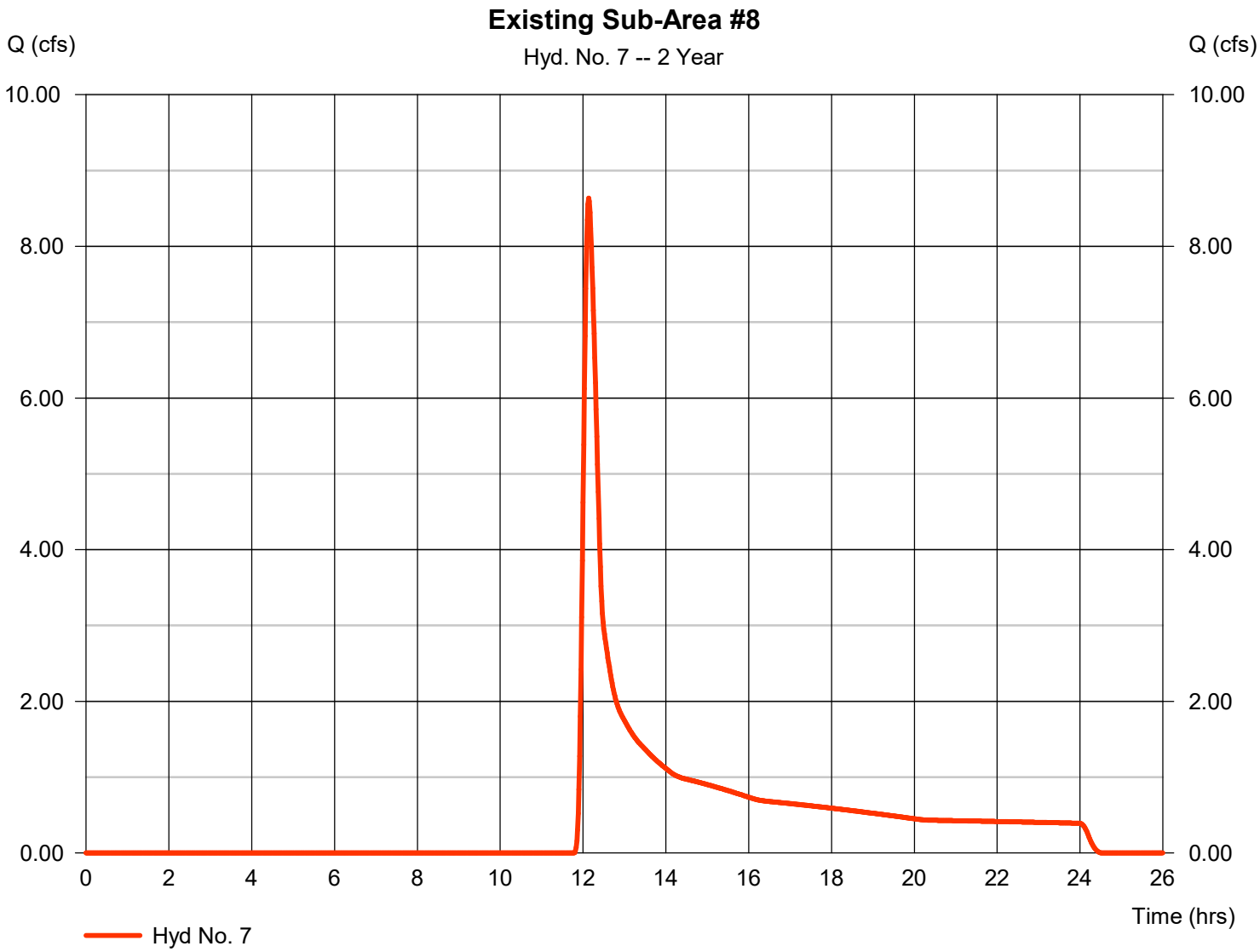
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 7

Existing Sub-Area #8

Hydrograph type	= SCS Runoff	Peak discharge	= 8.637 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 42,292 cuft
Drainage area	= 30.680 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 19.20 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



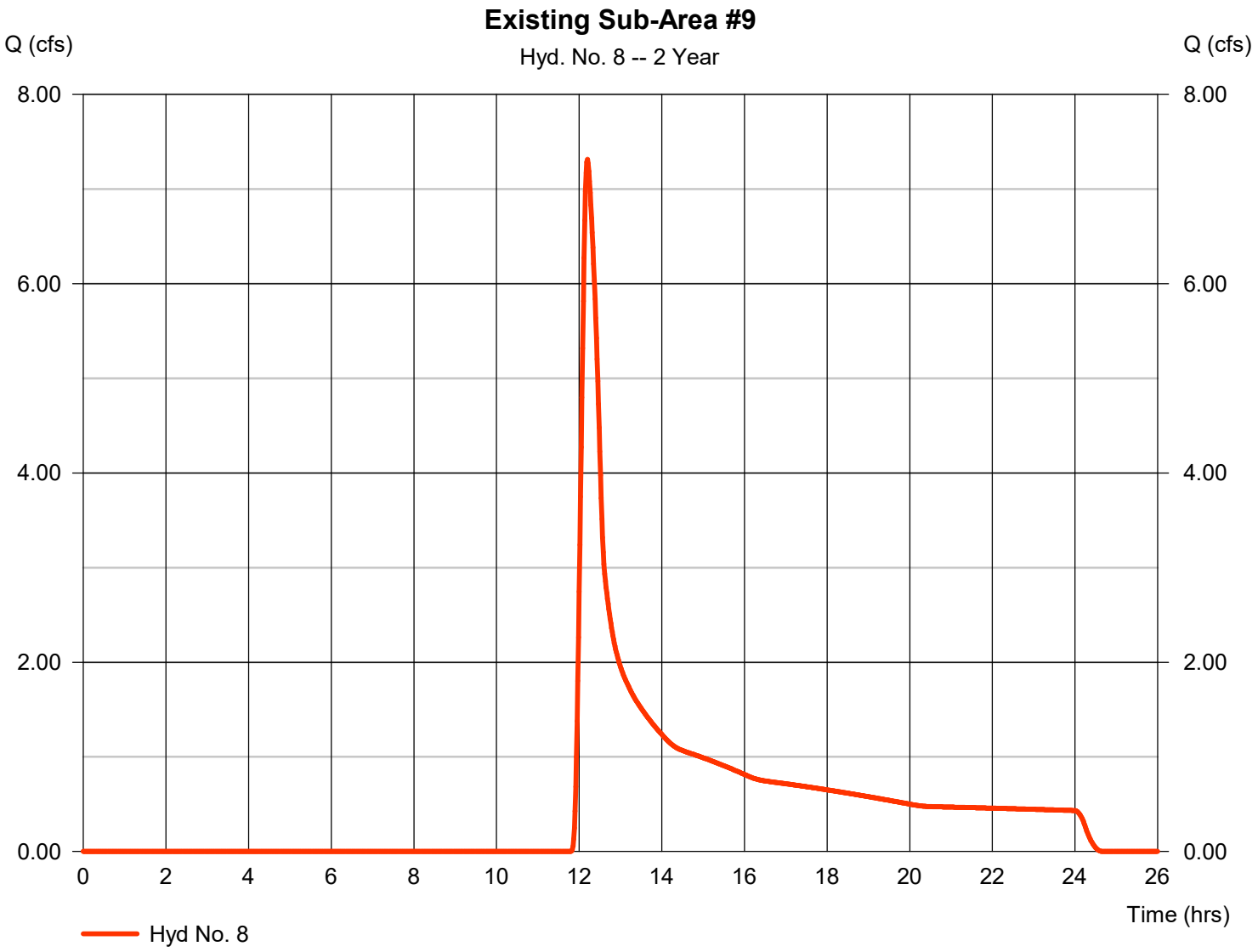
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 8

Existing Sub-Area #9

Hydrograph type	= SCS Runoff	Peak discharge	= 7.314 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 44,877 cuft
Drainage area	= 35.550 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 23.76 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



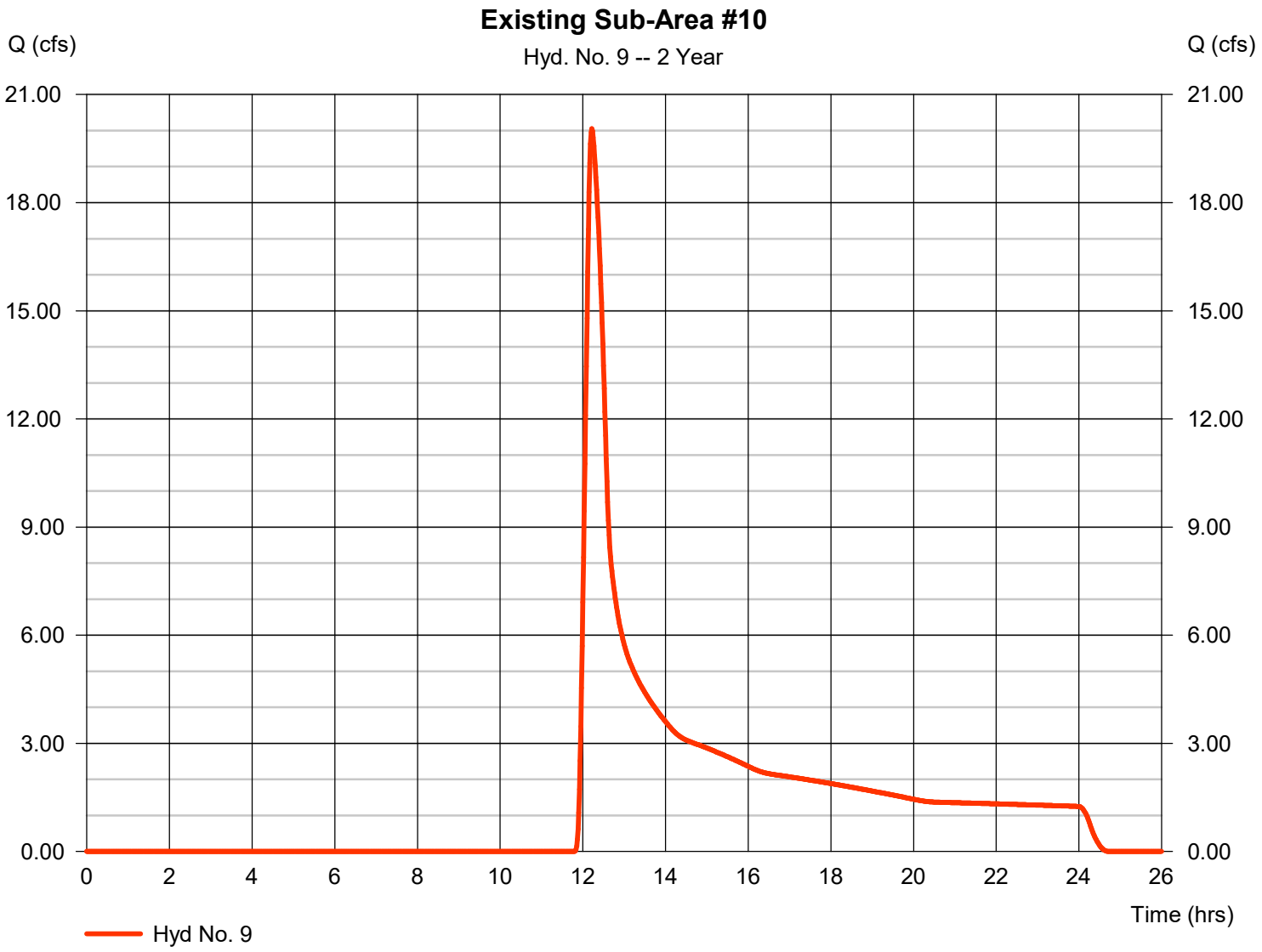
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 9

Existing Sub-Area #10

Hydrograph type	= SCS Runoff	Peak discharge	= 20.05 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 129,539 cuft
Drainage area	= 101.820 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.90 min
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 10

Existing Sub-Area #11

Hydrograph type	= SCS Runoff	Peak discharge	= 3.684 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 17,210 cuft
Drainage area	= 14.950 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
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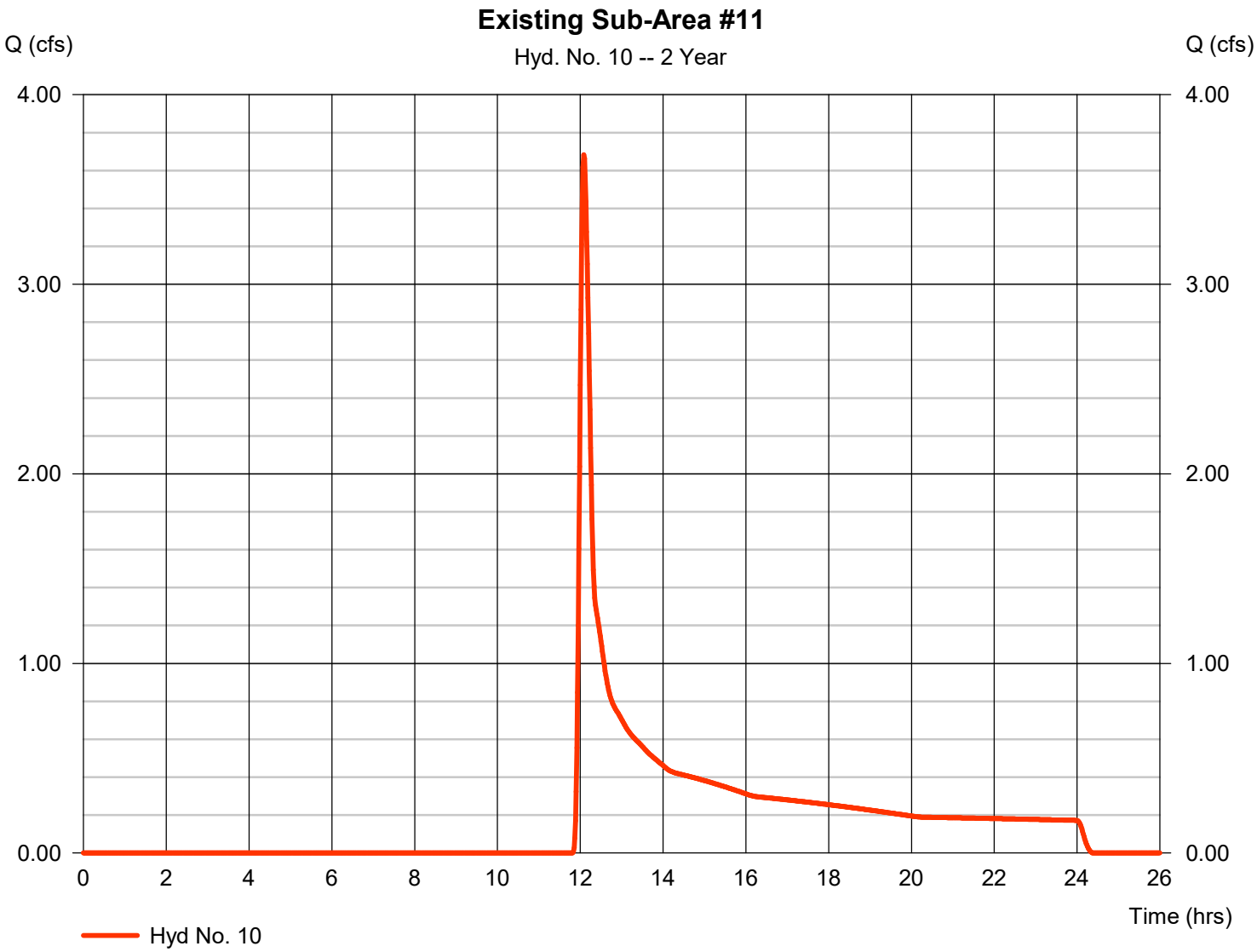
Total precip.	= 2.87 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

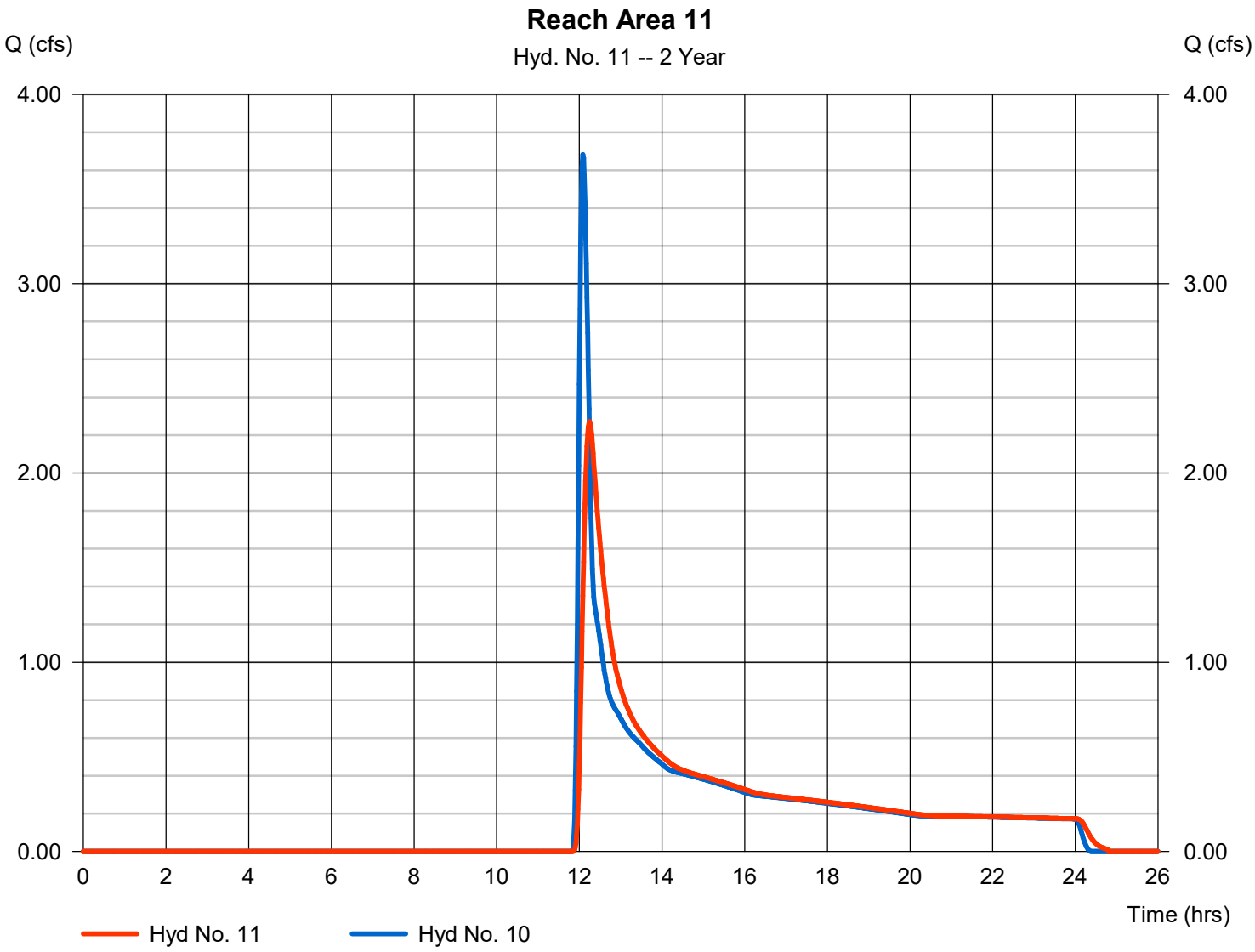
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 11

Reach Area 11

Hydrograph type	= Reach	Peak discharge	= 2.271 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 1 min	Hyd. volume	= 17,202 cuft
Inflow hyd. No.	= 10 - Existing Sub-Area #11	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0766

Modified Att-Kin routing method used.



Hydrograph Report

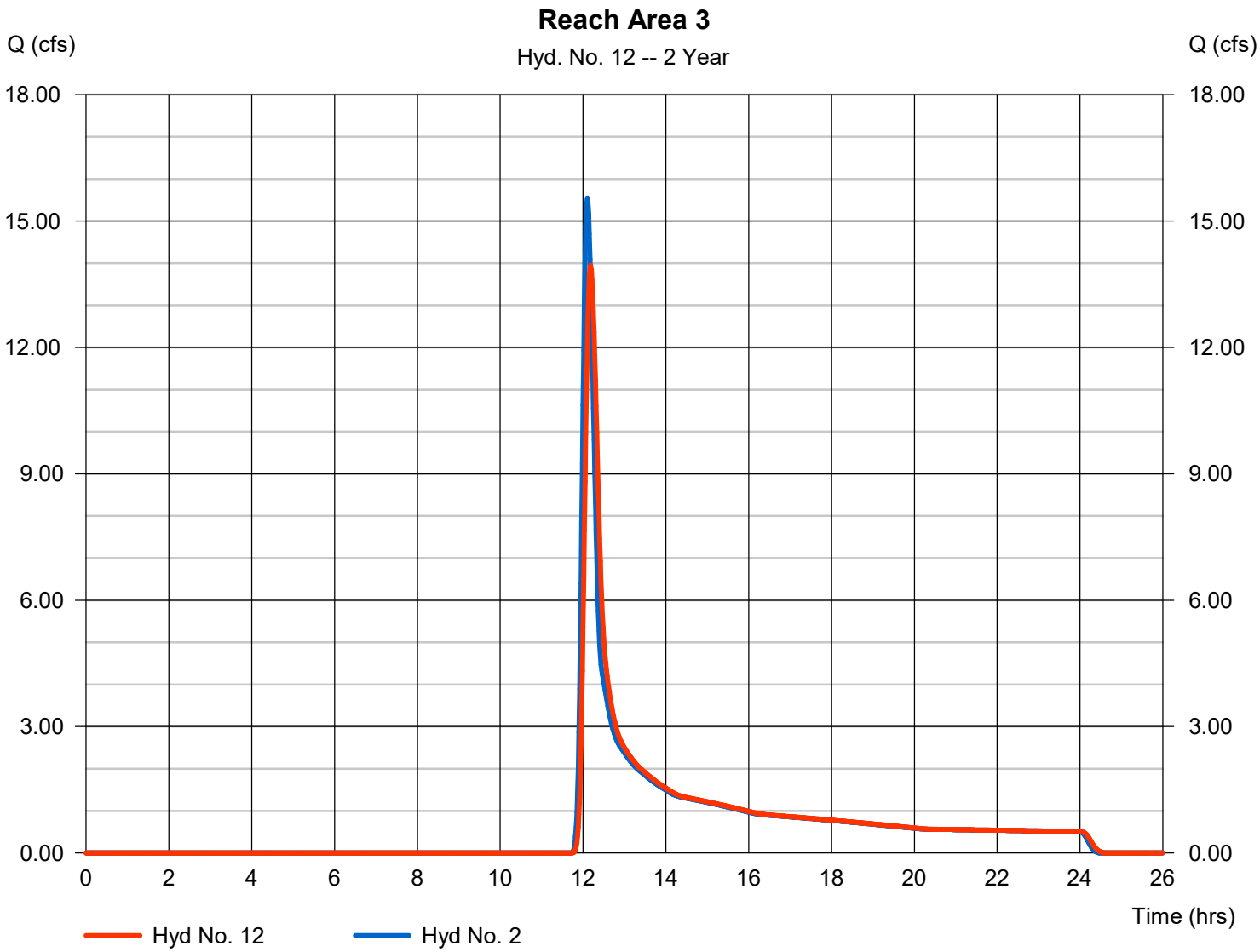
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 12

Reach Area 3

Hydrograph type	= Reach	Peak discharge	= 13.95 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.18 hrs
Time interval	= 1 min	Hyd. volume	= 60,574 cuft
Inflow hyd. No.	= 2 - Existing Sub-Area #3	Section type	= Triangular
Reach length	= 1300.0 ft	Channel slope	= 2.0 %
Manning's n	= 0.030	Bottom width	= 0.0 ft
Side slope	= 6.0:1	Max. depth	= 0.0 ft
Rating curve x	= 2.440	Rating curve m	= 1.333
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.2131

Modified Att-Kin routing method used.



Hydrograph Report

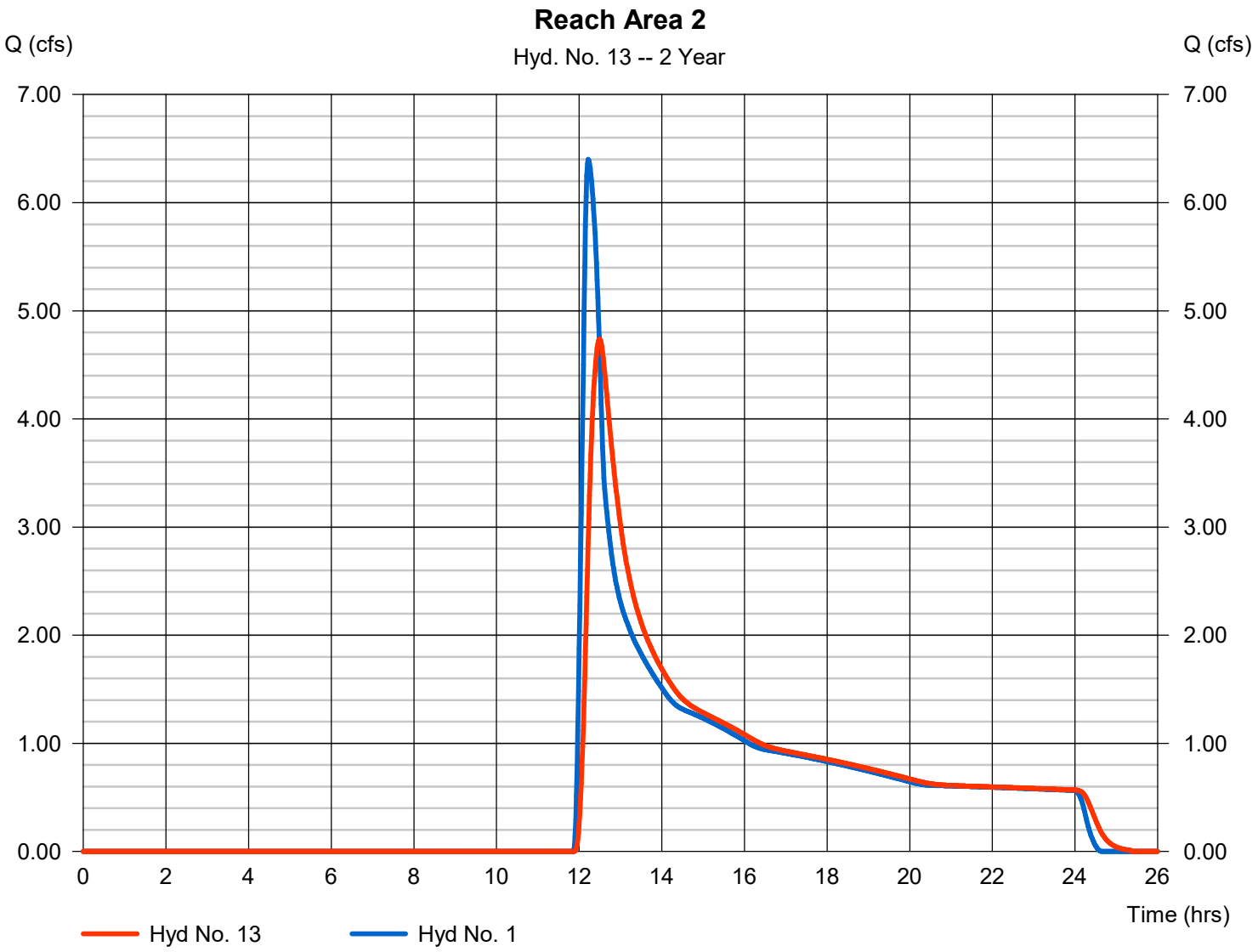
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 13

Reach Area 2

Hydrograph type	= Reach	Peak discharge	= 4.738 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 51,712 cuft
Inflow hyd. No.	= 1 - Existing Sub-Area #2	Section type	= Trapezoidal
Reach length	= 1817.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0642

Modified Att-Kin routing method used.



Hydrograph Report

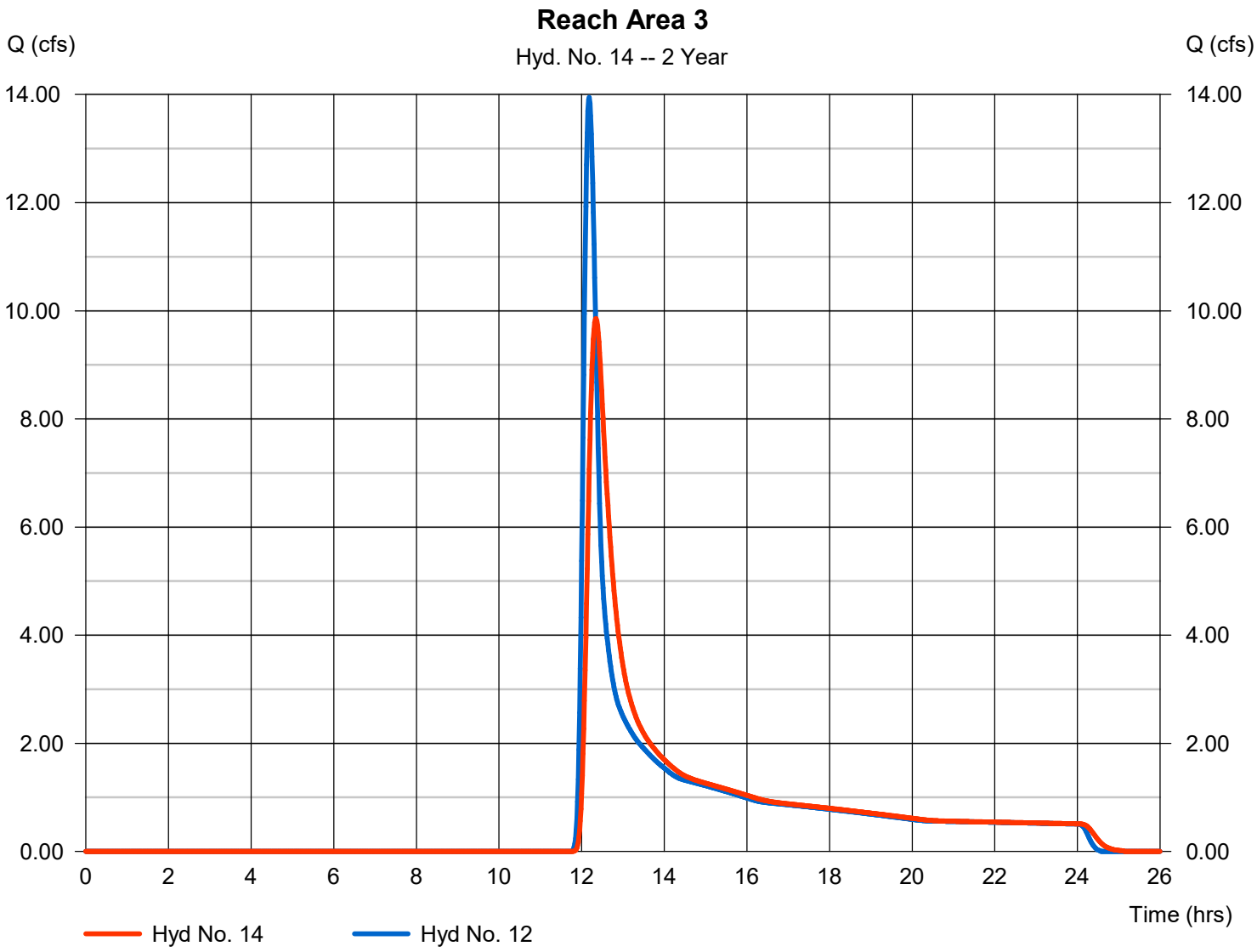
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 14

Reach Area 3

Hydrograph type	= Reach	Peak discharge	= 9.857 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 60,566 cuft
Inflow hyd. No.	= 12 - Reach Area 3	Section type	= Trapezoidal
Reach length	= 1817.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0790

Modified Att-Kin routing method used.



Hydrograph Report

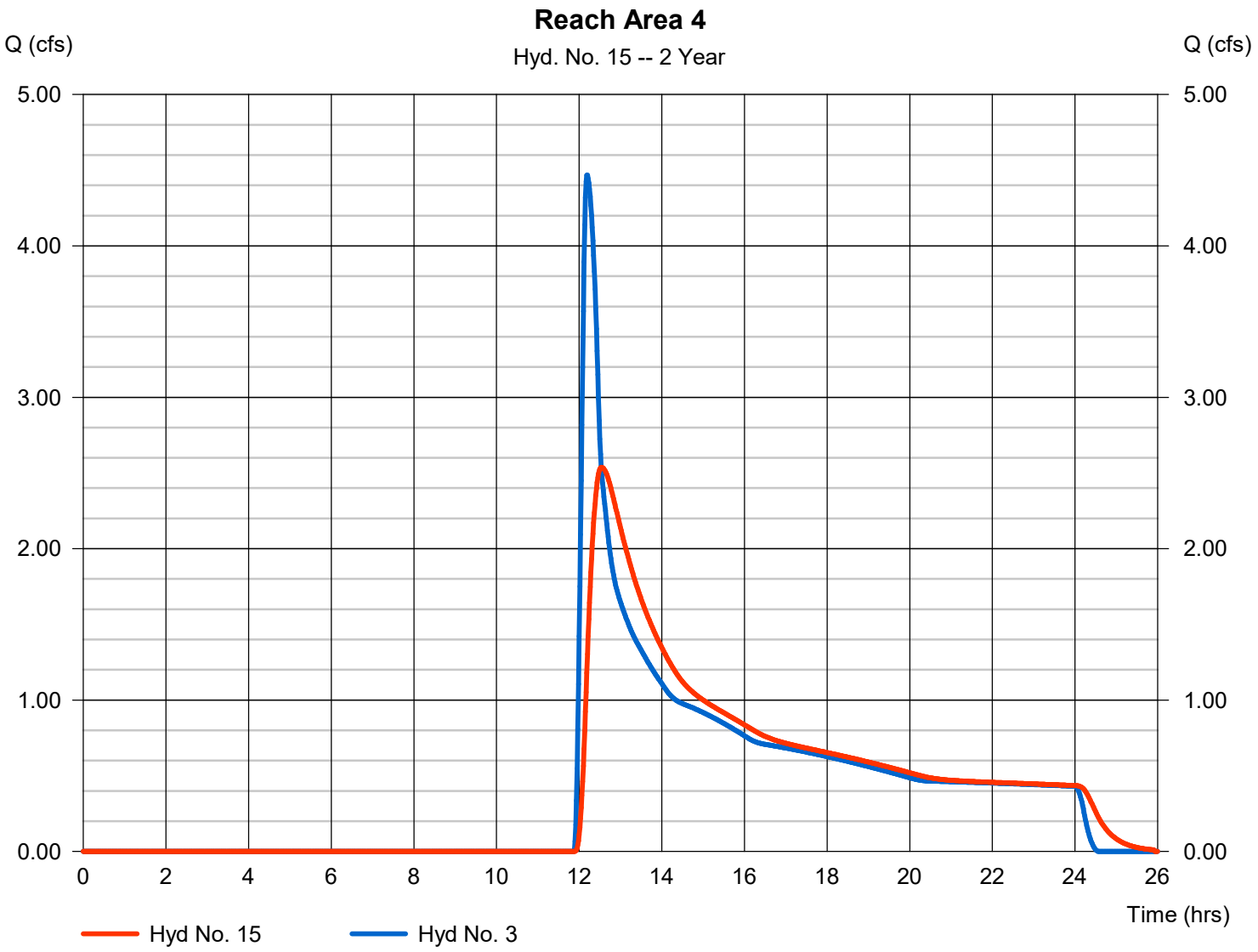
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 15

Reach Area 4

Hydrograph type	= Reach	Peak discharge	= 2.537 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.55 hrs
Time interval	= 1 min	Hyd. volume	= 37,684 cuft
Inflow hyd. No.	= 3 - Existing Sub-Area #4	Section type	= Trapezoidal
Reach length	= 2850.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0376

Modified Att-Kin routing method used.



Hydrograph Report

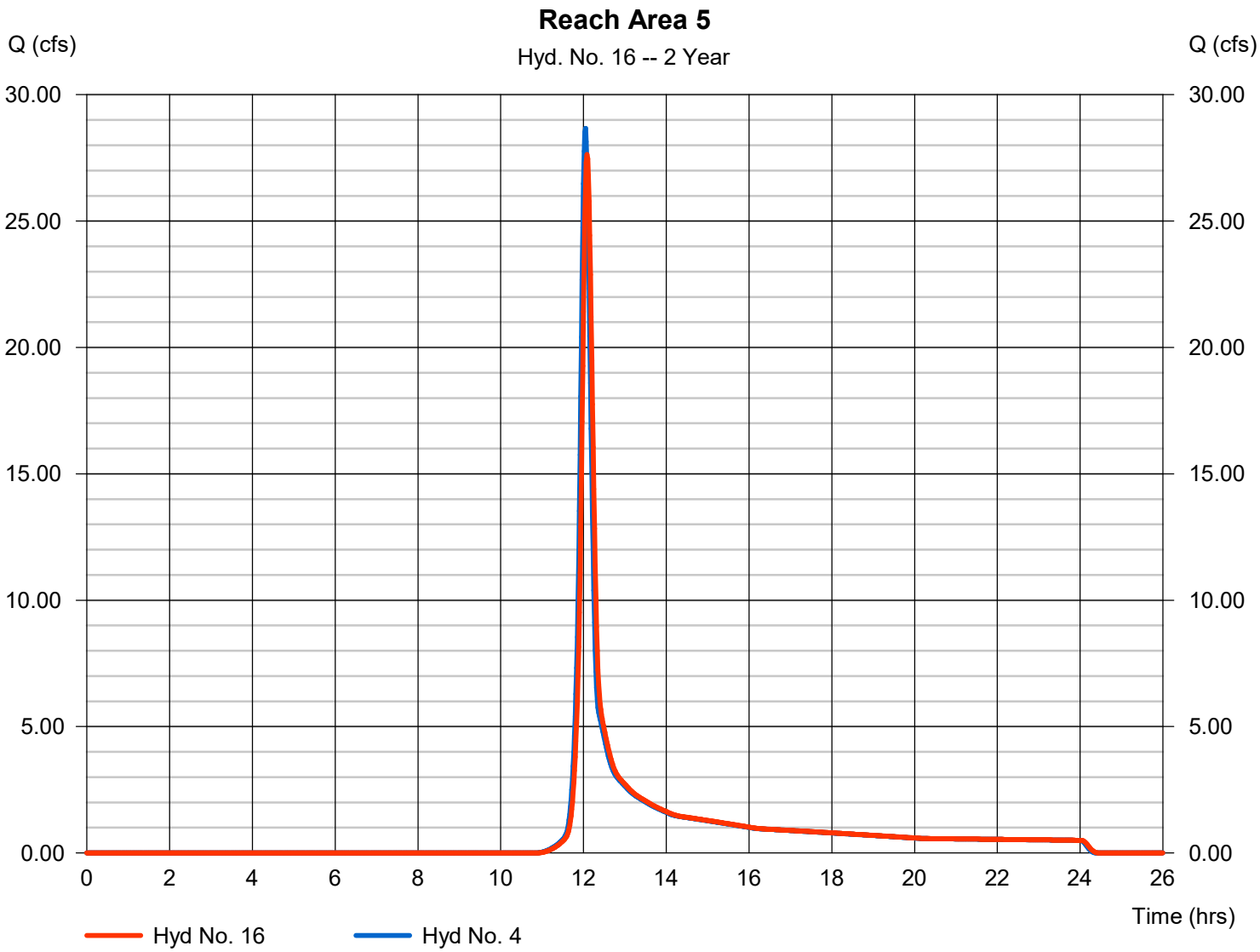
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 16

Reach Area 5

Hydrograph type	= Reach	Peak discharge	= 27.64 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 79,947 cuft
Inflow hyd. No.	= 4 - Existing Sub-Area #5	Section type	= Triangular
Reach length	= 600.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.030	Bottom width	= 0.0 ft
Side slope	= 5.0:1	Max. depth	= 0.0 ft
Rating curve x	= 1.833	Rating curve m	= 1.333
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.3911

Modified Att-Kin routing method used.



Hydrograph Report

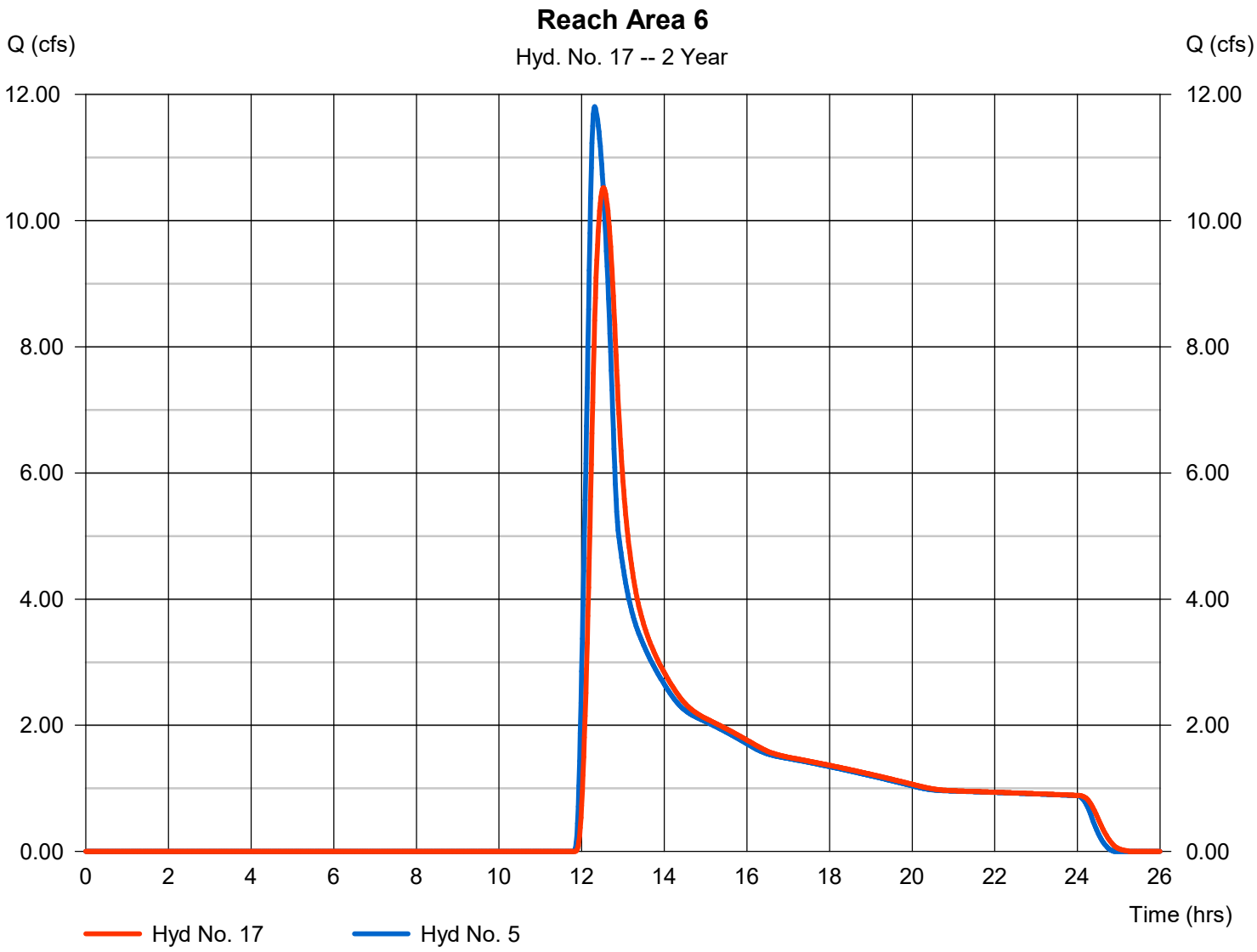
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 17

Reach Area 6

Hydrograph type	= Reach	Peak discharge	= 10.52 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.53 hrs
Time interval	= 1 min	Hyd. volume	= 91,530 cuft
Inflow hyd. No.	= 5 - Existing Sub-Area #6	Section type	= Trapezoidal
Reach length	= 2130.0 ft	Channel slope	= 1.5 %
Manning's n	= 0.030	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 2.079	Rating curve m	= 1.292
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1061

Modified Att-Kin routing method used.



Hydrograph Report

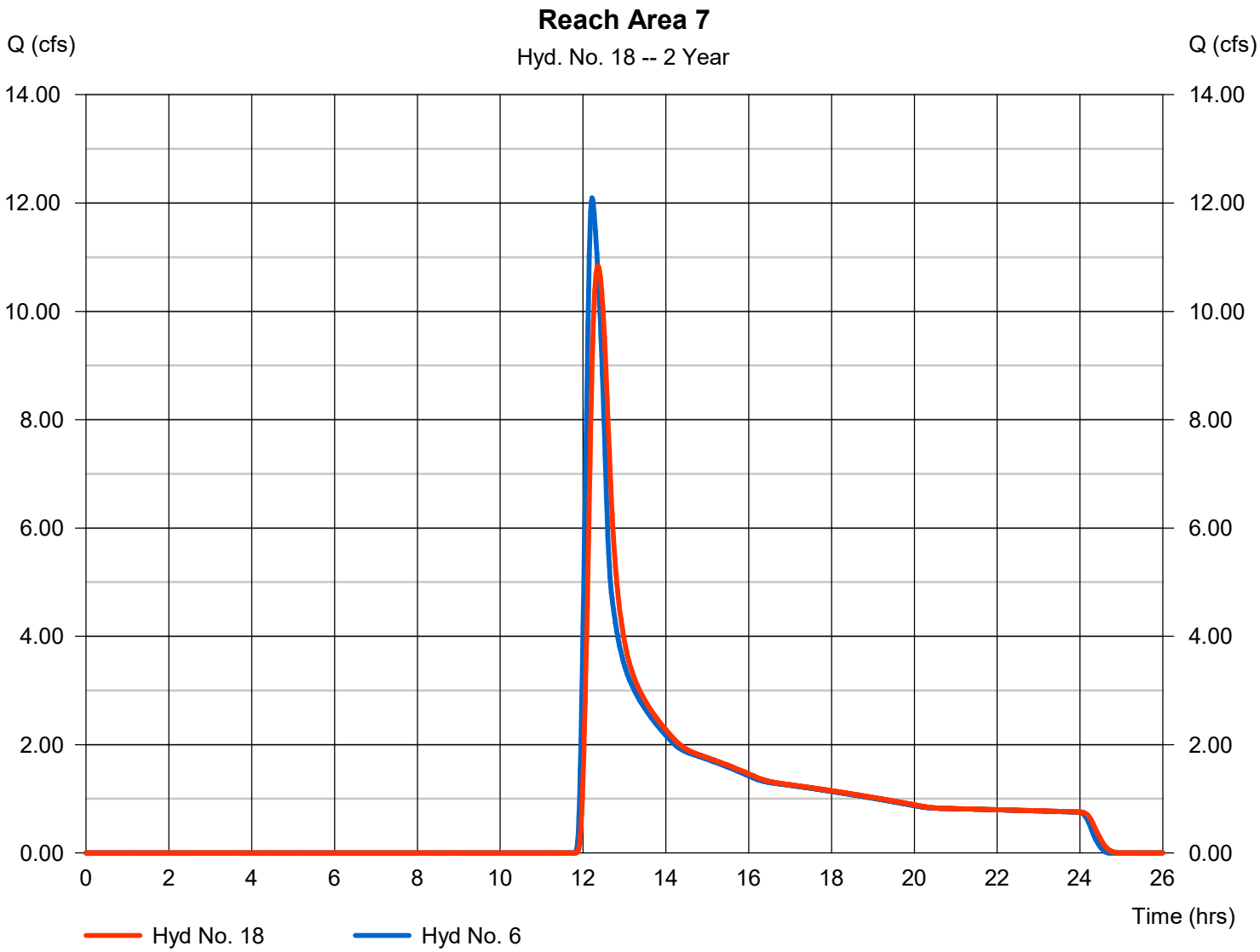
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 18

Reach Area 7

Hydrograph type	= Reach	Peak discharge	= 10.83 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.37 hrs
Time interval	= 1 min	Hyd. volume	= 78,137 cuft
Inflow hyd. No.	= 6 - Existing Sub-Area #7	Section type	= Trapezoidal
Reach length	= 1500.0 ft	Channel slope	= 1.5 %
Manning's n	= 0.030	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 2.079	Rating curve m	= 1.292
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1481

Modified Att-Kin routing method used.



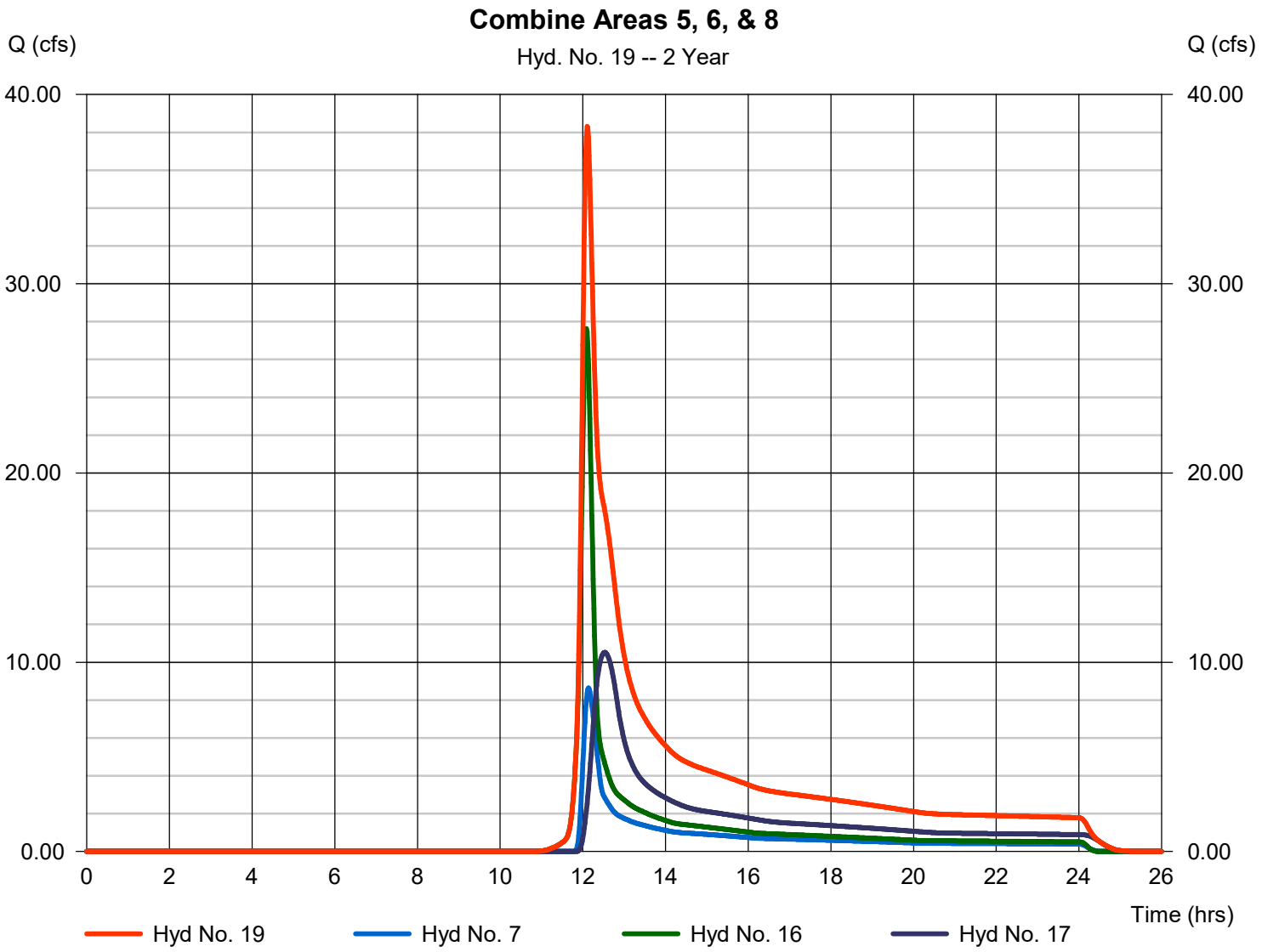
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 19

Combine Areas 5, 6, & 8

Hydrograph type	= Combine	Peak discharge	= 38.32 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 213,769 cuft
Inflow hyds.	= 7, 16, 17	Contrib. drain. area	= 30.680 ac



Hydrograph Report

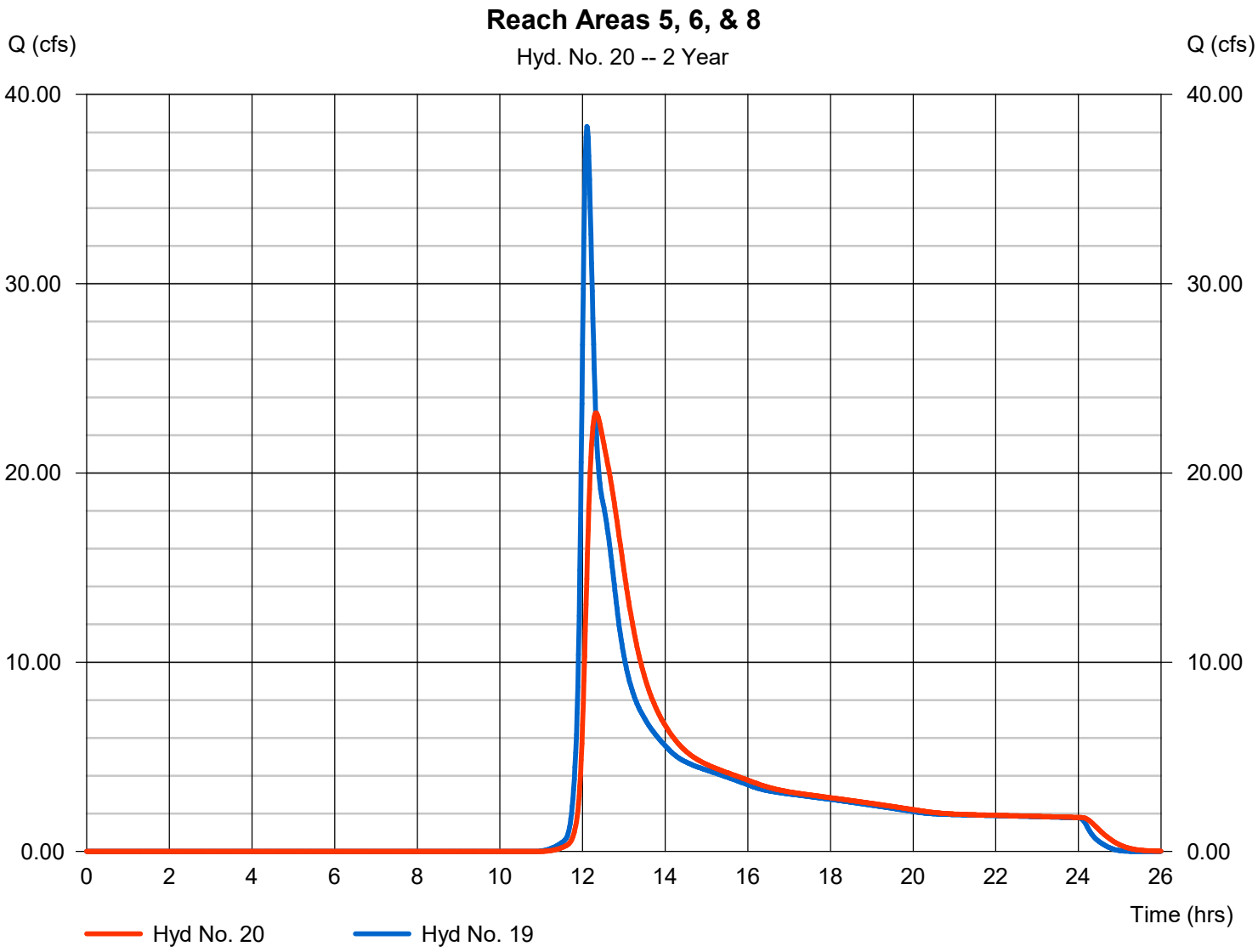
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 20

Reach Areas 5, 6, & 8

Hydrograph type	= Reach	Peak discharge	= 23.18 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 213,758 cuft
Inflow hyd. No.	= 19 - Combine Areas 5, 6, & 8	Section type	= Trapezoidal
Reach length	= 3475.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0553

Modified Att-Kin routing method used.



Hydrograph Report

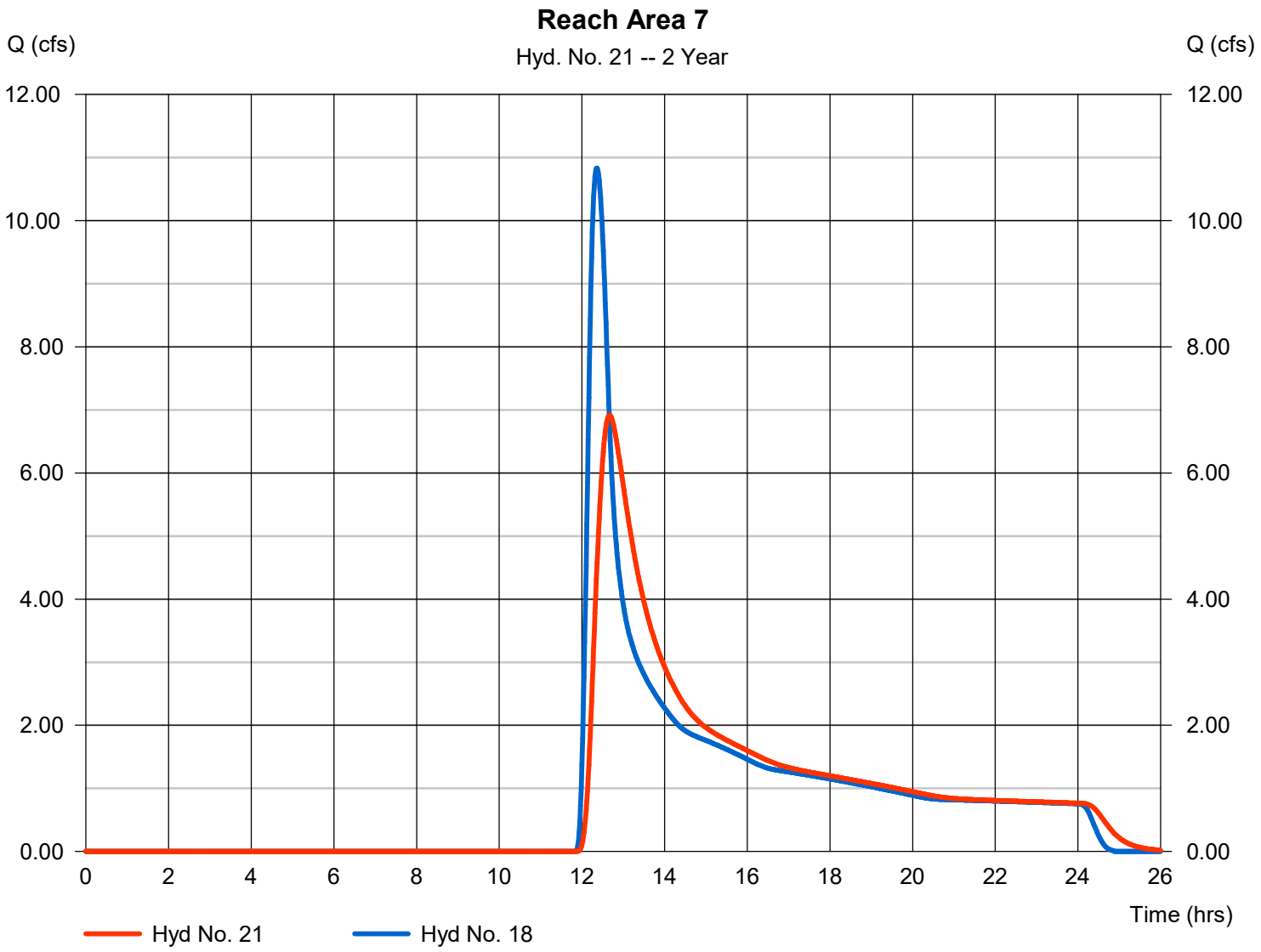
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 21

Reach Area 7

Hydrograph type	= Reach	Peak discharge	= 6.917 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.67 hrs
Time interval	= 1 min	Hyd. volume	= 78,122 cuft
Inflow hyd. No.	= 18 - Reach Area 7	Section type	= Trapezoidal
Reach length	= 3475.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0393

Modified Att-Kin routing method used.



Hydrograph Report

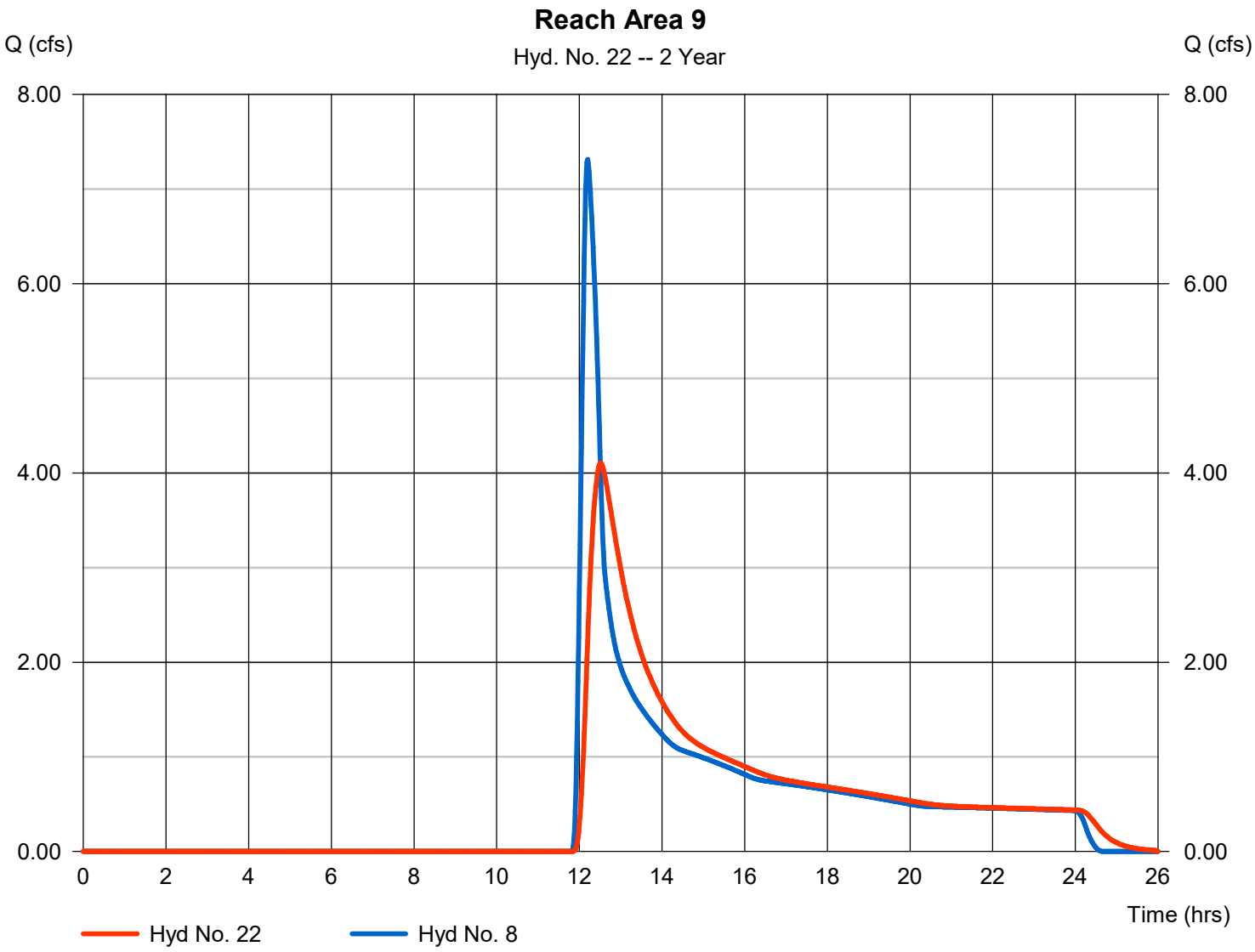
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 22

Reach Area 9

Hydrograph type	= Reach	Peak discharge	= 4.105 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.52 hrs
Time interval	= 1 min	Hyd. volume	= 44,862 cuft
Inflow hyd. No.	= 8 - Existing Sub-Area #9	Section type	= Trapezoidal
Reach length	= 3920.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 1.069	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0377

Modified Att-Kin routing method used.



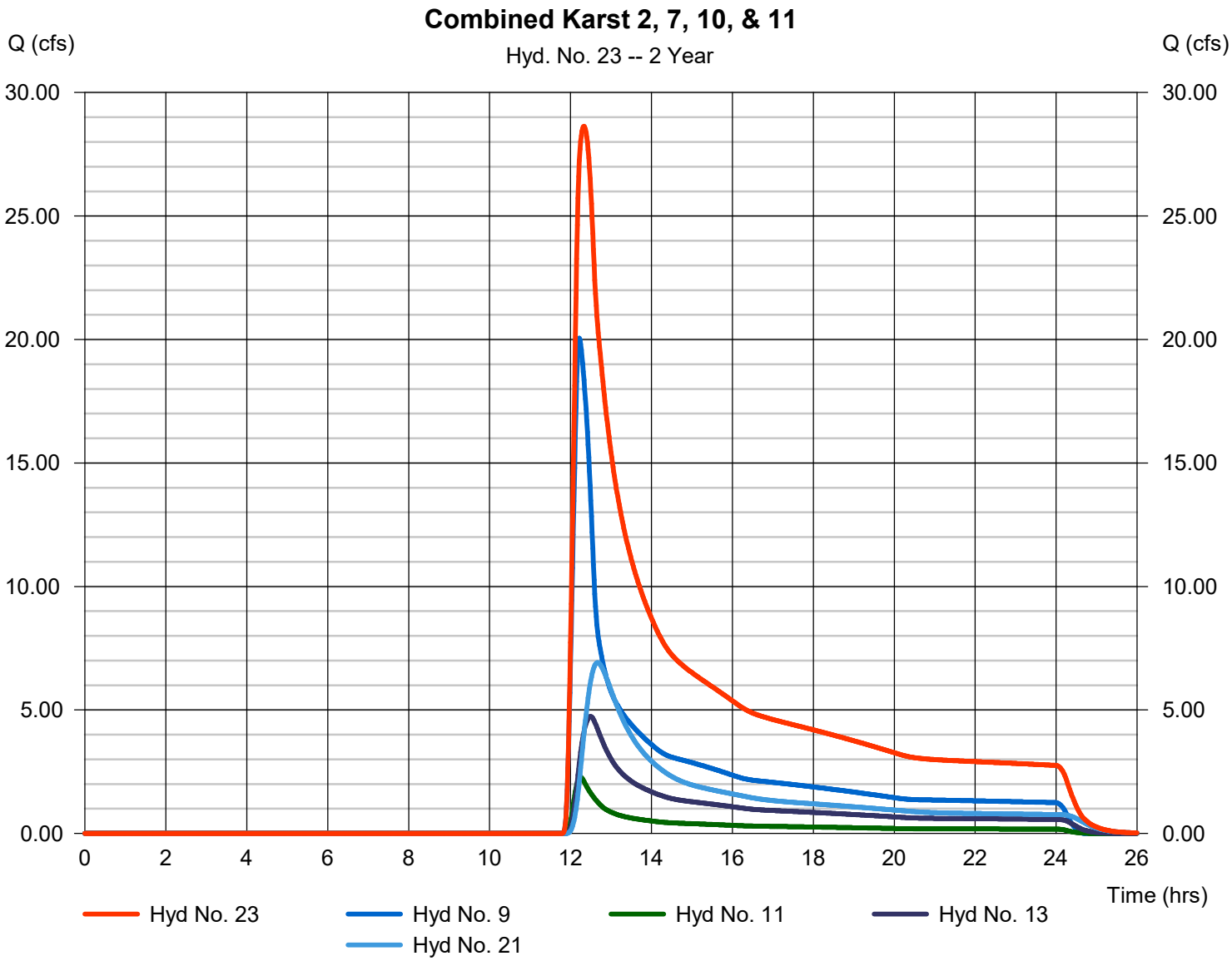
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 23

Combined Karst 2, 7, 10, & 11

Hydrograph type	= Combine	Peak discharge	= 28.63 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 276,575 cuft
Inflow hyds.	= 9, 11, 13, 21	Contrib. drain. area	= 101.820 ac



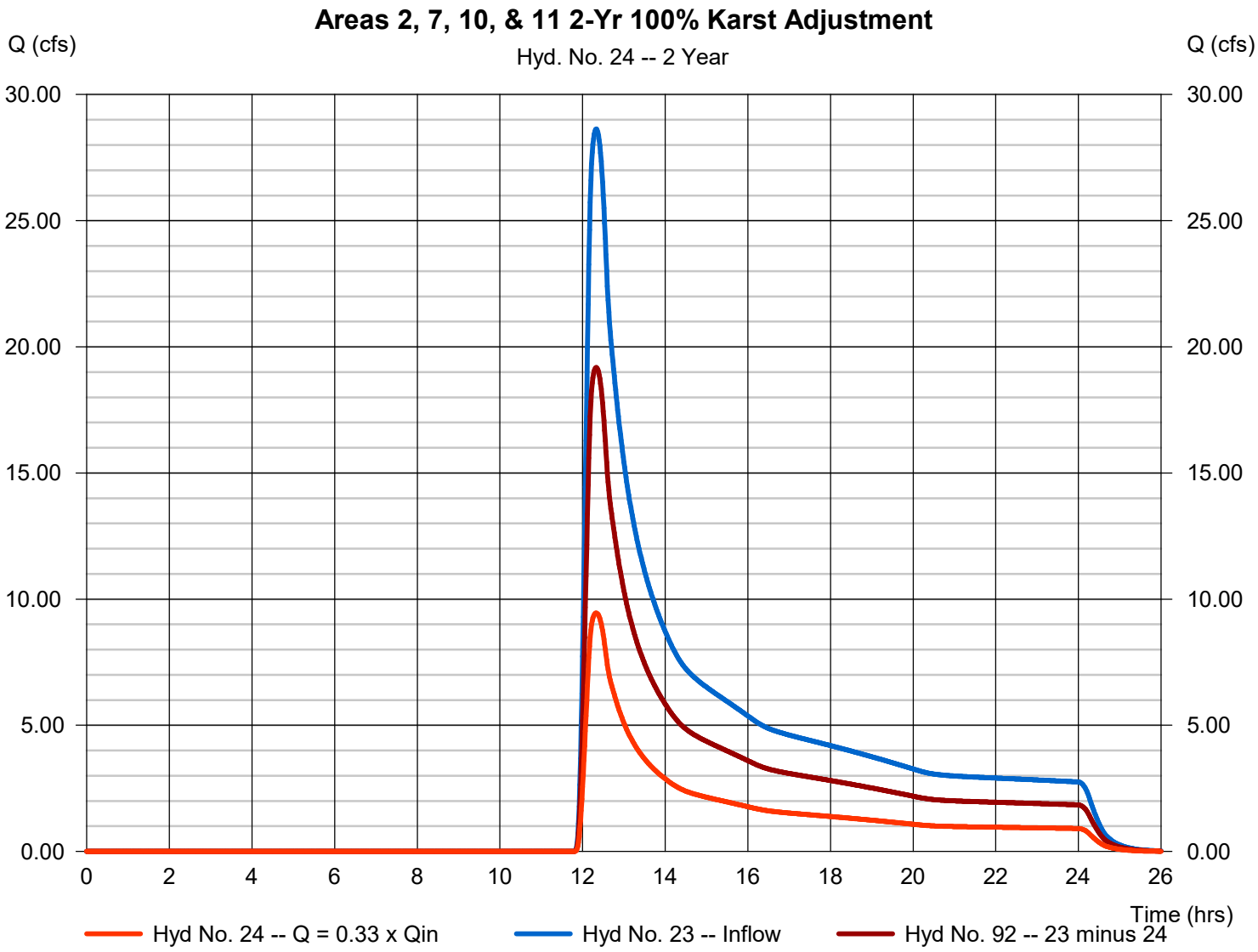
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 24

Areas 2, 7, 10, & 11 2-Yr 100% Karst Adjustment

Hydrograph type	= Diversion1	Peak discharge	= 9.449 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 91,270 cuft
Inflow hydrograph	= 23 - Combined Karst 2, 7, 10, & 11	2nd diverted hyd.	= 92
Diversion method	= Flow Ratio	Flow ratio	= 0.33



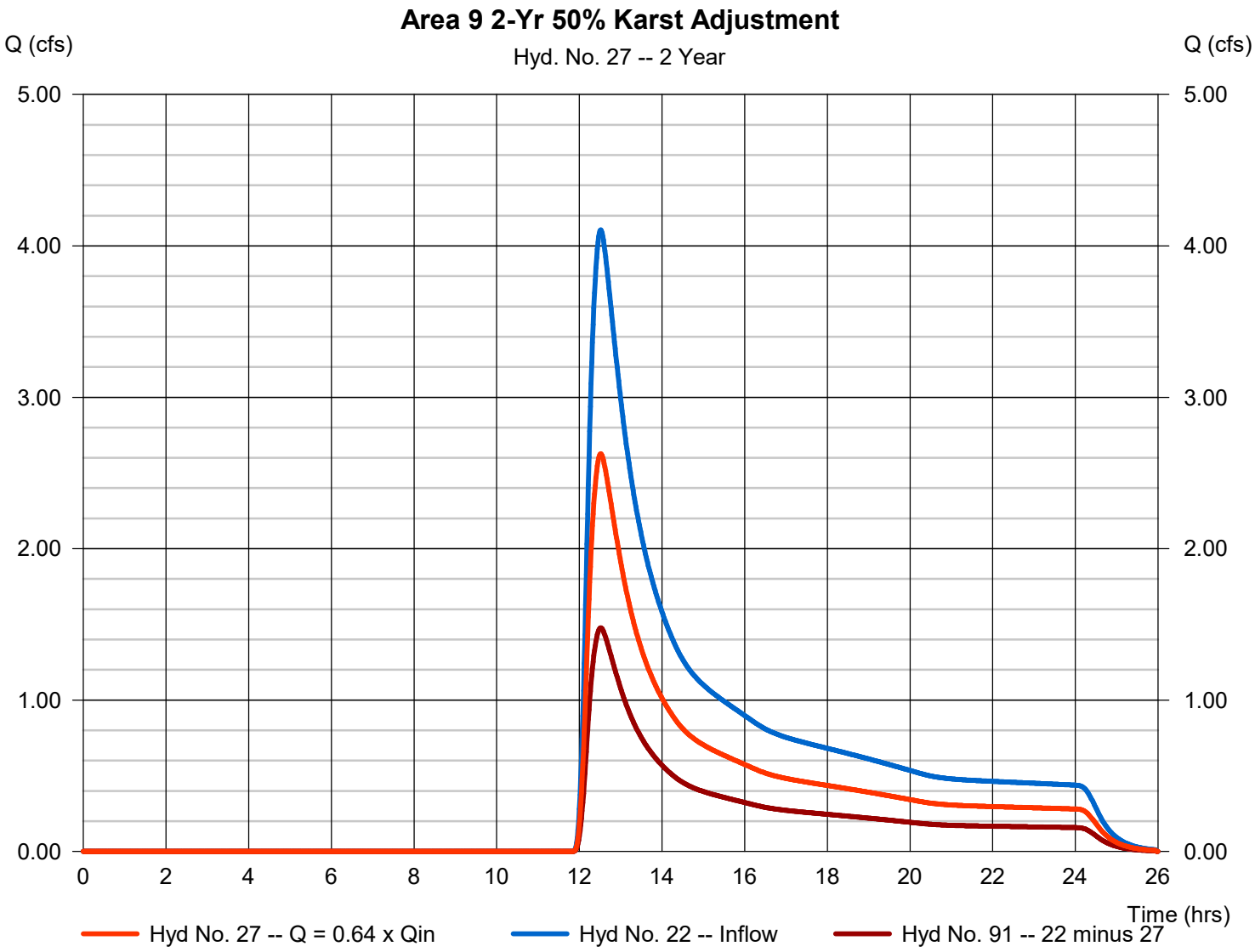
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 27

Area 9 2-Yr 50% Karst Adjustment

Hydrograph type	= Diversion1	Peak discharge	= 2.628 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.52 hrs
Time interval	= 1 min	Hyd. volume	= 28,711 cuft
Inflow hydrograph	= 22 - Reach Area 9	2nd diverted hyd.	= 91
Diversion method	= Flow Ratio	Flow ratio	= 0.64



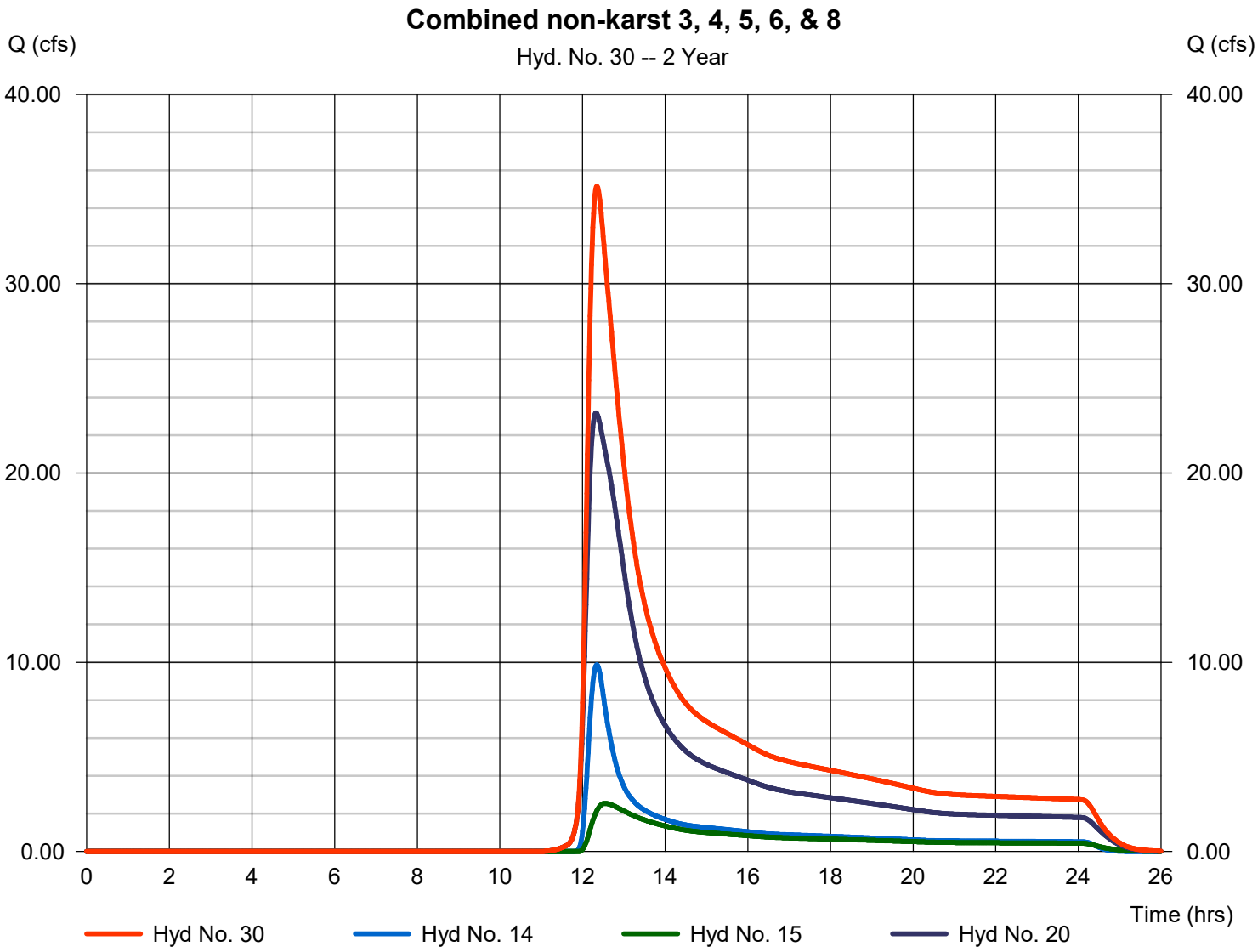
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 30

Combined non-karst 3, 4, 5, 6, & 8

Hydrograph type	= Combine	Peak discharge	= 35.15 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 312,009 cuft
Inflow hyds.	= 14, 15, 20	Contrib. drain. area	= 0.000 ac



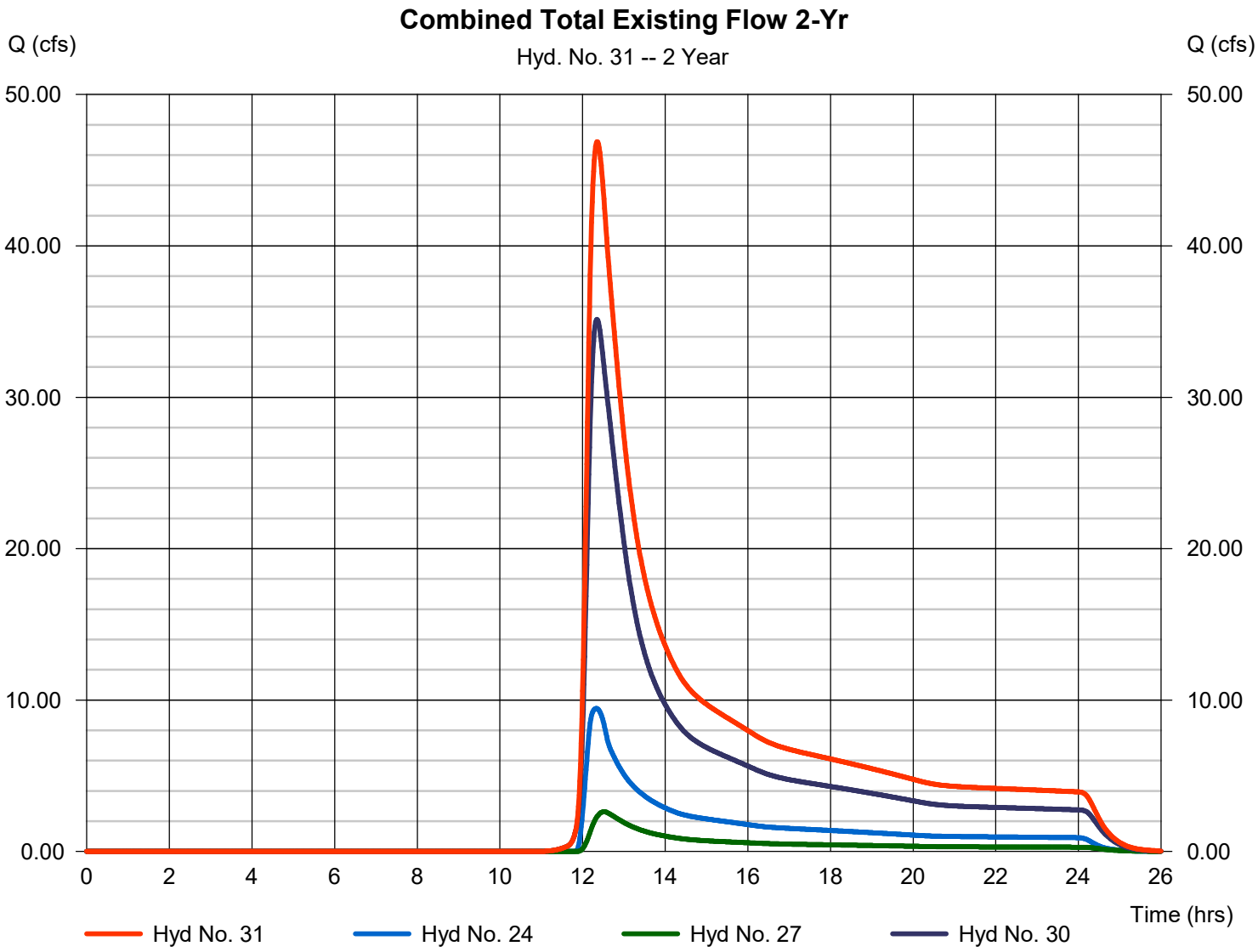
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 31

Combined Total Existing Flow 2-Yr

Hydrograph type	= Combine	Peak discharge	= 46.89 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 431,990 cuft
Inflow hyds.	= 24, 27, 30	Contrib. drain. area	= 0.000 ac



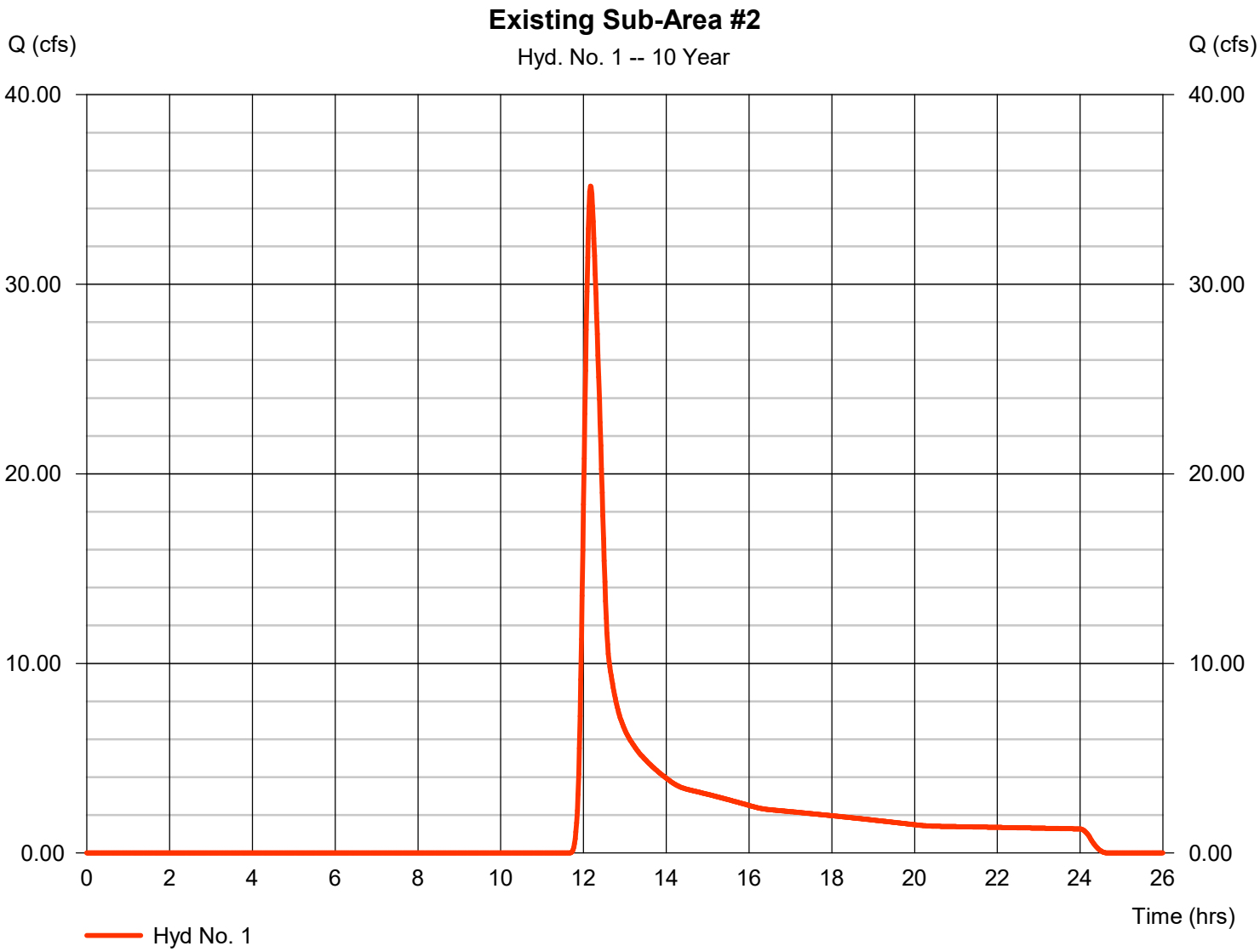
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 1

Existing Sub-Area #2

Hydrograph type	= SCS Runoff	Peak discharge	= 35.18 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 160,065 cuft
Drainage area	= 54.830 ac	Curve number	= 59
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.20 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



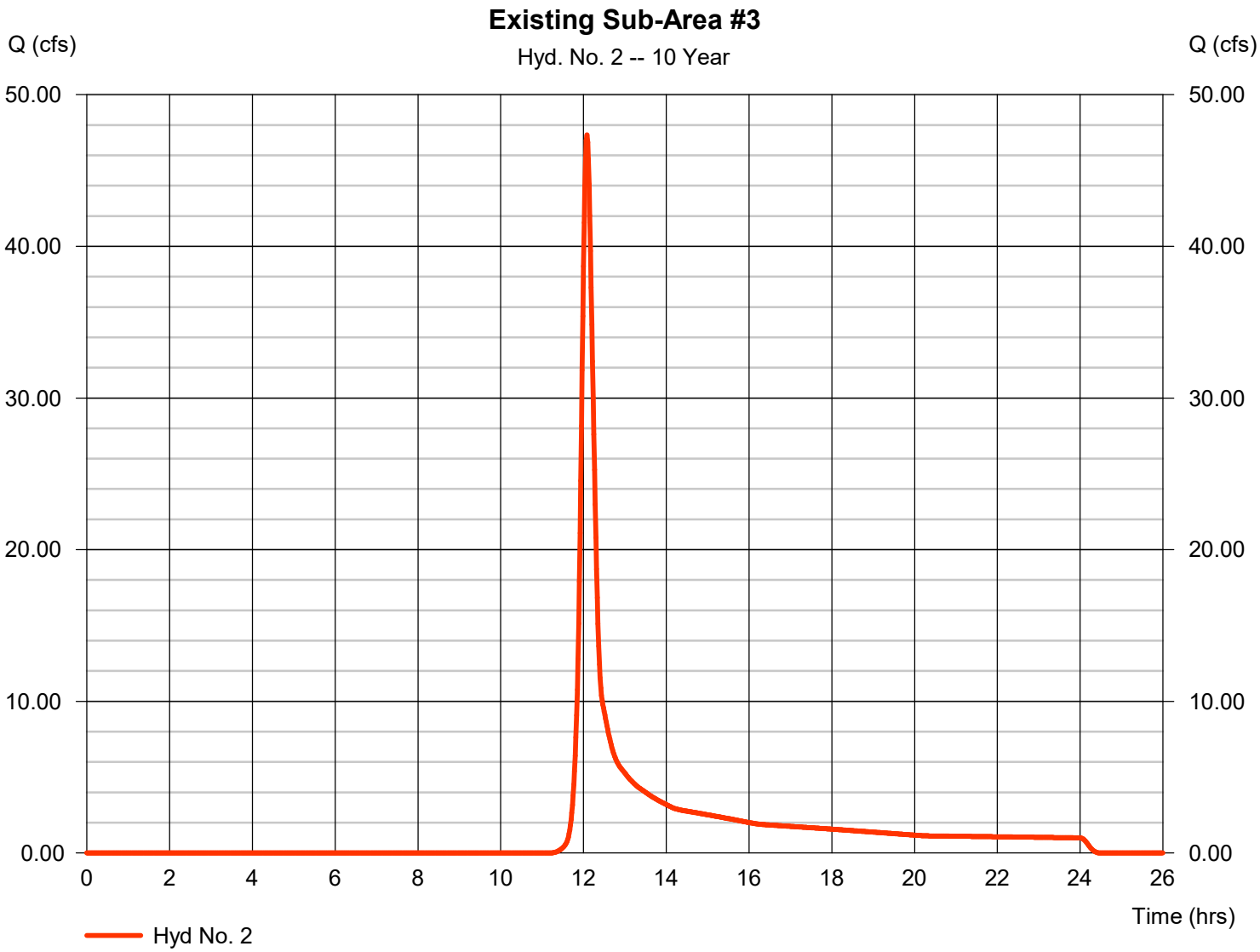
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 2

Existing Sub-Area #3

Hydrograph type	= SCS Runoff	Peak discharge	= 47.36 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 150,322 cuft
Drainage area	= 34.870 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 16.92 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



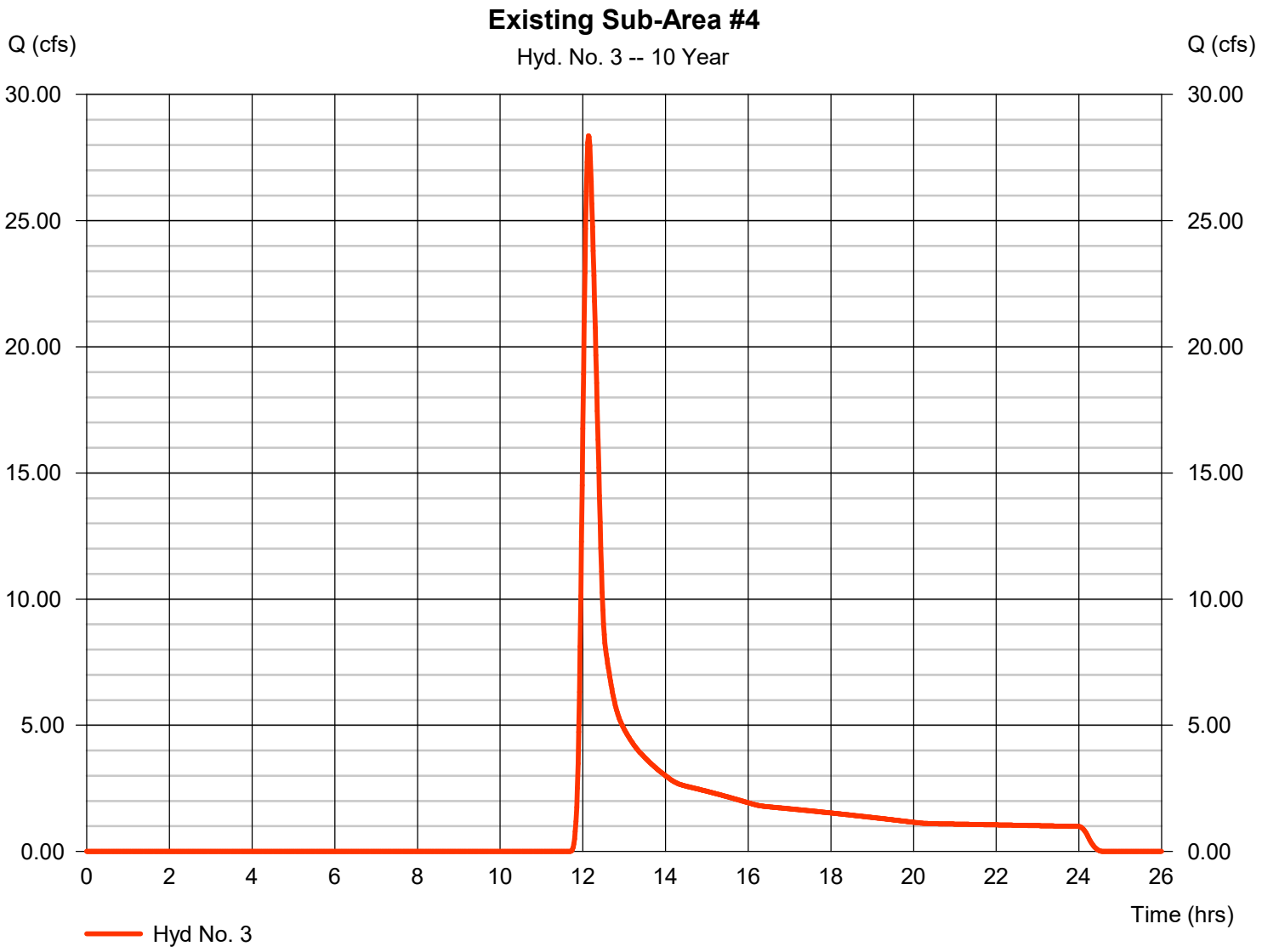
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 3

Existing Sub-Area #4

Hydrograph type	= SCS Runoff	Peak discharge	= 28.37 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 121,725 cuft
Drainage area	= 44.110 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 21.73 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



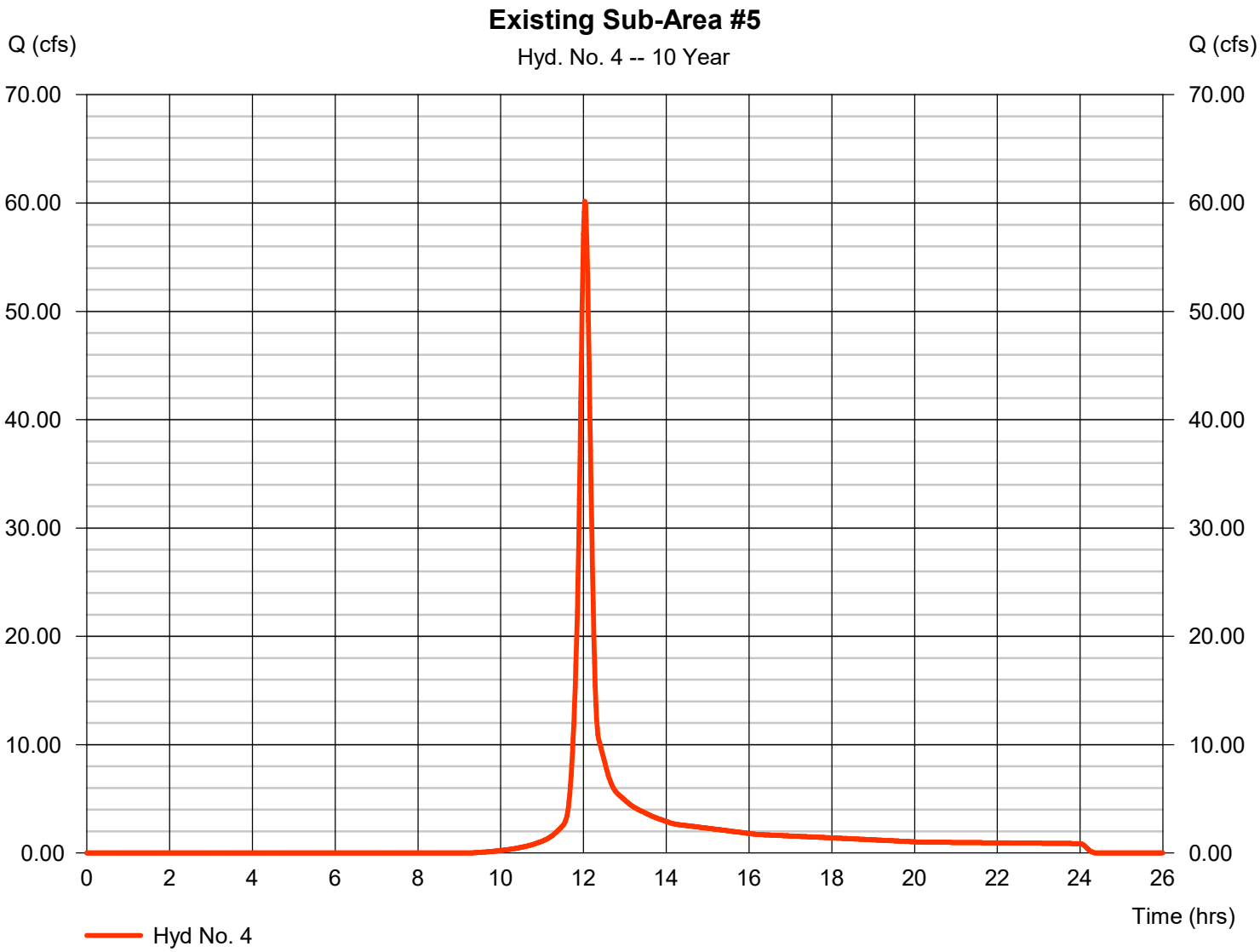
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 4

Existing Sub-Area #5

Hydrograph type	= SCS Runoff	Peak discharge	= 60.14 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 162,332 cuft
Drainage area	= 23.720 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 14.38 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



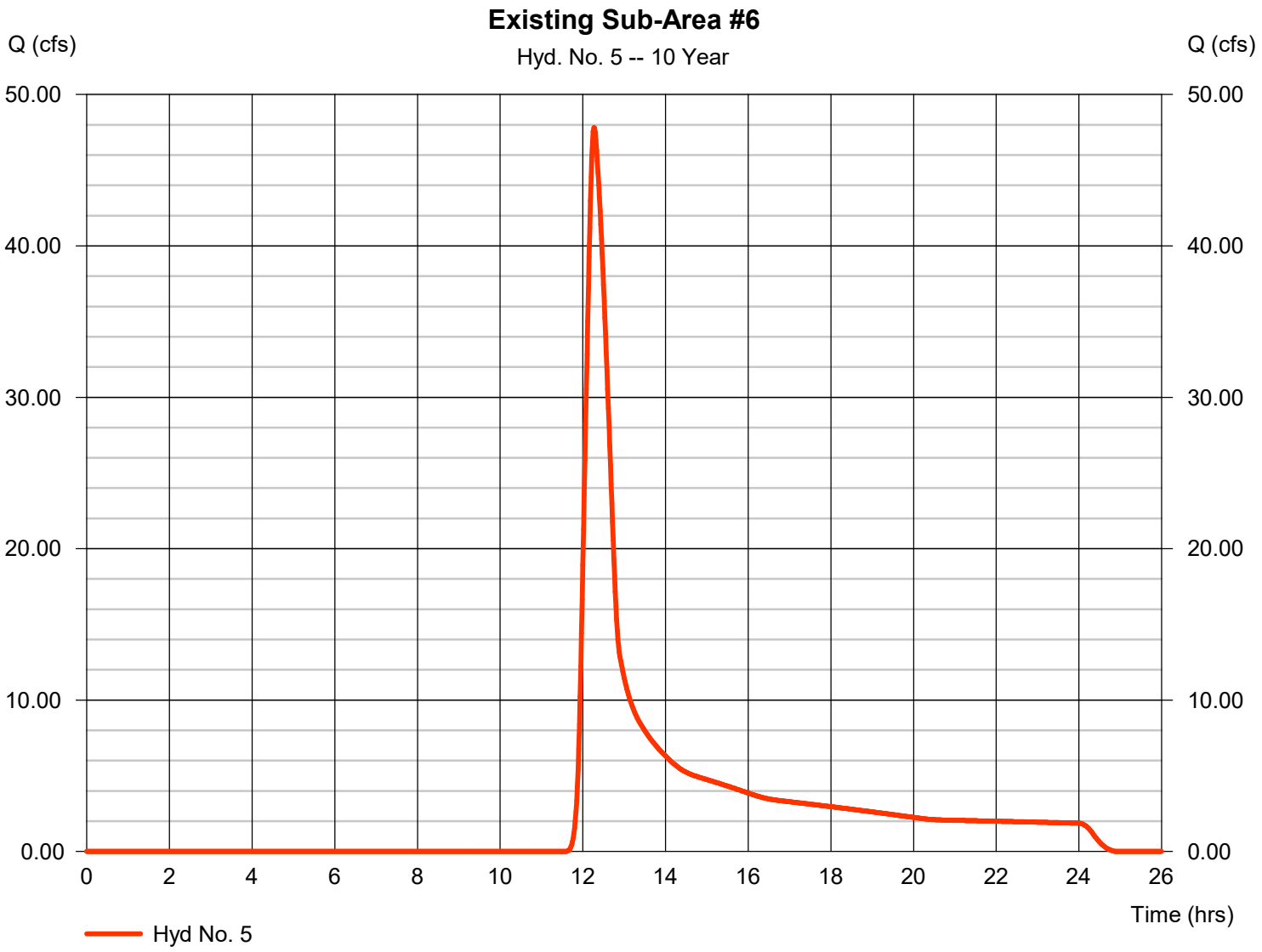
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 5

Existing Sub-Area #6

Hydrograph type	= SCS Runoff	Peak discharge	= 47.82 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 254,331 cuft
Drainage area	= 72.510 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 34.70 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



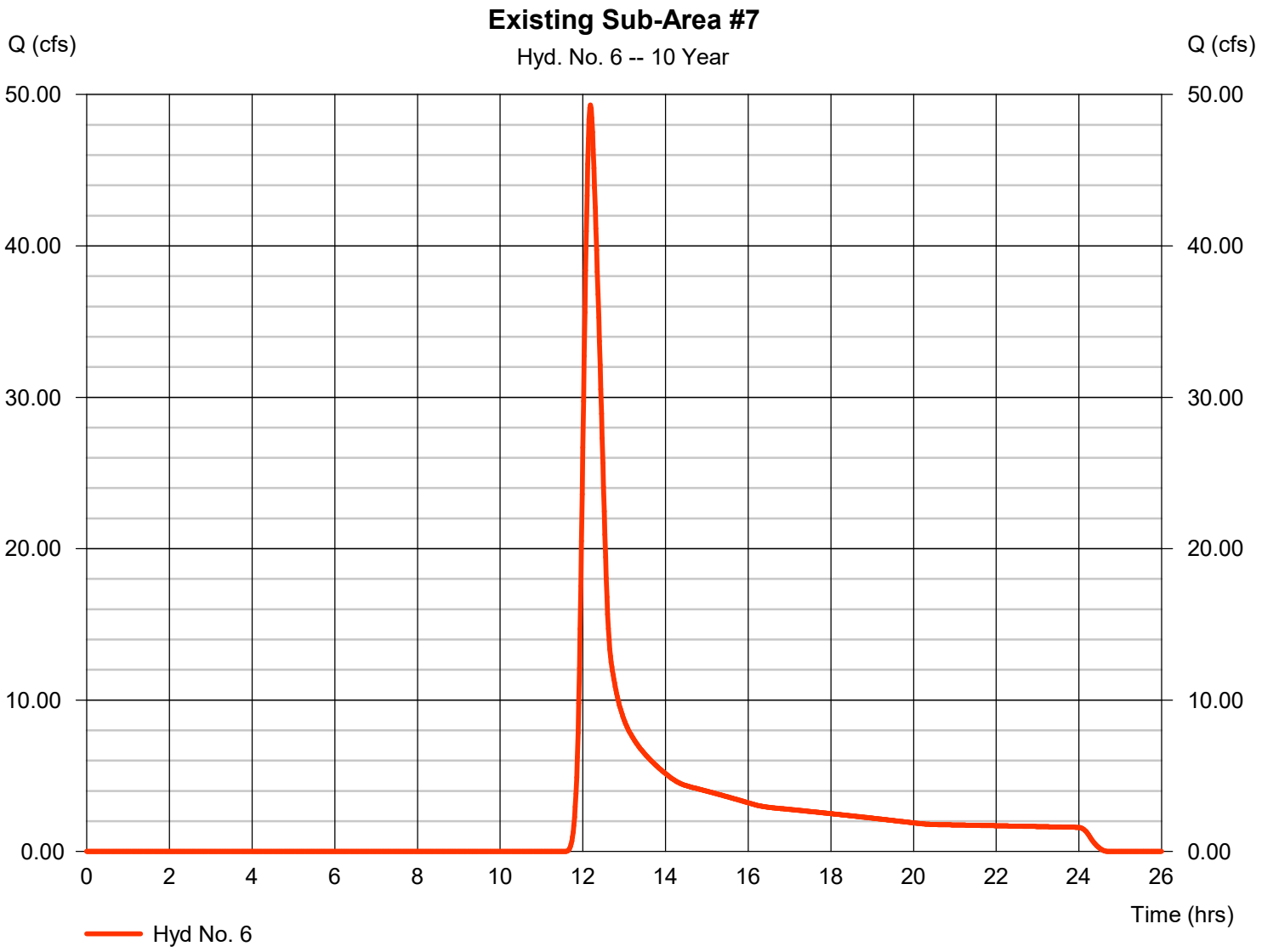
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 6

Existing Sub-Area #7

Hydrograph type	= SCS Runoff	Peak discharge	= 49.30 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.18 hrs
Time interval	= 1 min	Hyd. volume	= 217,116 cuft
Drainage area	= 61.420 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 26.96 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



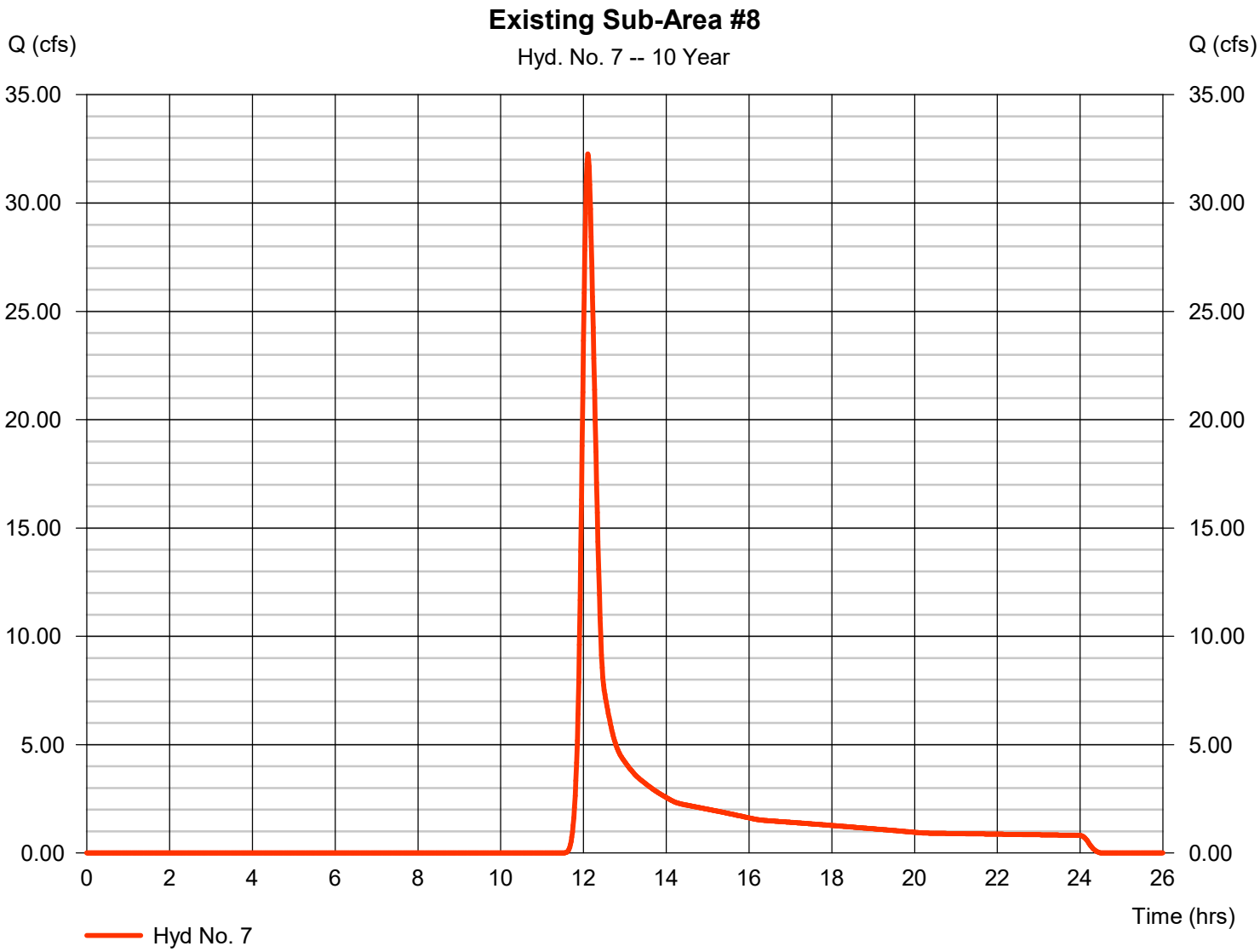
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 7

Existing Sub-Area #8

Hydrograph type	= SCS Runoff	Peak discharge	= 32.27 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 113,927 cuft
Drainage area	= 30.680 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 19.20 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



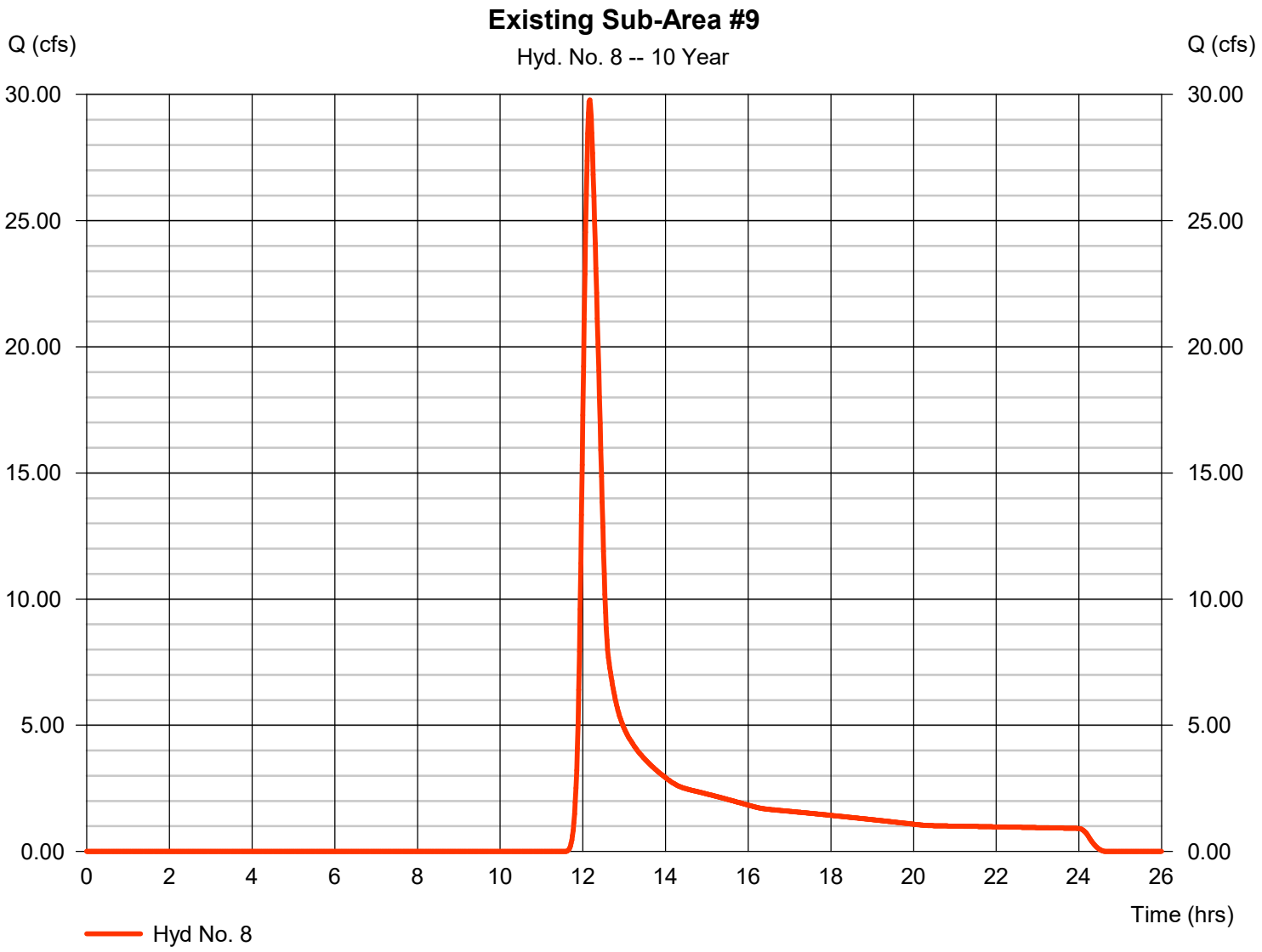
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 8

Existing Sub-Area #9

Hydrograph type	= SCS Runoff	Peak discharge	= 29.79 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 124,693 cuft
Drainage area	= 35.550 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 23.76 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



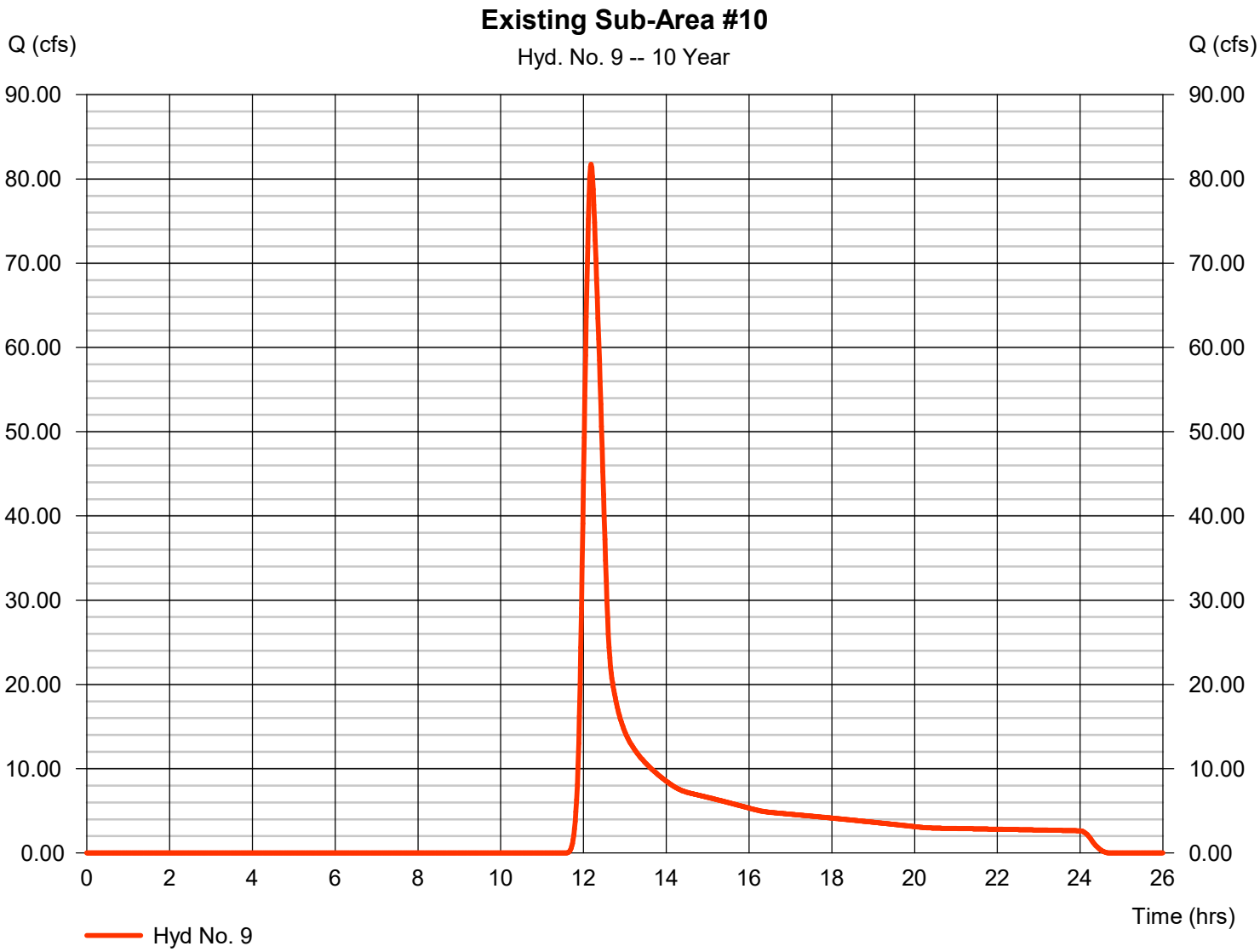
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 9

Existing Sub-Area #10

Hydrograph type	= SCS Runoff	Peak discharge	= 81.73 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.18 hrs
Time interval	= 1 min	Hyd. volume	= 359,927 cuft
Drainage area	= 101.820 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.90 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



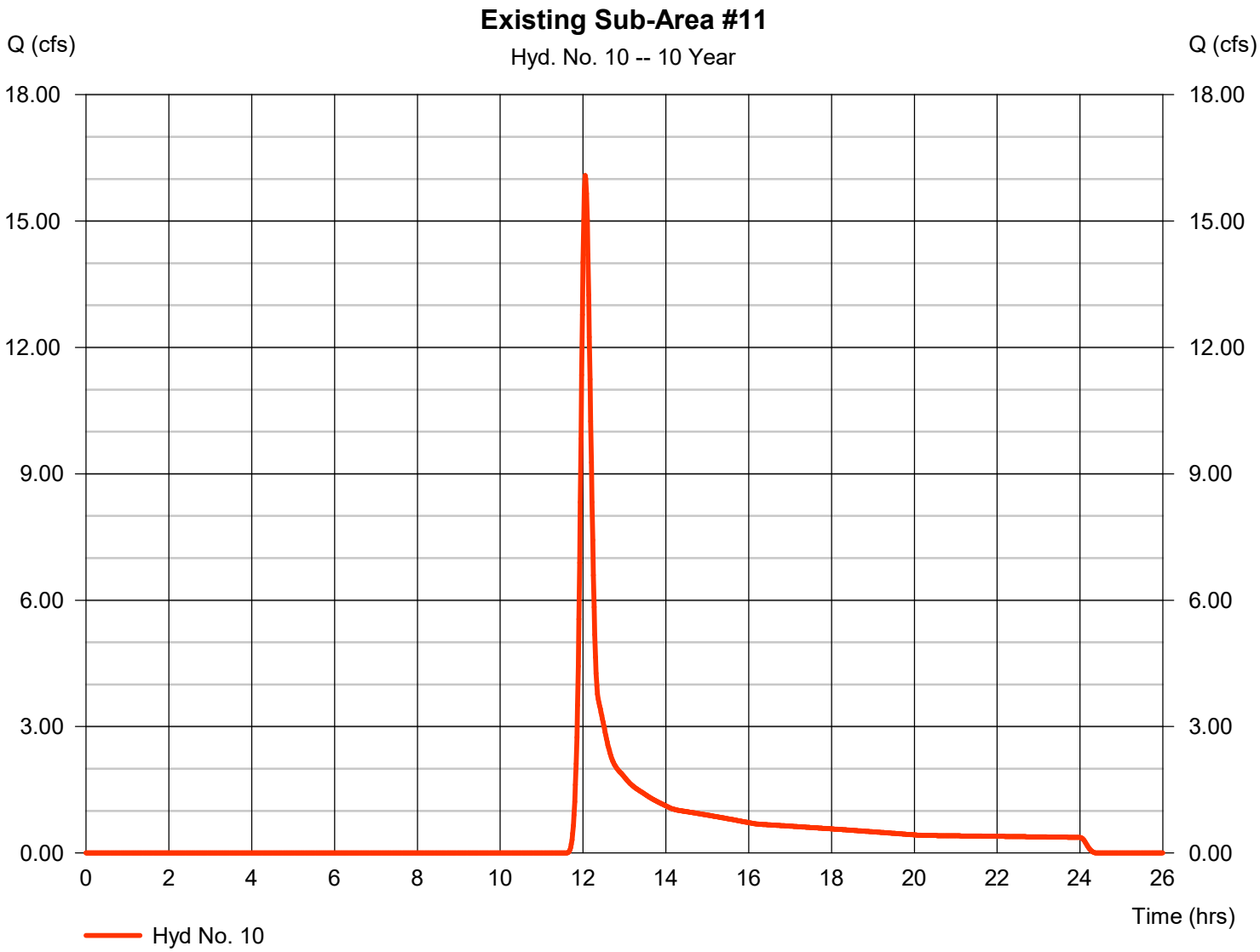
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 10

Existing Sub-Area #11

Hydrograph type	= SCS Runoff	Peak discharge	= 16.08 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 49,433 cuft
Drainage area	= 14.950 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 13.51 min
Total precip.	= 4.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

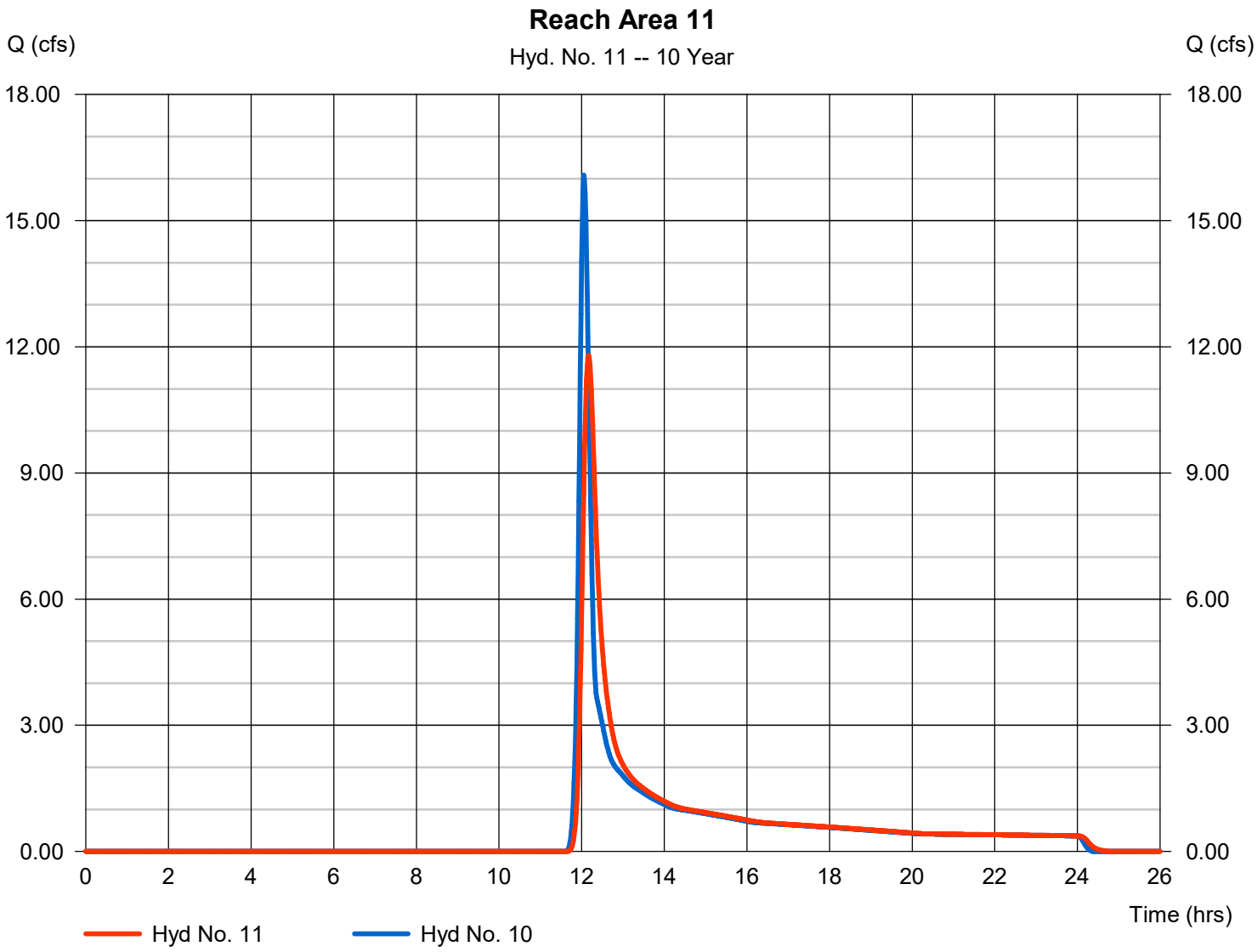
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 11

Reach Area 11

Hydrograph type	= Reach	Peak discharge	= 11.80 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 49,428 cuft
Inflow hyd. No.	= 10 - Existing Sub-Area #11	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1128

Modified Att-Kin routing method used.



Hydrograph Report

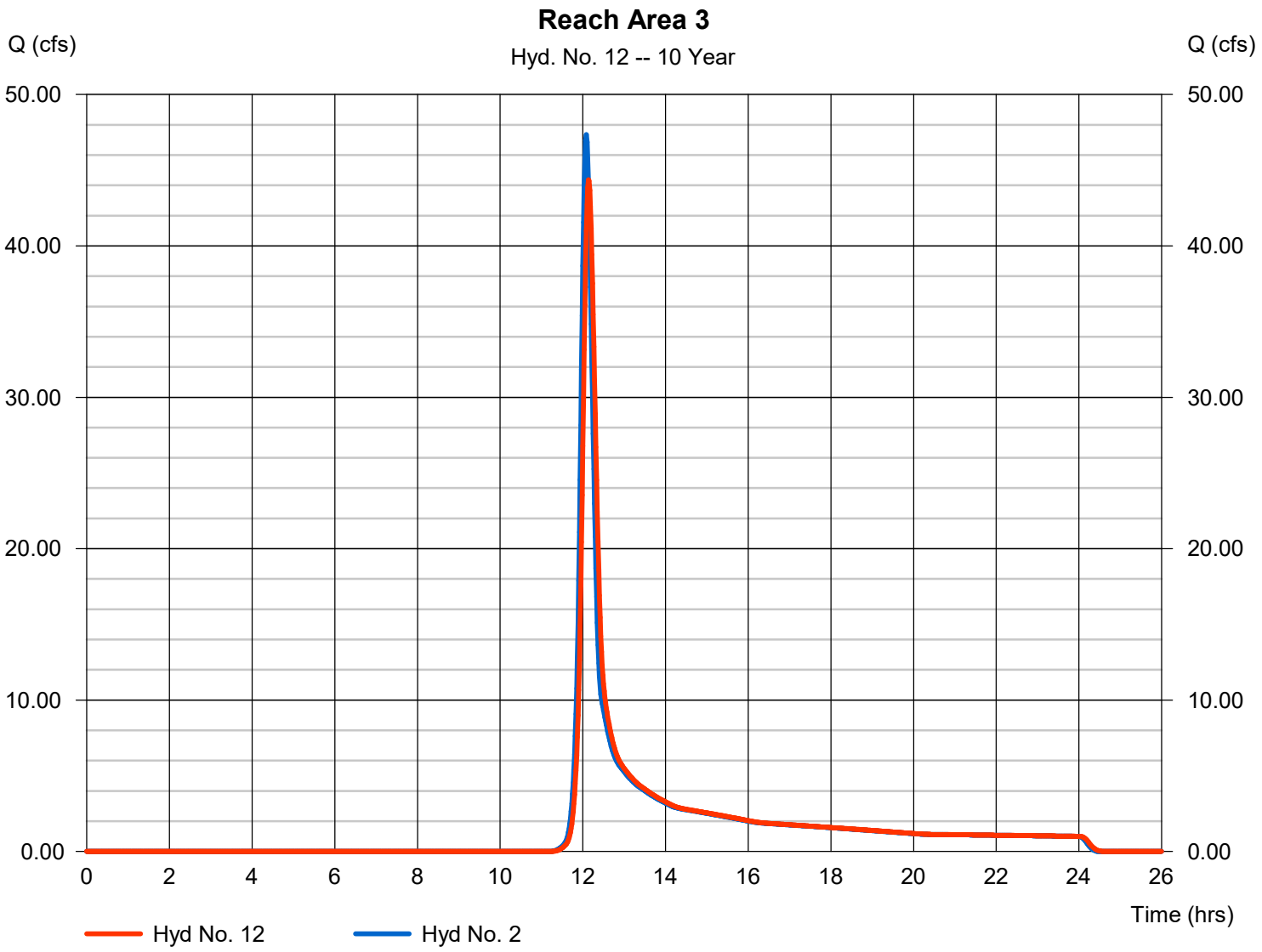
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 12

Reach Area 3

Hydrograph type	= Reach	Peak discharge	= 44.36 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 150,320 cuft
Inflow hyd. No.	= 2 - Existing Sub-Area #3	Section type	= Triangular
Reach length	= 1300.0 ft	Channel slope	= 2.0 %
Manning's n	= 0.030	Bottom width	= 0.0 ft
Side slope	= 6.0:1	Max. depth	= 0.0 ft
Rating curve x	= 2.440	Rating curve m	= 1.333
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.2723

Modified Att-Kin routing method used.



Hydrograph Report

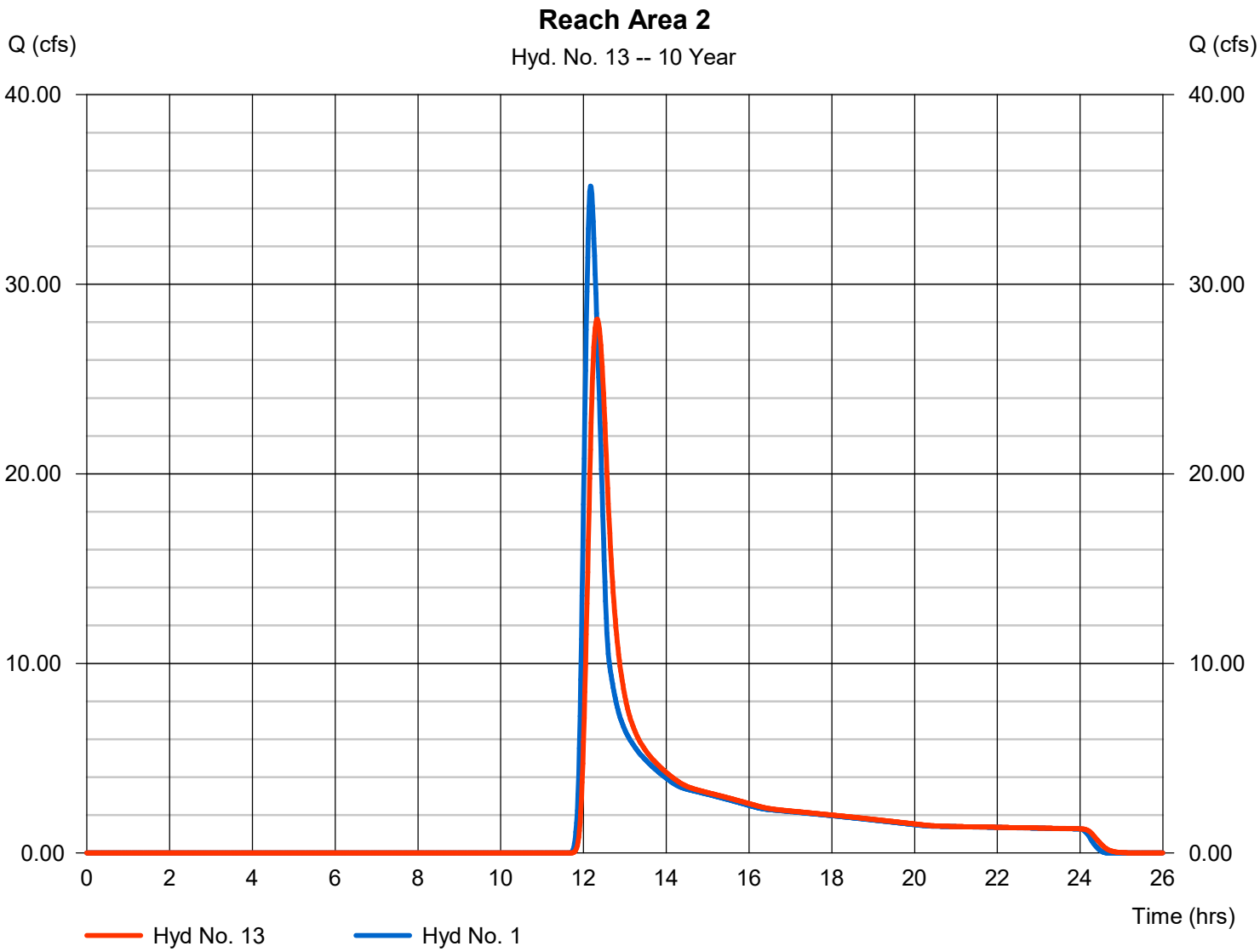
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 13

Reach Area 2

Hydrograph type	= Reach	Peak discharge	= 28.16 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 160,059 cuft
Inflow hyd. No.	= 1 - Existing Sub-Area #2	Section type	= Trapezoidal
Reach length	= 1817.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1008

Modified Att-Kin routing method used.



Hydrograph Report

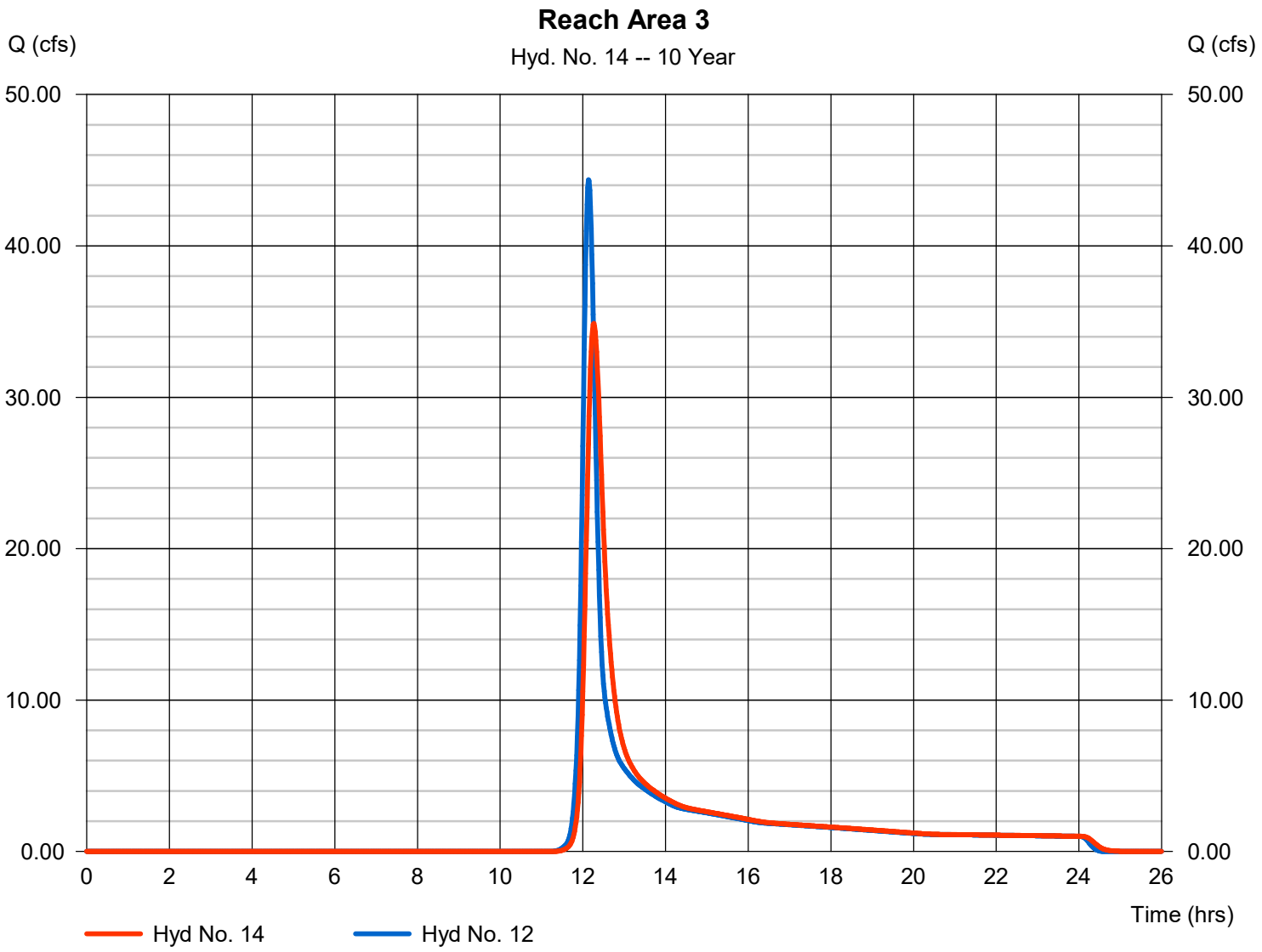
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 14

Reach Area 3

Hydrograph type	= Reach	Peak discharge	= 34.87 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 150,315 cuft
Inflow hyd. No.	= 12 - Reach Area 3	Section type	= Trapezoidal
Reach length	= 1817.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1071

Modified Att-Kin routing method used.



Hydrograph Report

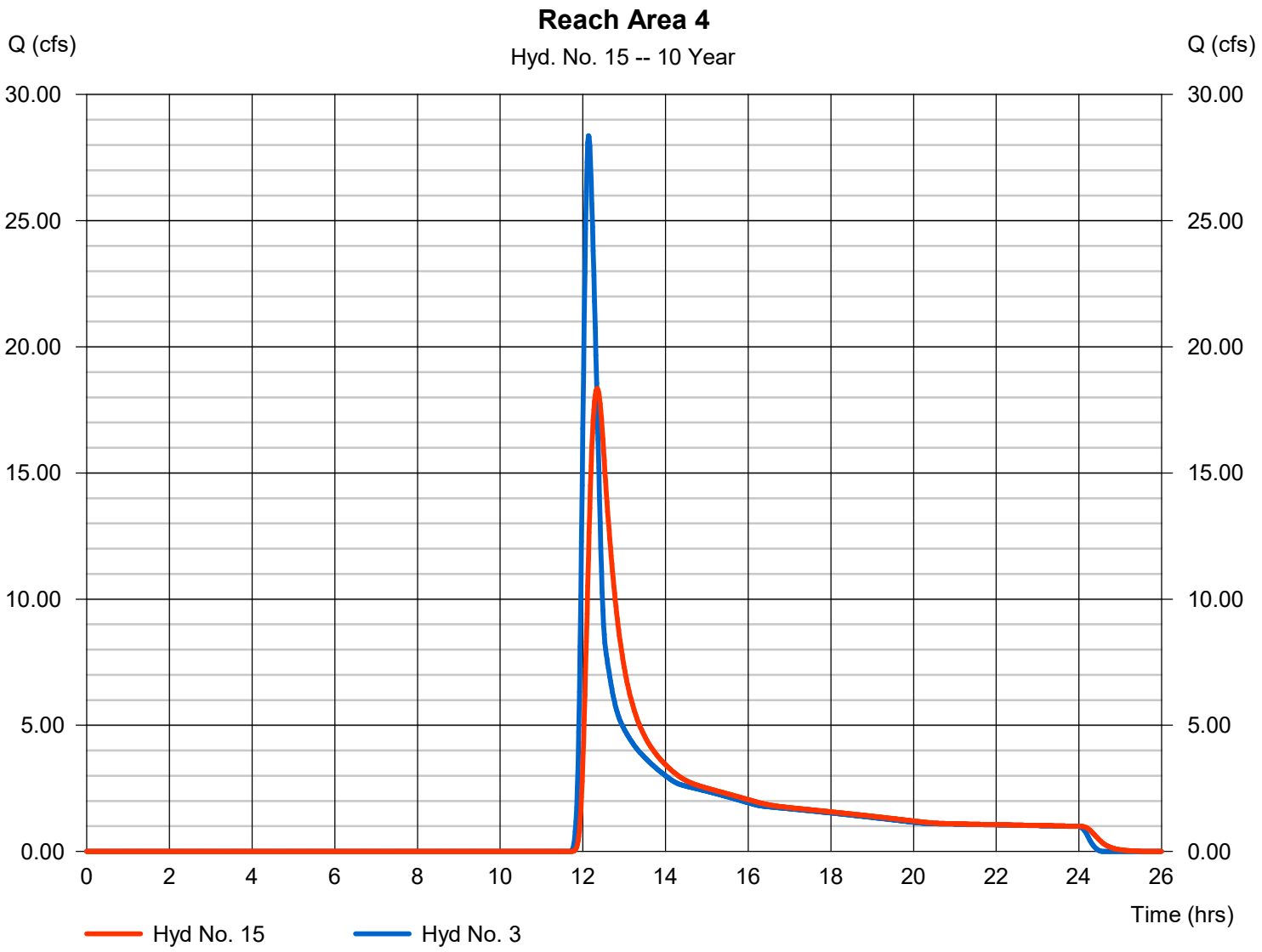
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 15

Reach Area 4

Hydrograph type	= Reach	Peak discharge	= 18.35 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 121,716 cuft
Inflow hyd. No.	= 3 - Existing Sub-Area #4	Section type	= Trapezoidal
Reach length	= 2850.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0618

Modified Att-Kin routing method used.



Hydrograph Report

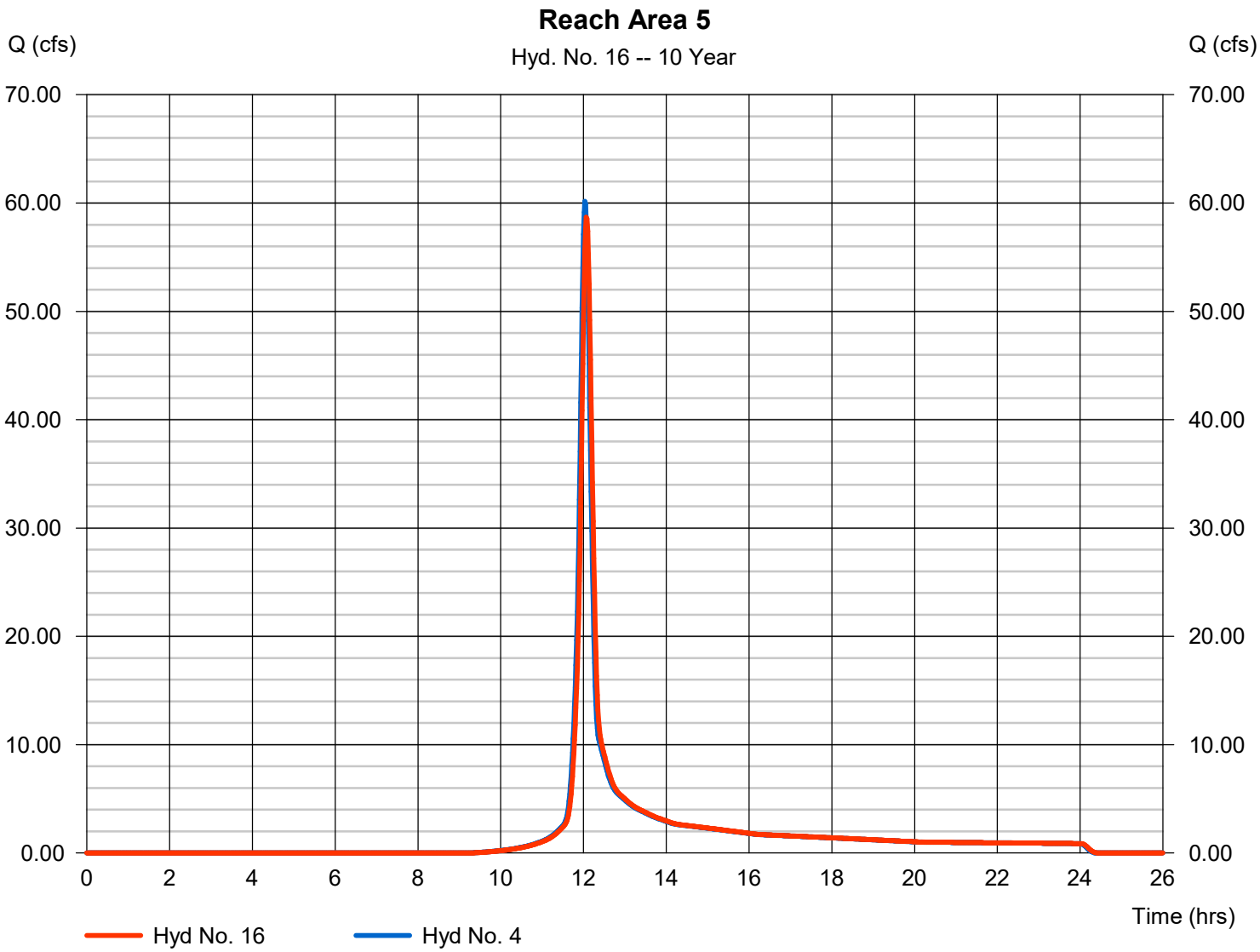
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 16

Reach Area 5

Hydrograph type	= Reach	Peak discharge	= 58.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 162,331 cuft
Inflow hyd. No.	= 4 - Existing Sub-Area #5	Section type	= Triangular
Reach length	= 600.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.030	Bottom width	= 0.0 ft
Side slope	= 5.0:1	Max. depth	= 0.0 ft
Rating curve x	= 1.833	Rating curve m	= 1.333
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.4526

Modified Att-Kin routing method used.



Hydrograph Report

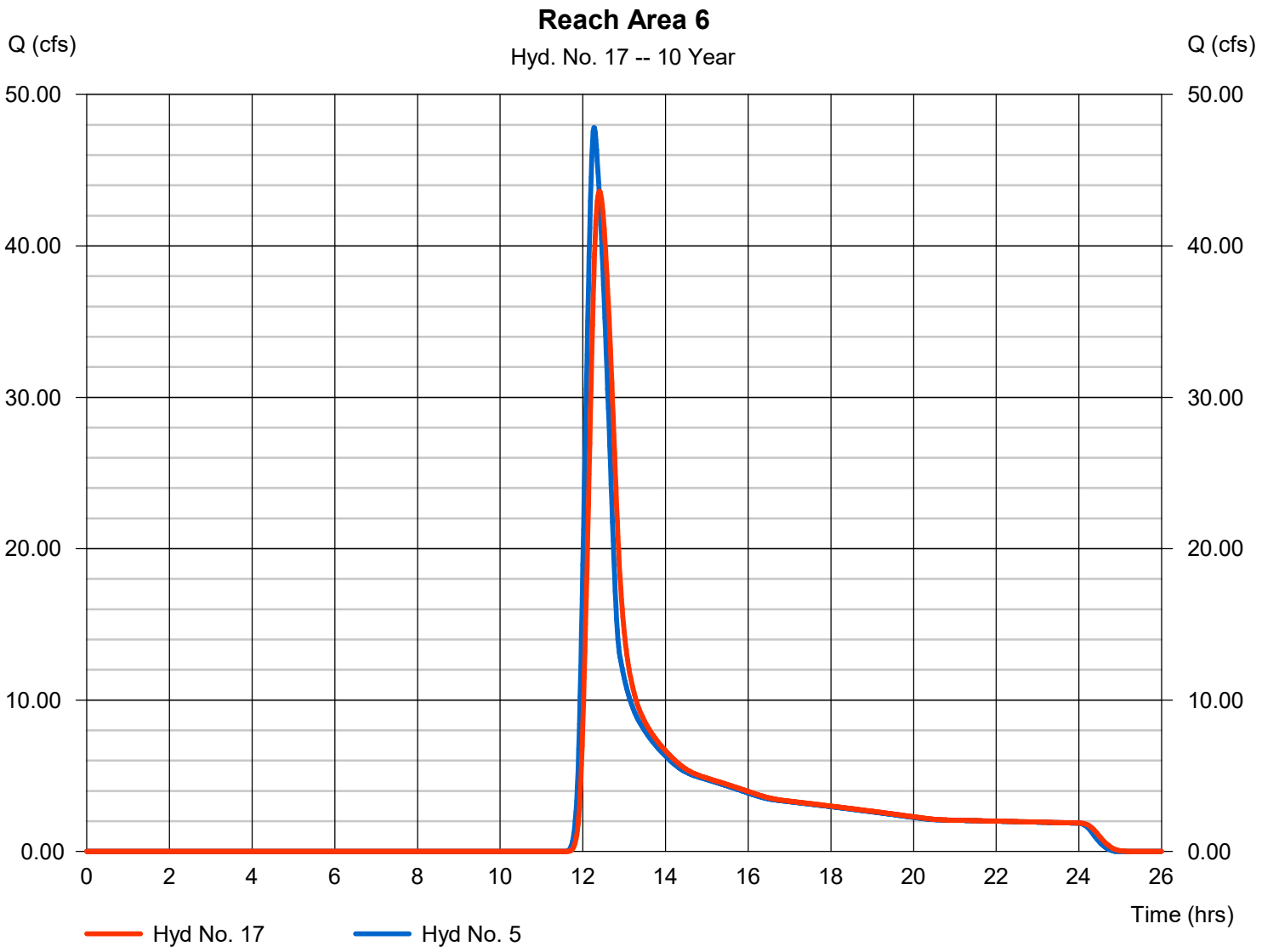
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 17

Reach Area 6

Hydrograph type	= Reach	Peak discharge	= 43.62 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.40 hrs
Time interval	= 1 min	Hyd. volume	= 254,327 cuft
Inflow hyd. No.	= 5 - Existing Sub-Area #6	Section type	= Trapezoidal
Reach length	= 2130.0 ft	Channel slope	= 1.5 %
Manning's n	= 0.030	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 2.079	Rating curve m	= 1.292
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1426

Modified Att-Kin routing method used.



Hydrograph Report

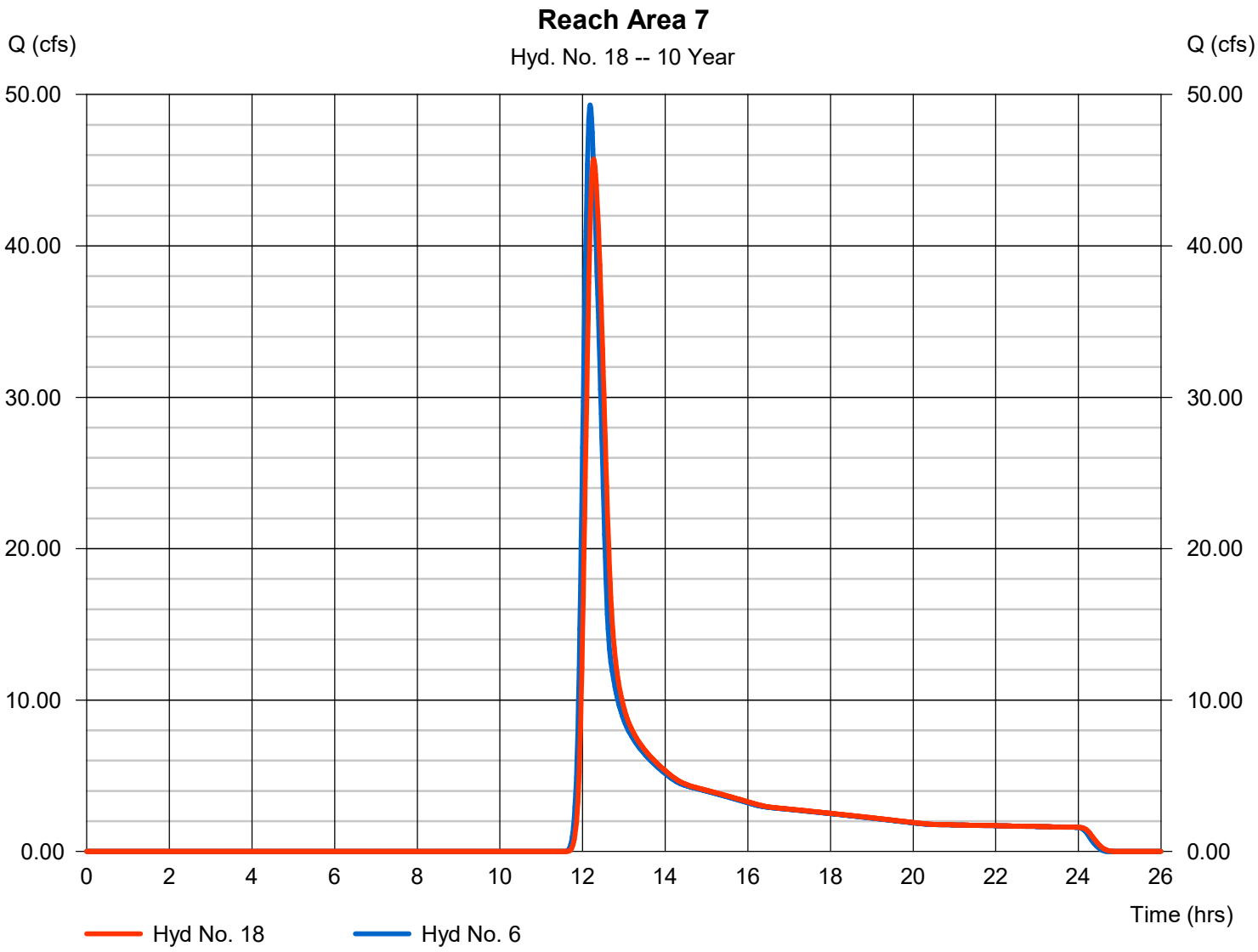
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 18

Reach Area 7

Hydrograph type	= Reach	Peak discharge	= 45.74 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 217,113 cuft
Inflow hyd. No.	= 6 - Existing Sub-Area #7	Section type	= Trapezoidal
Reach length	= 1500.0 ft	Channel slope	= 1.5 %
Manning's n	= 0.030	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 2.079	Rating curve m	= 1.292
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1979

Modified Att-Kin routing method used.



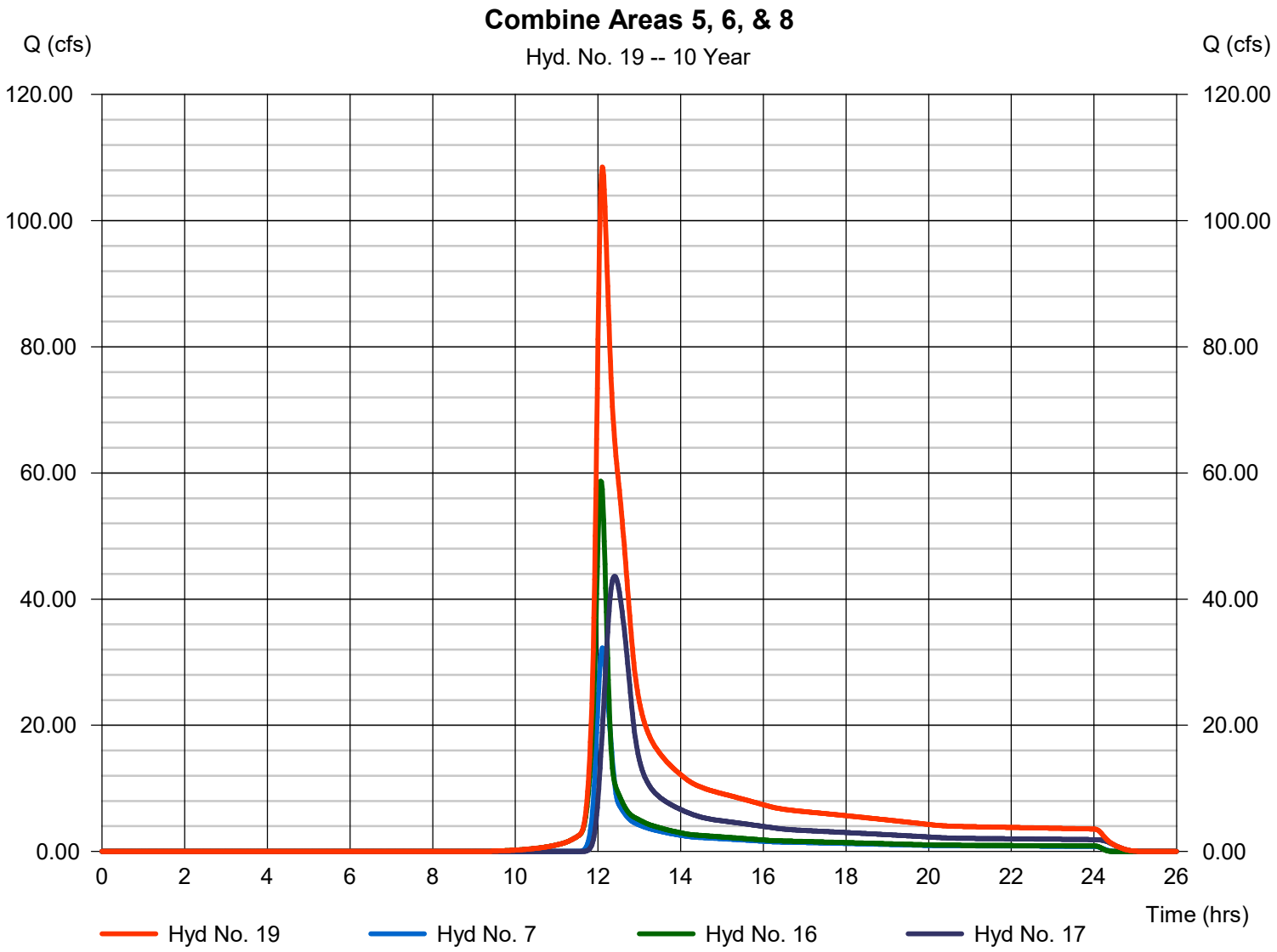
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 19

Combine Areas 5, 6, & 8

Hydrograph type	= Combine	Peak discharge	= 108.51 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 530,586 cuft
Inflow hyds.	= 7, 16, 17	Contrib. drain. area	= 30.680 ac



Hydrograph Report

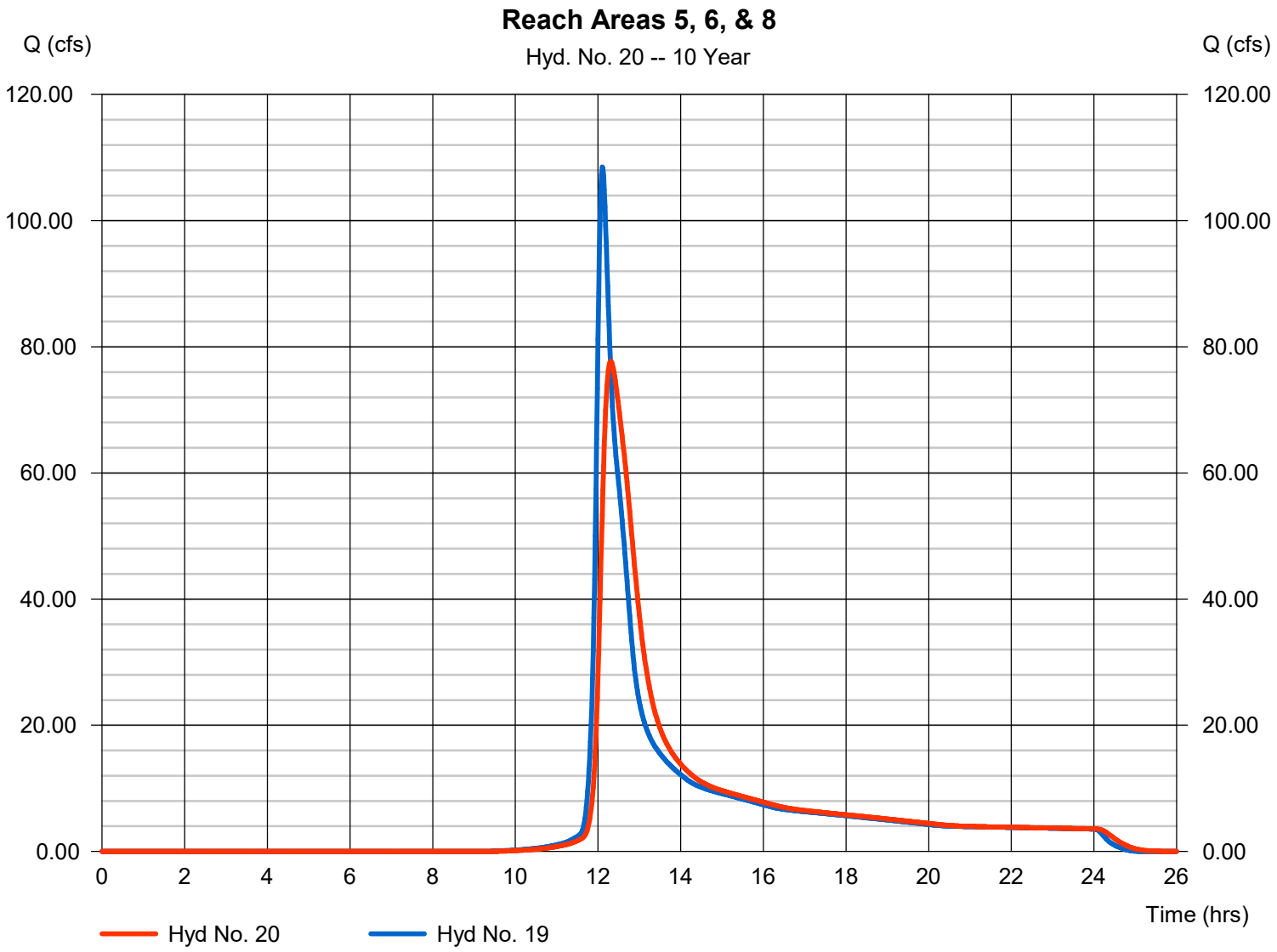
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 20

Reach Areas 5, 6, & 8

Hydrograph type	= Reach	Peak discharge	= 77.67 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.32 hrs
Time interval	= 1 min	Hyd. volume	= 530,578 cuft
Inflow hyd. No.	= 19 - Combine Areas 5, 6, & 8	Section type	= Trapezoidal
Reach length	= 3475.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0730

Modified Att-Kin routing method used.



Hydrograph Report

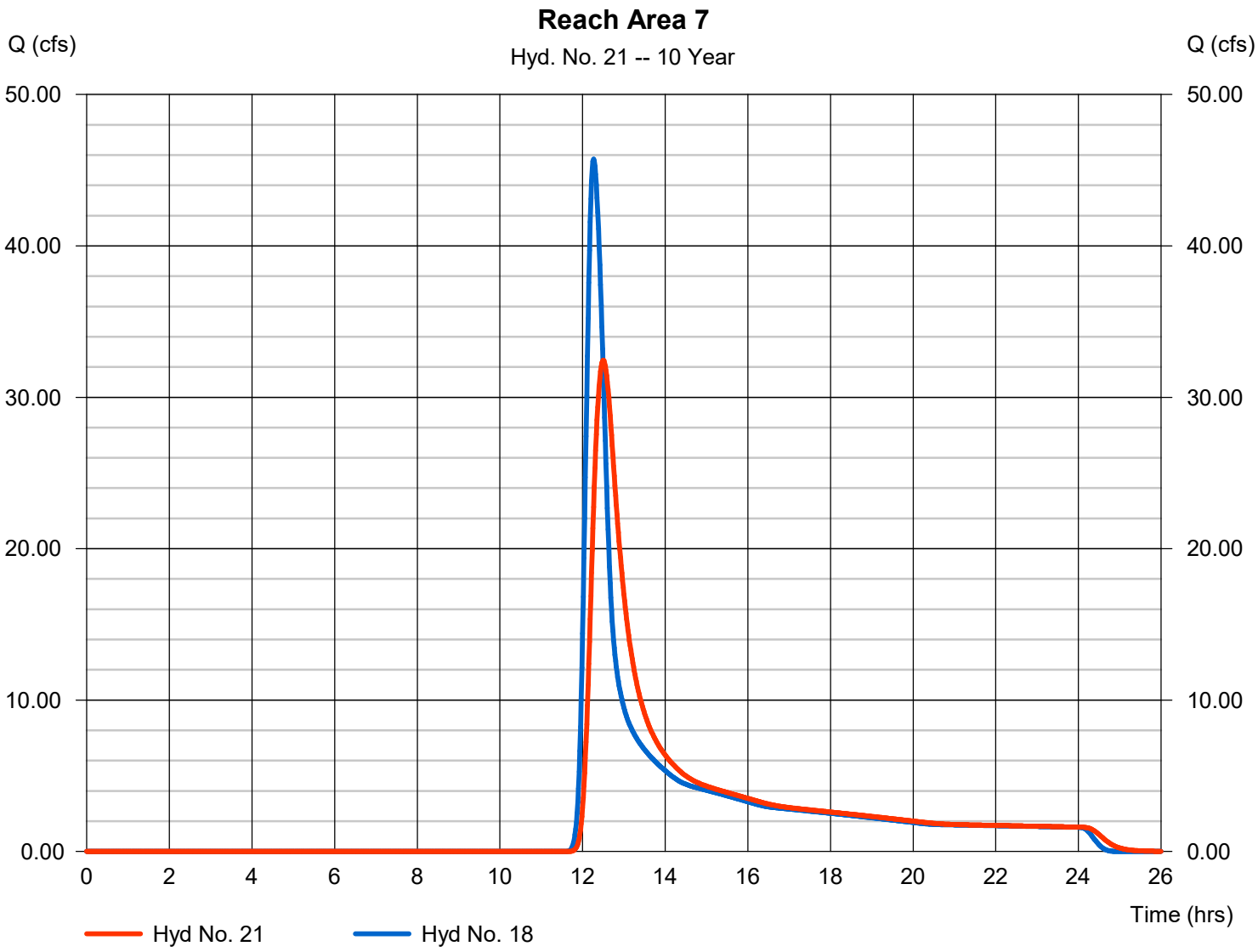
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 21

Reach Area 7

Hydrograph type	= Reach	Peak discharge	= 32.45 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 217,102 cuft
Inflow hyd. No.	= 18 - Reach Area 7	Section type	= Trapezoidal
Reach length	= 3475.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0579

Modified Att-Kin routing method used.



Hydrograph Report

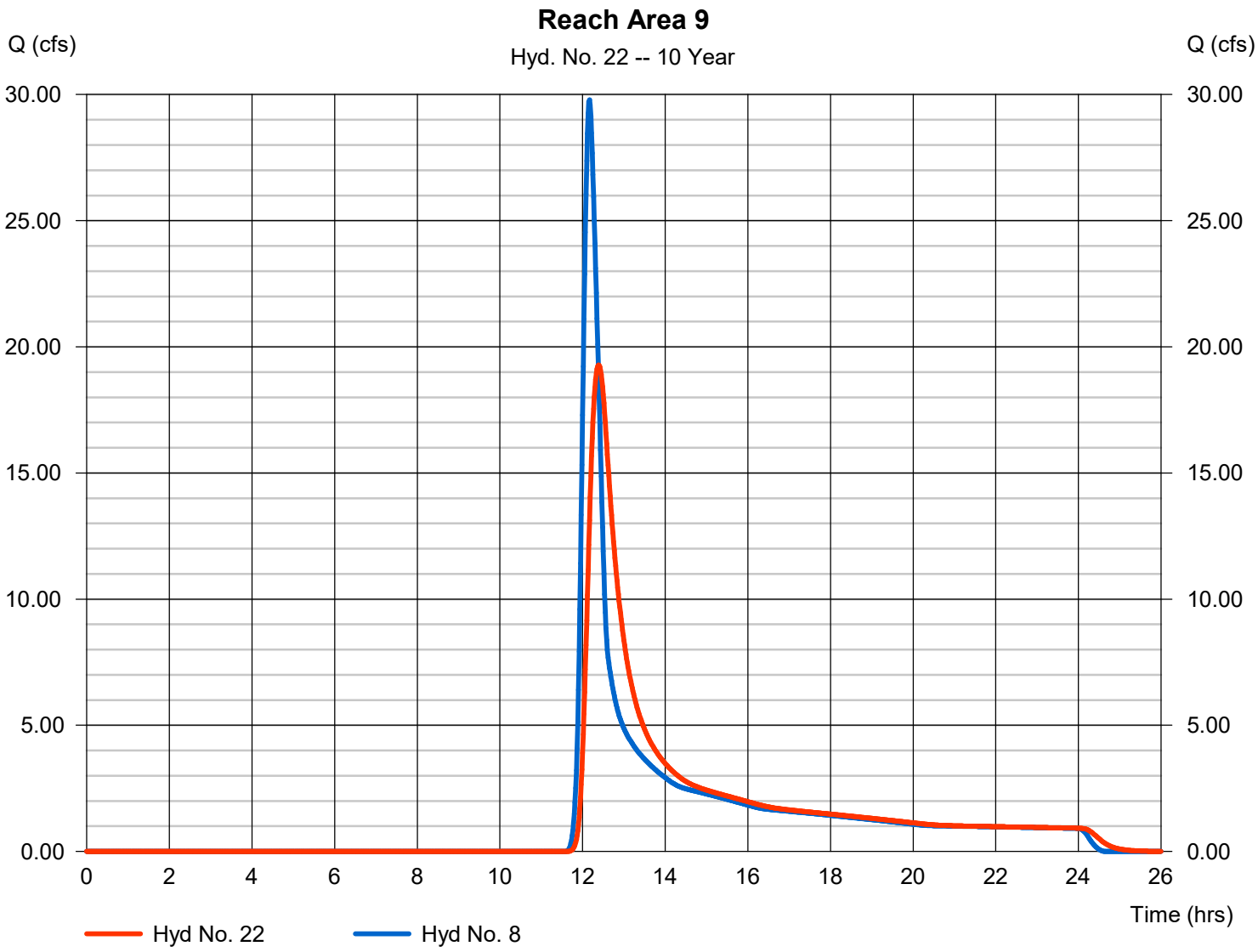
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 22

Reach Area 9

Hydrograph type	= Reach	Peak discharge	= 19.28 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.38 hrs
Time interval	= 1 min	Hyd. volume	= 124,682 cuft
Inflow hyd. No.	= 8 - Existing Sub-Area #9	Section type	= Trapezoidal
Reach length	= 3920.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 1.069	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0550

Modified Att-Kin routing method used.



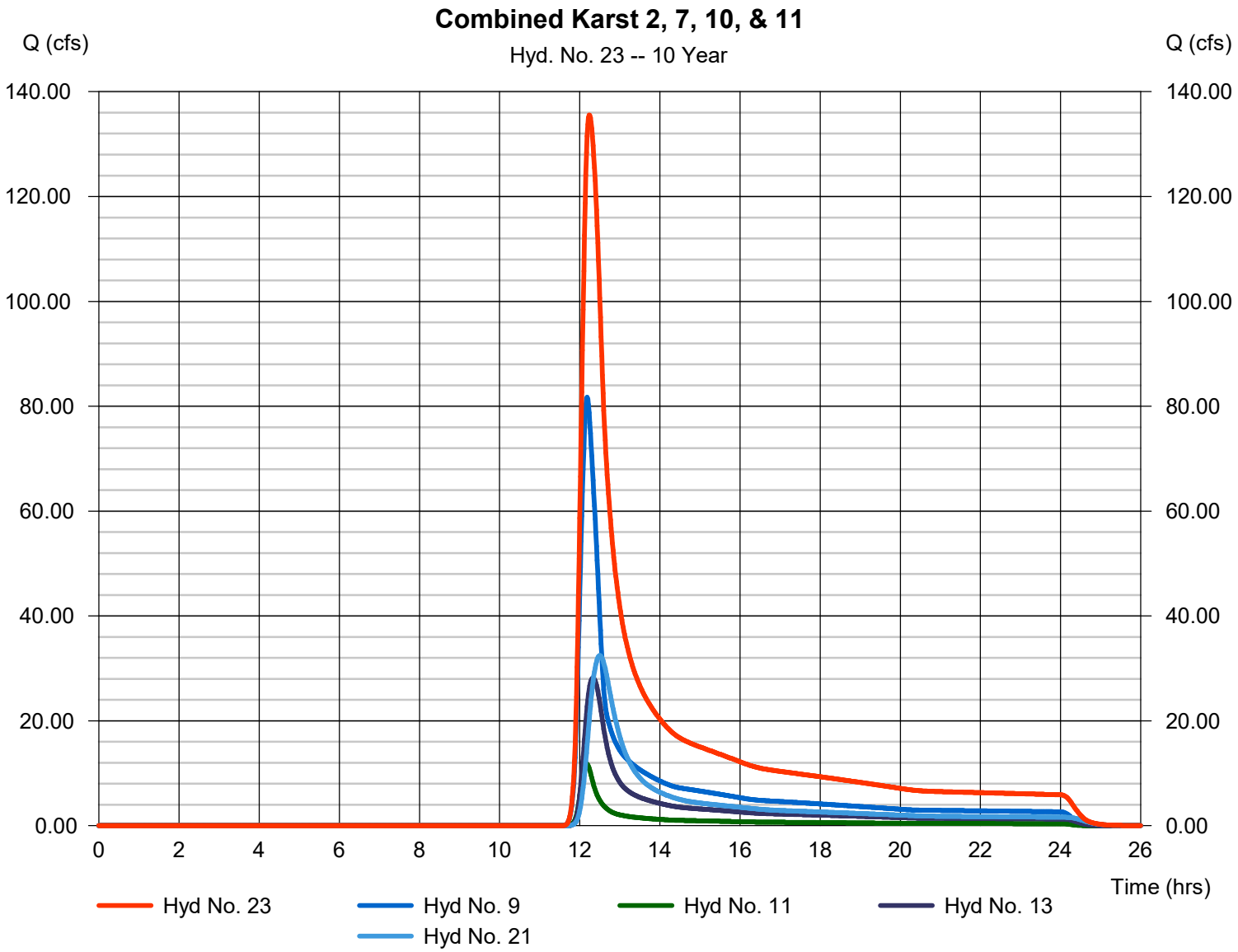
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 23

Combined Karst 2, 7, 10, & 11

Hydrograph type	= Combine	Peak discharge	= 135.57 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 786,516 cuft
Inflow hyds.	= 9, 11, 13, 21	Contrib. drain. area	= 101.820 ac



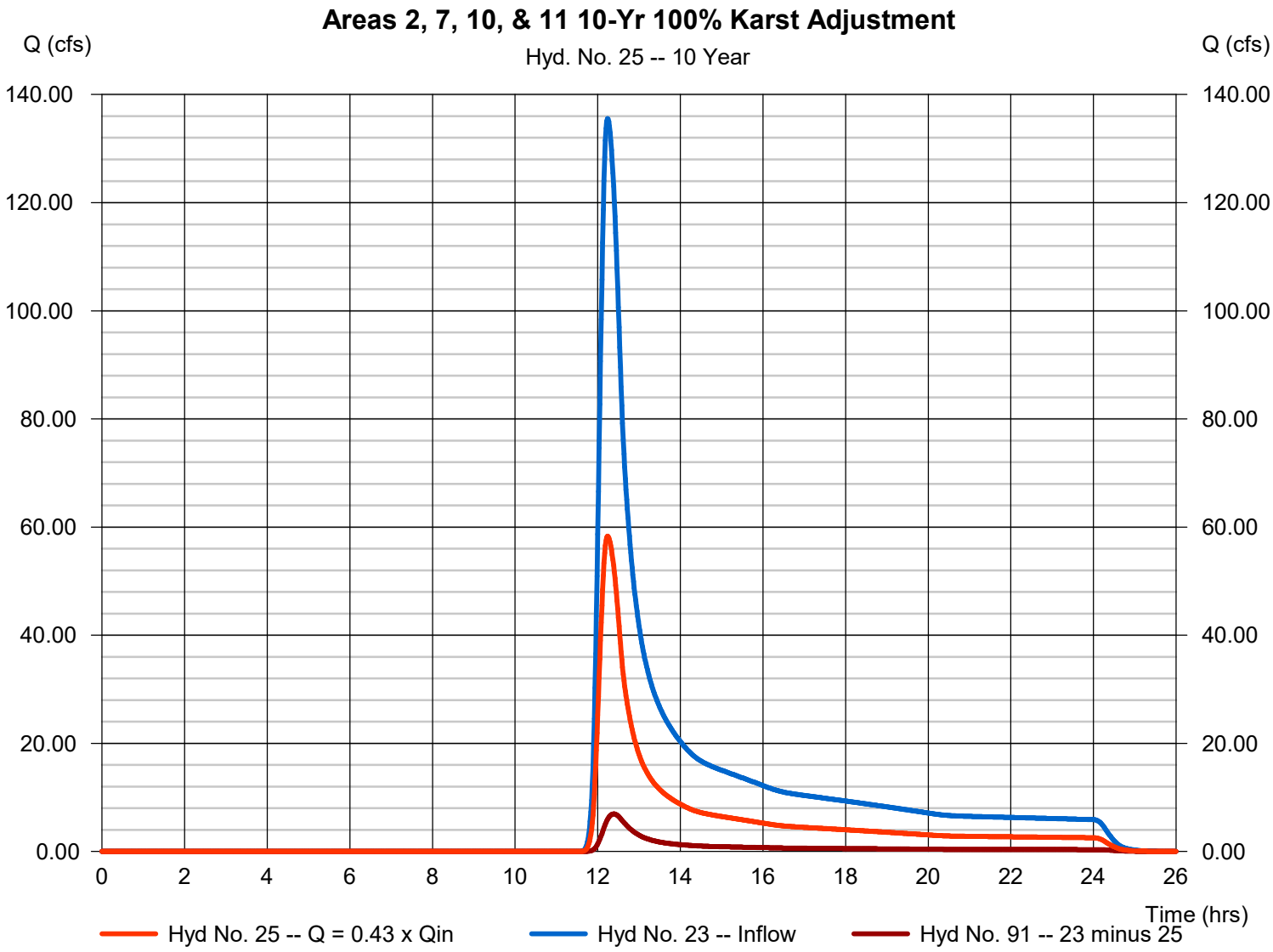
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 25

Areas 2, 7, 10, & 11 10-Yr 100% Karst Adjustment

Hydrograph type	= Diversion1	Peak discharge	= 58.30 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 338,202 cuft
Inflow hydrograph	= 23 - Combined Karst 2, 7, 10, & 11	2nd diverted hyd.	= 91
Diversion method	= Flow Ratio	Flow ratio	= 0.43



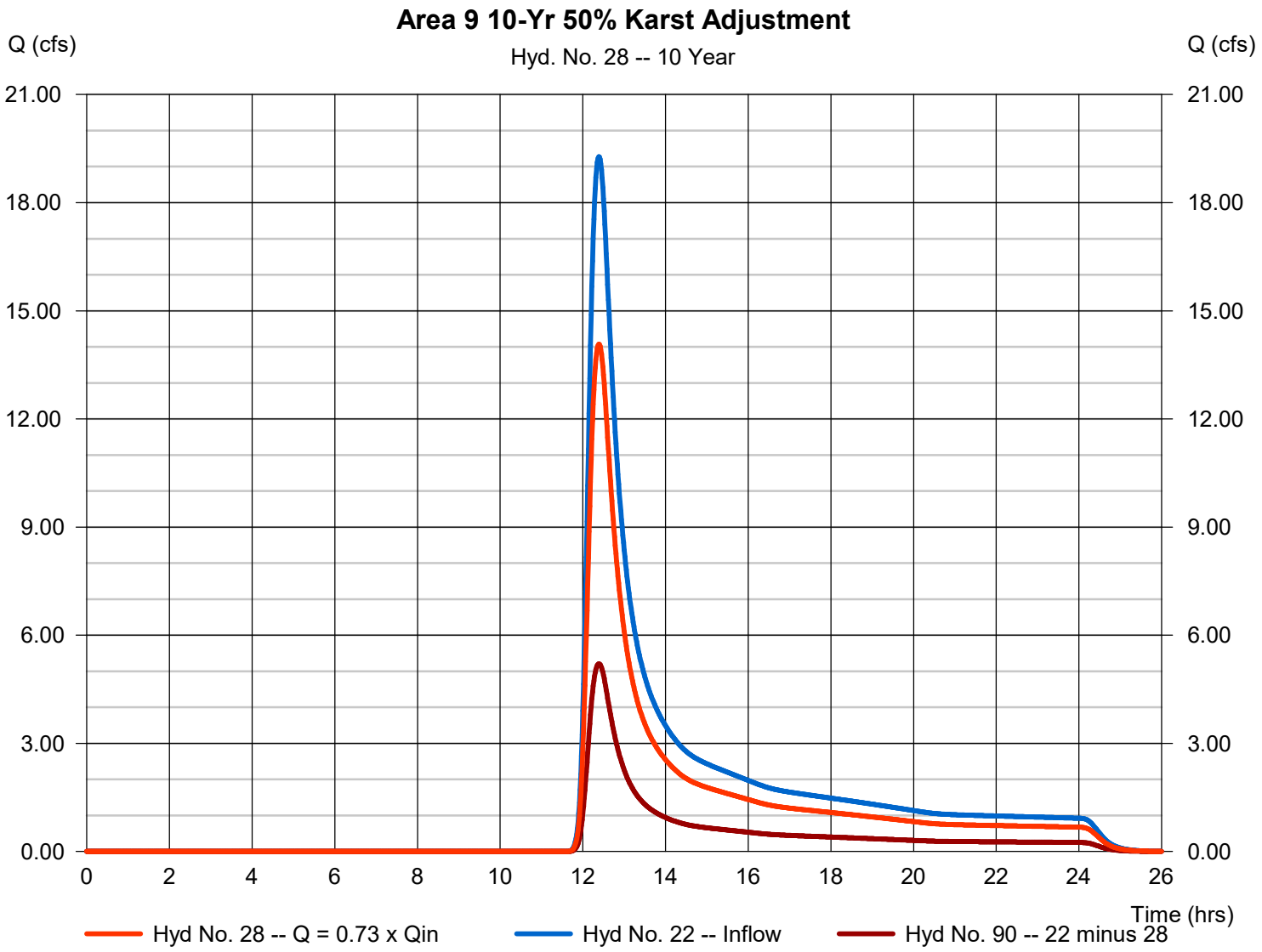
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 28

Area 9 10-Yr 50% Karst Adjustment

Hydrograph type	= Diversion1	Peak discharge	= 14.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.38 hrs
Time interval	= 1 min	Hyd. volume	= 91,018 cuft
Inflow hydrograph	= 22 - Reach Area 9	2nd diverted hyd.	= 90
Diversion method	= Flow Ratio	Flow ratio	= 0.73



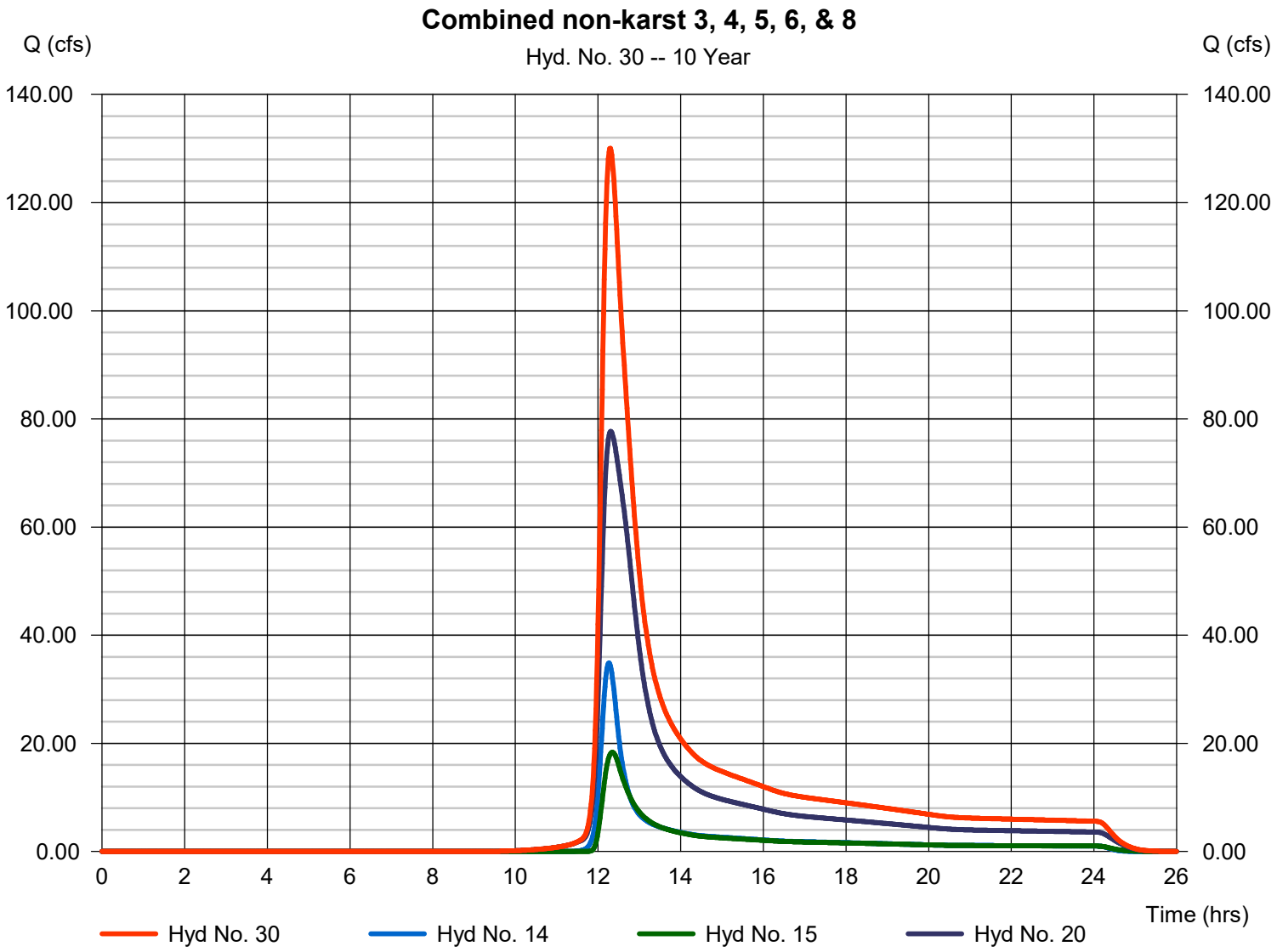
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 30

Combined non-karst 3, 4, 5, 6, & 8

Hydrograph type	= Combine	Peak discharge	= 130.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.30 hrs
Time interval	= 1 min	Hyd. volume	= 802,608 cuft
Inflow hyds.	= 14, 15, 20	Contrib. drain. area	= 0.000 ac



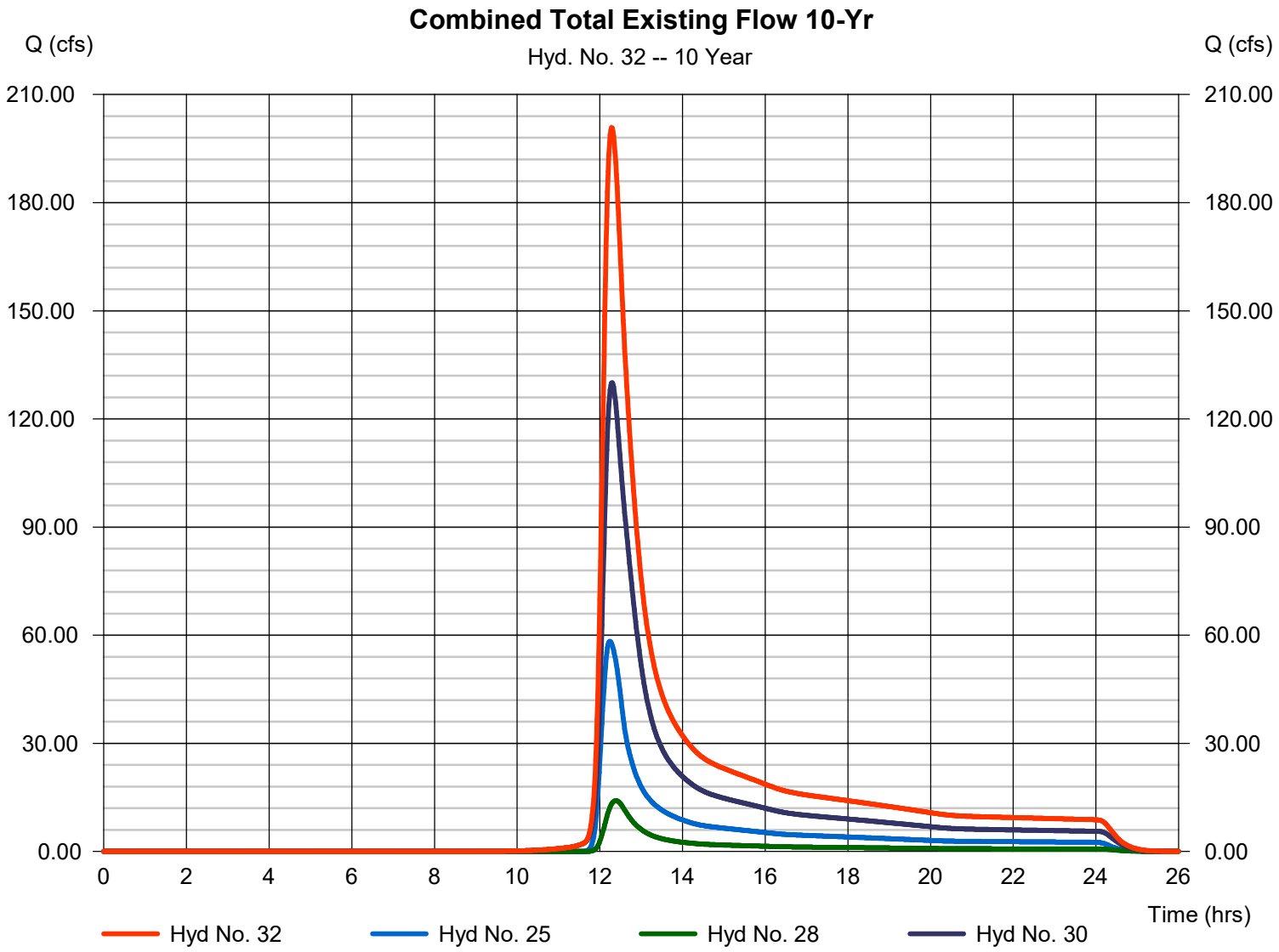
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 32

Combined Total Existing Flow 10-Yr

Hydrograph type	= Combine	Peak discharge	= 200.80 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.28 hrs
Time interval	= 1 min	Hyd. volume	= 1,231,828 cuft
Inflow hyds.	= 25, 28, 30	Contrib. drain. area	= 0.000 ac



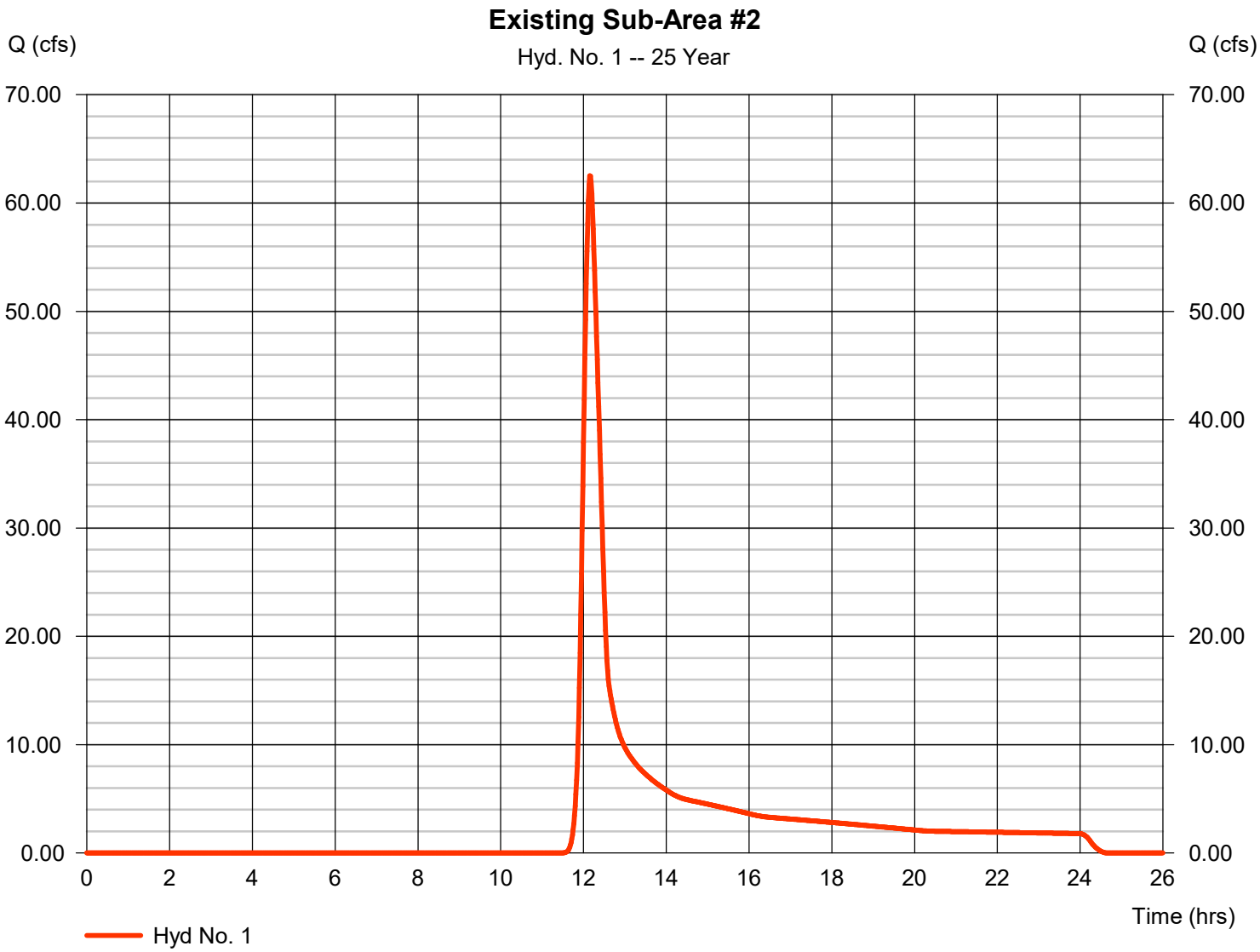
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 1

Existing Sub-Area #2

Hydrograph type	= SCS Runoff	Peak discharge	= 62.51 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 253,603 cuft
Drainage area	= 54.830 ac	Curve number	= 59
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.20 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



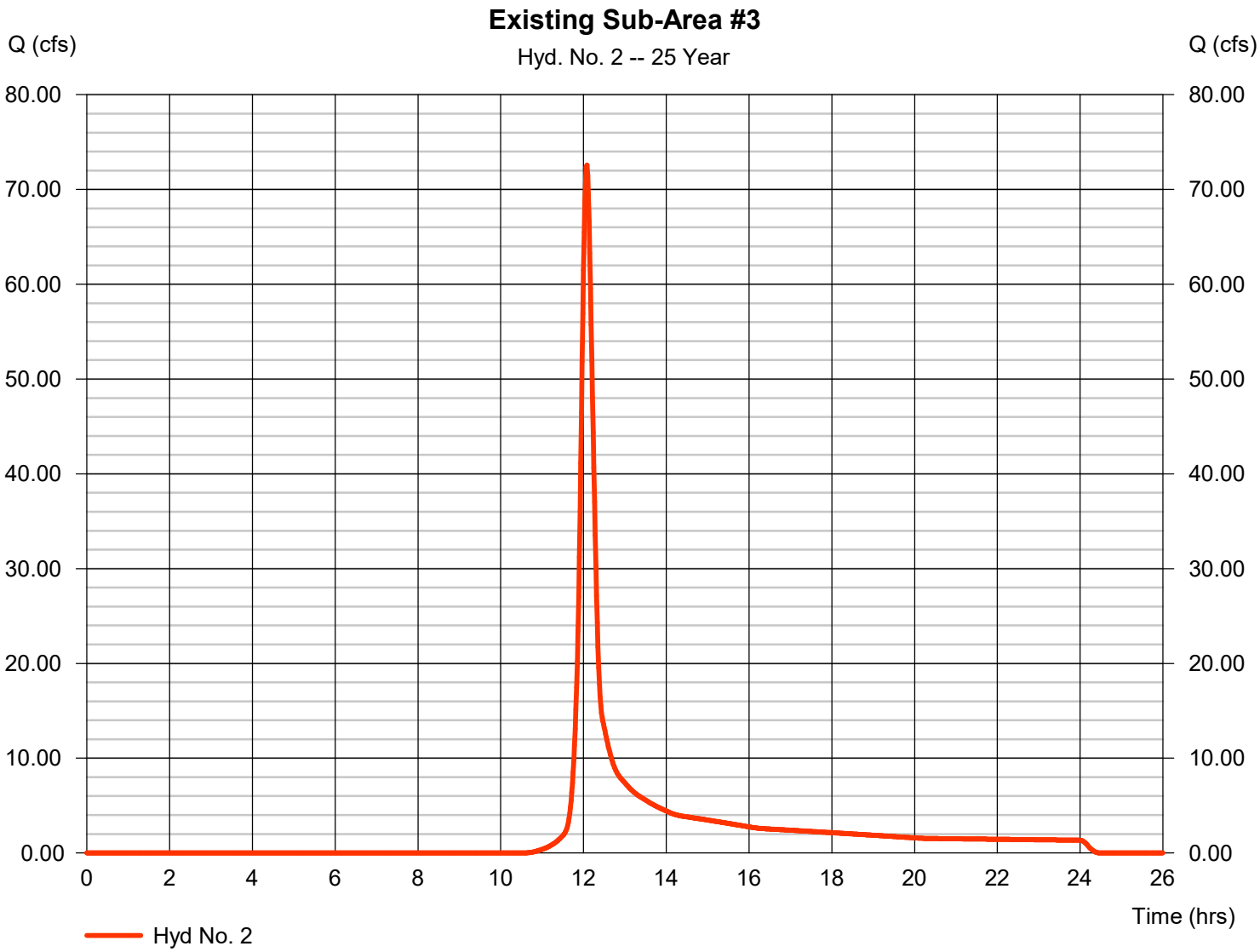
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 2

Existing Sub-Area #3

Hydrograph type	= SCS Runoff	Peak discharge	= 72.57 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 222,188 cuft
Drainage area	= 34.870 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 16.92 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



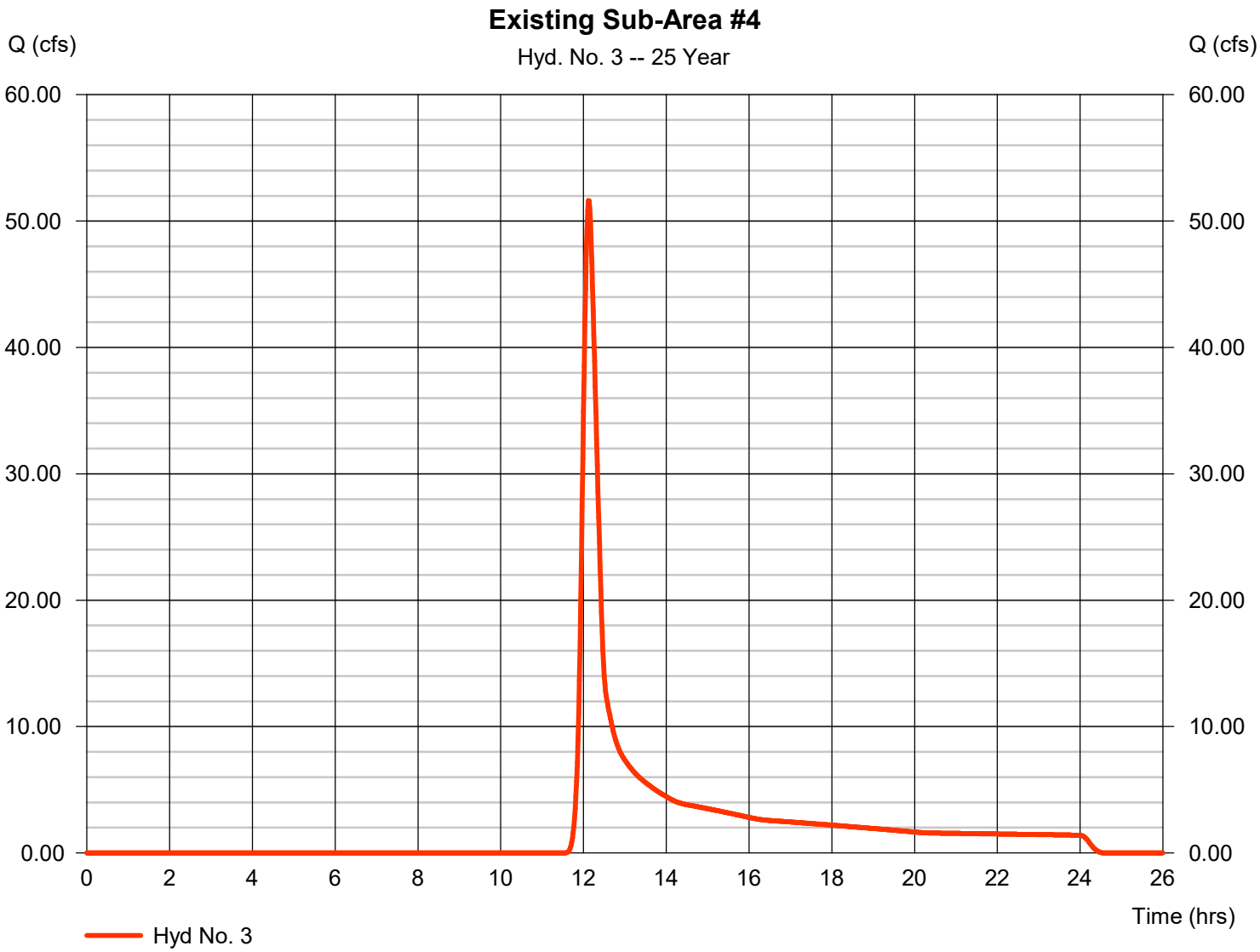
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 3

Existing Sub-Area #4

Hydrograph type	= SCS Runoff	Peak discharge	= 51.62 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 195,198 cuft
Drainage area	= 44.110 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 21.73 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



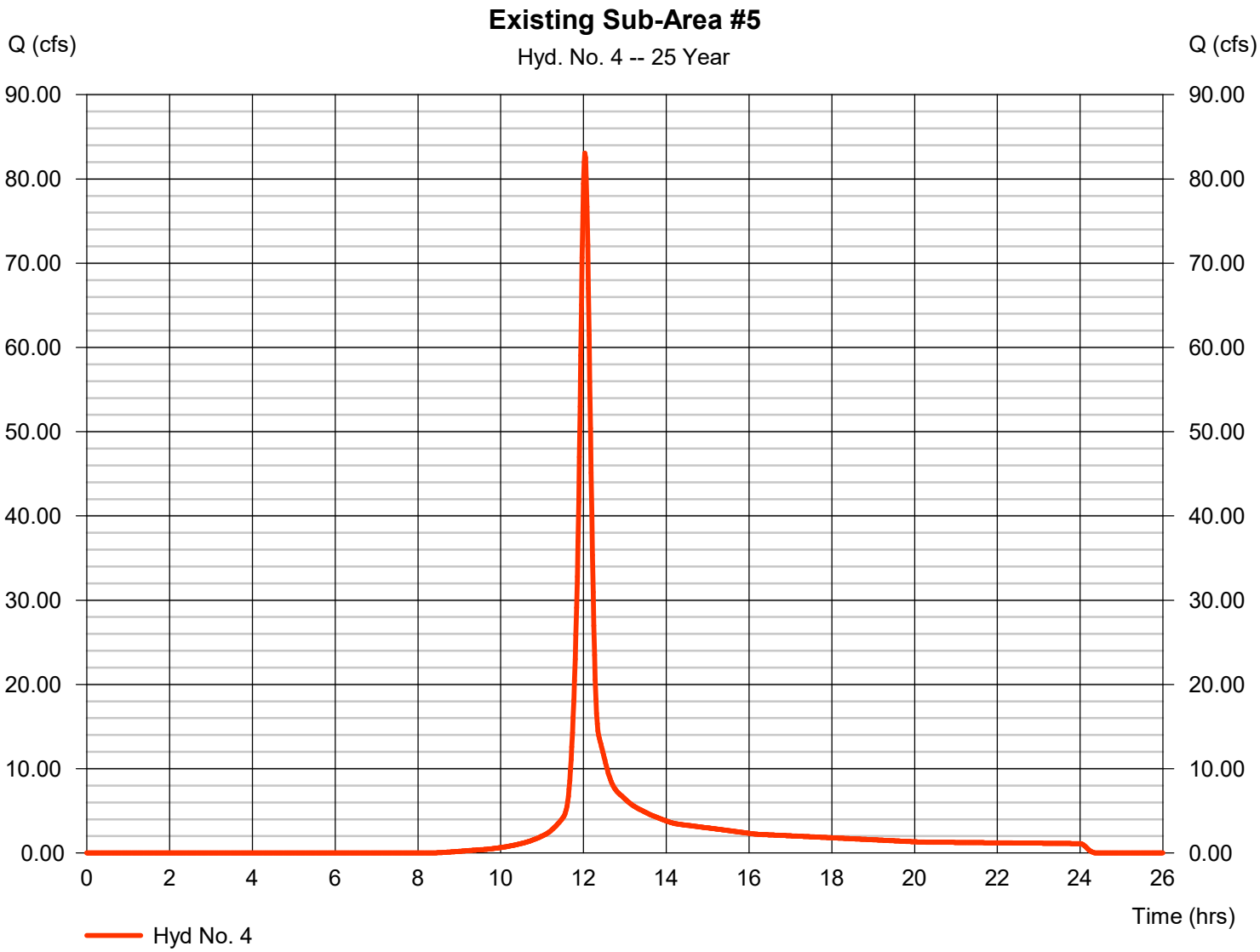
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 4

Existing Sub-Area #5

Hydrograph type	= SCS Runoff	Peak discharge	= 83.07 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 223,293 cuft
Drainage area	= 23.720 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 14.38 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



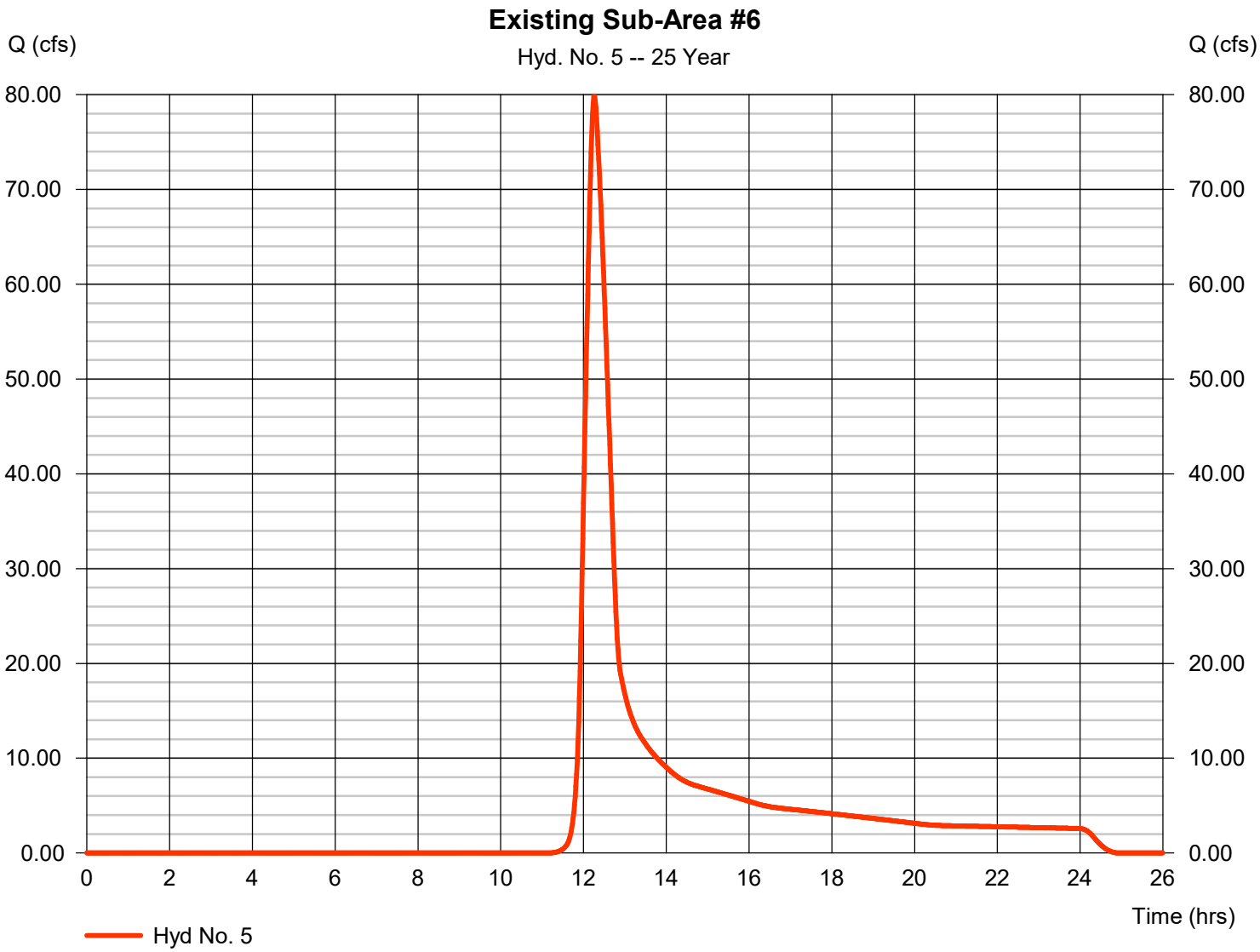
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 5

Existing Sub-Area #6

Hydrograph type	= SCS Runoff	Peak discharge	= 79.83 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 390,014 cuft
Drainage area	= 72.510 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 34.70 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



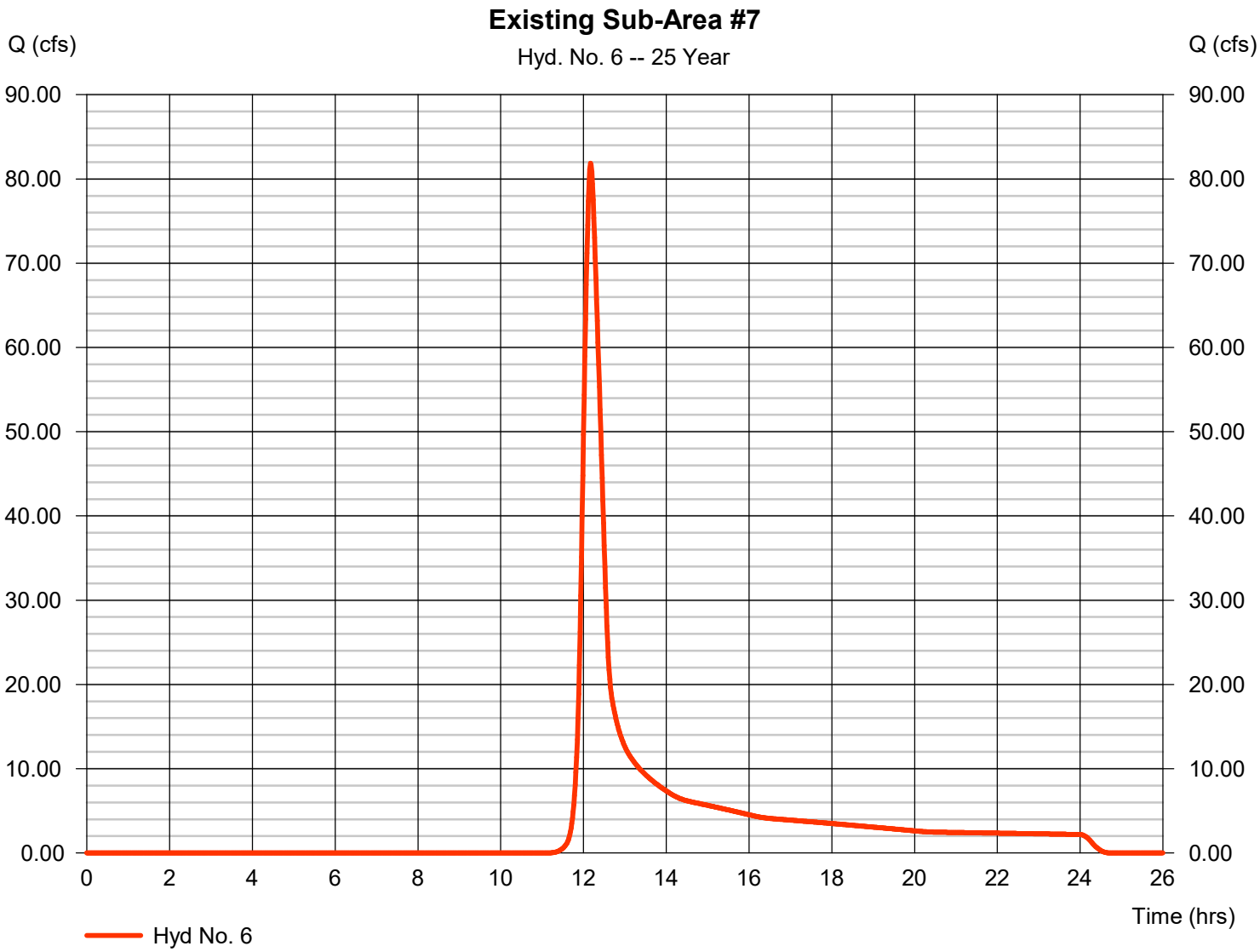
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 6

Existing Sub-Area #7

Hydrograph type	= SCS Runoff	Peak discharge	= 81.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 332,944 cuft
Drainage area	= 61.420 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 26.96 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



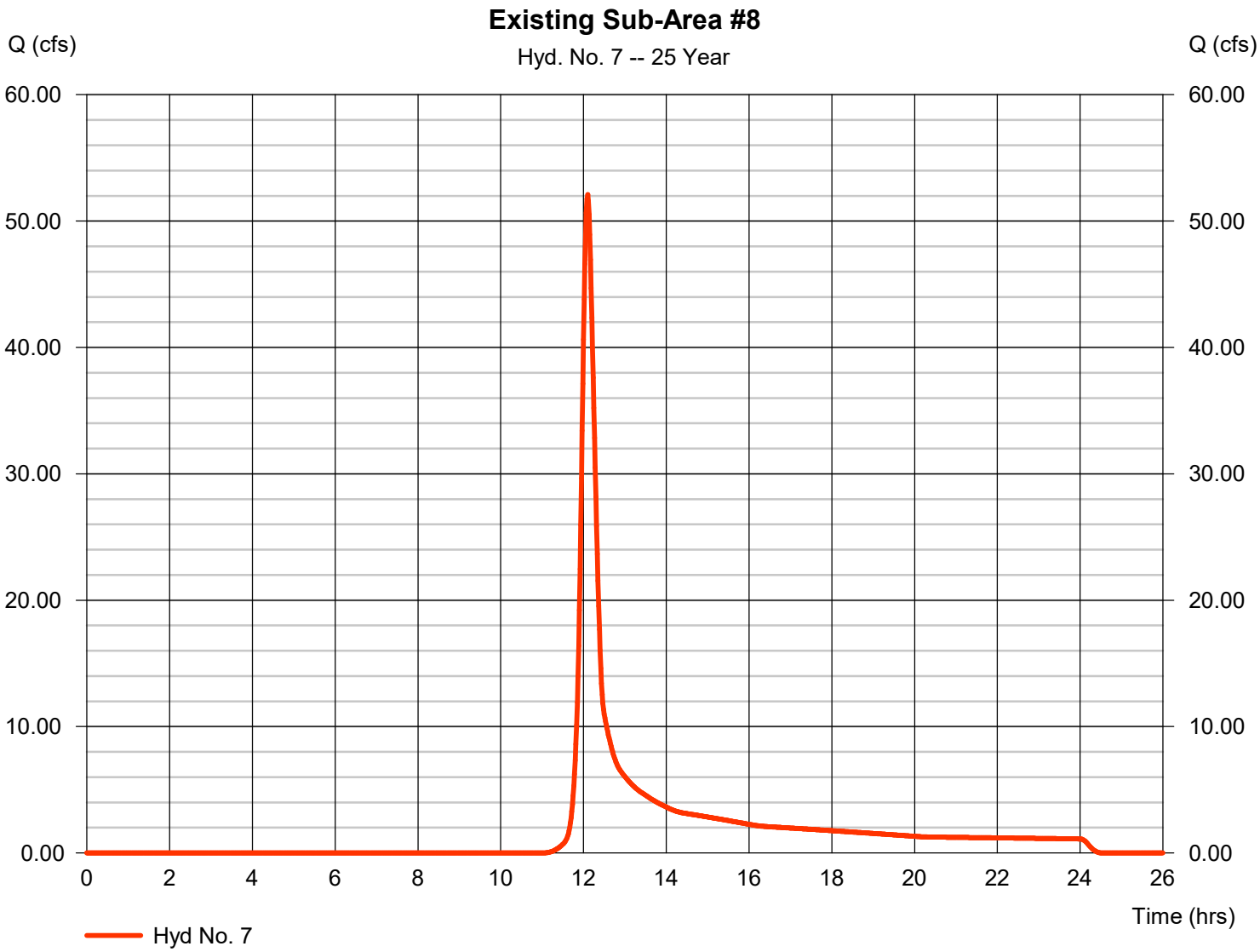
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 7

Existing Sub-Area #8

Hydrograph type	= SCS Runoff	Peak discharge	= 52.11 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 172,998 cuft
Drainage area	= 30.680 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 19.20 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



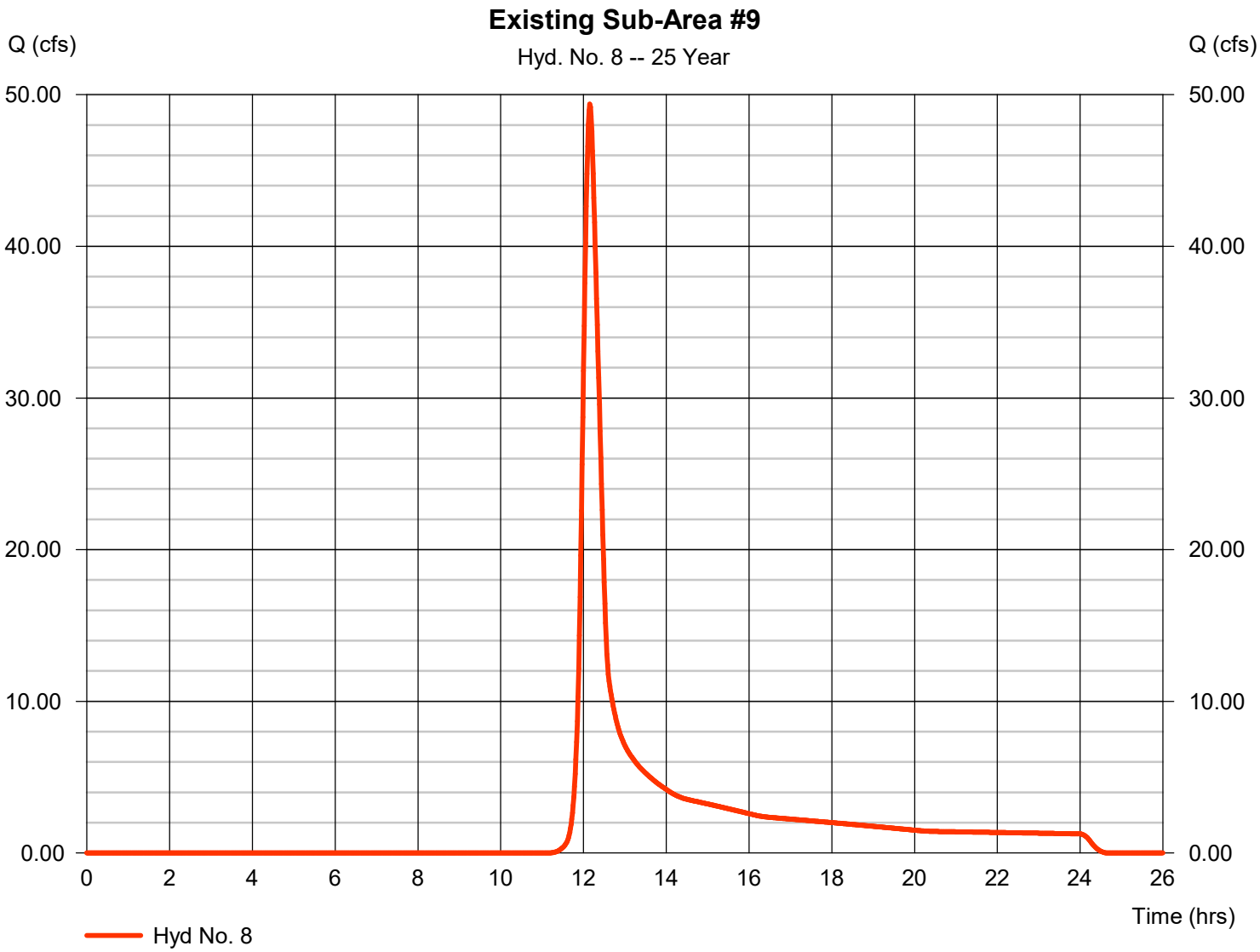
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 8

Existing Sub-Area #9

Hydrograph type	= SCS Runoff	Peak discharge	= 49.39 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 191,215 cuft
Drainage area	= 35.550 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 23.76 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



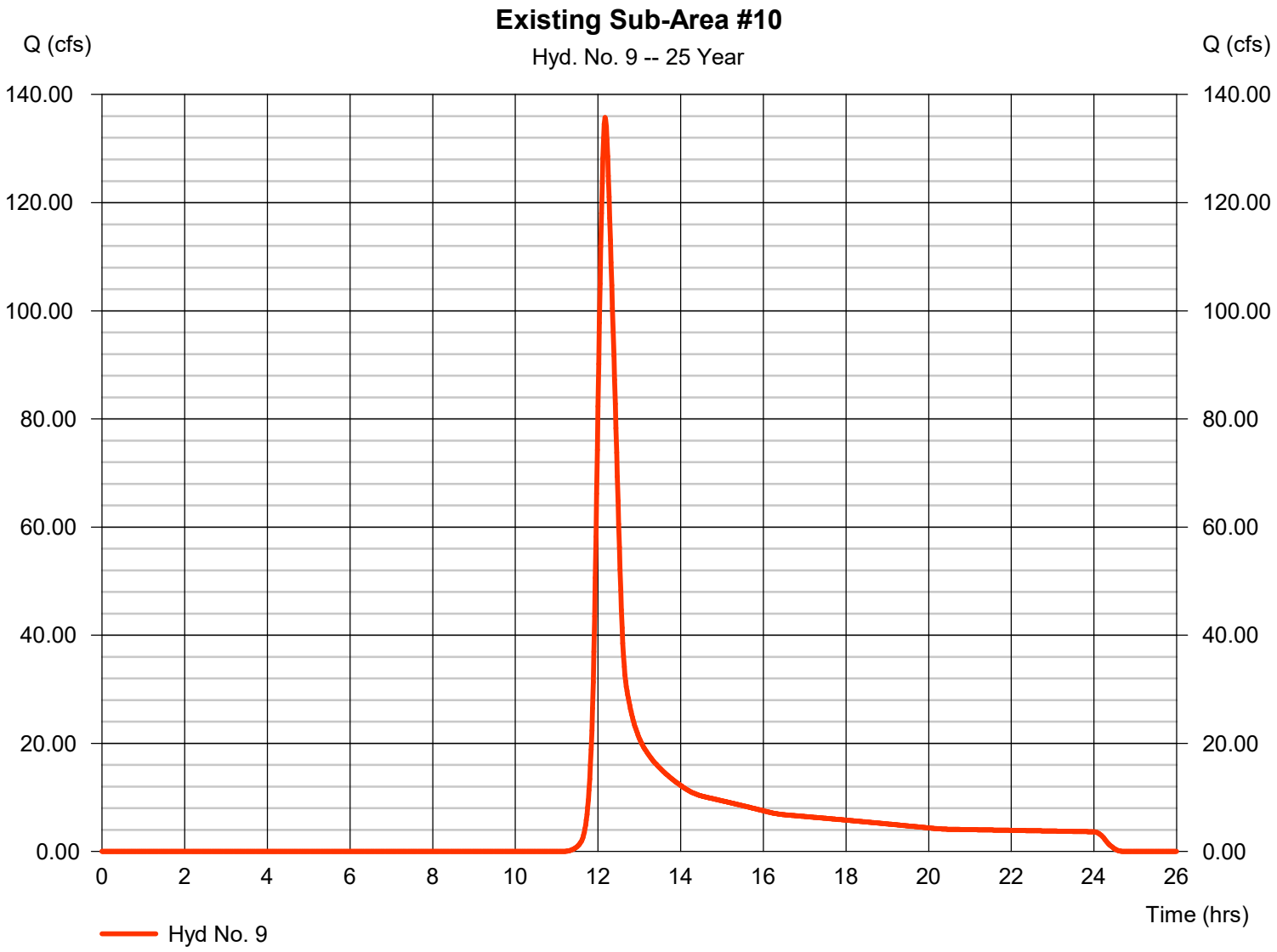
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 9

Existing Sub-Area #10

Hydrograph type	= SCS Runoff	Peak discharge	= 135.73 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 551,943 cuft
Drainage area	= 101.820 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.90 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



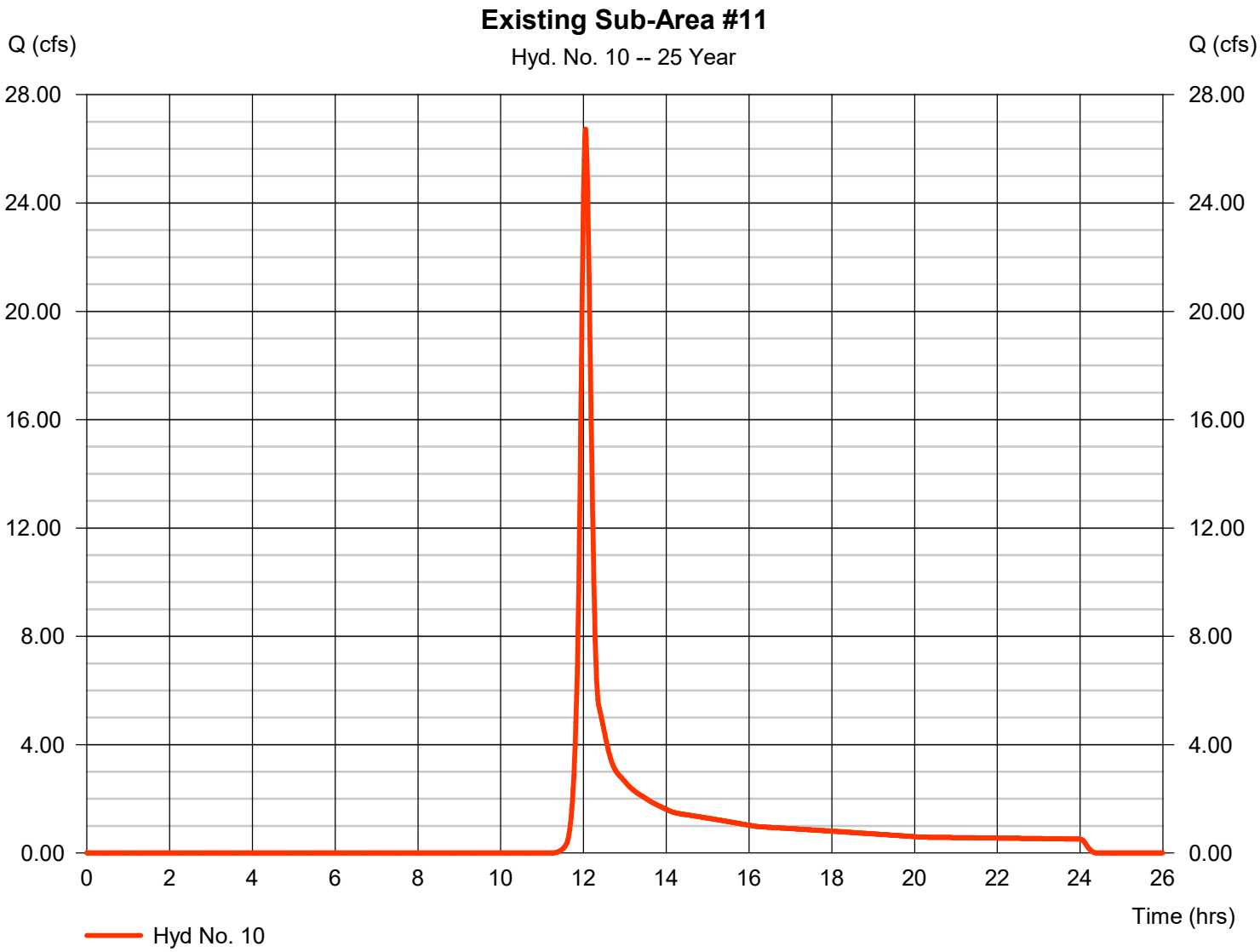
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 10

Existing Sub-Area #11

Hydrograph type	= SCS Runoff	Peak discharge	= 26.73 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 76,591 cuft
Drainage area	= 14.950 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	=	Time of conc. (Tc)	= 13.51 min
Total precip.	= 5.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

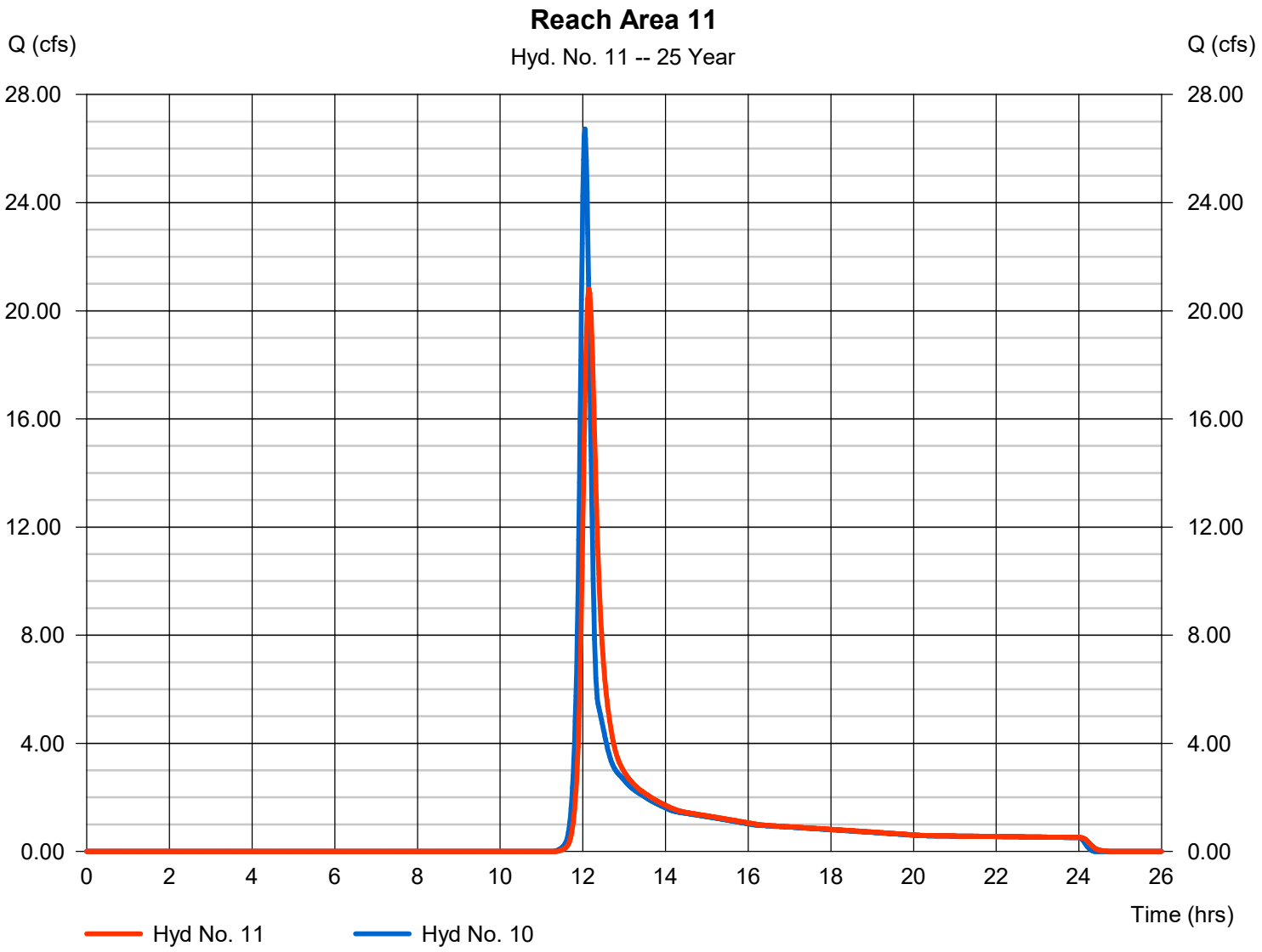
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 11

Reach Area 11

Hydrograph type	= Reach	Peak discharge	= 20.81 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 76,586 cuft
Inflow hyd. No.	= 10 - Existing Sub-Area #11	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1287

Modified Att-Kin routing method used.



Hydrograph Report

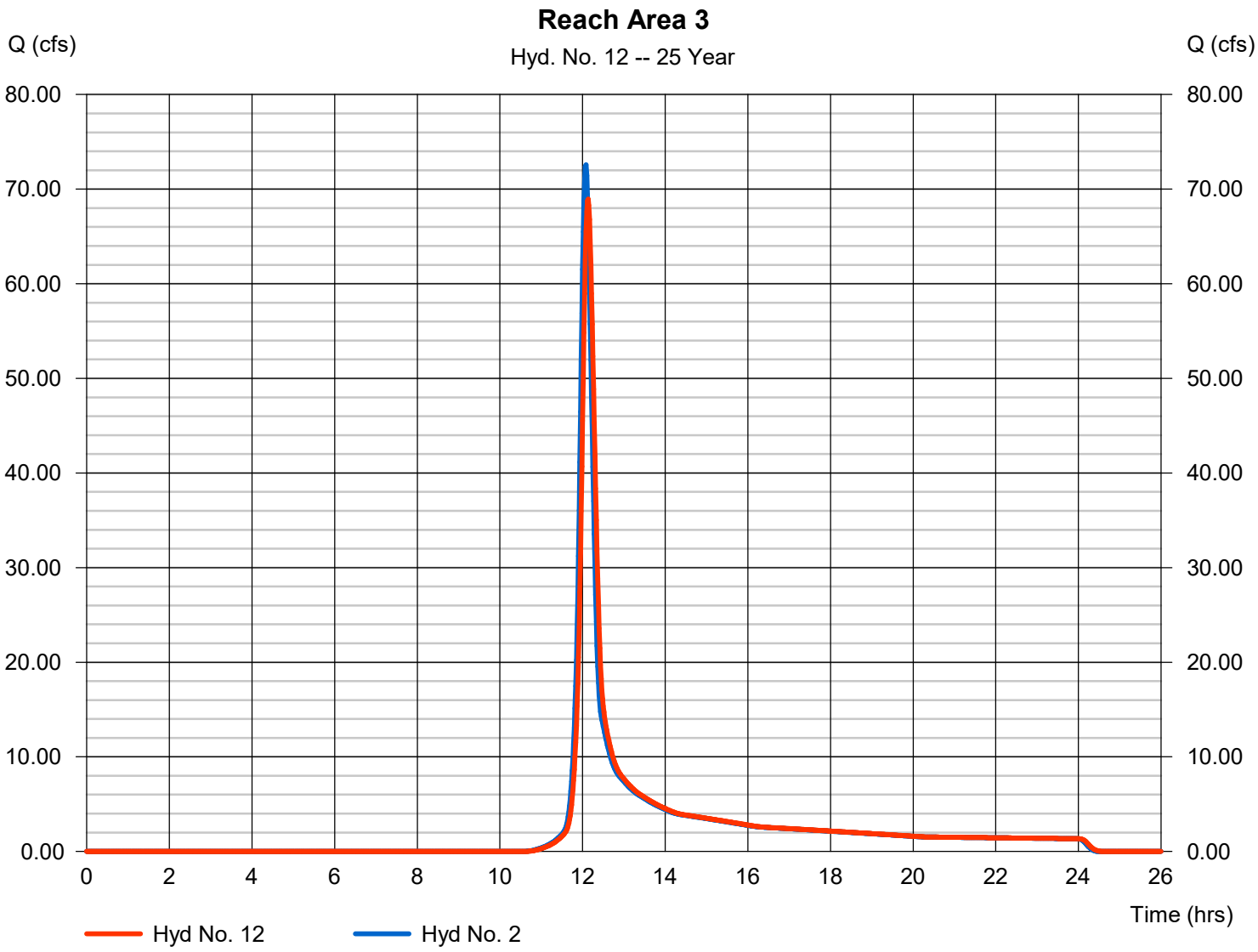
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 12

Reach Area 3

Hydrograph type	= Reach	Peak discharge	= 68.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 222,186 cuft
Inflow hyd. No.	= 2 - Existing Sub-Area #3	Section type	= Triangular
Reach length	= 1300.0 ft	Channel slope	= 2.0 %
Manning's n	= 0.030	Bottom width	= 0.0 ft
Side slope	= 6.0:1	Max. depth	= 0.0 ft
Rating curve x	= 2.440	Rating curve m	= 1.333
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.2984

Modified Att-Kin routing method used.



Hydrograph Report

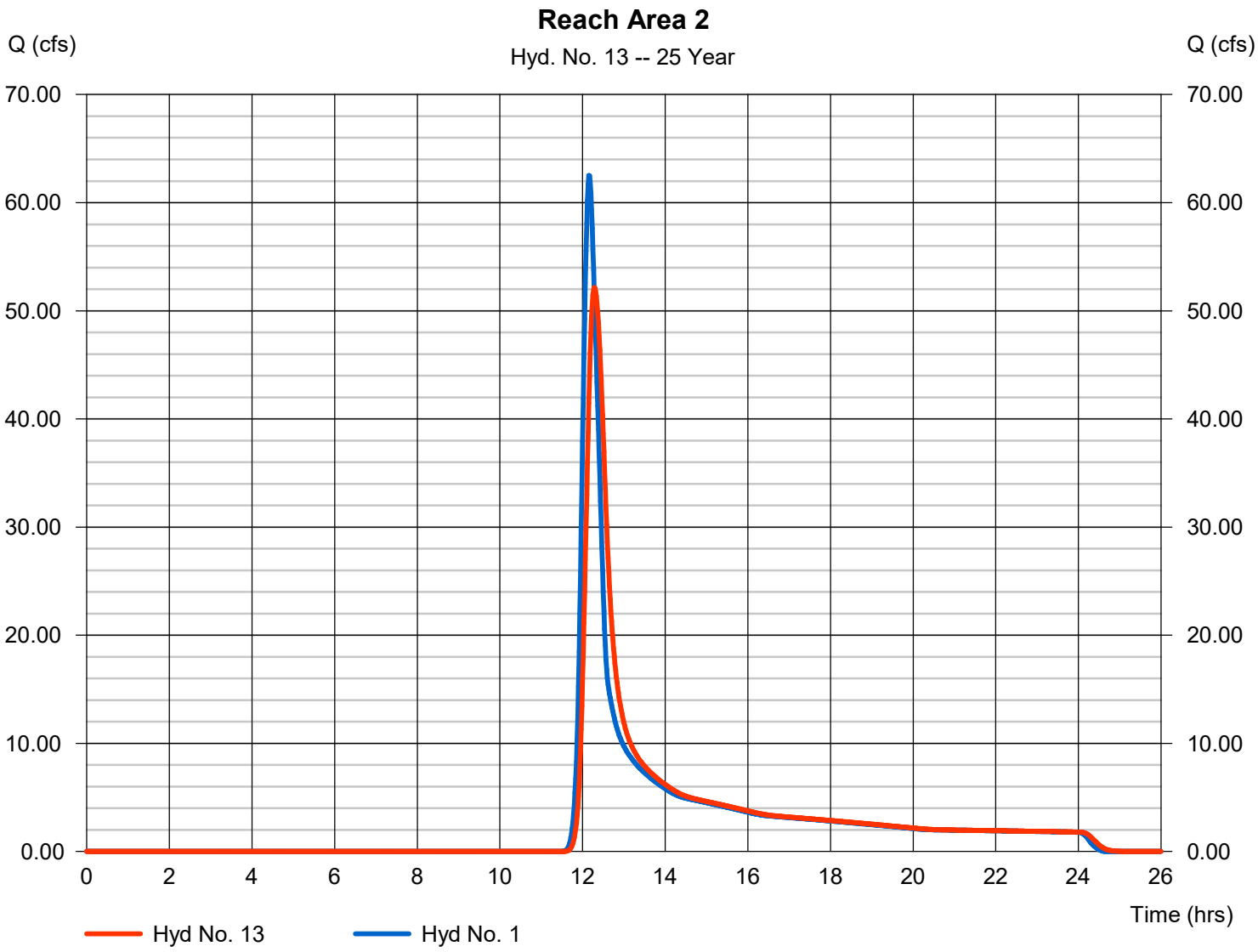
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 13

Reach Area 2

Hydrograph type	= Reach	Peak discharge	= 52.15 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.28 hrs
Time interval	= 1 min	Hyd. volume	= 253,598 cuft
Inflow hyd. No.	= 1 - Existing Sub-Area #2	Section type	= Trapezoidal
Reach length	= 1817.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1171

Modified Att-Kin routing method used.



Hydrograph Report

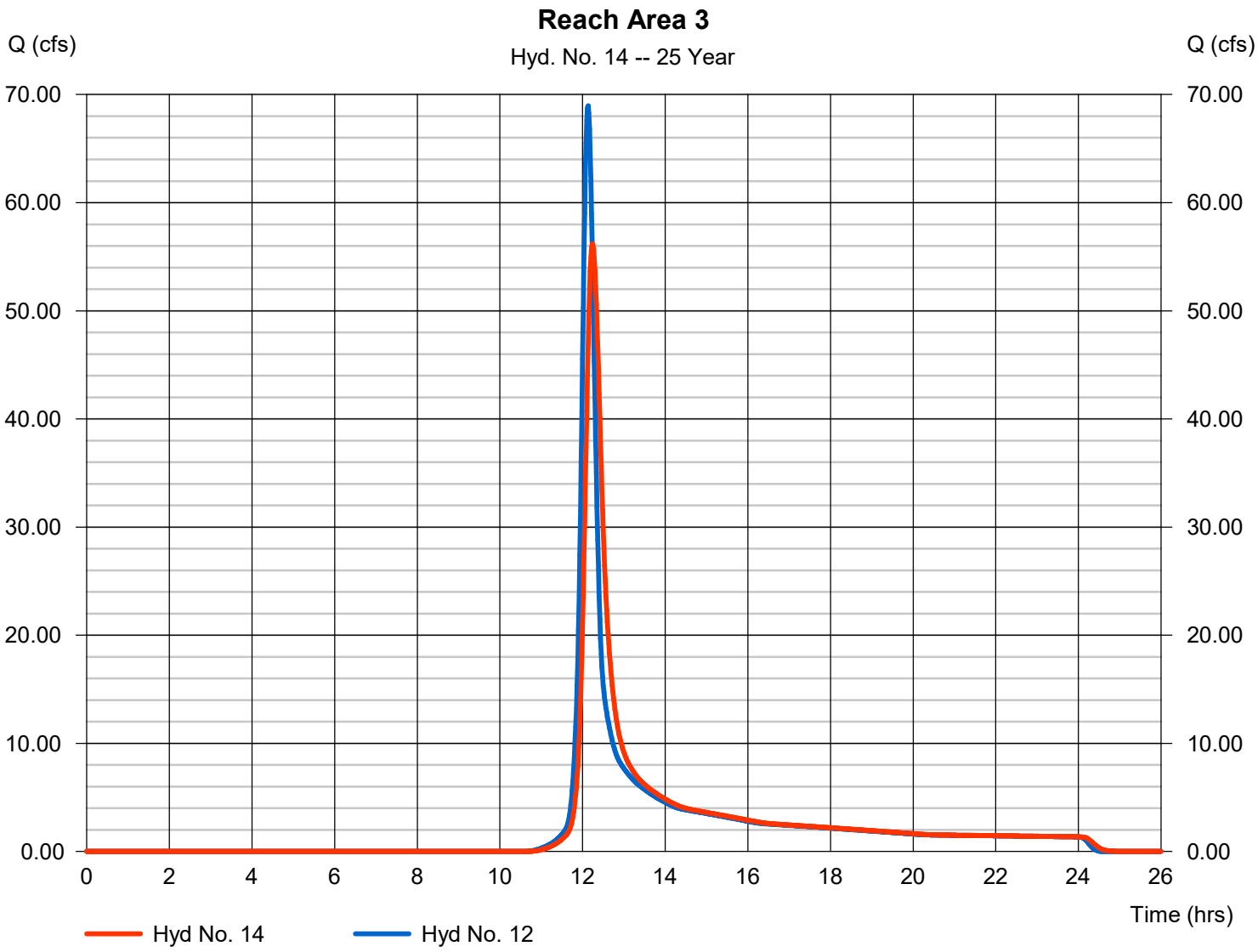
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 14

Reach Area 3

Hydrograph type	= Reach	Peak discharge	= 56.18 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 222,181 cuft
Inflow hyd. No.	= 12 - Reach Area 3	Section type	= Trapezoidal
Reach length	= 1817.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1201

Modified Att-Kin routing method used.



Hydrograph Report

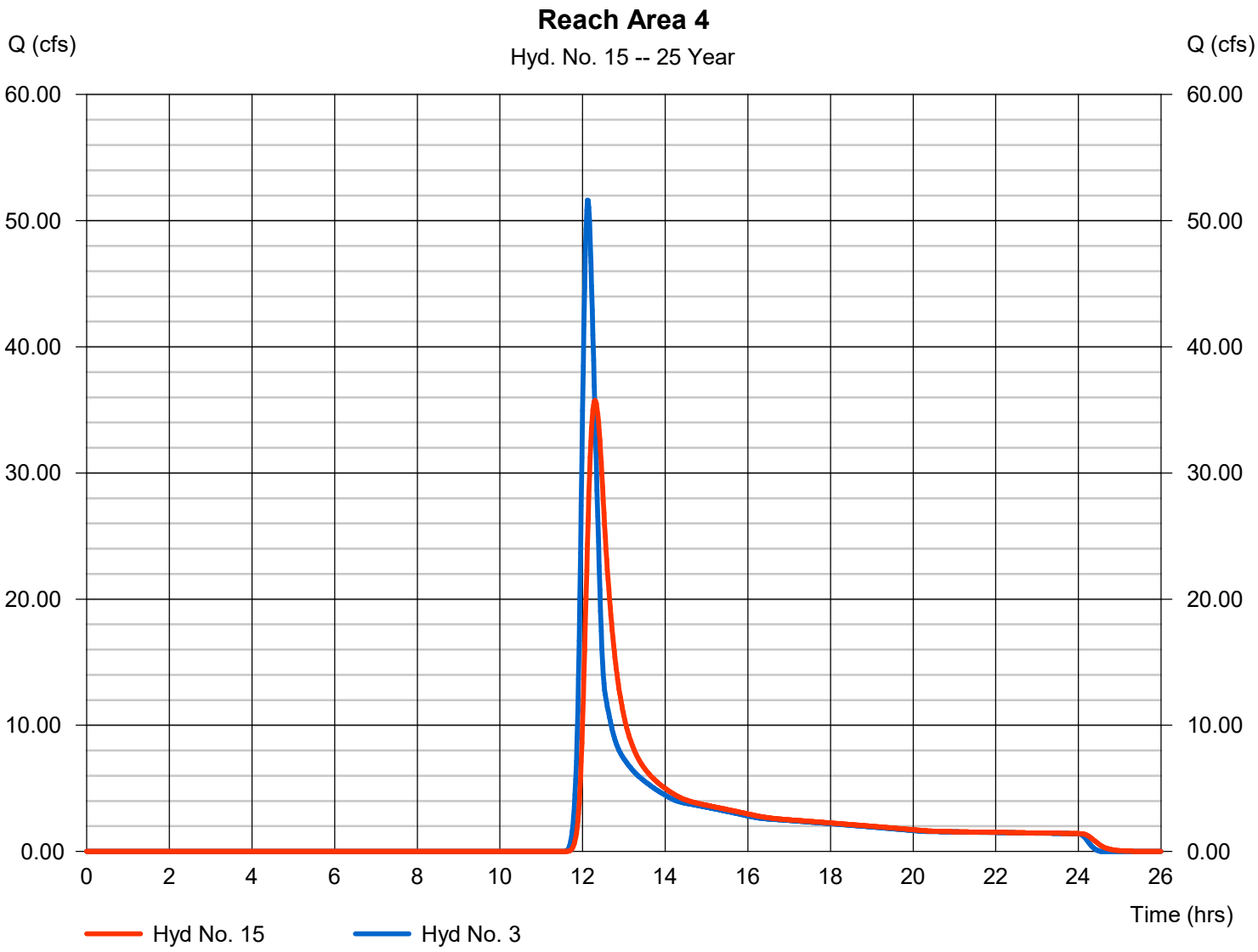
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 15

Reach Area 4

Hydrograph type	= Reach	Peak discharge	= 35.76 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.30 hrs
Time interval	= 1 min	Hyd. volume	= 195,191 cuft
Inflow hyd. No.	= 3 - Existing Sub-Area #4	Section type	= Trapezoidal
Reach length	= 2850.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0725

Modified Att-Kin routing method used.



Hydrograph Report

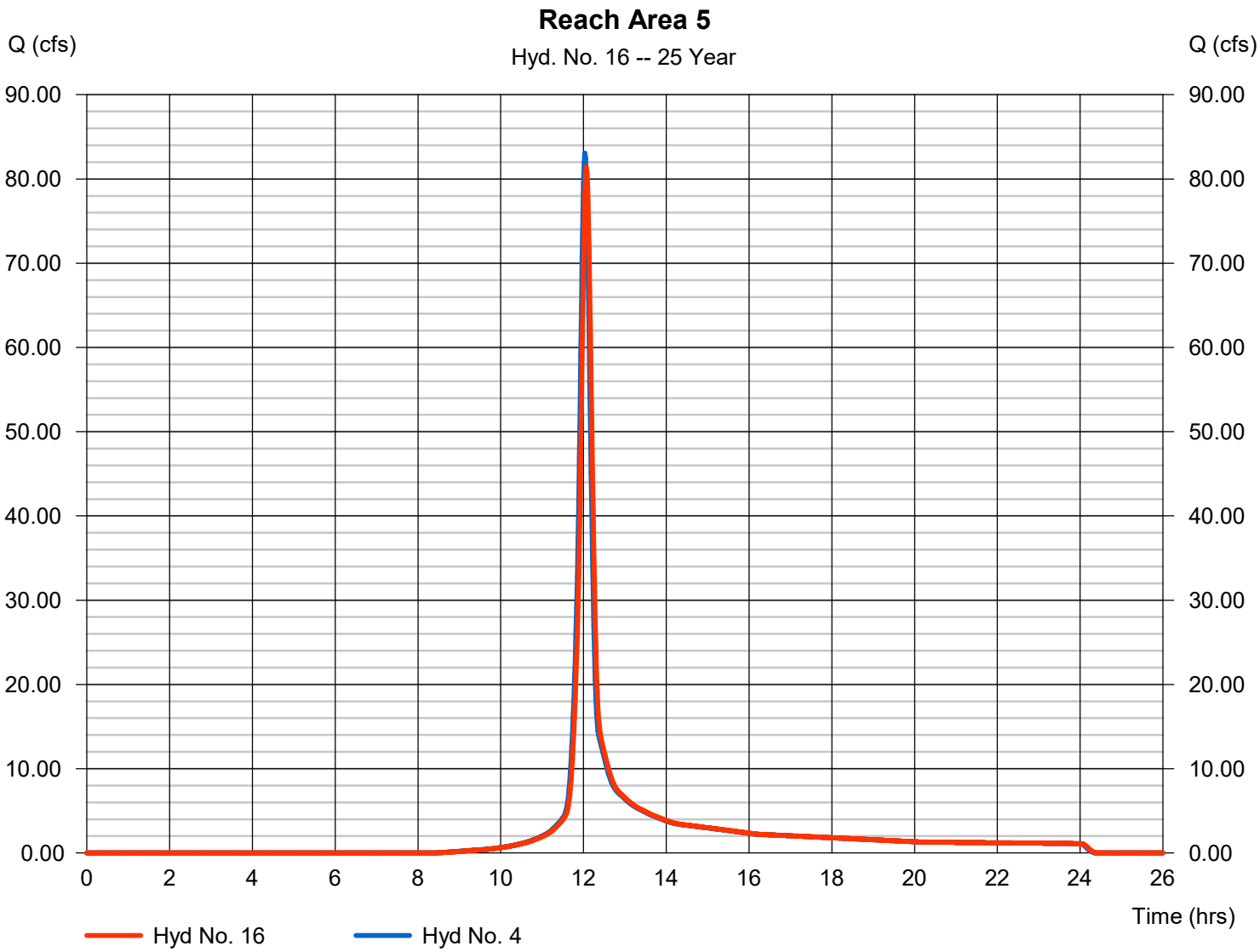
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 16

Reach Area 5

Hydrograph type	= Reach	Peak discharge	= 81.46 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 223,292 cuft
Inflow hyd. No.	= 4 - Existing Sub-Area #5	Section type	= Triangular
Reach length	= 600.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.030	Bottom width	= 0.0 ft
Side slope	= 5.0:1	Max. depth	= 0.0 ft
Rating curve x	= 1.833	Rating curve m	= 1.333
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.4815

Modified Att-Kin routing method used.



Hydrograph Report

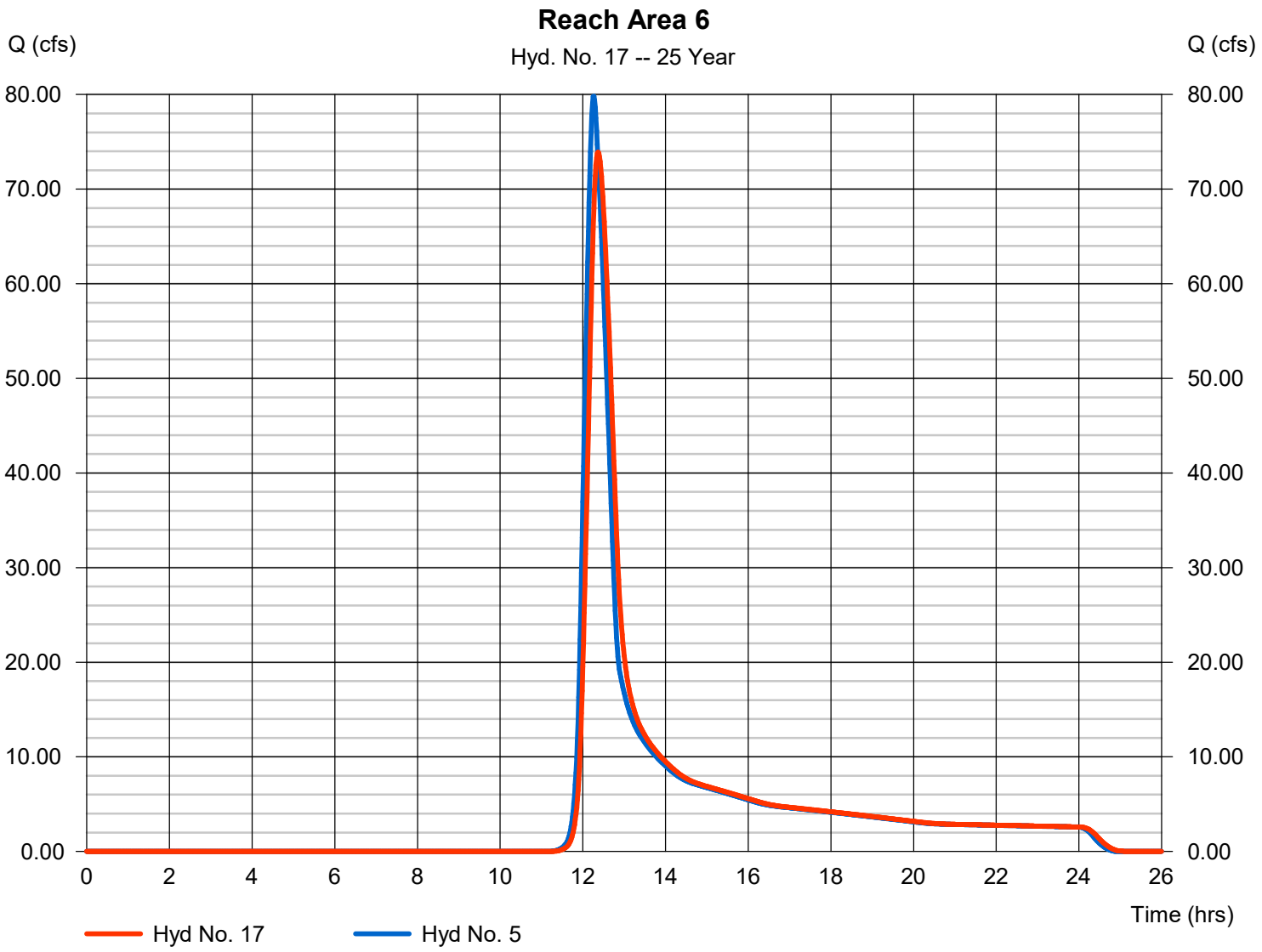
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 17

Reach Area 6

Hydrograph type	= Reach	Peak discharge	= 73.92 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.37 hrs
Time interval	= 1 min	Hyd. volume	= 390,010 cuft
Inflow hyd. No.	= 5 - Existing Sub-Area #6	Section type	= Trapezoidal
Reach length	= 2130.0 ft	Channel slope	= 1.5 %
Manning's n	= 0.030	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 2.079	Rating curve m	= 1.292
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1588

Modified Att-Kin routing method used.



Hydrograph Report

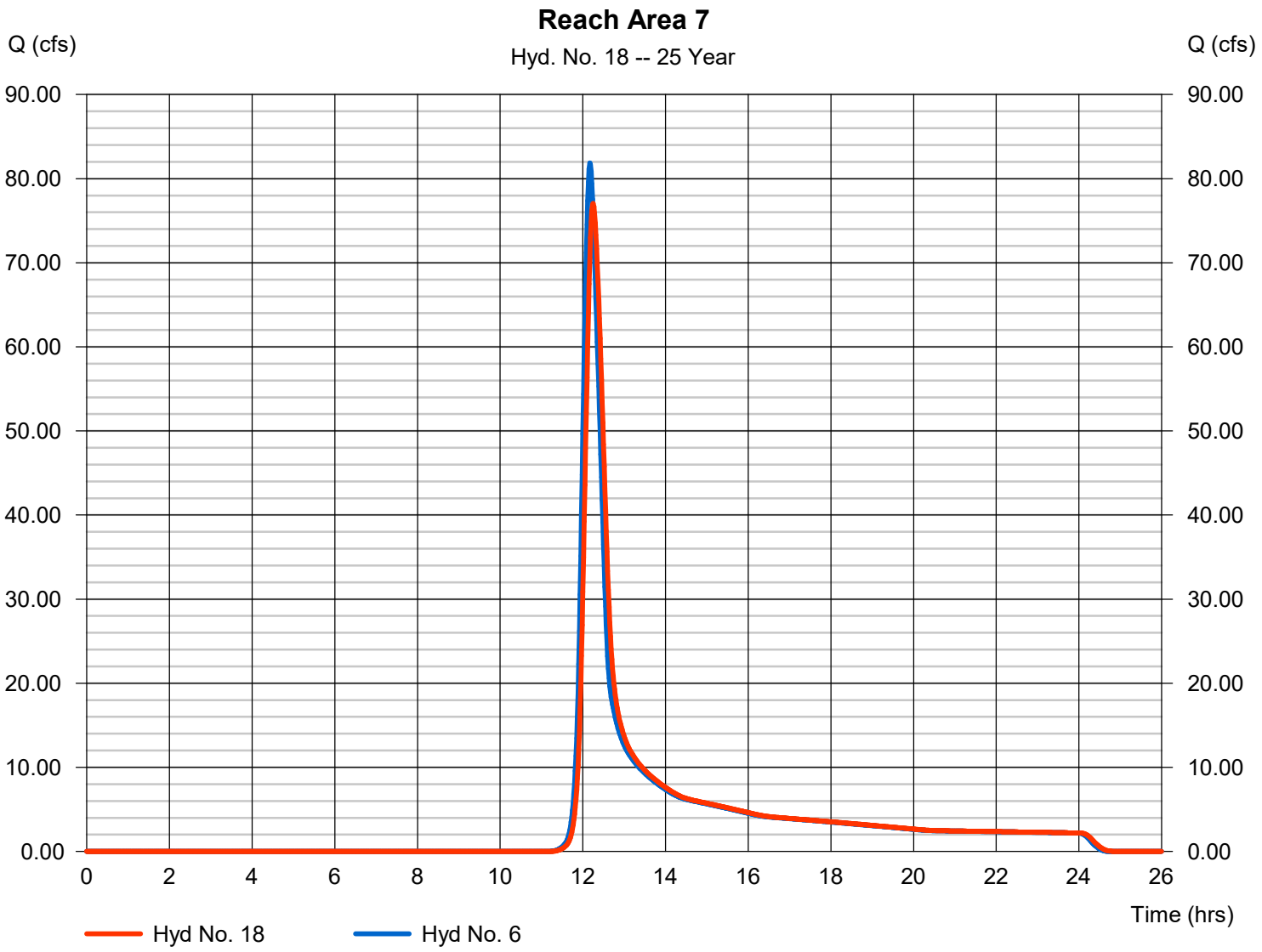
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 18

Reach Area 7

Hydrograph type	= Reach	Peak discharge	= 77.04 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.25 hrs
Time interval	= 1 min	Hyd. volume	= 332,942 cuft
Inflow hyd. No.	= 6 - Existing Sub-Area #7	Section type	= Trapezoidal
Reach length	= 1500.0 ft	Channel slope	= 1.5 %
Manning's n	= 0.030	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 2.079	Rating curve m	= 1.292
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.2193

Modified Att-Kin routing method used.



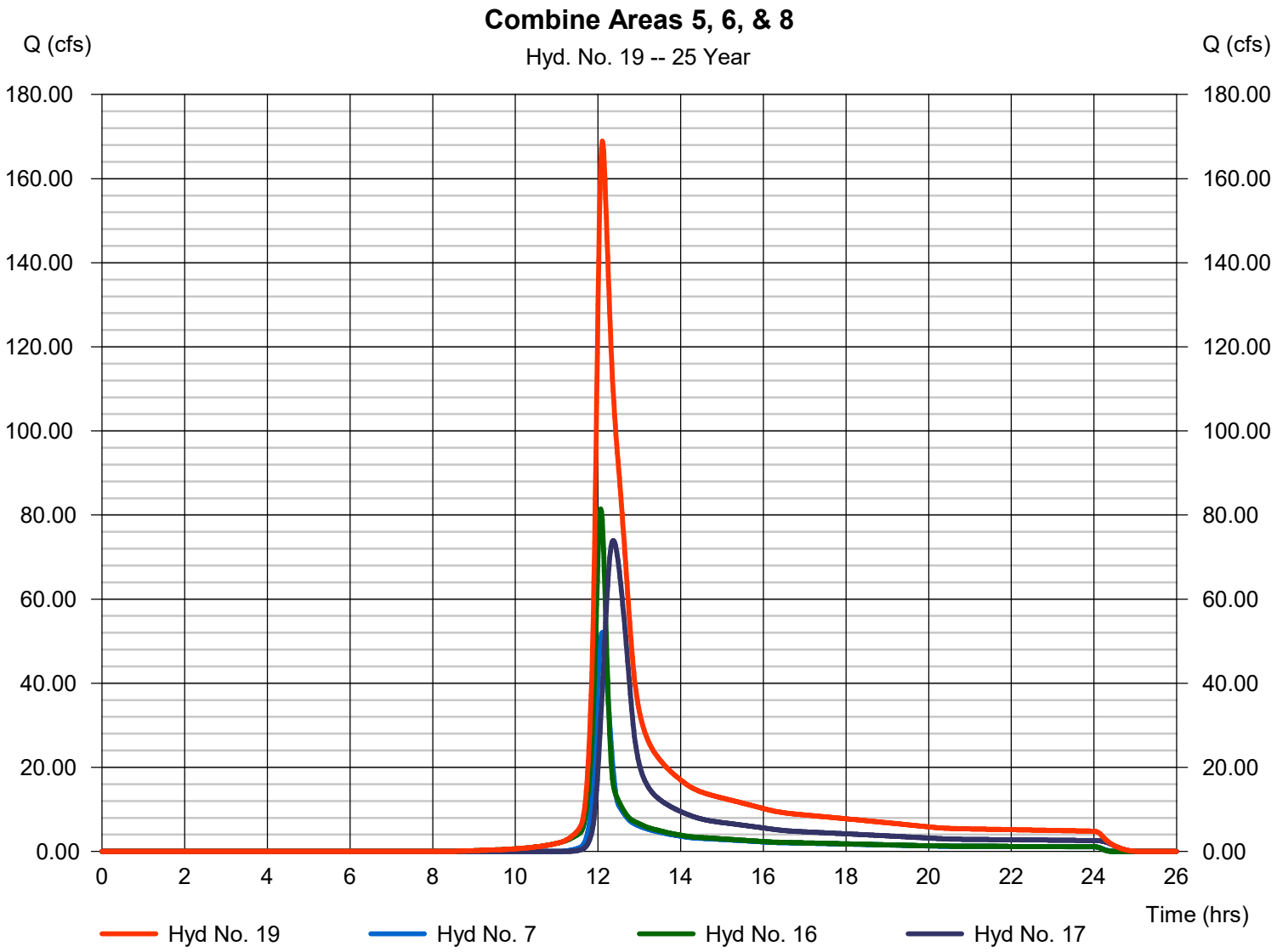
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 19

Combine Areas 5, 6, & 8

Hydrograph type	= Combine	Peak discharge	= 168.89 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 786,300 cuft
Inflow hyds.	= 7, 16, 17	Contrib. drain. area	= 30.680 ac



Hydrograph Report

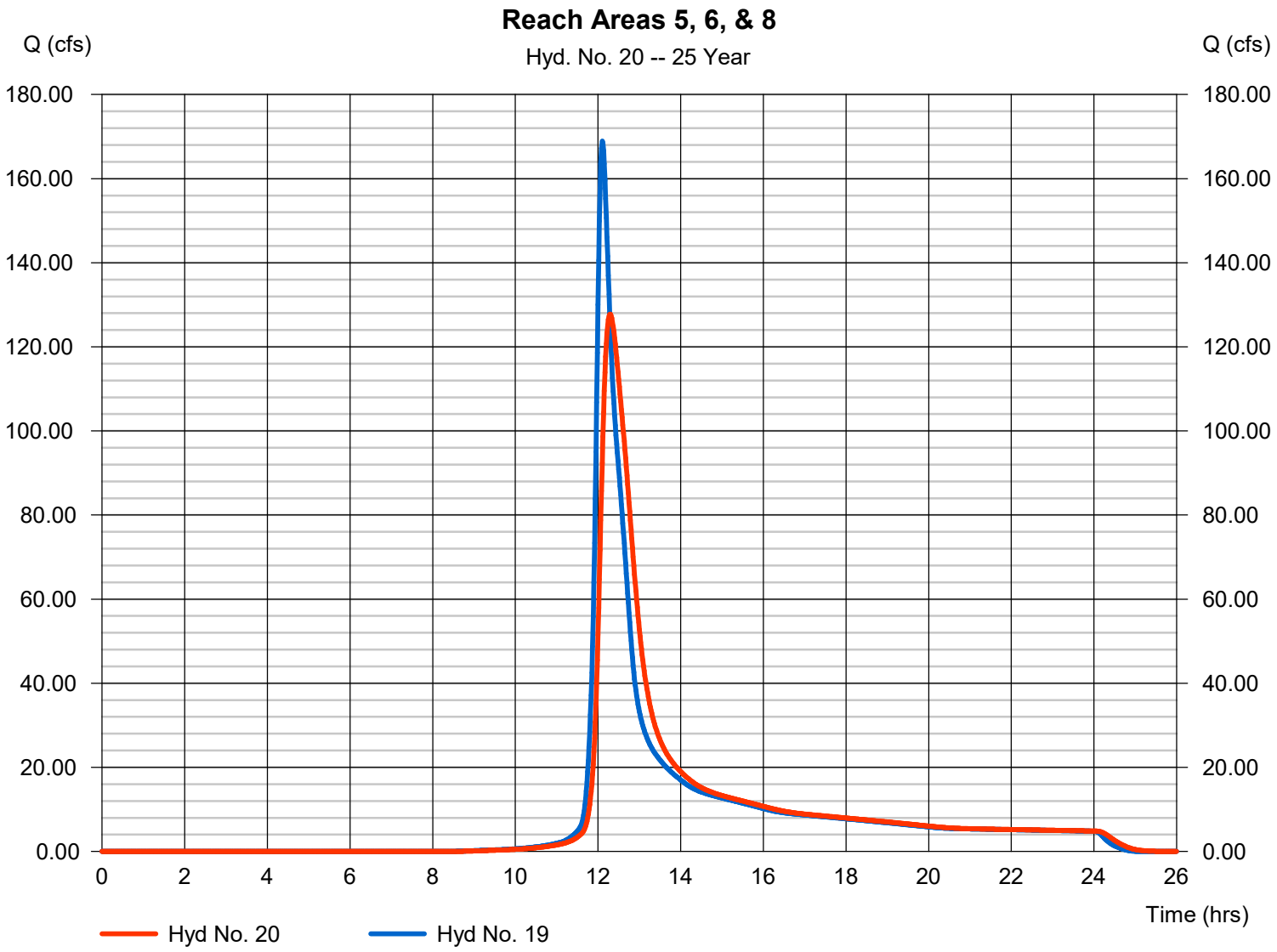
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 20

Reach Areas 5, 6, & 8

Hydrograph type	= Reach	Peak discharge	= 127.76 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.30 hrs
Time interval	= 1 min	Hyd. volume	= 786,293 cuft
Inflow hyd. No.	= 19 - Combine Areas 5, 6, & 8	Section type	= Trapezoidal
Reach length	= 3475.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0820

Modified Att-Kin routing method used.



Hydrograph Report

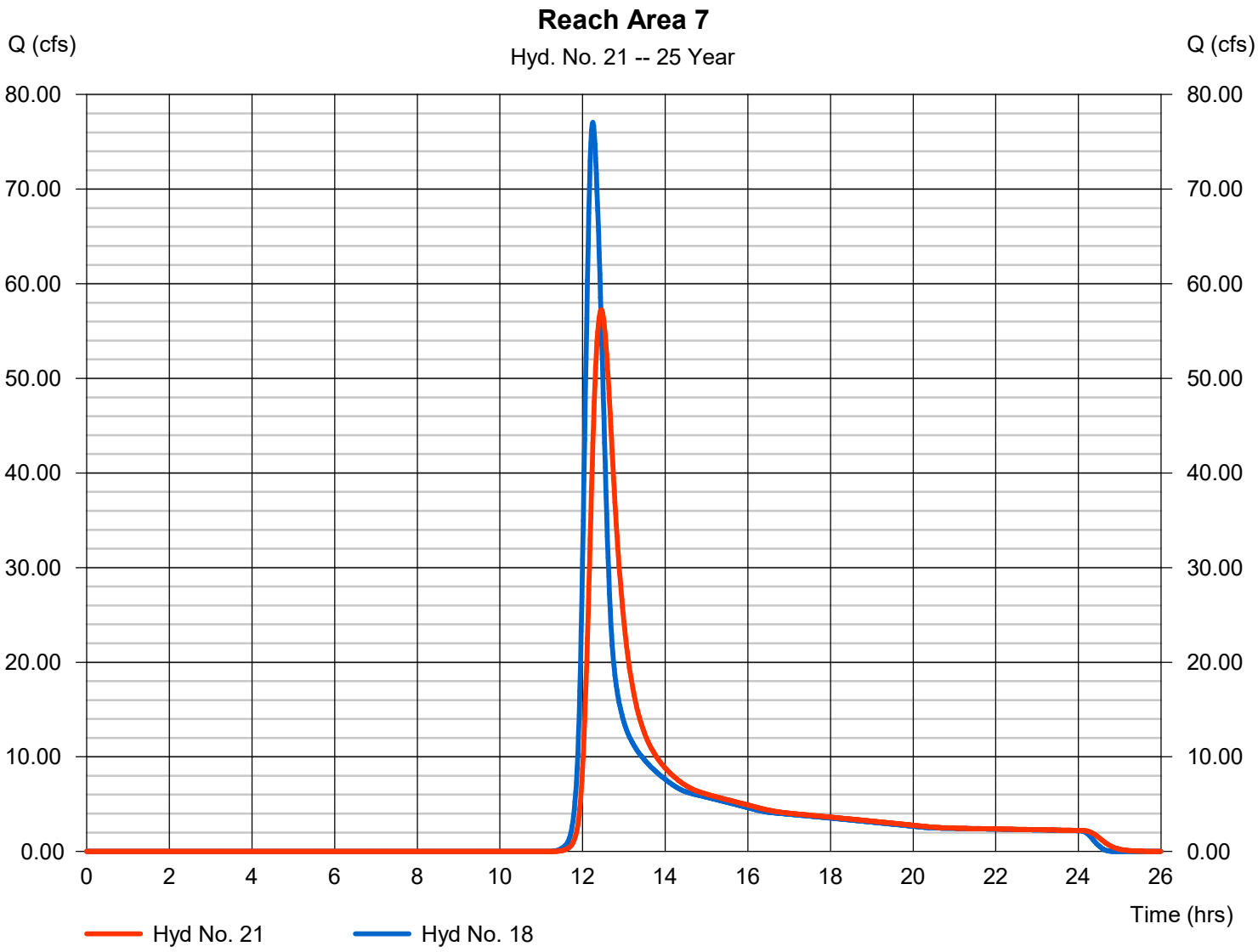
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 21

Reach Area 7

Hydrograph type	= Reach	Peak discharge	= 57.25 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.45 hrs
Time interval	= 1 min	Hyd. volume	= 332,933 cuft
Inflow hyd. No.	= 18 - Reach Area 7	Section type	= Trapezoidal
Reach length	= 3475.0 ft	Channel slope	= 0.6 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.828	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0666

Modified Att-Kin routing method used.



Hydrograph Report

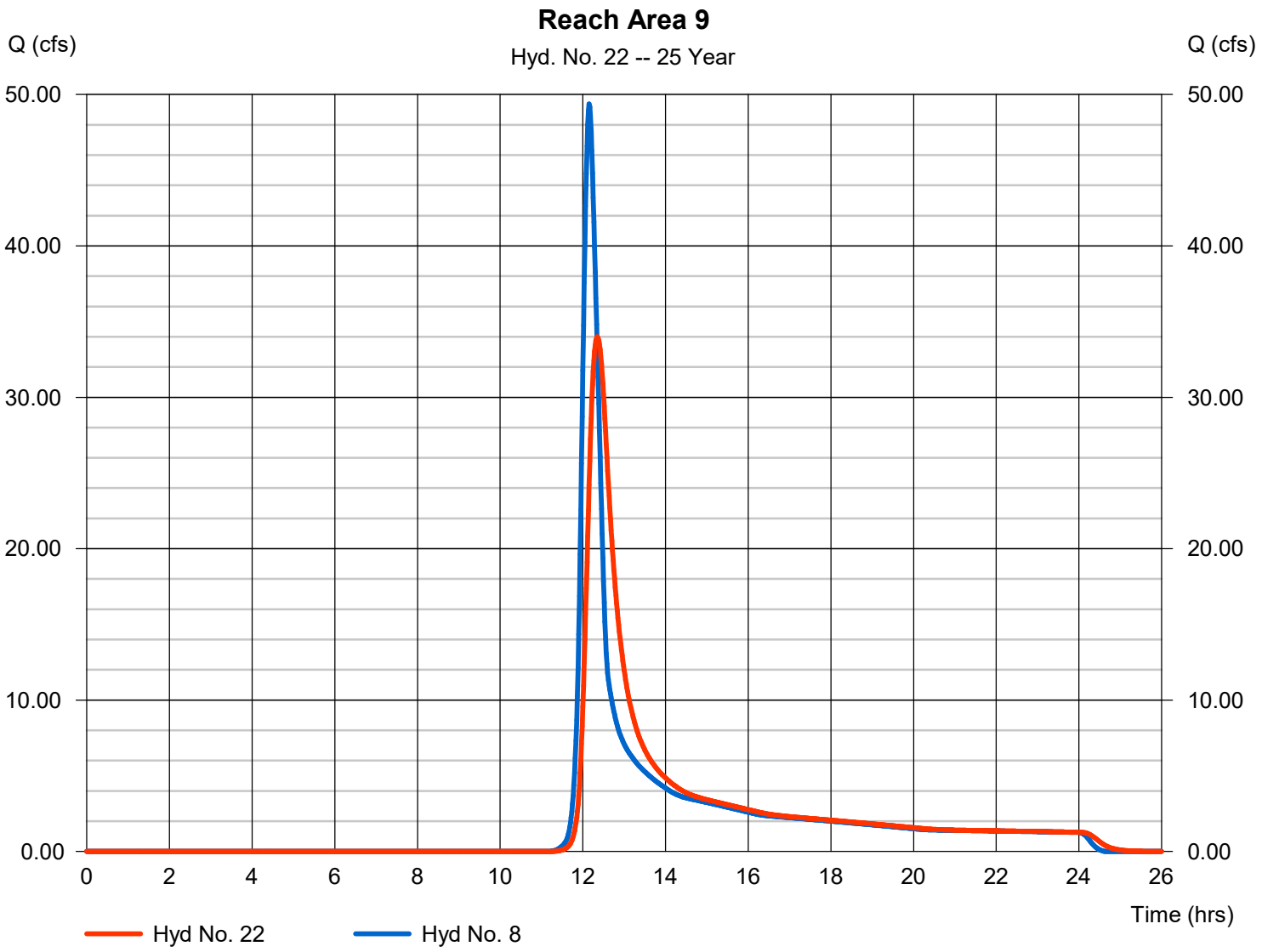
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 22

Reach Area 9

Hydrograph type	= Reach	Peak discharge	= 33.99 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 191,205 cuft
Inflow hyd. No.	= 8 - Existing Sub-Area #9	Section type	= Trapezoidal
Reach length	= 3920.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.030	Bottom width	= 10.0 ft
Side slope	= 3.0:1	Max. depth	= 2.0 ft
Rating curve x	= 1.069	Rating curve m	= 1.381
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0630

Modified Att-Kin routing method used.



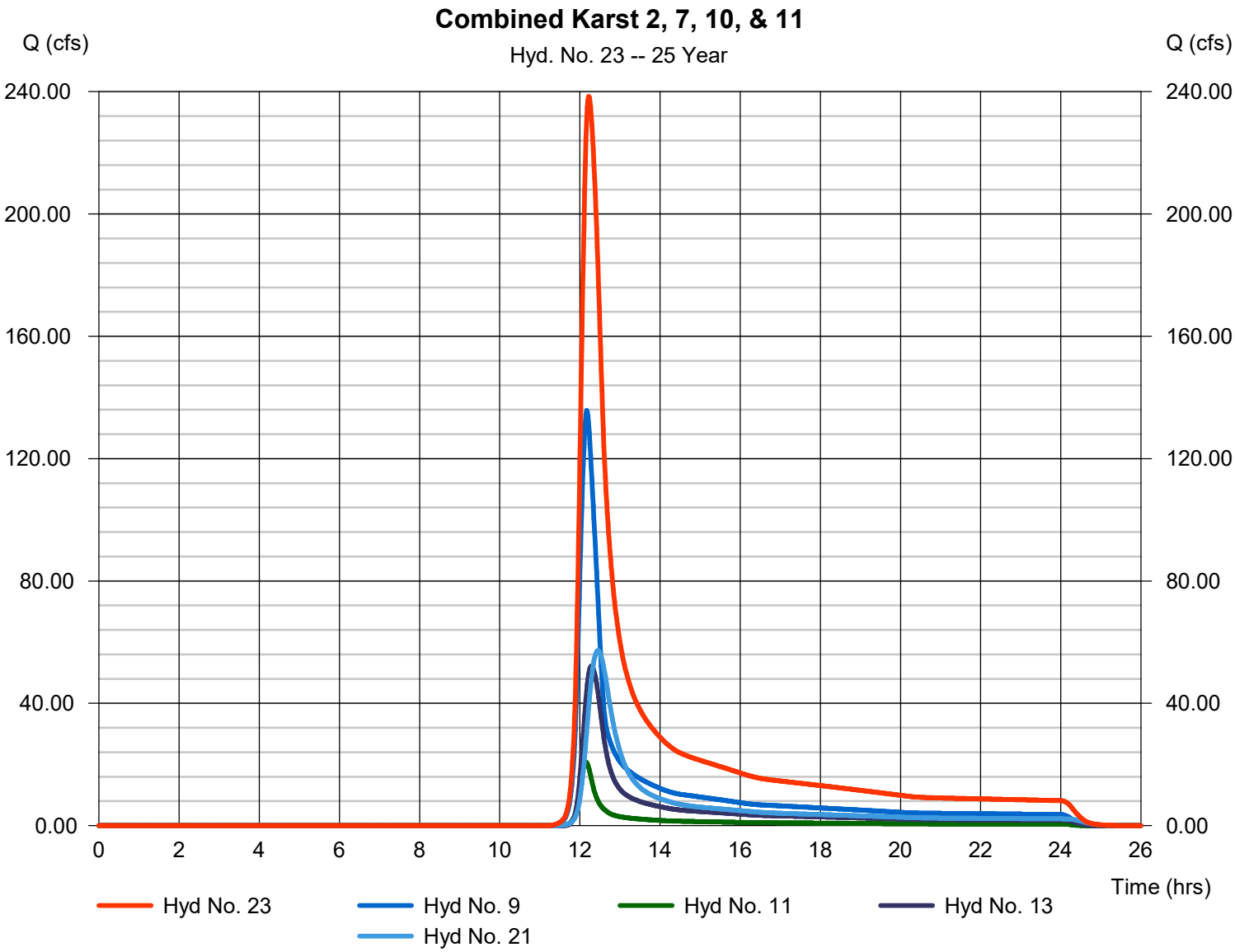
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 23

Combined Karst 2, 7, 10, & 11

Hydrograph type	= Combine	Peak discharge	= 238.44 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 1,215,061 cuft
Inflow hyds.	= 9, 11, 13, 21	Contrib. drain. area	= 101.820 ac



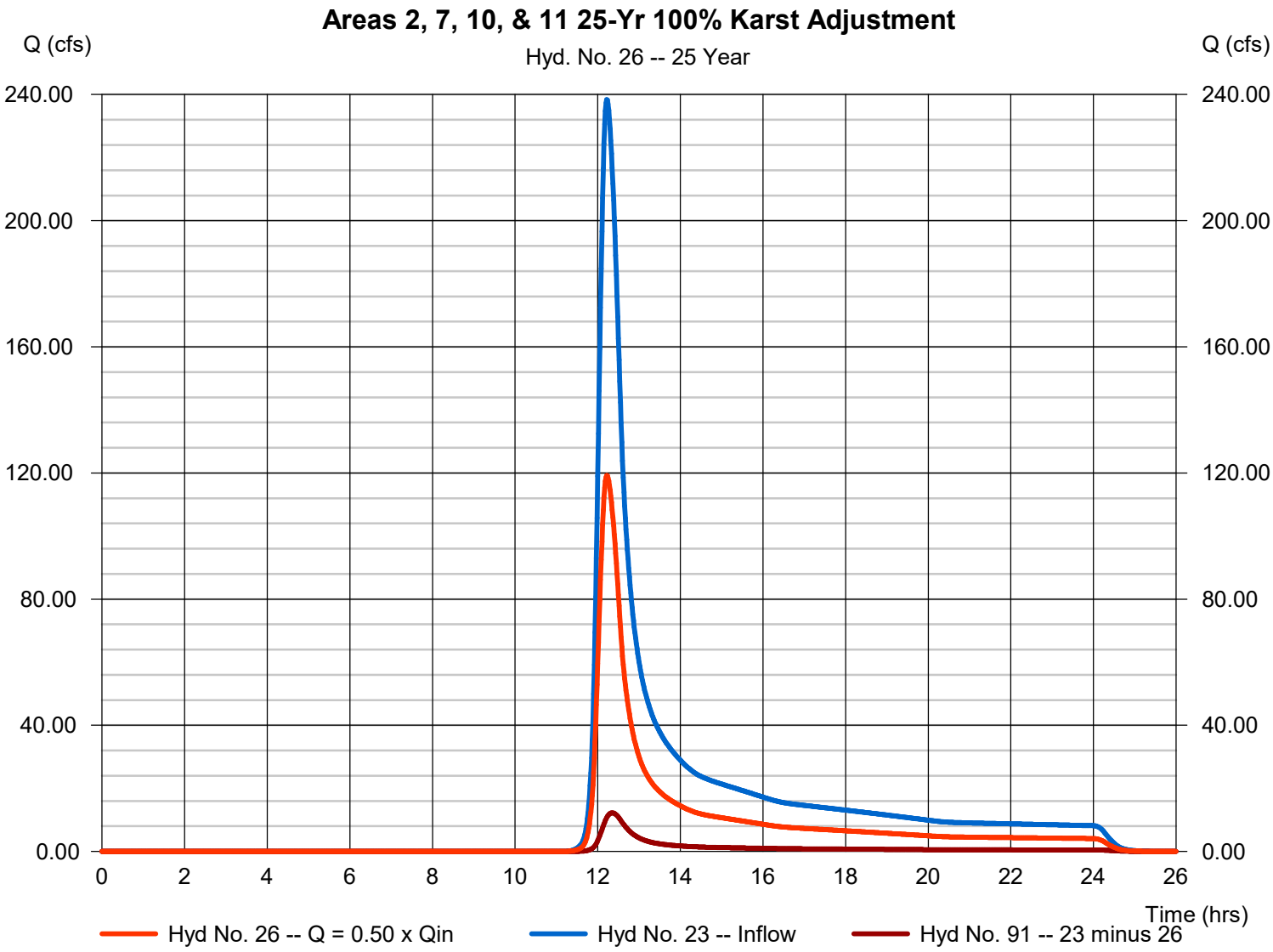
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 26

Areas 2, 7, 10, & 11 25-Yr 100% Karst Adjustment

Hydrograph type	= Diversion1	Peak discharge	= 119.22 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 607,530 cuft
Inflow hydrograph	= 23 - Combined Karst 2, 7, 10, & 11	2nd diverted hyd.	= 91
Diversion method	= Flow Ratio	Flow ratio	= 0.50



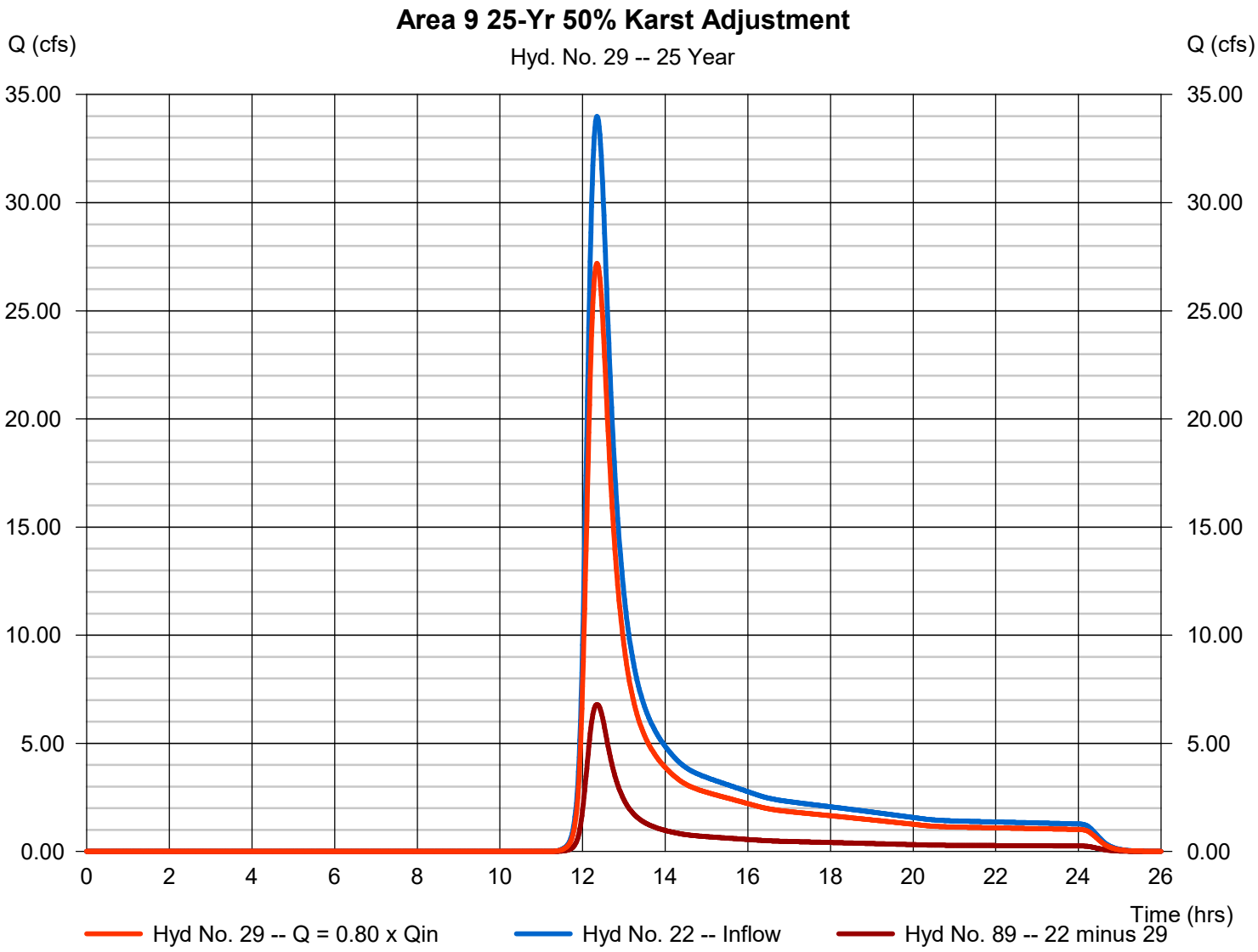
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 29

Area 9 25-Yr 50% Karst Adjustment

Hydrograph type	= Diversion1	Peak discharge	= 27.19 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 152,964 cuft
Inflow hydrograph	= 22 - Reach Area 9	2nd diverted hyd.	= 89
Diversion method	= Flow Ratio	Flow ratio	= 0.80



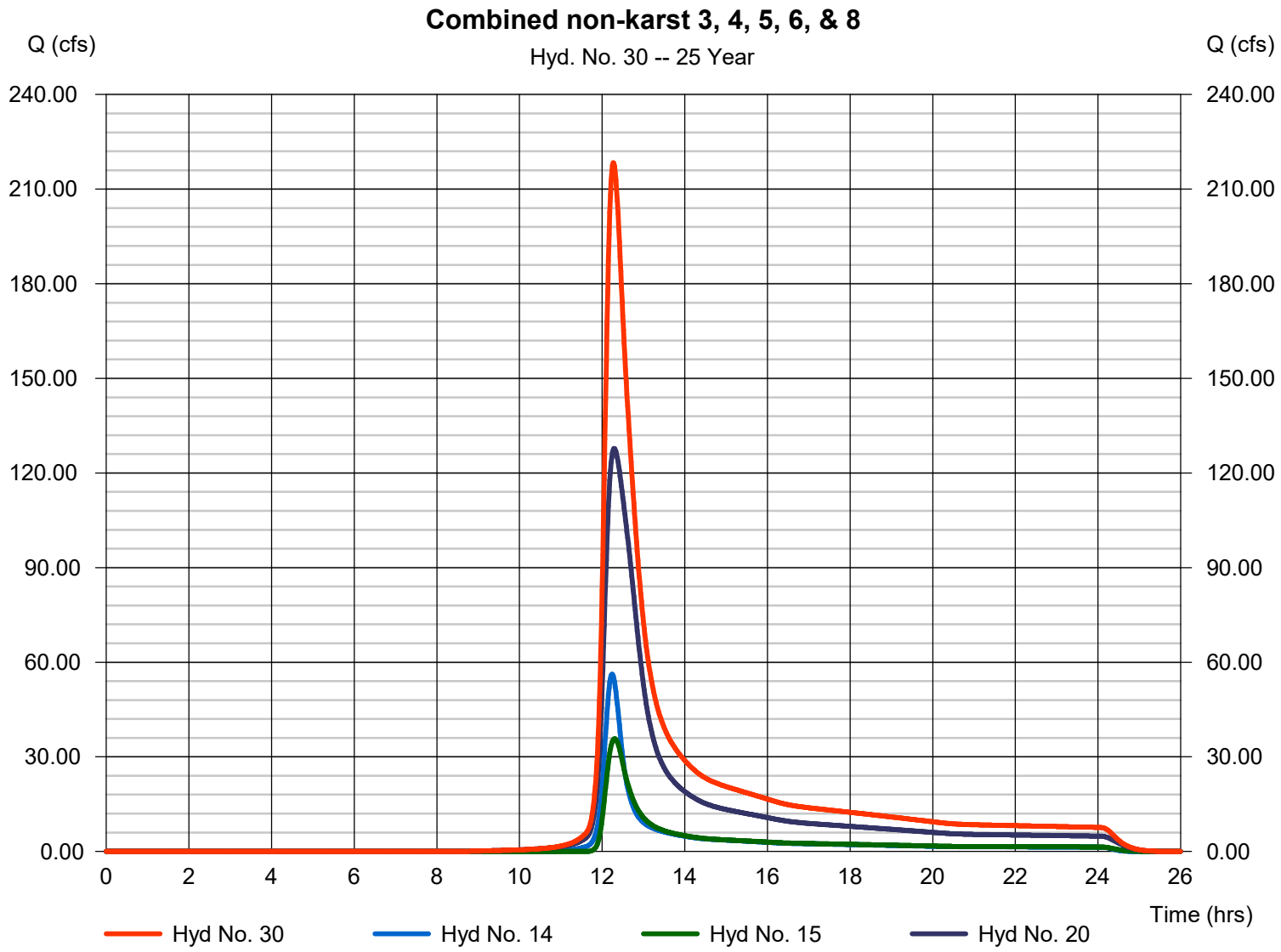
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 30

Combined non-karst 3, 4, 5, 6, & 8

Hydrograph type	= Combine	Peak discharge	= 218.40 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 1,203,664 cuft
Inflow hyds.	= 14, 15, 20	Contrib. drain. area	= 0.000 ac



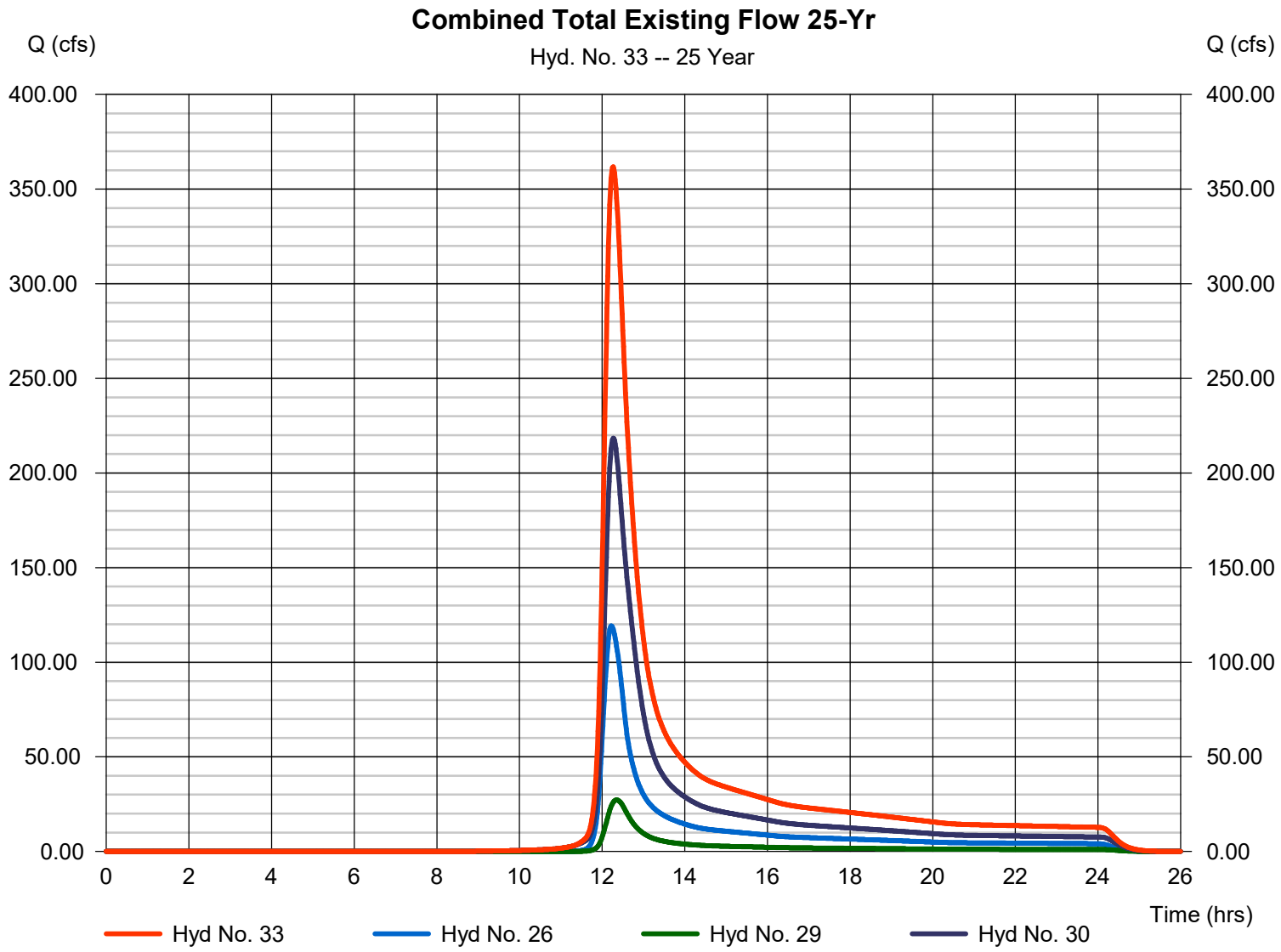
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 03 / 6 / 2023

Hyd. No. 33

Combined Total Existing Flow 25-Yr

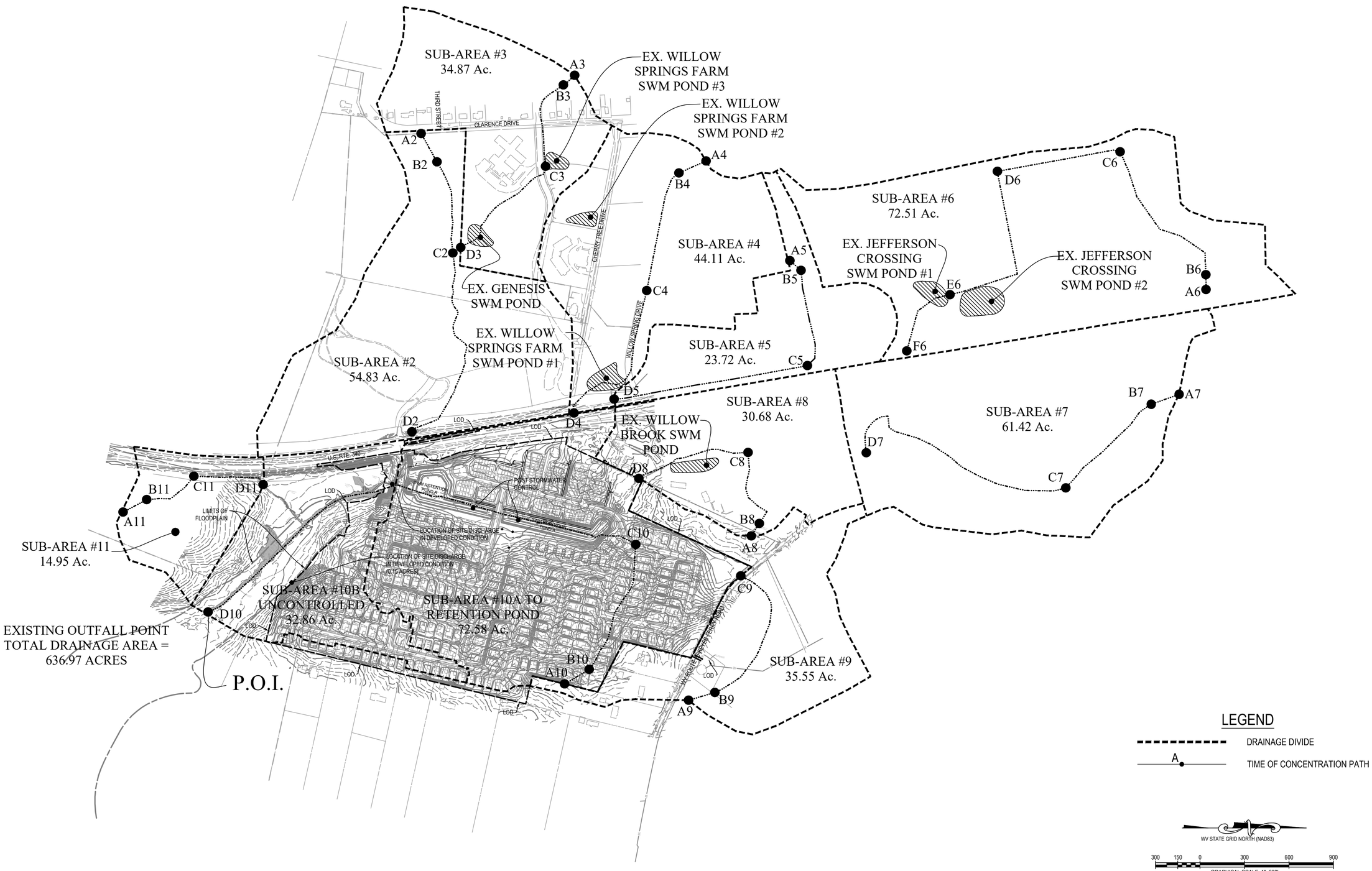
Hydrograph type	= Combine	Peak discharge	= 361.81 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 1,964,157 cuft
Inflow hyds.	= 26, 29, 30	Contrib. drain. area	= 0.000 ac



Appendix B

Proposed Runoff Calculations

- Post-Development Drainage Map
- Runoff Curve Number Calculations
- Tc Calculations
- 2-Year Hydrographs
- 10-Year Hydrographs
- 25-Year Hydrographs
- 100-Year Hydrographs



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3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

POST DEVELOPMENT DRAINAGE MAP

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 300' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CJ-102.DWG	
NCS:	
SHEET:	114 OF 134

FILE PATH: S:\PROJECT\GENERAL DRAWCOM\1-RFTS 1-WARNER\WARNER_MASTER C-102.DWG
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Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritt's Farm_DA #2	Created by:	MAC	Date:	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/11/2011
Check One:	X Present		Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Meadow	58	50.24	2,914
	B	Open space, Good condition	61	3.38	206
	B	Impervious Areas	98	1.21	119
			Totals =	54.83	3,239

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{3{,}239}{54.83}$ = 59 Use CN = **59**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.15	0.34	1.21	1.66	2.51

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritt's Farm_DA #2	Created by:	MAC	Date	8/9/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/11/2011

Check One: [X] Present [ ] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A2-B2			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	219			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.055			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.30		=	
			Hr.	0.30
			Min.	18.11

Shallow Concentrated Flow

Segment ID	B2-C2			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	640			
9. Watercourse slope, s ……...ft/ft	0.042			
10. Average velocity, V (figure 3-1)……ft/s	3.31			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.05	+	=	
			Hr.	0.05
			Min.	3.23

Channel Flow

Segment ID	C2-D2			
12. Cross sectional flow area, a……ft2	11.63			
13. Wetted perimeter, Pw……ft	20.83			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.56			
15. Channel Slope, s……ft/ft	0.034			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	6.21			
18. Flow Length, L……ft	1,432			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.06	+	=	
			Hr.	0.06
			Min.	3.84

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.42**
	Min.	**25.18**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #3	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/14/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Residential District (1/3 Acre)	72	18.85	1,357
	B	Meadow	58	16.02	929
			Totals =	34.87	2,286

CN (weighted)= total product / total area = 2,286 / 34.87 = 66 Use CN = **66**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.31	0.58	1.66	2.18	3.16

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #3	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A3-B3			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.035			
6 $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.19		=	
			Hr.	0.19
			Min.	11.59

Shallow Concentrated Flow

Segment ID	B3-C3			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	624			
9. Watercourse slope, s ……...ft/ft	0.037			
10. Average velocity, V (figure 3-1)……ft/s	3.10			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.06	+	=	
			Hr.	0.06
			Min.	3.35

Channel Flow

Segment ID	C3-D3			
12. Cross sectional flow area, a……ft2	9.33			
13. Wetted perimeter, Pw……ft	15.23			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.61			
15. Channel Slope, s……ft/ft	0.038			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	6.98			
18. Flow Length, L……ft	828			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.03	+	=	
			Hr.	0.03
			Min.	1.98

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.28**
	Min.	**16.92**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #4	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/24/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
EX SWM	B	Meadow	58	43.36	2,515
	B	Open space, Good condition	61	0.53	32
	B	Impervious Areas	98	0.22	22
			Totals =	44.11	2,569

CN (weighted)= total product / total area = 2,569 / 44.11 = 58 Use CN = **58**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.14	0.31	1.16	1.59	2.43

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #4	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A4-B4			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	200			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.080			
6 $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.24		=	
			Hr.	0.24
			Min.	14.50

Shallow Concentrated Flow

Segment ID	B4-C4			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	836			
9. Watercourse slope, s ……...ft/ft	0.049			
10. Average velocity, V (figure 3-1)……ft/s	3.57			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.07	+	=	
			Hr.	0.07
			Min.	3.90

Channel Flow

Segment ID	C4-D4			
12. Cross sectional flow area, a……ft2	9.4			
13. Wetted perimeter, Pw……ft	19.01			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.49			
15. Channel Slope, s……ft/ft	0.031			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	5.47			
18. Flow Length, L……ft	1,093			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.06	+	=	
			Hr.	0.06
			Min.	3.33

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.36**
	Min.	**21.73**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #5	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/14/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	11.02	672
	B	Impervious Areas	98	10.11	991
	B	Woods, Good Condition	55	2.59	142
			Totals =	23.72	1,805

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{1{,}805}{23.72} = 76$ Use CN = **76**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.70	1.09	2.50	3.13	4.27

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #5	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A5-B5			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.070			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.15		=	
			Hr.	0.15
			Min.	8.78

Shallow Concentrated Flow

Segment ID				
7. Surface description (paved or unpaved)……..				
8. Flow length, L ……...ft				
9. Watercourse slope, s ……...ft/ft				
10. Average velocity, V (figure 3-1)……ft/s				
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.00	+	=	
			Hr.	0.00
			Min.	0.00

Channel Flow

Segment ID	B5-C5		C5-D5	
12. Cross sectional flow area, a……ft2	9.26		13.11	
13. Wetted perimeter, Pw……ft	16.9		15.06	
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.55		0.87	
15. Channel Slope, s……ft/ft	0.052		0.014	
16. Manning's Roughness coefficient, n…….	0.030		0.030	
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	7.58		5.36	
18. Flow Length, L……ft	674		1,323	
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.02	+	0.07	=
			Hr.	0.09
			Min.	5.60

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.24**
	Min.	**14.38**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #6	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/14/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	14.87	907
	B	Impervious Areas	98	6.39	626
	B	Meadow	58	51.25	2,973
			Totals =	72.51	4,506

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{4{,}506}{72.51} =$ 62 Use CN = **62**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.22	0.44	1.42	1.90	2.81

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #6	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A6-B6			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.026			
6 $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.22			=
			Hr.	0.22
			Min.	13.05

Shallow Concentrated Flow

Segment ID	B6-C6		D6-E6	
7. Surface description (paved or unpaved)……..	UNPAVED		PAVED	
8. Flow length, L ……...ft	1,087		1,182	
9. Watercourse slope, s ……...ft/ft	0.022		0.012	
10. Average velocity, V (figure 3-1)……ft/s	2.39		2.23	
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.13	+	0.15	=
			Hr.	0.27
			Min.	16.42

Channel Flow

Segment ID	C6-D6		E6-F6	
12. Cross sectional flow area, a……ft2	30.47		14.33	
13. Wetted perimeter, Pw……ft	35.49		22.76	
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.86		0.63	
15. Channel Slope, s……ft/ft	0.006		0.041	
16. Manning's Roughness coefficient, n…….	0.030		0.030	
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	3.48		7.39	
18. Flow Length, L……ft	843		527	
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.07	+	0.02	=
			Hr.	0.09
			Min.	5.23

20. Watershed or subarea T_c or T_t ……..……..……..	Hr.	**0.58**
	Min.	**34.70**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #7	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/14/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	11.72	715
	B	Woods and Grass, Good Condition	58	45.06	2,613
	B	Impervious Areas	98	4.64	455
			Totals =	61.42	3,783

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{3{,}783}{61.42} = 62$ Use CN = **62**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.21	0.42	1.38	1.86	2.76

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #7	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A7-B7			
1. Surface description (table 3-1)……..	SHORT GRASS PRAIRIE			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.15			
3. Flow Length, L (total L<= 300 ft)……ft	200			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.045			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.21		=	
			Hr.	0.21
			Min.	12.53

Shallow Concentrated Flow

Segment ID	B7-C7			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	811			
9. Watercourse slope, s ……...ft/ft	0.030			
10. Average velocity, V (figure 3-1)……ft/s	2.79			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.08	+	=	
			Hr.	0.08
			Min.	4.84

Channel Flow

Segment ID	C7-D7			
12. Cross sectional flow area, a……ft2	30.15			
13. Wetted perimeter, Pw……ft	60.14			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.50			
15. Channel Slope, s……ft/ft	0.009			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	2.97			
18. Flow Length, L……ft	1,712			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.16	+	=	
			Hr.	0.16
			Min.	9.60

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.45**
	Min.	**26.96**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #8	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/14/2011
Check One:		Present	X	Developed	

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	7.65	467
	B	Meadow	58	19.80	1,148
	B	Impervious Areas	98	3.23	317
			Totals =	30.68	1,932

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{1{,}932}{30.68} =$ 63 Use CN = **63**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.24	0.47	1.47	1.97	2.90

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #8	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A8-B8			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	100			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.025			
6 $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.22		=	
			Hr.	0.22
			Min.	13.26

Shallow Concentrated Flow

Segment ID	B8-C8			
7. Surface description (paved or unpaved)……..	PAVED			
8. Flow length, L ……...ft	563			
9. Watercourse slope, s ……...ft/ft	0.027			
10. Average velocity, V (figure 3-1)……ft/s	3.34			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.05	+	=	
			Hr.	0.05
			Min.	2.81

Channel Flow

Segment ID	C8-D8			
12. Cross sectional flow area, a……ft2	11.9			
13. Wetted perimeter, Pw……ft	19.92			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.60			
15. Channel Slope, s……ft/ft	0.014			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	4.17			
18. Flow Length, L……ft	787			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.05	+	=	
			Hr.	0.05
			Min.	3.15

20. Watershed or subarea T_c or T_t …….……..……..	Hr.	**0.32**
	Min.	**19.22**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #9	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/14/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Open space, Good condition	61	0.19	12
	B	Meadow	58	31.39	1,821
	B	Impervious Areas	98	3.97	389
			Totals =	35.55	2,221

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{2{,}221}{35.55} =$ 62 Use CN = **62**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.23	0.46	1.44	1.93	2.85

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #9	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A9-B9			
1. Surface description (table 3-1)……..	DENSE GRASSES			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.24			
3. Flow Length, L (total L<= 300 ft)……ft	185			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.043			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.29		=	
			Hr.	0.29
			Min.	17.46

Shallow Concentrated Flow

Segment ID	B9-C9			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	1,038			
9. Watercourse slope, s ……...ft/ft	0.029			
10. Average velocity, V (figure 3-1)……ft/s	2.75			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.10	+	=	
			Hr.	0.10
			Min.	6.30

Channel Flow

Segment ID				
12. Cross sectional flow area, a……ft2				
13. Wetted perimeter, Pw……ft				
14. Hydraulic Radius, r= a/Pw Compute r……ft				
15. Channel Slope, s……ft/ft				
16. Manning's Roughness coefficient, n…….				
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V……ft/s				
18. Flow Length, L……ft				
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr		+	=	
			Hr.	0.00
			Min.	0.00

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.40**
	Min.	**23.76**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritts Farm_DA #10A	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/15/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Impervious Areas	98	31.38	3,075
	B	Open space, Good condition	61	41.20	2,513
			Totals =	72.58	5,588

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{5{,}588}{72.58} =$ 77 Use CN = **77**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.74	1.14	2.58	3.22	4.37

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritts Farm_DA #10A	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A10-B10			
1. Surface description (table 3-1)……..	SHORT GRASS PRAIRIE			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.15			
3. Flow Length, L (total L<= 300 ft)……ft	193			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.062			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.18		=	
			Hr.	0.18
			Min.	10.71

Shallow Concentrated Flow

Segment ID	B10-C10			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	922			
9. Watercourse slope, s ……...ft/ft	0.047			
10. Average velocity, V (figure 3-1)……ft/s	3.50			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.07	+	=	
			Hr.	0.07
			Min.	4.39

Channel Flow

Segment ID	C10-D10			
12. Cross sectional flow area, a……ft2	29.02			
13. Wetted perimeter, Pw……ft	21.77			
14. Hydraulic Radius, r= a/Pw Compute r……ft	1.33			
15. Channel Slope, s……ft/ft	0.007			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	5.03			
18. Flow Length, L……ft	3,256			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.18	+	=	
			Hr.	0.18
			Min.	10.78

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.43**
	Min.	**25.89**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Fritts Farm_DA #10B	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/15/2011
Check One:	Present	X	Developed		

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Impervious Areas	98	6.26	613
	B	Meadow	58	15.25	885
	B	Open space, Good condition	61	11.35	692
			Totals =	32.86	2,190

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{2{,}190}{32.86} =$ 67 Use CN = **67**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.35	0.62	1.74	2.28	3.27

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Fritts Farm_DA #10B	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A10-B10			
1. Surface description (table 3-1)……..	SHORT GRASS PRAIRIE			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.15			
3. Flow Length, L (total L<= 300 ft)……ft	200			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.035			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.23		=	
			Hr.	0.23
			Min.	13.86

Shallow Concentrated Flow

Segment ID				
7. Surface description (paved or unpaved)……..				
8. Flow length, L ……...ft				
9. Watercourse slope, s ……...ft/ft	0.005			
10. Average velocity, V (figure 3-1)……ft/s	1.14			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.00	+	=	
			Hr.	0.00
			Min.	0.00

Channel Flow

Segment ID	C10-D10			
12. Cross sectional flow area, a……ft2	29.02			
13. Wetted perimeter, Pw……ft	21.77			
14. Hydraulic Radius, r= a/Pw Compute r……ft	1.33			
15. Channel Slope, s……ft/ft	0.007			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V……ft/s	5.03			
18. Flow Length, L……ft	1,100			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.06	+	=	
			Hr.	0.06
			Min.	3.64

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.29**
	Min.	**17.50**

Runoff Curve Number and Runoff Worksheet (TR-55)

Project:	Prospect Place_DA #11	Created by:	MAC	Date:	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date:	8/14/2011
Check One:		Present	X	Developed	

1. Runoff Curve Number

Soil name and hydrologic group (appendix A) Name	HSG	Cover description	CN Table 2-2	Area (acres)	Product of CN x A
	B	Meadow	58	11.65	676
	B	Open space, Good condition	61	2.32	142
	B	Impervious Areas	98	0.98	96
			Totals =	14.95	913

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{913}{14.95} = 61$ Use CN = **61**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Frequency (year)	1	2	10	25	100
Rainfall, P (24-hour) (inches)	2.50	3.10	4.95	5.70	7.00
Runoff, Q (inches)	0.20	0.41	1.35	1.81	2.71

Time of Concentration (T_c) or Travel Time (T_t) Worksheet (TR-55)

Project:	Prospect Place_DA #11	Created by:	MAC	Date	8/12/2011
Location:	Jefferson County, West Virginia	Checked by:	JPG	Date	8/14/2011

Check One: [ ] Present [X] Developed

Check One: [X] T_c [ ] T_t through subarea

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

Sheet Flow (Applicable to T_c only)

Segment ID	A11-B11			
1. Surface description (table 3-1)……..	SHORT GRASS PRAIRIE			
2. Manning's roughness coefficient, *n* (table 3-1)……..	0.15			
3. Flow Length, L (total L<= 300 ft)……ft	181			
4. Two-Year 24-hour rainfall, p_2…… in	3.1			
5. Land Slope, s……ft/ft	0.066			
6 $T_t = \frac{0.007\,(nL)^{0.8}}{p_2^{0.5}\,s^{0.4}}$ Compute T_t……. hr	0.17			=
			Hr.	0.17
			Min.	9.93

Shallow Concentrated Flow

Segment ID	B11-C11			
7. Surface description (paved or unpaved)……..	UNPAVED			
8. Flow length, L ……...ft	381			
9. Watercourse slope, s ……...ft/ft	0.052			
10. Average velocity, V (figure 3-1)……ft/s	3.68			
11 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.03	+		=
			Hr.	0.03
			Min.	1.73

Channel Flow

Segment ID	C11-D11			
12. Cross sectional flow area, a……ft2	4.71			
13. Wetted perimeter, Pw……ft	16.2			
14. Hydraulic Radius, r= a/Pw Compute r……ft	0.29			
15. Channel Slope, s……ft/ft	0.041			
16. Manning's Roughness coefficient, n…….	0.030			
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V……ft/s	4.41			
18. Flow Length, L……ft	493			
19 $T_t = \frac{L}{3600V}$ Compute T_t……. hr	0.03	+		=
			Hr.	0.03
			Min.	1.86

20. Watershed or subarea T_c or T_t ……..	Hr.	**0.23**
	Min.	**13.51**

Appendix C

Water Quality Calculations

- Water Quality Map & Calculations

Performance Based Water Quality Calculations

STEP 1 **Determine the applicable area (A) and the post-developed impervious cover (I_{post}).**

Applicable area (A)= 100.13 Acres

Pre-development impervious cover:

Total Ex Impervious Area = 1.65

$I_{existing}$ = (total pre-development impervious cover ÷ A) × 100 = 1.65% utilized average land cover condition

Post-development impervious cover:

Total Proposed Impervious Area = 37.64

I_{post} = (total post-development impervious cover ÷ A) × 100 = 37.6%

STEP 2 **Determine the average land cover conditions ($I_{watershed}$) or the existing impervious cover ($I_{existing}$).**

$I_{existing}$ = 16.0%

STEP 3 **Determine the appropriate Development Situation.**

I_{post} 37.6% > $I_{existing}$ 16.0%

Situation 2 exists. The existing percent impervious cover is less than the average land cover condition and the proposed improvements will create a total percent impervious cover which is greater than the average land cover condition.

STEP 4 **Determine the relative pre-development pollutant load (L_{pre}).**

$L_{pre(watershed)}$ = [0.05 + 0.009 × $I_{watershed}$)] × A × 2.28 **VSMH (Equation 5-16)**

= 44.29 pounds per year

STEP 5 **Determine the relative post-development pollutant load (L_{post}).**

L_{post} = [0.05 + 0.009 × I_{post})] × A × 2.28 **VSMH (Equation 5-21)**

= 88.65 pounds per year

STEP 6 **Determine the relative pollutant removal requirement (RR).**

RR = L_{post} - $L_{pre(watershed)}$

=44.36 pounds per year

STEP 7 **Identify the best management practice (BMP) for the site.**

1 Determine the required pollutant removal efficiency for the site:

EFF = (RR ÷ Lpost) × 100

= 50.04%

	Area	I_{BMP}	Eff_{BMP}	Description	Impervious Area
2 Select BMP(s) Pond #1	67.37	46.58%	65%	Retention Basin III (4xWQV w/ Aquatic Bench)	31.38

3 Determine the pollutant load entering the proposed BMP(s).

L_{post} = [0.05 + 0.009 × I_{BMP})] × A × 2.28 **VSMH (Equation 5-24)**

L_{BMP1} = 72.07 pounds per year Pond #1

4 Calculate the pollutant load removed by the proposed BMP(s).

$L_{removed}$ = Eff_{BMP} × L_{BMP} **VSMH (Equation 5-24)**

$L_{removed/BMP1}$ = 46.85 pounds per year Pond #1

5 Calculate the total pollutant load removed by the BMP(s)

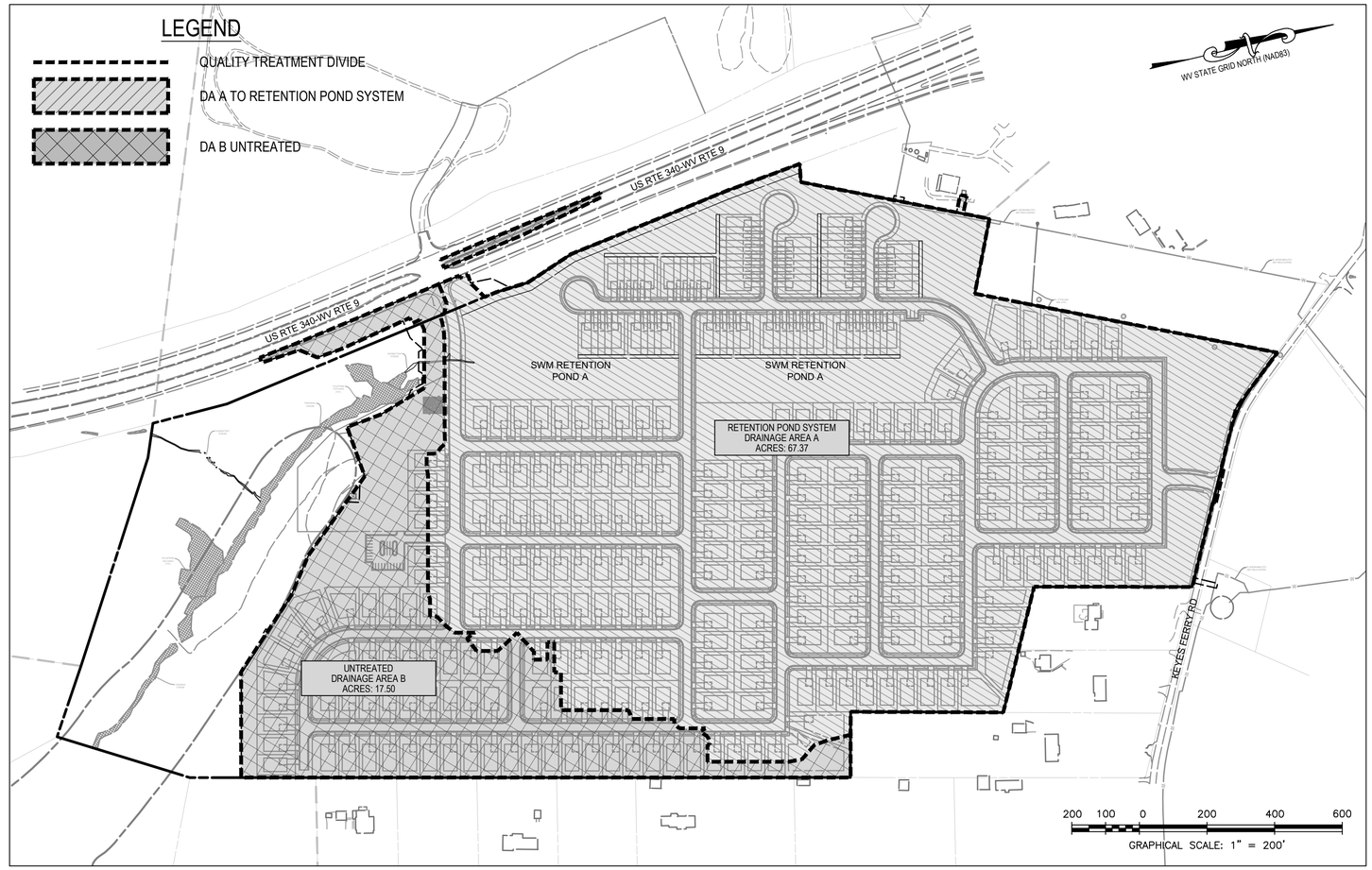
$L_{removed/total}$ = $L_{removed/BMP1}$ + $L_{removed/BMP2}$ + $L_{removed\ BMP3}$ + ….. **VSMH (Equation 5-25)**

$L_{removed/total}$ = 46.85 pounds per year

6 Verify compliance:

$L_{removed/total}$ 46.85 > 44.36 **OKAY**

QUALITY CONTROL CALCULATIONS



QUALITY CONTROL MAP

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 • Phone: 304-725-8456
Martinsburg, WV 25401 • www.ifs-se.com

JASON P. GERHART REGISTERED NO. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORMWATER QUALITY MAP

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: 1" = 200' VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CJ-103.DWG	
NCS:	
SHEET:	115 OF 134

Appendix D

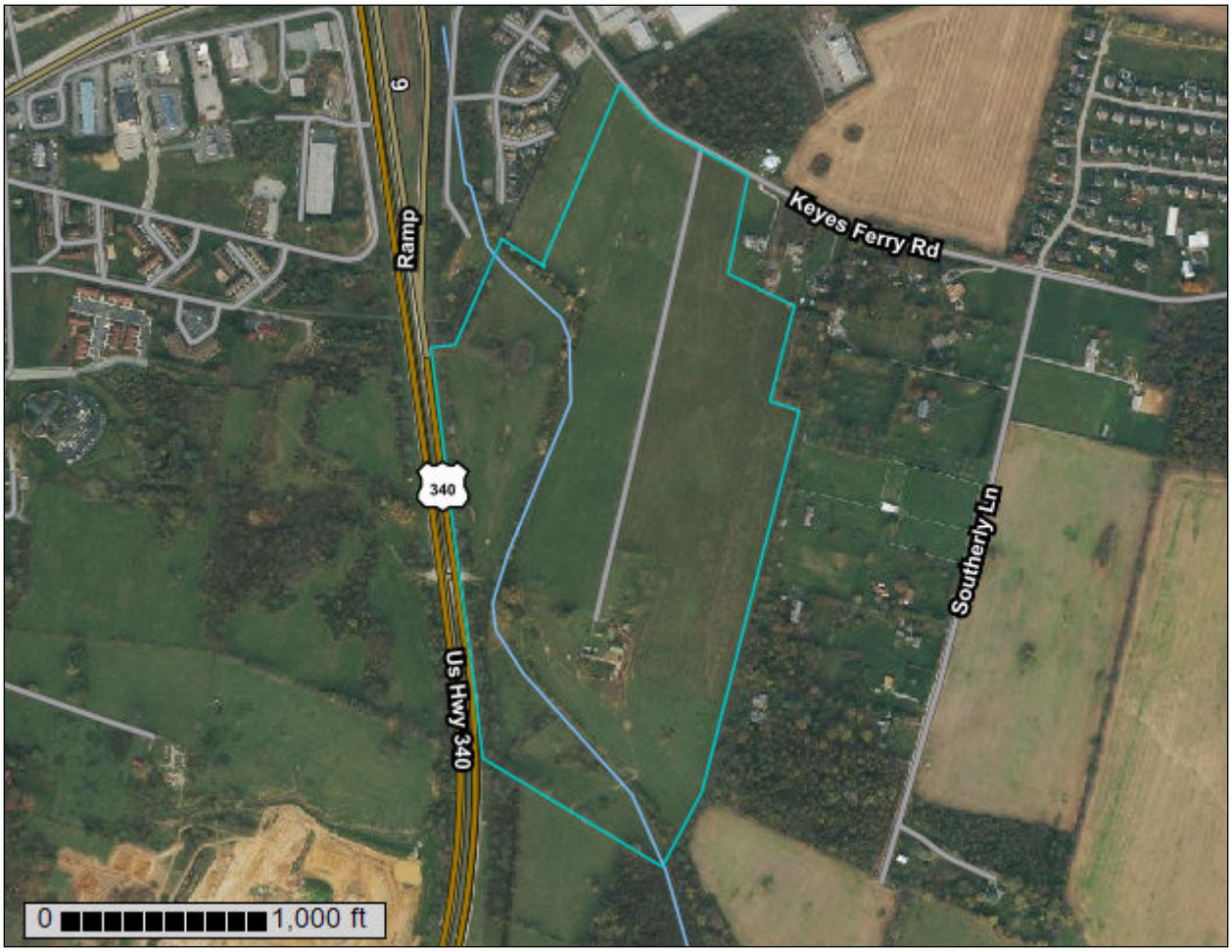
- Soils Report

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Jefferson County, West Virginia



August 26, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:6,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jefferson County, West Virginia
Survey Area Data: Version 15, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 23, 2020—Nov 3, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Fk	Funkstown silt loam	5.8	5.7%
HbC	Hagerstown silt loam, 8 to 15 percent slopes	7.4	7.4%
HeC	Hagerstown silt loam 8 to 15 percent slopes, very rocky	6.9	6.8%
PmB	Poplimento silt loam, 3 to 8 percent slopes	27.5	27.2%
PmC	Poplimento silt loam, 8 to 15 percent slopes	33.3	32.9%
Tm	Toms silt loam	16.8	16.6%
Ua	Udorthents, smoothed	0.1	0.1%
Uu	Urban land-Udorthents	3.3	3.2%
Totals for Area of Interest		**101.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not

mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jefferson County, West Virginia

Fk—Funkstown silt loam

Map Unit Setting

National map unit symbol: 1vdqc
Elevation: 80 to 180 feet
Mean annual precipitation: 33 to 46 inches
Mean annual air temperature: 40 to 64 degrees F
Frost-free period: 141 to 168 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Funkstown, silt loam, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Funkstown, Silt Loam

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy alluvium derived from limestone

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 29 inches: gravelly silt loam
H3 - 29 to 45 inches: silty clay loam
H4 - 45 to 80 inches: channery silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 20 to 28 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Other vegetative classification: Moist Loams (ML2)
Hydric soil rating: No

Minor Components

Toms, silt loam

Percent of map unit: 10 percent

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Fertile Loams (FL2)
Hydric soil rating: Yes

Holly, loam

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Wetlands (W1)
Hydric soil rating: Yes

HbC—Hagerstown silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2tb03
Elevation: 600 to 1,440 feet
Mean annual precipitation: 37 to 45 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 155 to 181 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hagerstown and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hagerstown

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, convex
Parent material: Clayey residuum weathered from limestone and dolomite

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 19 inches: silty clay loam
Bt2 - 19 to 54 inches: silty clay
C - 54 to 71 inches: silty clay loam
R - 71 to 81 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 43 to 98 inches to lithic bedrock

Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

HeC—Hagerstown silt loam 8 to 15 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 1vdqk
Elevation: 90 to 180 feet
Mean annual precipitation: 33 to 45 inches
Mean annual air temperature: 51 to 56 degrees F
Frost-free period: 141 to 168 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hagerstown, silt loam, and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hagerstown, Silt Loam

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 14 inches: silt loam
H3 - 14 to 65 inches: silty clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: Moist Loams (ML2)
Hydric soil rating: No

PmB—Poplimento silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 1vdnz
Elevation: 90 to 180 feet
Mean annual precipitation: 33 to 45 inches
Mean annual air temperature: 51 to 56 degrees F
Frost-free period: 141 to 168 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Poplimento, silt loam, and similar soils: 65 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Poplimento, Silt Loam

Setting
Landform: Hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone and siltstone

Typical profile
H1 - 0 to 9 inches: silt loam
H2 - 9 to 58 inches: clay
H3 - 58 to 72 inches: very channery silty clay loam

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Fertile Loams (FL2)
Hydric soil rating: No

PmC—Poplimento silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1vdp0
Elevation: 90 to 180 feet
Mean annual precipitation: 33 to 45 inches
Mean annual air temperature: 51 to 56 degrees F
Frost-free period: 141 to 168 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Poplimento, silt loam, and similar soils: 65 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Poplimento, Silt Loam

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone and siltstone

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 58 inches: clay
H3 - 58 to 72 inches: very channery silty clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Other vegetative classification: Fertile Loams (FL2)
Hydric soil rating: No

Tm—Toms silt loam

Map Unit Setting

National map unit symbol: 1vdq7
Elevation: 80 to 180 feet
Mean annual precipitation: 33 to 46 inches
Mean annual air temperature: 40 to 64 degrees F
Frost-free period: 141 to 168 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Toms, silt loam, and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Toms, Silt Loam

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey colluvium derived from limestone and siltstone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 53 inches: clay
H3 - 53 to 65 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.50 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Other vegetative classification: Moist Loams (ML2)
Hydric soil rating: Yes

Minor Components

Holly, loam

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Wetlands (W1)
Hydric soil rating: Yes

Ua—Udorthents, smoothed

Map Unit Setting

National map unit symbol: 1vdpn
Elevation: 310 to 820 feet
Mean annual precipitation: 33 to 45 inches
Mean annual air temperature: 51 to 56 degrees F
Frost-free period: 141 to 168 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities

Slope: 0 to 100 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Not Suited (NS)
Hydric soil rating: No

Uu—Urban land-Udorthents

Map Unit Setting

National map unit symbol: 1vdpp
Elevation: 250 to 660 feet
Mean annual precipitation: 33 to 45 inches

Mean annual air temperature: 51 to 56 degrees F
Frost-free period: 141 to 168 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 55 percent
Udorthents and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Other vegetative classification: Not Suited (NS)
Hydric soil rating: No

Description of Udorthents

Properties and qualities

Slope: 0 to 35 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Not Suited (NS)
Hydric soil rating: No

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Appendix E

- Storm Sewer/Culvert Computations

NOTE: THE DEVELOPER MAY SUBSTITUTE PIPE MATERIAL FOR EQUIVALENT N-FACTOR PIPE MATERIAL.

Reference Note	Structure Up	Structure Down	LineID	DrainageArea (ac)	RunoffCoeff (C)	IncrCxA	TotalCxA	InletTime (min)	iSys (in/hr)	Incr Flow Rate (cfs)	KnownQ (cfs)	Cumulative (cfs)	Total FlowRate (cfs)	InvertUp (ft)	InvertDn (ft)	LineLength (ft)	LineSlope (%)	LineSize (in)	Manning's Roughness Coefficient n	CapacityFull (cfs)	Vel Partial (ft/s)	PipeTravel (min)	Tc Total (min)	Grnd/Rim Elev Up (ft)
18	1	2	2A	3	4	5	6	7	8	9A	9B	9C	9	10	11	12	13	14	14A	15	16	17	17A	A
	15A	15	15A-15	0.23	0.70	0.16	0.16	5.00	6.53	1.05	0.00	0.00	1.05	451.53	451.15	38.00	1.00	15	0.012	7.00	3.9	0.16	5.00	455.10
	14B	14A	14B-14A	0.90	0.60	0.54	0.54	5.00	6.53	3.53	0.00	0.00	3.53	450.41	450.10	31.00	1.00	15	0.012	7.00	5.7	0.09	5.00	453.90
	14A	14	14A-14	0.25	0.70	0.18	0.72	5.00	6.49	4.64	0.00	0.00	4.64	450.00	449.37	25.00	2.52	15	0.012	11.11	8.5	0.05	5.09	454.04
	13A	13	13A-13	0.32	0.70	0.22	0.22	5.00	6.53	1.46	0.00	0.00	1.46	441.19	440.37	43.61	1.88	15	0.012	9.60	5.3	0.14	5.00	445.01
	12B	12A	12B-12A	0.71	0.60	0.43	0.43	5.00	6.53	2.78	0.00	0.00	2.78	439.10	438.72	38.00	1.00	15	0.012	7.00	5.3	0.12	5.00	442.59
	12A	12	12A-12	0.20	0.70	0.14	0.57	5.00	6.48	3.67	0.00	0.00	3.67	438.72	438.09	25.64	2.46	15	0.012	10.97	7.9	0.05	5.12	442.59
	11A	11	11A-11	0.21	0.75	0.16	0.16	5.00	6.53	1.03	0.00	0.00	1.03	434.01	433.51	40.00	1.25	15	0.012	7.82	4.1	0.16	5.00	437.60
	18	17	18-17	0.16	0.70	0.11	0.11	5.00	6.53	0.73	0.00	0.00	0.73	460.08	459.77	31.28	0.99	15	0.012	6.97	3.4	0.15	5.00	463.20
	17	16	17-16	0.24	0.70	0.17	0.28	5.00	6.47	1.81	0.00	0.00	1.81	459.67	458.09	37.79	4.18	15	0.012	14.31	7.3	0.09	5.15	463.45
	16	15	16-15	0.05	0.70	0.04	0.32	5.00	6.44	2.03	0.00	0.00	2.03	457.99	451.15	192.66	3.55	15	0.012	13.19	7.3	0.44	5.24	461.33
	15	14	15-14	0.17	0.70	0.12	0.60	5.00	6.29	3.74	0.00	0.00	3.74	451.05	449.37	56.00	3.00	15	0.012	12.12	8.5	0.11	5.68	455.10
	14	13	14-13	0.00	0.50	0.00	1.31	5.00	6.26	8.20	0.00	0.00	8.20	449.27	440.90	217.50	3.85	15	0.012	13.73	11.7	0.31	5.79	452.62
	13	12	13-12	0.21	0.70	0.15	1.68	5.00	6.16	10.35	0.00	0.00	10.35	440.37	437.89	63.15	3.93	15	0.012	13.87	12.4	0.08	6.10	444.16
	12	11	12-11	0.00	0.80	0.00	2.25	5.00	6.13	13.78	0.00	0.00	13.78	437.64	433.36	111.77	3.83	18	0.012	22.27	13.2	0.14	6.18	441.32
OUTFALL	11	10	11-10	0.13	0.70	0.09	2.50	5.00	6.09	15.19	0.00	0.00	15.19	433.26	428.50	137.56	3.46	18	0.012	21.17	13.1	0.18	6.32	437.60
	154A	154	154A-154	0.21	0.70	0.15	0.15	5.00	6.53	0.96	0.00	0.00	0.96	461.90	461.59	31.00	1.00	15	0.012	7.00	3.7	0.14	5.00	465.40
	149C	149B	149C-149B	0.58	0.60	0.35	0.35	5.00	6.53	2.27	0.00	0.00	2.27	459.44	459.24	19.50	1.03	15	0.012	7.09	5.1	0.06	5.00	461.77
	149B	149A	149B-149A	0.13	0.70	0.09	0.44	5.00	6.50	2.85	0.00	0.00	2.85	459.14	458.83	31.00	1.00	15	0.012	7.00	5.3	0.10	5.06	464.46
	149A	149	149A-149	0.08	0.85	0.07	0.51	5.00	6.47	3.28	0.00	0.00	3.28	458.73	457.75	98.00	1.00	15	0.012	7.00	5.5	0.30	5.16	464.31
	147A	147	147A-147	0.37	0.68	0.25	0.25	5.00	6.53	1.64	0.00	0.00	1.64	453.69	453.38	31.00	1.00	15	0.012	7.00	4.5	0.11	5.00	457.19
	146B	146A	146B-146A	0.04	0.85	0.03	0.03	5.00	6.53	0.22	0.00	0.00	0.22	447.41	447.23	35.36	0.51	15	0.012	4.99	1.9	0.31	5.00	450.42
	146A	146	146A-146	0.57	0.70	0.40	0.43	5.00	6.41	2.78	0.00	0.00	2.78	447.13	446.72	31.00	1.32	15	0.012	8.05	5.8	0.09	5.31	450.63
	144A	144	144A-144	0.24	0.70	0.17	0.17	5.00	6.53	1.10	0.00	0.00	1.10	443.15	442.87	36.37	0.77	15	0.012	6.14	3.6	0.17	5.00	446.66
	143A	143	143A-143	1.74	0.50	0.87	0.87	5.00	6.53	5.68	0.00	0.00	5.68	441.32	440.87	19.34	2.33	15	0.012	10.67	8.8	0.04	5.00	444.67
	160A	160	160A-160	0.19	0.70	0.13	0.13	5.00	6.53	0.87	0.00	0.00	0.87	442.51	442.05	31.19	1.47	15	0.012	8.50	4.2	0.13	5.00	446.26
	162	161	162-161	0.37	0.70	0.26	0.26	5.00	6.53	1.69	0.00	0.00	1.69	447.88	447.57	31.26	0.99	15	0.012	6.97	4.5	0.11	5.00	451.60
	161	160	161-160	0.48	0.70	0.34	0.60	5.00	6.48	3.86	0.00	0.00	3.86	447.47	442.05	99.28	5.46	15	0.012	16.35	10.5	0.16	5.11	451.23
	160	143	160-143	0.18	0.70	0.13	0.85	5.00	6.43	5.49	0.00	0.00	5.49	441.95	440.87	53.58	2.02	15	0.012	9.94	8.3	0.11	5.27	446.03
	155	154	155-154	0.57	0.60	0.34	0.34	5.00	6.53	2.23	0.00	0.00	2.23	462.37	461.59	119.66	0.65	15	0.012	5.65	4.3	0.47	5.00	466.74
	154	153	154-153	0.38	0.60	0.23	0.72	5.00	6.36	4.56	0.00	0.00	4.56	461.49	460.68	120.34	0.67	15	0.012	5.74	5.2	0.39	5.47	465.55
	153	152	153-152	0.40	0.60	0.24	0.96	5.00	6.24	5.97	0.00	0.00	5.97	460.43	459.55	114.56	0.77	18	0.012	9.97	5.9	0.32	5.85	464.34
	152	151	152-151	0.29	0.60	0.17	1.13	5.00	6.13	6.94	0.00	0.00	6.94	459.45	459.24	31.00	0.68	18	0.012	9.37	5.8	0.09	6.17	463.20
	151	150	151-150	0.42	0.70	0.29	1.43	5.00	6.11	8.70	0.00	0.00	8.70	459.14	458.68	35.36	1.30	18	0.012	12.98	7.9	0.07	6.26	463.05
	150	149	150-149	0.09	0.70	0.06	1.49	5.00	6.08	9.05	0.00	0.00	9.05	458.58	457.60	31.00	3.16	18	0.012	20.23	11.0	0.05	6.34	462.93
	149	148	149-148	0.07	0.85	0.06	2.05	5.00	6.07	12.47	0.00	0.00	12.47	457.50	455.37	86.91	2.45	18	0.012	17.81	10.9	0.13	6.38	462.79
	148	147	148-147	0.18	0.70	0.13	2.18	5.00	6.03	13.15	0.00	0.00	13.15	455.27	453.13	118.65	1.80	18	0.012	15.28	9.8	0.20	6.52	459.79
	147	146	147-146	0.25	0.70	0.18	2.61	5.00	5.97	15.56	0.00	0.00	15.56	452.63	446.07	369.12	1.78	24	0.012	32.67	10.2	0.60	6.72	457.04
	146	145	146-145	0.63	0.70	0.44	3.48	5.00	5.80	20.18	0.00	0.00	20.18	444.97	444.25	25.00	2.88	24	0.012	41.59	13.1	0.03	7.32	450.48
	145	144	145-144	0.00	0.85	0.00	3.48	5.00	5.79	20.15	0.00	0.00	20.15	444.15	441.72	109.50	2.22	24	0.012	36.51	12.0	0.15	7.36	449.00
	144	143	144-143	0.15	0.70	0.11	3.75	5.00	5.75	21.58	0.00	0.00	21.58	441.62	440.22	59.08	2.37	24	0.012	37.73	12.5	0.08	7.51	445.99
	143	142	143-142	0.10	0.85	0.09	5.56	5.00	5.73	31.86	0.00	0.00	31.86	440.12	439.34	31.16	2.50	24	0.012	38.77	13.8	0.04	7.59	445.22
	142	141	142-141	0.24	0.70	0.17	5.73	5.00	5.72	32.76	0.00	0.00	32.76	438.74	438.19	22.07	2.49	30	0.012	70.15	13.9	0.03	7.62	445.37
	141	140A	141-140A	0.00	0.75	0.00	5.73	5.00	5.71	32.72	0.00	0.00	32.72	435.09	433.52	63.77	2.46	30	0.012	69.72	13.8	0.08	7.65	445.48
OUTFALL	140A	140	140A-140	0.00	0.85	0.00	5.73	5.00	5.69	32.60	0.00	0.00	32.60	425.23	424.15	46.43	2.33	30	0.012	67.77	13.7	0.06	7.73	437.79
	26A	26	26A-26	0.52	0.75	0.39	0.39	5.00	6.53	2.55	0.00	0.00	2.55	431.54	428.50	125.43	2.42	15	0.012	10.89	7.0	0.30	5.00	435.92
	27	26	27-26	0.25	0.75	0.19	0.19	5.00	6.53	1.22	0.00	0.00	1.22	429.83	428.50	62.52	2.13	15	0.012	10.21	5.1	0.21	5.00	434.19
OUTFALL	26	25	26-25	0.26	0.75	0.20	0.77	5.00	6.42	4.96	0.00	0.00	4.96	428.40	428.00	50.49	0.79	15	0.012	6.23	5.6	0.15	5.30	434.62
	22	21	22-21	0.12	0.75	0.09	0.09	5.00	6.53	0.59	0.00	0.00	0.59	431.35	431.19	31.00	0.52	15	0.012	5.03	2.5	0.21	5.00	435.77
OUTFALL	21	20	21-20	0.15	0.70	0.11	0.20	5.00	6.45	1.26	0.00	0.00	1.26	428.16	428.00	32.46	0.49	15	0.012	4.91	3.2	0.17	5.21	435.63
	69A	69	69A-69	0.16	0.85	0.14	0.14	5.00	6.53	0.89	0.00	0.00	0.89	468.20	468.04	31.00	0.52	15	0.012	5.03	2.9	0.18	5.00	471.56
	66A	66	66A-66	0.49	0.60	0.29	0.29	5.00	6.53	1.92	0.00	0.00	1.92	460.98	460.67	31.00	1.00	15	0.012	7.00	4.7	0.11	5.00	464.49
	63A	63	63A-63	0.10	0.85	0.09	0.09	5.00	6.53	0.56	0.00	0.00	0.56	449.96	449.65	31.00	1.00	15	0.012	7.00	3.0	0.17	5.00	453.28
	83A	83	83A-83	0.36	0.60	0.22	0.22	5.00	6.53	1.41	0.00	0.00	1.41	455.95	454.36	35.77	4.45	15	0.012	14.75	6.9	0.09	5.00	459.50
	81B	81A	81B-81A	0.67	0.70	0.47	0.47	5.00	6.53	3.06	0.00	0.00	3.06	456.75	456.36	31.00	1.26	15	0.012	7.85	5.9	0.09	5.00	460.54
	81A	81	81A-81	0.41	0.70	0.29	0.76	5.00	6.49	4.91	0.00	0.00	4.91	456.26	453.04	142.56	2.26	15	0.012	10.52	8.3	0.29	5.09	460.68
	80A	80	80A-80	0.59	0.60	0.35	0.35	5.00	6.53	2.31	0.00	0.00	2.31	450.73	450.28	31.00	1.45	15	0.012	8.43	5.7	0.09	5.00	454.19
	89	88	89-88	0.46	0.65	0.30	0.30	5.00	6.53	1.95	0.00	0.00	1.95	469.49	465.46	133.10	3.03	15	0.012	12.18	6.9	0.32	5.00	473.80
	88	87	88-87	0.41	0.65	0.27	0.57	5.00	6.41	3.63	0.00	0.00	3.63	465.36	465.05	31.13	1.00	15	0.012	6.98	5.7	0.09	5.32	468.95
	87	86	87-86	0.14	0.85	0.12	0.68	5.00	6.38	4.37	0.00	0.00	4.37	465.05	462.83	37.79	5.87	15	0.012	16.96	11.2	0.06	5.41	468.73
	86	85	86-85	0.10	0.70	0.07	0.75	5.00	6.36	4.80	0.00	0.00	4.80	462.73	460.14	67.76	3.82	15	0.012	13.68	10.0	0.11	5.47	466.33
	85	84	85-84	0.37	0.60	0.22	0.98	5.00	6.32	6.18	0.00	0.00	6.18	460.04	458.77	41.04	3.09	15	0.012	12.31	10.0	0.07	5.58	463.59
	84	83	84-83	0.15	0.70	0.11	1.08	5.00	6.30	6.82	0.00	0.00	6.82	456.23	454.20	93.10	2.18	18	0.012	16.80	8.8	0.18	5.65	462.37
	83	82	83-82	0.06	0.70	0.04	1.34	5.00	6.25	8.37	0.00	0.00	8.37	454.10	453.44	38.97	1.69	18	0.012	14.81	8.6	0.08	5.82	458.64
	82	81	82-81	0.99	0.70	0.69	2.03	5.00	6.22	12.64	0.00	0.00	12.64	453.34	452.79	31.00	1.77	18	0.012	15.16	9.7	0.05	5.90	457.08
	81	80	81-80	0.22	0.70	0.15	2.94	5.00	6.21	18.26	0.00	0.00	18.26	452.29	449.63	59.51	4.47	24	0.012	51.81	14.8	0.07	5.95	457.22
	80	62	80-62	0.06	0.70	0.04	3.34	5.00	6.18	20.65	0.00	0.00	20.65	449.53	446.90	69.00	3.81	24	0.012	47.85	14.5	0.08	6.02	454.05
	61A	61	61A-61	0.41	0.60	0.25	0.25	5.00	6.53	1.61	0.00	0.00	1.61	444.57	443.80	34.39	2.24	15	0.012	10.47	5.8	0.10	5.00	448.11
	96A	96	96A-96	0.63	0.60	0.38	0.38	5.00	6.53	2.47	0.00	0.00	2.47	447.31	447.00	31.00	1.00	15	0.012	7.00	5.1	0.10	5.00	450.49
	95A	95	95A-95	0.73	0.60	0.44	0.44	5.00	6.53	2.86	0.00	0.00	2.86	442.94	442.63	31.00	1.00	15	0.012	7.00	5.3	0.10	5.00	446.18
	98	97	98-97	0.68	0.60	0.41	0.41	5.00	6.53	2.66	0.00	0.00	2.66	451.86	451.55	31.00	1.00	15	0.012	7.00	5.3	0.10	5.00	455.27
	97	96	97-96	0.14	0.70	0.10	0.51	5.00	6.49	3.28	0.00	0.00	3.28	451.45	447.00	156.09	2.85	15	0.012	11.82	8.0	0.33	5.10	455.42
	96	95	96-95	0.26	0.70	0.18	1.07	5.00	6.38	6.80	0.00	0.00	6.80	446.90	442.63	140.83	3.03	15	0.012	12.19	10.2	0.23	5.42	450.64
	95	60	95-60	0.22	0.70	0.15	1.66	5.00	6.30	10.45	0.00	0.00	10.45	442.53	441.33	25.00	4.80	15	0.012	15.33	13.5	0.03	5.65	446.33
	38A	38	38A-38	0.64	0.60	0.38	0.38	5.00	6.53	2.51	0.00	0.00	2.51	434.61	434.03	33.72	1.72	15	0.012	9.18	6.2	0.09	5.00	438.08
	90A	90	90A-90	0.85	0.60	0.51	0.51	5.00	6.53	3.33	0.00	0.00	3.33	436.22	435.84	38.00	1.00	15	0.012	7.00	5.6	0.11	5.00	439.72
	92	91	92-91	0.66	0.60	0.40	0.40	5.00	6.53	2.59	0.00	0.00	2.59	438.85	438.47	38.00	1.00	15	0.012	7.00	5.2	0.12	5.00	442.31
	91	90	91-90	0.27	0.70	0.19	0.59	5.00	6.48	3.79	0.00	0.00	3.79	438.37	435.84	170.44	1.48	15	0.012	8.53	6.7	0.43	5.12	442.31
	90	36	90-36	0.27	0.70	0.19	1.28	5.00	6.33	8.13	0.00	0.00	8.13	435.74	433.36	138.97	1.71	15	0.012	9.16	8.5	0.27	5.55	439.72
	34A	34	34A-34	0.18	0.55	0.10	0.10	5.00	6.53	0.65	0.00	0.00	0.65	432.11	431.95	31.00	0.52	15	0.012	5.03	2.6	0.20	5.00	435.63
	71A	71	71A-71	0.84	0.55	0.46	0.46	5.00	6.53	3.02	0.00	0.00	3.02	481.82	478.95	162.44	1.77	15	0.012	9.30	6.7	0.41	5.00	485.18
	72	71	72-71	0.15	0.85	0.13	0.13	5.00	6.53	0.83	0.00	0.00	0.83	479.07	478.91	32.41	0.49	15	0.012	4.92	2.8	0.19	5.00	482.45
	71	70	71-70	0.66	0.60	0.40	0.99	5.00	6.38	6.29	0.00	0.00	6.29	478.81	473.26	144.56	3.84	15	0.012	13.71	10.8	0.22	5.41	482.31
	70	69	70-69	0.53	0.70	0.37	1.36	5.00	6.31	8.56	0.00	0.00	8.56	473.16	468.04	123.00	4.16	15	0.012	14.28	12.2	0.17	5.63	476.62
	69	68	69-68	0.67	0.65	0.44	1.93	5.00	6.25	12.06	0.00	0.00	12.06	467.29	467.11	35.36	0.51	24	0.012	17.49	6.0	0.10	5.80	471.70
	68	67	68-67	0.70	0.60	0.42	2.35	5.00	6.22	14.61	0.00	0.00	14.61	467.01	466.86	31.00	0.48	24	0.012	17.05	6.1	0.08	5.89	472.19
	67	66	67-66	0.17	0.70	0.12	2.47	5.00	6.20	15.29	0.00	0.00	15.29	466.76	460.02	192.55	3.50	24	0.012	45.85	12.8	0.25	5.98	472.33
	66	65	66-65	0.26	0.70	0.18	2.94	5.00	6.12	18.00	0.00	0.00	18.00	458.17	452.55	125.51	4.48	24	0.012	51.86	14.7	0.14	6.23	464.63
	65	64	65-64	0.15	0.70	0.11	3.05	5.00	6.07	18.51	0.00	0.00	18.51	452.05	451.89	31.00	0.52	30	0.012	31.92	6.8	0.08	6.37	457.20
	64	63	64-63	0.11	0.85	0.09	3.14	5.00	6.05	19.01	0.00	0.00	19.01	451.79	448.50	98.00	3.36	30	0.012	81.42	13.1	0.12	6.45	457.35
	63	62	63-62	0.05	0.85	0.04	3.27	5.00	6.01	19.66	0.00	0.00	19.66	448.39	446.50	57.49	3.29	30	0.012	80.57	13.1	0.07	6.57	453.43
	62	61	62-61	0.10	0.70	0.07	6.68	5.00	5.99	40.01	0.00	0.00	40.01	444.00	441.46	98.00	2.59	30	0.012	71.54	15.0	0.11	6.64	451.29
	61	60	61-60	0.20	0.70	0.14	7.06	5.00	5.96	42.10	0.00	0.00	42.10	441.36	439.98	56.00	2.46	30	0.012	69.75	14.9	0.06	6.75	447.37
	59A	59	59A-59	0.61	0.60	0.37	0.37	5.00	6.53	2.39	0.00	0.00	2.39	438.00	437.81	31.00	0.61	15	0.012	5.48	4.2	0.12	5.00	441.64
	60	59	60-59	0.00	0.90	0.00	8.72	5.00	5.94	51.82	0.00	0.00	51.82	437.49	435.59	90.68	2.10	30	0.012	64.32	14.7	0.10	6.82	444.90
	59	38	59-38	0.10	0.70	0.07	9.16	5.00	5.91	54.14	0.00	0.00	54.14	435.49	432.78	126.82	2.14	30	0.012	64.96	15.0	0.14	6.92	441.50
	38	37	38-37	0.26	0.70	0.18	9.72	5.00	5.87	57.09	0.00	0.00	57.09	432.28	431.93	35.36	0.99	36	0.012	71.89	11.3	0.05	7.06	438.13
	37	36	37-36	0.66	0.60	0.40	10.12	5.00	5.86	59.27	0.00	0.00	59.27	431.83	431.38	38.00	1.18	36	0.012	78.63	12.2	0.05	7.11	437.60
	36	35	36-35	0.23	0.70	0.16	11.56	5.00	5.84	67.56	0.00	0.00	67.56	430.88	430.56	37.79	0.85	42	0.012	100.30	11.2	0.06	7.16	437.60
	35	34	35-34	0.05	0.80	0.04	11.60	5.00	5.83	67.61	0.00	0.00	67.61	430.46	429.88	88.96	0.65	42	0.012	88.01	10.1	0.15	7.22	436.76
	34	33	34-33	0.06	0.75	0.05	11.75	5.00	5.79	67.97	0.00	0.00	67.97	429.78	429.12	60.00	1.10	42	0.012	114.31	12.5	0.08	7.37	435.48
	33	32	33-32	0.09	0.85	0.08	11.83	5.00	5.76	68.16	0.00	0.00	68.16	429.02	428.68	31.00	1.10	42	0.012	114.15	12.5	0.04	7.45	435.16
	32	31	32-31	0.07	0.80	0.06	11.88	5.00	5.75	68.35	0.00	0.00	68.35	428.58	428.38	18.42	1.09	42	0.012	113.57	12.4	0.02	7.49	435.30
OUTFALL	31	30	31-30	0.00	0.65	0.00	11.88	5.00	5.75	68.27	0.00	0.00	68.27	428.28	428.00	25.41	1.10	42	0.012	114.41	12.5	0.03	7.51	434.52

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JASON P. GERHART REGISTERED No. 19727 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS

1. 03/16/2023 - W/DOH, CTLB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER COMPUTATIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-761.DWG	
NCS:	
SHEET:	107 OF 134

Reference Note	INLET STATION Up	INLET STATION Down	Outlet Water Surface Elev.	JUNCTION LOSS V_0	H_0 Loss Coefficient k	H_0	Q_i	V_i	Angle	1.3 H_t	0.5 H_t	0.5 IS-1 Applicable	Final H	Inlet Water Surface Elev.	Inlet Invert +0.8D Elev.	Rim/Flow Line Elev.	Remarks
	81B	81A	457.36	2.50	0.25	0.02		4.00		0.14	0.07	Y	0.13	**457.49**	457.75	459.87	Curb Inlet
	83A	83	455.36	1.15	0.25	0.01		2.50		0.05	0.03	Y	0.04	**455.40**	456.95	458.83	Curb Inlet
	63A	63	450.65	0.45	0.25	0.00		1.15		0.01	0.01	Y	0.01	**450.66**	450.96	452.61	Curb Inlet
	66A	66	461.67	1.56	0.25	0.01		0.45		0.01	0.01	Y	0.03	**461.70**	461.98	463.82	Curb Inlet
	69A	69	469.12	0.72	0.25	0.00		1.56		0.02	0.01	Y	0.01	**469.14**	469.20	470.89	Curb Inlet
OUTFALL	**171**	170	430.33	7.56	0.25	0.22	13.38	0.72	0	0.29	0.15	Y	1.84	**432.17**	432.37	436.62	Curb Inlet
	172	171	432.46	7.57	0.25	0.22	10.58	7.56	28	1.07	0.54	Y	0.84	**433.30**	433.04	436.72	Curb Inlet
	173	172	433.30	5.99	0.25	0.14	9.27	7.57	50	1.16	0.58	Y	0.85	**434.15**	433.48	436.57	Curb Inlet
	174	173	434.15	5.25	0.25	0.11	6.73	5.99	40	0.70	0.35	Y	0.61	**434.76**	434.85	436.85	Curb Inlet
	175	174	434.90	5.48	0.25	0.12	4.34	5.25	45	0.60	0.30	Y	0.59	**435.49**	435.21	437.00	Curb Inlet
	176	175	435.49	3.54	0.25	0.05	3.81	5.48	45	0.56	0.28	Y	0.42	**435.90**	435.81	437.53	Curb Inlet
	177	176	435.91	3.10	0.25	0.04	3.20	3.54	90	0.31	0.16	Y	0.48	**436.39**	436.46	440.60	Curb Inlet
	178	177	436.56	2.61	0.25	0.03		3.10		0.10	0.05	Y	0.11	**436.67**	436.71	#VALUE!	End Section
	173A	173	434.15	0.76	0.25	0.00		2.61		0.05	0.03	Y	0.03	**434.19**	433.98	436.92	Curb Inlet
	175A	175	435.49	0.68	0.25	0.00		0.76		0.01	0.00	Y	0.03	**435.52**	436.93	438.62	Curb Inlet
OUTFALL	**41**	40	430.40	8.51	0.25	0.28	60.32	0.68	0	0.37	0.18	Y	1.43	**431.83**	432.96	444.64	Curb Inlet
	42	41	440.78	8.53	0.25	0.28	59.56	8.51	0	0.88	0.44	Y	0.72	**441.50**	441.45	444.98	Curb Inlet
	43	42	441.55	8.43	0.25	0.28	57.85	8.53	90	1.90	0.95	Y	1.29	**442.84**	442.41	445.99	Curb Inlet
	44	43	442.99	8.18	0.25	0.26	48.10	8.43	90	1.84	0.92	Y	1.16	**444.15**	443.75	445.99	Curb Inlet
	45	44	444.15	6.80	0.25	0.18	47.80	8.18	11	0.90	0.45	Y	0.88	**445.04**	445.72	447.91	Curb Inlet
	46	45	445.82	6.76	0.25	0.18	46.23	6.80	11	0.69	0.35	Y	0.89	**446.71**	447.99	451.54	Curb Inlet
	47	46	448.79	6.54	0.25	0.17	34.79	6.76	45	0.97	0.48	Y	0.61	**449.40**	449.00	451.69	Curb Inlet
	48	47	449.40	4.92	0.25	0.09	33.05	6.54	45	0.83	0.41	Y	0.50	**449.90**	449.35	451.42	Curb Inlet
	49	48	449.90	6.73	0.25	0.18	32.44	4.92	11	0.47	0.23	Y	0.78	**450.67**	450.62	453.35	Curb Inlet
	50	49	450.72	6.61	0.25	0.17	29.51	6.73	79	1.14	0.57	Y	1.24	**451.96**	454.32	457.93	Curb Inlet
	51	50	455.40	6.01	0.25	0.14	27.62	6.61	83	1.08	0.54	Y	1.68	**457.08**	462.85	468.25	Curb Inlet
	52	51	462.95	5.63	0.25	0.12	25.54	6.01	52	0.79	0.39	Y	0.52	**463.47**	463.26	468.56	Curb Inlet
	53	52	463.47	5.20	0.25	0.11	22.84	5.63	45	0.66	0.33	Y	0.45	**463.91**	463.71	466.80	Curb Inlet
	54	53	463.91	7.27	0.25	0.21	15.79	5.20	90	0.84	0.42	Y	1.49	**465.40**	465.62	467.82	Curb Inlet
	55	54	465.77	4.06	0.25	0.06	0.72	7.27	64	1.08	0.54	Y	1.24	**467.01**	467.21	469.23	Curb Inlet
	56	55	467.31	0.59	0.25	0.00		4.06		0.12	0.06	Y	0.06	**467.37**	467.51	469.42	Curb Inlet
	44A	44	444.20	6.99	0.25	0.19	5.16	0.59	75	0.25	0.13	Y	1.62	**445.82**	446.65	449.44	Curb Inlet
	44B	44A	446.75	4.20	0.25	0.07	4.11	6.99	90	1.12	0.56	Y	0.73	**447.48**	447.19	449.58	Curb Inlet
	44C	44B	447.48	9.63	0.25	0.36	3.45	5.65	90	1.14	0.57	Y	1.18	**448.66**	454.24	456.62	Curb Inlet
	44D	44C	454.34	5.65	0.25	0.12				0.16	0.08	Y	0.16	**454.50**	454.65	456.47	Curb Inlet
	47A	47	449.40	5.42	0.25	0.11	7.05	2.81	0	0.20	0.10	Y	1.00	**450.40**	455.43	457.12	Curb Inlet
	47B	47A	455.33	12.52	0.25	0.61	3.06	9.76	0	1.46	0.73	Y	2.06	**457.39**	462.19	464.60	Curb Inlet
	47C	47B	462.29	4.02	0.25	0.06				0.08	0.04	Y	0.06	**462.35**	462.48	464.45	Curb Inlet
	47D	47B	463.02	9.76	0.25	0.37				0.48	0.24	Y	0.46	**463.48**	469.28	471.17	Curb Inlet
	48A	48	449.90	1.08	0.25	0.00		2.49		0.05	0.02	Y	0.04	**449.94**	449.70	451.61	Curb Inlet
	50A	50	455.55	4.87	0.25	0.09				0.12	0.06	Y	0.08	**455.63**	456.03	457.93	Curb Inlet
	53A	53	463.96	4.43	0.25	0.08				0.10	0.05	Y	0.05	**464.01**	464.73	466.64	Curb Inlet
	54A	54	465.72	9.80	0.25	0.37	6.73	7.38	90	1.64	0.82	Y	1.29	**467.01**	467.49	468.57	Curb Inlet
	54B	54A	467.59	7.38	0.25	0.21				0.27	0.14	Y	1.27	**468.86**	471.76	473.08	Curb Inlet
OUTFALL	**131**	130	430.33	9.47	0.25	0.35	7.74	6.31		0.73	0.37	Y	0.76	**431.09**	429.68	436.84	Curb Inlet
	132	131	433.83	6.31	0.25	0.15	6.80	6.55	68	1.02	0.51	Y	0.71	**434.54**	434.19	437.70	Curb Inlet
	133	132	434.54	5.54	0.25	0.12	5.30	6.31	90	1.00	0.50	Y	1.21	**435.75**	435.44	438.41	Curb Inlet
	134	133	435.75	4.32	0.25	0.07	4.93	5.54	71	0.69	0.35	Y	0.52	**436.27**	435.85	438.26	Curb Inlet
	135	134	436.27	4.02	0.25	0.06	2.79	4.32	19	0.30	0.15	Y	0.53	**436.80**	439.37	441.72	Curb Inlet
	136	135	439.47	5.30	0.25	0.11	0.24	2.02	45	0.21	0.10	Y	0.15	**439.62**	439.78	441.57	Curb Inlet
	137	136	439.88	2.02	0.25	0.02				0.02	0.01	Y	0.01	**439.89**	440.09	441.75	Curb Inlet
	131A	131	434.08	3.90	0.25	0.06				0.08	0.04	Y	0.04	**434.12**	435.17	436.86	Curb Inlet
	132A	132	434.54	2.90	0.25	0.03				0.04	0.02	Y	0.02	**434.56**	434.73	437.56	Curb Inlet
OUTFALL	**101**	100	430.33	7.12	0.25	0.20	34.25	0.60	0	0.26	0.13	Y	0.44	**430.77**	430.67	439.11	Curb Inlet
	102	101	436.45	6.98	0.25	0.19	34.06	7.12	17	0.82	0.41	Y	0.68	**437.13**	437.62	440.73	Curb Inlet
	103	102	437.72	6.94	0.25	0.19	33.34	6.98	19	0.82	0.41	Y	1.21	**438.93**	439.08	447.45	Curb Inlet
	104	103	439.18	6.79	0.25	0.18	26.41	6.94	93	0.57	0.29	Y	0.60	**439.78**	439.73	444.53	Curb Inlet
	105	104	439.83	5.38	0.25	0.11	25.91	6.79	43	0.89	0.45	Y	0.67	**440.50**	440.15	444.78	Curb Inlet
	106	105	440.50	5.28	0.25	0.11	23.39	5.38	2	0.36	0.18	Y	0.53	**441.02**	440.75	443.22	Curb Inlet
	107	106	441.02	4.76	0.25	0.09	12.98	5.28	90	0.70	0.35	Y	0.47	**441.49**	441.19	443.27	Curb Inlet
	108	107	441.49	6.32	0.25	0.15	8.55	4.76	0	0.36	0.18	Y	0.72	**442.22**	442.25	444.35	Curb Inlet
	109	108	442.30	6.97	0.25	0.19	8.02	6.32	12	0.65	0.33	Y	1.79	**444.09**	444.84	447.57	Curb Inlet
	110	109	444.85	6.53	0.25	0.17	4.98	6.97	78	1.20	0.60	Y	2.20	**447.05**	451.65	453.75	Curb Inlet
	111	110	451.75	9.82	0.25	0.37	4.25	5.97	75	1.20	0.60	Y	2.24	**453.99**	462.87	466.71	Curb Inlet
	112	111	462.97	5.97	0.25	0.14	2.17	4.26	9	0.35	0.18	Y	0.32	**463.29**	463.36	467.11	Curb Inlet
	113	112	463.46	4.26	0.25	0.07	0.50	3.02	45	0.24	0.12	Y	0.13	**463.59**	463.82	466.14	Curb Inlet
	114	113	463.92	3.02	0.25	0.04				0.05	0.02	Y	0.03	**463.95**	464.32	466.14	Curb Inlet
	101A	101	435.70	2.89	0.25	0.03				0.04	0.02	Y	0.03	**435.73**	435.88	438.72	Curb Inlet
	104A	104	442.00	8.29	0.25	0.27	0.39	2.74	58	0.48	0.24	Y	0.28	**442.28**	450.21	452.51	Curb Inlet
	104B	104A	450.31	2.74	0.25	0.03				0.04	0.02	Y	0.02	**450.33**	450.69	452.51	Curb Inlet
	106A	106	441.02	4.55	0.25	0.08				0.10	0.05	Y	0.08	**441.11**	441.32	443.22	Curb Inlet
	120	107	441.54	10.58	0.25	0.43	9.81	1.64	0	0.58	0.29	Y	1.15	**442.69**	442.49	444.49	Curb Inlet
	121	120	442.69	11.91	0.25	0.55	4.95	11.75	0	1.69	0.85	Y	2.25	**444.94**	445.21	447.35	Curb Inlet
	122	121	445.31	11.75	0.25	0.54	3.38	5.79	90	1.41	0.70	Y	1.34	**446.65**	452.94	455.10	Curb Inlet
	123	122	452.83	5.79	0.25	0.13				0.17	0.08	Y	0.16	**452.99**	453.17	455.24	Curb Inlet
	120A	120	442.69	4.39	0.25	0.07				0.10	0.05	Y	0.06	**442.76**	442.80	444.63	Curb Inlet
	121A	121	445.31	5.32	0.25	0.11				0.14	0.07	Y	0.17	**445.48**	445.55	447.50	Curb Inlet
	108A	108	442.30	5.72	0.25	0.13				0.16	0.08	Y	0.10	**442.40**	443.09	444.51	Curb Inlet
	110A	110	451.75	3.88	0.25	0.06				0.08	0.04	Y	0.05	**451.80**	452.13	453.75	Curb Inlet
	112A	112	463.46	3.87	0.25	0.06				0.08	0.04	Y	0.08	**463.54**	463.69	464.27	Curb Inlet

Reference Note	INLET STATION Up	INLET STATION Down	Outlet Water Surface Elev.	JUNCTION LOSS V_0	H_0 Loss Coefficient k	H_0	Q_i	V_i	Angle	1.3 H_t	0.5 H_t	0.5 IS-1 Applicable	Final H	Inlet Water Surface Elev.	Inlet Invert +0.8D Elev.	Rim/Flow Line Elev.	Remarks
0	**1**	**1A**	**2**	**8**	**9A**	**9**	**10**	**11**	**14**	**17**	**18**	**18A**	**19**	**20**	**20A**	**B**	**C**
OUTFALL	**11**	10	430.33	13.06	0.25	0.66	13.78	13.23	0	2.10	1.05	Y	3.50	**433.83**	434.46	436.93	Curb Inlet
	12	11	434.56	13.23	0.25	0.68	10.35	12.43	0	1.98	0.99	Y	2.63	**437.19**	438.84	441.32	Manhole
	13	12	438.89	12.43	0.25	0.60	8.20	11.75	0	1.75	0.88	Y	2.26	**441.15**	441.37	443.49	Curb Inlet
	14	13	441.90	11.75	0.25	0.54	4.64	8.51	90	2.23	1.12	Y	4.10	**446.00**	450.27	452.62	Manhole
	15	14	450.37	8.49	0.25	0.28	2.03	7.31	0	0.74	0.37	Y	0.53	**450.90**	452.05	454.43	Curb Inlet
	16	15	452.15	7.31	0.25	0.21	1.81	7.35	41	1.13	0.56	Y	0.73	**452.88**	458.99	460.66	Curb Inlet
	17	16	459.09	7.35	0.25	0.21	0.73	3.41	49	0.47	0.23	Y	0.26	**459.35**	460.67	462.78	Curb Inlet
	18	17	460.77	3.41	0.25	0.05				0.06	0.03	Y	0.03	**460.80**	461.08	462.53	Curb Inlet
	11A	11	434.51	4.14	0.25	0.07				0.09	0.04	Y	0.05	**434.56**	435.01	436.93	Curb Inlet
	12A	12	439.09	7.87	0.25	0.24	2.78	5.30	90	0.91	0.45	Y	0.52	**439.61**	439.72	441.92	Curb Inlet
	12B	12A	439.72	5.30	0.25	0.11				0.14	0.07	Y	0.13	**439.85**	440.10	441.92	Curb Inlet
	13A	13	441.37	5.32	0.25	0.11				0.14	0.07	Y	0.09	**441.46**	442.19	444.34	Curb Inlet
	14A	14	450.37	8.51	0.25	0.28	3.53	5.70	90	1.05	0.53	Y	0.64	**451.01**	451.00	453.37	Curb Inlet
	14B	14A	451.10	5.70	0.25	0.13				0.16	0.08	Y	0.16	**451.26**	451.41	453.23	Curb Inlet
	15A	15	452.15	3.88	0.25	0.06				0.08	0.04	Y	0.05	**452.20**	452.53	454.43	Curb Inlet
OUTFALL	**140A**	140	426.15	6.64	0.25	0.17	32.72	0.86	0	0.23	0.11	Y	0.36	**426.51**	427.23	437.79	Manhole
	141	140A	435.52	6.67	0.25	0.17	32.76	6.64	49	0.98	0.49	Y	0.83	**436.35**	437.09	445.48	Manhole
	142	141	440.19	6.67	0.25	0.17	31.86	6.67	54	1.01	0.50	Y	0.62	**440.81**	440.74	444.70	Curb Inlet
	143	142	440.94	10.14	0.25	0.40	21.58	6.67	77	1.41	0.71	Y	1.23	**442.17**	441.72	444.55	Curb Inlet
	144	143	442.17	6.87	0.25	0.18	20.15	10.14	12	1.28	0.64	Y	1.10	**443.27**	443.22	445.32	Curb Inlet
	145	144	443.32	6.41	0.25	0.16	20.18	6.87	90	1.21	0.60	Y	1.34	**444.66**	445.75	449.00	Manhole
	146	145	445.85	6.42	0.25	0.16	15.56	6.41	0	0.50	0.25	Y	0.42	**446.27**	446.57	449.81	Curb Inlet
	147	146	447.67	4.95	0.25	0.10	13.15	6.42	0	0.42	0.21	Y	1.70	**449.37**	454.23	456.37	Curb Inlet
	148	147	454.33	7.44	0.25	0.21	12.47	4.95	17	0.56	0.28	Y	1.86	**456.19**	456.47	459.12	Curb Inlet
	149	148	456.57	7.06	0.25	0.19	9.05	7.44	17	0.88	0.44	Y	1.49	**458.06**	458.70	462.12	Curb Inlet
	150	149	458.80	5.12	0.25	0.10	8.70	7.06	45	0.95	0.48	Y	0.67	**459.47**	459.78	462.26	Curb Inlet
	151	150	459.88	4.92	0.25	0.09	6.94	5.12	45	0.55	0.28	Y	0.48	**460.36**	460.34	462.38	Curb Inlet
	152	151	460.44	3.93	0.25	0.06	5.97	4.92	90	0.59	0.30	Y	0.41	**460.85**	460.65	462.53	Curb Inlet
	153	152	460.85	3.38	0.25	0.04	4.56	3.93	0	0.17	0.08	Y	0.40	**461.25**	461.63	463.67	Curb Inlet
	154	153	461.68	5.19	0.25	0.10	2.23	4.28	0	0.27	0.13	Y	0.64	**462.32**	462.49	464.88	Curb Inlet
	155	154	462.59	4.28	0.25	0.07				0.09	0.05	Y	0.17	**462.76**	463.37	466.07	Curb Inlet
	160	143	442.17	4.47	0.25	0.08	3.86	1.82	33	0.15	0.07	Y	0.40	**442.58**	442.95	445.36	Curb Inlet
	161	160	443.05	3.14	0.25	0.04	1.69	4.47	62	0.42	0.21	Y	0.51	**443.56**	448.47	450.56	Curb Inlet
	162	161	448.57	4.54	0.25	0.08				0.10	0.05	Y	0.07	**448.64**	448.88	450.93	Curb Inlet
	160A	160	443.05	4.16	0.25	0.07				0.09	0.04	Y	0.05	**443.10**	443.51	445.59	Curb Inlet
	143A	143	442.17	4.63	0.25	0.08		0.71		0.11	0.06	Y	0.18	**442.36**	442.32	444.67	Grate Inlet
	144A	144	443.87	3.55	0.25	0.05				0.06	0.03	Y	0.04	**443.91**	444.15	445.99	Curb Inlet
	146A	146	447.72	5.84	0.25	0.13	0.22	1.87	45	0.23	0.11	Y	0.16	**447.88**	448.13	449.96	Curb Inlet
	146B	146A	448.23	1.87	0.25	0.01				0.02	0.01	Y	0.01	**448.24**	448.41	449.75	Curb Inlet
	147A	147	454.38	4.51	0.25	0.08				0.10	0.05	Y	0.07	**454.45**	454.69	456.52	Curb Inlet
	149A	149	458.75	5.53	0.25	0.12	2.85	5.30	90	0.75	0.38	Y	0.59	**459.34**	459.73	463.64	Curb Inlet
	149B	149A	459.83	5.30	0.25	0.11	2.27	5.08	0	0.32	0.16	Y	0.21	**460.04**	460.14	463.79	Curb Inlet
	149C	149B	460.24	5.08	0.25	0.10				0.13	0.07	Y	0.09	**460.33**	460.44	461.77	Grate Inlet
	154A	154	462.59	3.71	0.25	0.05				0.07	0.03	Y	0.04	**462.63**	462.90	464.73	Curb Inlet
OUTFALL	**26**	25	430.33	4.04	0.25	0.06	2.55	0.78		0.09	0.04	Y	0.30	**430.63**	429.40	433.95	Curb Inlet
	27	26	430.63	1.00	0.25	0.00		4.04		0.12	0.06	Y	0.08	**430.71**	430.83	433.52	Curb Inlet
	26A	26	430.63	2.08	0.25	0.02		1.00		0.03	0.01	Y	0.18	**430.81**	432.54	435.25	Curb Inlet
OUTFALL	**21**	20	430.33	1.02	0.25	0.00	0.59	2.08		0.04	0.02	Y	0.03	**430.36**	429.16	434.96	Curb Inlet
	22	21	432.19	0.48	0.25	0.00		1.02		0.01	0.00	Y	0.01	**432.20**	432.35	435.10	Curb Inlet
OUTFALL	**31**	30	430.80	7.10	0.25	0.20	68.35	0.48	90	0.26	0.13	Y	0.23	**431.03**	431.08	434.52	Manhole
	32	31	431.18	7.10	0.25	0.20	68.16	7.10	37	1.02	0.51	Y	0.58	**431.76**	431.38	434.63	Curb Inlet
	33	32	431.76	7.08	0.25	0.19	67.97	7.10	90	1.32	0.66	Y	0.78	**432.55**	431.82	434.49	Curb Inlet
	34	33	432.55	7.07	0.25	0.19	67.61	7.08	0	0.61	0.30	Y	0.54	**433.08**	432.58	434.81	Curb Inlet
	35	34	433.08	7.03	0.25	0.19	67.56	7.07	41	1.04	0.52	Y	0.86	**433.95**	433.26	436.09	Curb Inlet
	36	35	433.95	7.02	0.25	0.19	59.27	7.03	41	1.03	0.52	Y	0.66	**434.61**	433.68	436.93	Curb Inlet
	37	36	434.61	8.38	0.25	0.27	57.09	7.02	45	1.17	0.58	Y	0.84	**435.45**	434.23	436.93	Curb Inlet
	38	37	435.45	8.08	0.25	0.25	54.14	8.38	45	1.49	0.74	Y	0.96	**436.41**	434.68	437.46	Curb Inlet
	59	38	436.41	11.03	0.25	0.47	51.82	8.08	0	1.07	0.54	Y	2.42	**438.83**	437.49	440.83	Curb Inlet
	60	59	438.83	10.56	0.25	0.43	42.10	11.03	0	1.42	0.71	Y	1.94	**440.78**	439.49	444.90	Manhole
	61	60	441.98	8.58	0.25	0.29	40.01	10.56	0	1.16	0.58	Y	1.08	**443.06**	443.36	446.70	Curb Inlet
	62	61	443.46	8.15	0.25	0.26	20.65	8.58	0	0.85	0.43	Y	1.22	**444.68**	446.00	450.62	Curb Inlet
	63	62	448.50	4.00	0.25	0.06	19.01	8.15	13	0.77	0.39	Y	0.50	**449.00**	450.39	452.76	Curb Inlet
	64	63	450.50	3.87	0.25	0.06	18.51	4.00	90	0.42	0.21	Y	0.39	**450.89**	453.79	456.68	Curb Inlet
	65	64	453.89	3.77	0.25	0.06	18.00	3.87	79	0.38	0.19	Y	0.24	**454.13**	454.05	456.53	Curb Inlet
	66	65	454.15	5.73	0.25	0.13	15.29	3.77	79	0.45	0.23	Y	0.90	**455.05**	459.77	463.96	Curb Inlet
	67	66	461.62	4.87	0.25	0.09	14.61	5.73	90	0.82	0.41	Y	1.16	**462.78**	468.36	471.66	Curb Inlet
	68	67	468.46	4.65	0.25	0.08	12.06	4.87	45	0.50	0.25	Y	0.36	**468.82**	468.61	471.52	Curb Inlet
	69	68	468.82	3.84	0.25	0.06	8.56	4.65	45	0.43	0.22	Y	0.30	**469.12**	468.89	471.03	Curb Inlet
	70	69	469.12	6.97	0.25	0.19	6.29	3.84	0	0.35	0.17	Y	2.01	**471.13**	474.16	475.95	Curb Inlet
	71	70	474.26	5.12	0.25	0.10	3.02	6.97	0	0.48	0.24	Y	1.41	**475.67**	479.81	481.64	Curb Inlet
	72	71	479.91	0.68	0.25	0.00		5.12		0.19	0.09	Y	0.10	**480.01**	480.07	481.78	Curb Inlet
	71A	71	479.95	2.46	0.25	0.02		0.68		0.03	0.02	Y	0.32	**480.27**	482.82	484.51	Curb Inlet
	34A	34	433.08	0.53	0.25	0.00		2.46		0.04	0.02	Y	0.02	**433.11**	433.11	434.96	Curb Inlet
	90	36	434.61	6.63	0.25	0.17	3.79	0.53	0	0.22	0.11	Y	1.99	**436.60**	436.74	439.05	Curb Inlet
	91	90	436.84	3.09	0.25	0.04	2.59	6.63	90	0.98	0.49	Y	0.99	**437.83**	439.37	441.64	Curb Inlet
	92	91	439.47	2.11	0.25	0.02		3.09		0.09	0.04	Y	0.10	**439.57**	439.85	441.64	Curb Inlet
	90A	90	436.84	2.71	0.25	0.03		2.11		0.07	0.03	Y	0.12	**436.96**	437.22	439.05	Curb Inlet
	59A	59	438.83	1.95	0.25	0.01		2.71		0.07	0.04	Y	0.07	**438.90**	439.00	440.97	Curb Inlet
	38A	38	436.41	2.04	0.25	0.02		1.95		0.05	0.02	Y	0.07	**436.48**	435.61	437.41	Curb Inlet
	95	60	442.33	8.51	0.25	0.28	6.80	2.04	0	0.40	0.20	Y	0.75	**443.08**	443.53	445.66	Curb Inlet
	96	95	443.63	5.54	0.25	0.12	3.28	8.51	0	0.67	0.33	Y	1.66	**445.29**	447.90	449.97	Curb Inlet
	97	96	448.00	2.67	0.25	0.03	2.66	5.54	90	0.69	0.34	Y	0.69	**448.69**	452.45	454.75	Curb Inlet
	98	97	452.55	2.17	0.25	0.02		2.67		0.07	0.04	Y	0.08	**452.63**	452.86	454.60	Curb Inlet

STORM INLET COMPUTATIONS

INLET NO.			RUNOFF TO INLET								CURB / SUMP INLET COMPUTATIONS																	RUNOFF INTERCEPTED					REMARKS
Inlet Structure No.	Inlet Type	Length (ft)	Drainage Area (ac)	C	CA	Sum CA	I (in/hr)	Q, increm (cfs)	Q, carryover (cfs)	Qt, gutter (cfs)	S, gutter (ft/ft)	Sx, cross slope (ft/ft)	T, spread (ft)	W (ft)	WFT	Sw (ft/ft)	SwSx	Eo	a (in)	SYw = a/(12W)	Se (ft/ft) = Sx + SwEo	Lt (ft)	P, eff length (ft)	Lt/Lt	d (ft)	E	h (ft)	Qi intercepted	dih	Qb, carryover (cfs)	d, sump (ft)	T, spread at sag (ft)	
59	TYPE E	6	0.10	0.70	0.07	--	4.00	0.28	0.00	0.28	0.0400	0.0208	1.38	2.00	1.45	0.0833	4.00	1.00	3.50	0.15	0.17	4.87	--	1.23	0.12	1.00	0.33	0.28	--	0.00	--	--	--
38	TYPE E	6	0.26	0.70	0.18	--	4.00	0.73	0.00	0.73	0.0150	0.0208	3.44	2.00	0.58	0.0833	4.00	0.97	3.50	0.15	0.16	5.50	--	1.09	0.20	1.00	0.33	0.73	--	0.00	--	--	--
37	TYPE E	8	0.66	0.60	0.40	--	4.00	1.58	0.00	1.58	0.0150	0.0208	6.03	2.00	0.33	0.0833	4.00	0.81	3.50	0.15	0.14	8.36	--	0.96	0.25	1.00	0.33	1.58	--	0.01	--	--	--
36	TYPE E	6	0.23	0.70	0.16	--	4.00	0.64	0.00	0.64	0.0150	0.0208	3.05	2.00	0.65	0.0833	4.00	0.99	3.50	0.15	0.16	5.19	--	1.16	0.19	1.00	0.33	0.64	--	0.00	--	--	--
35	TYPE E	6	0.05	0.80	0.04	--	4.00	0.16	0.00	0.16	0.0150	0.0208	1.35	2.00	1.48	0.0833	4.00	1.00	3.50	0.15	0.17	2.87	--	2.09	0.11	1.00	0.33	0.16	--	0.00	--	--	--
34	TYPE E	6	0.06	0.75	0.05	--	4.00	0.18	0.00	0.18	0.0110	0.0208	1.49	2.00	1.34	0.0833	4.00	1.00	3.50	0.15	0.17	2.75	--	2.18	0.12	1.00	0.33	0.18	--	0.00	--	--	--
33	TYPE E	6	0.09	0.85	0.08	--	4.00	0.31	0.00	0.31	0.0100	0.0208	1.85	2.00	1.08	0.0833	4.00	--	--	--	--	--	9.60	--	0.15	--	0.33	0.31	--	0.00	0.07	0.79	SUMP
32	TYPE E	6	0.07	0.80	0.06	--	4.00	0.22	0.00	0.22	0.0010	0.0208	4.00	2.00	0.50	0.0833	4.00	--	--	--	--	--	9.60	--	0.21	--	0.33	0.22	--	0.00	0.05	0.64	SUMP
173A	TYPE E	6	0.22	0.65	0.14	--	4.00	0.57	0.00	0.57	0.0110	0.0208	3.17	2.00	0.63	0.0833	4.00	0.98	3.50	0.15	0.16	4.50	--	1.33	0.19	1.00	0.33	0.57	--	0.00	--	--	--
177	TYPE E	6	0.13	0.75	0.10	--	4.00	0.39	0.00	0.39	0.0290	0.0208	1.66	2.00	1.20	0.0833	4.00	1.00	3.50	0.15	0.17	5.09	--	1.18	0.14	1.00	0.33	0.39	--	0.00	--	--	--
176	TYPE E	6	0.13	0.75	0.10	--	4.00	0.39	0.00	0.39	0.0230	0.0208	1.74	2.00	1.15	0.0833	4.00	1.00	3.50	0.15	0.17	4.74	--	1.26	0.14	1.00	0.33	0.39	--	0.00	--	--	--
175A	TYPE E	6	0.17	0.75	0.13	--	4.00	0.51	0.00	0.51	0.0120	0.0208	2.67	2.00	0.75	0.0833	4.00	1.00	3.50	0.15	0.17	4.38	--	1.37	0.18	1.00	0.33	0.51	--	0.00	--	--	--
175	TYPE E	6	0.35	0.75	0.26	--	4.00	1.05	0.00	1.05	0.0120	0.0208	5.00	2.00	0.40	0.0833	4.00	0.89	3.50	0.15	0.16	6.30	--	0.95	0.23	1.00	0.33	1.05	--	0.00	--	--	--
174	TYPE E	8	0.55	0.75	0.41	--	4.00	1.65	0.00	1.65	0.0100	0.0208	6.91	2.00	0.29	0.0833	4.00	0.75	3.50	0.15	0.13	7.84	--	1.02	0.27	1.00	0.33	1.65	--	0.00	--	--	--
173	TYPE E	6	0.11	0.65	0.07	--	4.00	0.29	0.00	0.29	0.0010	0.0208	4.81	2.00	0.42	0.0833	4.00	--	--	--	--	--	9.60	--	0.23	--	0.33	0.29	--	0.00	0.06	0.76	SUMP
172	TYPE E	12	0.61	0.75	0.46	--	4.00	1.83	0.00	1.83	0.0010	0.0208	12.45	2.00	0.16	0.0833	4.00	--	--	--	--	--	15.60	--	0.38	--	0.33	1.83	--	0.00	0.14	1.65	SUMP
53A	TYPE E	6	0.15	0.85	0.13	--	4.00	0.51	0.00	0.51	0.0100	0.0208	2.95	2.00	0.68	0.0833	4.00	0.99	3.50	0.15	0.17	4.16	--	1.44	0.19	1.00	0.33	0.51	--	0.00	--	--	--
50A	TYPE E	8	0.37	0.70	0.26	--	4.00	1.04	0.00	1.04	0.0400	0.0208	3.01	2.00	0.67	0.0833	4.00	0.99	3.50	0.15	0.17	8.49	--	0.94	0.19	0.99	0.33	1.03	--	0.01	--	--	--
48A	TYPE E	6	0.29	0.70	0.20	--	4.00	0.81	0.00	0.81	0.0200	0.0208	3.33	2.00	0.60	0.0833	4.00	0.98	3.50	0.15	0.16	6.26	--	0.96	0.19	1.00	0.33	0.81	--	0.00	--	--	--
47D	TYPE E	10	0.78	0.60	0.47	--	4.00	1.87	0.00	1.87	0.0580	0.0208	4.31	2.00	0.46	0.0833	4.00	0.93	3.50	0.15	0.16	12.56	--	0.80	0.21	0.94	0.33	1.76	--	0.11	--	--	--
47C	TYPE E	10	0.42	0.70	0.29	--	4.00	1.18	0.00	1.18	0.0580	0.0208	2.82	2.00	0.71	0.0833	4.00	0.99	3.50	0.15	0.17	9.99	--	1.00	0.18	1.00	0.33	1.18	--	0.00	--	--	--
47B	TYPE E	10	0.55	0.60	0.33	--	4.00	1.32	0.11	1.43	0.0580	0.0208	3.43	2.00	0.58	0.0833	4.00	0.97	3.50	0.15	0.16	10.94	--	0.91	0.20	0.99	0.33	1.41	--	0.02	--	--	--
47A	TYPE E	10	0.58	0.70	0.41	--	4.00	1.62	0.02	1.64	0.0520	0.0208	4.06	2.00	0.49	0.0833	4.00	0.94	3.50	0.15	0.16	11.42	--	0.88	0.21	0.98	0.33	1.60	--	0.04	--	--	--
44D	TYPE E	12	0.88	0.60	0.53	--	4.00	2.11	0.00	2.11	0.0400	0.0208	5.33	2.00	0.38	0.0833	4.00	0.86	3.50	0.15	0.15	12.29	--	0.98	0.24	1.00	1.33	2.11	--	0.00	--	--	--
44C	TYPE E	6	0.15	0.70	0.11	--	4.00	0.42	0.00	0.42	0.0400	0.0208	1.61	2.00	1.24	0.0833	4.00	1.00	3.50	0.15	0.17	5.78	--	1.04	0.13	1.00	2.33	0.42	--	0.00	--	--	--
44B	TYPE E	6	0.25	0.70	0.18	--	4.00	0.70	0.00	0.70	0.0400	0.0208	1.95	2.00	1.03	0.0833	4.00	1.00	3.50	0.15	0.17	7.16	--	0.84	0.16	0.96	0.33	0.67	--	0.03	--	--	--
44A	TYPE E	12	0.90	0.60	0.54	--	4.00	2.16	0.00	2.16	0.0400	0.0208	5.40	2.00	0.37	0.0833	4.00	0.86	3.50	0.15	0.15	12.44	--	0.96	0.24	1.00	0.33	2.15	--	0.01	--	--	--
56	TYPE E	6	0.13	0.85	0.11	--	4.00	0.44	0.00	0.44	0.0100	0.0208	2.50	2.00	0.80	0.0833	4.00	1.00	3.50	0.15	0.17	3.90	--	1.54	0.18	1.00	0.33	0.44	--	0.00	--	--	--
55	TYPE E	10	0.95	0.70	0.67	--	4.00	2.66	0.00	2.66	0.0100	0.0208	8.79	2.00	0.23	0.0833	4.00	0.64	3.50	0.15	0.11	10.42	--	0.96	0.31	1.00	0.33	2.65	--	0.01	--	--	--
54	TYPE E	8	0.55	0.70	0.39	--	4.00	1.54	0.00	1.54	0.0100	0.0208	6.66	2.00	0.30	0.0833	4.00	0.77	3.50	0.15	0.13	7.53	--	1.06	0.26	1.00	0.33	1.54	--	0.00	--	--	--
53	TYPE E	10	0.50	0.70	0.35	--	4.00	1.40	0.00	1.40	0.0350	0.0208	4.18	2.00	0.48	0.0833	4.00	0.94	3.50	0.15	0.16	9.52	--	1.05	0.21	1.00	0.33	1.40	--	0.00	--	--	--
52	TYPE E	10	0.47	0.75	0.35	--	4.00	1.41	0.00	1.41	0.0400	0.0208	3.81	2.00	0.50	0.0833	4.00	0.95	3.50	0.15	0.16	9.88	--	1.05	0.21	1.00	0.33	1.41	--	0.00	--	--	--
51	TYPE E	10	0.46	0.70	0.32	--	4.00	1.29	0.00	1.29	0.0400	0.0208	3.70	2.00	0.54	0.0833	4.00	0.96	3.50	0.15	0.16	9.44	--	1.06	0.20	1.00	0.33	1.29	--	0.00	--	--	--
50	TYPE E	10	0.43	0.70	0.30	--	4.00	1.20	0.00	1.20	0.0400	0.0208	3.48	2.00	0.57	0.0833	4.00	0.97	3.50	0.15	0.16	9.12	--	1.10	0.20	1.00	0.33	1.20	--	0.00	--	--	--
49	TYPE E	6	0.20	0.70	0.14	--	4.00	0.56	0.00	0.56	0.0200	0.0208	2.17	2.00	0.92	0.0833	4.00	1.00	3.50	0.15	0.17	5.30	--	1.13	0.17	1.00	0.33	0.56	--	0.00	--	--	--
48	TYPE E	6	0.19	0.70	0.13	--	4.00	0.53	0.00	0.53	0.0200	0.0208	2.01	2.00	1.00	0.0833	4.00	1.00	3.50	0.15	0.17	5.18	--	1.16	0.17	1.00	0.33	0.53	--	0.00	--	--	--
47	TYPE E	10	0.65	0.70	0.46	--	4.00	1.82	0.00	1.82	0.0400	0.0208	4.83	2.00	0.38	0.0833	4.00	0.90	3.50	0.15	0.15	11.32	--	0.98	0.23	0.98	0.33	1.81	--	0.04	--	--	--
46	TYPE E	8	0.41	0.70	0.29	--	4.00	1.15	0.00	1.15	0.0400	0.0208	3.33	2.00	0.60	0.0833	4.00	0.98	3.50	0.15	0.16	8.92	--	0.90	0.19	0.98	1.33	1.13	--	0.02	--	--	--
45	TYPE E	6	0.16	0.70	0.11	--	4.00	0.45	0.00	0.45	0.0200	0.0208	1.88	2.00	1.06	0.0833	4.00	1.00	3.50	0.15	0.17	4.82	--	1.24	0.16	1.00	0.33	0.45	--	0.00	--	--	--
44	TYPE E	8	0.62	0.60	0.37	--	4.00	1.49	0.00	1.49	0.0200	0.0208	5.32	2.00	0.38	0.0833	4.00	0.86	3.50	0.15	0.15	8.61	--	0.93	0.24	0.99	0.33	1.48	--	0.01	--	--	--
43	TYPE E	8	0.45	0.70	0.32	--	4.00	1.26	0.00	1.26	0.0200	0.0208	4.76	2.00	0.42	0.0833	4.00	0.90	3.50	0.15	0.15	7.86	--	1.02	0.22	1.00	0.33	1.26	--	0.00	--	--	--
42	TYPE E	6	0.23	0.70	0.16	--	4.00	0.64	0.00	0.64	0.0100	0.0208	3.70	2.00	0.54	0.0833	4.00	--	--	--	--	--	9.60	--	0.20	--	0.33	0.64	--	0.00	0.11	1.30	SUMP
132A	TYPE E	6	0.16	0.70	0.11	--	4.00	0.45	0.00	0.45	0.0100	0.0208	2.55	2.00	0.78	0.0833	4.00	--	--	--	--	--	9.60	--	0.18	--	0.33	0.45	--	0.00	0.09	1.02	SUMP
131A	TYPE E	6	0.06	0.80	0.05	--	4.00	0.19	0.00	0.19	0.0220	0.0208	1.34	2.00	1.49	0.0833	4.00	1.00	3.50	0.15	0.17	3.48	--	1.73	0.11	1.00	0.33	0.19	--	0.00	--	--	--
137	TYPE E	6	0.05	0.75	0.04	--	4.00	0.15	0.00	0.15	0.0110	0.0208	1.39	2.00	1.43	0.0833	4.00	1.00	3.50	0.15	0.17	2.55	--	2.36	0.12	1.00	0.33	0.15	--	0.00	--	--	--
136	TYPE E	10	0.53	0.75	0.40	--	4.00	1.59	0.00	1.59	0.0400	0.0208	4.38	2.00	0.46	0.0833	4.00	0.93	3.50	0.15	0.16	10.52	--	0.95	0.22	1.00	0.33	1.58	--	0.01	--	--	--
135	TYPE E	10	0.45	0.75	0.34	--	4.00	1.35	0.00	1.35	0.0400	0.0208	3.85	2.00	0.52	0.0833	4.00	0.96	3.50	0.15	0.16	9.66	--	1.09	0.21	1.00	0.33	1.35	--	0.00	--	--	--
134	TYPE E	6	0.09	0.70	0.06	--	4.00	0.25	0.00	0.25	0.0190	0.0208	1.53	2.00	1.31	0.0833	4.00	1.00	3.50	0.15	0.17	3.73	--	1.61	0.13	1.00	0.33	0.25	--	0.00	--	--	--
133	TYPE E	6	0.32	0.75	0.24	--	4.00	0.96	0.00	0.96	0.0190	0.0208	3.95	2.00	0.51	0.0833	4.00	0.95	3.50	0.15	0.16	6.72	--	0.89	0.21	0.98	0.33	0.94	--	0.02	--	--	--
132	TYPE E	6	0.06	0.80	0.05	--	4.00	0.19	0.00	0.19	0.0010	0.0208	3.50	2.00	0.57	0.0833	4.00	--	--	--	--	--	9.60	--	0.20	--	0.33	0.19	--	0.00	0.05	0.58	SUMP
110A	TYPE E	6	0.20	0.85	0.17	--	4.00	0.68	0.00	0.68	0.0400	0.0208	1.93	2.00	1.04	0.0833	4.00	1.00	3.50	0.15	0.17	7.67	--	0.85	0.16	0.97	0.33	0.66	--	0.02	--	--	--
108A	TYPE E	8	0.36	0.70	0.25	--	4.00	1.01	0.00	1.01	0.0260	0.0208	3.60	2.00	0.56	0.0833	4.00	0.97	3.50	0.15	0.16	7.46	--	1.07	0.20	1.00	0.33	1.01	--	0.00	--	--	--
120A	TYPE E	8	0.34	0.70	0.24	--	4.00	0.95	0.22	1.17	0.0400	0.0208	3.39	2.00	0.59	0.0833	4.00	0.98	3.50	0.15	0.16	9.00	--	0.89	0.20	0.98	0.33	1.15	--	0.02	--	--	--
121A	TYPE E	12	0.87	0.70	0.61	--	4.00	2.44	0.22	2.65	0.0720	0.0208	5.10	2.00	0.39	0.0833	4.00	0.88	3.50	0.15	0.15	15.98	--	0.75	0.23	0.92	0.33	2.43	--	0.22	--	--	--
123	TYPE E	10	0.74	0.70	0.52	--	4.00	2.07	0.00	2.07	0.0720	0.0208	4.29	2.00	0.47	0.0833	4.00	0.93	3.50	0.15	0.16	13.98	--	0.72	0.21	0.90	0.33	1.86	--	0.22	--	--	--
122	TYPE E	10	0.35	0.70	0.25	--	4.00	0.98	0.00	0.98	0.0720	0.0208	1.98	2.00	1.01	0.0833	4.00	1.00	3.50	0.15	0.17	9.84	--	1.02	0.17	1.00	0.33	0.98	--	0.00	--	--	--
121	TYPE E	6	0.22	0.70	0.15	--	4.00	0.62	0.00	0.62	0.0720	0.0208	1.06	2.00	1.20	0.0833	4.00	1.00	3.50	0.15	0.17	8.09	--	0.74	0.14	0.91	0.33	0.56	--	0.05	--	--	--
120	TYPE E	8	0.38	0.70	0.27	--	4.00	1.06	0.05	1.12	0.0400	0.0208	3.25	2.00	0.62	0.0833	4.00	0.98	3.50	0.15	0.16	8.80	--	0.91	0.19	0.99	0.33	1.10	--	0.02	--	--	--
106A	TYPE E	6	0.44	0.70	0.31	--	4.00	1.23	0.00	1.23	0.0010	0.0208	10.48	2.00	0.19	0.0833	4.00	--	--	--	--	--	9.60	--	0.34	--	0.33	1.23	--	0.00	0.17	2.01	SUMP
104B	TYPE E	6	0.08	0.75	0.06	--	4.00	0.24	0.00	0.24	0.0400	0.0208	1.31	2.00	1.53	0.0833	4.00	1.00	3.50	0.15	0.17	4.57	--	1.31	0.11	1.00	0.33	0.24	--	0.00	--	--	--
104A	TYPE E	6	0.22	0.70	0.15	--	4.00	0.62	0.00	0.62	0.0400	0.0208	1.86	2.00	1.08	0.0833	4.00	1.00	3.50	0.15	0.17	6.79	--	0.88	0.15	0.98	0.33	0.60	--	0.01	--	--	--
101A	TYPE E	6	0.16	0.75	0.12	--	4.00	0.48	0.00	0.48	0.0210	0.0208	1.91	2.00	1.05	0.0833	4.00	1.00	3.50	0.15	0.17	5.04	--	1.19	0.16	1.00	0.33	0.48	--	0.00	--	--	--
114	TYPE E	6	0.09	0.85	0.08	--	4.00	0.31	0.00	0.31	0.0400	0.0208	1.43	2.00	1.40	0.0833	4.00	1.00	3.50	0.15	0.17	5.06	--	1.19	0.12	1.00	0.33	0.31	--	0.00	--	--	--
113	TYPE E	6	0.20	0.70	0.14	--	4.00	0.56	0.00	0.56	0.0400	0.0208	1.79	2.00	1.12	0.0833	4.00	1.00	3.50	0.15	0.17	6.52	--	0.92	0.15	0.99	0.33	0.55	--	0.01	--	--	--
112	TYPE E	6	0.23	0.50	0.12	--	4.00	0.46	0.00	0.46	0.0400	0.0208	1.67	2.00	1.20	0.0833	4.00	1.00	3.50	0.15	0.17	6.00	--	1.00	0.14	1.00	0.33	0.46	--	0.00	--	--	--
111	TYPE E	6	0.17	0.70	0.12	--	4.00	0.48	0.00	0.48	0.0400	0.0208	1.69	2.00	1.19	0.0833	4.00	1.00	3.50	0.15	0.17	6.09	--	0.99	0.14	1.00	0.33	0.48	--	0.00	--	--	--
110	TYPE E	10	0.49	0.70	0.34	--	4.00	1.37	0.00	1.37	0.0400	0.0208	3.90	2.00	0.51	0.0833	4.00	0.95	3.50	0.15	0.16	9.74	--	1.03	0.21	1.00	0.33	1.37	--	0.00	--	--	--
109	TYPE E	6	0.15	0.65	0.10	--	4.00	0.39	0.00	0.39	0.0360	0.0208	1.60	2.00	1.25	0.0833	4.00	1.00	3.50	0.15	0.17	5.43	--	1.11	0.13	1.00	0.33	0.39	--	0.00	--	--	--
108	TYPE E	6	0.29	0.65	0.19	--	4.00	0.75	0.00	0.75	0.0250	0.0208	2.75	2.00	0.73	0.0833	4.00	0.99	3.50	0.15	0.17	6.43	--	0.93	0.18	0.99	0.33	0.75	--	0.01	--	--	--
106	TYPE E	6	0.18	0.70	0.13	--	4.00	0.50	0.00	0.50	0.0010	0.0208	6.78	2.00	0.29	0.0833	4.00	--	--	--	--	--	9.60	--	0.27	--	0.33	0.50	--	0.00	0.09	1.11	SUMP
105	TYPE E	6	0.18	0.75	0.14	--	4.00	0.54	0.00	0.54	0.0320	0.0208	1.85	2.00	1.08	0.0833	4.00	1.00	3.50	0.15	0.17	6.01	--	1.00	0.15	1.00	0.33	0.54	--	0.00	--	--	--
103	TYPE E	6	0.21	0.70	0.15	--	4.00	0.59	0.00	0.59	0.0370	0.0208	1.85	2.00	1.08	0.0833	4.00	1.00	3.50	0.15	0.17	6.50	--	0.92	0.15	0.99	0.33	0.58	--	0.01	--	--	--
102	TYPE E	6	0.16	0.60	0.10	--	4.00	0.38	0.00	0.38	0.0400	0.0208	1.56	2.00	1.28	0.0833	4.00	1.00	3.50	0.15	0.17	5.56	--	1.08	0.13	1.00	0.33	0.38	--	0.00	--	--	--
101	TYPE E	6	0.02	0.85	0.02	--	4.00	0.07	0.00	0.07	0.0300	0.0208	0.86	2.00	2.33	0.0833	4.00	1.00	3.50	0.15	0.17	2.47	--	2.43	0.07	1.00	0.33	0.07	--	0.00	--	--	--
80A	TYPE E	10	0.59	0.60	0.35	--	4.00	1.42	0.00	1.42	0.0240	0.0208	0.21	2.00	9.59	1.0833	52.00	0.90	3.50	0.15	0.15	8.74	--	1.14	0.23	1.00	1.33	1.42	--	0.00	--	--	--
155	TYPE E	6	0.57	0.60	0.34	--	4.00	1.37	0.00	1.37	0.0200	0.0208	5.03	2.00	0.40	0.0833	4.00	0.88	3.50	0.15	0.15	8.22	--	0.73	0.23	0.91	0.33	1.24	--	0.13	--	--	--
154	TYPE E	6	0.38	0.60	0.23	--	4.00	0.91	0.00	0.91	0.0100	0.0208	4.83	2.00	0.41	0.0833	4.00	0.90	3.50	0.15	0.15	5.59	--	1.07	0.23	1.00	0.33	0.91	--	0.00	--	--	--

GRATE INLET DESIGN COMPUTATIONS

INLET NO.	TYPE	AREA (Ac)	"C"	"I" (in/hr)	GRATE DESIGN				REMARKS
					FLOW (cfs)	$AREA_{50}$ (sf)	$PERIM_{50}$ (ft)	DEPTH (ft)	
149C	TYPE A	0.58	0.60	6.53	2.27	3.00	9.42	0.19	SUMP
143A	TYPE A	1.74	0.50	6.53	5.68	3.00	9.42	0.34	SUMP
54B	TYPE A	2.29	0.45	6.53	6.73	3.00	9.42	0.38	SUMP
54A	TYPE A	2.97	0.50	6.53	9.70	2.25	8.25	0.80	SUMP

STORM INLET COMPUTATIONS

INLET NO.			RUNOFF TO INLET								CURB / SUMP INLET COMPUTATIONS																	RUNOFF INTERCEPTED					REMARKS
Inlet Structure No.	Inlet Type	Length (ft)	Drainage Area (ac)	C	CA	Sum CA	I (in/hr)	Q, increm (cfs)	Q, carryover (cfs)	Qt, gutter (cfs)	S, gutter (ft/ft)	Sx, cross slope (ft/ft)	T, spread (ft)	W (ft)	WFT	Sw (ft/ft)	SwSx	Eo	a (in)	SYw = a/(12W)	Se (ft/ft) = Sx + SwEo	Lt (ft)	P, eff length (ft)	Lt/Lt	d (ft)	E	h (ft)	Qi intercepted	dih	Qb, carryover (cfs)	d, sump (ft)	T, spread at sag (ft)	
15A	TYPE E	6	0.08	0.70	0.06	--	4.00	0.22	0.00	0.22	0.0400	0.0208	1.27	2.00	1.57	0.0833	4.00	1.00	3.50	0.15	0.17	4.44	--	1.35	0.11	1.00	0.33	0.22	--	0.00	--	--	--
14B	TYPE E	10	0.90	0.60	0.54	--	4.00	2.16	0.00	2.16	0.0300	0.0208	5.90	2.00	0.34	0.0833	4.00	0.82	3.50	0.15	0.14	11.66	--	0.86	0.25	0.97	0.33	2.10	--	0.06	--	--	--

Reference Note	Structure Up	Structure Down	LineID	DrainageArea (ac)	RunoffCoeff (C)	IncrCxA	TotalCxA	InletTime (min)	iSys (in/hr)	Incr Flow Rate (cfs)	KnownQ (cfs)	Cumulative (cfs)	Total FlowRate (cfs)	InvertUp (ft)	InvertDn (ft)	LineLength (ft)	LineSlope (%)	LineSize (in)	Manning's Roughness Coefficient n	CapacityFull (cfs)	Vel Partial (ft/s)	PipeTravel (min)	Tc Total (min)	Grnd/Rim Elev Up (ft)
18	1	2	2A	3	4	5	6	7	8	9A	9B	9C	9	10	11	12	13	14	14A	15	16	17	17A	A
	173A	173	173A-173	0.22	0.65	0.14	0.14	5.00	6.53	0.93	0.00	0.00	0.93	432.98	432.53	52.51	0.86	15	0.012	6.48	3.5	0.25	5.00	437.59
	175A	175	175A-175	0.17	0.75	0.13	0.13	5.00	6.53	0.83	0.00	0.00	0.83	435.93	434.31	161.89	1.00	15	0.012	7.00	3.5	0.78	5.00	439.29
	178	177	178-177	0.98	0.50	0.49	0.49	5.00	6.53	3.20	0.00	0.00	3.20	435.71	435.56	29.50	0.51	15	0.012	4.99	4.3	0.11	5.00	437.57
	177	176	177-176	0.13	0.75	0.10	0.59	5.00	6.48	3.81	0.00	0.00	3.81	435.46	434.91	109.50	0.50	15	0.012	4.96	4.4	0.41	5.11	441.27
	176	175	176-175	0.13	0.75	0.10	0.69	5.00	6.34	4.34	0.00	0.00	4.34	434.81	434.31	35.36	1.41	15	0.012	8.32	6.8	0.09	5.52	438.20
	175	174	175-174	0.35	0.75	0.26	1.08	5.00	6.26	6.73	0.00	0.00	6.73	434.21	433.90	31.00	1.00	15	0.012	7.00	6.6	0.08	5.78	437.67
	174	173	174-173	0.55	0.75	0.41	1.49	5.00	6.24	9.27	0.00	0.00	9.27	433.65	432.28	38.95	3.52	18	0.012	21.34	11.5	0.06	5.85	437.52
	173	172	173-172	0.11	0.65	0.07	1.70	5.00	6.22	10.58	0.00	0.00	10.58	432.28	431.94	31.00	1.10	18	0.012	11.92	7.7	0.07	5.91	437.24
	172	171	172-171	0.61	0.75	0.46	2.16	5.00	6.20	13.38	0.00	0.00	13.38	431.84	431.26	22.15	2.62	18	0.012	18.41	11.4	0.03	5.98	437.39
OUTFALL	171	170	171-170	0.00	0.60	0.00	2.16	5.00	6.19	13.36	0.00	0.00	13.36	431.17	428.00	123.01	2.58	18	0.012	18.27	11.3	0.18	6.01	437.29
	54B	54A	54B-54A	2.29	0.45	1.03	1.03	5.00	6.53	6.73	0.00	0.00	6.73	470.56	466.39	323.82	1.29	18	0.012	12.91	7.4	0.73	5.00	473.75
	54A	54	54A-54	2.97	0.50	1.49	2.52	5.00	6.28	15.79	0.00	0.00	15.79	465.89	464.12	114.50	1.55	24	0.012	30.47	9.8	0.19	5.73	469.24
	53A	53	53A-53	0.15	0.85	0.13	0.13	5.00	6.53	0.83	0.00	0.00	0.83	463.73	462.96	38.64	1.99	15	0.012	9.88	4.4	0.15	5.00	467.31
	50A	50	50A-50	0.37	0.70	0.26	0.26	5.00	6.53	1.69	0.00	0.00	1.69	455.03	454.55	38.00	1.26	15	0.012	7.87	4.9	0.13	5.00	458.60
	48A	48	48A-48	0.29	0.70	0.20	0.20	5.00	6.53	1.33	0.00	0.00	1.33	448.70	448.20	39.14	1.28	15	0.012	7.91	4.5	0.14	5.00	452.28
	47D	47B	47D-47B	0.78	0.60	0.47	0.47	5.00	6.53	3.06	0.00	0.00	3.06	468.28	462.02	113.78	5.50	15	0.012	16.39	9.8	0.19	5.00	471.84
	47C	47B	47C-47B	0.42	0.70	0.29	0.29	5.00	6.53	1.92	0.00	0.00	1.92	461.48	461.29	31.00	0.61	15	0.012	5.48	4.0	0.13	5.00	465.12
	47B	47A	47B-47A	0.55	0.60	0.33	1.09	5.00	6.45	7.05	0.00	0.00	7.05	461.19	454.33	131.23	5.23	15	0.012	16.00	12.5	0.17	5.19	465.27
	47A	47	47A-47	0.58	0.70	0.41	1.50	5.00	6.39	9.58	0.00	0.00	9.58	454.23	447.09	126.50	5.64	18	0.012	27.04	13.8	0.15	5.37	457.79
	44D	44C	44D-44C	0.88	0.60	0.53	0.53	5.00	6.53	3.45	0.00	0.00	3.45	453.65	453.34	31.00	1.00	15	0.012	7.00	5.6	0.09	5.00	457.14
	44C	44B	44C-44B	0.15	0.70	0.11	0.63	5.00	6.49	4.11	0.00	0.00	4.11	453.24	446.29	175.90	3.95	15	0.012	13.91	9.6	0.30	5.09	457.29
	44B	44A	44B-44A	0.25	0.70	0.18	0.81	5.00	6.39	5.16	0.00	0.00	5.16	446.19	445.75	31.00	1.42	15	0.012	8.34	7.1	0.07	5.40	450.25
	44A	44	44A-44	0.90	0.60	0.54	1.35	5.00	6.36	8.57	0.00	0.00	8.57	445.65	443.20	99.69	2.46	15	0.012	10.97	9.9	0.17	5.47	450.11
	56	55	56-55	0.13	0.85	0.11	0.11	5.00	6.53	0.72	0.00	0.00	0.72	466.51	466.31	42.46	0.47	15	0.012	4.80	2.7	0.27	5.00	470.09
	55	54	55-54	0.95	0.70	0.67	0.78	5.00	6.43	4.99	0.00	0.00	4.99	466.21	464.77	138.56	1.04	15	0.012	7.13	6.3	0.37	5.27	469.90
	54	53	54-53	0.55	0.70	0.39	3.68	5.00	6.21	22.84	0.00	0.00	22.84	464.02	462.31	123.00	1.39	24	0.012	28.90	10.2	0.20	5.93	468.49
	53	52	53-52	0.50	0.70	0.35	4.15	5.00	6.15	25.54	0.00	0.00	25.54	461.71	461.36	35.36	0.99	30	0.012	44.21	9.4	0.06	6.13	467.47
	52	51	52-51	0.47	0.75	0.35	4.51	5.00	6.13	27.62	0.00	0.00	27.62	461.26	460.95	31.26	0.99	30	0.012	44.25	9.6	0.05	6.19	469.23
	51	50	51-50	0.46	0.70	0.32	4.83	5.00	6.11	29.51	0.00	0.00	29.51	460.85	453.40	258.12	2.89	30	0.012	75.49	14.3	0.30	6.24	468.92
	50	49	50-49	0.43	0.70	0.30	5.39	5.00	6.02	32.44	0.00	0.00	32.44	452.32	448.72	126.50	2.85	30	0.012	74.96	14.5	0.15	6.55	458.60
	49	48	49-48	0.20	0.70	0.14	5.53	5.00	5.98	33.05	0.00	0.00	33.05	448.62	447.45	98.00	1.19	30	0.012	48.55	10.7	0.15	6.69	454.02
	48	47	48-47	0.19	0.70	0.13	5.86	5.00	5.93	34.79	0.00	0.00	34.79	446.95	446.70	35.36	0.71	36	0.012	60.76	8.9	0.07	6.84	452.09
	47	46	47-46	0.65	0.70	0.46	7.82	5.00	5.91	46.23	0.00	0.00	46.23	446.60	446.39	31.00	0.68	36	0.012	59.47	9.3	0.06	6.91	452.36
	46	45	46-45	0.41	0.70	0.29	8.10	5.00	5.90	47.80	0.00	0.00	47.80	445.59	443.42	125.51	1.73	36	0.012	95.01	13.4	0.16	6.96	452.21
	45	44	45-44	0.16	0.70	0.11	8.22	5.00	5.85	48.10	0.00	0.00	48.10	443.32	441.45	98.00	1.91	36	0.012	99.81	14.0	0.12	7.12	448.58
	44	43	44-43	0.62	0.60	0.37	9.94	5.00	5.82	57.85	0.00	0.00	57.85	441.35	440.59	38.00	2.00	36	0.012	102.19	14.9	0.04	7.24	446.66
	43	42	43-42	0.45	0.70	0.32	10.25	5.00	5.81	59.56	0.00	0.00	59.56	440.01	439.15	50.33	1.71	36	0.012	94.45	14.2	0.06	7.28	446.66
	42	41	42-41	0.23	0.70	0.16	10.41	5.00	5.79	60.32	0.00	0.00	60.32	439.05	438.38	40.17	1.67	36	0.012	93.32	14.0	0.05	7.34	445.65
OUTFALL	41	40	41-40	0.00	0.75	0.00	10.41	5.00	5.78	60.19	0.00	0.00	60.19	430.56	428.00	179.05	1.43	36	0.012	86.40	13.2	0.23	7.39	445.31
	132A	132	132A-132	0.16	0.70	0.11	0.11	5.00	6.53	0.73	0.00	0.00	0.73	433.73	433.54	31.11	0.61	15	0.012	5.47	2.9	0.18	5.00	438.23
	131A	131	131A-131	0.06	0.80	0.05	0.05	5.00	6.53	0.31	0.00	0.00	0.31	434.17	433.08	28.55	3.82	15	0.012	13.67	3.9	0.12	5.00	437.53
	137	136	137-136	0.05	0.75	0.04	0.04	5.00	6.53	0.24	0.00	0.00	0.24	439.09	438.88	35.36	0.59	15	0.012	5.39	2.0	0.29	5.00	442.42
	136	135	136-135	0.53	0.75	0.40	0.44	5.00	6.42	2.79	0.00	0.00	2.79	438.78	438.47	31.00	1.00	15	0.012	7.00	5.3	0.10	5.29	442.24
	135	134	135-134	0.45	0.75	0.34	0.77	5.00	6.39	4.93	0.00	0.00	4.93	438.37	434.95	75.86	4.51	15	0.012	14.86	10.7	0.12	5.39	442.39
	134	133	134-133	0.09	0.70	0.06	0.84	5.00	6.35	5.30	0.00	0.00	5.30	434.85	434.54	31.00	1.00	15	0.012	7.00	6.3	0.08	5.51	438.93
	133	132	133-132	0.32	0.75	0.24	1.08	5.00	6.32	6.80	0.00	0.00	6.80	434.44	433.29	75.27	1.53	15	0.012	8.65	7.8	0.16	5.59	439.08
	132	131	132-131	0.06	0.80	0.05	1.24	5.00	6.27	7.74	0.00	0.00	7.74	433.19	432.83	15.94	2.26	15	0.012	10.52	9.3	0.03	5.75	438.37
OUTFALL	131	130	131-130	0.00	0.80	0.00	1.28	5.00	6.26	8.03	0.00	0.00	8.03	428.68	428.00	29.84	2.28	15	0.012	10.56	9.5	0.05	5.78	437.51
	112A	112	112A-112	0.74	0.45	0.33	0.33	5.00	6.53	2.17	0.00	0.00	2.17	462.69	462.46	45.14	0.51	15	0.012	5.00	3.9	0.19	5.00	464.94
	110A	110	110A-110	0.20	0.85	0.17	0.17	5.00	6.53	1.11	0.00	0.00	1.11	451.13	450.75	38.00	1.00	15	0.012	7.00	3.9	0.16	5.00	454.42
	108A	108	108A-108	0.36	0.70	0.25	0.25	5.00	6.53	1.65	0.00	0.00	1.65	442.09	441.30	38.53	2.05	15	0.012	10.02	5.7	0.11	5.00	445.18
	120A	120	120A-120	0.34	0.70	0.24	0.24	5.00	6.53	1.55	0.00	0.00	1.55	441.80	441.49	31.00	1.00	15	0.012	7.00	4.4	0.12	5.00	445.30
	121A	121	121A-121	0.87	0.70	0.61	0.61	5.00	6.53	3.98	0.00	0.00	3.98	444.55	444.31	31.00	0.77	15	0.012	6.16	5.3	0.10	5.00	448.17
	123	122	123-122	0.74	0.70	0.52	0.52	5.00	6.53	3.38	0.00	0.00	3.38	452.17	451.83	31.00	1.10	15	0.012	7.33	5.8	0.09	5.00	455.91
	122	121	122-121	0.35	0.70	0.25	0.76	5.00	6.49	4.95	0.00	0.00	4.95	451.94	444.31	126.74	6.02	15	0.012	17.17	11.8	0.18	5.09	455.77
	121	120	121-120	0.22	0.70	0.15	1.53	5.00	6.43	9.81	0.00	0.00	9.81	444.21	441.59	71.32	3.67	15	0.012	13.41	11.9	0.10	5.27	448.02
	120	107	120-107	0.38	0.70	0.27	2.03	5.00	6.39	12.98	0.00	0.00	12.98	441.49	440.54	25.00	3.80	15	0.012	13.64	12.8	0.03	5.37	445.16
	106A	106	106A-106	0.44	0.70	0.31	0.31	5.00	6.53	2.01	0.00	0.00	2.01	440.32	440.00	38.00	0.84	15	0.012	6.42	4.6	0.14	5.00	443.89
	104B	104A	104B-104A	0.08	0.75	0.06	0.06	5.00	6.53	0.39	0.00	0.00	0.39	449.69	449.31	38.00	1.00	15	0.012	7.00	2.7	0.23	5.00	453.18
	104A	104	104A-104	0.22	0.70	0.15	0.21	5.00	6.44	1.38	0.00	0.00	1.38	449.21	441.00	101.09	8.12	15	0.012	19.94	8.3	0.20	5.23	453.18
	101A	101	101A-101	0.16	0.75	0.12	0.12	5.00	6.53	0.78	0.00	0.00	0.78	434.88	434.70	32.37	0.56	15	0.012	5.22	2.9	0.19	5.00	439.39
	114	113	114-113	0.09	0.85	0.08	0.08	5.00	6.53	0.50	0.00	0.00	0.50	463.32	462.92	40.00	1.00	15	0.012	7.00	3.0	0.22	5.00	466.81
	113	112	113-112	0.20	0.70	0.14	0.22	5.00	6.44	1.40	0.00	0.00	1.40	462.82	462.46	35.36	1.02	15	0.012	7.06	4.3	0.14	5.22	466.81
	112	111	112-111	0.23	0.50	0.12	0.66	5.00	6.40	4.25	0.00	0.00	4.25	462.36	461.97	39.27	0.99	15	0.012	6.97	6.0	0.11	5.36	467.78
	111	110	111-110	0.17	0.70	0.12	0.78	5.00	6.36	4.98	0.00	0.00	4.98	461.87	450.75	324.06	3.43	15	0.012	12.96	9.8	0.55	5.47	467.38
	110	109	110-109	0.49	0.70	0.34	1.30	5.00	6.18	8.02	0.00	0.00	8.02	450.65	443.85	122.09	5.57	15	0.012	16.52	13.3	0.15	6.02	454.42
	109	108	109-108	0.15	0.65	0.10	1.39	5.00	6.14	8.55	0.00	0.00	8.55	443.84	441.30	98.00	2.59	15	0.012	11.27	10.1	0.16	6.17	448.24
	108	107	108-107	0.29	0.65	0.19	1.83	5.00	6.09	11.16	0.00	0.00	11.16	441.05	440.29	56.00	1.36	18	0.012	13.26	8.5	0.11	6.33	445.02
	107	106	107-106	0.00	0.75	0.00	3.86	5.00	6.05	23.39	0.00	0.00	23.39	439.19	438.85	42.75	0.80	30	0.012	39.63	8.5	0.08	6.44	443.94
	106	105	106-105	0.18	0.70	0.13	4.30	5.00	6.03	25.91	0.00	0.00	25.91	438.75	438.25	102.22	0.49	30	0.012	31.08	7.2	0.24	6.53	443.89
	105	104	105-104	0.18	0.75	0.14	4.43	5.00	5.96	26.41	0.00	0.00	26.41	438.15	437.83	62.54	0.51	30	0.012	31.79	7.3	0.14	6.77	445.45
	104	103	104-103	1.32	0.75	0.99	5.64	5.00	5.91	33.34	0.00	0.00	33.34	437.73	437.18	55.84	0.98	30	0.012	44.10	9.9	0.09	6.91	445.20
	103	102	103-102	0.21	0.70	0.15	5.78	5.00	5.89	34.06	0.00	0.00	34.06	437.08	435.72	135.27	1.01	30	0.012	44.55	10.0	0.23	7.00	448.12
	102	101	102-101	0.16	0.60	0.10	5.88	5.00	5.82	34.25	0.00	0.00	34.25	435.62	434.45	44.76	2.61	30	0.012	71.84	14.3	0.05	7.23	441.40
OUTFALL	101	100	101-100	0.02	0.85	0.02	6.02	5.00	5.81	34.96	0.00	0.00	34.96	428.67	428.00	49.93	1.34	30	0.012	51.47	11.2	0.07	7.28	439.78

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 Martinsburg, WV 25401
Phone: 304-725-8456 www.ifs-se.com

JASON P. GERHART REGISTERED No. 19727 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3-16-23

REVISIONS

1. 03/16/2023 - WVDOH, CTUB, AND CITY OF CHARLES TOWN COMMENTS

STORM SEWER COMPUTATIONS

STONE SPRING SUBDIVISON

TAX MAP 15, PARCEL 01; D.B. 451, PG. 745
CITY OF CHARLES TOWN TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

SCALE:	HORIZ.: N/A VERT.:
DATE:	JANUARY 2023
JOB:	2665-0206
DRAWN: JCH	CHECK: JPG
CADD: C-CU-761.DWG	
NCS:	
SHEET:	110 OF 134

Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

SLD2022-05 Huyett Rd Storage Facility - PC Workshop Discussion

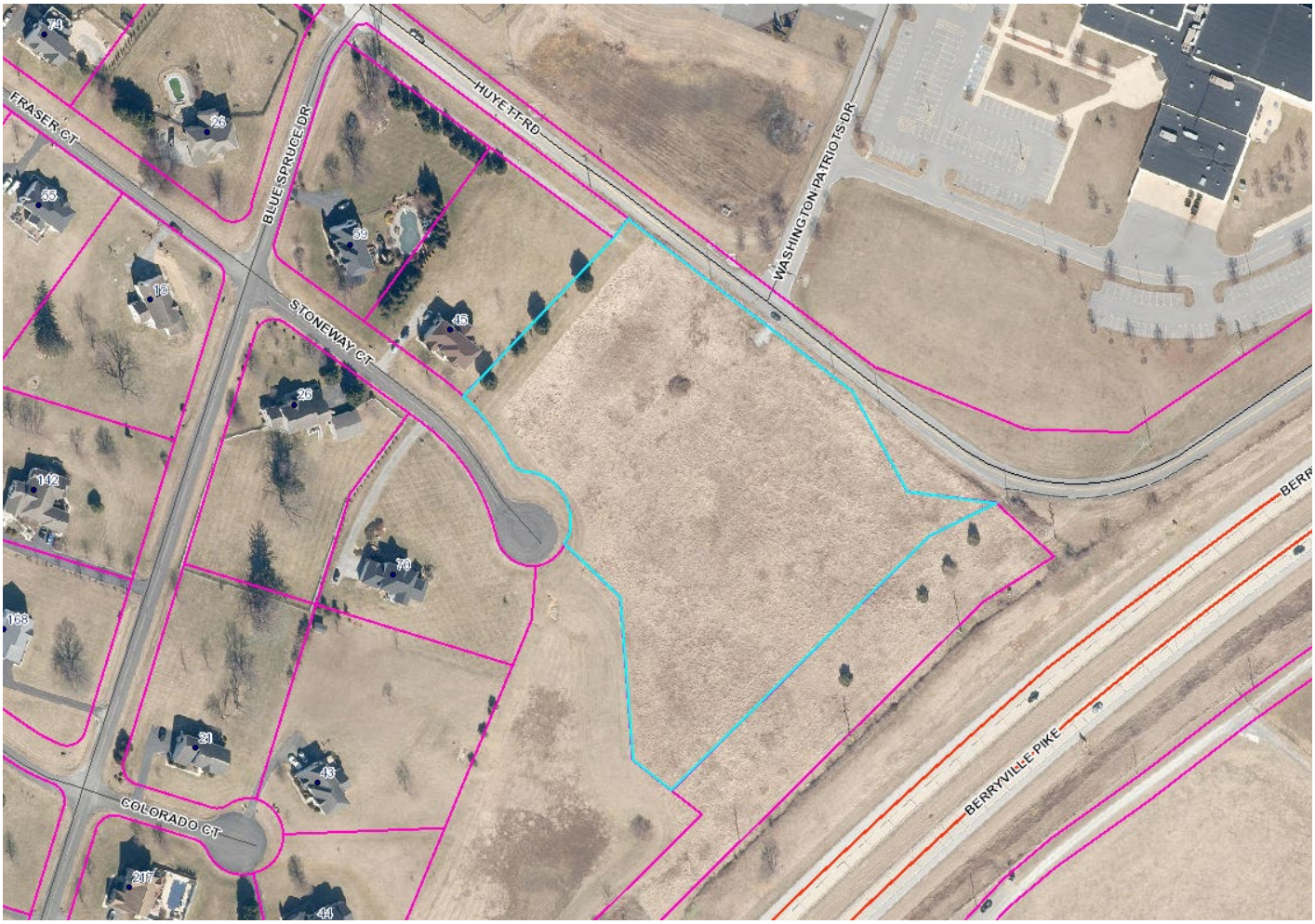
ATTACHMENTS:

- 1. Staff Report.pdf
- 2. Application.pdf
- 3. Plans.pdf
- 4. Stormwater Management.pdf

Preliminary Plan Report

SLD2022-05/200201

Date: For the March 27th, 2023 Planning Commission meeting
Applicant: MDHI Charles Town LLC
Property Owner: Thomas Management Group Inc.
Report by: James Newman, City Planner, Zoning/Subdivision Administrator.
Proposal: Major Land Development
Property Location: Adjacent to Berryville Pike and Huyett Road (see **blue** outline below)
Current Zoning: General Commercial



PROJECT OVERVIEW

The development of 5.49 acres into a self-storage facility with five storage buildings and an office building.

SKETCH PLAN

The sketch plan was approved by the Planning Commission on October 24, 2022. The preliminary plan is **generally in conformance** with the sketch plan.

The entrance is located just east of Washington Patriots Drive, whereas the sketch plan showed an entrance west of the drive. The number of parking spaces has been reduced and the office building has been reduced in size and moved closer to the entrance.

ZONING REVIEW

The property is zoned General Commercial (GC).

Lot Coverage

In the GC zoning district, up to 90% of a lot may be developed. This project will develop 64.5% of the site. The site is 5.49 acres in size, and 3.55 acres will be developed.

Open Space

There is no open space requirement in GC.

Trails

The proposed trail must be designed to City Standards. Those standards are included in the plans.

Parking

The Subdivision Ordinance does not provide required parking for self-storage facilities. The applicant has provided six parking spaces (including one handicap space) for the 1,000 sq. ft. office building, while general office uses only require 2.84 spaces per 1,000 sq. ft.

Subdivision Ordinance Section 1333.23.F.3.D requires that there be an opaque buffer or vegetated buffer between parking and residential zoned lots. A vegetated buffer is shown on the plans. A fence will also be placed around the entire perimeter of the facility, including the parking bay.

Lighting

Exterior lighting will occur via light boxes mounted to the storage facility buildings. These lights must be shielded and downcast. No light poles are proposed.

Buffers

Per Subdivision Ordinance Section 1333.15, for new developments and news uses in existing developments, an opaque buffer and screen of a minimum height of 6ft is required between adjoining residential and non-residential uses.

An opaque screen at least 6ft. tall is required around the perimeter of self-storage facilities. The plans show a chain link fence with slats. Due to Zoning Ordinance restrictions on the location of chain link fences, the applicant has conveyed an interest in erecting a fence with different materials, such as vinyl.

Stormwater

Stormwater plans are being reviewed by the City's engineering firm Kimley-Horn. They have raised no concerns about the proposed plans, and have provided comments of a technical nature for the applicant to review.

RECOMMENDATION

Approval by the Planning Commission is not a public hearing, and is for the benefit of the Planning Commission to ensure the Preliminary Plat and Plan is in substantial compliance with the sketch plan.

Due to general conformance with the sketch plan and zoning and subdivision regulations, the Planning Commission should vote to **approve** the preliminary plan.

DocuSign Envelope ID: DAB20520-A65C-4598-8FD9-07AEA1823D9F

S/LD Application No._____

SUBDIVISION AND LAND DEVELOPMENT APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
ARTICLE 1332, SUBDIVISION AND LAND DEVELOPMENT APPLICATION & APPROVAL REQUIREMENTS

To assist the Subdivision Administrator in the review of a Subdivision and Land Development (S/LD) Application, the Applicant must utilize this form to supply the City with the information prescribed under Section 1332.03 of the Charles Town Subdivision Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's S/LD Application as required by Ordinance Section 1332.03.

1. DATE _____, 20_____

2. APPLICATION TYPE

☐ Minor Subdivision | Final S/LD Plan

☐ Major Subdivision Development*
- Preliminary S/LD Plan and Final Plat

☒ Major Land Development**
- Preliminary S/LD Plan

☐ Major Subdivision and Land Development***
- Preliminary S/LD Plan and Final Plat

*Conventional Subdivision – A Preliminary Plan and Plat Approval and a Final Plan and Plat Approval is required.

**No Division/Merger of Land – A Preliminary Plan and Plat Approval is required for the submission of a building or multiple buildings on one lot where there is no subdivision of land (commonly referred to as a site plan).

***A Preliminary Plan and Plat Approval and a Final Plan and Plat Approval is required for the submission of a building or multiple buildings that will require the merger, adjustment or subdivision of land.

DocuSign Envelope ID: DAB20520-A65C-4598-8FD9-07AEA1823D9F

3. APPLICANT'S NAME* MDHI Charles Town LLC

Address: 786 Spruce Hill Way; Charles Town, WV 25414

Telephone Number (609) 414-3702 Fax Number (___)

Email Address andrew@matadorinvestmentgroup.com

4. PROPERTY OWNER'S NAME Thomas Management Group Inc

Address: 9390 Middleway Pike; Charles Town, WV 25414

Telephone Number (304) 283-2601 Fax Number (___)

Email Address jthomas@jeffersonasphalt.net

5. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address: Huyett Road

Tax Map # and Parcel: Map 11, Parcel 10

Deed Book and Page #: DB 1102; PG 631

Property Area in Square Feet or Acres: 5.5+/- acres

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

44,000 sq. ft. of self-storage floor space and 1,000 sq. ft. accessory office building.

7. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

Existing Use: Vacant

Current Zoning: General Commercial

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

8. ARE THERE ANY ANTICIPATED WAIVERS OR VARIANCES? IF YES, PROVIDE DETAILS.

Nothing anticipated.

9. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date
Unknown (County)	Spruce Hill Section 2	Approved	2-11-2003
SLD-2022-05-SP	Huyett Road Self Storage Sketch Plan	Approved	9-26-2022

10. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

☒ No

DocuSign Envelope ID: DAB20520-A65C-4598-8FD9-07AEA1823D9F

11. PLAN/PLAT SUBMISSION TO OTHER AGENCIES (Documentation of all required approvals must be attached to this Application or submitted prior to Preliminary S/LD Application approval)

Agency (Specify others as applicable)	Submittal Date	Approval/Permit Issued	Date of Approval/Issuance
City of Charles Town			
City of Charles Town Utility Board			
Jefferson County Planning and Zoning Department			
Jefferson County Addressing Office			
Jefferson County Board of Education			
WV Department of Environmental Protection			
WV Department of Transportation, Division of Highways			
WV State Historic Preservation Office			
WV Office of Environmental Health Services			
U.S. Army Corps of Engineers			

12. FEE CALCULATION (Per Fee Schedule) $200 Application Fee

$2,000 Review Fee Escrow

AMOUNT PAID $ $2,200

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1332.03 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant

DocuSigned by:
Andrew McMenamin
844F6F2BADFF4BE... Date 1/24/2023

Signature of Property Owner (If different than Applicant)

DocuSigned by:
F0404C9742F3456... Date 1/24/2023

Please submit an original completed Application and specified number of Plan/Plat (Three (3) copies at 24" x 36", Adobe PDF format, and Five (5) copies at 11" x 17") copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments/Conditions:_____

_____

_____

_____

_____

_____

PRELIMINARY SUBDIVISION/LAND DEVELOPMENT PLAT

HUYETT ROAD STORAGE

SITE PLAN REFERENCE NUMBER: #2022-05
CITY OF CHARLES TOWN
JEFFERSON COUNTY, WEST VIRGINIA
TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631

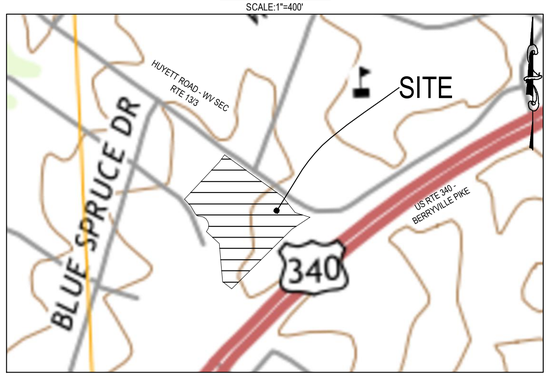
CIVIL LEGEND:

EXISTING		PROPOSED
	BOUNDARY/RIGHT-OF-WAY LINE	
	ADJACENT BOUNDARY LINE	
EX. VDH, EX. CC, IPF, RBF	CONCRETE MONUMENT/IRON REBAR	CC-TBS, TBS
	EASEMENT LINE	
	ROAD CENTERLINE	
	HEADER CURB	
	CURB & GUTTER	CURB, TRANS., REVERSE CURB
	EDGE OF PAVEMENT	
	EDGE OF CONCRETE	
	EDGE OF GRAVEL	
	SIDEWALK	
	GUARDRAIL	
	BOARD FENCE	
	CHAIN LINK FENCE	
	WIRE FENCE	
TO BE REMOVED, TO REMAIN	BUILDINGS	
	RETAINING WALL	
	MISCELLANEOUS SIGNS	
	MAIL BOX	MB
	SITE LIGHT WITH POLE	
	BUILDING MOUNTED LIGHT	
	UTILITY POLE	
	UTILITY POLE GUY WIRE	
	OVERHEAD UTILITY LINE	OHE
	UNDERGROUND UTILITY LINE	UGE
	OVERHEAD COMMUNICATIONS LINE	OHC
	UNDERGROUND COMMUNICATIONS LINE	UGC
	UNDERGROUND GAS LINE	G
8" PVC SAN. SEW.	SANITARY SEWER MAIN	C3, 8" PVC SAN. SEW.
	SANITARY SEWER FORCE MAIN	FM
	SANITARY SEWER MANHOLE	
	SANITARY SEWER CLEAN-OUT	CO
15" HDPE	STORM SEWER LINE	30, 31, 15" HDPE
	STORM SEWER MANHOLE	
	STORM SEWER DROP INLET	
	STORM SEWER CURB INLET	
	STORM SEWER RIP-RAP	
	STORM SEWER END SECTION	
8" W/M	WATER MAIN	8" W/M
	FIRE HYDRANT	
	WATER VALVE	
	WATER METER	
590	INDEX CONTOUR LINE	590
592	INTERMEDIATE CONTOUR LINE	592
× 543.6	SPOT ELEVATIONS	+45 GS, +45 TC, +45 INV
	TREES/SHRUBS	
	DRIP LINE OF TREES	
	LIMITS OF CONSTRUCTION	
HbB, HgC	SOIL BOUNDARY	

Know what's **below.** **Call** before you dig.

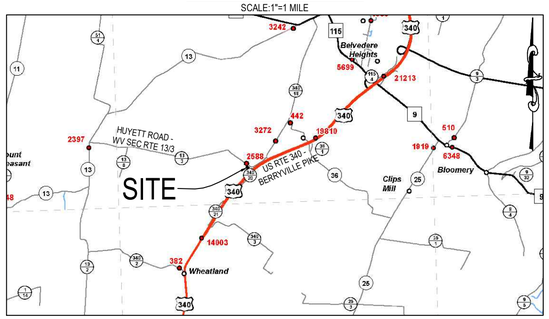
VICINITY MAP

SCALE:1"=400'



WVDOH VICINITY MAP

SCALE:1"=1 MILE



OWNER
THOMAS MANAGEMENT GROUP INC.
9390 MIDDLEWAY PIKE
CHARLES TOWN, WV 25414

APPLICANT
MDHI CHARLES TOWN LLC
786 SPRUCE HILL WAY
CHARLES TOWN, WV 25414
(609)414-3702

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 • Martinsburg, WV 25401
Phone: 304-725-8456 • www.ifs-ae.com

Sheet List Table

Sheet Number	Sheet Title
01	COVER SHEET
02	GENERAL NOTES
03	SITE DETAILS
04	EROSION & SEDIMENT CONTROL NARRATIVE
05	EROSION & SEDIMENT CONTROL NARRATIVE
06	EROSION & SEDIMENT CONTROL PLAN PHASE I
07	EROSION & SEDIMENT CONTROL PLAN PHASE II
08	EROSION & SEDIMENT CONTROL DETAILS
09	EROSION & SEDIMENT CONTROL DETAILS AND COMPUTATIONS
10	EXISTING CONDITIONS AND DEMOLITION PLAN
11	PRELIMINARY PLAT
12	SITE LAYOUT AND UTILITY PLAN
13	GRADING PLAN
14	UTILITY DETAILS
15	STORM SEWER PROFILES
16	STORM SEWER PROFILES
17	STORM SEWER DETAILS
18	STORM SEWER DETAILS
19	STORM SEWER DETAILS
20	STORM SEWER COMPUTATIONS
21	STORMWATER MANAGEMENT DETAILS AND COMPUTATIONS
22	WATER QUALITY DRAINAGE AREA
23	WVDOH TRAFFIC CONTROL AND GRADING PLAN
24	SIGHT DISTANCE PLAN AND PROFILE
25	LANDSCAPE PLAN

Site Density

Gross Density (Acres)	5.492
Net Buildable Land Area (Acres)	5.010
Max Density Requirement	N/A
Total Developed Area (Acres)	3.550

Developed Area Breakdown

Area	Square Feet	Acres
Total Area	**239,241.55**	**5.49**
Buildings	45,000.00	1.03
WVDOH Entrance	720.43	0.02
Drive Aisles/Parking	93,542.57	2.15
Sidewalk	384.41	0.01
Asphalt Trail	3,129.96	0.07
Stormwater Management Areas*	11,677.80	0.27
Total Developed Area	**154,455.17**	**3.55**
Percentage Developed	**64.56%**	

*Areas not within the above criteria.

ZO Table 1322.10, GC District Bulk and Area Regulations

Regulation	Required	Proposed
Maximum Density	No Requirement	N/A
Minimum Lot Size	No Requirement	N/A
Minimum Lot Width	No Requirement	N/A
Minimum Front Yard Setback	40'	40' min.
Minimum Side Yard Setback	10' (25' where adjoining a residential district)	25' min.
Minimum Rear Yard Setback	30'	30' min.
Maximum Lot Coverage	90%	64.56%
Minimum Required Open Space	No Requirement	N/A
Maximum Buiding Height	55'	55' MAX
Maximum Stories	5 stories	1 story

SLDO Table 1333.23(J) Minimum Off-Street Parking Space Requirements

Regulation	Required	Proposed
General Office Building	2.84 Vehicles per 1,000 SF GFA	8 Parking Spaces (1 ADA Van Space)

APPROVAL BLOCK

THIS PRELIMINARY PLAN AND PLAT WAS APPROVED BY THE CITY OF CHARLES TOWN, ON THE ____ DAY OF _____, 20____, SUBJECT TO ANY CONDITIONS SPECIFIED HEREON.

ALL EXPENSES INCURRED WITH RESPECT TO IMPROVEMENTS FOR ALL UTILITY SERVICES, PAVING, GRADING, LANDSCAPING, CURBS, GUTTERS, SIDEWALKS, ROAD LIGHTING, ROAD SIGNS, FLOOD PROTECTION DEVICES, DRAINAGE STRUCTURES AND ALL OTHER IMPROVEMENTS THAT MAY BE REQUIRED SHALL BE IN THE RESPONSIBILITY OF THE SUBDIVIDER AND NO THE CITY.

SECRETARY OF THE PLANNING COMMISSION _____ DATE _____

STATEMENT OF ACCEPTANCE:

THE DEVELOPER, IN SIGNING THIS PLAT, AGREES TO ABIDE BY ALL CONDITIONS, TERMS, AND SPECIFICATIONS PROVIDED HEREON; AND TO COMPLETE ALL THE IMPROVEMENTS REQUIRED BY THE SITE PLAN.

MDHI CHARLES TOWN LLC _____ DATE _____
786 SPRUCE HILL WAY
CHARLES TOWN, WV 25414

STATEMENT OF ACCURACY

THE ENGINEER AND/OR SURVEYOR, IN SIGNING THIS PLAT./PLAN, ATTESTS TO THE BEST OF HIS/HER KNOWLEDGE, THAT THIS PLAN IS COMPLETE AND ACCURATE.

ENGINEER _____ DATE _____

LIST OF APPROVALS:

CHARLES TOWN UTILITY BOARD AVAILABILITY LETTER (WATER):
DATED: _____ N/A _____

CHARLES TOWN UTILITY BOARD AVAILABILITY LETTER (SEWER):
DATED: _____ N/A _____

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS:
PERMIT #_____
DATED: _____

JEFFERSON COUNTY GIS/ADDRESSING:
APPROVED: _____ N/A _____

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION:
WVNPDES PERMIT # : WVR112065

REVISIONS:

NO.	SHEET NUMBER AND REVISION DESCRIPTION	DATE
1	ALL SHEETS PER CITY COMMENTS	03/15/2023

COMPLETE LIST OF WAIVERS/VARIANCES

ORDINANCE	SECTION OF ORDINANCE	DESCRIPTION OF WAIVER OR VARIANCE	DATE GRANTED
NONE GRANTED			

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 • Martinsburg, WV 25401
Phone: 304-725-8456 • www.ifs-ae.com

JASON P. GERNERT, REGISTERED, No. 18127, STATE OF WEST VIRGINIA, PROFESSIONAL ENGINEER
SEAL:

REVISIONS
1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

COVER SHEET

HUYETT ROAD STORAGE
SITE PLAN
TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: AS NOTED VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-GI-001.DWG	
NCS: N/A	
SHEET:	01 OF 25

GENERAL NOTES:

1. THE PROPOSED SITE IMPROVEMENTS FOR 'HUYETT ROAD STORAGE' INCLUDE, BUT ARE NOT LIMITED TO, THE CONSTRUCTION OF AN OFFICE BUILDING, SELF STORAGE BUILDINGS (5), DRIVE AISLES AND PARKING AREAS WITH ASSOCIATED DRAINAGE STRUCTURES, A BIORETENTION BASIN, AN UNDERGROUND SWM FACILITY AND PRIVATE UTILITIES.
2. THE SUBJECT PROPERTY IS LOCATED IN THE CITY OF CHARLES TOWN, IDENTIFIED AS TAX MAP 11, PARCEL 10. THE PROPERTY OWNER IS THOMAS MANAGEMENT GROUP INC. AS RECORDED IN D.B. 1102 PG 631 AMONG THE LAND RECORDS OF THE CITY OF CHARLES TOWN, JEFFERSON COUNTY, WEST VIRGINIA.
3. THE TOTAL EXISTING SITE ACREAGE FOR PARCEL 11 IS 5.49 ACRES. DISTRUBED AREA FOR THE PROJECT IS ±4.78 ACRES.
4. THE TOPOGRAPHIC CONTOUR INTERVAL IS TWO (2) FEET. TOPOGRAPHIC INFORMATION WAS COMPILED FROM A FIELD TOPOGRAPHIC SURVEY PREPARED BY CHRISTOPHER CONSULTANTS DATED JANUARY 2023. HORIZONTAL DATUM IS REFERENCED TO THE WEST VIRGINIA COORDINATE SYSTEM OF 1983, NORTH ZONE. VERTICAL DATUM IS REFERENCED TO NAVD 88.
5. PERIMETER BOUNDARY INFORMATION SHOWN HEREON IS PER A FIELD RUN SURVEY PERFORMED IN NOVEMBER 2021 AND UPDATED IN JANUARY 2023 BY CHRISTOPHER CONSULTANTS.
6. THE SUBJECT PROPERTY IS LOCATED ON F.E.M.A. MAP 54037C0120E DATED DECEMBER 18, 2009. NO PORTION OF THIS PROPERTY IS LOCATED WITHIN THE 100-YEAR FLOODPLAIN AREA (ZONE A). THE PROPERTY IS OUT OF FLOOD ZONE.
7. THE CURRENT NATIONAL WETLANDS INVENTORY MAP DOES NOT SHOW WETLANDS/SENSITIVE AREAS ON THE SUBJECT PROPERTY.
8. CHANGES OR REVISIONS IN CONSTRUCTION PLANS AND SPECIFICATIONS SHALL NOT BE MADE UNLESS FIRST APPROVED BY THE CITY OF CHARLES TOWN AND/OR OTHER APPROPRIATE AGENCIES.
9. SEE COVER SHEET, SHEET 01, FOR LEGEND OF SYMBOLS USED HEREIN.
10. AVERAGE DAILY TRIPS AND PEAK HOUR TRIPS PROVIDED PURSUANT TO THE ITE TRIP GENERATION MANUAL, 7'TH EDITION BASED ON ITE LAND USE CODE 151 (MINI WAREHOUSE).
    - 10.1. AVERAGE DAILY TRIPS ON A WEEKDAY = 2.50 TRIPS PER 1,000 SF GFA. (41,800 SF GFA/1,000 SF GFA X 2.50 TRIPS = 104.50 TRIPS)
    - 10.2. PEAK HOUR TRIPS ON A SATURDAY = 0.40 TRIPS PER 1,000 SF GFA. (41,800 SF GFA/1,000 SF GFA X 0.30 TRIPS = 12.54 TRIPS)
11. ANY LIGHTING APPROVED WITH BUILDING PERMIT SHALL BE SHIELDED AND/OR DIRECTED AWAY FROM ADJOINING USES AND STREETS TO REDUCE GLARE.

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CONTACT "MISS UTILITY" AT 811 OR 1-800-245-4848 A MINIMUM OF SEVENTY-TWO (72) HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR OTHER EARTH DISTURBING ACTIVITIES WITHIN PUBLIC RIGHT-OF-WAYS OR WITHIN AREAS SERVED BY UNDERGROUND UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING THE PRESENCE OF ANY UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
2. TO THE BEST OF OUR KNOWLEDGE AND BELIEF, THERE IS NO EVIDENCE OF ANY GRAVE, OBJECT OR STRUCTURE MARKING A PLACE OF BURIAL ON THIS PROPERTY. THERE ARE NO KNOWN CEMETERIES, ARCHEOLOGICAL SITES, NATURAL FEATURES, NOR HISTORIC SITES LISTED, OR DETERMINED TO BE ELIGIBLE, OR WHICH THE OWNER HAS REASON TO BELIEVE MAY BE ELIGIBLE FOR LISTING ON THE NATIONAL REGISTER OF HISTORIC PLACES WITHIN THE CONSTRUCTION LIMITS.
3. INTEGRITY FEDERAL SERVICES DOES NOT CERTIFY TO THE LOCATION OF OR THE EXISTENCE OF ANY EXISTING UNDERGROUND UTILITIES. THE EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON AVAILABLE INFORMATION. THIS DOES NOT CONSTITUTE A GUARANTEE OF THEIR ACTUAL LOCATIONS OR THAT THEY HAVE ALL BEEN SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK AND FOR ANY DAMAGES WHICH OCCUR BY THEIR FAILURE TO LOCATE OR PRESERVE THESE UNDERGROUND UTILITIES. IF DURING CONSTRUCTION OPERATIONS THE CONTRACTOR SHOULD ENCOUNTER UTILITIES OTHER THAN THOSE SHOWN ON THE PLAN, THEY SHALL IMMEDIATELY NOTIFY THE ENGINEER AND TAKE NECESSARY AND PROPER STEPS TO PROTECT THE FACILITY AND INSURE THE CONTINUANCE OF SERVICE. IF NECESSARY, THE SITE PLAN WILL BE MODIFIED TO ELIMINATE THE CONFLICT AT THE DEVELOPER'S EXPENSE.
4. INTEGRITY FEDERAL SERVICES DOES NOT CERTIFY TO THE SUB-SURFACE CONDITIONS OF THE SITE, THE LOCATION OF UNDERLYING ROCK, OR THE LOCATION OF POTENTIAL SINKHOLES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIGGING OF TEST HOLES TO VERIFY SUB-SURFACE CONDITIONS PRIOR TO BEGINNING ANY CONSTRUCTION. IF SINKHOLES ARE FOUND IN THE FIELD, REMEDIATION WILL BE REQUIRED AS SPECIFIED BY THE WVDEP AND/OR A QUALIFIED GEOTECHNICAL ENGINEERING FIRM.
5. EROSION AND SEDIMENT CONTROL DEVICES ARE TO BE IN PLACE PRIOR TO ANY CONSTRUCTION. REFER TO EROSION AND SEDIMENT CONTROL PLAN FOR PHASING AND DETAILS.
6. ALL LAND, ON OR OFF SITE, WHICH IS DISTURBED BY THIS DEVELOPMENT, AND WHICH IS NOT BUILT UPON OR SURFACED, SHALL BE ADEQUATELY STABILIZED TO CONTROL EROSION AND SEDIMENTATION.
7. DEVELOPMENT OF THE SITE INCLUDING CONSTRUCTION AND MATERIALS SHALL BE IN CONFORMANCE TO CURRENT CITY OF CHARLES TOWN AND THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARDS AND SPECIFICATIONS.
8. ALL TESTS, STUDIES, ETC., REQUIRED DURING CONSTRUCTION WILL BE CARRIED OUT BY A THIRD PARTY ENGINEERING FIRM AND PAID FOR BY THE CONTRACTOR.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE OWNER AND THE ENGINEER OF ANY CHANGES OR CONDITIONS ATTACHED TO PERMITS REQUIRED FOR CONSTRUCTION.
10. THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF CLEANING TRUCKS AND/OR OTHER EQUIPMENT OF MUD PRIOR TO ENTERING THE RIGHT-OF-WAY, AND IT IS THE CONTRACTORS RESPONSIBILITY TO CLEAN STREETS OF MUD AND/OR ALLAY DUST AND TO TAKE WHATEVER MEASURES NECESSARY TO ENSURE THAT THE STREETS ARE KEPT IN A CLEAN AND DUST FREE CONDITION AT ALL TIMES.
11. THE CONTRACTOR SHALL NOTIFY OPERATORS WHO MAINTAIN EXISTING UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION OR BLASTING AT LEAST TWO (2) WORKING DAYS, BUT NOT MORE THAN TEN (10) WORKING DAYS, PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION.
12. THE CLIENT, CONTRACTOR, AND/OR SURVEYOR SHALL BE RESPONSIBLE FOR NOTIFYING INTEGRITY FEDERAL SERVICES OF ANY CONDITIONS FOUND IN THE FIELD THAT VARY FROM WHAT IS SHOWN ON THE APPROVED PLANS. OBSERVATIONS REGARDING APPARENT INCONSISTENCIES IN THE PLANS SHALL BE BROUGHT TO GORDON'S ATTENTION FOR VERIFICATION PRIOR TO STAKEOUT.
13. THE CLIENT AND CONTRACTOR ARE RESPONSIBLE FOR REVIEWING THE PLANS PRIOR TO CONSTRUCTION AND NOTIFYING INTEGRITY FEDERAL SERVICES OF ANY CIRCUMSTANCES FOUND WITHIN THESE PLANS IN NEED OF VERIFICATION SO THAT APPROPRIATE REVISIONS CAN BE MADE, IF WARRANTED.
14. ALL HANDICAPPED PARKING SPACES SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT. (ADA - CURRENT VERSION). ALL TRAILS & SIDEWALKS SHALL COMPLY WITH ADA REQUIREMENTS.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH PERFORMANCE OF ITS WORK AND THE WORK OF ITS SUBCONTRACTORS. INTEGRITY FEDERAL SERVICES SHALL NOT HAVE CONTROL OVER, CHARGE OF, OR RESPONSIBILITY FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.
16. THE CONTRACTOR SHALL VISIT THE SITE AND FIELD VERIFY EXISTING CONDITIONS AND GRADES PRIOR TO STARTING CONSTRUCTION.
17. THE CONTRACTOR SHALL CLEAR THE SITE OF ALL APPLICABLE VEGETATION, BUILDINGS, FOUNDATIONS, ETC. WITHIN THE LIMITS OF CONSTRUCTION AND SHALL BE RESPONSIBLE FOR COORDINATING ANY DISCONNECTION AND/OR ABANDONMENT OF EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND ABANDONING ALL EXISTING WELLS AND/OR SEPTIC DRAIN FIELDS AND COORDINATING THEIR ABANDONMENT WITH THE HEALTH DEPARTMENT
18. ALL PROPOSED GRADES AS SHOWN HEREIN ARE FINISHED GRADE UNLESS OTHERWISE NOTED ON THE PLAN.
19. MAINTAIN A MINIMUM VERTICAL CLEARANCE OF ONE (1) FOOT SIX (6) INCHES BETWEEN CROSSINGS OF ALL UTILITY LINES UNLESS OTHERWISE NOTED.
20. THE APPROVAL OF THESE PLANS SHALL IN NO WAY GRANT PERMISSION BY THE APPROVING JURISDICTION FOR THE CONTRACTOR TO TRESPASS ON OFF-SITE PROPERTIES. THE APPROVAL OF THESE PLANS SHALL IN NO WAY RELIEVE THE OWNER OF COMPLYING WITH OTHER APPLICABLE LOCAL, STATE AND FEDERAL REQUIREMENTS.
21. WHERE THE ORDINANCES DIFFER BETWEEN LOCAL, STATE, AND FEDERAL REQUIREMENTS, THE MOST RESTRICTIVE SHALL APPLY.
22. CONTRACTOR TO REFERENCE GEOTECHNICAL REPORT OR A PROFESSIONAL ENGINEER OR CERTIFIED TECHNICIAN FOR SUITABLE BACKFILL MATERIAL REQUIREMENTS AND COMPACTION REQUIREMENTS. CBR TESTS SHALL BE PERFORMED PRIOR TO DETERMINATION OF FINAL SUBGRADE ELEVATION FOR PAVEMENT AREAS. SOILS TESTS OF SUBGRADE MUST BE SUBMITTED FOR ACTUAL DETERMINATION OF REQUIRED PAVEMENT SECTION THICKNESS PRIOR TO CONSTRUCTION. ALL SUBGRADE SHALL BE COMPACTED TO THE PERCENTAGES OF MAXIMUM DRY DENSITY (AASHTO T99C) UNLESS OTHERWISE DIRECTED BY AN APPROVED GEOTECHNICAL REPORT.
23. BUILDING FOOTPRINTS AS SHOWN ARE APPROXIMATE IN BUILDING SIZE AND DO NOT REPRESENT FINAL ARCHITECTURALS.
24. CHANGES IN THE TOP & BOTTOM OF SLOPES SHALL BE A MINIMUM OF FIVE FEET (5') FROM PROPERTY OR RIGHT-OF-WAY LINE.
25. ALL GRADING SHALL PROVIDE PROPER DRAINAGE & DISPOSAL OF STORM WATER WITHOUT PONDING.
26. ALL FILL SHALL BE COMPACTED TO PREVENT EROSION.
27. GRADING SHALL NOT BE DONE IN SUCH A WAY TO DIVERT WATER ONTO THE PROPERTY OF ANOTHER LAND OWNER.
28. LOTS SHALL BE GRADED TO SECURE PROPER DRAINAGE AWAY FROM BUILDINGS AND TO PREVENT POOLING OR COLLECTION OF STORM WATER.
29. EXCAVATION OR FILL SHALL NOT ENDANGER AN ADJOINING PROPERTY.
30. ALL CLEARING, GRADING, DRAINAGE, CONSTRUCTION, AND DEVELOPMENT SHALL BE CONDUCTED IN STRICT ACCORDANCE WITH THE APPROVED PLAN.
31. FIELD VERIFY EXISTING GRADES PRIOR TO CONSTRUCTION.
32. CONTRACTOR TO ENSURE POSITIVE DRAINAGE THROUGHOUT CONSTRUCTION.

CITY OF CHARLES TOWN ORDINANCE NOTES:

1. STORM WATER MANAGEMENT SHALL BE PROVIDED BY A COMBINATION OF AN EXISTING STORMWATER MANAGEMENT POND ADJACENT TO OUR SITE AND A PROPOSED UNDERGROUND STORMWATER MANAGEMENT FACILITY, AND BIORETENTION BASIN. THE EXISTING STORMWATER MANAGEMENT POND IS PERMITTED FOR USE PER AGREEMENT IN DEED BOOK 1029, PAGE 165.
2. ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF CHARLES TOWN ZONING ORDINANCE AND ARTICLE 1333 OF THE CITY OF CHARLES TOWN SUBDIVISION AND LAND DEVELOPMENT ORDINANCE. CHANGES OR REVISIONS IN CONSTRUCTION PLANS AND SPECIFICATIONS SHALL NOT BE MADE UNLESS FIRST APPROVED BY THE CITY OF CHARLES TOWN AND OTHER APPROPRIATE AGENCIES
3. ALL STREET AND TRAFFIC CONTROL SIGNS SHALL CONFORM TO THE STANDARDS SET FORTH IN SECTION ARTICLE 1333.04 OF THE CITY OF CHARLES TOWN SUBDIVISION AND LAND DEVELOPMENT ORDINANCE. IN ADDITION, ALL SIGNS SHALL BE INSTALLED IN THE PUBLIC RIGHT-OF-WAY AND LOCATED IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2009 EDITION AND THE CITY MANAGER.
4. ARCHITECTURALS SHALL BE PROVIDED UNDER SEPARATE COVER.
5. ALL SITE IMPROVEMENTS SHOWN SHALL BE BONDED TO THE SATISFACTION OF THE PLANNING COMMISSION PRIOR TO ISSUANCE OF ANY BUILDING PERMITS.
6. RETAINING WALLS 18 INCHES OR GREATER IN HEIGHT REQUIRE A BUILDING PERMIT THAT MUST BE OBTAINED BY THE OWNER/DEVELOPER. THESES WALLS MUST BE DESIGNED AND CERTIFIED BY A LICENSED WEST VIRGINIA ENGINEER AND SHALL BE SUBMITTED UNDER SEPARATE COVER.
7. ALL ENTRANCE SIGNS, BUILDING SIGNS AND FREESTANDING PYLON SIGN SHALL REQUIRE A SIGN PERMIT TO ENSURE CONFORMANCE WITH THE CITY OF CHARLES TOWN'S SIGN REGULATIONS.
8. ALL FREESTANDING SIGNS SHALL BE ERECTED AT A MAXIMUM HEIGHT OF 30 FEET AND SHALL CONTAIN A MAXIMUM SQUARE FOOTAGE OF 100 SQUARE FEET, EXCLUDING STRUCTURE COMPONENTS FOR THE SIGN. ALL FREESTANDING SIGNS PERMITTED SHALL COMPLY WITH THE CITY OF CHARLES TOWN ZONING ORDINANCE SIGN REQUIREMENTS.
9. ALL BUILDING MOUNTED SIGNS OR BUSINESS SIGNS LOCATED ON INDIVIDUAL LOTS SHALL HAVE A MAXIMUM SQUARE FOOTAGE OF 50 SQUARE FEET, EXCLUDING STRUCTURAL COMPONENTS FOR THE SIGN AND EACH LOT IS TO BE ALLOWED ONE SIGN.
10. AS REQUIRED BY THE ZONING ORDINANCE, STRUCTURES SHALL BE LIMITED TO A MAXIMUM HEIGHT OF 55 FEET WITHIN THE GENERAL COMMERCIAL DISTRICT.

CITY OF CHARLES TOWN ENGINEERING NOTES:

1. EXISTING TREES ARE TO REMAIN IN THEIR NATURAL CONDITION THROUGHOUT THE DEVELOPMENT WHEREVER PRACTICAL.
2. AT THIS TIME, NO OFF-SITE BORROW PITS ARE ANTICIPATED FOR THIS PROJECT.
3. PROPERTY CORNERS ARE TO BE SET WITH ½" x 30" REBARS WITH I.D. CAPS UNLESS OTHERWISE NOTED.
4. ALL PROPOSED UTILITIES (E.G. ELECTRIC, CABLE, TELEPHONE) SHALL BE LOCATED UNDERGROUND.
5. CUT AND FILL ACTIVITY/MATERIAL SHALL NOT ENCROACH ON ADJOINING PROPERTIES.
17. SOLID WASTE REMOVAL HAS BEEN PROVIDED BY 1 REFUSE DUMPSTER LOCATION ON SITE. THE PROPERTY MANAGER WILL DETERMINE THE TYPE OF DUMPSTER AND THE FREQUENCY OF COLLECTION.
18. SITE LIGHTING IS NOT PROPOSED FOR THIS SITE. ANY ADDITIONAL LIGHTING SHALL MEET THE CITY OF CHARLES TOWN REQUIREMENTS.
19. WATER AND SEWER SERVICE TO BE PROVIDED PRIVATELY VIA SEPTIC AND WATER WELL.
20. PERMEABLE AREAS OF THE SITE SHALL BE PLANTED WITH GROUND COVER, SHRUBS, AND TREES AS REQUIRED BY THE SUBDIVISION AND LAND DEVELOPMENT ORDINANCE.

GOV'T. AGENCIES/UTILITIES:

- CITY OF CHARLES TOWN DEPARTMENT
  OF COMMUNITY DEVELOPMENT
  101 E. WASHINGTON STREET
  CHARLES TOWN, WV 25414
  (304) 725-2311
- WATER
  CITY OF CHARLES TOWN UTILITY BOARD
  108 W. CONGRESS STREET
  CHARLES TOWN, WV 25414
  (304) 725-2316
- SANITARY SEWER
  CITY OF CHARLES TOWN UTILITY BOARD
  108 W. CONGRESS STREET
  CHARLES TOWN, WV 25414
  (304) 725-2316
- ELECTRIC
  THE POTOMAC EDISON COMPANY
  18444 NORTHWESTERN TURNPIKE
  AUGUSTA, WV 26704
  (800) 686-0011
- TELECOMMUNICATIONS
  FRONTIER COMMUNICATIONS
  1108 N. MILDRED STREET
  RANSON, WV 25438
  (304) 728-8500
- TRANSPORTATION
  WEST VIRGINIA DIVISION OF HIGHWAYS,
  DISTRICT FIVE
  2120 NORTHWESTERN TURNPIKE
  BURLINGTON, WV 26710
  (304) 289-2208
- OTHER
  MISS UTILITY
  5608 MACCORKLE AVE, SW
  SOUTH CHARLESTON, WV 25309
  (800) 245-4848 OR 811

NOTES:
THE CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES PRIOR TO CONSTRUCTION.

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JASON P. GERNAT REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL:

REVISIONS

1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

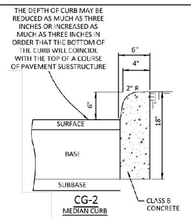
GENERAL NOTES

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP. (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-GI-002.DWG	
NCS:	N/A
SHEET:	02 OF 25



CG-2
MEDIAN CURB

NOTES:

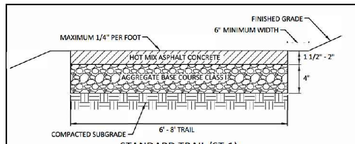
1. THE USE OF CG-1R SHALL NOT BE UTILIZED WITHIN THE LIMITS OF PUBLIC RIGHT OF WAY.
2. A MAXIMUM OF A 2" RADIUS IS ACCEPTABLE WITH CURB AND GUTTER.
3. SUBGRADE FOR ALL CURB AND GUTTER SHALL BE COMPACTED TO 95 PERCENT DENSITY AT OPTIMUM MOISTURE TO THE FULL WIDTH OF RIGHT OF WAY IN ACCORDANCE WITH AASHTO, T99.

NOT TO SCALE

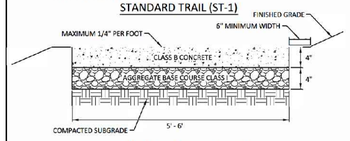
TYPICAL COMBINATION CURB AND GUTTER

City of Charles Town

CG-1
CG-1R
CG-2



STANDARD TRAIL (ST-1)



STANDARD SIDEWALK (SW-1)

NOTES:

1. ALL PEDESTRIAN AND BIKE TRAILS LOCATED OUTSIDE OF CITY OF CHARLESTOWN RIGHT OF WAY SHALL BE A MINIMUM OF 5' IN WIDTH FOR SIDEWALKS, 6' FOR ALL PEDESTRIAN TRAILS, AND 8' FOR ALL BIKE TRAILS.
2. A PRIVATE ACCESS EASEMENT SHALL BE PROVIDED FOR ALL SIDEWALKS AND TRAILS OUTSIDE OF CITY OF CHARLES TOWN RIGHT OF WAY AND SHALL INCLUDE A MINIMUM OF 3' OF WIDTH ON BOTH SIDES OF THE TRAIL OR SIDEWALK.
3. THE MAXIMUM GRADE FOR ALL PEDESTRIAN TRAILS SHALL BE 10%.
4. THE MAXIMUM GRADE FOR ALL BIKE TRAILS SHALL BE 8%, EXCEPT UP TO 15% IS ALLOWED FOR DISTANCES OF LESS THAN 150 FEET.
5. APPROPRIATE LIGHTING AND SIGNAGE, LANDSCAPING, BUFFERING AND DRAINAGE MEASURES, ALONG WITH CONSIDERATIONS FOR SECURITY SHALL BE INCORPORATED IN THE DESIGN OF THESE FACILITIES.

NOT TO SCALE

TRAIL AND TYPICAL SIDEWALK

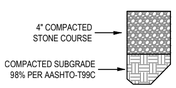
City of Charles Town

ST-1
SW-1

MINIMUM GRAVEL PAVEMENT TYPICAL SECTION:

NOT TO SCALE

GRAVEL PAVEMENT



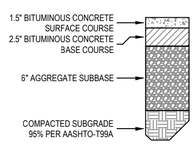
NOTES:

1. SOILS TESTS OF SUBGRADE MUST BE SUBMITTED FOR ACTUAL DETERMINATION BASED ON CBR OF REQUIRED PAVEMENT SECTION THICKNESS PRIOR TO CONSTRUCTION.
2. ALL STONE AND SUBGRADE MATERIAL SHALL BE COMPACTED TO 98% THEORETICAL MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T99 METHOD C, WITHIN 2% OF OPTIMUM MOISTURE CONTENT.

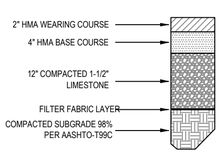
MINIMUM TYPICAL PAVEMENT SECTIONS:

NOT TO SCALE

K-1 ASPHALT PAVEMENT



WVDOH ENTRANCE PAVEMENT

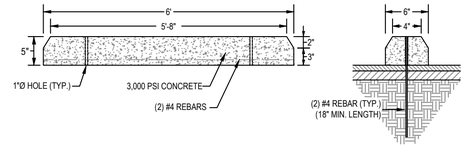


NOTES:

1. SOILS TESTS OF SUBGRADE MUST BE SUBMITTED FOR ACTUAL DETERMINATION BASED ON CBR OF REQUIRED PAVEMENT SECTION THICKNESS PRIOR TO CONSTRUCTION.
2. FOR K-1 ASPHALT PAVEMENT TYPICAL, ALL BASE AND SUBGRADE MATERIAL SHALL BE COMPACTED TO 95% THEORETICAL MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T99 METHOD A, WITHIN 2% OF OPTIMUM MOISTURE CONTENT.
2. FOR WVDOH ENTRANCE PAVEMENT TYPICAL, ALL BASE AND SUBGRADE MATERIAL SHALL BE COMPACTED TO 98% THEORETICAL MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T99 METHOD C, WITHIN 2% OF OPTIMUM MOISTURE CONTENT.

WHEEL STOP DETAIL:

NOT TO SCALE



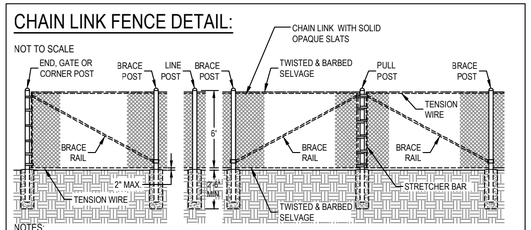
SECTION

NOTES:

1. DIMENSIONS MAY BE MODIFIED AS NEEDED BASED ON PRODUCT SUPPLIER.

CHAIN LINK FENCE DETAIL:

NOT TO SCALE

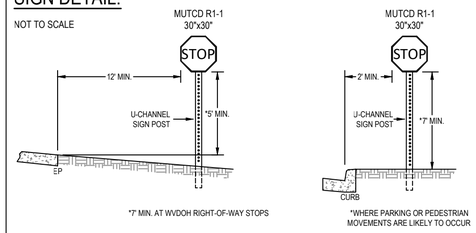


NOTES:

1. OWNER/CONTRACTOR MAY OPT TO USE THE CHAIN LINK FENCE AS SHOWN HEREIN OR APPROVED ALTERNATE CHAIN LINK FENCE.

SIGN DETAIL:

NOT TO SCALE

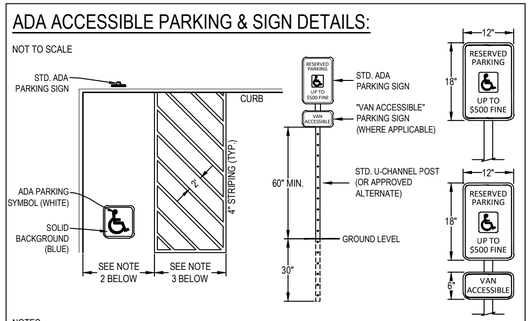


NOTES:

1. FOR MORE EXTENSIVE STANDARDS REFER TO THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS 2009 EDITION (WITH UPDATES) AND THE STANDARDS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION.
2. U-CHANNEL SIGN POST SHALL BE PER WVDOH STANDARD DETAIL SHEET TE1-7A.
3. ALL STOP BARS SHALL BE TYPE V, WHITE, 12" WIDTH, SOLID STOP LINES (PER WVDOH SPECIFICATIONS).

ADA ACCESSIBLE PARKING & SIGN DETAILS:

NOT TO SCALE

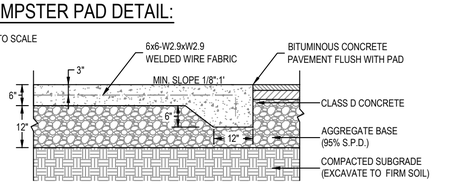


NOTES:

1. ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE AMERICANS WITH DISABILITIES ACT (ADA-CURRENT VERSION) ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES AND APPLICABLE LOCAL AND STATE CODES.
2. 8' (96") MINIMUM PARKING SPACE WIDTH TYPICAL FOR STANDARD "CAR" AND "VAN ACCESSIBLE" ADA PARKING SPACES.
3. 5' (60") MINIMUM ACCESS AISLE WIDTH TYPICAL FOR STANDARD "CAR" ADA PARKING SPACES; 8' (96") MINIMUM ACCESS AISLE WIDTH TYPICAL FOR STANDARD "VAN ACCESSIBLE" ADA PARKING SPACES.
4. FOR MORE EXTENSIVE STANDARDS REFER TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR STREETS AND HIGHWAYS 2009 EDITION (WITH UPDATES).

DUMPSTER PAD DETAIL:

NOT TO SCALE



NOTES:

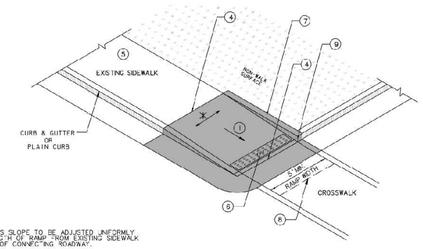
1. ALL BASE AND SUBGRADE MATERIAL SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T99 METHOD C.
2. CONCRETE SHALL BE MINIMUM 4,000 PSI FIBERGLASS REINFORCED CONCRETE.

ADA SIDEWALK RAMPS:

NOT TO SCALE

NOTES:

1. ALL PROPOSED ADA RAMPS ARE TYPE IB RAMPS.
2. ALL SIDEWALK RAMPS SHALL BE CONSTRUCTED TO MEET CURRENT ADA STANDARDS.



TYPE IB RAMP

NOTES

THE TYPE OF RAMP TO BE USED SHALL BE AS SPECIFIED ON THE PLANS. THESE STANDARDS CAN BE CONSIDERED GUIDELINES IN SELECTING RAMP TYPES, HOWEVER THEY CAN BE DEVIATED FROM WITH A SPECIAL DETAIL AS NOTED IN PLANS.

RAMP CONCRETE SHALL MEET THE REQUIREMENTS OF SECTION 609 OF THE CURRENT WVDOT, DOH STANDARD SPECIFICATIONS ROADS AND BRIDGES AND ANY SUBSEQUENT DOH SUPPLEMENTAL SPECIFICATIONS, AND THE PUBLIC RIGHTS OF WAY ACCESSIBILITY GUIDELINES (PROWAG) DATED JULY 26, 2011. RAMP SURFACE SHALL INCLUDE A "DETECTABLE WARNING SURFACE" (SEE PVT7 SHT. 11 OF 13) AS SHOWN FOR EACH RAMP TYPE. A COARSE BROOM FINISH, TRANSVERSE TO FLARE SLOPES, OR EQUAL NON-SKID FINISH SHALL BE PROVIDED ON CONCRETE SURFACES.

NORMAL GUTTER FLOW LINE AND PROFILE SHALL BE MAINTAINED THROUGH THE RAMP AREA, UNLESS OTHERWISE SHOWN OR SPECIFIED. POSITIVE DRAINAGE MUST BE MAINTAINED SO THAT NO PONDING OCCURS WITHIN THE RAMP OR CLEAR SPACE AREA.

1/4" MINIMUM, 1/2" MAXIMUM PREFORMED EXPANSION JOINT FILLER, MEETING THE REQUIREMENTS OF SECTION 609 OF THE SPECIFICATIONS, AS NOTED ABOVE, SHALL BE PLACED AT ALL LOCATIONS WHERE RAMP CONTACTS CURB, GUTTER, CONCRETE PAVEMENT, OR OTHER RIGID OBJECTS.

WHERE EXISTING SIDEWALK CONNECTS TO PROPOSED SIDEWALK OR RAMPS, EXPANSION JOINTS ALONG WITH DOWEL BARS WILL BE PLACED. DOWEL BARS WILL BE UTILIZED BETWEEN EXISTING AND PROPOSED TO REDUCE VERTICAL CHANGE. SEE SHEET 11 FOR ADDITIONAL INFORMATION.

SAWCUTS WILL BE UTILIZED DURING DEMOLITION OF EXISTING SIDEWALKS. SIMILAR METHODS MAY BE USED UPON APPROVAL BY FIELD ENGINEER.

RAMPS SHALL NOT BE PLACED IN LINE WITH DRAINAGE STRUCTURES. LOCATION OF THE RAMP SHALL TAKE PRECEDENCE OVER LOCATION OF THE DRAINAGE STRUCTURE, EXCEPT WHERE EXISTING STRUCTURES ARE BEING UTILIZED FOR CONSTRUCTION OF NEW RAMPS.

ANY GRATE IN PEDESTRIAN AREAS SHALL HAVE OPENINGS NOT GREATER THAN 1/2" AND SHALL BE PLACED WITH LONG DIMENSION OF OPENING PERPENDICULAR TO THE DIRECTION OF PEDESTRIAN TRAVEL.

IF THE 8.33% (12:1) SLOPE CANNOT BE OBTAINED DUE TO GRADE OF THE ADJACENT ROADWAY, THE SLOPED PORTION OF THE RAMP SHALL BE EXTENDED TO A MINIMUM LENGTH OF 15'-0".

EXISTING CROSS WALK AND STOP BAR MARKINGS TO BE ERADICATED AND RELOCATED AS DICTATED BY PROPOSED RAMP LOCATIONS. COST NOT INCIDENTAL TO COST OF PROPOSED RAMP.

CURB RAMP WIDTH SHALL MATCH SIDEWALK WIDTH PLUS CLEARANCE. TYPICAL SIDEWALK WIDTH IS 5' MINIMUM. RAMP WIDTHS LESS THAN 5' REQUIRE DIVISION/DISTRICT ENGINEER APPROVAL. WIDTHS LESS THAN 4' REQUIRE AN EXCEPTION JUSTIFICATION REPORT. SEE SHEET 11 FOR INFORMATION REGARDING RAMP THICKNESS.

GRADE BREAKS SHALL BE PERPENDICULAR TO THE DIRECTION OF THE RAMP RUN. SURFACE SLOPES THAT MEET AT GRADE BREAKS SHALL BE FLUSH.

CLEAR SPACE- BEYOND THE BOTTOM GRADE BREAK, A CLEAR SPACE THE WIDTH OF THE CURB RAMP AND EXTENDING A MINIMUM INTO THE ABUTTING ROADWAY SHALL BE PROVIDED WITHIN THE WIDTH OF THE PEDESTRIAN STREET CROSSING AND WHOLLY OUTSIDE THE PARALLEL TRAVEL LANE. SURFACE TO MATCH EXISTING. ANY CLEAR SPACE WORK TO BE COMPLETED WILL BE INCIDENTAL TO THE COST OF THE RAMP.

ALL CURB RAMPS SHALL BE CONSTRUCTED TO PROVIDE ACCESS TO EXISTING OPERABLE PARTS. AN EXAMPLE OF THIS WOULD BE PEDESTRIAN PUSH BUTTONS.

LEGEND

1. 8.33% (12:1) MAXIMUM RAMP SLOPE INCLUDING CONSTRUCTION TOLERANCE. SLOPE OF RAMP SHALL CARRY THROUGH TO FACE OF CURB
2. CROSS SLOPE: 2.00% MAXIMUM INCLUDING CONSTRUCTION TOLERANCE
3. CURB RAMPS REQUIRE A (5'-0") MINIMUM TURNING SPACE WHERE PEDESTRIANS PERFORM TURNING MANEUVERS WITH A MAXIMUM CROSS SLOPE OF 2% AND LONGITUDINAL SLOPE MATCHING ROADWAY
4. GRADE BREAK REQUIRED TO BE FLUSH (0") AND PERPENDICULAR TO PEDESTRIAN PATH OF TRAVEL
5. IF SIDEWALK IS EXISTING AND NON-COMPLIANT SEE "TRANSITION TO EXISTING NON-COMPLIANT SIDEWALK" DETAIL SHEET 12
6. DETECTABLE WARNING SURFACE. SEE "DETECTABLE WARNING SURFACE (DWS)" DETAIL SHEET 11
7. CURB WALL OR CHEEK WALL AS DICTATED BY FIELD CONDITIONS. SEE "EXISTING ADJACENT SURFACE TRANSITION" DETAIL SHEET 13
8. CLEAR SPACE - WIDTH OF CURB RAMP AND EXTENDING 4' MINIMUM
9. 3/4" CHAMFER EDGE

PAY LIMITS FOR CURB RAMPS (EXCLUDING DWS)

NOT TO SCALE

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 1-1-1999

REVISION DATE
7/25/05
10/28/10
10/26/12

SIDEWALK RAMPS
(Sheet 3 of 13)
TYPE IB RAMP

STANDARD SHEET PVT 7

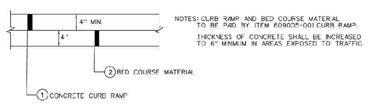
ADA SIDEWALK RAMPS:

NOT TO SCALE

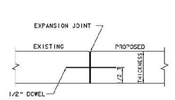
NOTES:

1. ALL PROPOSED ADA RAMPS ARE TYPE IB RAMPS.
2. ALL SIDEWALK RAMPS SHALL BE CONSTRUCTED TO MEET CURRENT ADA STANDARDS.

DETECTABLE WARNING SURFACE (DWS)



CURB RAMP TYPICAL



NOTE: 1/2" DOWEL TO BE EVENLY SPACED. MINIMUM LENGTH 18". COST OF DOWEL INSTALLATION INCIDENTAL TO COST OF RAMP.

CURB RAMP TYPICAL

NOTES

DETECTABLE WARNING SURFACES (DWS'S) SHALL ONLY BE PURCHASED FROM VENDORS ON THE WEST VIRGINIA DIVISION OF HIGHWAYS APPROVED VENDOR LIST 609.2 - DETECTABLE WARNING SURFACES.

DESIGN AND PLACEMENT OF DETECTABLE WARNING SURFACE (DWS) SHALL BE IN ACCORDANCE WITH SECTION 609 OF THE CURRENT WVDOT, DOH STANDARD SPECIFICATIONS ROADS AND BRIDGES AND AND SUBSEQUENT DOH SUPPLEMENTAL SPECIFICATIONS AND THE PUBLIC RIGHTS OF WAY ACCESSIBILITY GUIDELINES (PROWAG) DATED JULY 26, 2011.

DETECTABLE WARNING SURFACES SHALL EXTEND ACROSS THE FULL WIDTH OF THE CURB RAMP THRESHOLD WHERE THE CURB IS FLUSH WITH THE ROADWAY AND SHALL BE PLACED AT THE BACK OF THE CURB WITH A 0" MINIMUM, 2" MAXIMUM BORDER DIMENSION FROM JOINTS ON EACH SIDE OF THE DWS. WHERE THE BACK OF THE CURB EDGE IS TOOLED TO PROVIDE A RADIUS, THE BORDER DIMENSION SHOULD BE MEASURED FROM THE END OF THE RADIUS.

DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT GUTTER, STREET, OR HIGHWAY EITHER LIGHT ON DARK OR DARK ON LIGHT.

A WET OR PLASTIC SET-IN-PLACE DETECTABLE WARNING SURFACE (DWS) SHALL BE INSTALLED AT THE TIME OF THE PLACEMENT OF THE CURB RAMP, WHILE THE CONCRETE IS STILL PLASTIC.

MOLD-IN-PLACE CONCRETE DOMES, BRICK PAVERS, OR IRON OR STEEL WARNING SYSTEMS SHALL NOT BE USED.

SET IN PLACE DWS SHALL BE USED IN NEW CONSTRUCTION. SURFACE MOUNTED DWS ARE NOT PERMITTED.

CONCRETE SHALL BE FINISHED AROUND THE DWS AT TIME OF PLACEMENT.

A SINGLE DWS PANEL SHALL BE USED WITH CURB RAMP WIDTHS OF 5' OR LESS.

ANY CUTTING OF DWS DURING INSTALLATION SHALL BE APPROVED BY PROJECT ENGINEER.

IF DWS IS CUT TO CONFORM TO A SPECIFIC SHAPE OF RAMP AND AND KRING DEVICES BECOME PART OF THE WASTE, THEN ANCHOR WILL BE REMOVED AND REATTACHED INTO THE DWS AT THE ORIGINAL EDGE OFFSET AS PER MANUFACTURER.

ALL DOWEL BARS SHALL BE EPOXY COATED IN ACCORDANCE WITH SECTION 709.1 OF THE CURRENT WVDOH STANDARD SPECIFICATIONS ROADS AND BRIDGES.

NOT TO SCALE

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 1-1-1999

REVISION DATE
7/25/05
10/28/10
10/26/12

SIDEWALK RAMPS
(Sheet 11 of 13)
DETECTABLE WARNING SURFACES & TYPICALS

STANDARD SHEET PVT 7

INTEGRITY FEDERAL SERVICES
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JASON P. GERMAN REGISTERED No. 18127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL:

REVISIONS
1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

SITE DETAILS

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP. (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-GI-501.DWG	
NCS:	N/A
SHEET:	03 OF 25

EROSION AND SEDIMENT CONTROL NARRATIVE:

I. PROJECT DESCRIPTION:

THIS PROJECT IS FOR THE CONSTRUCTION OF A SELF STORAGE COMPLEX WITH ASSOCIATED DRIVE AISLES PARKING AREAS AND SIDEWALKS. IN ADDITION, THERE WILL BE THE CONSTRUCTION OF UNDERGROUND UTILITIES SERVING THE PROPERTY, A BIORETENTION BASIN AND UNDERGROUND STORMWATER MANAGEMENT. THE TOTAL PROJECT AREA IS APPROXIMATELY ±5.49 ACRES. THE TOTAL IMPERVIOUS AREA CREATED BY THE DEVELOPMENT OF THE SITE IS APPROXIMATELY ±3.30 ACRES. ASSOCIATED GRADING VOLUMES FOR THE PROPOSED SITE IMPROVEMENTS ARE APPROXIMATELY 16,000 C.Y. OF CUT AND 16,000 C.Y. OF FILL (NOT TO BE USED FOR BIDDING PURPOSES).

II. EXISTING SITE CONDITIONS:

THE SITE IS LOCATED ALONG THE WESTERN SIDE OF BERRYVILLE PIKE (U.S. ROUTE 340) AND THE SOUTHERN SIDE OF HUYETT ROAD (WV SEC. ROUTE 13/3). THE SUBJECT PROPERTY CONSISTS OF UNDEVELOPED OPEN SPACE COVERED WITH FIELD GRASS AND VEGETATED AREAS. THE SITE CONSISTS OF MODERATELY STEEP AND FLAT SLOPES RANGING FROM APPROXIMATELY 1%-12%. THE SURFACE RUNOFF DRAINS VIA A SWALE TO AN OUTFALL LOCATION AT THE SOUTH WESTERN PORTION OF THE SITE.

III. ADJACENT AREAS:

THE SITE IS BOUNDED BY RESIDENTIAL PROPERTIES TO THE SOUTH AND WEST, AN EXISTING SWM FACILITY TO THE SOUTH, BERRYVILLE PIKE (U.S. ROUTE 340) TO THE EAST AND HUYETT ROAD (WV SEC. ROUTE 13/3) TO THE NORTH. THERE IS LITTLE POTENTIAL FOR OFFSITE EROSION AND SEDIMENT DAMAGE BY THIS PROJECT AS TEMPORARY EROSION AND SEDIMENT CONTROLS WILL BE USED DURING CONSTRUCTION AND PERMANENT STORMWATER MANAGEMENT CONTROLS WILL BE INSTALLED PRIOR TO THE SITE BEING FULLY DEVELOPED.

IV. CRITICAL AREAS:

THERE ARE NO CRITICAL AREAS ON THIS SITE. DISTURBED AREAS WILL BE PROTECTED WITH SILT FENCE, DIVERSION DIKES AND/OR OTHER CONTROL MEASURES.

V. SOILS:

SOIL NAME	MAPPING UNIT	DEPTH TO RESTRICTIVE FEATURE	DRAINAGE CLASS	PERMEABILITY (IN/HR)	DEPTH TO WATER TABLE	HSG
FUNKSTOWN SILT LOAM	Fk	MORE THAN 80"	MODERATELY WELL DRAINED	MODERATELY HIGH TO HIGH-0.6-2.0	20"-28"	C
RYDER-POPLIMENTO COMPLEX, 8-15% SLOPES	RpC	24"-40"	WELL DRAINED	LOW TO HIGH-0.06-2.0	MORE THAN 80"	B
POPLIMENTO SILT LOAM, 3-8% SLOPES	PmB	MORE THAN 80"	WELL DRAINED	MODERATELY HIGH-0.2-0.6	MORE THAN 80"	B
POPLIMENTO SILT LOAM, 8-15% SLOPES	PmC	MORE THAN 80"	WELL DRAINED	MODERATELY HIGH-0.2-0.6	MORE THAN 80"	B

NOTES:
- SOILS INFORMATION PROVIDED BY THE USDA SOIL SURVEY OF JEFFERSON COUNTY, WEST VIRGINIA.

VI. POTENTIAL EROSION PROBLEM AREAS:

PER THE SOILS DATA SHOWN ABOVE, THE EXISTING SOILS LOCATED ONSITE HAVE A MODERATE-SLIGHT ERODABILITY POTENTIAL.

VII. EROSION AND SEDIMENT CONTROL ELEMENTS:

UNLESS OTHERWISE NOTED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE CONSTRUCTED AND MAINTAINED IN STRICT COMPLIANCE WITH THE LATEST EDITION OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL AND APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.

1. MARK CLEARING LIMITS:

PRIOR TO BEGINNING LAND DISTURBING ACTIVITIES, CLEARLY MARK ALL CLEARING LIMITS, SENSITIVE AREAS AND THEIR BUFFERS, AND TREES THAT ARE TO BE PRESERVED WITHIN THE CONSTRUCTION AREA. PLASTIC, METAL, OR STAKE WIRE FENCE MAY BE USED TO MARK CLEARING LIMITS. SAFETY FENCE SHOULD BE INSTALLED TO PREVENT PUBLIC ACCESS TO POTENTIALLY HAZARDOUS AREAS OF THE SITE AND TO PREVENT ACCESS TO EROSION AND SEDIMENT CONTROL MEASURES.

2. ESTABLISH CONSTRUCTION ACCESS:

ALL CONSTRUCTION ACCESS SHALL ENTER AND EXIT THE SITE THROUGH THE STABILIZED CONSTRUCTION ENTRANCE AS SHOWN ON THE PLANS LOCATED ON THE SOUTHERN SIDE OF THE PROPERTY OFF OF HUYETT ROAD (WV SEC ROUTE 13/3). THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. IF WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE. CONTRACTOR SHALL SUPPLY A WATER SOURCE BY PROVIDING A WATER TRUCK/WATER TANK ON SITE OR BY USE OF EXISTING ON SITE WATER SERVICE. THE CONSTRUCTION ENTRANCE LOCATION MAY BE SHIFTED TO ACCOMMODATE CONSTRUCTION PHASING. ANY SHIFT IN THE LOCATION SHALL BE APPROVED BY THE CITY OF CHARLES TOWN.

3. INSTALL SEDIMENT CONTROLS:

THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION SHALL REMAIN IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICABLE. PRIOR TO LEAVING THE CONSTRUCTION SITE, SURFACE RUNOFF FROM DISTURBED AREAS SHALL PASS THROUGH AN APPROPRIATE SEDIMENT CONTROL MEASURE. BMP'S INTENDED TO TRAP SEDIMENT ON SITE SHALL BE CONSTRUCTED AS ONE OF THE FIRST STEPS IN GRADING. THESE BMP'S SHALL BE FUNCTIONAL PRIOR TO LAND DISTURBING ACTIVITIES TAKING PLACE. EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS SHALL BE SEEDED AND MULCHED AS PER TEMPORARY AND PERMANENT SOIL STABILIZATION MEASURES.

SEDIMENT TRAP:

SEDIMENT TRAPS SHALL BE INSTALLED PRIOR TO INITIATING ROUGH GRADING (DURING THE FIRST PHASE OF CONSTRUCTION) TO DETAIN SEDIMENT-LADEN RUNOFF FROM SMALL DRAINAGE AREAS OF FIVE ACRES OR LESS. SEDIMENT TRAPS SHALL BE INSTALLED AT THE OUTLET OF DITCHES AND OTHER PERIMETER CONTROLS INSTALLED DURING THE FIRST STAGE OF CONSTRUCTION. SEDIMENT TRAPS MAY ALSO BE INSTALLED AT THE OUTLET OF ANY STRUCTURE WHICH CONCENTRATES SEDIMENT-LADEN RUNOFF (I.E. DISCHARGE POINT OF DIVERSIONS, CHANNELS, SLOPE DRAINS OR OTHER RUNOFF CONVEYANCES).

SUPER SILT FENCE:

SUPER SILT FENCE SHALL BE INSTALLED TO REDUCE RUNOFF VELOCITY AND ALLOW SEDIMENT TO BECOME TRAPPED BEHIND OR UP-SLOPE OF THE SUPER SILT FENCE. SUPER SILT FENCE PROVIDES A BARRIER THAT CAN COLLECT AND HOLD DEBRIS AND SOIL, PREVENTING THE MATERIAL FROM ENTERING CRITICAL AREAS, STREAMS, STREETS, ETC. SUPER SILT FENCE ALSO HELPS TO DECREASE THE VELOCITY OF SHEET FLOWS AND LOW-TO-MODERATE LEVEL CHANNEL FLOWS.

TEMPORARY DIVERSIONS:

TEMPORARY DIVERSIONS SHALL BE INSTALLED TO DIVERT UP-SLOPE CLEAN WATER AROUND A PROJECT SITE TO REDUCE THE QUANTITY OF WATER WITHIN THE SEDIMENT CONTROL SYSTEM; TO DIVERT UP-SLOPE WATER FROM DISTURBED AREAS TO AN APPROPRIATE SEDIMENT TRAPPING FACILITY SUCH AS A SEDIMENT TRAP OR SEDIMENT BASIN; TO DIVERT INTERNAL SEDIMENT-LADEN WATER TO A SEDIMENT-TRAPPING STRUCTURE; TO PREVENT EROSION AND MAINTAIN ACCEPTABLE WORKING CONDITIONS ABOVE CRITICAL DISTURBED AREAS PRIOR TO STABILIZATION. TEMPORARY DIVERSIONS ALSO HELP TO INTERCEPT AND DIVERT WATER AWAY FROM FOOTERS, WALLS & OTHER STRUCTURES. ANY PERIMETER DIVERSION BERM/DITCH USED MUST BE STABILIZED PRIOR TO IMPLEMENTING IT.

DIVERSIONS THAT ARE TO SERVE LONGER THAN 14 WORKING DAYS SHALL BE STABILIZED IMMEDIATELY WITH SEED AND MULCH WITH OR WITHOUT A ROLLED EROSION CONTROL PRODUCT MEETING THE REQUIREMENTS FOUND IN THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL TO PRESERVE DIKE HEIGHT, PREVENT EROSION AND REDUCE MAINTENANCE.

INLET PROTECTION:

INLET PROTECTION SHALL BE BE PLACED ON ALL STORM DRAIN DROP INLETS OR CURB INLETS TO TRAP SEDIMENT BEFORE CONTAMINATED RUNOFF ENTERS A STORM DRAINAGE SYSTEM. STORM DRAIN INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY FOLLOWING INSTALLATION OF STORMWATER CONTROLS OR PRIOR TO CONSTRUCTION ACTIVITIES FOR EXISTING STORM DRAINS OR WHERE STORM DRAIN INLETS ARE TO BE MADE OPERATIONAL BEFORE PERMANENT STABILIZATION OF THE CORRESPONDING DISTURBED DRAINAGE AREA.

4. STABILIZE SOILS:

THE GENERAL PERMIT REQUIRES THAT:

- STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOUR (4) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED.
- APPLICABLE PRACTICES INCLUDE, BUT ARE NOT LIMITED TO: TEMPORARY AND PERMANENT SEEDING, SODDING, MULCHING, EROSION CONTROL FABRICS AND MATTING, SURFACE ROUGHENING, SURFACE WATER CONTROL, AND DUST CONTROL.
- SELECTED SOIL STABILIZATION MEASURES SHALL BE APPROPRIATE FOR THE TIME OF YEAR, SITE CONDITIONS, AND ESTIMATED DURATION OF USE.
- ALL SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT TRAPPING MEASURES.
- LINEAR CONSTRUCTION ACTIVITIES SUCH AS RIGHT-OF-WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINES, AND TRENCHING FOR UTILITIES, SHALL BE CONDUCTED TO MEET THE SOIL STABILIZATION TIMEFRAME REQUIREMENTS. CONTRACTORS SHALL INSTALL THE BEDDING MATERIALS, ROADBEDS, STRUCTURES, PIPELINES, OR UTILITIES AND RE-STABILIZE THE DISTURBED SOILS SO THAT THE FOUR (4) DAY REQUIREMENTS ARE MET.

TEMPORARY SEEDING:

TEMPORARY STABILIZATION SHALL BE INITIATED WITHIN FOUR (4) DAYS TO AREAS THAT WILL NOT BE RE-DISTURBED FOR MORE THAN FOURTEEN (14) DAYS. AREAS INCLUDE DENUDED AREAS, SOIL STOCKPILES, DIKES, DAMS, SIDES OF SEDIMENT BASINS, TEMPORARY ROAD BANKS, ETC.

PERMANENT SEEDING:

PERMANENT STABILIZATION SHALL BE INITIATED WITHIN FOUR (4) DAYS OF REACHING FINAL GRADE AND WITHIN FOUR (4) DAYS AFTER CONSTRUCTION HAS BEEN COMPLETED. AREAS INCLUDE DISTURBED AREAS WHERE PERMANENT, LONG-LIVED VEGETATIVE COVER IS NEEDED TO STABILIZE THE SOIL AND ROUGH-GRADED AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR SIX MONTHS OR MORE. ANY AREAS THAT ARE NOT BROUGHT TO FINAL GRADE FOR SIX (6) MONTHS OR MORE SHOULD INCLUDE TEMPORARY SEEDING.

MULCHING:

THE APPLICATION OF STRAW, HAY OR OTHER SUITABLE MATERIALS TO THE SOIL SURFACE TO PREVENT EROSION BY PROTECTING THE SOIL SURFACE FROM RAINDROP IMPACT AND REDUCING THE VELOCITY OF OVERLAND FLOW. AREAS THAT HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED SHOULD BE MULCHED IMMEDIATELY FOLLOWING SEEDING. AREAS THAT CANNOT BE SEEDED BECAUSE OF THE SEASON SHOULD BE MULCHED TO PROVIDE SOME PROTECTION TO THE SOIL SURFACE.

TOPSOILING:

TOPSOILING IS THE SPREADING OF TOPSOIL OF A SUITABLE QUALITY OVER AN AREA TO BE STABILIZED BY ESTABLISHING VEGETATION. IF TOPSOIL IS TO BE STOCKPILED AT SITE, IT SHALL BE IN A LOCATION THAT WILL NOTE ERODE, BLOCK DRAINAGE, OR INTERFERE WITH WORK ON THE SITE. ALL SOIL STOCKPILES SHALL BE STABILIZED BY TEMPORARY SEEDING AND MULCHING AND PROTECTED WITH SEDIMENT TRAPPING MEASURES SUCH AS SILT FENCE. TOPSOIL SHALL BE SPREAD AT A LIGHTLY COMPACTED DEPTH OF 2 TO 4 INCHES. 4 INCHES OR GREATER IS RECOMMENDED FOR AREAS WHERE FINE-TEXTURED (CLAYEY) SUBSOIL OR OTHER ROOT LIMITING FACTORS ARE PRESENT.

ROLLED EROSION CONTROL PRODUCTS (RECP):

TEMPORARY OR PERMANENT EROSION CONTROL NETS, BLANKETS AND THREE-DIMENSIONAL MATRIXES MADE FROM A WIDE VARIETY OF NATURAL (SUCH AS JUTE, COIR AND STRAW) AND MAN-MADE MATERIALS ALONE OR IN COMBINATION THAT HELP PREVENT EROSION IN SEVERAL WAYS. PREFABRICATED BLANKETS OR NETTING SHALL BE USED AS A TEMPORARY SURFACE STABILIZING MEASURE AND TO AID IN THE ESTABLISHMENT OF VEGETATION. THEY ARE TYPICALLY USED ON STEEP SLOPES AND TO HELP ESTABLISH GRASS IN LOW VELOCITY VEGETATED CHANNELS.

5. PROTECT SLOPES:

THE GENERAL PERMIT PROHIBITS UP-SLOPE RUNOFF FROM FLOWING DOWN FILL SLOPES. ALL FILL SURFACE RUNOFF SHALL BE CONTAINED WITH TEMPORARY BERMS AND IN PIPES, SLOPE DRAINS, OR STABILIZED CHANNELS. DRAINAGE SHALL BE PROVIDED TO REMOVE GROUND WATER INTERSECTING THE SLOPE SURFACE OF EXPOSED SOIL AREAS. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES, CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS. SOILS ON SLOPES SHALL BE STABILIZED AS SPECIFIED IN TEMPORARY AND PERMANENT SOIL STABILIZATION MEASURES.

6. PROTECT STORM DRAIN INLETS:

STORM DRAIN INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SURFACE WATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. INLET PROTECTION SHALL BE PLACED ON ALL STORM INLETS TO PROTECT AGAINST SEDIMENT-LADEN RUNOFF ENTERING THE SYSTEM AT THE INLETS.

INLET PROTECTION:

INLET PROTECTION SHALL BE BE PLACED ON ALL STORM DRAIN DROP INLETS AND/OR CURB INLETS TO TRAP SEDIMENT BEFORE CONTAMINATED RUNOFF ENTERS A STORM DRAINAGE SYSTEM. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY FOLLOWING INSTALLATION OF STORMWATER CONTROLS, PRIOR TO CONSTRUCTION ACTIVITIES FOR EXISTING STORM DRAINS, AND/OR WHERE STORM DRAIN INLETS ARE TO BE MADE OPERATIONAL BEFORE PERMANENT STABILIZATION OF THE DISTURBED DRAINAGE AREA HAVE OCCURRED.

CULVERT INLET PROTECTION:

CULVERT INLET PROTECTION SHALL BE BE PLACED ON ALL STORM CULVERT INLETS TO PREVENT SEDIMENT FROM ENTERING, ACCUMULATING IN, AND BEING TRANSFERRED BY THE CULVERT AND ASSOCIATED DRAINAGE SYSTEM. CULVERT INLET PROTECTION MAY ALSO PROVIDE EROSION CONTROL AT STORM CULVERT INLETS DURING THE PHASE OF A PROJECT WHERE ELEVATION AND DRAINAGE PATTERNS CHANGE, CAUSING ORIGINAL CONTROL MEASURES TO BE INEFFECTIVE OR IN NEED OF REMOVAL.

7. CONVEY STORMWATER IN A NON-EROSIVE MANNER:

POINTS OF DISCHARGE AND RECEIVING STREAMS SHALL BE PROTECTED FROM EROSION DUE TO INCREASES IN THE VOLUME, VELOCITY, AND PEAK FLOW RATE OF SURFACE WATER RUNOFF FROM THE PROJECT SITE. ALL STORMWATER CONVEYANCE CHANNELS SHALL BE STABILIZED FOR EXPECTED FLOWS.

OUTLET PROTECTION:

OUTLET PROTECTION SHALL BE INSTALLED AT ALL CULVERT OUTLETS OF ALL TYPES, PIPE CONDUITS FROM ALL SEDIMENT BASINS, SWM PONDS, AND NEW CHANNELS CONSTRUCTED AS OUTLETS FOR CULVERTS AND CONDUITS. OUTLET PROTECTION SHALL BE PROVIDED IN THE FORM OF A RIP-RAP-LINED APRON CONSTRUCTED AT A ZERO OR MINIMUM SLOPE TO SLOW THE OUTLET VELOCITY AND ADEQUATELY PROTECT SOILS FROM SCOUR BY REDUCING FLOW.

8. CONTROL OTHER POLLUTANTS:

ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF SURFACE OR GROUND WATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE. COVER, CONTAINMENT, AND PROTECTION FROM VANDALISM SHALL BE PROVIDED FOR ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCTS, AND NON-INERT WASTES PRESENT ON SITE. ALL MATERIALS USED ON THE SITE SHALL BE PROPERLY STORED, HANDLED, DISPENSED AND DISPOSED OF FOLLOWING ALL APPLICABLE LABEL DIRECTIONS. FLAMMABLE AND COMBUSTIBLE LIQUIDS SHALL BE STORED AND HANDLED ACCORDING TO APPLICABLE REGULATIONS, AND, AT A MINIMUM, ACCORDING TO OSHA STANDARDS 29 CFR 1926 162. ONLY APPROVED CONTAINERS AND PORTABLE TANKS SHALL BE USED FOR STORAGE AND HANDLING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS.

- MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM DRAIN DOWN, SOLVENT AND DE-GREASING CLEANING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO SURFACE WATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CONTAMINATED SURFACES SHALL BE CLEANED IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT.
- WHEEL WASH OR TIRE BATH WASTEWATER SHALL BE DISCHARGED TO A SEPARATE ON-SITE TREATMENT SYSTEM OR TO THE SANITARY SEWER.
- APPLICATION OF AGRICULTURAL CHEMICALS INCLUDING FERTILIZERS AND PESTICIDES SHALL BE CONDUCTED IN A MANNER AND AT APPLICATION RATES THAT WILL NOT RESULT IN LOSS OF CHEMICAL TO SURFACE WATER RUNOFFF. MANUFACTURERS RECOMMENDATIONS FOR APPLICATION RATES AND PROCEDURES SHALL BE FOLLOWED.
- IN THE EVENT OF AN ACCIDENTAL SPILL, IMMEDIATE ACTION SHALL BE TAKEN BY THE CONTRACTOR TO CONTAIN AND REMOVE THE SPILLED MATERIAL. THE SPILL SHALL BE REPORTED TO THE APPROPRIATE AGENCIES IN THE REQUIRED TIME FRAMES. AS REQUIRED UNDER PROVISIONS OF THE CLEAN WATER ACT, ANY SPILL OR DISCHARGE ENTERING WATERS OF THE UNITED STATES SHALL BE PROPERLY REPORTED.

9. CONTROL DEWATERING:

FOUNDATION, VAULT, AND UTILITY TRENCH DEWATERING WATER SHALL BE DISCHARGED INTO A CONTROLLED CONVEYANCE SYSTEM PRIOR TO DISCHARGE TO A SEDIMENT POND. CHANNELS RECEIVING THE DISCHARGED WATER MUST BE STABILIZED. HIGHLY TURBID OR CONTAMINATED WATER FROM CONSTRUCTION EQUIPMENT OPERATIONS, WORK INSIDE A COFFERDAM, SHALL BE HANDLED SEPARATELY FROM SURFACE WATER. IF DEWATERING IS REQUIRED FOR SMALL VOLUMES OF LOCALIZED DEWATERING ON THIS SITE, A PUMP AND DEWATERING FILTER BAG SHALL BE UTILIZED. THE FILTER BAG SHALL DISCHARGE TO A DITCH OR SWALE WITH A WELL ESTABLISHED VEGETATIVE AREA.

10. MAINTAIN BMP'S:

TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL BMP'S SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. MAINTENANCE AND REPAIR SHALL BE CONDUCTED IN ACCORDANCE WITH THE BMP'S. AT A MINIMUM, ALL SEDIMENT CONTROL BMP'S SHALL BE INSPECTED AT LEAST ONCE EVERY FOUR (4) CALENDAR DAYS AND WITHIN 24 HOURS OF THE OCCURRENCE OF A PRECIPITATION EVENT OF 0.25 INCHES OR GREATER, OR THE OCCURRENCE OF RUNOFF FROM SNOWMELT SUFFICIENT TO CAUSE A DISCHARGE. TEMPORARY EROSION AND SEDIMENT CONTROL BMP'S SHOULD BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL RESULTING FROM THE REMOVAL OF BMP'S OR VEGETATION SHALL BE PERMANENTLY STABILIZED.

11. MANAGE THE PROJECT:

A SEQUENCE OF CONSTRUCTION HAS BEEN PROVIDED ON THIS SHEET TO DESCRIBE AN OVERALL CONSTRUCTION SEQUENCE AS IT RELATES TO EROSION AND SEDIMENT CONTROL BMP'S AND CONSTRUCTION OF VARIOUS ELEMENTS OF THE PROJECT. IN GENERAL, THE PROJECT IS TO BEGIN CONSTRUCTION IN MAY 2023 AND END APPROXIMATELY IN APRIL 2024. THE CONTRACTOR IS RESPONSIBLE FOR THE DETAILS OF THE DAY TO DAY OPERATIONS.

- THE PRIMARY PROJECT MANAGER SHALL EVALUATE, WITH INPUT FROM UTILITIES AND OTHER CONTRACTORS, THE SURFACE WATER MANAGEMENT REQUIREMENTS FOR THE ENTIRE PROJECT, INCLUDING THE UTILITIES. WHEN PREPARING THE SEDIMENT CONTROL PLAN. ALL BMP'S SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. WHENEVER INSPECTION AND/OR MONITORING REVEALS THAT THE BMP'S IDENTIFIED IN THE SEDIMENT CONTROL PLAN ARE INADEQUATE, THE SEDIMENT CONTROL PLAN SHALL BE MODIFIED, AS APPROPRIATE, IN A TIMELY MANNER.
- CONTRACTOR SHALL REPORT SPILLAGE OR DISCHARGE OF POLLUTANTS WITHIN 24-HOURS. THE SEDIMENT CONTROL PLAN SHALL BE RETAINED ON SITE. THE SEDIMENT CONTROL PLAN SHALL BE MODIFIED WHENEVER THERE IS A SIGNIFICANT CHANGE IN THE DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE OF ANY BMP. THE WVDEP MUST BE NOTIFIED OF ANY CHANGES TO THE CONSTRUCTION SWPP.

12. STABILIZATION:

THE CONSTRUCTION SITE SHOULD BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. ESTABLISHMENT OF FINAL COVER MUST BE INITIATED WITHIN FOUR (4) DAYS AFTER REACHING FINAL GRADE. A NOTICE OF TERMINATION MUST BE FILED WITH THE WVDEP WHEN THE SITE REACHES FINAL STABILIZATION. FINAL STABILIZATION MEANS THAT ALL SOIL-DISTURBING ACTIVITIES ARE COMPLETED, AND THAT EITHER A PERMANENT VEGETATIVE COVER OF 70% OR GREATER HAS BEEN ESTABLISHED OR THAT THE SURFACE HAS BEEN STABILIZED BY HARD COVER SUCH AS PAVEMENT OR BUILDINGS. (THE 70% REQUIREMENT REFERS TO THE TOTAL VEGETATED AREA AND NOT JUST A PERCENT OF THE SITE).

VIII. EROSION AND SEDIMENT CONTROL NOTES:

1. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE CONSTRUCTED AND MAINTAINED IN STRICT COMPLIANCE WITH THE LATEST EDITION OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL AND APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
2. AREAS OF DEVELOPMENT SHALL BE PLANNED IN PHASES AND STAGES IN ORDER TO PREVENT THE TRANSPORT OF SEDIMENT FROM THE DEVELOPMENT SITE DURING CONSTRUCTION AND MINIMIZE EXPOSURE TO DISTURBED GROUND. RE-VEGETATION OF EXPOSED AREAS AND THE MAINTENANCE OF THAT VEGETATION SHALL BE AN INTEGRAL PART OF THE CLEARING ACTIVITIES FOR ANY PHASE.
3. NO DISTURBED AREA IS TO REMAIN DENUDED FOR MORE THAN FOUR (4) DAYS EXCEPT FOR MATERIAL STORAGE AREAS OR FOR THOSE AREAS ON WHICH ACTUAL CONSTRUCTION ACTIVITIES ARE CURRENTLY BEING PERFORMED UNLESS AUTHORIZED BY THE CITY OF CHARLES TOWN AND/OR THE EASTERN PANHANDLE CONSERVATION DISTRICT.
4. ALL SOIL STOCKPILES SHALL BE STABILIZED BY TEMPORARY SEEDING AND MULCHING AND PROTECTED WITH PERIMETER SEDIMENT CONTROLS SUCH AS SILT FENCE TO PREVENT CONTACT WITH STORMWATER RUNOFF. ALL STOCKPILES MUST BE LOCATED OUTSIDE OF ANY VEGETATED BUFFER AREAS AND SHOULD BE LOCATED AS FAR AS PRACTICABLE FROM STORMWATER CONVEYANCE SYSTEMS AND WATER BODIES.
5. ALL SLOPES SHALL BE LEFT IN A ROUGHENED CONDITION DURING SITE GRADING OPERATIONS TO REDUCE RUNOFF VELOCITIES AND EROSION. TEMPORARY AND/OR PERMANENT STABILIZATION MEASURES SHALL BE APPLIED TO ALL SLOPES AS SPECIFIED IN THE SOIL STABILIZATION MEASURES.
6. DURING CONSTRUCTION, PROTECT ALL FILLS SO THAT RUNOFF DOES NOT GO DOWN THE FACE OF THE HILL. UTILIZE BERMS, TEMPORARY SLOPE DRAINS, OR OTHER METHODS TO DIVERT RUNOFF AWAY FROM THE FILL AND INTO A SEDIMENT TRAPPING STRUCTURE. AS MORE FILL IS ADDED, SLOPE THE TOP (OR BERM IT) TO DIRECT WATER AWAY FROM THE SLOPE AND TO A STABLE CONVEYANCE SYSTEM. SEED & MULCH EVERY FOUR (4) DAYS OR 15' OF FILL.
7. NO OFF-SITE SOURCE OF BORROW MATERIALS IS ANTICIPATED FOR THIS PROJECT. IN THE EVENT THAT AN OFF-SITE SOURCE OF BORROW MATERIALS IS USED, AN EROSION AND SEDIMENT CONTROL PLAN SHALL BE PROVIDED FOR THE BORROW PIT AND THE BORROW PIT SHALL MEET ALL APPLICABLE REQUIREMENTS AND PERMITS OF THE WVDEP.
8. DUE TO GRADE CHANGES DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION AND SEDIMENT CONTROL MEASURES (i.e. SILT FENCES, ETC.) TO PREVENT EROSION AND POLLUTANT DISCHARGE OFF-SITE.

IX. SOIL STABILIZATION:

EXCEPT AS NOTED BELOW, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOUR (4) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED OR FOUR (4) DAYS FOR SITES REQUIRED TO USE ENHANCED BMP'S.

- WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 4TH DAY, AS APPLICABLE AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASES IS PRECLUDED BY NATURAL CAUSES, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS CONDITIONS ALLOW.
- WHERE CONSTRUCTION ACTIVITY WILL RESUME ON A PORTION OF THE SITE WITHIN 14 DAYS FROM WHEN ACTIVITIES CEASED, (E.G. THE TOTAL TIME PERIOD THAT CONSTRUCTION ACTIVITY IS TEMPORARILY HALTED IS LESS THAN 14 DAYS) THEN STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE BY THE 4TH DAY AFTER CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED.
- AREAS WHERE SEED HAS FAILED TO GERMINATE ADEQUATELY (UNIFORM PERENNIAL VEGETATIVE COVER OF 70% OR GREATER) WITHIN 30 DAYS AFTER SEEDING AND MULCHING MUST BE RE-SEEDED IMMEDIATELY, OR AS SOON AS WEATHER CONDITIONS ALLOW.

TEMPORARY STABILIZATION:

- SELECTION OF TEMPORARY SEED MIXTURE SHALL DEPEND ON THE TIME OF YEAR DURING APPLICATION. SELECT PLANTS APPROPRIATE TO THE SEASON AND SITE CONDITIONS. REFER TO TABLE 3.10.1 TEMPORARY SEEDING OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL FOR A LIST OF COVER PLANTS, APPROVED PLANTING DATES, AND APPLICATION RATES.

PERMANENT STABILIZATION:

SEED MIXTURES INCLUDE THE FOLLOWING:

COMMON NAME	APPLICATION RATE	PREFERRED PLANTING DATES
KENTUCKY 31 FESCUE	45 LBS./ACRE	3/1-6/15 & 8/15-9/15
RED FESCUE	20 LBS./ACRE	3/1-6/15 & 8/15-9/15
KENTUCKY BLUEGRASS	25 LBS./ACRE	3/1-6/15 & 8/15-9/15
WHITE DUTCH CLOVER	5 LBS./ACRE	3/1-6/15 & 8/15-9/15

- FERTILIZER: DETERMINED BY SOIL TEST
- LIME: 90 LBS./1,000 SQ. FT. PULVERIZED AGRICULTURAL GRADE LIMESTONE
- MULCH: 70-90 LBS./1,000 SQ. FT. STRAW OR HAY MULCH

ALTERNATIVE SEED MIXTURES MAY BE SUBSTITUTED AS APPROVED BY INTEGRITY FEDERAL SERVICES. SELECT PLANTS APPROPRIATE TO THE SEASON AND SITE CONDITIONS. REFER TO TABLE 3.11.1 PERMANENT SEEDING OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL FOR A LIST OF COVER PLANTS APPROVED PLANTING DATES, AND APPLICATION RATES.

X. UNDERGROUND UTILITY LINE INSTALLATION:

1. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
2. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES, CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS.
3. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED O

EROSION & SEDIMENT CONTROL NOTES:

1. ANY AREA OF EXPOSED SOIL WHERE NO CONSTRUCTION IS ANTICIPATED FOR A PERIOD OF LONGER THAN 14 DAYS OR WHERE CONSTRUCTION ACTIVITY HAS STOPPED FOR 4 DAYS SHALL BE TEMPORARILY STABILIZED.
2. FOLLOWING INITIAL SOIL DISTURBANCE OR RE-DISTURBANCE, PERMANENT STABILIZATION SHALL BE COMPLETED WITHIN FOUR (4) CALENDAR DAYS AFTER COMPLETION OF ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES GREATER THAN 3 HORIZONTAL TO 1 VERTICAL (3:1); AND FOUR (4) CALENDAR DAYS AFTER REACHING FINAL GRADE FOR ALL OTHER DISTURBED OR GRADED AREAS.
   - THESE PROVISIONS DO NOT APPLY TO THOSE AREAS THAT ARE SHOWN ON THE PLAN FOR MATERIAL STORAGE OR FOR THOSE AREAS ON WHICH ACTUAL CONSTRUCTION ACTIVITIES ARE CURRENTLY BEING PERFORMED.
   - THESE TIME REQUIREMENTS MAY BE EXTENDED, AS DEEMED NECESSARY BY THE JEFFERSON COUNTY ENGINEER IN THE EVENT THAT ADVERSE CONDITIONS PREVENT COMPLIANCE WITH THE STATED TIME LIMITATIONS FOR THE COMPLETION OF PERMANENT OR TEMPORARY STABILIZATION.
3. STABILIZATION WILL BE CONSIDERED ADEQUATE WHEN THE FOLLOWING CONDITIONS ARE MET:
   A) WATER COURSES, STREAM BANKS, AND DRAINAGE EASEMENTS SHALL BE 100% STABILIZED AND FREE FROM EROSION AND DEPOSITION.
   B) SLOPES STEEPER THAN 10% SHALL HAVE AT LEAST 98% STABLE GROUND COVER, AS DETERMINED BY THE JEFFERSON COUNTY ENGINEER.
   C) ALL OTHER AREAS SHALL HAVE AT LEAST 85% STABLE GROUND COVER, AS DETERMINED BY THE JEFFERSON COUNTY ENGINEER.
   D) GRASS VEGETATION SHALL HAVE REACHED A MINIMUM OF 3 INCHES OF HEIGHT OR HAVE BEEN MOWED BACK TO A MINIMUM OF 2 INCHES IN HEIGHT.
4. FOR ALL PROJECTS ADJACENT TO OR WITHIN 500 FEET OF A CONTINUOUSLY FLOWING STREAM, NO GRADING, EXCAVATING, REMOVAL, OR DESTRUCTION OF TOPSOIL, TREES, OR OTHER VEGETATIVE COVER, OR CONSTRUCTION ACTIVITY SHALL RESULT IN POINT OR NON-POINT LOADING OF SUSPENDED MATTER SUCH THAT TURBIDITY STANDARDS SPELLED OUT IN THE WATER RESOURCES BOARD LEGISLATIVE RULES ARE VIOLATED. SAID STANDARDS STATE THAT TURBIDITY SHALL NOT EXCEED 10 NTU'S OVER BACKGROUND TURBIDITY WHEN THE BACKGROUND IS 50 NTU'S OR LESS, OR HAVE MORE THAN A 10% INCREASE IN TURBIDITY (PLUS 10 NTU'S MINIMUM) WHEN THE BACKGROUND TURBIDITY IS MORE THAN 50 NTU'S.
5. NO OFF-SITE SOURCE OF BORROW MATERIALS IS ANTICIPATED FOR THIS PROJECT. IN THE EVENT THAT AN OFF-SITE SOURCE OF BORROW MATERIALS IS USED, AN EROSION AND SEDIMENT CONTROL PLAN SHALL BE PROVIDED FOR THE BORROW PIT AND THE BORROW PIT SHALL MEET ALL APPLICABLE REQUIREMENTS AND PERMITS OF THE WVDEP
6. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE THAT ALL EROSION AND SEDIMENT CONTROL MEASURES ARE PERFORMING AS DESIGNED. THE JEFFERSON COUNTY ENGINEER MAY REQUIRE MODIFICATIONS TO AN APPROVED PLAN, REQUIRE ADDITIONAL SEDIMENT AND EROSION CONTROL MEASURES, OR CAUSE NEW PLANS TO BE SUBMITTED AS A RESULT OF FIELD INSPECTION REVEALING THE APPROVED PLANS DO NOT PROVIDE ADEQUATE PROTECTION. MODIFICATIONS MAY ALSO BE REQUESTED BY THE OWNER OR DEVELOPER DUE TO UNFORESEEN FIELD CONDITIONS.
7. ALL RESIDENTIAL AND COMMERCIAL/INDUSTRIAL BUILDING LOTS SHALL HAVE A STABILIZED CONSTRUCTION ENTRANCE INSTALLED PRIOR TO BEGINNING CONSTRUCTION ON THE LOT.

PUBLIC NOTICE SIGN:

NOT TO SCALE

NOTES:

1. SECTION II.B OF THE GENERAL PERMIT STATES THAT WITHIN 72 HOURS OF FILING AN APPLICATION, THE APPLICANT SHALL DISPLAY A SIGN FOR THE DURATION OF THE CONSTRUCTION PROJECT NEAR THE ENTRANCE OF THE PROJECT OR, FOR LINEAR PROJECTS, AT A LOCATION NEAR AN ACTIVE PART OF THE PROJECT THAT IS ACCESSIBLE BY THE PUBLIC; CONTAINING THE FOLLOWING INFORMATION:
   - THE APPLICANT'S NAME AND EMERGENCY TELEPHONE NUMBER;
   - PROJECT REFERENCE ID;
   - FOR INFOR ON THIS STORMWATER PERMIT CALL: 800-654-5227 or DEP.Comments@wv.gov.
   - PERMIT NUMBER (SEE II.B.4.)
2. THE SIGN SHALL BE A MINIMUM OF TWO FEET BY TWO FEET AND BE AT LEAST THREE FEET ABOVE GROUND LEVEL; CLEARLY VISIBLE AND LEGIBLE FROM A PUBLIC ROADWAY OR RIGHT-OF-WAY.
3. IF IT IS NOT FEASIBLE TO DISPLAY A SIGN AT OR NEAR THE PROJECT, THE APPLICANT MAY POST, WITHIN 72 HOURS OF FILING THE APPLICATION NOTICE CONTAINING THE FOREGOING INFORMATION AT A LOCAL PUBLIC BUILDING, INCLUDING, BUT NOT LIMITED TO, A TOWN HALL OR PUBLIC LIBRARY.
4. THE APPLICANT SHALL PROVIDE THE LOCATION WHERE THE SIGN OR NOTICE IS TO BE POSTED.
5. WITHIN 7 BUSINESS DAYS OF ASSIGNMENT OF THE PERMIT REGISTRATION NUMBER, THE APPLICANT SHALL AFFIX SUCH NUMBER TO THE SIGN OR TO THE POSTED NOTICE.

A TEMPLATE FOR THE SIGN IS AS FOLLOW:

- THE TOP PART OF THE SIGN, DOWN TO THE WORDS "APPLICATION DATE", SHALL BE WORDED AND FORMATTED AS SHOWN. REMAINING TEXT SHALL BE FILLED IN BY THE APPLICANT (DATE, NAME OF REGISTRANT OR CONTACT, PROJECT DESCRIPTION, AND PHONE) IN THE SIZE AND FORMAT SHOWN. HIGH CONTRAST COLORS MUST BE USED.
- THE SIGN SHALL BE A MINIMUM 24" x 24" WITH 1.6" AND 0.8" LETTERS
- THE SIGN SHALL BE A MINIMUM 36" ABOVE GROUND LEVEL.

①1.6" LETTERS
②0.8" LETTERS

① For Info on NPDES
① Stormwater Permit
② To comment on Sediment Control Plan
① Call: 800-654-5227
or
② DEP.Comments@wv.gov
② DEP 601 57th Street SE, Charleston WV 25304
② Application Date: 02/03/23 ①
①HUYETT ROAD STORAGE,
① WVR112065
② (609) 414-3702

Table 3.10.1 Temperary seed chart

PLANT NAMES		PLANTING DATES	APPLICATION RATE LBS/ACRE
COMMON	SCIENTIFIC		
Annual Ryegrass	*Lolium multiflorum*	2/16 – 5/15 8/1 – 11/1	40
Field Bromegrass	*Bromus ciliatus*	3/1 – 6/15 8/1 – 9/15	40
Spring Oats	*Avena sativa*	3/1 –6/15	100
Winter Rye	*Secale cereale*	8/15 –2/28	170
Winter Wheat	*Triticum aestivum*	8/15 – 2/28	180
Japanese Millet	*Echinochloa crusgalli*	5/15 – 8/15	30
Redtop	*Agrostis alba*	3/1 – 6/15	10
Annual Ryegrass and Spring Oats	*Lolium multiflorum* *Avena sativa*	3/1 – 6/15	30 70
German/Foxtail Millet	*Setaria italica*	5/1 – 8/1	40
Hairy Vetch	*Vicia villosa*	8/15 – 4/1	60

*Inoculation is required. If a hydroseeder is utilized, the application rate is 5 times the recommended rate.

Table 3.11.1 Permanent seeding

SEED MIX	PLANT NAMES		APPLICATION RATE LBS/ACRE
	COMMON	SCIENTIFIC	
A	Kentucky 31 Fescue Red Fescue Birdsfoot Trefoil	*Festuca arundinacea* *Festuca rubra* *Lotus corniculatus*	65 20 5
B	Switchgrass Perennial Ryegrass Redtop Birdsfoot Trefoil	*Panicum virgatum* *Lolium perenne* *Agrostis alba* *Lotus corniculatus*	15 20 5 15
C	Red Fescue Kentucky Bluegrass Marion Bluegrass	*Festuca rubra* *Poa pratensis* *Poa pratensis*	20 40 30
D	Kentucky 31 Fescue Red Fescue Kentucky Bluegrass White Dutch Clover	*Festuca arundinacea* *Festuca rubra* *Poa pratensis* *Trifolium repens*	45 20 25 5
E	Perennial Ryegrass Switchgrass Crownvetch or Perennial Pea	*Lolium perenne* *Panicum virgatum* *Coronilla varia* *Lathyrus latifolius*	30 15 20 30
F	Orchardgrass Ladino Clover Redtop	*Dactylis glomerata* *Trifolium repens* *Agrostis alba*	20 5 5
G	Birdsfoot Trefoil Weeping Lovegrass Perennial Ryegrass	*Lotus corniculatus* *Eragrostis curvula* *Lolium perenne*	15 45 10
H	Crownvetch Orchardgrass	*Coronilla varia* *Dactylis glomerata*	25 40
I	Crownvetch Perennial Ryegrass	*Coronilla varia* *Lolium perenne*	25 30
J	Perennial Pea Orchardgrass	*Lathyrus latifolius* *Dactylis glomerata*	30 30
K	Deertongue Birdsfoot Trefoil Weeping Lovegrass	*Panicum clandestinum* *Lotus corniculatus* *Eragrostis curvula*	30 15 5
L	Orchardgrass Sericcia Lespedeza Ladino Clover	*Dactylis glomerata* *Lespedeza cuneata* *Trifolium repens*	30 40 5
M	Perennial Ryegrass Ladino Clover Redtop	*Lolium perenne* *Trifolium repens* *Agrostis alba*	50 5 5
N	Crownvetch Orchardgrass Redtop	*Coronilla varia* *Dactylis glomerata* *Agrostis alba*	15 30 5

Table 3.11.1 Permanent seeding Cont'd.

SEED MIX	PLANT NAMES		APPLICATION RATE LBS/ACRE
	COMMON	SCIENTIFIC	
O	Perennial Ryegrass Birdsfoot Trefoil Redtop	*Lolium perenne* *Lotus corniculatus* *Agrostis alba*	40 15 5
P	Sericcia Lespedeza Orchardgrass Redtop	*Lespedeza cuneata* *Dactylis glomerata* *Agrostis alba*	40 30 5
Q	Orchardgrass Reed Canarygrass[1] Redtop Ladino Clover	*Dactylis glomerata* *Phalaris arundinacea* *Agrostis alba* *Trifolium repens*	25 30 5 5
R	Kentucky Bluegrass Redtop White Clover or Birdsfoot Trefoil	*Poa pratensis* *Agrostis alba* *Trifolium repens* *Lotus corniculatus*	30 5 5 15
S	Reed Canarygrass[1] Weeping Lovegrass	*Phalaris arundinacea* *Eragrostis curvula*	40 5
T	Perennial Ryegrass Reed Canarygrass[1] Birdsfoot Trefoil	*Lolium perenne* *Phalaris arundinacea* *Lotus corniculatus*	30 15 5
U	Timothy Alfalfa	*Phleum pratense* *Medicago sativa*	10 18
V	Timothy Birdsfoot Trefoil	*Phleum pratense* *Lotus corniculatus*	10 15
W	Redtop Perennial Ryegrass Orchardgrass	*Agrostis alba* *Lolium perenne* *Dactylis glomerata*	5 30 25
X	Reed Canarygrass[1] Birdsfoot Trefoil Redtop	*Phalaris arundinacea* *Lotus corniculatus* *Agrostis alba*	30 20 5
Y	Switchgrass Birdsfoot Trefoil	*Panicum virgatum* *Lotus corniculatus*	30 20
Z	Switchgrass Sericcia Lespedeza	*Panicum virgatum* *Lespedeza cuneata*	15 30
A-1	Orchardgrass Red Clover	*Dactylis glomerata* *Trifolium pratense*	30 10
A-2	Switchgrass Big Bluestem Indiangrass Little Bluestem Sideoats Grama[2]	*Panicum virgatum* *Andropogon gerardi* *Sorghastrum nutans* *Andropogon scoparius* *Bouteloua curtipendula*	15 5 5 5 5
A-3	Switchgrass Eastern Gamagrass[3]	*Panicum virgatum* *Tripsacum dactyloides*	20 15

NOTE: When utilizing a properly prepared seedbed, the rates of application can be reduced by 30 percent except for seed mixes A-2 & A-3.

[1] Reed Canarygrass shall not be used east of I-79 and/or south of Charleston.
[2] Use north and east of I-64 and I-79.
[3] Use south and west of I-64 and I-79.

Table 3.11.2 Nurse crops

PLANT NAMES		PLANTING DATES	APPLICATION RATE LBS/ACRE
COMMON	SCIENTIFIC		
Annual Ryegrass	*Lolium multiflorum*	2/16 – 5/15 8/1 – 11/1	25
Field Bromegrass	*Bromus ciliatus*	3/1 – 6/15 8/1 – 9/15	20
Spring Oats	*Avena sativa*	3/1 –6/15	50
Winter Rye	*Secale cereale*	8/15 –2/28	85
Winter Wheat	*Triticum aestivum*	8/15 – 2/28	90
Japanese Millet	*Echinochloa crusgalli*	5/15 – 8/15	15
Redtop	*Agrostis alba*	3/1 – 6/15	10
Annual Ryegrass and Spring Oats	*Lolium multiflorum* *Avena sativa*	3/1 – 6/15	15 35
German/Foxtail Millet	*Setaria italica*	5/1 – 8/1	25
Hairy Vetch*	*Vicia villosa*	8/15 – 4/1	30

* Inoculation is required. If a hydroseeder is utilized, the application rate is five times the recommended rate.

Table 3.12.1 Organic mulch materials and application rates

Mulches:	Rates:		Notes:
	Per acre	Per 1,000 ft².	
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 1,500 lbs.	35 lbs.	Do not use as mulch for winter cover or during hot, dry periods.* Apply as slurry.
Cornstalks	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 2,000 lbs./ac. or 45 lbs./1,000 sq. ft.

From VA DSWC

Table 3.11.3 Permanent seeding requirements

SEED MIX	FINE LAWN	COARSE LAWN	LOW MAINT.	NO MAINT.	PASTURE	SENSITIVE NATURAL AREAS	pH RANGE	DRAINAGE	SHADE TOLERANCE	PREFERRED PLANTING DATES			
										3/1-4/15	6/16-8/14	8/15 - 9/15	9/16 - 2/28
A			✓ 1				6.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
B				✓			5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
C	✓ 1						6.0 – 7.5	MOD. – WELL	FULL SUN	✓		✓	
D		✓ 1					6.0 – 7.5	MOD. – WELL	FULL SUN	✓		✓	
E				✓ 1			6.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
F			✓	✓	✓		5.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
G				✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
H			✓	✓ 1	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
I			✓	✓ 1	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
J			✓	✓ 1	✓		4.0 – 8.0	MOD. – WELL	TOLERANT	✓	♦	✓	♦
K				✓			4.0 – 7.0	MOD. – WELL	FULL SUN	✓	♦	✓	♦
L				✓	✓		4.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
M			✓	✓	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
N			✓	✓ 1	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
O			✓	✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
P			✓	✓	✓		4.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
Q			✓	✓	✓		4.5 – 7.5	POOR – WELL	TOLERANT	✓	♦	✓	♦
R			✓	✓	✓		5.5 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
S			✓	✓	✓		4.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
T					✓		5.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
U					✓		6.5 – 8.0	MOD. – WELL	FULL SUN	✓	♦	✓	♦
V					✓		5.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
W			✓	✓	✓		5.0 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
X					✓		5.5 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦
Y			✓	✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
Z			✓	✓	✓		5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
A-1					✓		4.5 – 7.5	MOD. – WELL	TOLERANT	✓	♦	✓	♦
A-2				✓	✓	✓	5.0 – 7.5	MOD. – WELL	FULL SUN	✓	♦	✓	♦
A-3				✓		✓	5.0 – 7.5	POOR – WELL	FULL SUN	✓	♦	✓	♦

♦ Nurse crop required – See Table B
1 Urban areas only

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1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

EROSION & SEDIMENT CONTROL NARRATIVE

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
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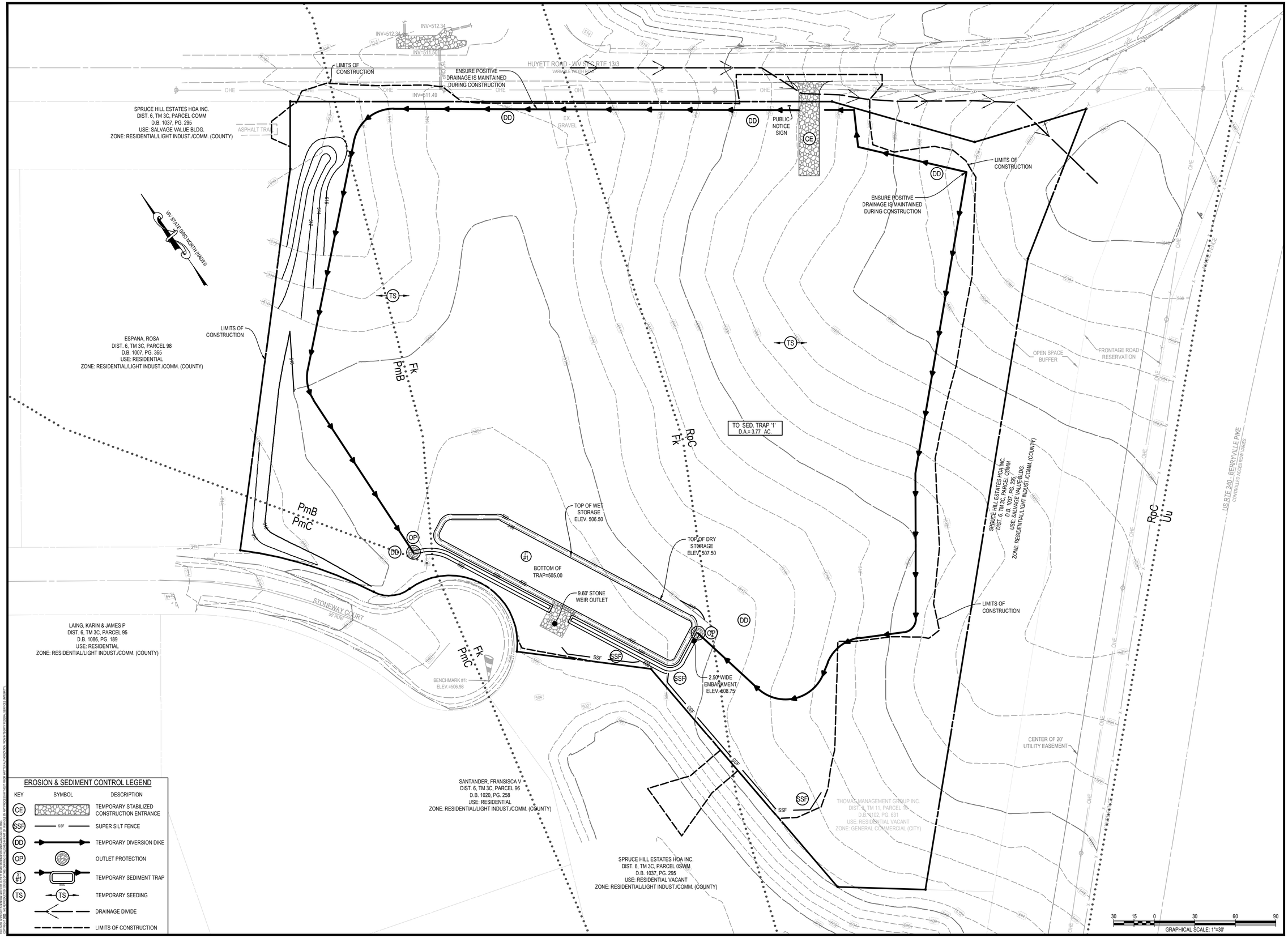
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-GC-001.DWG	
NCS:	N/A
SHEET:	05 OF 25



EROSION & SEDIMENT CONTROL LEGEND

KEY	SYMBOL	DESCRIPTION
CE		TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
SSF	SSF	SUPER SILT FENCE
DD		TEMPORARY DIVERSION DIKE
OP		OUTLET PROTECTION
#1		TEMPORARY SEDIMENT TRAP
TS	TS	TEMPORARY SEEDING
		DRAINAGE DIVIDE
		LIMITS OF CONSTRUCTION

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EROSION & SEDIMENT CONTROL PLAN PHASE I

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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NCS:	N/A
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FILE PATH: S:\PROJECTS\5022-0101 HUYETT ROAD STORAGE SITE\DWG\CADD\CIVIL\5022-0101 - HUYETT ROAD STORAGE SITE.DWG
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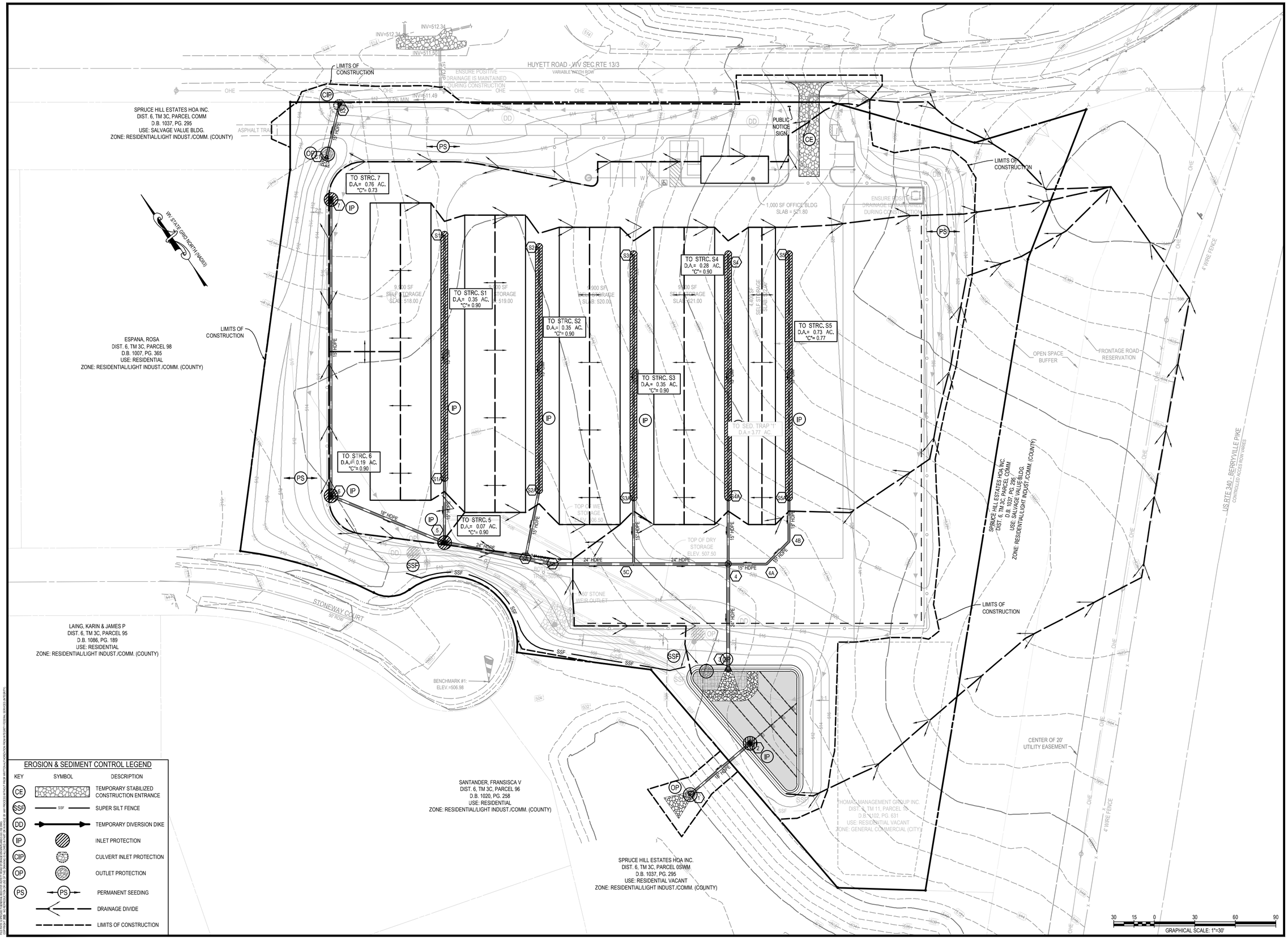

EROSION & SEDIMENT CONTROL LEGEND

KEY	SYMBOL	DESCRIPTION
CE		TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
SSF	SSF	SUPER SILT FENCE
DD		TEMPORARY DIVERSION DIKE
IP		INLET PROTECTION
CIP		CULVERT INLET PROTECTION
OP		OUTLET PROTECTION
PS	PS	PERMANENT SEEDING
		DRAINAGE DIVIDE
		LIMITS OF CONSTRUCTION

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EROSION & SEDIMENT CONTROL PLAN PHASE II

HUYETT ROAD STORAGE SITE PLAN

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CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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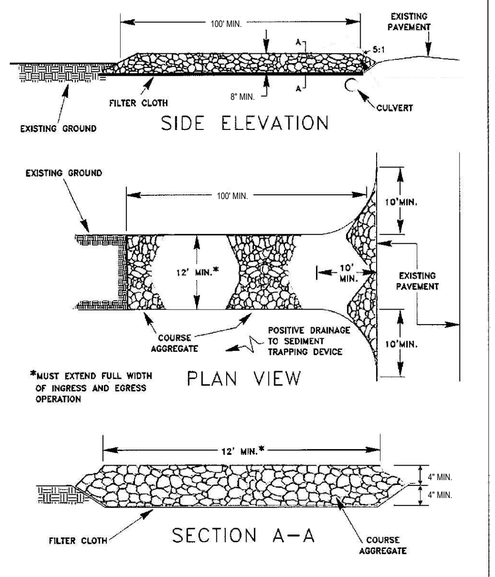
FIGURE 3.02.1

STONE CONSTRUCTION ENTRANCE



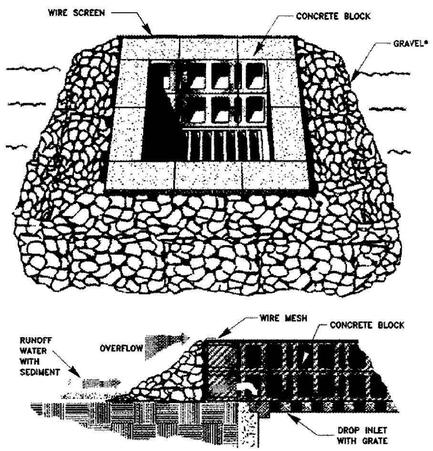
SOURCE: ADAPTED from 1983 Maryland Standards for Soil Erosion and Sediment Control and Va. DSWC

3.02-2

CE

FIGURE 3.33.3

BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER

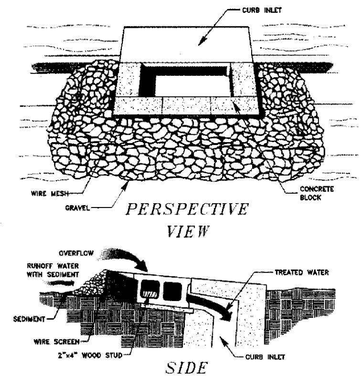


* GRAVEL SHALL BE CLEAN 3/4" TO 2" COARSE AGGREGATE

IP

FIGURE 3.33.8

BLOCK & GRAVEL CURB INLET PROTECTION



SPECIFIC APPLICATION
THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CAPABILITY IS NECESSARY TO PREVENT EXCESSIVE PONDING OR FLOODING.

* GRAVEL SHALL BE CLEAN 3/4" TO 2" COARSE AGGREGATE

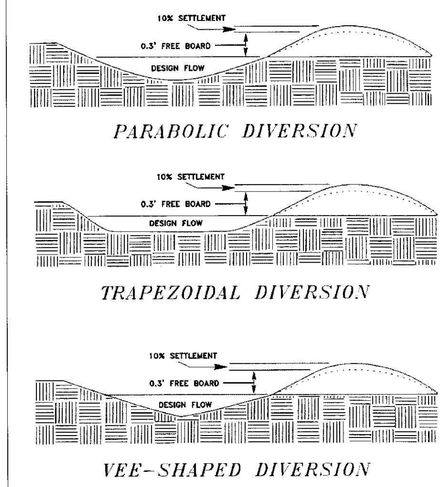
3.33-14

IP

NOTES:
• MINIMUM CONSTRUCTED DEPTH SHALL BE 1.5' (2:1 SIDE SLOPES)

FIGURE 3.15.1

TYPICAL DIVERSIONS

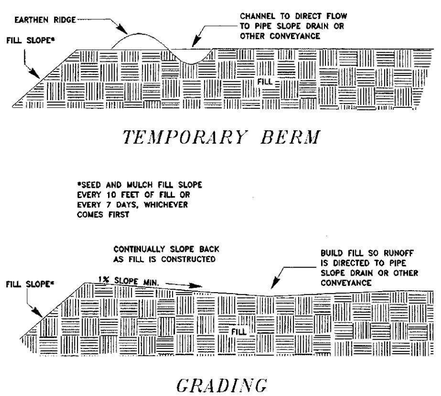


Source: VIRGINIA DCR–DSWC

DD

FIGURE 3.15.2

TEMPORARY FILL DIVERSIONS

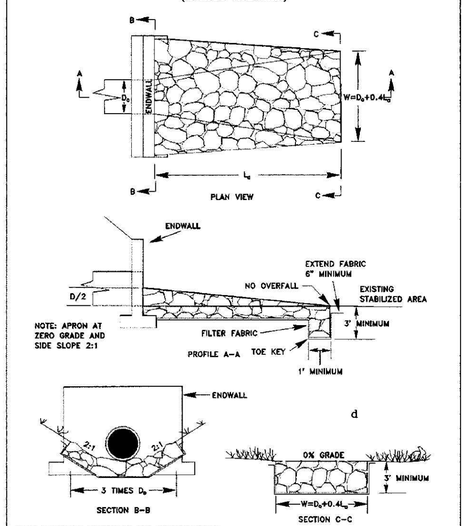


DD

FIGURE 3.17.3

OUTLET PROTECTION

DISCHARGE TO UNCONFINED SECTION
(MINIMUM TAILWATER)



FROM NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL

OP

FIGURE 3.27.1

PLACEMENT OF SILT FENCE

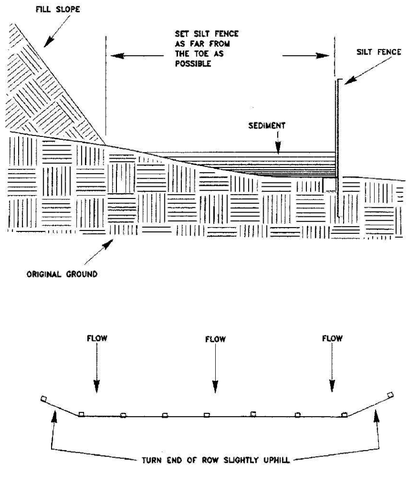


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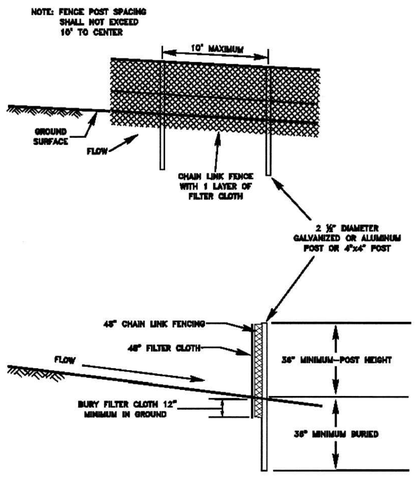
FIGURE 3.28.1

SUPER SILT FENCE



SSP

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EROSION & SEDIMENT CONTROL DETAILS

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

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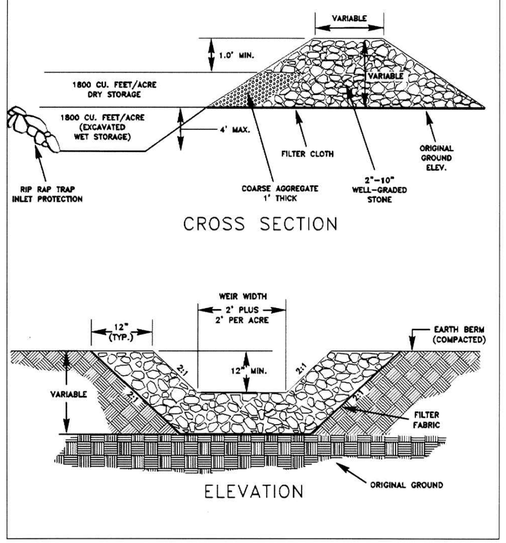
FIGURE 3.29.1

ROCK OUTLET SEDIMENT TRAP



#1

TEMPORARY STONE OUTLET SEDIMENT TRAP COMPUTATIONS

TRAP ID NO.	TOTAL DRAINAGE AREA (AC.)	TOTAL DRAINAGE AREA (SQ. FT.)	STORAGE REQUIRED (CU. FT.)	STORAGE PROVIDED (CU. FT.)	WET STORAGE					DRY STORAGE						TRAP DESIGN ELEVATIONS				EMBANKMENT			STONE WEIR WIDTH (FT.)
					DEPTH (D1) (FT.)	AREA (A1) (SQ. FT.)	VOLUME REQ'D (V1) (CU. FT.)	VOLUME PROV'D (V1) (CU. FT.)	APPROX. SURFACE DIMENSION (FT. x FT.)	DEPTH (D2) (FT.)	AREA (A2) (SQ. FT.)	MINIMUM AREA REQ'D (SQ. FT.)	VOLUME REQ'D (V2) (CU. FT.)	VOLUME PROV'D (V2) (CU. FT.)	APPROX. SURFACE DIMENSION (FT. x FT.)	BOTTOM OF TRAP (FT.)	CLEANOUT LEVEL (FT.)	TOP OF WET STORAGE (FT.)	TOP OF DRY STORAGE (FT.)	ELEVATION (FT.)	HEIGHT (FT.)	TOP WIDTH (FT.)	
1	3.77	164,021	13,555	16,304	1.5	6,650	6,778	8,479	190.0 x 35.0	1.0	9,000	6,905	6,778	7,825	200.0 x 45.0	± 505.00	± 505.75	± 506.50	± 507.50	± 508.75	2.25	2.50	9.60

REQUIRED STORAGE = 3,600 CUBIC FEET PER ACRE
V1= 0.85 x D1 x A1; V2=[(A1 + A2)/2] x D2
OUTLET WIDTH=2' PLUS 2' PER ACRE. MINIMUM OUTLET CHANNEL WIDTH=4'.
NOTES:
1. SURFACE DIMENSIONS ARE APPROXIMATE AREAS USED TO SIZE THE SEDIMENT TRAP, EXACT DIMENSIONS AND/OR SHAPE MAY VARY WITH CURRENT FIELD CONDITIONS.
2. IF CHANGES ARE MADE TO THE SEDIMENT TRAP, THE REQUIRED WET AND DRY STORAGE VOLUMES MUST BE MET.
3. SEDIMENT MUST BE REMOVED FROM TRAP WHEN THE TRAP'S WET STORAGE VOLUME IS REDUCED BY ONE-HALF.
4. ALL DISTURBED AREAS ASSOCIATED WITH THE INSTALLATION OF THE SEDIMENT TRAP SHOULD BE SEEDED AND MULCHED IMMEDIATELY AFTER INSTALLATION.

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HUYETT ROAD STORAGE SITE PLAN

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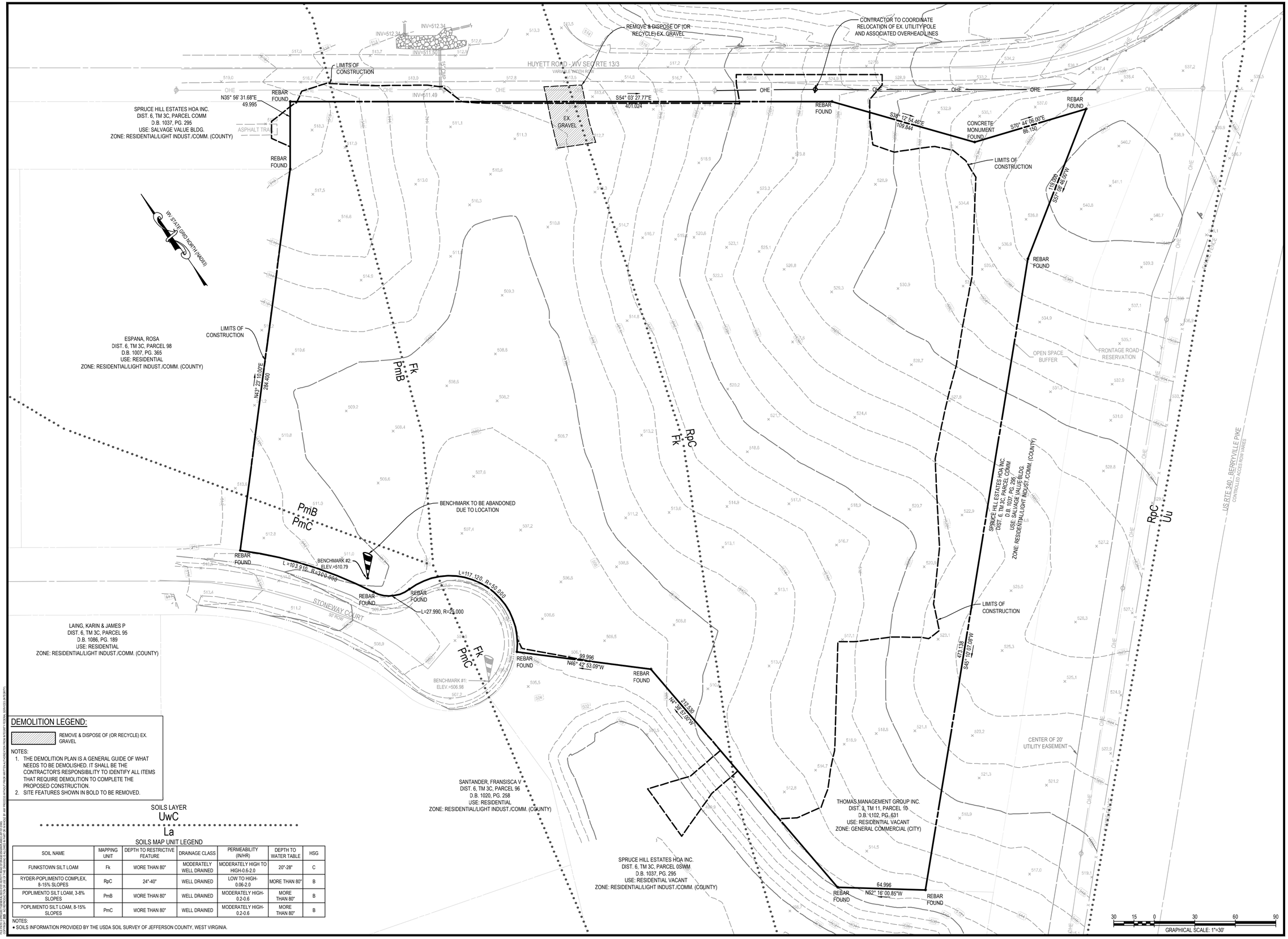

DEMOLITION LEGEND:

REMOVE & DISPOSE OF (OR RECYCLE) EX. GRAVEL

NOTES:

1. THE DEMOLITION PLAN IS A GENERAL GUIDE OF WHAT NEEDS TO BE DEMOLISHED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY ALL ITEMS THAT REQUIRE DEMOLITION TO COMPLETE THE PROPOSED CONSTRUCTION.
2. SITE FEATURES SHOWN IN BOLD TO BE REMOVED.

SOILS LAYER

UwC

La

SOILS MAP UNIT LEGEND

SOIL NAME	MAPPING UNIT	DEPTH TO RESTRICTIVE FEATURE	DRAINAGE CLASS	PERMEABILITY (IN/HR)	DEPTH TO WATER TABLE	HSG
FUNKSTOWN SILT LOAM	Fk	MORE THAN 80"	MODERATELY WELL DRAINED	MODERATELY HIGH TO HIGH-0.6-2.0	20"-28"	C
RYDER-POPLIMENTO COMPLEX, 8-15% SLOPES	RpC	24"-40"	WELL DRAINED	LOW TO HIGH-0.06-2.0	MORE THAN 80"	B
POPLIMENTO SILT LOAM, 3-8% SLOPES	PmB	MORE THAN 80"	WELL DRAINED	MODERATELY HIGH-0.2-0.6	MORE THAN 80"	B
POPLIMENTO SILT LOAM, 8-15% SLOPES	PmC	MORE THAN 80"	WELL DRAINED	MODERATELY HIGH-0.2-0.6	MORE THAN 80"	B

NOTES:

- SOILS INFORMATION PROVIDED BY THE USDA SOIL SURVEY OF JEFFERSON COUNTY, WEST VIRGINIA.

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1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS	

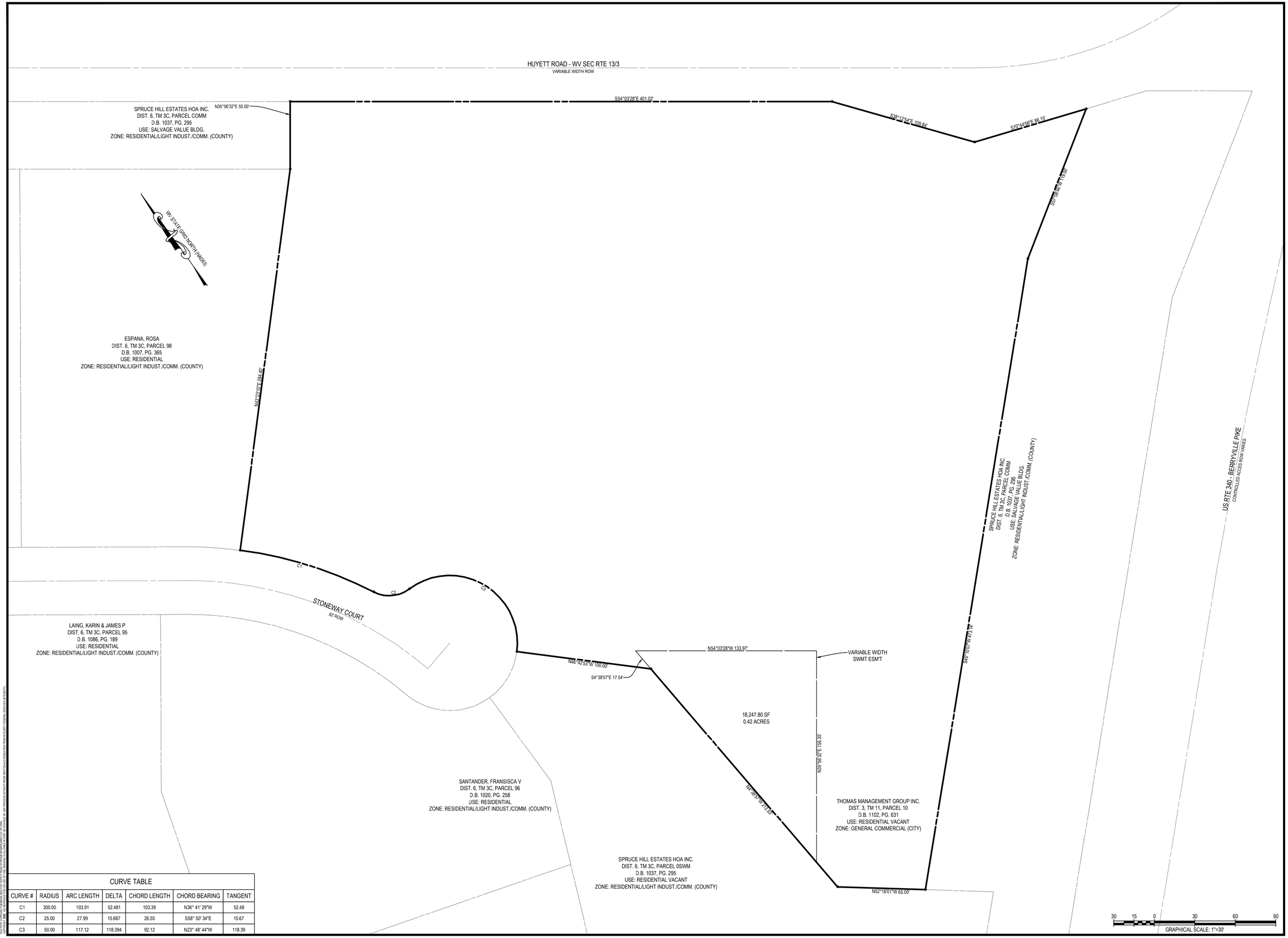
EXISTING CONDITIONS AND DEMOLITION PLAN

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: 1"=30' VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-XP-101.DWG	
NCS:	N/A
SHEET:	10 OF 25



CURVE TABLE

CURVE #	RADIUS	ARC LENGTH	DELTA	CHORD LENGTH	CHORD BEARING	TANGENT
C1	300.00	103.91	52.481	103.39	N36° 41' 29"W	52.48
C2	25.00	27.99	15.667	26.55	S58° 50' 34"E	15.67
C3	50.00	117.12	118.394	92.12	N23° 48' 44"W	118.39

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JASON P. GERWICK REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL:

REVISIONS

1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

PRELIMINARY PLAT

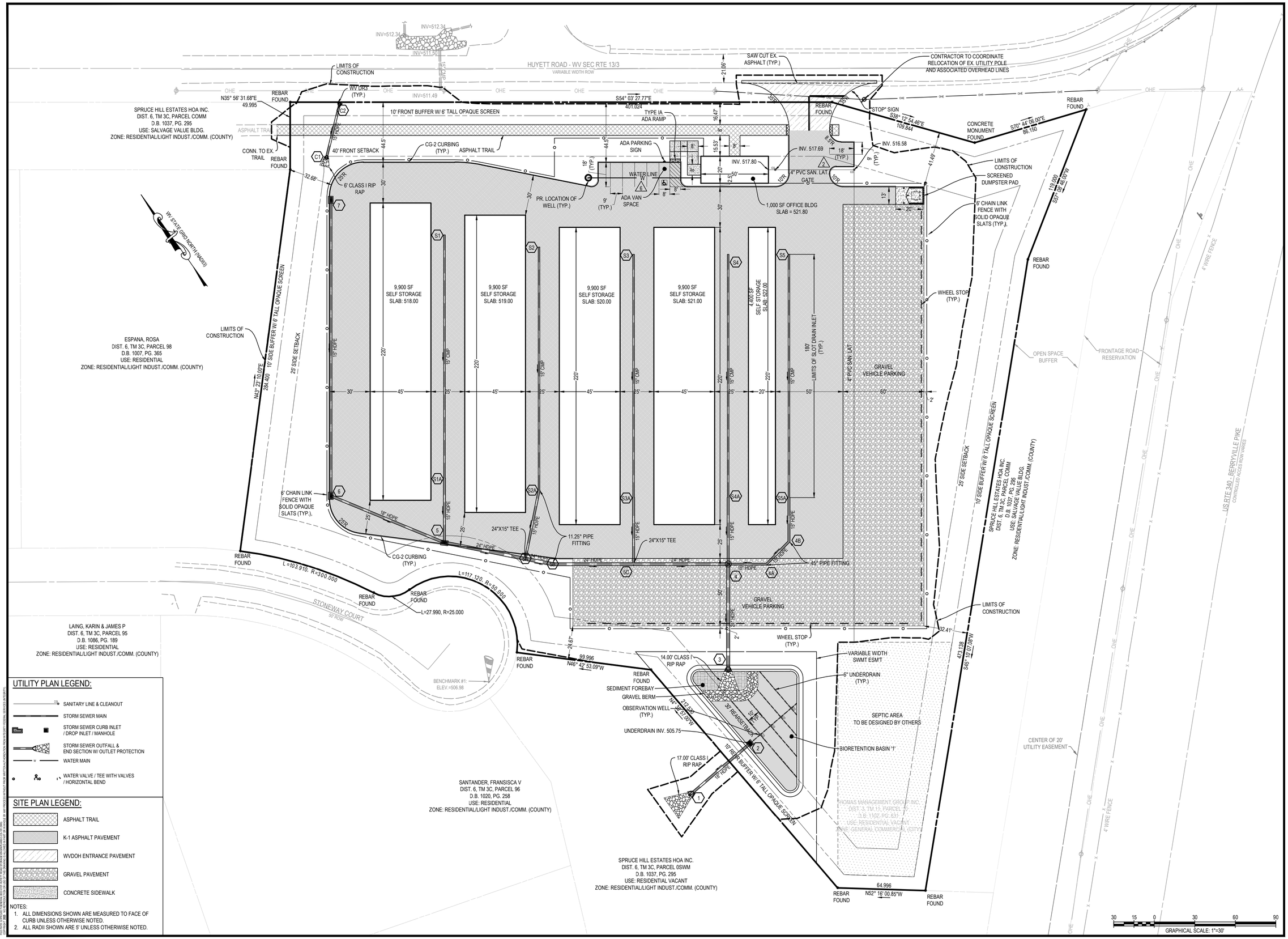
HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: 1"=30' VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CV-101.DWG	
NCS:	N/A
SHEET:	11 OF 25

FILE PATH: G:\PROJECTS\INTEGRITY\2022-0101 HUYETT ROAD STORAGE\DRAWING\ARCO\C-101.DWG
DRAWING: 22x34 USE PRINTED DRAWING AT SCALE OF 1"=30' DRAWING IS BASED ON PLOT OR SCANNED IN AND MAY NOT BE TO SCALE IF ANY PRINTED SHEETS WERE MARTY FOLLA FORMAT FROM INTEGRITY FEDERAL SERVICES (IN PLOTTER)



UTILITY PLAN LEGEND:

- SANITARY LINE & CLEANOUT
- STORM SEWER MAIN
- STORM SEWER CURB INLET / DROP INLET / MANHOLE
- STORM SEWER OUTFALL & END SECTION W/ OUTLET PROTECTION
- WATER MAIN
- WATER VALVE / TEE WITH VALVES / HORIZONTAL BEND

SITE PLAN LEGEND:

- ASPHALT TRAIL
- K-1 ASPHALT PAVEMENT
- WVDOH ENTRANCE PAVEMENT
- GRAVEL PAVEMENT
- CONCRETE SIDEWALK

NOTES:

1. ALL DIMENSIONS SHOWN ARE MEASURED TO FACE OF CURB UNLESS OTHERWISE NOTED.
2. ALL RADII SHOWN ARE 5' UNLESS OTHERWISE NOTED.

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SEAL: JASON P. GERNAT REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS
1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

SITE LAYOUT AND UTILITY PLAN

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP. (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

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DRAWN: CTW	CHECK: BJS
CADD: C-CS-101.DWG	
NCS:	N/A
SHEET:	12 OF 25

FILE PATH: S:\PROJECTS\GENERAL\5022-0101 HUYETT ROAD STORAGE\DRAWINGS\CD\C-101.DWG
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ABBREVIATIONS:
- GS = GROUND SPOT
- TC = TOP OF CURB
- TOP = TOP OF STRUCTURE
- INV = INVERT OF STRUCTURE
- SWM = STORMWATER MANAGEMENT

HUYETT ROAD - WV SEC RTE 13/3
VARIABLE WIDTH ROW

SPRUCE HILL ESTATES HOA INC.
DIST. 6, TM 3C, PARCEL COMM
D.B. 1037, PG. 295
USE: SALVAGE VALUE BLDG.
ZONE: RESIDENTIAL/LIGHT INDUST./COMM. (COUNTY)

ESPANA, ROSA
DIST. 6, TM 3C, PARCEL 98
D.B. 1007, PG. 365
USE: RESIDENTIAL
ZONE: RESIDENTIAL/LIGHT INDUST./COMM. (COUNTY)

LAING, KARIN & JAMES P
DIST. 6, TM 3C, PARCEL 95
D.B. 1086, PG. 189
USE: RESIDENTIAL
ZONE: RESIDENTIAL/LIGHT INDUST./COMM. (COUNTY)

SANTANDER, FRANSISCA V
DIST. 6, TM 3C, PARCEL 96
D.B. 1020, PG. 258
USE: RESIDENTIAL
ZONE: RESIDENTIAL/LIGHT INDUST./COMM. (COUNTY)

SPRUCE HILL ESTATES HOA INC.
DIST. 6, TM 3C, PARCEL 0SWM
D.B. 1037, PG. 295
USE: RESIDENTIAL VACANT
ZONE: RESIDENTIAL/LIGHT INDUST./COMM. (COUNTY)

HOMES MANAGEMENT GROUP INC.
DIST. 6, TM 11, PARCEL 10
D.B. 1102, PG. 631
USE: RESIDENTIAL VACANT
ZONE: GENERAL COMMERCIAL (CITY)

US RTE 340 - BERRYVILLE PIKE
CONTROLLED ACCESS ROW VARIES

STONEWAY COURT
50' ROW

9,900 SF SELF STORAGE SLAB: 518.00
9,900 SF SELF STORAGE SLAB: 519.00
9,900 SF SELF STORAGE SLAB: 520.00
9,900 SF SELF STORAGE SLAB: 521.00
4,400 SF SELF STORAGE SLAB: 522.00
1,000 SF OFFICE BLDG SLAB = 521.80

SEE GRADING AREA DETAIL, THIS SHEET

LIMITS OF CONSTRUCTION

OPEN SPACE BUFFER

FRONTAGE ROAD RESERVATION

CENTER OF 20' UTILITY EASEMENT

BENCHMARK #1: ELEV.=506.98

WV STATE GRID NORTH (NAD83)

GRADING AREA DETAIL

GRAPHICAL SCALE: 1"=10'

GRAPHICAL SCALE: 1"=30'

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1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

GRADING PLAN

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10, D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: AS NOTED VERT.: N/A
DATE:	FEBRUARY 3, 2023
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DRAWN: CTW	CHECK: BJS
CADD: C-CG-101.DWG	
NCS:	N/A
SHEET:	13 OF 25

FILE PATH: C:\PROJECT\2022\5022-0101 HUYETT ROAD STORAGE\DRAWING\HUYETT ROAD STORAGE.DWG
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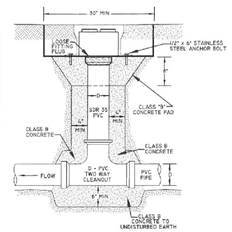
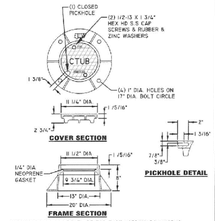


MAIN LINE CLEANOUT

(FOR D ≤ 8")

NOTES:

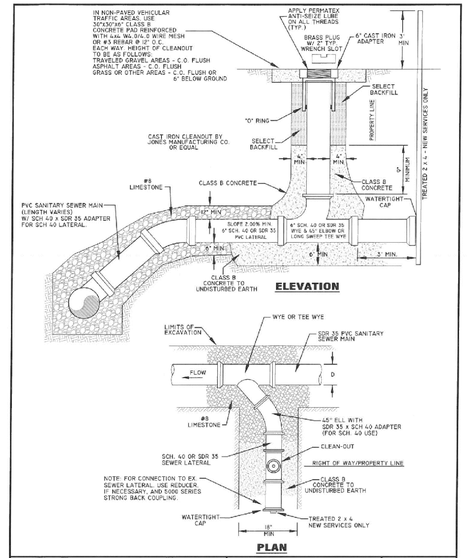
1. CLEANOUT FRAME AND COVER SHALL BE INSTALLED SUCH THAT IT IS LEVEL TO 2" BELOW SURROUNDING SURFACE. CLEANOUTS PROJECTING ABOVE SURFACE ARE UNACCEPTABLE.
2. FOR CLEANOUTS SUBJECT TO VEHICULAR TRAFFIC, CONSTRUCT 30"x30"x8" CLASS B CONCRETE PAD REINFORCE WITH 6x6 W4.0xW4.0 WIRE MESH OR #3 REBAR @ 12" C.C EACH DIRECTION.
3. FOR NON-VEHICULAR TRAFFIC AREAS CONCRETE PAD CAN BE ELIMINATED AT DIRECTION OF ENGINEER. BACKFILL TO MATCH SURROUNDING AREA.
4. USE TEE AND PLUG FOR CLEANOUT AT END OF LINE.
5. FOR MAINLINE DIAMETER OF 8" OR GREATER, USE STRAIGHT TEE



NOTE: DIMENSIONS ABOVE ARE FOR EAST JORDAN IRON WORKS APPROVED SUPPLIERS:
EAST JORDAN IRON WORKS
FRAME & COVER (5760), UNDIMPED

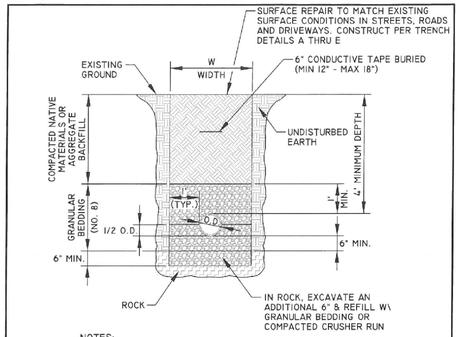
MAIN LINE CLEANOUT FRAME & COVER

Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	MAINLINE CLEANOUT & FRAME & COVER DETAIL	Standard Detail No. S-12 NOT TO SCALE SEPTEMBER 2015



PLAN

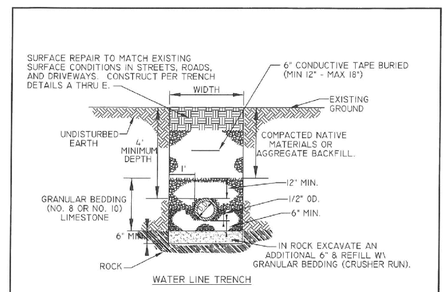
Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	NEW LATERAL CONNECTION DETAIL	Standard Detail No. S-13 NOT TO SCALE SEPTEMBER 2015



NOTES:

1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON, W = O.D. + 24", UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
4. BACKFILL ON SIDES TO 1/2 O.D. OF PIPE TO HOLD PIPE IN PLACE PRIOR TO PLACING ADDITIONAL BEDDING.
5. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (±2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
6. MAINTAIN MINIMUM OF 4' OF COVER TO THE TOP OF PIPE.
7. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS
8. ALL WATER LINES REQUIRE PERMIT FROM APPLICABLE REGULATORY ENTITIES. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	SEWER LINE TRENCH DETAIL	Standard Detail No. S-1 NOT TO SCALE SEPTEMBER 2015



WATER LINE TRENCH

NOTES:

1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON, W = O.D. + 24", UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
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5. MAINTAIN MINIMUM OF 4' OF COVER TO THE TOP OF PIPE.
6. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS
7. ALL WATER LINES REQUIRE PERMIT FROM APPLICABLE REGULATORY ENTITIES. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

Charles Town Utility Board 832 S. George Street, P.O. Box 359, Charles Town, WV 25414 Phone: (304) 725-2316 • Fax: (304) 725-4313	WATER LINE TRENCH DETAIL	Standard Detail No. W-9 NOT TO SCALE APRIL 2015

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SEAL:

REVISIONS
1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

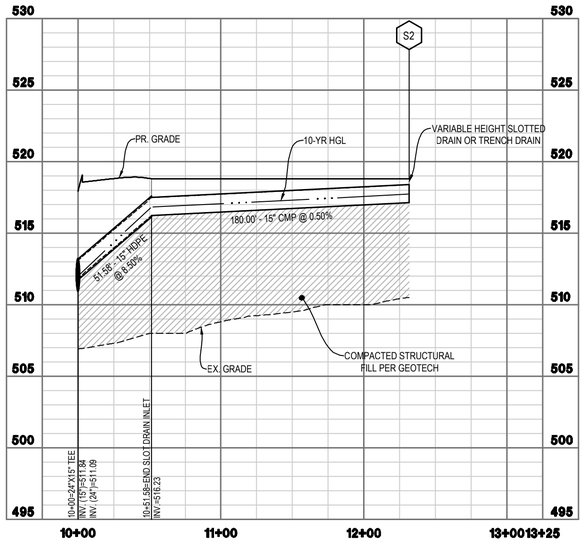
UTILITY DETAILS

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

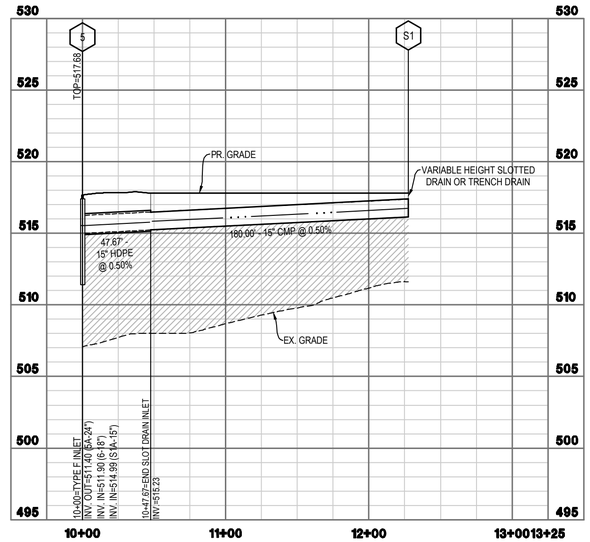
C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CU-501.DWG	
NCS:	N/A
SHEET:	14 OF 25



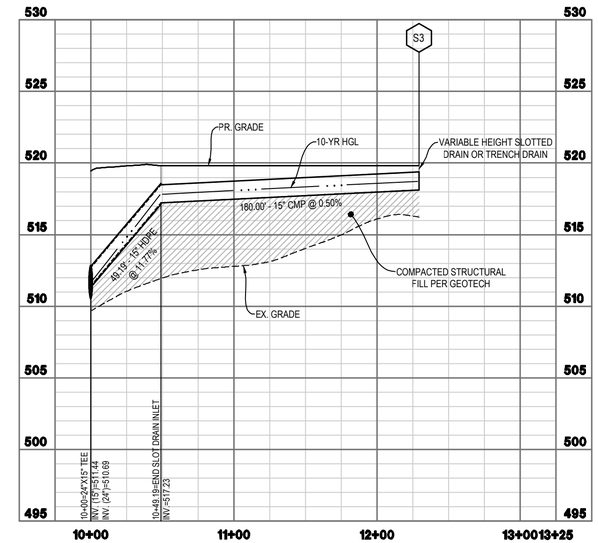
STORM PROFILE

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'



STORM PROFILE

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'



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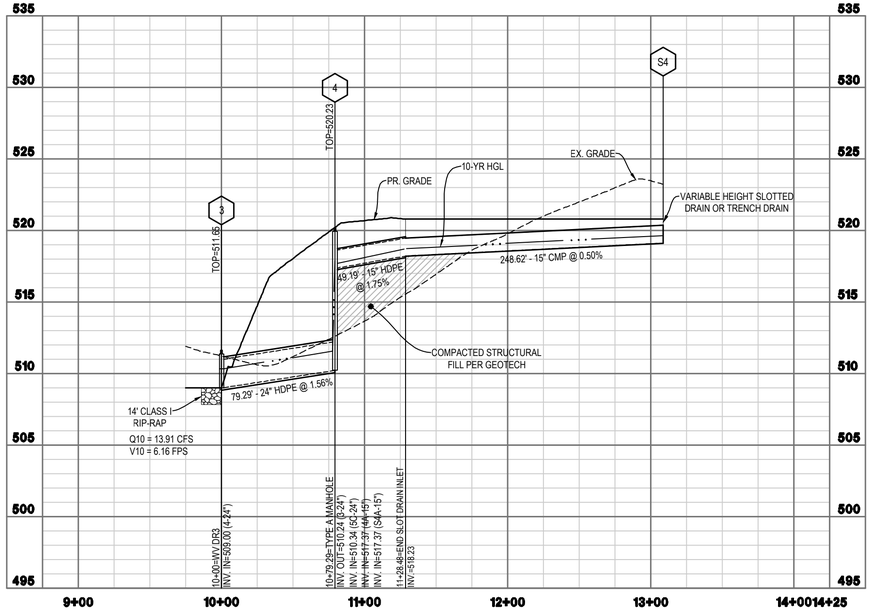

STORM PROFILE

SCALE:
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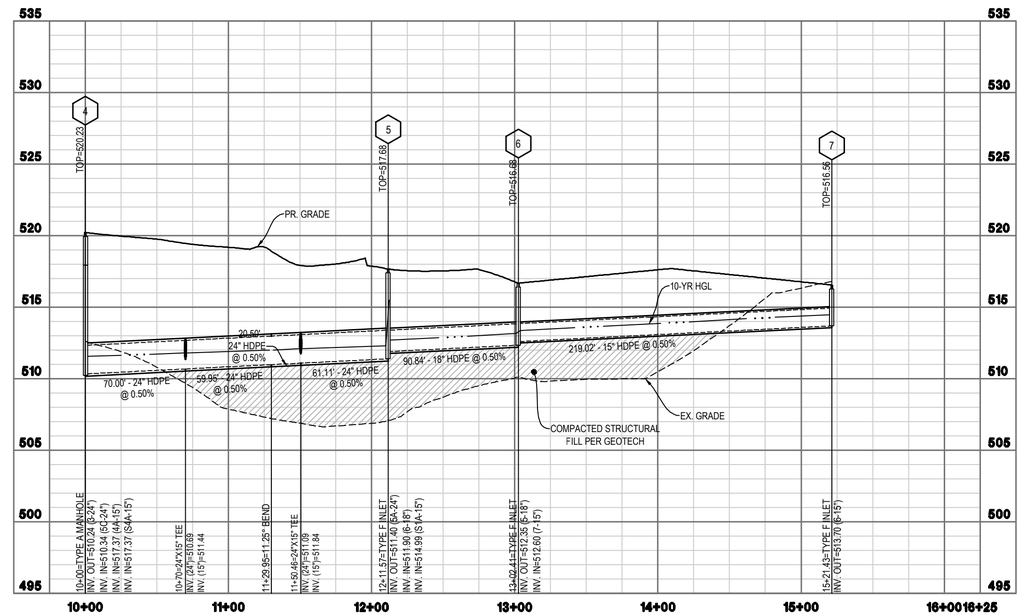

STORM PROFILE

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'

0 2.5 5 10 15
VERTICAL SCALE: 1"=5'

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

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1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

STORM SEWER PROFILES

HUYETT ROAD STORAGE SITE PLAN

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CHARLES TOWN CORP. (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

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NCS:	N/A
SHEET:	15 OF 25

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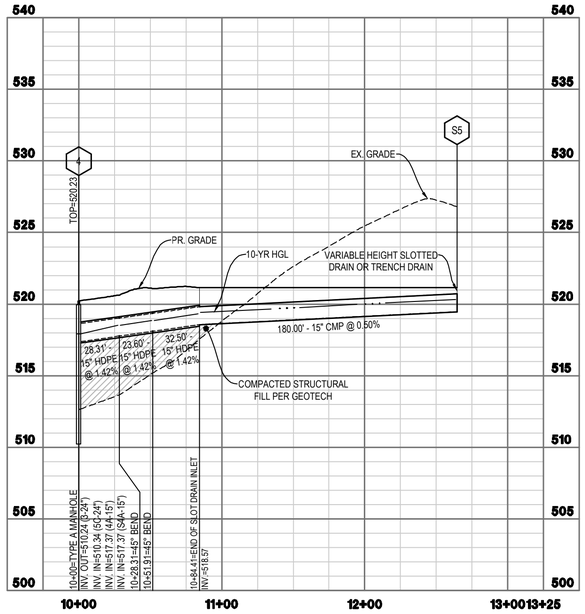

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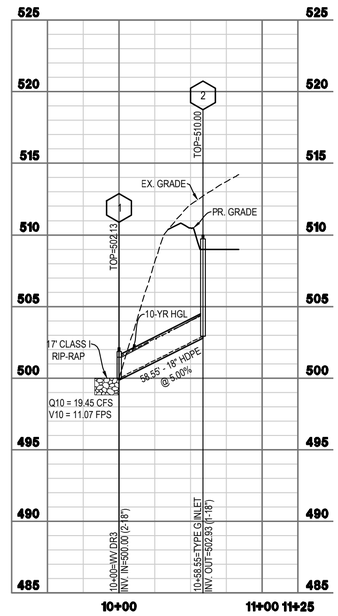

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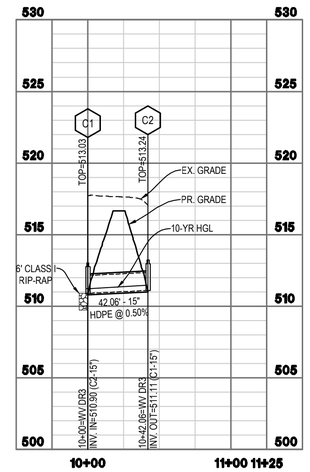

CULVERT PROFILE

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'

0 2.5 5 10 15
VERTICAL SCALE: 1"=5'

50 25 0 50 100 150
GRAPHICAL SCALE: 1"=50'

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SEAL:

REVISIONS	
1	03/15/2023 - ALL SHEETS PER CITY COMMENTS

STORM SEWER PROFILES

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

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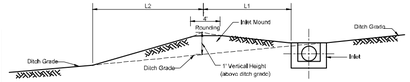
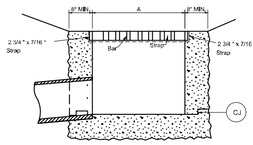
NCS:	N/A
SHEET:	16 OF 25

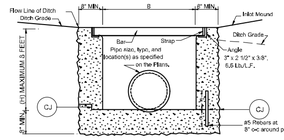
INLET MOUNDING TABLE			
DITCH GRADE (%)		L1, HORIZONTAL LENGTH (FT.)	L2, HORIZONTAL LENGTH (FT.)
FROM	TO*		
0	3	10	15
3	5	9	20
5	7.5	8	40
7.5	UP	SPECIAL DESIGN	SPECIAL DESIGN



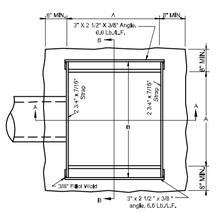
MOUNDING DETAIL
Median and Side Ditches



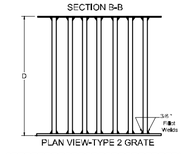
SECTION A-A
(Type 2 Grate Shown)



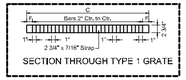
SECTION B-B



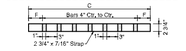
PLAN



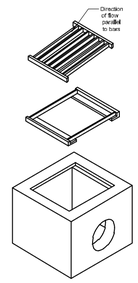
PLAN VIEW-TYPE 2 GRATE



SECTION THROUGH TYPE 1 GRATE



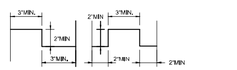
SECTION THROUGH TYPE 2 GRATE



EXPLODED DETAIL

DIMENSIONS						TYPE 2 GRATE		FRAME	TYPE 1 GRATE		
Pipe Size	A	B	C	D	H (Min)	F	Bars	WT.	F	Bars	WT.
18"	2'-6"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-0"	3 3/8"	7	223	62	1 3/8"	15	453
21"	2'-6"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-0"	3 3/8"	7	223	62	1 3/8"	15	453
24"	2'-6"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-6"	3 3/8"	7	223	62	1 3/8"	15	453
27"	3'-0"	3'-8"	3'-11 3/4"	3'-6 3/4"	2'-6"	3 3/8"	8	379	69	1 3/8"	17	566
30"	3'-6"	4'-0"	3'-6 3/4"	3'-11 3/4"	3'-0"	3 3/8"	9	357	89	1 3/8"	21	797
33"	3'-6"	4'-3"	3'-6 3/4"	4'-2 3/4"	3'-3"	3 7/8"	10	419	85	1 7/8"	21	847
36"	4'-0"	4'-6"	3'-11 3/4"	4'-5 3/4"	3'-6"	3 3/8"	11	466	90	1 3/8"	23	981
42"	4'-6"	5'-0"	4'-5 3/4"	4'-11 3/4"	4'-0"	3 3/8"	12	587	101	1 3/8"	27	1277
48"	5'-0"	5'-6"	4'-11 3/4"	5'-5 3/4"	4'-6"	3 3/8"	14	748	112	1 3/8"	29	1507

TABLE NOTE: GRATE AND FRAME WEIGHTS ARE FOR INFORMATION ONLY AND WILL INCREASE IF LARGER STRAP AND BARS ARE USED.
THE FOLLOWING SUBSTITUTIONS IN DIMENSIONS ARE ACCEPTABLE FOR FABRICATING THE GRATE AND FRAME:
STRAP THICKNESS: 1/2" STRAP DEPTH: 3" BAR DEPTH: 3"



CONSTRUCTION JOINT DETAILS

NOTES

THE FINAL INSTALLED TOP SURFACE OF INLET AND GRATE SHALL BE FLUSH WITH ADJACENT FINISHED SURFACES SUCH AS PAVEMENT, GUTTERS, CURBS, AND SIDEWALKS. TOP OF GRATE ELEVATION, IF SHOWN ON THE PLANS, IS FOR INFORMATION ONLY.

CONSTRUCTION MAY BE CAST-IN PLACE, PRECAST IN ONE OR MULTIPLE SECTIONS, OR ANY COMBINATION OF CAST-IN-PLACE AND PRECAST.

TYPE 2 GRATE SHALL BE USED AT ALL LOCATIONS UNLESS OTHERWISE SPECIFIED ON THE PLANS. TYPE 1 URBAN GRATES SHALL NOT BE USED ONLY AT SPECIALLY DESIGNATED LOCATIONS AS SHOWN ON THE PLANS.

THE CONTRACTOR, AT HIS OPTION, MAY OMIT USE OF THE FRAME BY FORMING A LEDGE IN THE CONCRETE.

SPECIAL CARE SHALL BE EXERCISED IN FORMING THE 2" WIDE CONCRETE LEDGE TO PROVIDE A SMOOTH, EVEN SURFACE FOR SUPPORTING THE GRATES IF THE SHALLOW FRAME IS NOT USED. NO PROJECTIONS SHALL EXIST ON THE BEARING SURFACES OF THE LEDGE OR THE GRATES, AND THE GRATES SHALL SEAT ON THE LEDGE WITHOUT ROCKING.

THE MOUNDING DETAIL AS SHOWN IS NOT REQUIRED WHEN AN INLET IS PLACED IN A SAG.

OPTIONAL CONSTRUCTION JOINTS LABELED "CJ" MAY BE ROUGHENED CONCRETE, KEYED OR DOWELED AS PER THE TYPICAL DETAILS SHOWN HEREIN OR AS APPROVED BY THE ENGINEER. NON SHRINK GROUT MEETING THE REQUIREMENTS OF SUBSECTION 715.5 OF THE SPECIFICATIONS MAY BE USED TO A DEPTH OF 1/2" FOR LEVELING BETWEEN PRECAST SECTIONS. THICKER DEPTHS WILL BE ALLOWED AS PER THE MANUFACTURER'S RECOMMENDATIONS.

THIS INLET IS TO BE INSTALLED IN ROADSIDE OR MEDIAN DITCHES ONLY. IT IS NOT TO BE PLACED ADJACENT TO PAVEMENT OR IN THE GUTTER PAN OF COMBINATION CURB AND GUTTER.

THE MINIMUM DISTANCE FROM THE TOP OF ANY PIPE OPENING TO ANY CONSTRUCTION JOINT ABOVE THE OPENING SHALL BE FOUR (4) INCHES.

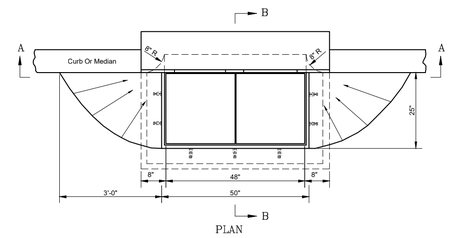
THE NUMBER AND LOCATION OF PIPE OPENINGS SHALL BE AS SHOWN IN THE PLANS. THE CONTRACTOR AT NO ADDITIONAL COST, SHALL BE RESPONSIBLE FOR ANY TEMPORARY BRACING REQUIRED TO TRANSPORT PRECAST INLET SECTIONS DUE TO MULTIPLE OPENINGS.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

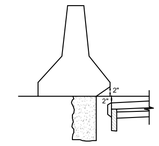
PREPARED 7-1-99
REVISION DATE

TYPE G INLET

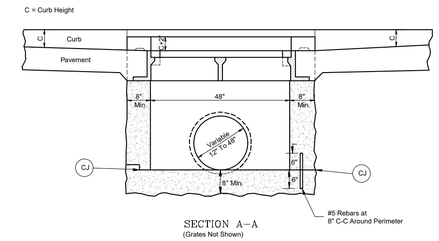
STANDARD SHEET DR6-G



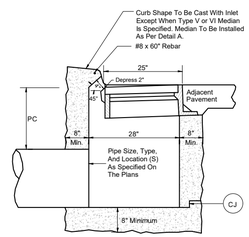
PLAN



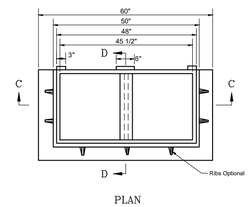
DETAIL A



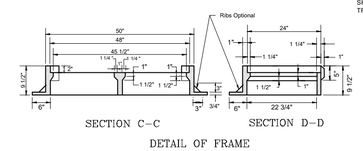
SECTION A–A
(Grates Not Shown)



SECTION B–B
(Grates Not Shown)

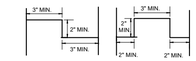


PLAN



SECTION C–C SECTION D–D

DETAIL OF FRAME



CONSTRUCTION JOINT DETAILS

NOTES

THE FINAL INSTALLED TOP SURFACE OF INLET AND GRATE SHALL BE FLUSH WITH ADJACENT FINISHED SURFACES SUCH AS PAVEMENT, GUTTERS, CURBS, AND SIDEWALKS. TOP OF GRATE ELEVATION, IF SHOWN ON THE PLANS, IS FOR INFORMATION ONLY.

CONSTRUCTION MAY BE CAST-IN PLACE, PRECAST IN ONE OR MULTIPLE SECTIONS, OR ANY COMBINATION OF CAST-IN-PLACE AND PRECAST.

OPTIONAL CONSTRUCTION JOINTS LABELED "CJ" MAY BE ROUGHENED CONCRETE, KEYED OR DOWELED AS PER THE TYPICAL DETAILS SHOWN HEREIN OR AS APPROVED BY THE ENGINEER. NON SHRINK GROUT MEETING THE REQUIREMENTS OF SUBSECTION 715.5 OF THE SPECIFICATIONS MAY BE USED TO A DEPTH OF 1/2" FOR LEVELING BETWEEN PRECAST SECTIONS. THICKER DEPTHS WILL BE ALLOWED IF AS PER THE MANUFACTURER'S RECOMMENDATIONS.

THE COVERING FOR REINFORCING STEEL SHALL BE TWO INCHES, MEASURED FROM THE SURFACE OF THE CONCRETE TO THE FACE OF THE BAR, UNLESS OTHERWISE SHOWN.

FOR DETAILS OF GRATES (TWO REQUIRED), SEE INLET CASTINGS STANDARD SHEET DR6-X.

PC (MINIMUM PIPE COVER) SHALL BE 12" BELOW INLET TOP FOR PIPES PLACED UNDER THE SIDEWALK OR GRASSED AREA OR 24" BELOW INLET TOP FOR PIPES PLACED UNDER PAVEMENT OR SHOULDER.

CURB, IF SPECIFIED, MAY BE EITHER CONCRETE PLACED ON THE INLET BACKWALL AS DETAILED HEREIN OR AN APPROVED CURB BOX AS MANUFACTURED WITH THE GRATE AND FRAME. DIMENSIONS OF THE CURB BOX SHOULD REASONABLY CONFORM TO THE STANDARD CURB + AS SPECIFIED ON THE PLANS.THE CURB WILL BE PAID FOR PER SECTION 610, IN EITHER CASE.

THIS INLET SHALL NOT BE PLACED IN A PEDESTRIAN CROSS WALK.

THE MINIMUM DISTANCE FROM THE TOP OF ANY PIPE OPENING TO ANY CONSTRUCTION JOINT ABOVE THE OPENING SHALL BE FOUR (4) INCHES.

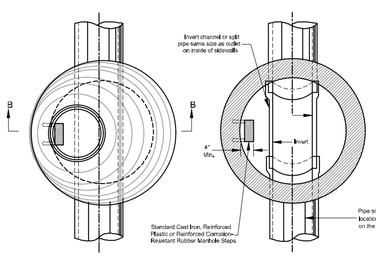
THE NUMBER AND LOCATION OF PIPE OPENINGS SHALL BE AS SHOWN IN THE PLANS. THE CONTRACTOR AT NO ADDITIONAL COST, SHALL BE RESPONSIBLE FOR ANY TEMPORARY BRACING REQUIRED TO TRANSPORT PRECAST INLET SECTIONS DUE TO MULTIPLE OPENINGS.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-1-99
REVISION DATE

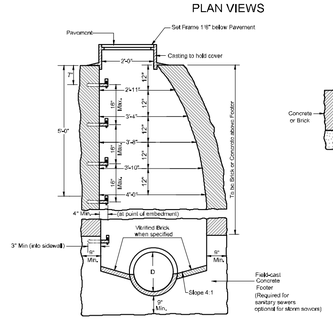
TYPE F INLET

STANDARD SHEET DR6-F



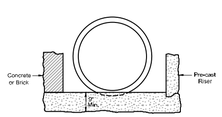
Complete Structure Section Through Footer

PLAN VIEWS



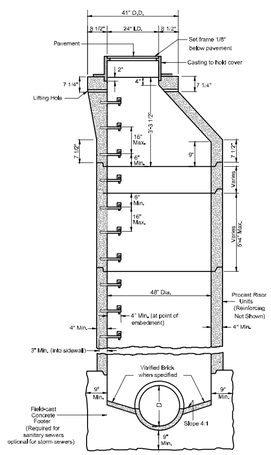
Section B-B

CAST-IN-PLACE OPTION



CONCRETE BASE

FOR USE WITH STORM SEWERS ONLY
May Be Precast



Section B-B

PRE-CAST

NOTES

TYPE A MANHOLES, WHEN SPECIFIED ON THE PLANS, MAY BE CONSTRUCTED IN EITHER METHOD (CAST-IN-PLACE OR PRE-CAST OPTION) AS SHOWN HEREIN.

STEPS, FRAMES, AND COVERS SHALL BE AS SHOWN ON STANDARD SHEET DR7-X.

"KEYED" OR "DOWELED" TYPE CONSTRUCTION JOINTS, ACCEPTABLE TO THE ENGINEER, MAY BE USED IN THE CONSTRUCTION OF CONCRETE MANHOLES.

IF THE CAST-IN-PLACE MANHOLE IS OVER TWELVE FEET (12') IN DEPTH, THE SIDEWALLS BELOW THAT DEPTH WILL BE DOUBLE THICKNESS.

PIPE AT ELEVATIONS OTHER THAN SHOWN MAY BE JOINED TO THE MANHOLE BY CUTTING A HOLE THE SIZE OF THE CONNECTING PIPE IN THE MANHOLE, INSERTING THE PIPE THE THICKNESS OF THE MANHOLE SHELL AND CLOSING ALL OPENINGS AROUND THE CONNECTING PIPE WITH JOINT MORTAR.

DRAWING SHOWS PIPE ENTERING AND LEAVING MANHOLE IN A STRAIGHT LINE, HOWEVER, THE PIPES MAY ENTER OR LEAVE AT AN ANGLE OR PLACE AS CALLED FOR OR SHOWN ON THE PLANS.

MINIMUM HEIGHT OF BENCH WALL ABOVE FLOWLINE OF PIPE IS 25% OF THE DIAMETER OF THE PIPES.

THE USE OF BRICK FOR MANHOLE CONSTRUCTION WILL NOT BE ALLOWED WHEN A MANHOLE IS LOCATED IN THE ROADWAY.

THE FOLLOWING ADDITIONAL NOTES ARE APPLICABLE FOR PRE-CAST MANHOLES:
MANHOLE STEPS SHALL BE PLACED INTO PLASTIC CONCRETE WALL DURING MANUFACTURE OR MORTARED INTO HOLES AFTER THE CONCRETE HAS SET.

SIDEWALL SECTIONS MAY BE USED IN ANY COMBINATION TO PRODUCE A MANHOLE OF DESIRED DEPTH, EXCEPT THE TAPERED TOP SECTION SHALL BE RETAINED AS SHOWN.

THE TAPERED TOP SECTION SHALL BE MANUFACTURED AND MEET THE SAME REQUIREMENTS AS THE MANHOLES SIDEWALLS, BUT SHALL CONFORM TO THE DIMENSIONS DETAILED HEREIN.

LIFTING HOLES IN THE TAPERED TOP SECTION AND THE CIRCUMFERENTIAL NOTCHES IN THE MANHOLE COVER ARE FOR HANDLING PURPOSES ONLY.

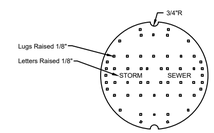
THE PRE-CAST SIDEWALL UNITS SHALL BE SET IN JOINT MORTAR OR SEALED WITH O-RING GASKETS.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

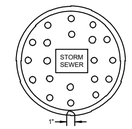
PREPARED 7-1-99
REVISION DATE

TYPE A MANHOLE

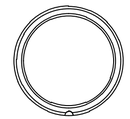
STANDARD SHEET DR7-A



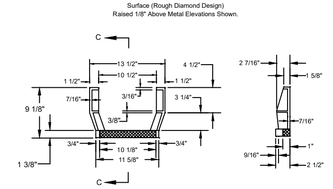
PLAN



PLAN

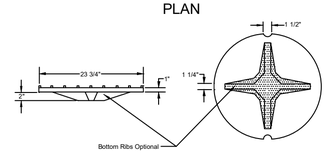


BOTTOM VIEW OF COVER



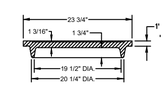
PLAN SECTION C-C

GRAY IRON STEP



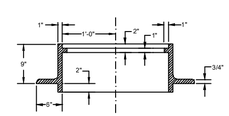
ELEVATION INVERTED PLAN

MANHOLE COVER



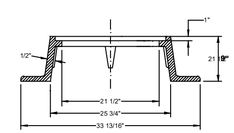
COVER SECTION

ALTERNATE MANHOLE COVER



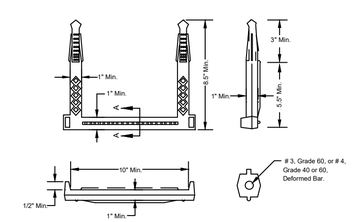
SECTION

MANHOLE FRAME



SECTION

ALTERNATE MANHOLE FRAME



SECTION A-A
(Enlarged)

REINFORCED PLASTIC AND REINFORCED CORROSION RESISTANT RUBBER MANHOLE STEPS

NOTES

Lettering on covers shall denote STORM SEWER or SANITARY SEWER as applicable.

Bottom ribs may be deleted from manhole cover castings. The 1/8" raised lugs are a skid resistant measure. Alternative measures will require approval by the Engineer.

Shop Drawings shall be submitted if details and dimensions vary.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-1-99
REVISION DATE

MANHOLE CASTINGS

STANDARD SHEET DR7-X

INTEGRITY FEDERAL SERVICES
CIVIL ENGINEERING • LANDSCAPE ARCHITECTURE • PLANNING
148 S. Queen Street, Suite 201 Martinsburg, WV 25401
Phone: 304-725-8456 www.ifs-se.com

JASON P. GERNAT REGISTERED No. 18127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL:

REVISIONS
1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

STORM SEWER DETAILS

HUYETT ROAD STORAGE SITE PLAN

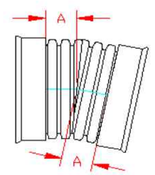
TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CU-561.DWG	
NCS:	N/A
SHEET:	17 OF 25

DUAL WALL FABRICATED 11.25° BENDS
4" - 24" DIAMETER

PART #	PIPE SIZE	A	JOINT
1591AN65B	15 in (375 mm)	6.0 in (152 mm)	WT
2491AN65B	24 in (600 mm)	7.9 in (202 mm)	WT



ST & WT (INCLUDES 2 GASKETS)

* = PLAIN END
ST = SOIL TIGHT
WT = WATER TIGHT

** LIMITED AVAILABILITY. PLEASE SEE INJECTION MOLDED FITTING SECTION FOR OTHER AVAILABLE FITTINGS

NOTE: ALL FITTINGS DIMENSIONS ARE FOR REFERENCE ONLY

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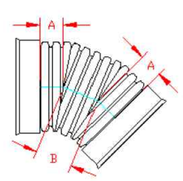
ADS Advanced Drainage Systems, Inc.

DRAWING #:	2200	
DRAWN BY:	JCB	04.06.06
APPROVED BY:	JCB	06.25.07
REVISIONS:	TJR	4/21/2016

DUAL WALL FABRICATED MITERED 45° BENDS
12" - 30" DIAMETER

PART #	PIPE SIZE	A	B	JOINT
1594AN65B	15 in (375 mm)	5.4 in (137 mm)	8.5 in (216 mm)	WT



ST & WT (INCLUDES 2 GASKETS)

* = PLAIN END
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WT = WATER TIGHT

NOTE: ALL FITTINGS DIMENSIONS ARE FOR REFERENCE ONLY

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ADS Advanced Drainage Systems, Inc.

DRAWING #:	2215	
DRAWN BY:	JCB	04.06.06
APPROVED BY:	JCB	06.25.07
REVISIONS:	TJR	4/26/2016

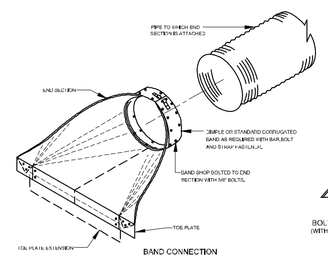
DIMENSIONS OF GALVANIZED STEEL END SECTION FOR ROUND PIPE

PIPE DIAM. (INCHES)	METAL THK. (INCHES)	DIMENSIONS (INCHES) A ±1"	B MAX	H ±1"	L ±1'0"	W ±2"	APPROX. SLOPE	BODY
12	.064	5	6	5	21	24	2 1/2	1 PC.
15	.064	7	8	6	26	30	2 1/2	1 PC.
18	.064	8	10	6	31	36	2 1/2	1 PC.
21	.064	9	12	6	36	42	2 1/2	1 PC.
24	.064	10	13	6	41	48	2 1/2	1 PC.
30	.079	12	16	8	51	60	2 1/2	1 PC.
36	.079	14	19	9	60	72	2 1/2	2 PC.
42	.109	16	22	11	69	84	2 1/2	2 PC.
48	.109	18	27	12	78	96	2 1/2	2 PC.
54	.109	19	30	12	84	102	2	2 PC.
60	.109	19	33	12	87	114	1 3/4	3 PC.
66	.109	18	36	12	87	120	1 1/2	3 PC.
72	.109	18	39	12	87	126	1 1/2	3 PC.
78	.109	19	42	12	87	132	1 1/4	3 PC.
84	.109	18	45	12	87	138	1 1/8	3 PC.

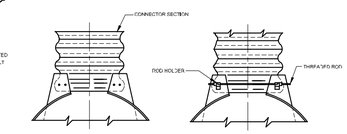
DIMENSIONS OF GALVANIZED STEEL END SECTION FOR PIPE ARCH

PIPE ARCH SPAN X RISE (INCHES)	EQUIV. DIAM. (INCHES)	METAL THK. (INCHES)	DIMENSIONS (INCHES) A ±1"	B MAX	H ±1"	L ±1'0"	W ±2"	APPROX. SLOPE	BODY
17X13	15	.064	7	9	6	19	30	2 1/2	1 PC.
21X15	18	.064	7	10	6	23	36	2 1/2	1 PC.
24X18	21	.064	8	12	6	26	42	2 1/2	1 PC.
28X20	24	.064	9	14	6	32	48	2 1/2	1 PC.
35X24	30	.079	10	18	6	39	60	2 1/2	1 PC.
42X29 (40X31)	36	.079	12	18	8	46	75	2 1/2	1 PC.
49X33 (46X36)	42	.109	13	21	9	53	85	2 1/2	2 PC.
57X38 (53X41)	48	.109	15	26	12	63	90	2 1/2	2 PC.
64X43 (60X46)	54	.109	18	30	12	70	102	2 1/4	2 PC.
71X47 (66X51)	60	.109	18	33	12	77	114	2 1/4	3 PC.
77X52 (73X55)	66	.109	18	36	12	77	126	2	3 PC.
83X57 (81X59)	72	.109	18	39	12	77	138	2	3 PC.

NOTE: SPAN AND RISE DIMENSIONS IN PARENTHESES ARE FOR 2"X1" CORRUGATED PIPE ARCHES; ALL OTHER SPAN AND RISE VALUES ARE FOR 2 7/3"X1/2" CORRUGATED PIPE ARCHES.



BAND CONNECTION



BOLTED OR RIVETED CONNECTION (WITH OR WITHOUT CONNECTOR SECTION)

THREADED ROD CONNECTION

NOTES

TYPICAL END SECTIONS FOR PIPES AND PIPE ARCHES ARE DETAILED HEREIN. OTHER SIMILAR DESIGNS MAY BE USED IF ACCEPTABLE TO THE ENGINEER.

GALVANIZED STEEL END SECTIONS SHALL BE USED ON THE ENDS OF CORRUGATED STEEL PIPES AND/OR PIPE ARCHES AT THOSE LOCATIONS SPECIFIED ON THE PLANS. END SECTIONS SHALL BE MEASURED AS THE NUMBER OF UNITS INSTALLED OF EACH SIZE AND TYPE AND SHALL BE PAID FOR IN ACCORDANCE WITH 604 OF THE SPECIFICATIONS.

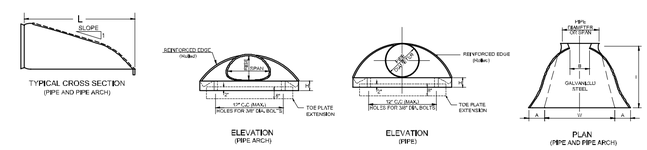
TWO-PIECE AND THREE-PIECE END SECTIONS SHALL BE OF LAP SEAM CONSTRUCTION TIGHTLY JOINED WITH 3/8 " DIAMETER GALVANIZED RIVETS OR BOLTS.

FOR 60" THRU 84" PIPES, THE REINFORCED EDGES OF THE END SECTIONS SHALL BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES FASTENED BY 3/8" DIAMETER GALVANIZED BOLTS AND NUTS. THIS REQUIREMENT SHALL ALSO BE APPLICABLE TO THE END SECTIONS FOR 77"X52", 73"X 55", 83"X 57", AND 81"X 59" PIPE ARCH SIZES. IN ADDITION, FOR THOSE PIPE ARCH SIZES, ANGLE REINFORCEMENT SHALL BE USED UNDER THE CENTER PANEL SEAMS.

THE END SECTION CONNECTION DETAILS SHALL BE AS SHOWN ON THIS PLAN SHEET OR OF A SIMILAR DESIGN AS RECOMMENDED BY THE MANUFACTURER. ALL SIMILAR DESIGNS SHALL PROVIDE A SECURE ATTACHMENT OF THE END SECTION TO THE PIPE OR PIPE ARCH.

ALTHOUGH A PIPE OR PIPE ARCH MAY HAVE A BITUMINOUS COATING AND/OR PAVED INVERT, IT WILL NOT BE NECESSARY TO BITUMINOUS COAT OR PAVE THE END SECTION, CONNECTORS, OR CONNECTOR SECTION.

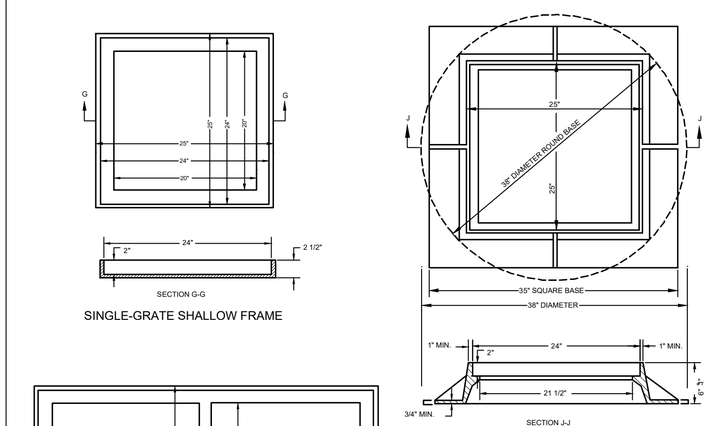
TOE PLATE EXTENSIONS SHALL BE THE SAME THICKNESS AS THE END SECTIONS AND SHALL BE FASTENED TO TOE PLATES WITH 3/8 " DIAMETER GALVANIZED BOLTS. LENGTH OF TOE PLATE EXTENSION SHALL BE W+10"(APPROX.) FOR 12" THRU 30" DIAMETER PIPES AND FOR PIPE ARCHES WITH RISE VALUES UP TO AND INCLUDING 29". THE LENGTH SHALL BE W+22"(APPROX.) FOR LARGER PIPE SIZES AND W+18" (APPROX.) FOR LARGER PIPE ARCHES.

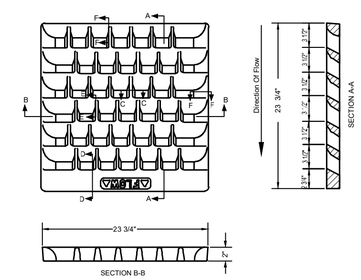


WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

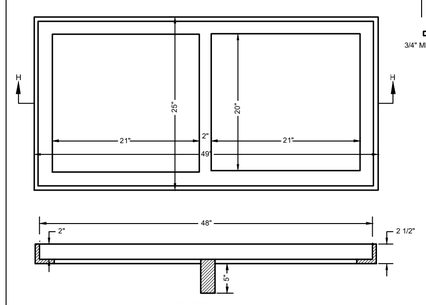
END SECTIONS FOR CORRUGATED STEEL PIPES AND PIPE ARCHES

STANDARD SHEET DR3

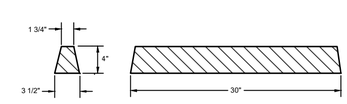




TILT-BAR GRATE



DOUBLE-GRATE SHALLOW FRAME



GRATE SUPPORT BAR

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

INLET CASTINGS

STANDARD SHEET DR6-X

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JASON P. GERNAT REGISTERED No. 19127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL:

REVISIONS

1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

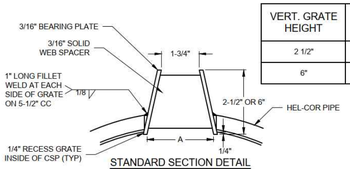
STORM SEWER DETAILS

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP. (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

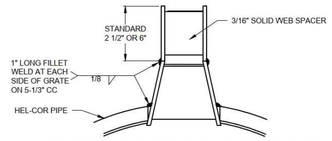
C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CU-561.DWG	
NCS:	N/A
SHEET:	18 OF 25

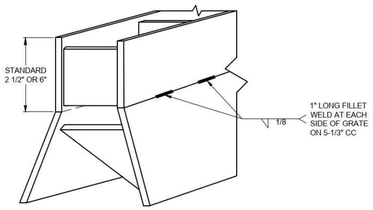


STANDARD SECTION DETAIL

VERT. GRATE HEIGHT	"A"
2 1/2"	2-1/4"
6"	3"



STANDARD SECTION DETAIL WITH VERTICAL EXTENSION

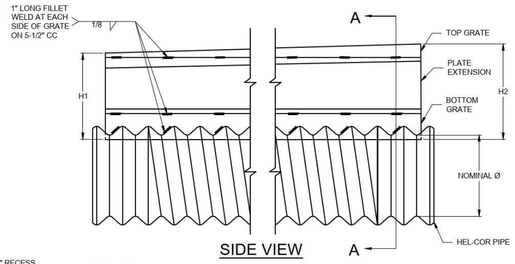


ISOMETRIC VIEW OF GRATES WITH VERTICAL EXTENSION

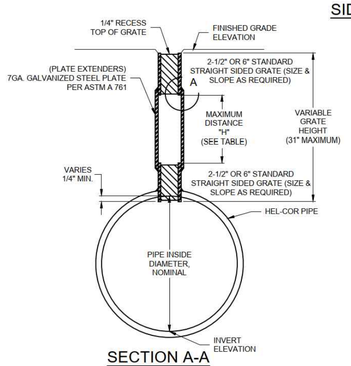
NOTES:
1. SPACERS DO NOT LINE UP WHEN PLACING THE VERTICAL EXTENSION ONTO THE TRAPEZOIDAL SECTION.
2. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES
3. BOTTOM GRATE MAY BE A STRAIGHT GRATE (OPTIONAL)

SLOTTED DRAIN GRATE EXTENSION DETAIL (TRAPEZOIDAL GRATES)

NOT TO SCALE



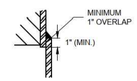
SIDE VIEW



SECTION A-A

LOADING CONDITION	H
≤ H10 * GRANULAR BACKFILL	8"
H20/H25/HL93 * 750 PSI CONCRETE	19"
AIRPORT ** 1000 PSI CONCRETE	12"

* 125 PSI TIRE PRESSURE
** 195 PSI TIRE PRESSURE



DETAIL "A"

NOTES
1. FINISHED ELEVATION IS SET FROM TOP OF GRATE, NOT FROM INVERT OF PIPE.
2. TOP OF GRATE TO BE RECESSED 1/4" FROM FINISHED GRADE.
3. H1 & H2 MEASURED FROM TOP OF GRATE TO BOTTOM OF GRATE.
4. GRATES ARE SLOPED AS REQUIRED PER THE PROJECT DRAWINGS.
5. REFERENCE SLOTTED DRAIN INSTALLATION DETAILS FOR BACKFILL REQUIREMENTS.
6. ORDER MUST NOTE IF PRODUCT IS USED UNDER AIRCRAFT & HEAVY LOADING FOR SPECIAL WELDING & REINFORCEMENT.
7. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

SLOTTED DRAIN CORRUGATED STEEL PIPE
VARIABLE HEIGHT GRATE DETAIL

NOT TO SCALE

0-SLOTTED DRAIN DETAIL GRID

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CONTECH PIPE SOLUTIONS
CONTECH CONTRACT DRAWING

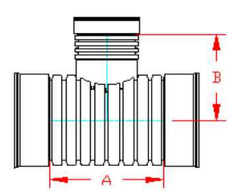
SLOTTED DRAIN
STANDARD DETAILS
VARIABLE HEIGHT GRATES

PROJECT No.:	SEQ. No.: DATE: 11/10/2021
DESIGNED:	DRAWN:
CHECKED:	APPROVED: ----
SHEET NO.:	6 OF 6

DUAL WALL FABRICATED REDUCING TEES
24"×12" - 24"×18" DIAMETER

PART #	PIPE SIZE	A	B	JOINT
2465AN65B	24 x 15 in (600 x 375 mm)	31.5 in (800 mm)	21.4 in (543 mm)	WT

* = PLAIN END
ST = SOIL TIGHT
WT = WATER TIGHT



ST & WT (INCLUDES 3 GASKETS)

NOTE: ALL FITTINGS DIMENSIONS ARE FOR REFERENCE ONLY

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ADS Advanced Drainage Systems, Inc.

DRAWING #	2420A	
DRAWN BY	JCB	04.30.06
APPROVED BY	JCB	06.26.07
REVISIONS	NJP	06.14.07

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STORM SEWER DETAILS

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
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SCALE:	HORIZ.: N/A VERT.: N/A
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CADD: C-CU-561.DWG	
NCS:	N/A
SHEET:	19 OF 25

Culvert Designer/Analyzer Report
Proposed Culvert

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elev	511.59 ft	Discharge	0.75 cfs
Headwater Depth/Height	0.39	Tailwater Elevation	N/A ft
Inlet Control HW Elev.	511.57 ft	Control Type	Entrance Control
Outlet Control HW Elev.	511.59 ft		

Grades

Upstream Invert	511.11 ft	Downstream Invert	510.90 ft
Length	42.06 ft	Constructed Slope	0.004993 ft/ft

Hydraulic Profile

Profile	S2	Depth, Downstream	0.33 ft
Slope Type	Steep	Normal Depth	0.33 ft
Flow Regime	Supercritical	Critical Depth	0.34 ft
Velocity Downstream	2.90 ft/s	Critical Slope	0.004451 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.012
Section Material	HDPE (Smooth Interior)	Span	1.25 ft
Section Size	15 inch	Rise	1.25 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	511.59 ft	Upstream Velocity Head	0.12 ft
Ke	0.20	Entrance Loss	0.02 ft

Inlet Control Properties

Inlet Control HW Elev.	511.57 ft	Flow Control	Unsubmerged
Inlet Type	Groove end w/headwall	Area Full	1.2 ft²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

10-YR PIPE COMPUTATIONS

LineID	Structure	DrainageArea	RunoffCoeff	IncrCxA	TotalCxA	iSys	TotalRunoff	KnownQ	FlowRate	InvertUp	InvertDn	LineLength	LineSlope	LineSize	CapacityFull	VelAve	Tc	PipeTravel	Grnd/RimElev Up
	Up	(ac)	(C)			(in/hr)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(%)	(in)	(cfs)	(ft/s)	(min)	(min)	(ft)
4-3	4	0.00	0.00	0.00	2.55	5.46	13.91	0.00	13.91	510.24	509.00	79.29	1.56	24	30.64	6.16	8.60	0.29	520.23
4A-4	4A	0.00	0.00	0.00	0.56	6.09	3.42	0.00	3.42	517.77	517.37	28.31	1.41	15	8.32	5.46	6.30	0.17	519.20
4B-4A	4B	0.00	0.00	0.00	0.56	6.13	3.45	0.00	3.45	518.11	517.77	23.61	1.44	15	8.40	4.51	6.20	0.14	519.54
S5A-4B	S5A	0.00	0.00	0.00	0.56	6.19	3.48	0.00	3.48	518.57	518.11	32.50	1.42	15	8.32	4.53	6.00	0.19	520.00
SLOT DRAIN INLET 5	S5	0.73	0.77	0.56	0.56	6.54	3.67	0.00	3.67	519.47	518.57	180.00	0.50	15	4.57	4.14	5.00	1.00	---
S4A-4	S4A	0.00	0.00	0.00	0.25	5.83	1.47	0.00	1.47	518.23	517.37	49.19	1.75	15	9.25	4.45	7.20	0.64	519.66
SLOT DRAIN INLET 4	S4	0.28	0.90	0.25	0.25	6.54	1.65	0.00	1.65	519.13	518.23	180.00	0.50	15	4.57	3.42	5.00	2.24	520.55
5C-4	5C	0.00	0.00	0.00	1.73	5.55	9.62	0.00	9.62	510.69	510.34	70.00	0.50	24	17.33	5.04	8.30	0.37	512.81
S3A-5C	S3A	0.00	0.00	0.00	0.32	5.95	1.88	0.00	1.88	517.23	511.44	49.19	11.77	15	24.00	5.06	6.80	0.52	518.66
SLOT DRAIN INLET 3	S3	0.35	0.90	0.32	0.32	6.54	2.06	0.00	2.06	518.13	517.23	180.00	0.50	15	4.57	3.63	5.00	1.79	---
5B-5C	5B	0.00	0.00	0.00	1.42	5.65	8.01	0.00	8.01	510.99	510.69	59.95	0.50	24	17.33	4.77	7.90	0.38	513.11
5A-5B	5A	0.00	0.00	0.00	1.42	5.68	8.06	0.00	8.06	511.09	510.99	20.50	0.49	24	17.11	5.08	7.80	0.13	513.22
S2A-5A	S2A	0.00	0.00	0.00	0.32	5.95	1.88	0.00	1.88	516.23	511.84	51.58	8.51	15	20.41	6.91	6.80	0.54	517.66
SLOT DRAIN INLET 2	S2	0.35	0.90	0.32	0.32	6.54	2.06	0.00	2.06	517.13	516.23	180.00	0.50	15	4.57	3.63	5.00	1.79	---
5-5A	5	0.07	0.90	0.06	1.10	5.81	6.41	0.00	6.41	511.40	511.09	61.11	0.51	24	17.45	4.37	7.30	0.49	517.68
S1A-5	S1A	0.00	0.00	0.00	0.32	5.95	1.88	0.00	1.88	515.23	514.99	47.67	0.50	15	4.96	3.71	6.80	0.50	516.66
SLOT DRAIN INLET 1	S1	0.35	0.90	0.32	0.32	6.54	2.06	0.00	2.06	516.13	515.23	180.00	0.50	15	4.57	3.63	5.00	1.79	---
6-5	6	0.19	0.90	0.17	0.73	6.12	4.44	0.00	4.44	512.35	511.90	90.84	0.50	18	8.01	4.61	6.20	0.60	516.68
7-6	7	0.76	0.73	0.55	0.55	6.54	3.63	0.00	3.63	513.70	512.60	219.02	0.50	15	4.96	4.41	5.00	1.24	516.56
2-1	2	0.00	0.00	0.00	0.00	0.00	0.00	19.45	19.45	502.93	500.00	58.55	5.00	18	25.45	11.07	0.00	0.09	510.00

10-YEAR INLET COMPUTATIONS

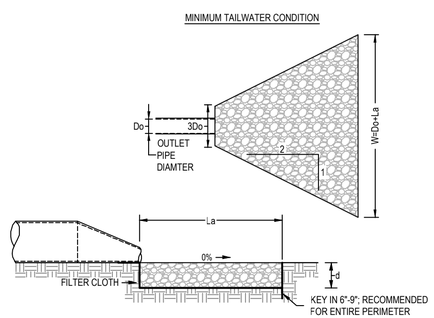
InletID	JunctType	CurbLength	DrainageArea	RunoffCoeff	iInlet	IncrQ	QCarryover	QCaptured	GutterSlope	CrossSlope, Sx	CrossSlope, Sw	QCaptured	QBypass	InletLocation	InletDepth	BypassSpread	GrateArea	GutterSpread	KnownQ
		(ft)	(ac)	(C)	(in/hr)	(cfs)	(cfs)	(cfs)	(ft/ft)	(ft/ft)	(ft/ft)	(cfs)	(cfs)		(ft)	(ft)	(sqft)	(ft)	(cfs)
S5	Dp-Grate	....	0.73	0.77	6.54	3.67	0.00	3.67	Sag	0.05	0.05	3.67	0.00	Sag	0.02	n/a	25.20	2.84	0.00
S4	Dp-Grate	....	0.28	0.90	6.54	1.65	0.00	1.65	Sag	0.05	0.05	1.65	0.00	Sag	0.01	n/a	25.20	2.53	0.00
S3	Dp-Grate	....	0.35	0.90	6.54	2.06	0.00	2.06	Sag	0.05	0.05	2.06	0.00	Sag	0.02	n/a	25.20	2.61	0.00
S2	Dp-Grate	....	0.35	0.90	6.54	2.06	0.00	2.06	Sag	0.05	0.05	2.06	0.00	Sag	0.02	n/a	25.20	2.61	0.00
5	Grate	....	0.07	0.90	6.54	0.41	0.00	0.41	Sag	0.05	0.05	0.41	0.00	Sag	0.11	n/a	8.32	0.84	0.00
S1	Dp-Grate	....	0.35	0.90	6.54	2.06	0.00	2.06	Sag	0.05	0.05	2.06	0.00	Sag	0.02	n/a	25.20	2.57	0.00
6	Grate	....	0.19	0.90	6.54	1.12	0.00	1.12	Sag	0.04	0.04	1.12	0.00	Sag	0.22	n/a	8.32	1.75	0.00
7	Grate	....	0.76	0.73	6.54	3.63	0.00	3.63	Sag	0.05	0.05	3.63	0.00	Sag	0.49	n/a	8.32	6.52	0.00

10-YEAR HGL COMPUTATIONS

LineID	LineSize	FlowRate	InvertDn	HGLDn	DepthDn	VelAve	VelHd Dn	FlowRate	Grnd/RimElev Dn	LineLength	InvertUp	HGLUp	DepthUp	VelHd Up	Grnd/RimElev Up	EnergyLoss	J-LossCoeff	MinorLoss
	(in)	(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)
4-3	24	13.91	509.00	510.36	1.36	6.16	0.60	13.91	511.65	79.29	510.24	511.58 j	1.34**	0.60	520.23	0.00	1.00 z	n/a
4A-4	15	3.42	517.37	517.93	0.56	5.46	0.31	3.42	520.23	28.31	517.77	518.52	0.75**	0.31	519.20	0.00	0.75 z	0.23
4B-4A	15	3.45	517.77	518.52	0.75	4.51	0.31	3.45	519.20	23.61	518.11	518.86	0.75**	0.31	519.54	0.00	0.75 z	0.24
S5A-4B	15	3.48	518.11	518.86	0.75	4.53	0.32	3.48	519.54	32.50	518.57	519.32	0.75**	0.32	520.00	0.00	0.15 z	n/a
SLOT DRAIN INLET 5	15	3.67	518.57	519.42	0.85	4.14	0.27	3.67	520.00	180.00	519.47	520.32	0.85	0.27	---	0.90	1.00	0.27
S4A-4	15	1.47	517.37	517.71	0.34	4.45	0.18	1.47	520.23	49.19	518.23	518.71	0.48**	0.18	519.66	0.00	0.15 z	0.03
SLOT DRAIN INLET 4	15	1.65	518.23	518.75	0.52	3.42	0.18	1.65	519.66	180.00	519.13	519.65 j	0.52**	0.18	520.55	0.90	1.00	n/a
5C-4	24	9.62	510.34	511.58	1.24	5.04	0.45	9.62	520.23	70.00	510.69	511.80 j	1.11**	0.45	512.81	0.00	1.00 z	n/a
S3A-5C	15	1.88	511.44	511.80	0.36	5.06	0.21	1.88	512.81	49.19	517.23	517.77	0.54**	0.21	518.66	0.00	0.15 z	0.03
SLOT DRAIN INLET 3	15	2.06	517.23	517.82	0.59	3.63	0.20	2.06	518.66	180.00	518.13	518.72	0.59	0.21	---	0.90	1.00	0.21
5B-5C	24	8.01	510.69	511.80	1.11	4.77	0.40	8.01	512.81	59.95	510.99	512.00	1.01**	0.40	513.11	0.00	0.23 z	0.09
5A-5B	24	8.06	510.99	512.00	1.01	5.08	0.40	8.06	513.11	20.50	511.09	512.10	1.01**	0.40	513.22	0.00	1.00 z	n/a
S2A-5A	15	1.88	511.84	512.10	0.26	6.91	0.21	1.88	513.22	51.58	516.23	516.77	0.54**	0.21	517.66	0.00	0.23 z	0.05
SLOT DRAIN INLET 2	15	2.06	516.23	516.82	0.59	3.63	0.20	2.06	517.66	180.00	517.13	517.72	0.59	0.21	---	0.90	1.00	0.21
5-5A	24	6.41	511.09	512.10	1.01	4.37	0.34	6.41	513.22	61.11	511.40	512.30 j	0.90**	0.34	517.68	0.00	1.48 z	n/a
S1A-5	15	1.88	514.99	515.52	0.53	3.71	0.21	1.88	517.68	47.67	515.23	515.77	0.54**	0.21	516.66	0.00	0.15 z	0.03
SLOT DRAIN INLET 1	15	2.06	515.23	515.82	0.59	3.63	0.20	2.06	516.66	180.00	516.13	516.72	0.59	0.21	---	0.90	1.00	0.21
6-5	18	4.44	511.90	512.70	0.80	4.61	0.33	4.44	517.68	90.84	512.35	513.16	0.81**	0.33	516.68	0.00	1.41 z	n/a
7-6	15	3.63	512.60	513.39	0.79	4.41	0.30	3.63	516.68	219.02	513.70	514.49	0.79	0.30	516.56	1.10	1.00	0.30
C2-C1	15	0.75	510.90	511.23	0.33	2.84	0.12	0.75	513.03	42.06	511.11	511.45	0.34**	0.12	513.24	0.00	1.00 z	n/a
2-1	18	19.45	500.00	501.47	1.47	11.07	1.91	19.45	502.13	58.55	502.93	504.39 j	1.46**	1.91	510.00	0.00	1.00 z	n/a

OUTLET PROTECTION COMPUTATIONS

NOT TO SCALE



STR. NO.	PIPE DIAMETER (IN.)	DISCHARGE Q_{10} (CFS)	VELOCITY (FPS)	TW DEPTH > 1/2 DIA. PIPE	TAILWATER CONDITION	STONE QUALITY			BLANKET THICKNESS (d) (IN.)	APRON LENGTH (La) MINIMUM (FT.)	APRON WIDTH (W) MINIMUM (FT.)	3 Do (FT)
						CLASS	D_{50} (IN.)	D_{MAX} (IN.)				
3	24"	13.91	6.16	NO	MIN.	I	D_{50}=6"	D_{MAX}=9"	14.00	14.00	16.00	6.00
1	24"	19.45	11.07	NO	MIN.	I	D_{50}=6"	D_{MAX}=9"	14.00	17.00	19.00	6.00
C1	15"	0.75	2.90	NO	MIN.	I	D_{50}=6"	D_{MAX}=9"	14.00	6.00	7.25	3.75

NOTES:

1. STONE QUALITY FOR RIP-RAP SHALL CONSIST OF FIELDSTONE OR ROUGH UNHEWN QUARRY STONE. THE STONE SHALL BE HARD, OF AN ANGULAR END AND OF A QUALITY THAT WILL NOT DISINTEGRATE ON EXPOSURE TO WATER OR WEATHERING. RECYCLED CONCRETE MAY BE USED PROVIDED IT HAS A DENSITY OF AT LEAST 150 POUNDS PER CUBIC FOOT AND DOES NOT HAVE ANY EXPOSED STEEL OR REINFORCING BARS.
2. IN ALL CASES, FILTER FABRIC SHALL BE PLACED BETWEEN THE RIP-RAP AND THE UNDERLYING SOIL TO PROTECT SOIL MOVEMENT INTO, THROUGH, AND UNDERNEATH THE RIP-RAP. THE MATERIAL MUST MEET OR EXCEED THESE REQUIREMENTS: THE PLASTIC FILTER CLOTH CAN BE WOVEN OR NON-WOVEN MONOFILAMENT YARNS AND SHALL MEET THESE BASE REQUIREMENTS: THICKNESS=20-60 MILS., GRAB STRENGTH=90-120 LBS. AND SHALL CONFORM TO ASTM D-1777 AND ASTM D-1682.

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SEAL: JASON P. GERNAT REGISTERED No. 18127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

REVISIONS

1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

STORM SEWER COMPUTATIONS

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CU-561.DWG	
NCS:	N/A
SHEET:	20 OF 25

BIORETENTION SIZING CALCUATIONS										
FACILITY ID	Ponding SA (sq. ft.)	Top of Media SA (sq. ft.)	Ponding Depth (ft.)	Soil Media (ft.)	Soil Media Void Ratio	Choker Stone (ft.)	Choker Stone Void Ratio	Underdrain Stone (ft.)	Underdrain Stone Void Ratio	Total Storage (cu. Ft.)
BIO 1	4,377	3,950	0.50	2.25	0.25	0.17	0.25	1.00	0.40	6,052

Performance Based Water Quality Calculations

Determine the applicable area (A) and the post-developed impervious cover (I_{post}).

Applicable area (A)= 5.49 Acres

Pre-development impervious cover:

Total Ex Impervious Area = 0.03

$I_{existing}$ = (total pre-development impervious cover ÷ A) × 100 = 0.55% utilized average land cover condition

Post-development impervious cover:

Total Proposed Impervious Area = 3.30

I_{post} = (total post-development impervious cover ÷ A) × 100 = 60.1%

Determine the average land cover conditions ($I_{watershed}$) or the existing impervious cover ($I_{existing}$).

$I_{watershed}$ = 16.0%

Determine the appropriate Development Situation.

I_{post} 60.1% > $I_{existing}$ 16.0%

Situation 2 exists. The existing percent impervious cover is less than the average land cover condition and the proposed improvements will create a total percent impervious cover which is greater than the average land cover condition.

Determine the relative pre-development pollutant load (L_{pre}).

$L_{pre(watershed)}$ = [0.05 + 0.009 × $I_{watershed}$)] × A × 2.28 **VSMH (Equation 5-16)**

= 2.43 pounds per year

Determine the relative post-development pollutant load (L_{post}).

L_{post} = [0.05 + 0.009 × I_{post})] × A × 2.28 **VSMH (Equation 5-21)**

= 7.40 pounds per year

Determine the relative pollutant removal requirement (RR).

RR = L_{post} - $L_{pre(watershed)}$

=4.97 pounds per year

Identify the best management practice (BMP) for the site.

Determine the required pollutant removal efficiency for the site:

EFF = (RR ÷ Lpost) × 100

= 67.17%

Select BMP(s)	Area	I_{BMP}	Eff_{BMP}	Description	Impervious Area
Bioretention '1'	5.08	62.80%	50%	Bioretention Basin (1xWQV)	3.19
Existing SWM Pond	5.49	60.11%	35%	Extended Detention (2xWQV)	3.30

Determine the pollutant load entering the proposed BMP(s).

L_{post} = [0.05 + 0.009 × I_{BMP})] × A × 2.28 **VSMH (Equation 5-24)**

L_{BMP1} = 7.13 pounds per year

L_{BMP2} = 7.40 pounds per year

Calculate the pollutant load removed by the proposed BMP(s).

$L_{removed}$ = Eff_{BMP} × L_{BMP} **VSMH (Equation 5-24)**

$L_{removed/BMP1}$ = 3.56 pounds per year

$L_{removed/BMP2}$ = 2.59 pounds per year

Calculate the total pollutant load removed by the BMP(s)

$L_{removed/total}$ = $L_{removed/BMP1}$ + $L_{removed/BMP2}$ + $L_{removed/BMP3}$ + ... **VSMH (Equation 5-25)**

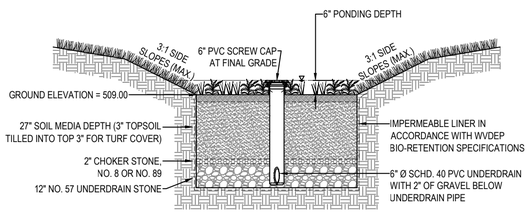
$L_{removed/total}$ = 6.15 pounds per year

Verify compliance:

$L_{removed/total}$ 6.15 > 4.97 **OKAY**

BIORETENTION BASIN '1':

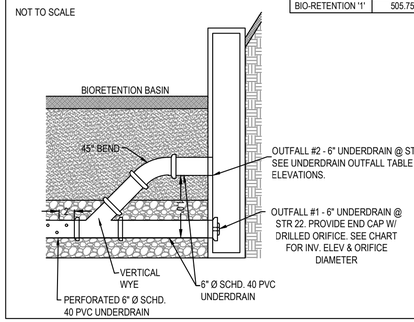
NOT TO SCALE



BIO-RETENTION '1A' UPTURNED ELBOW DETAIL:

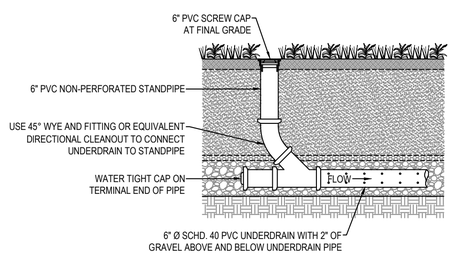
NOT TO SCALE

UNDERDRAIN OUTFALL TABLE			
FACILITY ID	OUTFALL #1 INV. ELEV.	OUTFALL #1 ORIFICE DIA. (IN.)	OUTFALL #2 INV. ELEV.
BIO-RETENTION '1'	505.75	1.00	506.75



CLEANOUT DETAIL:

NOT TO SCALE



BR-7.2. BIORETENTION INSTALLATION:

PER CHAPTER 4.2.3 OF THE WEST VIRGINIA STORMWATER MANAGEMENT & DESIGN GUIDANCE MANUAL.

THE FOLLOWING IS A TYPICAL CONSTRUCTION SEQUENCE TO PROPERLY INSTALL A BIORETENTION BASIN. THESE STEPS MAY BE MODIFIED TO REFLECT DIFFERENT BIORETENTION APPLICATIONS OR EXPECTED SITE CONDITIONS:

STEP 1. CONSTRUCTION OF THE BIORETENTION BASIN AREA MAY ONLY BEGIN AFTER THE ENTIRE CDA 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.

STEP 2. THE DESIGNER AND THE INSTALLER SHOULD HAVE A PRE-CONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CDA AND 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 PRE-CONSTRUCTION MEETING TO THE INSTALLER AND THE PLAN REVIEW/INSPECTION AUTHORITY.

STEP 3. TEMPORARY APPROVED EROSION AND SEDIMENT 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. IN CASES WHERE THE BIORETENTION IS CO-LOCATED WITH EROSION AND SEDIMENT CONTROL PRACTICES (E.G., SEDIMENT TRAPS), THE CONDITIONS NOTED IN SECTION BR-7.1. OF THE WEST VIRGINIA STORMWATER MANAGEMENT & DESIGN GUIDANCE MANUAL MUST BE FOLLOWED.

STEP 4. ANY PRE-TREATMENT CELLS SHOULD BE EXCAVATED FIRST AND THEN SEALED TO TRAP SEDIMENTS.

STEP 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.

STEP 6. IT MAY BE NECESSARY TO RIP THE BOTTOM SOILS TO A DEPTH OF 6 TO 12 INCHES TO PROMOTE GREATER INFILTRATION.

STEP 7. IF USING A FILTER FABRIC, PLACE THE FABRIC ON THE SIDES OF THE BIORETENTION AREA WITH A 6 INCH OVERLAP ON THE SIDES. IF AN UNDERDRAIN STONE STORAGE LAYER WILL BE USED, PLACE APPROPRIATE DEPTH OF NO. 57 STONE ON THE BOTTOM, INSTALL THE PERFORATED UNDERDRAIN PIPE, PACK NO. 57 STONE TO 3 INCHES ABOVE THE UNDERDRAIN PIPE. ON TOP OF THE NO. 57 STONE, ADD 2 INCHES OF CHOKER STONE (NO. 8 OR NO. 89 STONE) AND THEN 2 TO 4 INCHES OF CONSTRUCTION SAND AS A FILTER BETWEEN THE UNDERDRAIN AND THE SOIL MEDIA LAYER. IF NO STONE STORAGE LAYER IS USED, START WITH 6 INCHES OF NO. 57 STONE ON THE BOTTOM, AND PROCEED WITH THE LAYERING AS DESCRIBED ABOVE.

STEP 8. DELIVER THE SOIL MEDIA FROM AN APPROVED VENDOR, AND STORE IT ON AN ADJACENT IMPERVIOUS AREA OR PLASTIC SHEETING. 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.

STEP 9. PREPARE PLANTING HOLES FOR ANY TREES AND SHRUBS, INSTALL THE VEGETATION, AND WATER ACCORDINGLY. INSTALL ANY TEMPORARY IRRIGATION.

STEP 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.

STEP 11. INSTALL THE PLANT MATERIALS AS SHOWN IN THE LANDSCAPING PLAN, AND WATER THEM DURING WEEKS OF NO RAIN FOR THE FIRST TWO MONTHS.

STEP 12. IF CURB CUTS ARE BLOCKED DURING BIORETENTION INSTALLATION, UNBLOCK THESE AFTER THE DRAINAGE AREA AND SIDE SLOPES HAVE GOOD VEGETATIVE COVER. IT IS RECOMMENDED THAT UNBLOCKING CURB CUTS AND INLETS TAKE PLACE AFTER TWO TO THREE STORM EVENTS IF THE DRAINAGE AREA INCLUDES NEWLY INSTALLED ASPHALT, SINCE NEW ASPHALT TENDS TO PRODUCE A LOT OF FINES AND GRIT DURING THE FIRST SEVERAL MONTHS.

STEP 13. CONDUCT THE FINAL CONSTRUCTION INSPECTION (SEE APPENDIX A OF THE WEST VIRGINIA STORMWATER MANAGEMENT & DESIGN GUIDANCE MANUAL), THEN LOG THE GPS COORDINATES FOR EACH BIORETENTION FACILITY AND SUBMIT THEM FOR ENTRY INTO THE LOCAL MAINTENANCE TRACKING DATABASE.

BIORETENTION LANDSCAPING SPECIFICATION

LANDSCAPING FOR BIORETENTION SURFACE SHALL BE TURF COVER AS FOLLOWS:

SEED MIX:	SEED	APPLICATION RATE
	KENTUCKY BLUEGRASS	20 LB/AC
	CREEPING RED FESCUE	30 LB/AC
	CHEWINGS FESCUE	30 LB/AC

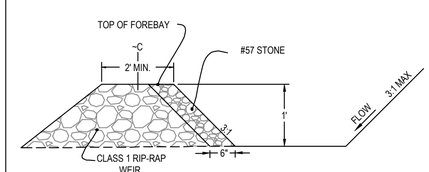
TOPSOIL: LOAMY SAND OR SANDY LOAM TEXTURE WITH LESS THAN 5% CLAY CONTENT, PH CORRECTED TO BETWEEN 6 & 7, AND AN ORGANIC MATTER CONTENT OF AT LEAST 3%. TOPSOIL SHALL BE TILLED INTO THE TOP 3" OF THE BIORETENTION MEDIA.

BIORETENTION LINER NOTES:

1. THE SEDIMENT FOREBAYS & BIORETENTION MEDIA SHALL BE LINED IN ONE OF THE FOLLOWING TWO WAYS:
   - 1.1. A 12" CLAY LINER WITH A MAXIMUM HYDRAULIC CONDUCTIVITY OF 1 x 10^{2-7} CM/SEC
   - 1.2. A 30 MIL PVC LINER.

GRAVEL BERM DETAIL:

NOT TO SCALE



NOTE: THIS IS TO BE INSTALLED TO FILTER FLOW ENTERING THE BIO-RETENTION FACILITY FROM THE SEDIMENT FORE-BAY IN ORDER TO PROVIDE PRE-TREATMENT OF RUNOFF ENTERING THE FACILITY.

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JASON P. GERNAT REGISTERED No. 18127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL:

REVISIONS

1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

STORMWATER MANAGEMENT DETAILS AND COMPUTATIONS

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: N/A VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CJ-001.DWG	
NCS:	N/A
SHEET:	21 OF 25

FILE PATH: C:\PROJECT\2022\5022-0101 HUYETT ROAD STORAGE\DRAWINGS\CADD\C-CJ-001.DWG
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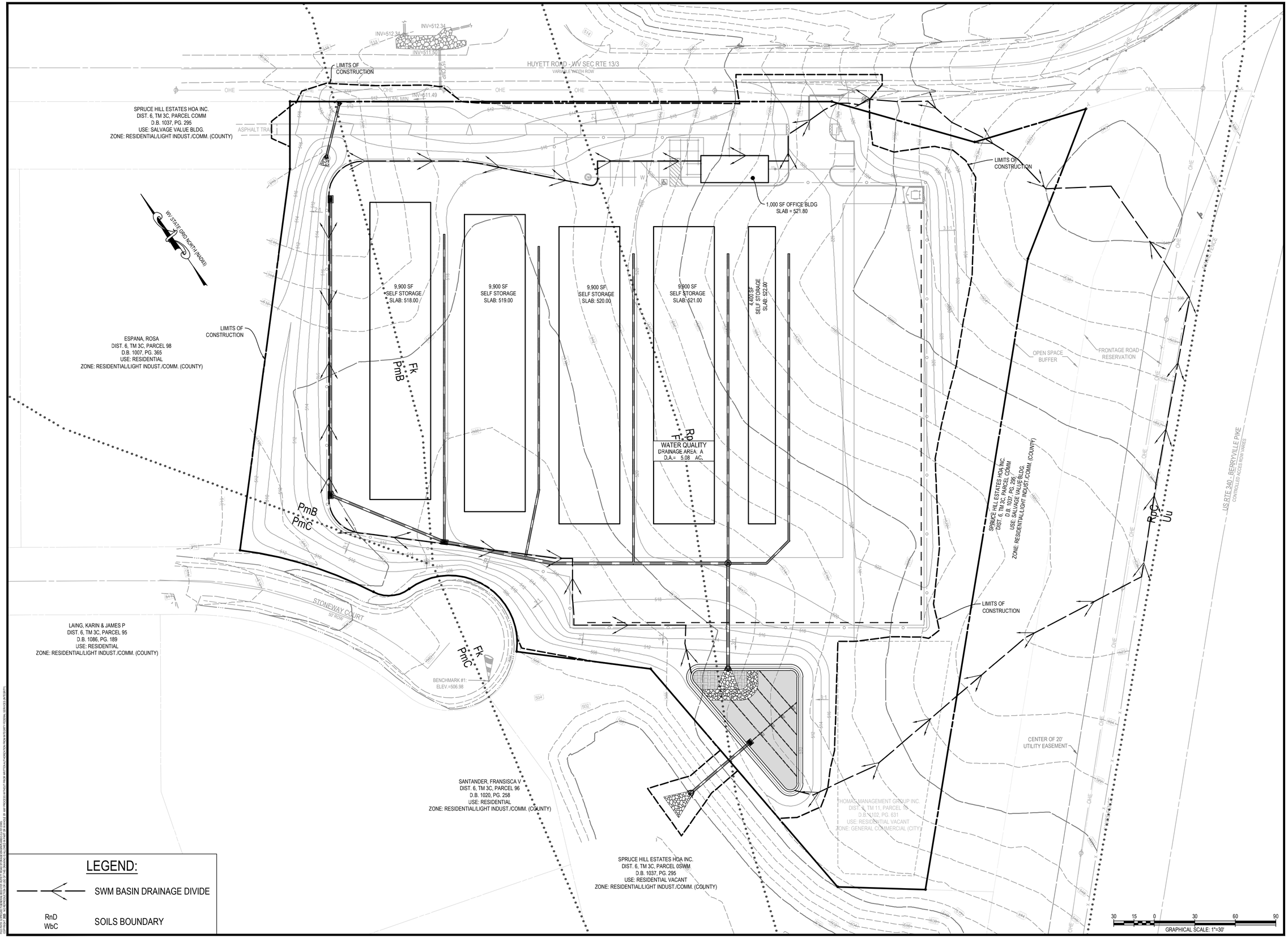

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No. 18127
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

SEAL:

REVISIONS

1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

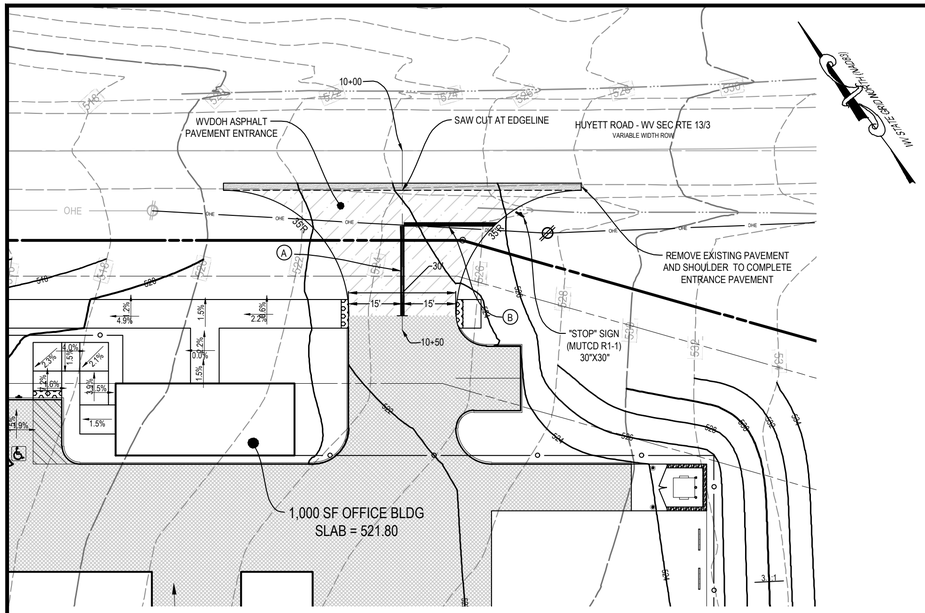
WATER QUALITY DRAINAGE AREA

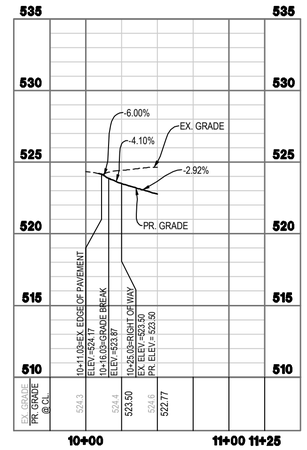
HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: 1"=30' VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CJ-101.DWG	
NCS:	N/A
SHEET:	22 OF 25

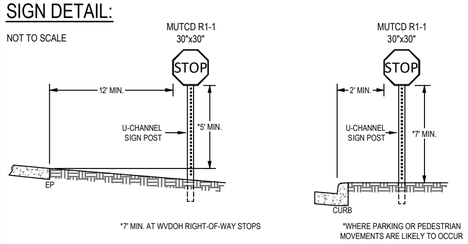




DRIVEWAY PROFILE

SIGN DETAIL:

NOT TO SCALE



NOTES:
1. FOR MORE EXTENSIVE STANDARDS REFER TO THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS 2009 EDITION (WITH UPDATES) AND THE STANDARDS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION.
2. U-CHANNEL SIGN POST SHALL BE PER WVDOH STANDARD DETAIL SHEET TE1-7A.
3. ALL STOP BARS SHALL BE TYPE V, WHITE, 12" WIDTH, SOLID STOP LINES (PER WVDOH SPECIFICATIONS).

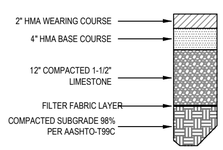
ASPHALT PAVEMENT

WVDOH ASPHALT PAVEMENT

REMOVE EXISTING PAVEMENT AND SHOULDER TO COMPLETE ENTRANCE PAVEMENT

MINIMUM TYPICAL PAVEMENT SECTIONS: (WVDOH)

NOT TO SCALE



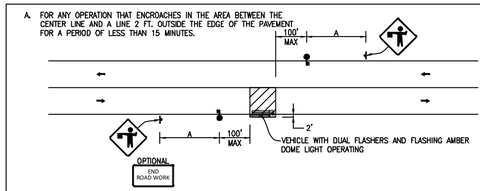
NOTES:
1. SOILS TESTS OF SUBGRADE MUST BE SUBMITTED FOR ACTUAL DETERMINATION OF REQUIRED PAVEMENT SECTION THICKNESS PRIOR TO CONSTRUCTION.

PAVEMENT MARKING LEGEND:

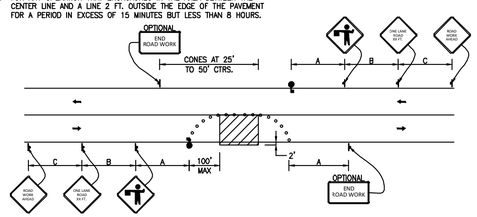
(A) TYPE II, YELLOW, 4" WIDTH, SOLID DOUBLE LINE, SEPARATED BY A 4" SPACE

(B) TYPE V, WHITE, 12" WIDTH, SOLID STOP LINE

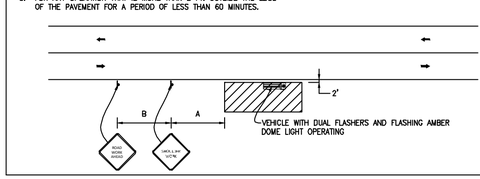
A. FOR ANY OPERATION THAT ENCROACHES IN THE AREA BETWEEN THE CENTER LINE AND A LINE 2 FT. OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD OF LESS THAN 15 MINUTES.



B. FOR ANY OPERATION THAT ENCROACHES IN THE AREA BETWEEN THE CENTER LINE AND A LINE 2 FT. OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD IN EXCESS OF 15 MINUTES BUT LESS THAN 8 HOURS.



C. FOR ANY OPERATION THAT IS MORE THAN 2 FT. OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD OF LESS THAN 60 MINUTES.



GENERAL NOTES:

1. CONSTRUCTION OPERATIONS SHALL BE CONFINED TO ONE TRAFFIC LANE, LEAVING THE OPPOSITE LANE OPEN TO TRAFFIC, AT LEAST 500 FT. OF BOTH TRAFFIC LANES SHALL BE AVAILABLE FOR TRAFFIC MOVEMENT AT INTERVALS NOT GREATER THAN 1,000 FT. A COMPLETE TRAFFIC CONTROL PLAN MUST BE APPROVED FOR ANY PROJECT EXPECTING TO EXCEED 1,000 FT. IN LENGTH INCLUDING BOTH TAPER AND WORK AREAS.
2. FOR LOW-VOLUME SITUATIONS WITH SHORT WORK ZONES ON STRAIGHT ROADWAYS WHERE THE FLAGGER IS VISIBLE TO ROAD USERS APPROACHING FROM BOTH DIRECTIONS, A SINGLE FLAGGER, POSITIONED TO BE VISIBLE TO ROAD USERS APPROACHING FROM BOTH DIRECTIONS, MAY BE USED.
3. FLASHING WARNING LIGHTS AND/OR FLAGS MAY BE USED TO CALL ATTENTION TO THE ADVANCE WARNING SIGNS.
4. THE FLAGGERS SHALL BE IN SIGHT OF EACH OTHER OR IN DIRECT COMMUNICATION AT ALL TIMES.
5. ALL SIGNS ARE TO BE REMOVED AT COMPLETION OF THE DAY'S OPERATIONS.
6. FOR MULTILANE ROADWAYS THE ADVANCE WARNING SIGNS FOR TRAFFIC APPROACHING FROM THE OPPOSITE DIRECTION MAY BE OMITTED IF APPROVED BY THE ENGINEER.

SUGGESTED ADVANCE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS (IN FT.)		
	A	B	C
URBAN (LOW SPEED)*	100	100	100
URBAN (HIGH SPEED)*	350	350	350
RURAL	500	500	500
EXPRESSWAY/FREEWAY	1,000	1,500	2,640

* SPEED CATEGORY TO BE DETERMINED BY WVDOH.

SYMBOLS

WORK AREA

SIGN

SIGN ON PORTABLE OR PERMANENT SUPPORT

FLAGGER WITH PADDLE

CONES

TYPICAL APPLICATIONS

PATCHING PAVEMENT,
FIELD SURVEY,
CLEANING UP DEBRIS ON PAVEMENT,
CROSSWALK PAINTING.

CASE A6

TWO-LANE, TWO-WAY TRAFFIC,
SHORT TERM OPERATIONS,
DAYTIME ONLY

SIGNAGE NOTES:

1. ALL SIGNS, TEMPORARY AND PERMANENT, SHALL BE COMPLIANT WITH THE "WEST VIRGINIA DIVISION OF HIGHWAYS SIGN FABRICATION DETAILS, 2005 EDITION".

SIGNING & PAVEMENT MARKING NOTES:

1. ALL PROPOSED SIGNING AND PAVEMENT MARKING SHALL BE IN ACCORDANCE WITH THE MOST CURRENT EDITION OF EACH OF THE FOLLOWING AND ANY REVISION THERETO:
   A. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS 2009 EDITION.
   B. THE WEST VIRGINIA DIVISION OF HIGHWAYS DESIGN GUIDE FOR SIGNING.
   C. THE WEST VIRGINIA DIVISION OF HIGHWAYS SIGN FABRICATION MANUAL.
   D. THE WEST VIRGINIA DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIRECTIVES REGARDING SIGNING.
   E. THE WEST VIRGINIA DIVISION OF HIGHWAYS SPECIFICATIONS (SECTIONS 657, 658, 659 AND 661.
   F. THE WEST VIRGINIA DIVISION OF HIGHWAYS STANDARD DETAILS BOOK, VOLUME II, SIGNING, SIGNALS, LIGHTING AND MARKING.
   G. THE WEST VIRGINIA DIVISION OF HIGHWAYS TRAFFIC CONTROL FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS.
2. ALL PAVEMENT MARKINGS SHALL BE WVDOT TYPE II OR V PAVEMENT MARKINGS, UNLESS OTHERWISE NOTED.
3. PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND SHALL BE MODIFIED IN THE FIELD TO AVOID CONFLICT WITH UNDERGROUND UTILITIES OR OTHER OBSTRUCTIONS, AND TO COMPLY WITH STANDARDS REFERENCED IN NOTE 1.
4. ANY EXISTING PAVEMENT MARKINGS, WHICH WILL CONFLICT WITH PROPOSED PAVEMENT MARKINGS, SHALL BE COMPLETELY 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. NO MARKINGS SHALL BE PLACED ON EXPANSION JOINTS ON STRUCTURES OR ON LONGITUDINAL CONSTRUCTION JOINTS UNLESS SO DIRECTED BY THE ENGINEER.
7. POST REMOVAL FOR GROUND MOUNTED SIGNS ON EXISTING BREAKAWAY SUPPORTS SHALL INCLUDE EITHER CONCRETE REMOVAL OF THE EXISTING STUB(S) OR THE CUTTING OFF OF THE EXISTING STUB(S) TO A MINIMUM OF SIX (6) INCHES BELOW GROUND AND THE RESTORATION OF THE GROUND TO ITS ORIGINAL CONDITION.
8. REFER TO APPROVED TRAFFIC SIGNAL PLAN FOR PROPER LOCATIONS OF STOP LINES AND CROSSWALKS WHEN APPLICABLE.
9. CONTRACTOR SHALL ENSURE THAT ANY SIGNS TO BE RELOCATED ARE IN GOOD CONDITION. IF EXISTING SIGN ARE DAMAGED NEW SIGNS SHALL BE RELOCATED PER THIS PLAN AND SPECIFICATIONS INCLUDED HEREIN.
10. REFER TO WVDOH STANDARD DETAILS BOOK VOLUME II, DETAILS TEM-1, TEM-2, AND TEM-3 FOR PAVEMENT MARKING SPECIFICATIONS.

GENERAL NOTES:

1. ALL TRAFFIC CONTROL SHALL BE THE RESPONSIBILITY OF THE DEVELOPER. TRAFFIC CONTROL SIGNS AND MAINTENANCE OF TRAFFIC SHALL COMPLY WITH THE STANDARDS OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION. STANDARD TEMPORARY TRAFFIC CONTROL CASE A6 FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, 2006 MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAYS SHALL BE UTILIZED FOR THIS PROJECT.
2. EXISTING PAVEMENT SHALL BE SAW CUT TO TIE IN NEW ENTRANCE APRON.
3. SEE THIS SHEET FOR DETAIL SHOWING CASE A6 FROM THE MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAYS, 2006 EDITION.
4. CONTACT WVDOH 48 HOURS PRIOR TO BEGINNING WORK.
5. CONTACT KEN CLOHAN (KENNETH.L.CLOHAN@WV.GOV OR 304-260-4392) TO REVIEW STRIPING BEFORE STRIPING IS COMPLETED.

DROP OFF GUIDANCE NOTES:

EXCAVATION ALONG THE EDGE OF PAVEMENT SHALL BE FILLED TO A SAFE SLOPE AT THE END OF EACH WORK DAY OR WHEN LANE CLOSURES ARE NOT IN PLACE.

MAINTENANCE OF TRAFFIC NOTES:

1. TRAFFIC CONTROL, SAFETY MEASURES, AND MAINTENANCE OF TRAFFIC SHALL BE IN ACCORDANCE WITH THE MOST CURRENT EDITION OF EACH OF THE FOLLOWING AND ANY REVISION THERETO:
   A. SECTION 636 OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS, STANDARD SPECIFICATIONS, ROADS AND BRIDGES.
   B. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, 2009 EDITION.
   C. WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS, MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAYS, 2006 EDITION.
   D. AASHTO ROADSIDE DESIGN GUIDE.
   E. WVDOH STANDARD SPECIFICATIONS, 2010 AND SUPPLEMENTAL SPECIFICATIONS, 2013.
2. REFLECTIVE SHEETING ON TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE OF NEW CONDITION AT THE BEGINNING OF THE PROJECT LIFE. NIGHT VISIBILITY AND LEGIBILITY SHALL BE MAINTAINED.
3. ACCESS TO ALL HOUSES AND BUSINESSES SHALL BE MAINTAINED AT ALL TIMES.
4. FLAGGER: WHEN WORK IS PERFORMED AT NIGHT WITH A FLAGGER, THE FLAGGER STATIONS SHALL BE ADEQUATELY ILLUMINATED.
5. TEMPORARY TAPE: ANY TEMPORARY TAPE SHALL BE MECHANICALLY APPLIED. SOLID LINES SHALL HAVE A 2" GAP EVERY FIFTY FEET.
6. EXISTING SIGNS AND DELINEATORS: ANY SUCH EXISTING FACILITIES RELOCATED, REMOVED, OR DAMAGED BY THE CONTRACTOR SHALL BE REPLACED TO ITS ORIGINAL CONDITION BY THE CONTRACTOR AT THEIR EXPENSE, UNLESS REPLACED BY FINAL SIGNING.
7. WHEN COVERING EXISTING SIGNS, THE CONTRACTOR HAS THE OPTIONS OF USING:
   A. HEAVY DUTY BLOCK OVERLAY (PLASTIC OR BURLAP TYPE)
   B. THIN WOOD OVERLAY (E.G. PLYWOOD)
   C. TAKING SIGNS DOWN AND RE-INSTALLING WHEN APPROPRIATE
   D. ANY DAMAGES CAUSED BY ABOVE NAMED SHALL BE REPAIRED/REPLACED TO IT'S ORIGINAL CONDITION AT CONTRACTOR'S EXPENSE.
8. ANY TEMPORARY CONCRETE BARRIER SHALL HAVE TYPE 8" X 12" B-1 DELINEATORS (WHITE OR YELLOW AS APPROPRIATE) FACING TRAFFIC AT 20 FOOT CENTERS.
9. TYPE 'B' LIGHTS SHALL BE INSTALLED ON ALL LEAD-IN SIGNING AND BARRICADES.
10. FINAL LOCATIONS OF THE TRAFFIC CONTROL DEVICES SHALL BE ESTABLISHED IN THE FIELD.
11. RESTORE ANY PAVED, LANDSCAPED, CURBED, & SIDEWALK AREAS DISTURBED DURING CONSTRUCTION ACTIVITIES TO ITS ORIGINAL CONDITION.

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JASON P. GERNAT REGISTERED No. 18127 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL:

REVISIONS

1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

WVDOH TRAFFIC CONTROL AND GRADING PLAN

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: AS NOTED VERT.: AS NOTED
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CADD: C-CG-102.DWG	
NCS:	N/A
SHEET:	23 OF 25

FILE PATH: C:\PROJECT\GENERAL\5022-0101 HUYETT ROAD STORAGE\DRAWING\ARCO-102.DWG
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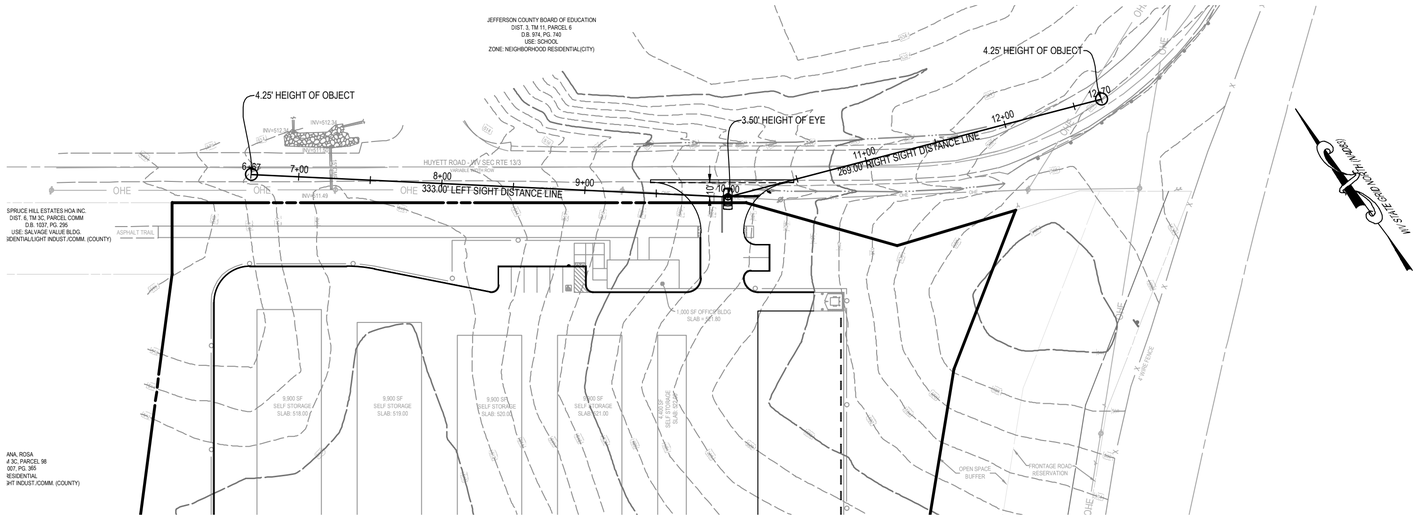
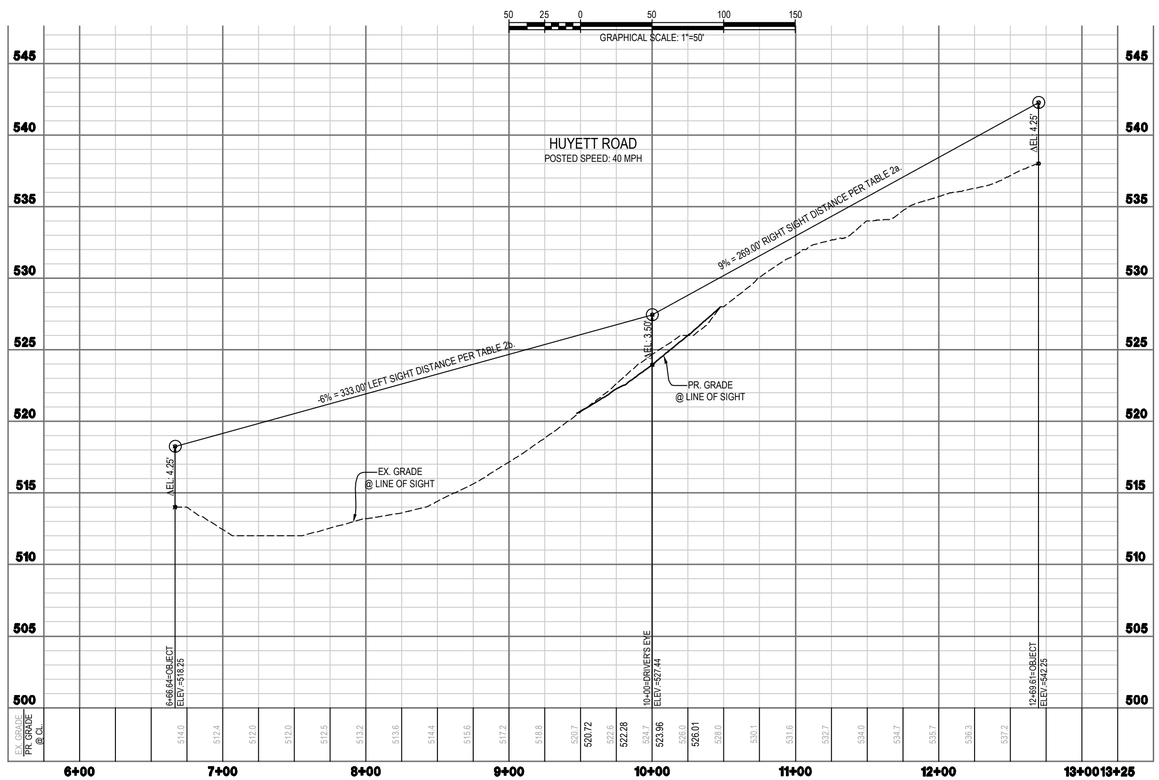
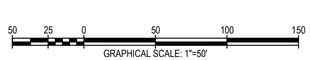




HUYETT ROAD SIGHT DISTANCE PROFILE



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1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

SIGHT DISTANCE PLAN AND PROFILE

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: 1"=50' VERT.: 1"=5'
DATE:	FEBRUARY 3, 2023
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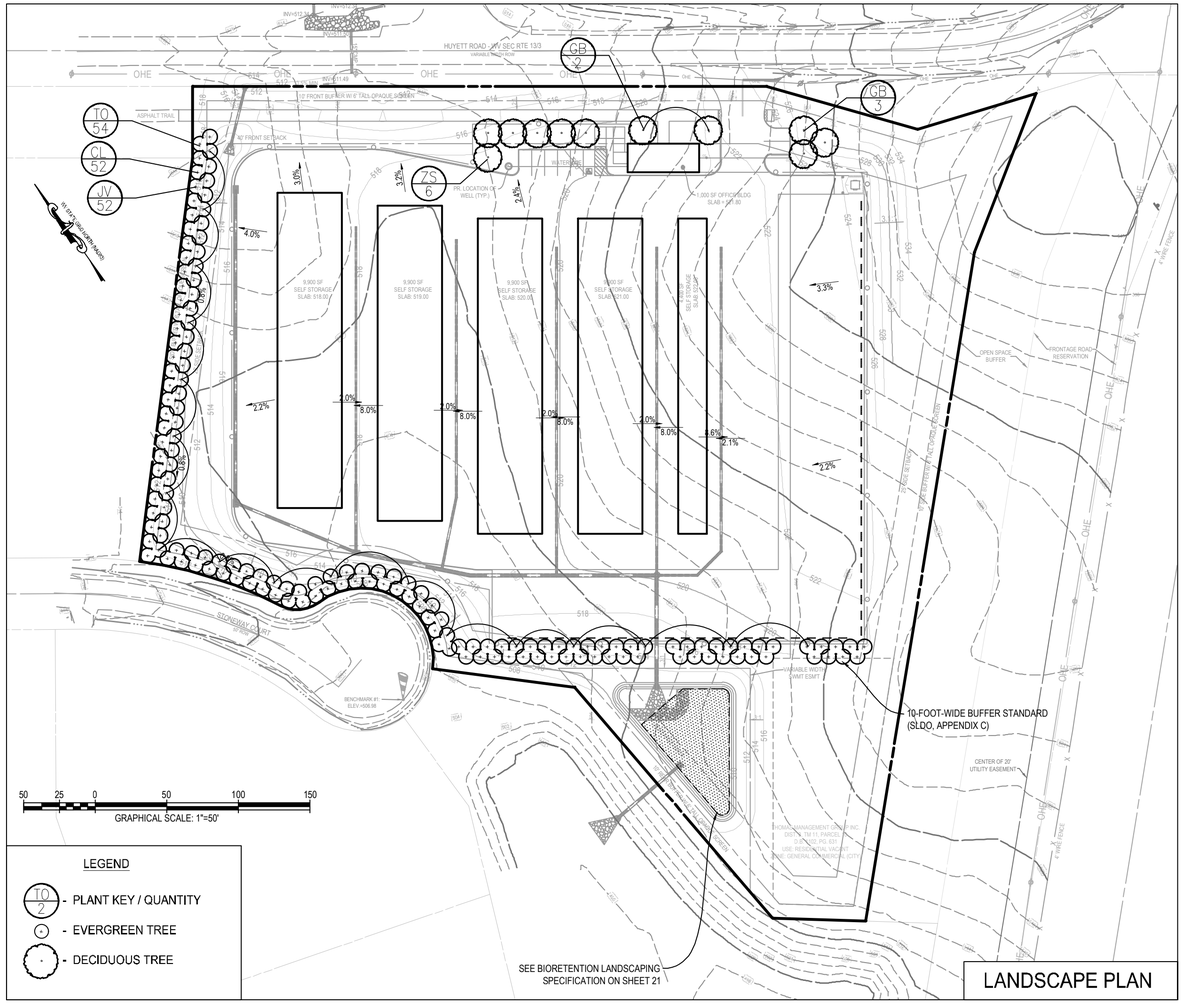
SHEET:	24 OF 25



LANDSCAPE PLAN

PLANT SCHEDULE					
TREES					
Key	Botanical Name	Common Name	Container	Size (Min.)	Quantity
CL	x Cuprocyparis leylandii	Leyland Cypress	B&B	6' Height	52
JV	Juniperus virginiana	Eastern Red Cedar	B&B	6' Height	52
TO	Thuja occidentalis 'Nigra'	Nigra American Arborvitae	B&B	6' Height	54
GB	Ginkgo biloba 'Autumn Gold'	Maidenhair Tree	B&B	2" Caliper	5
ZS	Zelkova serrata 'Green Vase'	Japanese Zelkova	B&B	2" Caliper	6

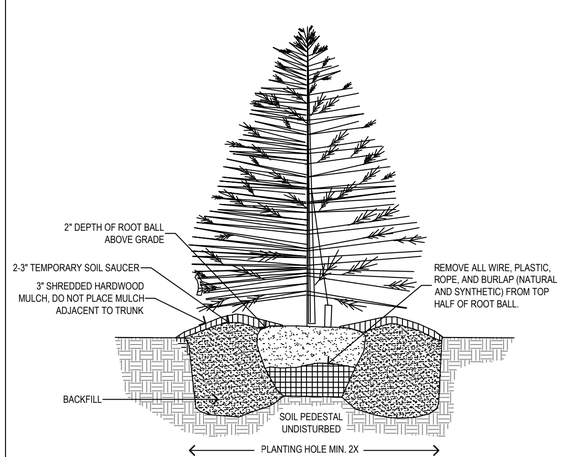
LANDSCAPE REQUIREMENTS	
SECTION 1333.16(A)1.	
REQUIREMENT: NO MORE THAN 40% OF ANY ONE TYPE SPECIE OF TREE SHALL BE PERMITTED.	
TREE	PROVIDED / PERCENTAGE (ROUNDED UP)
Thuja occidentalis 'Nigra'	54 / 32
x Cuprocyparis leylandii	52 / 31
Juniperus virginiana	52 / 31
Ginkgo biloba 'Autumn Gold'	5 / 3
Zelkova serrata 'Green Vase'	6 / 4
TOTAL	169 / 100
SECTION 1333.16(A)3.a.	
PERIMETER PARKING LOT LANDSCAPING	
REQUIREMENT: ONE TREE SHALL BE PROVIDED FOR EVERY 2,000 SQUARE FEET OF IMPERVIOUS AREA FOR THE FIRST 100,000 SQUARE FEET. THEREAFTER, ONE TREE FOR EVERY 5,000 SQUARE FEET OF IMPERVIOUS AREA OVER 100,000 SQUARE FEET.	
IMPERVIOUS AREA:	10,015 SQUARE FEET
TREES REQUIRED	11
TREES PROVIDED	11

NOTES:

1. PURSUANT TO LAND DEVELOPMENT ORDINANCE OF THE CITY OF CHARLES TOWN, WV SUBDIVISION ORDINANCE, LANDSCAPING, BUFFERING, AND SCREENING IS REQUIRED FOR MAJOR LAND DEVELOPMENTS.
2. SPECIES LISTED ARE PRELIMINARY AND MAY CHANGE WITH AVAILABILITY.
3. ALL NON-IMPERVIOUS AREAS WITHIN THE LIMITS OF CONSTRUCTION THAT ARE NOT SHOWN AS PLANTING BEDS SHALL BE SEEDED.
4. ALL LANDSCAPE PLANT MATERIALS SHALL CONFORM TO THE LATEST VERSION OF THE AMERICAN STANDARD OF NURSERY STOCK (ANSI Z60.1). PLANT MATERIALS SHALL BE OF STANDARD QUALITY OR BETTER, TRUE TO NAME AND TYPE OF THEIR SPECIES OR VARIETY.
5. THE CONTRACTOR SHALL COMPLY WITH THE LANDSCAPE SPECIFICATIONS GUIDELINES - 5th EDITION ADOPTED BY THE LANDSCAPE CONTRACTORS ASSOCIATION FOR PLANTING BED PREPARATION AND SOIL MIX GUIDELINES AND PROCEDURES.
6. THE EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE BASED UPON AVAILABLE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING WV 811 TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK AND IS RESPONSIBLE FOR ANY DAMAGES WHICH OCCUR BY HIS FAILURE TO LOCATE OR PRESERVE THESE UNDERGROUND UTILITIES.
7. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY FIELD CONDITIONS PRIOR TO CONSTRUCTION AND TO NOTIFY INTEGRITY FEDERAL SERVICES IF THE FIELD CONDITIONS ARE NOT IN CONFORMANCE WITH THE APPROVED PLANS.
8. IT SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR TO ENSURE THAT ALL TREES ARE NOT PLANTED WITHIN 5' OF ANY UNDERGROUND UTILITY.
9. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR EVALUATING INDIVIDUAL TREES FOR STABILITY AT THE TIME OF PLANTING. BASED ON THIS EVALUATION, TREES SHALL BE STAKED AND GUYED AS NECESSARY TO ENSURE THAT THEY REMAIN IN AN UPRIGHT POSITION. STAKES ARE TO BE REMOVED BY OWNER AFTER ONE GROWING SEASON.
10. ALL PLANT MATERIAL TO BE INSPECTED BY OWNER OR OWNERS REPRESENTATIVE PRIOR TO INSTALLATION. PLANTS THAT ARE DAMAGED OR DO NOT CONFORM TO THE REQUIRED SPECIFICATION SHALL BE REJECTED.
11. ALL PLANTING BEDS ADJACENT TO TURF AREAS SHALL HAVE A 6" SPADE EDGE.
12. EXISTING TREES TO BE SAVED WHEREVER PRACTICAL.

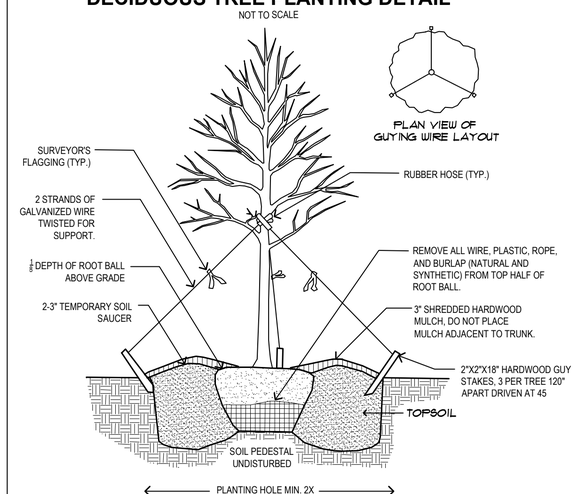
EVERGREEN TREE PLANTING DETAIL

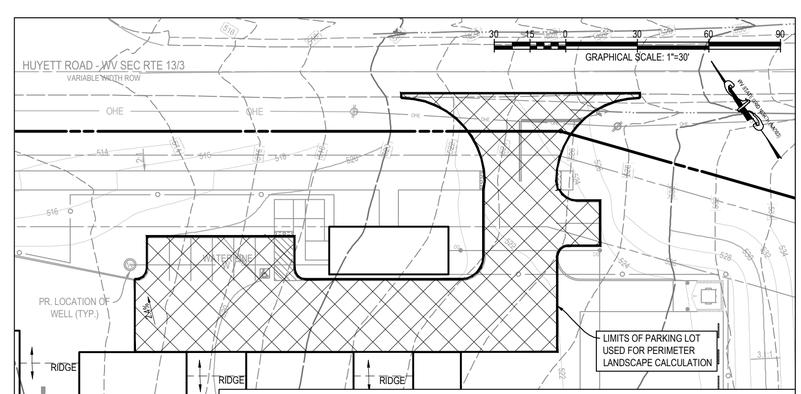
NOT TO SCALE



DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE





PARKING AREA FOR PERIMETER LANDSCAPE CALCULATION

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1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS

LANDSCAPE PLAN

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: AS NOTED VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: L-LP-101.DWG	
NCS:	N/A
SHEET:	25 OF 25

800

INTEGRITY
FEDERAL SERVICES

Storm Water Management Report

Huyett Road Storage

Charles Town Corp District
Jefferson County, West Virginia
J.C. File No.: 2022-05

Prepared For:
MDHI Charles Town LLC
786 Spruce Hill Way
Charles Town, WV 25414
(609)414-3702

Prepared By:
Integrity Federal Services
148 S. Queen Street, Suite 201
Martinsburg, WV 25401
(304) 725-8456

Prepared: February 2023
Revised: March 2023

TABLE OF CONTENTS & APPENDICES

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Site Characteristics ..... Page 2
Stormwater Management Control ..... Pages 2-3
Summary ..... Pages 3-4

APPENDICES

Water Quality Calculations: Appendix A

- Bioretention Sizing Spreadsheet
- Performance Based Water Quality Calculations
- Water Quality Drainage Map

Water Quantity Calculations: Appendix B

- Existing SWM Facility Report

PROJECT OVERVIEW

Stone Springs Subdivision is a +/- 5.49-acre commercial development. The proposed site includes but is not limited to the construction of an office building, self storage buildings (5), drive aisles and parking areas with associated drainage structures, an underground swm facilities and private utilities. These improvements have been designed to meet the requirements set forth by the current Virginia Stormwater Management Handbook, West Virginia Erosion & Sediment Control Best Management Practices Manual, and the West Virginia Stormwater Management and Design Guidance Manual.

Stormwater Management Control requirements for this site are being provided through the construction of an underground infiltration facility, a bioretention basin and the use of an existing offsite extended detention facility.

SITE CHARACTERISTICS

The Huyett Road Storage development is located in the Charles Town Corp District of Jefferson County, West Virginia, bounded by Huyett Road (WV Sec. Route 13/3) to the north and Berryville Pike (US Route 340) to the east. Adjacent residential uses are located to the west, and south of the property; with salvage building use land to the east. The subject property consists of undeveloped open space with field grass and some vegetated areas.

This overall drainage area contains the following soils pursuant to the USDA *Natural Resources Conservation Service (NRCS), Web Soil Survey*. (See Appendix D)

Soil Type	Name	Hydrologic Soil Groups
Fk	Funkstown Silt Loam	C
RpC	Ryder-Poplimento Complex, 8-15% Slopes	B
PmB	Poplimento Silt Loam, 3-8% Slopes	B
PmC	Poplimento Silt Loam, 8-15% Slopes	B

QUALITY CONTROL

The project includes impervious areas for buildings, sidewalks, asphalt aisles/parking, and a gravel lot. The remaining areas will be modeled as pervious managed turf. The water quality control volume was determined using Performance Based BMP Water Quality Calculations per the Virginia Stormwater Management Handbook, 1999.

The proposed stormwater quality control measures for the site consists of a bioretention basin and an existing extended detention basin. Water quality facilities are provided to treat the disturbed area to meet the target pollutant load. There is a portion of disturbed area being used to bypass offsite flow to its original outfall. The runoff from this portion is not being treated by the proposed bioretention basin but does outfall into the existing extended detention basin.

QUANTITY CONTROL

Stormwater quantity control is being provided through an offsite extended detention basin. Requirements for the site are set by the Deed of Easement (Deed Book 1029, Page 165) and stormwater management report for this facility. The existing extended detention basin is designed to include our site, so long as the impervious coverage does not exceed 70%. The proposed development does not change any adjacent flow patterns and maintains an impervious coverage of less than 70%.

Existing Stormwater Management Facility Report

The existing stormwater management facility report can be found in Appendix B. The report refers to the existing extended detention basin we are utilizing as 'Basin 3'. Our site is referred to as 'Residue' or 'Commercial (70% Impervious)' in the report. The drainage area our site is calculated with is 'Onsite Area 2'. Below is a summary of the information provided by the report.

Basin No. 3 Summary				
Storm Event	**Pre-Development (CFS)**	**Release Rate (cfs)**	**W.S.E**	**Storage Volume (Ac-ft.)**
1.25 YR	1.70	1.64	497.92	1.9432
2 YR	3.30	2.26	498.19	2.4119
10 YR	45.50	23.60	499.59	4.9093
100 YR	104.00	67.00	500.85	7.3600

STORMWATER CONEYANCE & DRAINAGE DESIGN

Storm Sewers

Storm sewer pipe system has been designed for the 10-year storm event. Storm sewer inlets have also been designed for the 10-year storm event. Storm event flows were computed using the Rational Method, and Hydraflow Storm Sewers software was used to model the storm sewer system. Calculations are provided in the plan set.

Culverts

A proposed culvert is being used to divert offsite drainage around our site to its original outfall location. The existing offsite drainage is released onto our site via an existing 15" culvert at a 0.01% slope. The design of the proposed culvert is based on a maximum flow from the existing 15" culvert.

SUMMARY

In conclusion, the proposed site is under 70% impervious coverage therefore the existing extended detention facility will be used to control the post development quantity. The overall site plan promotes pollutant reduction, and water quality enhancement. Water quality control is provided by removing the target pollutant load utilizing a bioretention facility and the existing

extended detention basin. The stormwater management facilities will minimize any impact to the water resources of the area.

Appendix A

Water Quality Calculations

BIORETENTION SIZING CALCUATIONS										
FACILITY ID	Ponding SA (sq. ft.)	Top of Media SA (sq. ft.)	Ponding Depth (ft.)	Soil Media (ft.)	Soil Media Void Ratio	Choker Stone (ft.)	Choker Stone Void Ratio	Underdrain Stone (ft.)	Underdrain Stone Void Ratio	Total Storage (cu. Ft.)
BIO 1	4,377	3,950	0.50	2.25	0.25	0.17	0.25	1.00	0.40	6,052

Performance Based Water Quality Calculations

STEP 1 **Determine the applicable area (A) and the post-developed impervious cover (I_{post}).**

Applicable area (**A**)= 5.49 Acres

Pre-development impervious cover:

Total Ex Impervious Area = 0.03

$I_{existing}$ = (total pre-development impervious cover ÷ A) × 100 = 0.55% utilized average land cover condition

Post-development impervious cover:

Total Proposed Impervious Area = **3.30**

I_{post} = (total post-development impervious cover ÷ A) × 100 = 60.1%

STEP 2 **Determine the average land cover conditions ($I_{watershed}$) <u>or</u> the existing impervious cover ($I_{existing}$).**

$I_{watershed}$ = 16.0%

STEP 3 **Determine the appropriate Development Situation.**

I_{post} 60.1% > $I_{existing}$ 16.0%

<u>Situation 2 exists. The existing percent impervious cover is less than the average land cover condition and the proposed improvements will create a total percent impervious cover which is greater than the average land cover condition.</u>

STEP 4 **Determine the relative pre-development pollutant load (L_{pre}).**

$L_{pre(watershed)}$ = [0.05 + 0.009 × $I_{watershed}$)] × A × 2.28 **VSMH (Equation 5-16)**

= 2.43 pounds per year

STEP 5 **Determine the relative post-development pollutant load (L_{post}).**

L_{post} = [0.05 + 0.009 × I_{post})] × A × 2.28 **VSMH (Equation 5-21)**

= 7.40 pounds per year

STEP 6 **Determine the relative pollutant removal requirement (RR).**

RR = L_{post} - $L_{pre(watershed)}$

=4.97 pounds per year

STEP 7 **Identify the best management practice (BMP) for the site.**

1 Determine the required pollutant removal efficiency for the site:

EFF = (RR ÷ Lpost) × 100

= 67.17%

2 Select BMP(s)

	Area	I_{BMP}	Eff_{BMP}	Description	Impervious Area
Bioretention '1'	5.08	62.80%	50%	Bioretention Basin (1xWQV)	3.19
Existing SWM Pond	5.49	60.11%	35%	Extended Detention (2xWQV)	3.30

3 Determine the pollutant load entering the proposed BMP(s).

L_{post} = [0.05 + 0.009 × I_{BMP})] × A × 2.28 **VSMH (Equation 5-24)**

L_{BMP1} = 7.13 pounds per year

L_{BMP2} = 7.40 pounds per year

4 Calculate the pollutant load removed by the proposed BMP(s).

$L_{removed}$ = Eff_{BMP} × L_{BMP} **VSMH (Equation 5-24)**

$L_{removed/BMP1}$ = 3.56 pounds per year

$L_{removed/BMP2}$ = 2.59 pounds per year

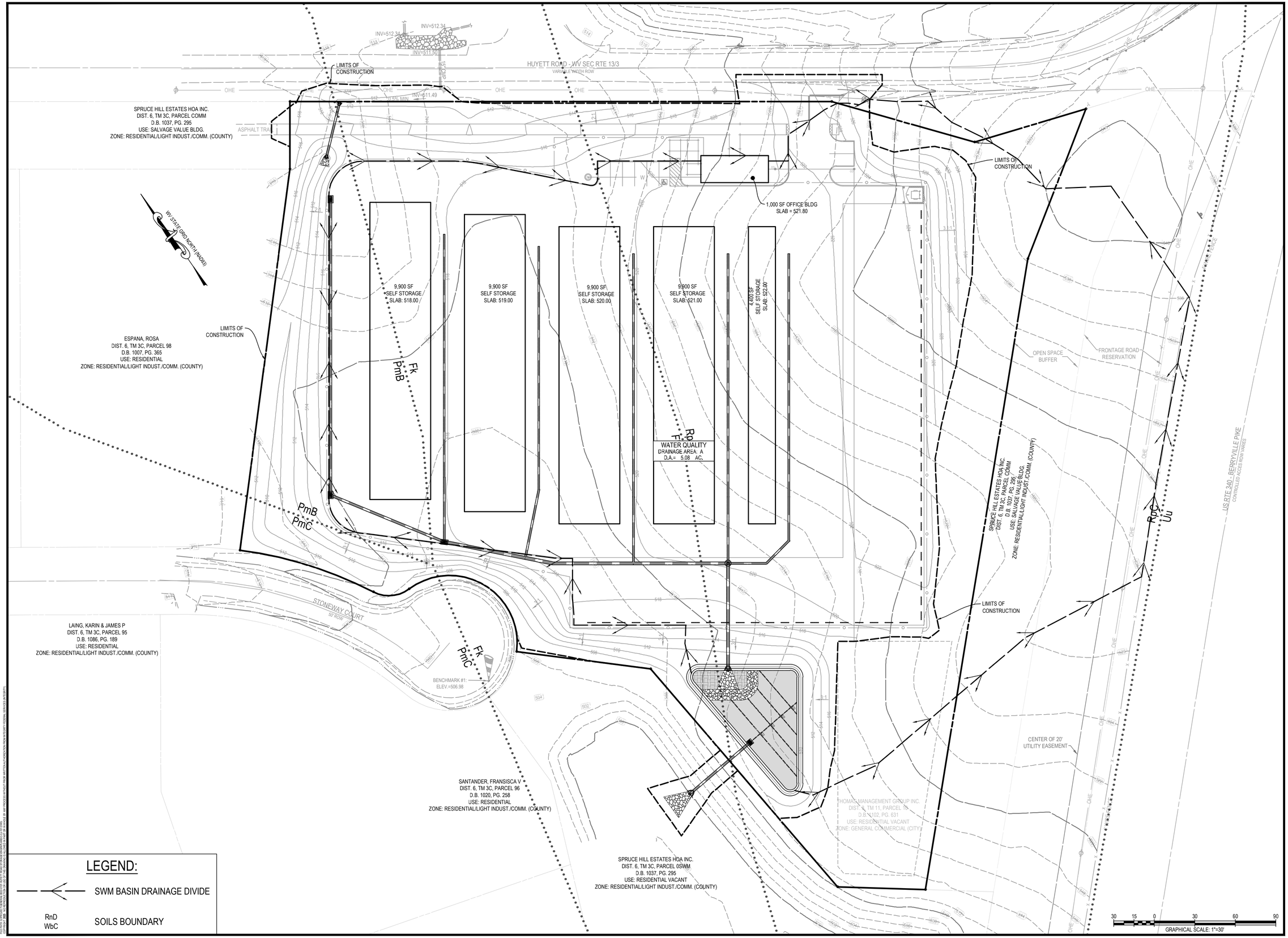
5 Calculate the total pollutant load removed by the BMP(s)

$L_{removed/total}$ = $L_{removed/BMP1}$ + $L_{removed/BMP2}$ + $L_{removed\ BMP3}$ + ….. **VSMH (Equation 5-25)**

$L_{removed/total}$ = 6.15 pounds per year

6 Verify compliance:

$L_{removed/total}$ 6.15 > 4.97 **OKAY**



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Martinsburg, WV 25401 • www.ifs-se.com

JASON P. GERNERT
REGISTERED
No. 18127
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

SEAL:

REVISIONS	
1. 03/15/2023 - ALL SHEETS PER CITY COMMENTS	

WATER QUALITY DRAINAGE AREA

HUYETT ROAD STORAGE SITE PLAN

TAX MAP 11, PARCEL 10; D.B. 1102, PG. 631
CHARLES TOWN CORP (3) TAX DISTRICT
JEFFERSON COUNTY, WEST VIRGINIA

C.T. FILE #2022-05

SCALE:	HORIZ.: 1"=30' VERT.: N/A
DATE:	FEBRUARY 3, 2023
JOB:	5022-0101
DRAWN: CTW	CHECK: BJS
CADD: C-CJ-101.DWG	
NCS:	N/A
SHEET:	22 OF 25

Appendix B

Water Quantity Calculations

02-28

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JEFFERSON COUNTY
PLANNING, ZONING AND ENGINEERING

STORMWATER MANAGEMENT REPORT

FOR

SPRUCE HILL SUBDIVISION
SECTION TWO

Situate Along the South Side of Huyett Road (Rte. 13/3)
Approximately 0.25 Miles West of US Rte. 340
Kabletown District, Jefferson County, West Virginia

AESI Job No. 4813.C

PREPARED BY:

ASSOCIATED ENGINEERING SCIENCES, INC.
34 West Franklin Street
Hagerstown, Maryland 21740

July 2002
Revised: September 6, 2002

R. L. REICHENBAUGH
REGISTERED
11188
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER

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NARRATIVE

This report addresses stormwater management requirements for the development of Section Two Spruce Hill Subdivision. Section Two consists of 61 lots with an average lot size of 1.3 acres. The site is situated along the south side of WV Secondary Route 13/3, Huyett Road and on the west side of U.S. Route 340 in Jefferson County, West Virginia. The total area within Section Two is 122.2 acres including a 5.5 acre residue proposed for future commercial development.

The site is approximately sixty percent cultivated and forty percent pasture, with about four acres of woods and an existing dwelling. The soils located on site are primarily Duffield series with small areas of Frankstone, Hagerstown, Huntington and Lindside series according to the Soil Survey of Jefferson County, West Virginia. The soils are Hydrologic Group B, except for the Hagerstown clay loam and Lindside soils which are Hydrologic Group C per Urban Hydrology for Small Watersheds, TR-55. The two-year pre-development curve number was based on meadow in good condition, for the cultivated and meadow portions. The ten-year pre-development curve number was based on present land use per Jefferson County's requirements. The site has a drainage divide approximately in the middle of this section with the eastern portion draining toward U.S. Route 340 on the east and the western portion draining towards the North Fork Bullskin Run on the western property line. The site is divided into three drainage areas for the stormwater management calculations. Drainage Area No. 2 includes a sinkhole that will be repaired. The drainage area to the sinkhole is 0.15 acres.

Urban Hydrology for Small Watersheds, TR-55 was used to calculate the pre-development and post-development hydrographs for the one, two, ten and one hundred year storm events. The pre-development runoff was adjusted for the Karst geology per the Jefferson County adjustment factors. The post-development runoff was also adjusted for Karst geology based on the disturbed areas losing their Karst characteristics. One acre of disturbed area per lot was used per Jefferson County requirements for the individual lots. The additional post-development runoff will be attenuated to pre-development levels by constructing stormwater management facilities within the drainage areas as near to the point of discharge at the property lines as possible.

A detention basin with extended detention was chosen as the best alternative for this site due to the Karst geology and the potential for sinkholes in the area if infiltration is used. S.W.M. Basin No. 2 will have a concrete inlet and culvert pipe with an emergency spillway to control the post-development runoff. Basin No. 2 is within 700 feet of a stream and will have vegetation capable of enhancing water quality. S. W. M. Basin No. 3 will have a concrete weir wall outlet structure and an emergency spillway as part of the weir wall that will safely convey the post-development runoff. The Basin No. 3 was sized to include the Residue proposed for future commercial development, based on 70 percent impervious area. Basin No. 3 was oversized to control the 100 year storm event to a discharge level that does not overtop U.S. Route 340.

P.S.U.H.M. was used to route the post-development storm events through the basins and outlet structures. The results of the calculations are as follows:

Area One

Storm Event	Pre-Development (C.F.S.)	Basin No. 2 Release Rate (C.F.S.)	Basin No. 2 Storage Volume W.S.E.	Basin No. 2 Storage Volume (Ac.Ft.)	Basin No. 1 Post-Devel. Hydrograph Combination (C.F.S.)	Total (C.F.S.)
1.25 YR..	4.0	0.26	491.56	0.4450	3.7	3.96
2 YR.	8.0	0.42	492.19	0.5973	7.5	7.92
10 YR.	84.9	25.0	492.69	0.7437	46.9	71.9
100 YR.	195	58.3	493.06	0.8500	133	191.3

The elevation of the settled top of berm is proposed to be 494.1, which provides 1.0 feet of freeboard for the 100-year storm event. The stormwater management basin will be excavated 1.5 feet below the low flow outlet to provide a temporary pool for sediment removal and additional water quality control. The proposed plantings will provide additional water quality to protect the stream downstream.

There are no existing storm drain systems downstream of the outlet of the basin. The channel downstream of the outlet structure is a broad flat flood plain of the North Fork Bullskin Run. The flow calculated for the breach analysis is equal to 13.9 c.f.s. and the flow depth in the downstream channel is calculated to be 0.12 feet with a velocity of 1.1 f.p.s, which is non-erosive for the existing stabilized conditions. The Bullskin Run flood plain is stabilized with vegetation typical of pasture land. Adjacent to the Bullskin Run for approximately fifteen feet the vegetation is a mixture of trees and brush.

Basin No. 3

Storm Event	Pre-Development (C.F.S.)	Release Rate (C.F.S.)	W.S.E.	Storage Volume (Ac.Ft.)
1.25 YR..	1.7	1.64	497.92	1.9432
2 YR.	3.3	2.26	498.19	2.4119
10 YR.	45.5	23.6	499.59	4.9093
100 YR.	104	67.0	500.85	7.3600

The elevation of the settled top of berm is proposed to be 502.3, which provides 1.4 feet of freeboard for the 100-year storm event. The existing ground is approximately 1.0 foot below the low flow outlet and will provide a temporary pool for sediment removal and additional water quality control.

Downstream of the basin there is a flat channel for approximately 140 feet and then a 24" RCP crossing U.S. Route 340. A second 24" RCP also crosses U.S. Route 340 approximately 400 feet south. According to the breach and HY8 analysis, U.S. Route 340 is not overtopped for the 100-year storm event.

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JOB 4813 SPRUCE HILL 3

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE 1" = 2000'

U.S.G.S. QUAD
MIDDLEWAY, WV

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34 West Franklin Street
HAGERSTOWN, MARYLAND 21741
(301) 797-9160 (301) 416-7105

JOB 4813.A SPRUCE HILL SUBDIVISION 4

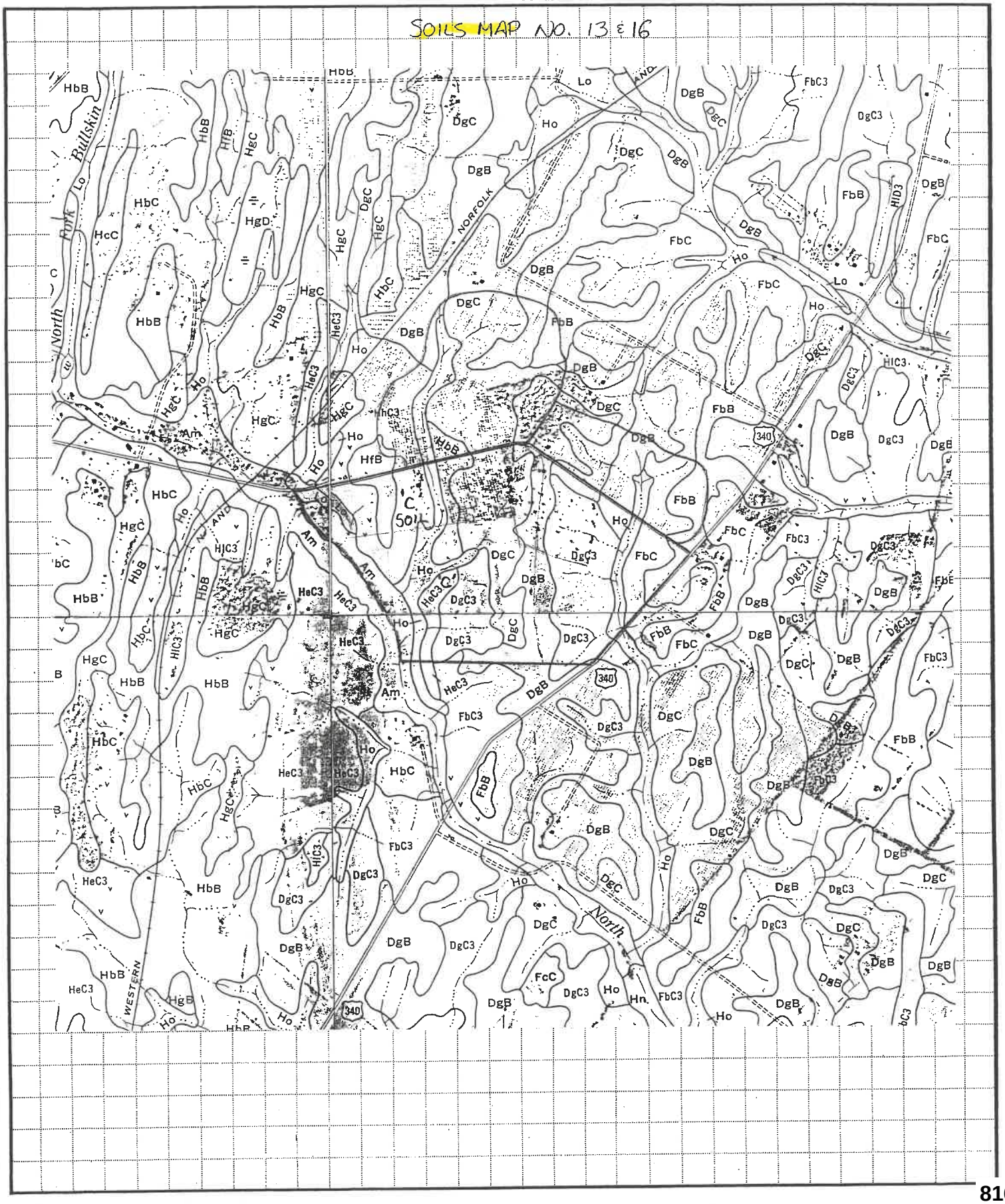
SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE DEC, 2001

SCALE 1" = 1667'

SOILS MAP NO. 13 & 16



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JOB 4813.A SPRUCE HILL SUBDIVISION
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY RDH DATE DEC 2001
SCALE _____

SOILS

	DESCRIPTION	'K'	H.S.G.
Am	Alluvial Land, Marl Substratum		
DgB	Duffield silt loam, 2-6% slope	0.32	B
DgC3	Duffield silt loam, 6-12% slope, severely eroded	0.32	B
DgC	Duffield silt loam, 6-12% slope	0.32	B
FbC	Frankstown shaly silt loam 6-12% slope	0.24	B
FbC3	Frankstown shaly silt loam 6-12% slope, severely eroded	0.24	B
HbB	Hagerstown silt loam, 2-6% slope	0.32	B
HeC3	Hagerstown silty clay loam, 6-12%, severely eroded	0.32	C
HfB	Hagerstown & Frederick cherty silt loam 2-6% slope	0.32	B
HhC3	Hagerstown & Frederick cherty silty clay loam, 6-12% sev. eroded	0.32	C
Ho	Huntington silt loam, local alluvium	0.28	B
Lo	Lindside silt loam, local alluvium	0.32	C

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JOB 4813 SPRUCE HILL
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____
SCALE ____

PRE-DEVELOPMENT

2 YR STORM - WOODED, MEADOW OR EXISTING ORCHARD

			RCN	
OFFSITE 1 94 AC. TOTAL				
WOODS	32 AC.	'B'		
CULTIVATED (USE MEADOW)	51 AC	'B'		
WOODS	5 AC	'C'	58	2 YR
CULTIVATED (USE MEADOW)	6 AC	'C'	65	10 & 100 yr
OFFSITE 2 48 AC. TOTAL				
WOODS	7 AC	'B'	58	2 YR
CULTIVATED (USE MEADOW)	41 AC	'B'	68	10 & 100 YR
ONSITE 1 138 AC TOTAL				
WOODS	4 AC.	'B'		
PASTURE (USE MEADOW)	34 AC.	'B'		
CULTIVATED (USE MEADOW)	67 AC.	'B'		
PASTURE (USE MEADOW)	18 AC.	'C'	61	2 YR
CULTIVATED (USE MEADOW)	15 AC	'C'	69	10 & 100 YR
ONSITE 2 44 AC TOTAL				
PASTURE (USE MEADOW)	18 AC	'B'	58	2 YR
CULTIVATED (USE MEADOW)	26 AC	'B'	66	10 & 100 YR
ONSITE 3 14 AC TOTAL				
CULTIVATED (USE MEADOW)	14 AC.	'B'	58	2 YR
			70	10 & 100 YR

10 YR STORM - PRESENT LAND USE

100 YR STORM - 1990 LAND USE WHERE FLOOD PLAIN. (NO SIGNIFICANT CHANGES SINCE 1990, USED PRESENT)

	2 YR	10 YR	100 YR	
100% KARST	0.33,	0.43,	0.50	ADJUSTMENT FACTORS

```
*****************************************************
* PSUHM: MODULE <1-A> - Curve Number Weighting      *
*****************************************************
```

File Name:
Description: OFFSITE 2 1.25 & 2 YR

Landuse	Soil Group	CN	Area (acres)	% Total Area
WOODS	B	55	7.0	14.6
CULTIVATED (MEADOW)	B	58	41.0	85.4
Weighted result --->		58	48.0	100

```
*****************************************************
* PSUHM: MODULE <1-A> - Curve Number Weighting      *
*****************************************************
```

File Name:
Description: OFFSITE 2 10 & 100 YR

Landuse	Soil Group	CN	Area (acres)	% Total Area
WOODS	B	55	7.0	14.6
CULTIVATED	B	70	41.0	85.4
Weighted result --->		68	48.0	100

```
*****************************************************
* PSUHM: MODULE (1-A) - Curve Number Weighting      *
*****************************************************
```

File Name:
Description: ONSITE 2 1.25 & 2 YR PRE-DEV.

Landuse	Soil Group	CN	Area (acres)	% Total Area
PASTURE (MEADOW)	B	58	18.0	40.9
CULTIVATED (MEADOW)	B	58	26.0	59.1
Weighted result --->		58	44.0	100

```
*****************************************************
* PSUHM: MODULE (1-A) - Curve Number Weighting      *
*****************************************************
```

File Name:
Description: ONSITE 2 10 & 100 YR PRE-DEV.

Landuse	Soil Group	CN	Area (acres)	% Total Area
PASTURE	B	61	18.0	40.9
CULTIVATED	B	70	26.0	59.1
Weighted result --->		66	44.0	100

```
*****************************************************************
* TRAVEL TIME CALCULATIONS - SCS Segmental Approach, TR-55 (1986) *
*****************************************************************

SUMMARY for OFFSITE 2 Tc

Segment 1: OVERLAND FLOW
     L = 100 ft, S = .03 ft/ft, n = .4, P(2yr/24hr) = 3.1 in
     Travel Time = 18.6 minutes

 Segment 2: CONCENTRATED FLOW
     L = 2000 ft, S = .025 ft/ft, UNPAVED surface
     Travel time = 13.1 minutes

TOTAL TRAVEL TIME = 31.6 min.
```

```
*****************************************************************
* TRAVEL TIME CALCULATIONS - SCS Segmental Approach, TR-55 (1986) *
*****************************************************************

SUMMARY for OFFSITE 2 Tt

 Segment 1: CONCENTRATED FLOW
     L = 1050 ft, S = .015 ft/ft, UNPAVED surface
     Travel time = 8.9 minutes

TOTAL TRAVEL TIME = 8.9 min.
```

```
*****************************************************************
* TRAVEL TIME CALCULATIONS - SCS Segmental Approach, TR-55 (1986) *
*****************************************************************

SUMMARY for ONSITE 2

Segment 1: OVERLAND FLOW
     L = 100 ft, S = .02 ft/ft, n = .24, P(2yr/24hr) = 3.1 in
     Travel Time = 14.5 minutes

 Segment 2: CONCENTRATED FLOW
     L = 1400 ft, S = .035 ft/ft, UNPAVED surface
     Travel time = 7.7 minutes

 Segment 3: CONCENTRATED FLOW
     L = 500 ft, S = .015 ft/ft, UNPAVED surface
     Travel time = 4.2 minutes

TOTAL TRAVEL TIME = 26.4 min.
```

```
*************************************************************************** 11
  PSUHM: MODULE <3-B> - SCS TR-55 TABULAR METHOD                          *
***************************************************************************
```

WATERSHED TITLE: AREA 2 PRE-DEVELOPMENT

1.25 YR. TYPE II STORM: PRECIPITATION = 2.65 in.

==========

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	48.000	58	0.500	0.17	31.600	0.500	8.900	0.175
2	44.000	58	0.500	0.17	26.400	0.400	0.000	0.040
OMPOSITE	92.000	58		0.17				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs)											
	11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	0.0	0.0	0.0	1.5	2.6	1.8	1.3	1.1	0.8	0.6	0.4	0.0
2	0.0	0.0	0.4	2.8	2.1	1.3	1.1	0.9	0.7	0.5	0.4	0.0
COMPOS.	0.0	0.0	0.5	4.2	4.7	3.2	2.4	2.0	1.5	1.1	0.8	0.0

THE PEAK FLOW IS 5.0 cfs - OCCURS AT 12.7 hrs

==========

KARST ADJUSTMENT

5.0 (0.33) = 1.7 CFS

```
*****************************************************************************
*  PSUHM: MODULE (3-B) - SCS TR-55 TABULAR METHOD                           *
*****************************************************************************
```

WATERSHED TITLE: AREA 2

2 YR. TYPE II STORM: PRECIPITATION = 3.1 in.

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	48.000	58	0.467	0.31	31.600	0.500	8.900	0.175
2	44.000	58	0.467	0.31	26.400	0.400	0.000	0.040
COMPOSITE	92.000	58		0.31				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs) 11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	0.0	0.0	0.1	3.4	5.2	3.4	2.4	1.9	1.4	1.0	0.7	0.0
2	0.0	0.0	1.4	5.7	3.9	2.4	1.9	1.6	1.2	0.9	0.6	0.0
COMPOS.	0.0	0.0	1.5	9.1	9.1	5.8	4.2	3.5	2.5	1.8	1.3	0.0

THE PEAK FLOW IS 9.9 cfs - OCCURS AT 12.6 hrs

KARST ADJUSTMENT

9.9 (0.33) = 3.3 CFS

```
*****************************************************************************
  PSUHM: MODULE (3-B) - SCS TR-55 TABULAR METHOD                            *
*****************************************************************************
```

WATERSHED TITLE: AREA 2

10 YR. TYPE II STORM: PRECIPITATION = 4.95 in.

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	48.000	68	0.190	1.84	31.600	0.500	8.900	0.175
2	44.000	66	0.208	1.69	26.400	0.400	0.000	0.040
OMPOSITE	92.000	67		1.77				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs) 11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	1	3	13	55	48	21	12	8	6	4	2	0
2	1	4	36	51	23	11	8	6	5	3	2	0
COMPOS.	2	7	50	106	71	32	19	15	10	7	5	0

THE PEAK FLOW IS 105.8 cfs - OCCURS AT 12.5 hrs

KARST ADJUSTMENT

105.8 (0.43) = 45.5 CFS

```
*****************************************************************************
  PSUHM: MODULE (3-B) - SCS TR-55 TABULAR METHOD                            *
*****************************************************************************
```

WATERSHED TITLE: AREA 2 PRE-DEVELOPMENT

100 YR. TYPE II STORM: PRECIPITATION = 7 in.

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	48.000	68	0.134	3.41	31.600	0.500	8.900	0.175
2	44.000	66	0.147	3.20	26.400	0.400	0.000	0.040
OMPOSITE	92.000	67		3.31				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs) 11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	3	9	33	110	89	37	20	14	9	6	4	0
2	3	12	84	98	41	19	13	11	8	5	3	0
COMPOS.	6	21	117	208	130	56	33	25	17	11	7	0

THE PEAK FLOW IS 207.6 cfs - OCCURS AT 12.5 hrs

KARST ADJUSTMENT

207.6 (0.50) = 103.8 CFS

ASSOCIATED ENGINEERING SCIENCES INC.
34 West Franklin Street
HAGERSTOWN, MARYLAND 21741
(301) 797-9160 (301) 416-7105

JOB 4813.C SPRUCE HILL

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

POST-DEVELOPMENT KARST

ONSITE 1C

D.A. = 28.8 AC.

LOTS 13 1AC DISTURBED = 13 AC.

STREET R/W = 2.0 AC.

OPEN SPACE/UNDISTURBED = 13.8 AC.

CN = 66

T_c = 27.1 MIN

T_t = 0.0

DISTURBED AREA % = $\frac{13.0+2.0}{28.8}(100) = 52\%$ 48% RETAINS 'K' CHARACTERISTICS

ADJUSTMENT FACTORS

2YR = 0.66 — 28.8 AC (0.66) = 19.0 AC.

10 YR = 0.74 — 28.8 AC (0.74) = 21.3 AC.

100YR = 0.81 — 28.8 AC (0.81) = 23.3 AC.

ONSITE 2

D.A. = 44 AC.

LOTS = 21 1AC DISTURBED = 21 AC.

STREET R/W = 4.2 AC.

COMMERCIAL = 6.5 AC.

OPEN SPACE/UNDISTURBED = 12.3 AC.

CN = 69

T_c = 26.4 MIN

T_t = 0.0

DISTURBED AREA % = $\frac{21+4.2+6.5}{44}(100) = 72.0\%$ 28% RETAINS 'K' CHAR.

ADJUSTMENT FACTORS

2YR = 0.84 — 44 AC. (0.84) = 37.0 AC.

10YR = 0.87 — 44 AC (0.87) = 38.3 AC.

100YR = 0.90 — 44 AC (0.90) = 39.6 AC.

```
*****************************************************
* PSUHM: MODULE (1-A) - Curve Number Weighting      *
*****************************************************
```

File Name:
Description: ONSITE 2 POST-DEVELOPMENT

Landuse	Soil Group	CN	Area (acres)	% Total Area
RESIDENTIAL 1.3 AC LOTS	B	67	33.0	75.0
COMMERCIAL (70% IMP)	B	87	6.5	14.8
OPEN SPACE	B	61	4.5	10.2
Weighted result --->		69	44.0	100

```
*****************************************************************
* TRAVEL TIME CALCULATIONS - SCS Segmental Approach, TR-55 (1986) *
*****************************************************************
```

SUMMARY for ONSITE 2

Segment 1: OVERLAND FLOW
L = 100 ft, S = .02 ft/ft, n = .24, P(2yr/24hr) = 3.1 in
Travel Time = 14.5 minutes

Segment 2: CONCENTRATED FLOW
L = 1400 ft, S = .035 ft/ft, UNPAVED surface
Travel time = 7.7 minutes

Segment 3: CONCENTRATED FLOW
L = 500 ft, S = .015 ft/ft, UNPAVED surface
Travel time = 4.2 minutes

TOTAL TRAVEL TIME = 26.4 min.

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*****************************************************************************
  PSUHM: MODULE (3-B) - SCS TR-55 TABULAR METHOD                            *
*****************************************************************************
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WATERSHED TITLE: AREA 2 POST ADJUSTED

1.25 YR. TYPE II STORM: PRECIPITATION = 2.65 in.

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	15.800	58	0.500	0.17	31.600	0.500	8.900	0.175
2	37.000	69	0.339	0.49	26.400	0.400	0.000	0.040
OMPOSITE	52.800	66		0.40				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs)											
	11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	0.0	0.0	0.0	0.5	0.9	0.6	0.4	0.4	0.3	0.2	0.1	0.0
2	0.0	0.1	5.0	11.2	6.0	3.1	2.3	1.9	1.4	0.9	0.7	0.0
COMPOS.	0.0	0.1	5.0	11.7	6.9	3.7	2.7	2.2	1.6	1.1	0.8	0.0

THE PEAK FLOW IS 11.7 cfs - OCCURS AT 12.4 hrs

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*****************************************************************************
  PSUHM: MODULE (3-B) - SCS TR-55 TABULAR METHOD                            *
*****************************************************************************
```

WATERSHED TITLE: AREA 2 POST ADJUSTED

2 YR. TYPE II STORM: PRECIPITATION = 3.1 in.

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	15.800	58	0.467	0.31	31.600	0.500	8.900	0.175
2	37.000	69	0.290	0.72	26.400	0.400	0.000	0.040
OMPOSITE	52.800	66		0.60				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs)											
	11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	0.0	0.0	0.0	1.1	1.7	1.1	0.8	0.6	0.4	0.3	0.2	0.0
2	0.0	0.3	9.3	18.1	9.1	4.5	3.2	2.6	1.9	1.3	0.9	0.0
COMPOS.	0.0	0.3	9.3	19.3	10.8	5.6	4.0	3.2	2.3	1.6	1.1	0.0

THE PEAK FLOW IS 19.9 cfs - OCCURS AT 12.4 hrs

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*****************************************************************************
*  PSUHM: MODULE (3-B) - SCS TR-55 TABULAR METHOD                           *
*****************************************************************************
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WATERSHED TITLE: AREA 2 POST ADJUSTED

10 YR. TYPE II STORM: PRECIPITATION = 4.95 in.

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	20.600	68	0.190	1.84	31.600	0.500	8.900	0.175
2	38.300	69	0.182	1.92	26.400	0.400	0.000	0.040
COMPOSITE	58.900	69		1.89				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs) 11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	0.5	1.3	5.7	23.4	20.6	8.9	5.0	3.6	2.4	1.6	1.0	0.0
2	1.2	5.1	39.5	50.8	22.3	10.5	7.4	6.0	4.3	2.9	2.0	0.0
COMPOS.	1.7	6.4	45.1	74.2	42.9	19.4	12.4	9.6	6.6	4.4	3.0	0.0

THE PEAK FLOW IS 77.6 cfs - OCCURS AT 12.4 hrs

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*****************************************************************************
  PSUHM: MODULE (3-B) - SCS TR-55 TABULAR METHOD                            *
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WATERSHED TITLE: AREA 2 POST ADJUSTED

100 YR. TYPE II STORM: PRECIPITATION = 7 in.

SUMMARY OF INPUT PARAMETERS

SUBAREA	AREA (acre)	CURVE NUMBER	IA/P	RUNOFF (in)	TC (min)	ADJ. TC (hrs)	TT (min)	ADJ. TT (hrs)
1	20.600	68	0.134	3.41	31.600	0.500	8.900	0.175
2	39.600	69	0.128	3.51	26.400	0.400	0.000	0.040
OMPOSITE	60.200	69		3.48				

INDIVIDUAL SUBAREA & COMPOSITE HYDROGRAPHS

SUBAREA	TIME (hrs)											
	11.0	11.9	12.2	12.5	12.8	13.2	13.6	14.0	15.0	17.0	20.0	26.0
1	1	4	14	47	38	16	9	6	4	3	2	0
2	3	14	88	97	40	18	13	10	7	5	3	0
COMPOS.	5	17	102	144	78	34	21	16	11	7	5	0

THE PEAK FLOW IS 157.4 cfs - OCCURS AT 12.4 hrs

SPRUCE HILL BASIN 3
STAGE STORAGE TABLE

ELEV.	AREA (SF)	MEAN AREA (SF)	DELTA ELEV.	INCR. VOL. (CF)	TOT. VOL. (CF)	TOT. VOL. (AC.FT.)
496.5	36,720			0	0	0.00000
		54,000				
497.5	71,280		1.0	54,000	54,000	1.23967
		72,330				
498.0	73,380		0.5	36,165	90,165	2.06990
		78,020				
500.0	82,660		2.0	156,040	246,205	5.65209
		87,540				
502.0	92,420		2.0	175,080	421,285	9.67137
		92,420				
502.0	92,420		0.0	0	421,285	9.67137

136,800 FT^3 @ 498.60
68,400 FT^3 @ 497.70
34,200 FT^3 @ 497.13

STAGE/DISCHARGE TABLE FOR BASIN 3

BASIN WATER ELEVATION,ft.	BASIN OUTFLOW,cfs.	RISER BOX WATER ELEVATION,ft.	TAILWATER ELEVATION,ft.	OUTLET CULV. CONTROL
496.50	0.00	N/A	N/A	N/A
496.60	0.00	N/A	N/A	N/A
496.70	0.00	N/A	N/A	N/A
496.80	0.00	N/A	N/A	N/A
496.90	0.00	N/A	N/A	N/A
497.00	0.00	N/A	N/A	N/A
497.10	0.00	N/A	N/A	N/A
497.20	0.00	N/A	N/A	N/A
497.30	0.00	N/A	N/A	N/A
497.40	0.00	N/A	N/A	N/A
497.50	0.00	N/A	N/A	N/A
497.60	0.25	N/A	N/A	N/A
497.70	0.70	N/A	N/A	N/A
497.80	1.26	N/A	N/A	N/A
497.90	1.58	N/A	N/A	N/A
498.00	1.84	N/A	N/A	N/A
498.10	2.07	N/A	N/A	N/A
498.20	2.28	N/A	N/A	N/A
498.30	2.47	N/A	N/A	N/A
498.40	2.65	N/A	N/A	N/A
498.50	2.82	N/A	N/A	N/A
498.60	3.54	N/A	N/A	N/A
498.70	4.68	N/A	N/A	N/A
498.80	6.11	N/A	N/A	N/A
498.90	7.77	N/A	N/A	N/A
499.00	9.62	N/A	N/A	N/A
499.10	11.65	N/A	N/A	N/A
499.20	13.84	N/A	N/A	N/A
499.30	16.19	N/A	N/A	N/A
499.40	18.67	N/A	N/A	N/A
499.50	21.28	N/A	N/A	N/A
499.60	24.01	N/A	N/A	N/A
499.70	26.87	N/A	N/A	N/A
499.80	29.84	N/A	N/A	N/A
499.90	32.92	N/A	N/A	N/A
500.00	36.11	N/A	N/A	N/A
500.10	39.40	N/A	N/A	N/A
500.20	42.78	N/A	N/A	N/A
500.30	46.27	N/A	N/A	N/A
500.40	49.85	N/A	N/A	N/A
500.50	53.52	N/A	N/A	N/A
500.60	57.27	N/A	N/A	N/A
500.70	61.12	N/A	N/A	N/A
500.80	65.05	N/A	N/A	N/A
500.90	69.06	N/A	N/A	N/A
501.00	73.16	N/A	N/A	N/A

OUTLET STRUCTURE GEOMETRY FOR BASIN 3

STAGE 1 ---) RECTANGULAR ORIFICE

INVERT ELEVATION = 497.50 WIDTH = 2.50 FT. HEIGHT = 0.25 ft. DISCHARGE COEFF. = 0.600

STAGE 2 ---) RECTANGULAR WEIR
CREST ELEVATION = 498.50 CREST LENGTH = 5.50 ft. DISCHARGE COEFF. = 3.100

MODIFIED PULS BASIN ROUTING FOR ---1.25 YEAR STORM

INFLOW HYDROGRAPH FILENAME: A:A21YPOK.HYD
BASIN STORAGE/ELEVATION DATA FILENAME: A:BASIN3.ES
OUTLET STRUCTURE DISCHARGE/ELEVATION DATA FILENAME: A:OUTLET3.EO

TIME hrs.	HYDROGRAPH INFLOW,cfs	BASIN INFLOW,cfs	STORAGE acre-ft	ELEVATION ft.ABOVE msl	BASIN OUTFLOW,cfs	OUTFLOW TOTAL,cfs	RETENTION TIME,hrs
12.00	0.40	0.40	1.2397	497.50	0.00	0.00	37.50
12.20	5.00	5.00	1.2757	497.52	0.05	0.05	6.11
12.40	11.70	11.70	1.4191	497.61	0.28	0.28	2.87
12.60	10.10	10.10	1.5970	497.72	0.78	0.78	3.55
12.80	6.90	6.90	1.7193	497.79	1.20	1.20	5.14
13.00	4.80	4.80	1.7951	497.83	1.37	1.37	7.04
13.20	3.70	3.70	1.8423	497.86	1.46	1.46	8.64
13.40	3.10	3.10	1.8739	497.88	1.52	1.52	9.82
13.60	2.70	2.70	1.8963	497.90	1.56	1.56	10.76
13.80	2.40	2.40	1.9128	497.91	1.59	1.59	11.60
14.00	2.20	2.20	1.9243	497.91	1.61	1.61	12.22
14.20	2.00	2.00	1.9323	497.92	1.62	1.62	12.91
14.40	1.90	1.90	1.9380	497.92	1.63	1.63	13.28
14.60	1.80	1.80	1.9412	497.92	1.64	1.64	13.67
14.80	1.70	1.70	1.9426	497.92	1.64	1.64	14.08
15.00	1.60	1.60	1.9432	497.92	1.64	1.64	14.51
15.20	1.60	1.60	1.9425	497.92	1.64	1.64	14.51
15.40	1.50	1.50	1.9406	497.92	1.64	1.64	14.97
15.60	1.50	1.50	1.9384	497.92	1.63	1.63	14.97
15.80	1.40	1.40	1.9350	497.92	1.63	1.63	15.47
16.00	1.40	1.40	1.9313	497.92	1.62	1.62	15.47
16.20	1.30	1.30	1.9265	497.91	1.61	1.61	16.00
16.40	1.20	1.20	1.9209	497.91	1.61	1.61	16.57
16.60	1.20	1.20	1.9143	497.91	1.59	1.59	16.58

16.80	1.20	1.20	1.9079	497.90	1.58	1.58	16.58
17.00	1.10	1.10	1.9004	497.90	1.57	1.57	17.22
17.20	1.10	1.10	1.8927	497.89	1.56	1.56	17.24
17.40	1.10	1.10	1.8853	497.89	1.54	1.54	17.27
17.60	1.10	1.10	1.8781	497.88	1.53	1.53	17.29
17.80	1.00	1.00	1.8707	497.88	1.51	1.51	18.01
18.00	1.00	1.00	1.8624	497.88	1.50	1.50	18.04
18.20	1.00	1.00	1.8543	497.87	1.48	1.48	18.08
18.40	1.00	1.00	1.8464	497.87	1.47	1.47	18.11
18.60	1.00	1.00	1.8388	497.86	1.45	1.45	18.14
18.80	0.90	0.90	1.8310	497.86	1.44	1.44	18.95
19.00	0.90	0.90	1.8223	497.85	1.42	1.42	19.00
19.20	0.90	0.90	1.8138	497.85	1.40	1.40	19.05
19.40	0.90	0.90	1.8056	497.84	1.39	1.39	19.09
19.60	0.80	0.80	1.7972	497.84	1.37	1.37	20.02
19.80	0.80	0.80	1.7879	497.83	1.35	1.35	20.08
20.00	0.80	0.80	1.7789	497.82	1.34	1.34	20.14
20.20	0.80	0.80	1.7701	497.82	1.32	1.32	20.20
20.40	0.80	0.80	1.7617	497.81	1.30	1.30	20.26
20.60	0.80	0.80	1.7535	497.81	1.29	1.29	20.31
20.80	0.80	0.80	1.7455	497.80	1.27	1.27	20.37
21.00	0.80	0.80	1.7378	497.80	1.26	1.26	20.43
21.20	0.70	0.70	1.7292	497.79	1.23	1.23	21.69
21.40	0.70	0.70	1.7207	497.79	1.20	1.20	21.91
21.60	0.70	0.70	1.7127	497.78	1.17	1.17	22.13
21.80	0.70	0.70	1.7051	497.78	1.15	1.15	22.33
22.00	0.70	0.70	1.6979	497.78	1.12	1.12	22.54

TOTAL ROUTING MASS BALANCE DISCREPANCY= 0 %

PEAK INFLOW = 11.70 cfs. PEAK OUTFLOW = 1.64 cfs.

ROUTING TIME STEP = 0.10 hours NUMBER OF OUTFLOW HYDROGRAPH POINTS = 102

MODIFIED PULS BASIN ROUTING FOR ---2 YEAR STORM

INFLOW HYDROGRAPH FILENAME: A:A22YPOK.HYD
BASIN STORAGE/ELEVATION DATA FILENAME: A:BASIN3.ES
OUTLET STRUCTURE DISCHARGE/ELEVATION DATA FILENAME: A:OUTLET3.EO

TIME hrs.	HYDROGRAPH INFLOW,cfs	BASIN INFLOW,cfs	STORAGE acre-ft	ELEVATION ft.ABOVE msl	BASIN OUTFLOW,cfs	OUTFLOW TOTAL,cfs	RETENTION TIME,hrs
65.00	0.30	0.30	1.2397	497.50	0.00	0.00	50.00
65.20	3.50	3.50	1.2626	497.51	0.03	0.03	8.65
65.40	16.40	16.40	1.4195	497.61	0.28	0.28	2.06
65.60	19.30	19.30	1.7198	497.79	1.20	1.20	2.03
65.80	13.40	13.40	1.9663	497.94	1.68	1.68	3.16
66.00	9.10	9.10	2.1187	498.03	1.91	1.91	4.66
66.20	6.50	6.50	2.2118	498.08	2.03	2.03	6.28
66.40	5.10	5.10	2.2718	498.11	2.10	2.10	7.64
66.60	4.30	4.30	2.3136	498.14	2.15	2.15	8.68
66.80	3.80	3.80	2.3443	498.15	2.18	2.18	9.48
67.00	3.40	3.40	2.3674	498.17	2.21	2.21	10.21
67.20	3.10	3.10	2.3840	498.18	2.23	2.23	10.82
67.40	2.80	2.80	2.3962	498.18	2.24	2.24	11.49
67.60	2.60	2.60	2.4037	498.19	2.25	2.25	11.99
67.80	2.50	2.50	2.4081	498.19	2.26	2.26	12.25
68.00	2.40	2.40	2.4108	498.19	2.26	2.26	12.52
68.20	2.30	2.30	2.4119	498.19	2.26	2.26	12.79
68.40	2.20	2.20	2.4112	498.19	2.26	2.26	13.08
68.60	2.10	2.10	2.4098	498.19	2.26	2.26	13.37
68.80	2.00	2.00	2.4068	498.19	2.26	2.26	13.68
69.00	2.00	2.00	2.4026	498.19	2.25	2.25	13.67
69.20	1.90	1.90	2.3972	498.18	2.25	2.25	13.99
69.40	1.80	1.80	2.3903	498.18	2.24	2.24	14.33
69.60	1.70	1.70	2.3827	498.17	2.23	2.23	14.68

69.80	1.70	1.70	2.3741	498.17	2.22	2.22	14.66
70.00	1.60	1.60	2.3643	498.16	2.21	2.21	15.03
70.20	1.60	1.60	2.3544	498.16	2.20	2.20	15.01
70.40	1.50	1.50	2.3442	498.15	2.18	2.18	15.40
70.60	1.50	1.50	2.3330	498.15	2.17	2.17	15.38
70.80	1.50	1.50	2.3220	498.14	2.16	2.16	15.36
71.00	1.50	1.50	2.3112	498.13	2.15	2.15	15.34
71.20	1.40	1.40	2.2994	498.13	2.13	2.13	15.75
71.40	1.40	1.40	2.2874	498.12	2.12	2.12	15.73
71.60	1.40	1.40	2.2757	498.11	2.10	2.10	15.71
71.80	1.30	1.30	2.2637	498.11	2.09	2.09	16.16
72.00	1.30	1.30	2.2508	498.10	2.08	2.08	16.13
72.20	1.30	1.30	2.2381	498.09	2.06	2.06	16.12
72.40	1.20	1.20	2.2253	498.09	2.04	2.04	16.60
72.60	1.20	1.20	2.2115	498.08	2.03	2.03	16.59

TOTAL ROUTING MASS BALANCE DISCREPANCY= .06 %

PEAK INFLOW = 19.90 cfs. PEAK OUTFLOW = 2.26 cfs.

ROUTING TIME STEP = 0.10 hours NUMBER OF OUTFLOW HYDROGRAPH POINTS = 78

MODIFIED PULS BASIN ROUTING FOR ---10 YEAR STORM

INFLOW HYDROGRAPH FILENAME: A:A210YPOK.HYD
BASIN STORAGE/ELEVATION DATA FILENAME: A:BASIN3.ES
OUTLET STRUCTURE DISCHARGE/ELEVATION DATA FILENAME: A:OUTLET3.EO

TIME hrs.	HYDROGRAPH INFLOW,cfs	BASIN INFLOW,cfs	STORAGE acre-ft	ELEVATION ft.ABOVE msl	BASIN OUTFLOW,cfs	OUTFLOW TOTAL,cfs	RETENTION TIME,hrs
11.00	1.70	1.70	1.2397	497.50	0.00	0.00	8.82
11.10	1.90	1.90	1.2545	497.51	0.02	0.02	15.80
11.20	2.10	2.10	1.2707	497.52	0.05	0.05	14.33
11.30	2.30	2.30	1.2884	497.53	0.07	0.07	13.14
11.40	2.60	2.60	1.3080	497.54	0.10	0.10	11.72
11.50	2.90	2.90	1.3297	497.55	0.13	0.13	10.61
11.60	3.30	3.30	1.3541	497.57	0.17	0.17	9.45
11.70	4.30	4.30	1.3839	497.59	0.21	0.21	7.42
11.80	5.40	5.40	1.4219	497.61	0.29	0.29	6.05
11.90	6.40	6.40	1.4678	497.64	0.41	0.41	5.21
12.00	11.50	11.50	1.5375	497.68	0.60	0.60	3.07
12.10	23.50	23.50	1.6754	497.76	1.05	1.05	1.65
12.20	45.10	45.10	1.9477	497.93	1.65	1.65	1.01
12.30	66.90	66.90	2.3944	498.18	2.24	2.24	0.84
12.40	77.60	77.60	2.9705	498.50	2.84	2.84	0.89
12.50	74.20	74.20	3.5587	498.83	6.63	6.63	1.07
12.60	64.20	64.20	4.0544	499.11	11.82	11.82	1.29
12.70	53.20	53.20	4.4224	499.31	16.51	16.51	1.54
12.80	42.90	42.90	4.6686	499.45	19.99	19.99	1.80
12.90	35.40	35.40	4.8178	499.53	22.21	22.21	2.02
13.00	27.80	27.80	4.8908	499.57	23.32	23.32	2.32
13.10	23.60	23.60	4.9093	499.59	23.61	23.61	2.52
13.20	19.40	19.40	4.8929	499.58	23.36	23.36	2.77
13.30	17.10	17.10	4.8532	499.55	22.75	22.75	2.95
13.40	14.90	14.90	4.8008	499.52	21.95	21.95	3.15
13.50	13.60	13.60	4.7409	499.49	21.04	21.04	3.31
13.60	12.40	12.40	4.6782	499.46	20.13	20.13	3.48
13.70	11.60	11.60	4.6148	499.42	19.21	19.21	3.63
13.80	10.80	10.80	4.5523	499.39	18.31	18.31	3.78
13.90	10.20	10.20	4.4913	499.35	17.47	17.47	3.93
14.00	9.60	9.60	4.4321	499.32	16.65	16.65	4.09
14.10	9.20	9.20	4.3754	499.29	15.88	15.88	4.22
14.20	8.70	8.70	4.3210	499.26	15.17	15.17	4.38
14.30	8.30	8.30	4.2687	499.23	14.49	14.49	4.53
14.40	8.00	8.00	4.2190	499.20	13.84	13.84	4.68
14.50	7.70	7.70	4.1719	499.17	13.26	13.26	4.82
14.60	7.40	7.40	4.1270	499.15	12.71	12.71	4.97
14.70	7.20	7.20	4.0844	499.12	12.19	12.19	5.10
14.80	7.00	7.00	4.0443	499.10	11.70	11.70	5.23
14.90	6.80	6.80	4.0064	499.08	11.27	11.27	5.37
15.00	6.60	6.60	3.9704	499.06	10.86	10.86	5.50
15.10	6.50	6.50	3.9364	499.04	10.47	10.47	5.61
15.20	6.40	6.40	3.9046	499.02	10.11	10.11	5.72
15.30	6.30	6.30	3.8749	499.01	9.78	9.78	5.83
15.40	6.10	6.10	3.8466	498.99	9.47	9.47	5.98
15.50	6.00	6.00	3.8195	498.98	9.19	9.19	6.08
15.60	5.90	5.90	3.7938	498.96	8.92	8.92	6.19

15.70	5.70	5.70	3.7690	498.95	8.67	8.67	6.35
15.80	5.60	5.60	3.7451	498.94	8.42	8.42	6.46
15.90	5.50	5.50	3.7223	498.92	8.19	8.19	6.58
16.00	5.40	5.40	3.7007	498.91	7.96	7.96	6.70
16.10	5.30	5.30	3.6800	498.90	7.75	7.75	6.82
16.20	5.10	5.10	3.6597	498.89	7.56	7.56	6.99
16.30	5.00	5.00	3.6397	498.88	7.38	7.38	7.12
16.40	4.90	4.90	3.6204	498.87	7.20	7.20	7.24
16.50	4.80	4.80	3.6017	498.86	7.02	7.02	7.37
16.60	4.70	4.70	3.5836	498.85	6.86	6.86	7.50
16.70	4.60	4.60	3.5660	498.84	6.69	6.69	7.64

TOTAL ROUTING MASS BALANCE DISCREPANCY= .02 %

PEAK INFLOW = 77.60 cfs. PEAK OUTFLOW = 23.61 cfs.

ROUTING TIME STEP = 0.10 hours NUMBER OF OUTFLOW HYDROGRAPH POINTS = 58

MODIFIED PULS BASIN ROUTING FOR ---100 YEAR STORM

INFLOW HYDROGRAPH FILENAME: A:A2100POK.HYD
BASIN STORAGE/ELEVATION DATA FILENAME: A:BASIN3.ES
OUTLET STRUCTURE DISCHARGE/ELEVATION DATA FILENAME: A:OUTLET3.EO

TIME hrs.	HYDROGRAPH INFLOW,cfs	BASIN INFLOW,cfs	STORAGE acre-ft	ELEVATION ft.ABOVE msl	BASIN OUTFLOW,cfs	OUTFLOW TOTAL,cfs	RETENTION TIME,hrs
11.00	4.70	4.70	1.2397	497.50	0.00	0.00	3.19
11.10	5.20	5.20	1.2804	497.52	0.06	0.06	5.89
11.20	5.80	5.80	1.3250	497.55	0.13	0.13	5.41
11.30	6.40	6.40	1.3741	497.58	0.20	0.20	5.04
11.40	7.20	7.20	1.4282	497.61	0.31	0.31	4.60
11.50	8.10	8.10	1.4882	497.65	0.47	0.47	4.20
11.60	9.00	9.00	1.5543	497.69	0.65	0.65	3.90
11.70	11.80	11.80	1.6338	497.74	0.91	0.91	3.11
11.80	14.60	14.60	1.7340	497.80	1.25	1.25	2.65
11.90	17.40	17.40	1.8550	497.87	1.48	1.48	2.38
12.00	30.00	30.00	2.0373	497.98	1.79	1.79	1.55
12.10	57.00	57.00	2.3802	498.17	2.23	2.23	0.97
12.20	101.80	101.80	3.0147	498.53	3.02	3.02	0.70
12.30	141.80	141.80	3.9643	499.06	10.79	10.79	0.63
12.40	157.40	157.40	5.0494	499.66	25.82	25.82	0.67
12.50	144.00	144.00	6.0142	500.18	42.10	42.10	0.78
12.60	120.70	120.70	6.7089	500.53	54.48	54.48	0.93
12.70	98.20	98.20	7.1300	500.74	62.50	62.50	1.07
12.80	78.00	78.00	7.3257	500.83	66.35	66.35	1.23
12.90	63.70	63.70	7.3600	500.85	67.04	67.04	1.36
13.00	49.40	49.40	7.2799	500.81	65.44	65.44	1.53
13.10	41.70	41.70	7.1279	500.73	62.46	62.46	1.66
13.20	33.90	33.90	6.9391	500.64	58.82	58.82	1.81
13.30	29.80	29.80	6.7324	500.54	54.92	54.92	1.92
13.40	25.80	25.80	6.5241	500.43	51.08	51.08	2.05
13.50	23.50	23.50	6.3208	500.33	47.43	47.43	2.16
13.60	21.30	21.30	6.1279	500.24	44.06	44.06	2.27
13.70	19.90	19.90	5.9468	500.15	40.97	40.97	2.36
13.80	18.40	18.40	5.7780	500.06	38.16	38.16	2.47
13.90	17.40	17.40	5.6214	499.98	35.55	35.55	2.57
14.00	16.40	16.40	5.4778	499.90	33.00	33.00	2.68
14.10	15.60	15.60	5.3466	499.83	30.74	30.74	2.79
14.20	14.80	14.80	5.2265	499.76	28.72	28.72	2.91
14.30	14.10	14.10	5.1162	499.70	26.89	26.89	3.02
14.40	13.50	13.50	5.0147	499.64	25.27	25.27	3.13
14.50	13.00	13.00	4.9215	499.59	23.79	23.79	3.24
14.60	12.40	12.40	4.8353	499.54	22.47	22.47	3.36
14.70	12.10	12.10	4.7558	499.50	21.26	21.26	3.45
14.80	11.80	11.80	4.6832	499.46	20.20	20.20	3.54
14.90	11.50	11.50	4.6165	499.42	19.23	19.23	3.64
15.00	11.20	11.20	4.5550	499.39	18.35	18.35	3.73
15.10	11.00	11.00	4.4983	499.36	17.57	17.57	3.81
15.20	10.80	10.80	4.4462	499.33	16.84	16.84	3.89
15.30	10.50	10.50	4.3978	499.30	16.17	16.17	3.99
15.40	10.30	10.30	4.3525	499.27	15.58	15.58	4.07
15.50	10.10	10.10	4.3103	499.25	15.03	15.03	4.15
15.60	9.90	9.90	4.2709	499.23	14.52	14.52	4.23

15.70	9.60	9.60	4.2335	499.21	14.03	14.03	4.34
15.80	9.40	9.40	4.1979	499.19	13.58	13.58	4.42

TOTAL ROUTING MASS BALANCE DISCREPANCY= -.01 %

PEAK INFLOW = 157.40 cfs. PEAK OUTFLOW = 67.04 cfs.

ROUTING TIME STEP = 0.10 hours NUMBER OF OUTFLOW HYDROGRAPH POINTS = 49

ASSOCIATED ENGINEERING SCIENCES INC.
34 West Franklin Street
HAGERSTOWN, MARYLAND 21741
(301) 797-9160 (301) 416-7105

JOB 4813.C SPRUCE HILL
SHEET NO. ____ OF ____
CALCULATED BY ROH DATE ____
CHECKED BY ____ DATE ____
SCALE ____

BASIN 3

BREACH ANALYSIS

$Q_{MAX} = 3.2 H_w^{2.5}$

$H_w = 500.85 - 497.5 = 3.35$

$Q_{MAX} = 3.2(3.35)^{2.5} = 65.7$ CFS

DOWNSTREAM CONDITIONS

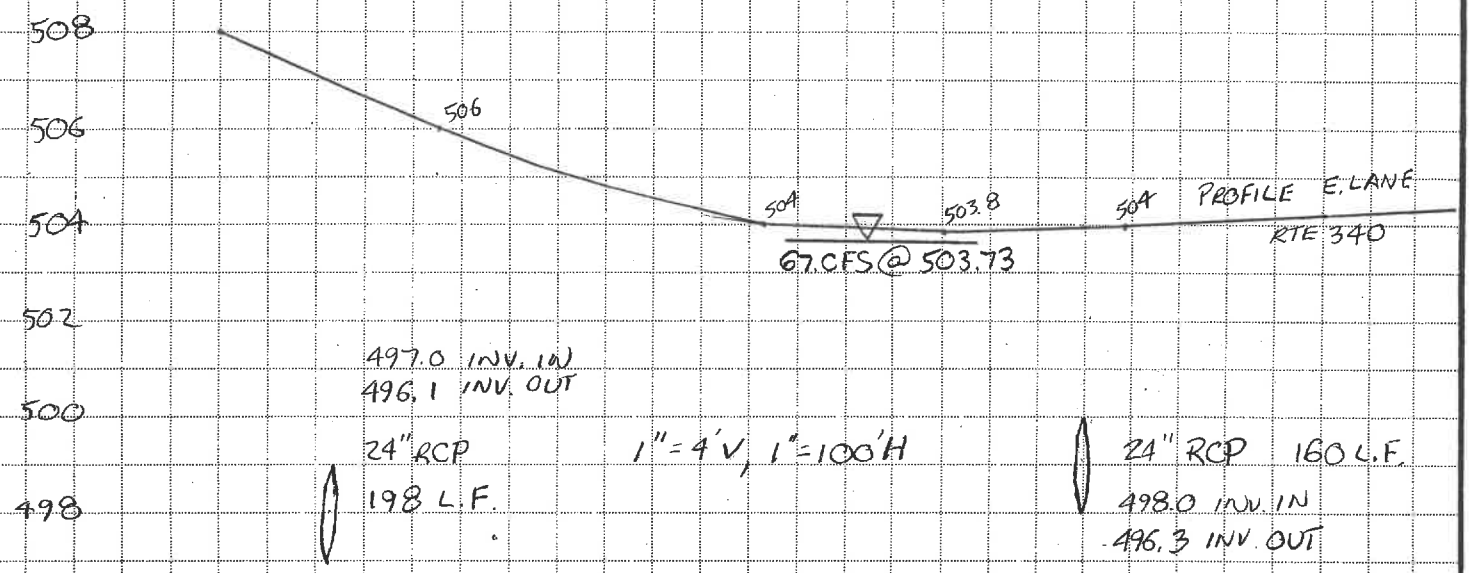
FLAT CHANNEL ≈ 140' TO 24" RCP CULVERT UNDER US RTE 340. A SECOND 24" RCP CULVERT IS ≈ 400' SOUTH WHICH ALSO CROSSES US RTE 340

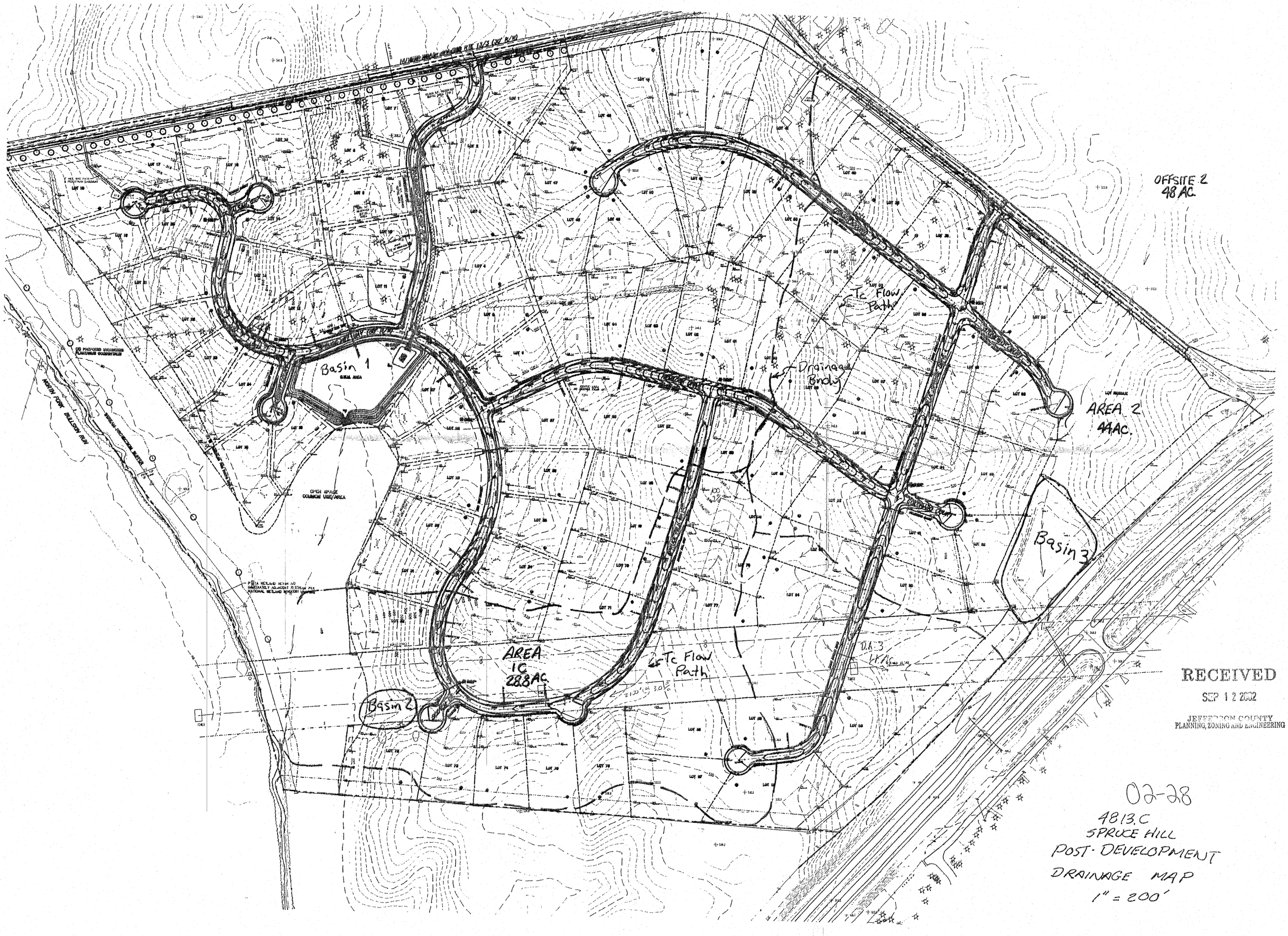
SEE FOLLOWING HY8 ANALYSIS FOR AFFECT ON US RTE 340

DOES NOT OVERTOP ROAD HAZARD CLASS 'A'

ASSOCIATED ENGINEERING SCIENCES INC.
34 West Franklin Street
HAGERSTOWN, MARYLAND 21741
(301) 797-9160 (301) 416-7105

JOB 4813 SPRUCE HILL
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____




OFFSITE 2
48 AC.
Tc Flow Path
Drainage Bndry
AREA 2
44AC.
Basin 1
Basin 3
AREA 1C
28.8AC
Tc Flow Path
Basin 2
D.A. 3
14 AC
NORTH FORK BULLSKIN RUN
OPEN SPACE COMMON USE AREA
RECEIVED
SEP 12 2002
JEFFERSON COUNTY
PLANNING, ZONING AND ENGINEERING
02-28
4813.C
SPRUCE HILL
POST-DEVELOPMENT
DRAINAGE MAP
1" = 200'

Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

BR - Norborne Glebe Phase 14B Bond Reduction - PC Technical Review

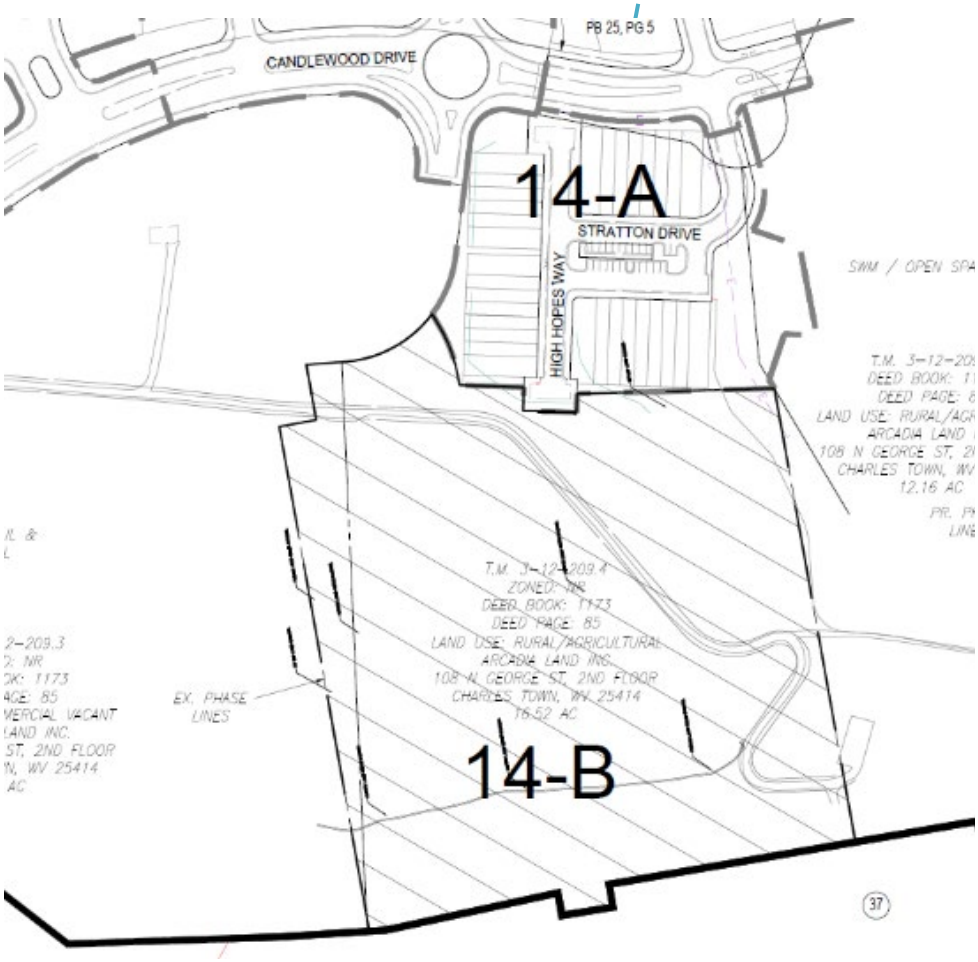
ATTACHMENTS:

- 1. Staff Report.pdf
- 2.Kimley-Horn Review.pdf
- 3. Performance Bond Reduction.pdf
- 4. Land Disturbance Bond Reduction.pdf
- 5.Bond information.pdf

Bond Reduction Request

Date: For the March 27, 2023 Planning Commission meeting
Applicant: Arcadia Land Inc.
Report by: James Newman, City Planner, Zoning/Subdivision Administrator.
Proposal: A bond reduction of $1,142,502.95

Norborne Glebe – Phase 14B



CURRENT BOND: Performance bond amount of $1,961,538.69 and a Land Disturbance Bond of $293.866.83

BACKGROUND:
The applicant, Arcadia Land Inc., has submitted a bond reduction request for the Norborne Glebe Subdivision – Phase 14B. The applicant is requesting a reduction of the **performance bond** amount from $ 1,961,538.69 to $**819,035.74** a reduction of $1,142,502.95

The **land disturbance** bond reduction is from $293,866.83 to **$123.437.57**, a reduction of $170,429.26.

Upon review of the request the City Engineer, Kimley-Horn, has determined that the bond reduction amount is a reasonable representation of the work completed in the field and shown in the as-built drawings.

BOND COMMITTEE

At their March 2, 2023 meeting, the City's Bond Committee discussed the application and recommend approval of the Performance Bond and Land Disturbance bonds as presented.

STAFF RECOMMENDATION

The City Engineer and City Staff have reviewed the bond reduction request and recommends the bond reduction request be **approved**.

Kimley»Horn

Memorandum

To: Daniel Murphy
Project Manager
Greenway Engineering
704 Foxcroft Avenue
Martinsburg, WV 25401

From: Mark Phillips, P.E.

Through: James Newman
City of Charles town
101 E Washington Street
Charles Town, WV 25414

Date: February 20, 2023

Subject: Norborne Glebe Subdivision Phase 14B Revised Bond Reduction Request Review – 2nd Submission

This memorandum summarizes our review of the Revised Bond Reduction Request for the Norborne Glebe Subdivision Phase 14B Bond Reduction application (dated February 16, 2023, prepared by Greenway Engineering) for a bond reduction (Performance and Land Disturbance) of $1,316,388.85. Using the Final Subdivision/Land Development Plat dated July 25, 2022, and a site visit conducted on February 15, 2023, it is our opinion that the quantities of work that have been presented on the bond reduction are a reasonable representation of the work completed in the field.

1. The Kimley-Horn comments dated February 15, 2023 to the Applicant have been addressed.

Thank you for the opportunity to review this Bond Reduction Request. In the meantime, please feel free to contact us at 703-870-3631 should you have any questions.

KIMLEY-HORN & ASSOCIATES, INC.

Mark Phillips, P.E.
Project Manager
Associate

Bond Request No._____

Norborne Glebe - Phase 14B
Performance Bond Reduction

RECEIVED
FEB 10 2023
BY:_____

BOND REQUEST AND REDUCTION

To assist the Subdivision Administrator in the review of a Bond Request Application, the Applicant must utilize this form to supply the City with the information prescribed under Article 1335 and Section 1332 of the Subdivision and Land Development Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's Bond Request Application as required by Ordinance Article 1335.

1. DATE February 2, 2023

2. APPLICATION TYPE ☐ Bond | Initiation ☒ Bond | Reduction

☐ Bond | Reallocation ☐ Bond | Release**

3. PROJECT NAME Norborne Glebe Subdivision - Phase 14B

Address N/A

4. APPLICANT'S NAME* Arcadia Land, Inc. Attn: Gary Endler

Address 108 N. George Street - 2nd Floor Charles Town, WV 25414

Telephone Number ( ) _____ Fax Number ( ) _____

Email Address 703-771-8000, gendler@arcadiacompanies.com

5. PROPERTY OWNER'S NAME Arcadia Land, Inc, Attn: Gary Endler

Address 108 N George Street - 2nd Floor Charles Town, WV 25414

Telephone Number ( ) _____ Fax Number ( ) _____

Email Address 703-771-8000, gendler@arcadiacompanies.com

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

**Requires a Public Hearing and landscaping surety for one year after release

Bond Request No._____

6. DESCRIPTION OF REQUETED INITIATION, REDUCTION, OR RELEASE:

Requesting Bond Reduction for the Performance Bond for Phase 14B, Norborne Glebe Subdivision

7. A) CURRENT BOND AMOUNT $1,961,538.69

B) PROPOSED BOND AMOUNT $ 700,948.34

8. PARCEL INVENTORY: (List all parcels that are part of this application):

Tax Map No.	Parcel No.	Deed Book	Page No.	Zoning District
Phase 14A	03120209004 and 031220209001	1173	85	

9. PARCEL HISTORY: (List all pending or previously approved applications on the subject parcels inventoried above, including previous plat applications if this application is an amendment)

Application No.	Project Name and Phase	Status	Approval Date

10. BOND RELEASE ATTACHMENTS.

The following shall be included with this request:

A. To the extent not previously submitted pursuant to bond reduction request, copies of inspection and test reports if work was inspected and tested by a third-party inspector.

B. Certification that all bonded Improvements, other than Improvements accepted by West Virginia Department of Highways (WVDOH), have been completed in accordance with the approved plans, profiles, and specifications and the requirements of any applicable manual. For Improvements to be accepted for maintenance by WVDOH, such Certification shall state that the Improvements have been installed and inspected in accordance with WVDOH's requirements.

C. A copy of the City-approved As-Built Drawings as required for facilities within public rights-of-way or Easements submitted pursuant to Section 1332.10 of this Ordinance.

Date of As-Builts _____ Prepared By _____

D. A letter from a Professional Engineer or Professional Land Surveyor certifying that property corners and Monuments have been set as required under this Ordinance.

E. Documentation of acceptance by WVDOH for public roadways and rights-of-way, or a maintenance and indemnification agreement and bond approved by the Planning Commission for public roadways that have been completed in accordance with WVDOH standards but which, due to factors other than their quality of construction, are not eligible for acceptance by WVDOH.

F. For private roadways, a letter of acceptance by the entity responsible for maintenance and a Latent Defects Indemnification Agreement and Bond in accordance with this Section.

G. Private Roadway Maintenance Bonds. Before a Performance Agreement and surety for private roadway construction shall be released, a Latent Defects Indemnification Agreement and Bond shall be provided by the applicant/Developer and approved by the Planning Commission. The guarantee provided by such Agreement and Bond must be for a period of two (2) years following the date of performance bond release, and must be in an amount equal to no less than 5% of the original performance bond estimate in accordance with Section 1335.07 (F) of the Subdivision Ordinance.

H. Landscaping Surety. Surety is required to ensure the landscaping shown on the Major S/LD plans is maintained for one (1) year. The one (1) year shall start from the date at which the surety for the site has been released, with the exception of this landscaping surety. The landscaping surety amount shall not be less than $5,000.00 or 10% of the total landscaping cost for the project, which every is greater.

Bond Request No._____

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Article 1335 of the S/LD Ordinance.

Signature of Applicant

_____ Date 2/4/2023

Treasurer

Signature of Property Owner (If different than Applicant)

_____ Date _____

Please submit an original completed Application, 1 digital copy and 1 paper copy of the As-Built Plans (if applicable) to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

Please also send a copy of the completed Application as well as the As-Builts to the following:

Hatch/Chester Engineers
Attn: Elizabeth Adamowicz
705 Quince Orchard Road, Suite 310
Gaithersburg, MD 20878

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Check No._____

Receipt No._____

Site Inspection Date:_____ Inspector:_____

Subdivision Administrator Approval:_____ Date:_____

Engineer Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

City Council Approval:_____ Date:_____

Comments:_____

_____

_____

_____

_____

Bond Request No._____

Norborne Glebe - Phase 14B
Land Disturbance Bond Reduction

RECEIVED
FEB 10 2023
BY:_____

BOND REQUEST AND REDUCTION

To assist the Subdivision Administrator in the review of a Bond Request Application, the Applicant must utilize this form to supply the City with the information prescribed under Article 1335 and Section 1332 of the Subdivision and Land Development Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's Bond Request Application as required by Ordinance Article 1335.

1. DATE February 2, 2023

2. APPLICATION TYPE ☐ Bond | Initiation ☒ Bond | Reduction

☐ Bond | Reallocation ☐ Bond | Release**

3. PROJECT NAME Norborne Glebe Subdivision - Phase 14B

Address N/A

4. APPLICANT'S NAME* Arcadia Land, Inc. Attn: Gary Endler

Address 108 N. George Street - 2nd Floor Charles Town, WV 25414

Telephone Number ( ) Fax Number ( )

Email Address 703-771-8000, gendler@arcadiacompanies.com

5. PROPERTY OWNER'S NAME Arcadia Land, Inc, Attn: Gary Endler

Address 108 N George Street - 2nd Floor Charles Town, WV 25414

Telephone Number ( ) Fax Number ( )

Email Address 703-771-8000, gendler@arcadiacompanies.com

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

**Requires a Public Hearing and landscaping surety for one year after release

Bond Request No._____

6. DESCRIPTION OF REQUETED INITIATION, REDUCTION, OR RELEASE:

Requesting Bond Reduction for the Land Disturbance Bond for Phase 14B, Norborne Glebe Subdivision

7. A) CURRENT BOND AMOUNT $293,866.83

B) PROPOSED BOND AMOUNT $ 123,437.57

8. PARCEL INVENTORY: (List all parcels that are part of this application):

Tax Map No.	Parcel No.	Deed Book	Page No.	Zoning District
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C. A copy of the City-approved As-Built Drawings as required for facilities within public rights-of-way or Easements submitted pursuant to Section 1332.10 of this Ordinance.

Date of As-Builts _____ Prepared By _____

D. A letter from a Professional Engineer or Professional Land Surveyor certifying that property corners and Monuments have been set as required under this Ordinance.

E. Documentation of acceptance by WVDOH for public roadways and rights-of-way, or a maintenance and indemnification agreement and bond approved by the Planning Commission for public roadways that have been completed in accordance with WVDOH standards but which, due to factors other than their quality of construction, are not eligible for acceptance by WVDOH.

F. For private roadways, a letter of acceptance by the entity responsible for maintenance and a Latent Defects Indemnification Agreement and Bond in accordance with this Section.

G. Private Roadway Maintenance Bonds. Before a Performance Agreement and surety for private roadway construction shall be released, a Latent Defects Indemnification Agreement and Bond shall be provided by the applicant/Developer and approved by the Planning Commission. The guarantee provided by such Agreement and Bond must be for a period of two (2) years following the date of performance bond release, and must be in an amount equal to no less than 5% of the original performance bond estimate in accordance with Section 1335.07 (F) of the Subdivision Ordinance.

H. Landscaping Surety. Surety is required to ensure the landscaping shown on the Major S/LD plans is maintained for one (1) year. The one (1) year shall start from the date at which the surety for the site has been released, with the exception of this landscaping surety. The landscaping surety amount shall not be less than $5,000.00 or 10% of the total landscaping cost for the project, which every is greater.

Bond Request No._____

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Article 1335 of the S/LD Ordinance.

Signature of Applicant

_____ Date 2/4/2022

Signature of Property Owner (If different than Applicant)

_____ Date _____

Please submit an original completed Application, 1 digital copy and 1 paper copy of the As-Built Plans (if applicable) to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

Please also send a copy of the completed Application as well as the As-Builts to the following:

Hatch/Chester Engineers
Attn: Elizabeth Adamowicz
705 Quince Orchard Road, Suite 310
Gaithersburg, MD 20878

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Check No._____

Receipt No._____

Site Inspection Date:_____ Inspector:_____

Subdivision Administrator Approval:_____ Date:_____

Engineer Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

City Council Approval:_____ Date:_____

Comments:_____

_____

_____

_____

_____

CITY OF CHARLES TOWN

LAND DISTURBANCE BOND UNIT COST LIST AND BOND REDUCTION FORM

This form shall be used to calculate the amount of the bond required to guarantee public improvements to be constructed under the approved Final S/LD Application. This form shall also be used in calculating the amount of bond reductions to be approved by the Planning Commission. **Note**: No bond shall be reduced until completion of at least thirty (30) percent of the physical Improvements secured by the bond.

PROJECT NAME:	Norborne Glebe - Phase 14B
PREPARED BY:	Greenway Engineering
DATE OF SUBMISSION	2-Feb-23

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
MOBILIZATION GENERAL								
Mobilization	LS	$6,250.00	1	$6,250.00	0.5	$3,125.00	50%	
Field Office	EA	$3,000.00			0.0	$0.00		
Job Sign	EA	$1,150.00			0.0	$0.00		
EROSION & SEDIMENT CONTROL								
Curb Inlet Protection	EA	$176.80	24	$4,243.20	24.0	$4,243.20	100%	
Grate Inlet Protection	EA	$200.00	5	$1,000.00	5.0	$1,000.00	100%	
Rock Check Dam	SY	$47.87	72	$3,446.64	72.0	$3,446.64	100%	
Outlet Protection	SY	$78.00	112	$8,706.36	111.6	$8,706.36	100%	
Temporary Seeding	SY	$0.77	71,535	$55,082.10	35,767.6	$27,541.05	50%	
Permanent Seeding	SY	$3.64	38,478	$140,059.92	19,239.0	$70,029.96	50%	
Level Spreader	SY	$0.00		$0.00	0.0	$0.00		
Stabilized Construction Entrance	EA	$2990.00	1	$2,990.00	1.0	$2,990.00	100%	
TOPSOIL REPLACEMENT								
Respread Topsoil	SY	$0.92	38,478	$35,399.76	38,478.0	$35,399.76	100%	
SPECIAL ITEMS								
Sediment Trap	LS			$0.00	0.0	$0.00		
Sediment Basin	LS			$0.00	0.0	$0.00		
Subtotal				$257,177.98				

TOTAL ESTIMATE OF COMPLETED WORK:

SubTOTAL:		$257,177.98
CONTINGENCIES:	10.0%	$25,717.80
TOTAL W/ CONTINGENCY:		$282,895.78
BOND PERIOD:	5	Years
ANNUAL INFLATION FACTOR:	1.02%	$14,427.68
Grand Total:		$297,323.47

TOTAL ESTIMATE OF REDUCTION:

SubTOTAL:	$156,481.97
CONTINGENCIES:	$15,648.20
TOTAL:	$172,130.17
INFLATION :	$1,755.73
Grand Total:	$173,885.90
Bond Remaining:	**$123,437.57**

CITY OF CHARLES TOWN

PERFORMANCE BOND UNIT COST LIST AND BOND REDUCTION FORM

This form shall be used to calculate the amount of the bond required to guarantee public improvements to be constructed under the approved Final S/LD Application. This form shall also be used in calculating the amount of bond reductions to be approved by the Planning Commission. **Note**: No bond shall be reduced until completion of at least thirty (30) percent of the physical Improvements secured by the bond.

PROJECT NAME:	Norborne Glebe - Phase 14B
PREPARED BY:	Greenway Engineering
DATE OF SUBMISSION	02/02/2023 Rev 02/16/2023

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
MOBILIZATION GENERAL								
Mobilization	LS	$6,250.00	1	$6,250.00	0.5	$3,125.00	50%	
Field Office	EA	$3,000.00			0.0	$0.00	0%	
Job Sign	EA	$1,150.00			0.0	$0.00	0%	
SURVEYING								
Steel Pipe Property Corner Marker Incl. Survey	EA	$275.00	328	$90,200.00	0.0	$0.00	0%	
R.O.W. MONUMENTS SURVEYED IN PLACE								
RM -- 1	EA	$825.00			0.0	$0.00	0%	
RM -- 2	EA	$575.00			0.0	$0.00	0%	
EARTHWORK EXCAVATION								
Regular Bulk used as Fill	CY	3.86	36,227.90	$139,839.69	36,227.9	$139,839.69	100%	
Rock, Rip	CY	17.30			0.0	$0.00	0%	
Rock, Blast	CY	38.48			0.0	$0.00	0%	
BORROW MATERIAL								
Buy, Load, Haul 10 Mi. Select Material	CY	28.90			0.0	$0.00	0%	
Fill and Compaction of On-site Borrow	CY	5.95	34,716.10	$206,560.80	34,716.1	$206,560.80	100%	
UNSUITABLE MATERIAL								
Load and Haul, 20 mi R/T	CY	$21.95			0.0	$0.00	0%	
Dump Charge	CY	37.50			0.0	$0.00	0%	
Site Grading	SY	0.75			0.0	$0.00	0%	
CLEAR & GRUB								
Light	AC	6,675.00	14.78	$98,656.50	14.8	$98,656.50	100%	
Moderate	AC	9,750.00			0.0	$0.00	0%	

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
Heavy	AC	$12,250.00			0.0	$0.00	0%	
Very Heavy	AC	$14,250.00			0.0	$0.00	0%	
LANDSCAPING								
Seeding	SY	$0.77	71,535.20	$55,082.10	35,767.6	$27,541.05	50%	
Sodding	SY	$3.64	38,478.00	$140,059.92	19,239.0	$70,029.96	50%	
PLANTING SHRUBS								
18”	EA	$40.00			0.0	$0.00	0%	
24”	EA	$70.00			0.0	$0.00	0%	
TREES								
6’ – 8’ (1-2 in. Caliper)	EA	$400.00	85	$34,000.00	0.0	$0.00	0%	
8’ – 10’ (2.5-3 in. Caliper)	EA	$700.00			0.0	$0.00	0%	
Tree Protection	LF	$9.00			0.0	$0.00	0%	
MISCELLANEOUS SITE IMPROVEMENTS								
RETAINING WALLS								
Timber Wall (Less Than 6 ft)	LF	$325.00			0.0	$0.00	0%	
Dry Rubble RW-1 (H=6')	LF	$450.00			0.0	$0.00	0%	
Mortared Rubble RW-1A (H=6')	LF	$535.00			0.0	$0.00	0%	
Concrete Gravity RW-2 (H=6')	LF	$339.00			0.0	$0.00	0%	
Concrete Gravity RW-3 (H=6')	LF	$378.00			0.0	$0.00	0%	
FENCING								
Std. Fence (H=5’) FR-5	LF	$9.31			0.0	$0.00	0%	
Farm Fence (H=5’) FR-3A	LF	$10.90			0.0	$0.00	0%	
Chain Link Fence (H=6’)FR 2-B	LF	$14.52			0.0	$0.00	0%	
Board Fence (H=6’)	LF	$19.35			0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
TOT LOTS									
Tot Lot	EA	$16,495.00				0.0	$0.00	0%	
STORM DRAINAGE									
STORM SEWER									
NOTE: All pipe unit prices include trench, excavation, bedding, pipe, & backfill									
Rock Excavation for All Pipe Types									
Less than 1,500 CY (Blasting)	CY	$110.00				0.0	$0.00	0%	
More than 1,500 CY (Blasting)	CY	$90.00				0.0	$0.00	0%	
Less than 1,500 CY (Hoe Ram)	CY	$135.00				0.0	$0.00	0%	
More than 1,500 CY (Hoe Ram)	CY	$110.00				0.0	$0.00	0%	
Trench De-watering									
Trench De-watering	LF	$2.95				0.0	$0.00	0%	
RCP CLASS III ROUND T & G W/MASTIC									
12" Pipe (RCP III)									
0' – 8' Cut	LF	$44.50				0.0	$0.00	0%	
8' – 14' Cut	LF	$62.50				0.0	$0.00	0%	
Add cost for Class IV	LF	$0.85				0.0	$0.00	0%	
O-Ring	LF	$5.50				0.0	$0.00	0%	
15" Pipe (RCP III)									
0' – 10' Cut	LF	$49.75				0.0	$0.00	0%	
10' – 16'	LF	$77.50				0.0	$0.00	0%	
Add Cost for Class IV	LF	$0.95				0.0	$0.00	0%	
O-Ring	LF	$5.50				0.0	$0.00	0%	
18" Pipe (RCP III)									
0' – 10' Cut	LF	$50.00				0.0	$0.00	0%	
10' – 16' Cut	LF	$80.00				0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
Add Cost for Class IV	LF	$2.00				0.0	$0.00	0%	
O-Ring	LF	$7.00				0.0	$0.00	0%	
21” Pipe (RCP III)									
0’ – 10’ Cut	LF	$57.50				0.0	$0.00	0%	
10’ – 16’ Cut	LF	$87.50				0.0	$0.00	0%	
Add Cost for Class IV	LF	$2.75				0.0	$0.00	0%	
O-Ring	LF	$13.00				0.0	$0.00	0%	
24” Pipe (RCP III)									
0’ – 10’ Cut	LF	$67.50				0.0	$0.00	0%	
10’ – 16’ Cut	LF	$95.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$3.15				0.0	$0.00	0%	
O-Ring	LF	$14.00				0.0	$0.00	0%	
27” Pipe (RCP III)									
0’ – 10’ Cut	LF	$60.00				0.0	$0.00	0%	
10’ – 16’ Cut	LF	$95.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$4.00				0.0	$0.00	0%	
O-Ring	LF	$15.00				0.0	$0.00	0%	
30” Pipe (RCP III)									
0’ – 10’ Cut	LF	$82.50				0.0	$0.00	0%	
10’ – 16’ Cut	LF	$125.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$6.00				0.0	$0.00	0%	
O-Ring	LF	$17.25				0.0	$0.00	0%	
33” Pipe (RCP III)									
0’ – 12’ Cut	LF	$115.00				0.0	$0.00	0%	
10’ – 18’ Cut	LF	$160.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$6.50				0.0	$0.00	0%	
O-Ring	LF	$21.95				0.0	$0.00	0%	
36” Pipe (RCP III)									
0’ – 12’ Cut	LF	$120.00				0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
12' – 18' Cut	LF	$175.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$7.75				0.0	$0.00	0%	
O-Ring	LF	$22.75				0.0	$0.00	0%	
42" Pipe (RCP III)									
0' – 12' Cut	LF	$140.00				0.0	$0.00	0%	
12' – 18' Cut	LF	$200.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$12.00				0.0	$0.00	0%	
O-Ring	LF	$35.45				0.0	$0.00	0%	
48" Pipe (RCP III)									
0' – 12' Cut	LF	$155.00				0.0	$0.00	0%	
12' – 18' Cut	LF	$215.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$12.50				0.0	$0.00	0%	
O-Ring	LF	$43.35				0.0	$0.00	0%	
54" Pipe (RCP III)									
0' – 12' Cut	LF	$190.00				0.0	$0.00	0%	
12' – 18' Cut	LF	$275.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$18.75				0.0	$0.00	0%	
O-Ring	LF	$44.45				0.0	$0.00	0%	
60" Pipe (RCP III)									
0' – 12' Cut	LF	$225.00				0.0	$0.00	0%	
12' – 18' Cut	LF	$335.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$22.50				0.0	$0.00	0%	
O-Ring	LF	$48.65				0.0	$0.00	0%	
ELLIPTICAL PIPE – RCP CLASS III									
23" X 14" (18" Equiv-RCP III									
0' – 10' Cut	LF	$75.00				0.0	$0.00	0%	
10' – 16' Cut	LF	$110.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$16.45				0.0	$0.00	0%	
O-Ring	LF	$43.35				0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
30” X 19” (24” Equiv-RCP III)									
0’ – 10’ Cut	LF	$90.00				0.0	$0.00	0%	
10’ – 16’ Cut	LF	$130.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$5.95				0.0	$0.00	0%	
O-Ring	LF	$43.35				0.0	$0.00	0%	
38” X 24” (30” Equiv-RCP III)									
0’ – 10’ Cut	LF	$120.00				0.0	$0.00	0%	
10’ – 16’ Cut	LF	$167.50				0.0	$0.00	0%	
Add Cost for Class IV	LF	$8.45				0.0	$0.00	0%	
O-Ring	LF	$51.35				0.0	$0.00	0%	
45” X 29” (36” Equiv-RCP III)									
0’ – 10’ Cut	LF	$165.00				0.0	$0.00	0%	
10’ – 16’ Cut	LF	$235.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$11.35				0.0	$0.00	0%	
O-Ring	LF	$53.35				0.0	$0.00	0%	
53” X 34” (42” Equiv-RCP III)									
0’ – 12’ Cut	LF	$210.00				0.0	$0.00	0%	
10’ – 18’ Cut	LF	$300.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$15.35				0.0	$0.00	0%	
O-Ring	LF	$58.95				0.0	$0.00	0%	
60” X 38” (48” Equiv-RCP III)									
0’ – 12’ Cut	LF	$255.00				0.0	$0.00	0%	
10’ – 18’ Cut	LF	$375.00				0.0	$0.00	0%	
Add Cost for Class IV	LF	$18.35				0.0	$0.00	0%	
O-Ring	LF	$69.95				0.0	$0.00	0%	
HDPE PIPE									
8" Pipe						0.0	$0.00	0%	
0'-8' Cut	LF	$28.65				0.0	$0.00	0%	
8'-14' Cut	LF	$43.15				0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
12" Pipe									
0'-8' Cut	LF	$38.95				0.0	$0.00	0%	
8'-14' Cut	LF	$57.75				0.0	$0.00	0%	
15" Pipe									
0'-8' Cut	LF	$50.25	1,132.00	$56,883.00		1,132.0	$56,883.00	100%	
8'-16' Cut	LF	$74.85				0.0	$0.00	0%	
18" Pipe									
0'-8' Cut	LF	$66.00	297.00	$19,602.00		297.0	$19,602.00	100%	
8'-16' Cut	LF	$98.55				0.0	$0.00	0%	
24" Pipe									
0'-8' Cut	LF	$76.90	100			100.0	$7,690.00	100%	
8'-16' Cut	LF	$115.25				0.0	$0.00	0%	
30" Pipe									
0'-8' Cut	LF	$91.33				0.0	$0.00	0%	
8'-16' Cut	LF	$137.27				0.0	$0.00	0%	
36" Pipe									
0'-8' Cut	LF	$101.68				0.0	$0.00	0%	
8'-16' Cut	LF	$152.33				0.0	$0.00	0%	
42" Pipe									
0'-8' Cut	LF	$113.99				0.0	$0.00	0%	
8'-16' Cut	LF	$171.00				0.0	$0.00	0%	
48" Pipe									
0'-8' Cut	LF	$129.55				0.0	$0.00	0%	
8'-16' Cut	LF	$195.66				0.0	$0.00	0%	
STORM STRUCTURES									
END SECTIONS									
End Section (ES-1), Concrete Pipe Size									
15”	EA	$485.00	1	$485.00		0.0	$0.00	0%	

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
18”	EA	$565.00	1	$565.00	1.0	$565.00	100%	
21”	EA	$645.00			0.0	$0.00	0%	
24”	EA	$755.00	2	$1,510.00	2.0	$1,510.00	100%	
27”	EA	$1,065.00			0.0	$0.00	0%	
30”	EA	$1,195.00			0.0	$0.00	0%	
36”	EA	$1,765.00			0.0	$0.00	0%	
42”	EA	$1,795.00			0.0	$0.00	0%	
48”	EA	$2,135.00			0.0	$0.00	0%	
54”	EA	$2,795.00			0.0	$0.00	0%	
60”	EA	$3,455.00			0.0	$0.00	0%	
ENDWALLS								
EW-1(Pre-cast) Round Pipe Size								
15”	EA	$800.00			0.0	$0.00	0%	
18”	EA	$1,337.00			0.0	$0.00	0%	
24”	EA	$2,021.00			0.0	$0.00	0%	
30”	EA	$2,133.00			0.0	$0.00	0%	
36”	EA	$2,366.00			0.0	$0.00	0%	
EW-1 Cast in Place [Round Pipe Size]								
15”	EA	$852.00			0.0	$0.00	0%	
18”	EA	$1,053.00			0.0	$0.00	0%	
24”	EA	$1,495.00			0.0	$0.00	0%	
30”	EA	$2,144.00			0.0	$0.00	0%	
36”	EA	$2,383.00			0.0	$0.00	0%	
EW-1A (Pre-Cast) Elliptical Pipe Size								
23” X 14” (18”)	EA	$695.00			0.0	$0.00	0%	
30” X 19” (24”)	EA	$969.00			0.0	$0.00	0%	
38” X 24” (30”)	EA	$1,165.00			0.0	$0.00	0%	
45” X 29” (36”)	EA	$1,445.00			0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
53” X 34” (42”)	EA	$1,840.00				0.0	$0.00	0%	
EW-1A (Cast in Place) Elliptical Pipe Size									
23” X 14” (18”)	EA	$667.00				0.0	$0.00	0%	
30” X 19” (24”)	EA	$939.00				0.0	$0.00	0%	
38” X 24” (30”)	EA	$1,247.00				0.0	$0.00	0%	
45” X 29” (36”)	EA	$1,618.00				0.0	$0.00	0%	
53” X 34” (42”)	EA	$2,109.00				0.0	$0.00	0%	
EW-2 (PreCast) Round Pipe Size									
42”	EA	$5,445.00				0.0	$0.00	0%	
48”	EA	$5,695.00				0.0	$0.00	0%	
54”	EA	$6,660.00				0.0	$0.00	0%	
60”	EA	$7,140.00				0.0	$0.00	0%	
72”	EA	$7,990.00				0.0	$0.00	0%	
84”	EA	$9,490.00				0.0	$0.00	0%	
EW-2 (Cast in Place) Round Pipe Size									
42”	EA	$4,723.00				0.0	$0.00	0%	
48”	EA	$6,039.00				0.0	$0.00	0%	
54”	EA	$6,972.00				0.0	$0.00	0%	
60”	EA	$8,179.00				0.0	$0.00	0%	
72”	EA	$10,713.00				0.0	$0.00	0%	
84”	EA	$12,288.00				0.0	$0.00	0%	
(EW-6PC) [Double Pipe] Pipe Size									
2-15”	EA	$999.00				0.0	$0.00	0%	
2-18”	EA	$1,235.00				0.0	$0.00	0%	
2-24”	EA	$1,510.00				0.0	$0.00	0%	
2-30”	EA	$2,165.00				0.0	$0.00	0%	
2-36”	EA	$2,647.00				0.0	$0.00	0%	

MANHOLES									
BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
Standard Brick Manhole Std Frame & Cover (MH-1)									
6' Depth	EA	$3,750.00				0.0	$0.00	0%	
Depth below 6'	VF	$163.00				0.0	$0.00	0%	
Standard Precast Manhole Std Frame & Cover (MH-2)									
6' Depth	EA	$3,100.00	1	$3,100.00		1.0	$3,100.00	100%	
Depth below 6'	VF	$177.00	0.879	$155.58		0.9	$155.58	100%	
Additional Cost (Amounts in parentheses to be added to the above unit costs)									
Watertight Fr/Cover (Add 110)	EA	$579.00				0.0	$0.00	0%	
Heavy Duty Fr/Cover (Add 82)	EA	$599.00				0.0	$0.00	0%	
DROP INLETS									
Cast in Place 48"									
Drop Inlet (DI-1) 12" – 24" Pipe0-10 VF	EA	$3,697.00				0.0	$0.00	0%	
Drop Inlet (DI-1A) 12" – 24" Pipe 10-20 VF	EA	$5,593.00				0.0	$0.00	0%	
Drop Inlet (DI-2) 12" – 24" Pipe0-10 VF, 10' throat	EA	$6,911.00				0.0	$0.00	0%	
Drop Inlet (DI-2A) 12" – 24" Pipe 10-20 VF, 10' throat	EA	$8,833.00				0.0	$0.00	0%	
CURB DROP INLETS									
Curb Drop Inlet (DI-3A)									
12"-30" Pipe (Invert Depth (H) =0'-8') Inlet Length 2'-6"	EA	$4,088.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-3AA)									
12"-30" Pipe (Invert Depth (H) =8'-20') Inlet Length 2'-6"	EA	$5,357.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-3B & DI-12) 12"-30" Pipe (Invert Depth (H) =0'-8') Inlet Length									
4'	EA	$4,279.00				0.0	$0.00	0%	

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
6’	EA	$4,573.00	15	$68,595.00	15.0	$68,595.00	100%	
8’	EA	$4,889.00			0.0	$0.00	0%	
MH	EA	$5,052.00			0.0	$0.00	0%	
12’	EA	$5,227.00			0.0	$0.00	0%	
16’	EA	$5,543.00			0.0	$0.00	0%	
20’	EA	$5,859.00			0.0	$0.00	0%	
Curb Drop Inlet (DI-3BB) 12”-30” Pipe (Invert Depth (H) =8’-20’) Inlet Length								
4’	EA	$4,276.00			0.0	$0.00	0%	
6’	EA	$4,848.00			0.0	$0.00	0%	
8’	EA	$5,429.00			0.0	$0.00	0%	
10'	EA	$5,732.00			0.0	$0.00	0%	
12’	EA	$6,011.00			0.0	$0.00	0%	
16’	EA	$6,296.00			0.0	$0.00	0%	
20’	EA	$6,599.00			0.0	$0.00	0%	
Curb Drop Inlet (DI-3C) 12”-30” Pipe (Invert Depth (H) =0’-8’) Inlet Length								
6’	EA	$4,013.00	4	$16,052.00	4.0	$16,052.00	100%	
8’	EA	$4,588.00			0.0	$0.00	0%	
10'	EA	$4,893.00			0.0	$0.00	0%	
12’	EA	$5,178.00			0.0	$0.00	0%	
16’	EA	$5,766.00			0.0	$0.00	0%	
20’	EA	$6,339.00			0.0	$0.00	0%	
Curb Drop Inlet (DI-3CC) 12”-30” Pipe (Invert Depth (H) =8’-20’) Inlet Length								
6’	EA	$4,746.00			0.0	$0.00	0%	
8’	EA	$5,293.00			0.0	$0.00	0%	
10'	EA	$5,627.00			0.0	$0.00	0%	
12’	EA	$5,988.00			0.0	$0.00	0%	
16’	EA	$6,772.00			0.0	$0.00	0%	
20’	EA	$7,465.00			0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
Curb Drop Inlet (DI-3D)									
12”-30” Pipe (Invert Depth (H) =0’-8’) Inlet Length 2’-6”	EA	$3,633.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-3DD)									
12”-30” Pipe (Invert Depth (H) =8’-20’) Inlet Length 2’-6”	EA	$4,367.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-3E) 12”-30” Pipe (Invert Depth (H) =0’-8’) Inlet Length									
4’	EA	$4,093.00				0.0	$0.00	0%	
8’	EA	$4,756.00				0.0	$0.00	0%	
10'	EA	$5,724.00				0.0	$0.00	0%	
12'	EA	$5,833.00				0.0	$0.00	0%	
16’	EA	$6,072.00				0.0	$0.00	0%	
20’	EA	$6,709.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-3EE) 12”-30” Pipe (Invert Depth (H) =8’-20’) Inlet Length									
6’	EA	$7,562.00				0.0	$0.00	0%	
8’	EA	$7,869.00				0.0	$0.00	0%	
10'	EA	$7,999.00				0.0	$0.00	0%	
12’	EA	$8,166.00				0.0	$0.00	0%	
16’	EA	$8,471.00				0.0	$0.00	0%	
20’	EA	$8,767.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-3F) 12”-30” Pipe Inlet Length (Invert Depth (H)=0’-8’)									
6’	EA	$3,765.00				0.0	$0.00	0%	
8’	EA	$4,419.00				0.0	$0.00	0%	
10'	EA	$4,749.00				0.0	$0.00	0%	
12’	EA	$5,085.00				0.0	$0.00	0%	
16’	EA	$5,742.00				0.0	$0.00	0%	
20’	EA	$6,395.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-3FF) 12”-30” Pipe (Invert Depth (H) =8’-20’) Inlet Length									

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
6’	EA	$8,077.00				0.0	$0.00	0%	
8’	EA	$8,288.00				0.0	$0.00	0%	
10'	EA	$8,480.00				0.0	$0.00	0%	
12’	EA	$8,669.00				0.0	$0.00	0%	
16’	EA	$9,047.00				0.0	$0.00	0%	
20’	EA	$9,446.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4A) 36”–48” Pipe (Invert Depth (H)=0’-8’) Inlet Length									
4’	EA	$4,868.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4AA) 36”–48” Pipe (Invert Depth (H)=0’-8’) Inlet Length									
4'	EA	$6,817.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4B) 36”-48” Pipe (Invert Depth (H) =0’-8’) Inlet Length									
6’	EA	$5,172.00				0.0	$0.00	0%	
8’	EA	$5,499.00				0.0	$0.00	0%	
10'	EA	$5,698.00				0.0	$0.00	0%	
12’	EA	$5,870.00				0.0	$0.00	0%	
16’	EA	$6,221.00				0.0	$0.00	0%	
20’	EA	$6,571.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4BB) 36”-48” Pipe (Invert Depth (H) =8’-20') Inlet Length									
6’	EA	$10,292.00				0.0	$0.00	0%	
8’	EA	$10,643.00				0.0	$0.00	0%	
10'	EA	$10,810.00				0.0	$0.00	0%	
12’	EA	$10,974.00				0.0	$0.00	0%	
16’	EA	$11,309.00				0.0	$0.00	0%	
20’	EA	$11,669.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4C) 36”-48” Pipe (Invert Depth (H) =0’-8’) Inlet Length									
8’	EA	$5,612.00				0.0	$0.00	0%	
10'	EA	$5,794.00				0.0	$0.00	0%	
12’	EA	$5,968.00				0.0	$0.00	0%	
16’	EA	$6,315.00				0.0	$0.00	0%	

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
20’	EA	$6,657.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4CC) 36”-48” Pipe (Invert Depth (H) =8’-20’) Inlet Length									
8’	EA	$13,371.00				0.0	$0.00	0%	
10'	EA	$13,693.00				0.0	$0.00	0%	
12’	EA	$14,097.00				0.0	$0.00	0%	
16’	EA	$14,712.00				0.0	$0.00	0%	
20’	EA	$15,365.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4D)									
36”-48” Pipe (Invert Depth (H) =0’-8’) Inlet Length 4'	EA	$4,933.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4DD)									
36”-48” Pipe (Invert Depth (H) =8’-16’) Inlet Length 4'	EA	$9,455.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4E) 36”-48” Pipe (Invert Depth (H) =0’-8’) Inlet Length									
6'	EA	$5,267.00				0.0	$0.00	0%	
8’	EA	$5,605.00				0.0	$0.00	0%	
10'	EA	$5,896.00				0.0	$0.00	0%	
12'	EA	$6,233.00				0.0	$0.00	0%	
16’	EA	$6,996.00				0.0	$0.00	0%	
20’	EA	$7,695.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4EE) 36”-48” Pipe (Invert Depth (H) =8’-16’) Inlet Length									
6’	EA	$9,165.00				0.0	$0.00	0%	
8’	EA	$9,495.00				0.0	$0.00	0%	
10'	EA	$9,839.00				0.0	$0.00	0%	
12’	EA	$10,167.00				0.0	$0.00	0%	
16’	EA	$10,838.00				0.0	$0.00	0%	
20’	EA	$11,483.00				0.0	$0.00	0%	
Curb Drop Inlet (DI-4F) 36”-48" Pipe Inlet Length (Invert Depth (H)=0’-8’)									

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
8’	EA	$5,877.00			0.0	$0.00	0%	
10'	EA	$6,209.00			0.0	$0.00	0%	
12’	EA	$6,568.00			0.0	$0.00	0%	
16’	EA	$7,259.00			0.0	$0.00	0%	
20’	EA	$7,963.00			0.0	$0.00	0%	
Curb Drop Inlet (DI-4FF) 36”-48” Pipe (Invert Depth (H) =8’-16’) Inlet Length								
8’	EA	$8,866.00			0.0	$0.00	0%	
10'	EA	$9,147.00			0.0	$0.00	0%	
12’	EA	$9,435.00			0.0	$0.00	0%	
16’	EA	$9,997.00			0.0	$0.00	0%	
20’	EA	$10,584.00			0.0	$0.00	0%	
Median Drop Inlets - CIP								
Median Drop Inlet **(DI-6A)** 12”-24” Pipe Inlet (H=8’)	EA	$4,205.00			0.0	$0.00	0%	
Median Drop Inlet **(DI-6B)** 12”-24” Pipe Inlet (H=8’)	EA	$4,267.00			0.0	$0.00	0%	
Median Drop Inlet **(DI-6C)** 30”-48” Pipe Inlet (H=10’)	EA	$5,589.00			0.0	$0.00	0%	
Median Drop Inlet **(DI-6D)** 30”-48” Pipe Inlet (H=10’)	EA	$5,692.00			0.0	$0.00	0%	
Median Drop Inlet **(DI-7)** Type III Top 12”-42” Pipe Inlet (H=10’)	EA	$5,748.00	2	$11,496.00	2.0	$11,496.00	100%	
Median Drop Inlet **(DI-7A)** Type III Top 12”-42” Pipe Inlet (H=10’)	EA	$6,338.00			0.0	$0.00	0%	
Median Drop Inlet **(DI-7B)** Type III Top 12”-42” Pipe Inlet (H=10’)	EA	$6,797.00			0.0	$0.00	0%	

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
MISCELLANEOUS INLETS								
Ditch Drop Inlet, **(DI-5)** Type III Tip 12”-42” Pipe Inlet (H=8’)	EA	$5,226.00			0.0	$0.00	0%	
Standard Yard Inlet **(YI-1)** 12”-48” Pipe (Invert Depth (H)=0’-8’) Inlet Length 4’(No Aprons)	EA	$4,749.00	0	$0.00	0.0	$0.00	0%	
Add Yard Inlet Apron	THROAT	$255.00			0.0	$0.00	0%	
Standard Yard Inlet **(YI-3)** 12”-48” Pipe (Invert Depth (H)=0’-8’) Inlet Length 4’(No Aprons)	EA	$5,127.00			0.0	$0.00	0%	
Add Yard Inlet Apron	THROAT	$255.00			0.0	$0.00	0%	
CULVERTS								
Single Box Culvert (BC-1A) Fills to 25’								
4’ X 4’	LF	$336.00			0.0	$0.00	0%	
5’ x 5”	LF	$410.00			0.0	$0.00	0%	
6’ X 6’	LF	$498.00			0.0	$0.00	0%	
8’ X 8’	LF	$699.00			0.0	$0.00	0%	
10’ X 10’	LF	$845.00			0.0	$0.00	0%	
Double Box Culvert (BC-2b) Fills to 25’								
4’ X 4’	LF	$566.00			0.0	$0.00	0%	
5’ x 5”	LF	$705.00			0.0	$0.00	0%	
6’ X 6’	LF	$854.00			0.0	$0.00	0%	
8’ X 8’	LF	$1,148.00			0.0	$0.00	0%	
10’ X 10’	LF	$1,411.00			0.0	$0.00	0%	
Oversized Single Box Culvert (BBC-1) Fills to 25’								

BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
12’ X 6’	LF	$1,026.00				0.0	$0.00	0%	
12’ X 8’	LF	$1,144.00				0.0	$0.00	0%	
12’ X 10’	LF	$1,239.00				0.0	$0.00	0%	
12’ X 12’	LF	$1,348.00				0.0	$0.00	0%	
Triple Box Culvert (BC-3B) Fills to 25’									
4’ X 4’	LF	$779.00				0.0	$0.00	0%	
5’ x 5”	LF	$965.00				0.0	$0.00	0%	
6’ X 6’	LF	$1,211.00				0.0	$0.00	0%	
8’ X 8’	LF	$1,633.00				0.0	$0.00	0%	
10’ X 10’	LF	$2,488.00				0.0	$0.00	0%	
Quadruple Box Culvert (BC-4B) Fills to 25’									
4’ X 4’	LF	$987.00				0.0	$0.00	0%	
5’ x 5”	LF	$1,225.00				0.0	$0.00	0%	
6’ X 6’	LF	$1,523.00				0.0	$0.00	0%	
8’ X 8’	LF	$1,497.00				0.0	$0.00	0%	
10’ X 10’	LF	$2,835.00				0.0	$0.00	0%	
Standard Wing for Box Culvert (1 Side Only) Height of Box									
4’	EA	$675.00				0.0	$0.00	0%	
5’	EA	$995.00				0.0	$0.00	0%	
6’	EA	$1,337.00				0.0	$0.00	0%	
8’	EA	$2,489.00				0.0	$0.00	0%	
10’	EA	$3,315.00				0.0	$0.00	0%	
Standard Wing for Oversized Box Culvert(BBC-W) Height of Box									
6’	EA	$1,351.00				0.0	$0.00	0%	
8’	EA	$2,189.00				0.0	$0.00	0%	
10’	EA	$3,269.00				0.0	$0.00	0%	
12’	EA	$4,763.00				0.0	$0.00	0%	

MISCELLANEOUS STORM									
BOND ESTIMATE						BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION		QUANTITY	EXTENSION	%COMPLETE	% Approved
Connection to Existing Structure									
15”-36” Pipe	EA	$735.00				0.0	$0.00	0%	
42”- 60” Pipe	EA	$1,125.00				0.0	$0.00	0%	
Casing Pipe, Bore and Jack (3/8” wall)									
22” ID (6”-8” Carrier Pipe)	LF	$411.00				0.0	$0.00	0%	
24” ID (10” Carrier Pipe)	LF	$451.00				0.0	$0.00	0%	
30” ID (12” Carrier Pipe)	LF	$569.00				0.0	$0.00	0%	
Plug Pipe									
6” –12” Pipe	EA	$142.00				0.0	$0.00	0%	
15”-36” Pipe	EA	$323.00				0.0	$0.00	0%	
42”- 60” Pipe	EA	$522.00				0.0	$0.00	0%	
Pavement Edge Pipe									
Standard Pipe Underdrain	LF	$19.00				0.0	$0.00	0%	
Riprap									
Dry, Class I, 18”	SY	$47.87	894.00	$42,795.78		894.0	$42,795.78	100%	
Dry, Class II, 18”	SY	$51.46				0.0	$0.00	0%	
Grouted, Class I, 18”	SY	$69.97				0.0	$0.00	0%	
Filter Fabric									
Class I	SY	$3.50				0.0	$0.00	0%	
Class II	SY	$3.00				0.0	$0.00	0%	
Class III	SY	$2.25				0.0	$0.00	0%	
Gabions (No excavation)									
Mattress	CY	$130.00				0.0	$0.00	0%	
Revetment	CY	$164.33				0.0	$0.00	0%	
Wall	CY	$212.25				0.0	$0.00	0%	
Paved Ditch (4” Thick)									
Concrete (Non-reinforced)	SY	$62.00				0.0	$0.00	0%	
Bituminous Concrete(4”)	SY	$30.00				0.0	$0.00	0%	
Sodded Ditch									

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
Sodded Ditch (Incl Fine Grading)	SY	$9.86			0.0	$0.00	0%	
STREET CONSTRUCTION								
ROADS AND PARKING								
Soil Stabilization	**Inches**							
Cement 6%	SY/Inch Depth	$2.70			0.0	$0.00	0%	
Depth (in Inches):								
Lime 6%	SY/Inch Depth	$1.89			0.0	$0.00	0%	
Depth (in Inches):								
Subbase, Aggregated Material								
Base Type I	SY/Inch Depth	$1.75	7,696	$107,744.00	7,696.0	$13,468.00	100%	
Depth (in Inches):		8						
Bituminous Concrete								
Base Course	SY/Inch Depth	$5.59	7,696.00	$129,061.92	7,696.0	$43,020.64	100%	
Depth (in Inches):		3						
Intermediate Course	SY/Inch Depth	$5.49			0.0	$0.00	0%	
Depth (in Inches):								
Top Course	SY/Inch Depth	$5.49	7,696.00	$84,502.08	7,696.0	$42,251.04	100%	
Depth (in Inches):		2						
Prime Coat	SY	$1.10			0.0	$0.00	0%	
Tack Coat	SY	$1.10			0.0	$0.00	0%	
Driveway Restoration								
4” Concrete & 4” Gravel	SY	$79.95			0.0	$0.00	0%	

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
2” S-5 & 7 6” Gravel	SY	$31.96			0.0	$0.00	0%	
Shoulders, Type I								
Aggregated Base, 4” (Sidewalk)	SY	$11.50	2,090.10	$24,036.12	0.0	$0.00	0%	
Concrete Curbing								
Curb & Gutter CG6 & CG7	LF	$22.50	4,389.26	$98,758.35	4,389.3	$98,758.35	100%	
Curb Cut, CG-12 Detectable Surf.	EA	$569.00	10	$5,690.00	10.0	$5,690.00	100%	
Entrances/Driveways								
Commercial Entrance CG-11	SY	$52.88			0.0	$0.00	0%	
Commercial Entrance CG-13	SY	$64.67			0.0	$0.00	0%	
Residential Driveway Apron	SY	$51.79			0.0	$0.00	0%	
Guardrails								
Std. Blocked-out W beam (GR2)	LF	$42.50			0.0	$0.00	0%	
Std. W beam, Weak Post GR8	LF	$28.50			0.0	$0.00	0%	
Terminal, GR-6 (L=12’-6”)	EA	$2,929.00			0.0	$0.00	0%	
Terminal, GR-7 (L=6’-3”)	EA	$2,659.00			0.0	$0.00	0%	
Type I, GR-8 Terminal (L=25’)	EA	$1,399.00			0.0	$0.00	0%	
Type II, GR-8 Terminal (L=13’-6”)	EA	$695.00			0.0	$0.00	0%	
Terminal, MB-4 (L=37’-6”)	EA	$3,495.00			0.0	$0.00	0%	
Type I, MB-5 Terminal (L=27’-1)	EA	$2,925.00			0.0	$0.00	0%	
Type II, MB-5 Terminal (L=13’-6)	EA	$1,675.00			0.0	$0.00	0%	
Miscellaneous								
Trash enclosure - Brick 6' high	LF	$325.00			0.0	$0.00	0%	
Reinforced Concrete Pad 6" to 8"	SY	$62.00			0.0	$0.00	0%	
Striping 4" width (VDOT Type	LF	$2.25			0.0	$0.00	0%	

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
B)					0.0	$0.00	0%	
Concrete Wheel Stops	EA	$70.00			0.0	$0.00	0%	
Parking Lot Striping	EA	$50.00			0.0	$0.00	0%	
Sign Island	EA	$850.00			0.0	$0.00	0%	
Traffic Barricade	LF	$43.45			0.0	$0.00	0%	
Street Name Signs	EA	$435.00	4	$1,740.00	4.0	$1,740.00	100%	
Traffic Control Signs	EA	$375.00	6	$2,250.00	6.0	$2,250.00	100%	
Street Light (pole, bracket, light)	EA	$4,285.00	30	$128,550.00	0.0	$0.00	0%	
SIDEWALKS AND TRAILS								
Sidewalk								
Concrete 4” w/WWF, No base	SY	$45.23	2,090	$94,535.12	0.0	$0.00	0%	
Bitum. Conc, 2” w/4” Base	SY	$30.00			0.0	$0.00	0%	
4” Conc, No Reinf., No Base	SY	$41.00			0.0	$0.00	0%	
HANDRAIL								
Handrail 3 Rail 1-1/4” #4 Finish	LF	$96.50			0.0	$0.00	0%	
Wood Chip Trail								
Trails(Incl Excavation & Grading) Wood chip, 4’ wide	SY	$17.69			0.0	$0.00	0%	
Bituminous Trail								
6’ to 10' wide	SY	$49.25	387	$19,059.75	0.0	$0.00	0%	
CRITICAL SLOPE STABILIZATION								
Paved Flume	SY	$67.00			0.0	$0.00	0%	
Stmwtr Conc Channel-Excav	SY	$7.75			0.0	$0.00	0%	
ADD Grass Lined-seeded	SY	$5.37			0.0	$0.00	0%	
ADD Grass Lined-sodded	SY	$10.89			0.0	$0.00	0%	
Outlet Protection								
Non-grouted Riprap 18”	SY	$52.00	333.00	$17,316.00	333.0	$17,316.00	100%	
Concrete 4”	SY	$53.50			0.0	$0.00	0%	

BOND ESTIMATE					BOND REDUCTION			City Use Only
ITEM	UNIT	UNIT COST	QUANTITY	EXTENSION	QUANTITY	EXTENSION	%COMPLETE	% Approved
Level Spreader	SY	$4.44			0.0	$0.00	0%	
Struc Streambank Protection								
Non-grouted Riprap 18”	SY	$58.00			0.0	$0.00	0%	
Gabions	CY	$147.00			0.0	$0.00	0%	
Vegetative Erosion Control								
Sodding incl Fertilizing – Banks	SY	$7.77			0.0	$0.00	0%	
Sodding incl Fertilizing – Flat	SY	$5.36			0.0	$0.00	0%	
Seeding incl Fertilizing	SY	$2.44			0.0	$0.00	0%	
Soding W/Soil Treat & Watering	SY	$3.25			0.0	$0.00	0%	
Seeding W/Soil Treat & Watering	SY	$6.46			0.0	$0.00	0%	
Straw Mulch w/Tack	SY	$1.40			0.0	$0.00	0%	
Jute Mesh	SY	$1.77			0.0	$0.00	0%	
SPECIAL ITEMS								
FEMA Processing LOMR/CLOMR	EA	$7,500.00			0.0	$0.00	0%	
As Built (Record Drawings)	EA	$9,500.00	1	$9,500.00	0.0	$0.00	0%	
SWM/BMP POND	LS				0.0	$0.00	0%	
SIGNALIZATION	LS				0.0	$0.00	0%	
Subtotal				$1,714,631.72				

TOTAL ESTIMATE OF COMPLETED WORK:

SubTOTAL:		$1,714,631.72
CONTINGENCIES:	10.0%	$171,463.17
TOTAL:		$1,886,094.90
INFLATION FACTOR:	4.0%	$75,443.80
Grand Total:		$1,961,538.69

TOTAL ESTIMATE OF REDUCTION:

SubTOTAL:	$998,691.39
CONTINGENCIES:	$99,869.14
TOTAL:	$1,098,560.53
INFLATION :	$43,942.42
Grand Total:	$1,142,502.95
Bond Remaining:	**$819,035.74**

Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

SLD2023-02 Westover Holdings Land Development - PC Technical Review

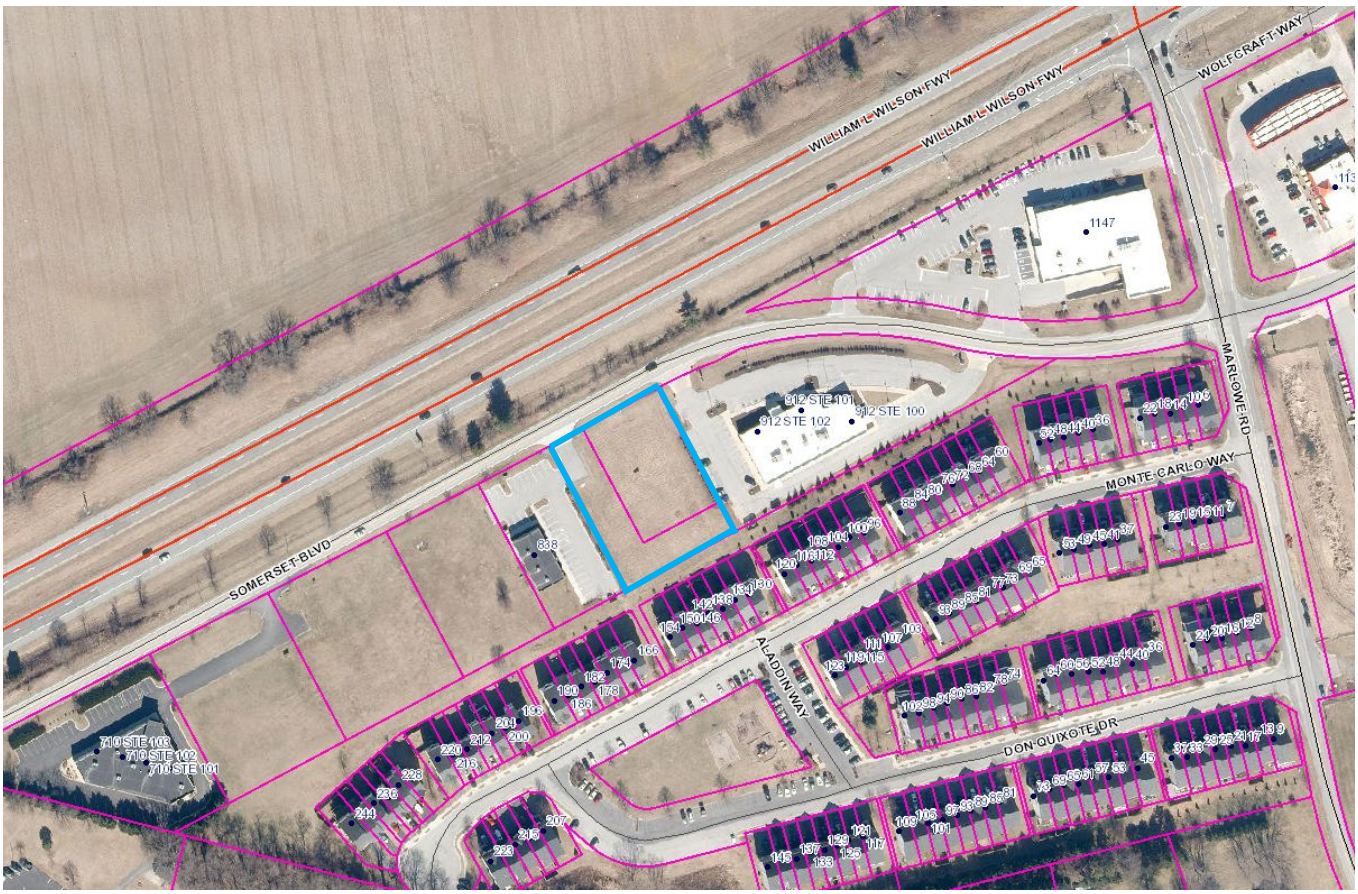
ATTACHMENTS:

- 1. Staff Report.pdf
- 2. Application.pdf
- 3. Recorded Merger Deed.pdf
- 4. Plans.pdf

Sketch Plan Completeness Review

SLD2023-02/200409

Date: For the March 27th, 2023 Planning Commission meeting
Applicant: Westover Holdings LLC
Property Owner: Grasso and Sons Development Corp. (Lot 6); Somerset LLC (Lot 5.0001)
Report by: James Newman, City Planner, Zoning/Subdivision Administrator.
Proposal: Major land development
Property Location: TD: 03 / Map: 16A / Pcl: 0005.0001 & TD: 03 / Map: 16A / Pcl: 0006.0000, located on Somerset Blvd. Parcel is outlined in **blue** below.
Current Zoning: General Commercial (GC).



PROJECT OVERVIEW

The development of the property as a dental lab.

The parcels in question are TD 3 Map 16A Parcel 6, and TD 3 Map 16A Parcel 5.0001. the merger of these parcels was approved by the City Planner on November 28, 2011, but the owners at the time failed to finish the process.

SKETCH PLAN

The sketch plan meets the requirement of being a complete application as stated in Subdivision Ordinance Section 1332.03.C.2.C. This does not mean the subdivision application meets the criteria for approval; it merely means that the application is deemed complete by staff.

MERGER

The lots were approved for merger on November 28, 2011. However, the property owners at the time did not finish the process. The Merger Deed prepared by the applicant will merge the two parcels owned by *Grasso and Sons* and *Somerset LLC* into Lot 6B. The owner will be Somerset, LLC.

ZONING REVIEW

The property is zoned General Commercial. There is no minimum lot size. The proposed setbacks conform to the Zoning ordinance requirements.

Table 1322.10, GC District Bulk and Area Regulations

Maximum Density	No Requirement
Minimum Lot Size	No Requirement
Minimum Lot Width	No Requirement
Minimum Front Yard Setback	40 feet
Minimum Side Yard Setback	10 feet (25 feet where adjoining a residential district)
Minimum Rear Yard Setback	30 feet
Maximum Lot Coverage	90 percent
Minimum Required Open Space	No Requirement
Maximum Building Height	55 feet[1]
Maximum Stories	5 stories[1]

[1] Hotels shall have a maximum height of 78 feet and maximum number of six (6) stories.

Site Development

Up to 70% of the site may be developed with impervious surface. The proposed development will cover 68.4% of the site.

Parking

Required parking for a dental lab is 3.53 spaces per 1,000 sq. ft. Based on a 5,340 sq. ft. structure, the required parking is 19 spaces. 34 spaces are being provided.

Open Space

There is no open space requirement.

Setbacks

All required setbacks have been met.

CONCLUSION

Staff deems the application complete; the Planning Commission should vote to determine the application is complete. If deemed complete, a public hearing will be scheduled for April 24th, 2023.

Authentisign ID 430C744B-99B7-ED11-BA77-14CB852F4F5B

Sketch Plan Application No._____

RECEIVED
MAR 01 2023
BY:_____

SKETCH PLAN APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
ARTICLE 1332, SUBDIVISION AND LAND DEVELOPMENT APPLICATION & APPROVAL REQUIREMENTS

To assist the Subdivision Administrator in the review of a Sketch Plan Application, the Applicant must utilize this form to supply the City with the information prescribed under Section 1332.03 of the Charles Town S/LD Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's Sketch Plan Application as required by Ordinance Section 1332.03. Applicant is responsible to ensure the standards of Ordinance Section 1332.04, Sketch Plan Requirements, are met and provided herein is a checklist of the Sketch Plan requirements.

1. DATE February 24th, 2023

2. APPLICATION TYPE*

☐ Zoning Use Permit, Special Exception Use and Sketch Plan requirements found in the Supplemental Regulations of the Zoning Ordinance
- Submit Three (3) 11" x 17" copies of the Sketch Plan shall be submitted and in Adobe PDF format

X Major S/LD Development
- Submit Three (3) 18" x 24" copies of the Sketch Plan shall be submitted and in Adobe PDF format

*There are two types of Sketch Plan submissions:

1. For Zoning Use Permit, Special Exception Use and Sketch Plan requirements found in the Supplemental Regulations of the Zoning Ordinance. Submission standards are found in Section 1332.04(D).
2. For a Sketch Plan for a Major S/LD application, submission standards are found in Section 1332.04(E)

3. APPLICANT'S NAME* Westover Holdings LLC

Address: 11 Meadow Branch Ave, Winchester VA 22601

Telephone Number (804) 405-9873 Fax Number ( )

Email Address austinwestover@gmail.com

4. PROPERTY OWNER'S NAME Grasso & Sons Development Corp. 4 Somerset LLC

Address: 34047 Soaring Bamboo Path Wesley Chapel, FL 33543 175 John Thomas Way Charlestown WV 25414

Telephone Number (703) 303-9170 Fax Number ( ) 304-283-2601

Email Address PGrasso@USAid.gov JThomas@Jeffersonasphalt.net

5. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address: Lot 6B Somerset Blvd Charles Town WV 25414

Tax Map # and Parcel: 16A / 6 16A/5.1

Deed Book and Page #: 1046/264 1130/249

Property Area in Square Feet or Acres: .83ac Total | .46ac This Parcel

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

Stand alone, single level dental office

7. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

Undeveloped land zoned appropriatly.

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

Authentisign ID 430C744B-89B7-ED11-BA77-14CB652F4F5B

8. ARE THERE ANY ANTICIPATED WAIVERS OR VARIANCES? IF YES, PROVIDE DETAILS.

NO

9. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

X No

10. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date

11. INTERESTED PARTY ADDRESSES, FOR PUBLIC NOTICE (including across street) (Interested parties are defined as adjacent properties within 100 feet).

Owner	# and Street	City, State, Zip
AO Charles Town LLC	149 Linwood Way	Martinsburg, WV 25403
University Healthcare Physicians INC	2500 Foundation Way	Martinsburg, WV 25401
Anthony Shockney	130 Monte Carlo Way	Charles Town WV 25414
Frank & Coral Montch	14802 Hazelmoor Ct	Silver Spring, MD 20906
Robert Miller	138 Monte Carlo CT	Charles Town WV 25414
Jamilyn & Chris Troxell	142 Monte Carlo CT	Charles Town WV 25414
Sean Gordon	146 Monte Carlo CT	Charles Town WV 25414
Maria Montero Harris Saavedra	150 Monte Carlo CT	Charles Town WV 25414
James & Carolyn Bryant	154 Monte Carlo CT	Charles Town WV 25414

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1332.02 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant

_____ Date 2/24/23

Signature of Property Owner (If different than Applicant)

Peter Grasso Date 02/28/23

Signature of Property Owner (If different than Applicant)

John J. Thomas, Jr. Date 02/28/23

AuthenticSign ID 430C744B-99B7-ED11-BA77-14CB652F4F5B

Please submit an original completed Application and specified number of Site Plan copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments:_____

_____

_____

_____

_____

_____

MERGER DEED PURSUANT TO SUBDIVISION AND LAND REGULATION SECTION 20.106 OF THE JEFFERSON COUNTY SUBDIVISION ORDINANCE OF OCTOBER 9, 2008, AS AMENDED FEBRAURY 1, 2018

THIS MERGER DEED, made this 15th day of March 2023, by and between **Somerset LLC,** a West Virginia limited liability company, and **Grasso & Sons Development Corporation,** a Virginia corporation, converted to **Grasso and Sons Development, LLC,** a Virginia limited liability company, on December 30, 2011, pursuant to the attached Certificate of Entity Conversion, GRANTORS; and **Somerset LLC,** GRANTEES;

WITNESSETH:

THAT, for and in valuable consideration, receipt of which is hereby acknowledged, the GRANTORS do hereby grant and convey, in fee simple and with Special Warranty, unto the GRANTEE, the following described property:

All those certain parcels of land with the rights of way and easements, appurtenant thereto and improvements thereon, situate in the Charles Town Corp District, Jefferson County, West Virginia, and more particularly described as follows:

Tax Map / Parcel: 16A / 0005 0001 0000

Currently owned by Somerset LLC

Merger Area 2, containing 10,963 square feet, or 0.25168 acres, and Merger Area 3, containing 5, 175 square feet or 0.11880 acres as more fully shown and described on that certain plat entitled "Merger Plat Lots 4, 5A, 6A and 7A Windmill Crossing Commercial", made by William H. Gordon Associates Inc., dated September 1, 2011, and revised November 8, 2011, and recorded in the aforesaid Clerk's Office in Plat Book 25 at page 321.

BRIEL PC, ATTORNEYS
Charles Town, WV
Martinsburg, WV
Winchester, VA
Ashburn, VA

AND BEING the same property conveyed to the Grantor, Somerset LLC, a West Virginia limited liability company herein by Deed recorded in Deed Book 1130, at Page 249, in the aforesaid Clerk's Office.

AND

Tax Map / Parcel: 16A / 0006 0000 0000

Currently owned by Grasso & Sons Development, LLC

BEING all of Lot 6A on a Plat entitled "Plat Showing Various Easements on Lots 5A, 6A & 7A, Windmill Crossing, made by William H. Gordon Associates, Inc., dated April 30, 2007 and revised December 26, 2007 and recorded in the Office of the Clerk of the County Commission of Jefferson County, West Virginia in Plat Book 24, at Page 81.

AND BEING the same property conveyed to the Grantor, Grasso & Sons Development Corporation, a Virginia corporation converted to Grasso and Sons Development, LLC, a Virginia limited liability company on December 30, 2011, pursuant to the attached Certificate of Entity Conversion, herein by Deed recorded in Deed Book 1046, at Page 264.

The land hereby conveyed is adjacent to and contiguous with the land which is owned by the Grantors herein, having been conveyed to them by Deeds recorded in Deed Book 1130, at Page 249 and Deed Book 1046, at Page 264 in aforesaid Clerk's office.

This conveyance is made for the purpose of merging the boundary lines of said presently owned lands of the Grantors hereby creating a single lot, identified as Lot 6B more fully shown and described on that certain plat entitled "Merger Plat Lots 4, 5A, 6A and 7A Windmill Crossing Commercial", made by William H. Gordon Associates Inc., dated September 1, 2011, and revised November 8, 2011, and recorded in the aforesaid Clerk's Office in Plat Book 25 at page 321.

DECLARATION OF CONSIDERATION OR VALUE

The GRANTORS does hereby certify that the document to which this declaration is attached is done for the purpose of complying with the Jefferson County Subdivision Ordinance, does not involve a transfer, and is therefore exempt from the West Virginia Excise Tax on transfer of real property.

BRIEL PC, ATTORNEYS
Charles Town, WV
Martinsburg, WV
Winchester, VA
Ashburn, VA

THIS DOCUMENT WAS PREPARED WITHOUT THE BENEFIT OF TITLE EXAMINATION.

WITNESS the following signature and seal:

SOMERSET LLC, a West Virginia limited liability company

By:_____
John J. Thomas, Jr., Manager

STATE OF WV
COUNTY OF Jefferson, to-wit:

I, the undersigned, a Notary Public in and for the jurisdiction aforesaid, do certify that John J. Thomas, Jr., Manager of Somerset LLC, a West Virginia limited liability company, whose name is signed to the foregoing document, acknowledged the same before me this 15 day of March 2023.

_____
Notary Public
My commission expires: 4/18/27

OFFICIAL SEAL
STATE OF WEST VIRGINIA
NOTARY PUBLIC
Tuesdi D. Miller
185 York Rd
Ranson WV 25438
My Commission Expires April 18, 2027

BRIEL PC, ATTORNEYS
Charles Town, WV
Martinsburg, WV
Winchester, VA
Ashburn, VA

THIS DOCUMENT WAS PREPARED WITHOUT THE BENEFIT OF TITLE EXAMINATION.

WITNESS the following signature and seal:

GRASSO & SONS DEVELOPMENT, LLC
~~CORPORATION, a Virginia Corporation~~

Peter S. Grasso Jr by A Fultz his attorney in fact

Peter S. Grasso, Jr. by Andrew Fultz, his attorney in fact

STATE OF West Virginia
COUNTY OF Jefferson, to-wit:

I, the undersigned, a Notary Public in and for the jurisdiction aforesaid, do certify that Peter S. Grasso, Jr. by Andrew Fultz, his attorney in fact, whose name is signed to the foregoing document, acknowledged the same before me this 15 day of March 2023.

Notary Public
My commission expires: 4/18/27

OFFICIAL SEAL
STATE OF WEST VIRGINIA
NOTARY PUBLIC
Tuesdi D. Miller
185 York Rd
Ranson WV 25438
My Commission Expires April 18, 2027

Prepared by: Briel, PC Attorneys
115 W. Congress Street
Charles Town, WV 25414
/kh

THIS DOCUMENT WAS PREPARED WITHOUT THE BENEFIT OF TITLE EXAMINATION.

1201010416

S388758 - 7

COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

AT RICHMOND, DECEMBER 30, 2011

The State Corporation Commission has found the accompanying articles of entity conversion submitted on behalf of

GRASSO & SONS DEVELOPMENT CORP.

to comply with the requirements of law and confirms payment of all required fees. Therefore, it is ORDERED that this

CERTIFICATE OF ENTITY CONVERSION

be issued and admitted to record with the articles of entity conversion and articles of organization in the Office of the Clerk of the Commission, effective December 30, 2011.

When the certificate becomes effective, GRASSO & SONS DEVELOPMENT CORP. is deemed to be a limited liability company organized under the laws of this Commonwealth with the name

Grasso and Sons Development, LLC

The limited liability company is granted the authority conferred on it by law in accordance with its articles of organization, subject to the conditions and restrictions imposed by law.

STATE CORPORATION COMMISSION

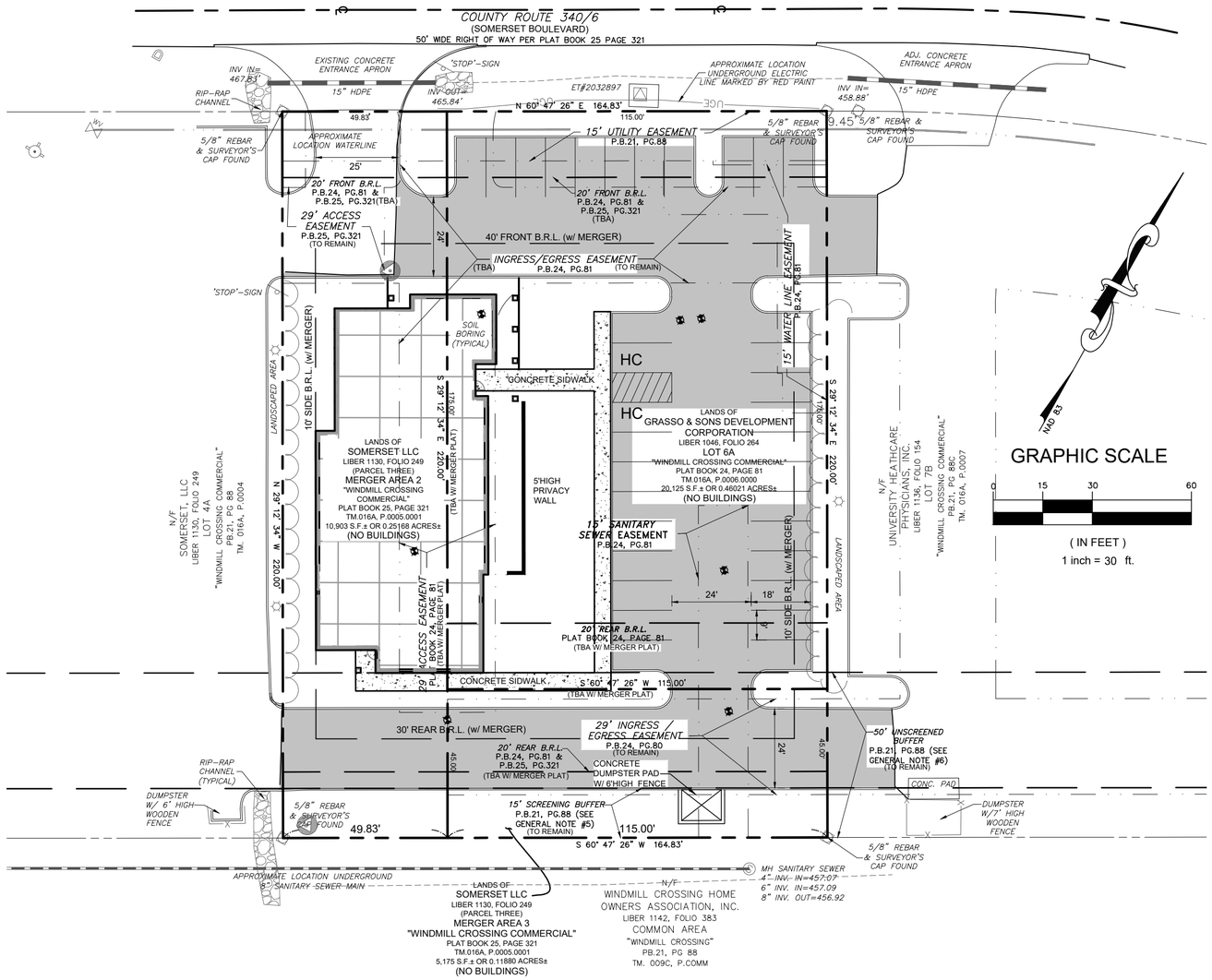
By

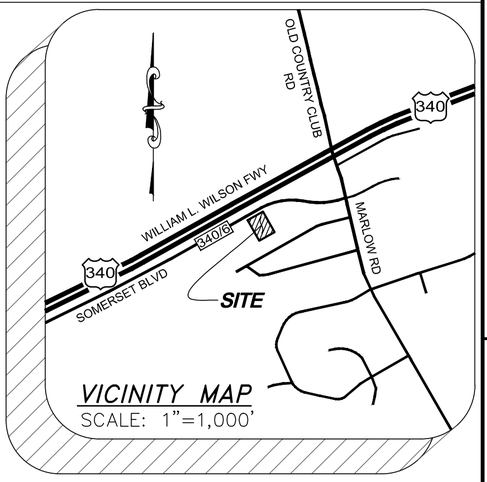
James C. Dimitri
Commissioner

Jefferson County
Jacqueline C Shadle, Clerk
Instrument 202300002541
03/16/2023 @ 03:48:06 PM
DEED
Book 1298 @ Page 705
Pages Recorded 5
Recording Cost $ 32.00

CNVRLACT
CIS0436
11-12-19-0078

SKETCH PLAN - WESTOVER DENTAL OFFICE





GRAPHIC SCALE

0 15 30 60

(IN FEET)
1 inch = 30 ft.

GENERAL NOTES:

1. SITE IS SITUATED IN WINDMILL CROSSING SUBDIVISION, APPROXIMATELY 800' SOUTH OF THE INTERSECTION OF SOMERSET BLVD. AND MARLOW RD.
2. THE SURVEYED PROPERTY SHOWN HEREON IS THE SAME LAND DESCRIBED IN SCHEDULE "A" OF TITLE COMMITMENT No. _____, PREPARED BY OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY WITH A COMMITMENT DATE OF OCTOBER 20, 2022 AT 9:00 A.M.
3. SITE CONSISTS OF 3 PARCELS TO BE MERGED. MERGER PLAT WILL ELIMINATE INTERIOR LOT LINES AND SETBACKS & EASEMENTS ASSOCIATED WITH THOSE LOT LINES.
   PARCEL 1 - LOT 6A - LANDS OF GRASSO & SONS DEVELOPMENT CORPORATION, LIBER 1046, FOLIO 264; PLAT BOOK 24, PAGE 81; TM 016A, PCL 0006.0000
   PARCELS 2 & 3 - LOT 5B (MERGER AREA 2 & 3) - LANDS OF SOMERSET LLC. LIBER 1130, FOLIO 249; PLAT BOOK 25, PAGE 321; TM 016A, PCL 0005.0001
4. HORIZONTAL DATUM IS NAD83 WEST VIRGINIA NORTH STATE PLANE COORDINATE SYSTEM, VERTICAL DATUM IS NAVD 88, BOTH DERIVED FROM GPS RTK OBSERVATIONS.
5. NO EVIDENCE OF CEMETERIES, GRAVE SITES, OR BURIAL GROUNDS WERE OBSERVED AS OF THE DATE OF FIELD WORK COMPLETION.
6. IN REGARDS TO THE 50' UNSCREENED BUFFER AND 15' SCREENING BUFFER SHOWN HEREON, REFERENCE IS HEREBY MADE TO A PLAT ENTITLED, "FINAL PLAT, WINDMILL CROSSING, COMMERCIAL LOTS 1-15, TOWNHOUSE LOTS 16-149..." AND RECORDED AMONG THE LAND RECORDS OF JEFFERSON COUNTY, WEST VIRGINIA IN PLAT BOOK 21, AS PAGE 88. NOTE: 1 STATES; "PER SECTION 4.16 REQUIRED BUFFER IS 50' UNSCREENED OR 15' SCREENED BUFFER."
7. CURRENT LAND USE - NOT DEVELOPED
   PROPOSED LAND - DENTIST OFFICE
8. ZONED - GENERAL COMMERCIAL (GC)
9. PROPERTY AREA - 36,268 SF (0.833 AC)
10. MAXIMUM ALLOWABLE 70% IMPERVIOUS. PROPOSED 24806 SF / 36268 SF = 68.4%
11. WATER & SEWER PROVIDED ON SITE BY CHARLES TOWN UTILITY BOARD. LETTER OF AVAILABILITY DATED DECEMBER 6, 2022 OBTAINED.
12. WINDMILL CROSSING WAS ANNEXED INTO THE CITY OF CHARLES TOWN IN 2007. IN 2011 THE CITY OF CHARLES TOWN AMENDED AND RESTATED CONDITIONS OF THE ANNEXATION IN RESOLUTION 2011-05 AND FURTHER AMENDED THE SIGNAGE CRITERIA IN RESOLUTION 2012-04.
13. BUILDING SETBACKS:
    FRONT - 40'
    REAR - 30'
    SIDE - 10'
14. 15' SCREENING BUFFER IN REAR ADJACENT TO RESIDENTIAL
15. PARKING REQUIREMENTS - MEDICAL/DENTAL OFFICE = 3.53 SPACES/1000SF GFA
    5,340 SF * 3.53 SP/1000 SF = 18.85 SP = 19 SPACES REQUIRED
    32 SPACES + 2 ADA SPACES PROVIDED

LINETYPE LEGEND

	SUBJECT PROPERTY LINE
	ADJOINING PROPERTY LINE
	MINIMUM BUILDING RESTRICTION LINE
	EDGE OF CONCRETE
	CONTOUR, MAJOR 5'
	CONTOUR, MINOR 1'
	CURB
X X	FENCE, AS NOTED
	LANDSCAPED AREAS
	ROAD, CENTER LINE
	ROAD, EDGE OF PAVEMENT
	UNDERGROUND SANITARY SEWER
	UNDERGROUND STORM DRAIN
UGE	UNDERGROUND ELECTRIC LINE

SYMBOLS LEGEND

	ELECTRIC TRANSFORMER
	LIGHT POST
	REBAR & SURVEYOR'S CAP FOUND (AS NOTED)
S	SANITARY SEWER MANHOLE
	SIGN (AS NOTED)
	SOIL BORING

OWNER/DEVELOPER:
WESTOVER HOLDINGS, LLC
11 MEADOW BRANCH AVE
WINCHESTER, VA 22601

Austin Westover
austinwestover@gmail.com
(804)405-9873

ARCHITECT:
FAZIO ARCHITECTS
308-B CONGRESS AVE
AUSTIN, TX 78701

KEITH GREGG
keith@fazioarchitects.com
(512)494-1680

ENGINEERING/SURVEYING:
TRIAD ENGINEERING, INC
1075 SHERMAN AVE
HAGERSTOWN, MD 21790

ERIC ISER, PE
eiser@triadeng.com
(301)797-6400

Rev	Date	Agency
1	03-15-23	City of Charles Town Planning (Kimley-Horn)

TRIAD ENGINEERING, INC.
1075-D SHERMAN AVENUE
HAGERSTOWN, MD 21740
PH: 301.797.6400 FAX: 301.797.2424
OFFICE LOCATIONS
MARYLAND ○ PENNSYLVANIA ○ VIRGINIA ○ WEST VIRGINIA

CADD FILE:	CHECKED BY: E.H.I.	SCALE: 1"=30'
	DRAWN BY: Staff	DATE: 03/15/2023

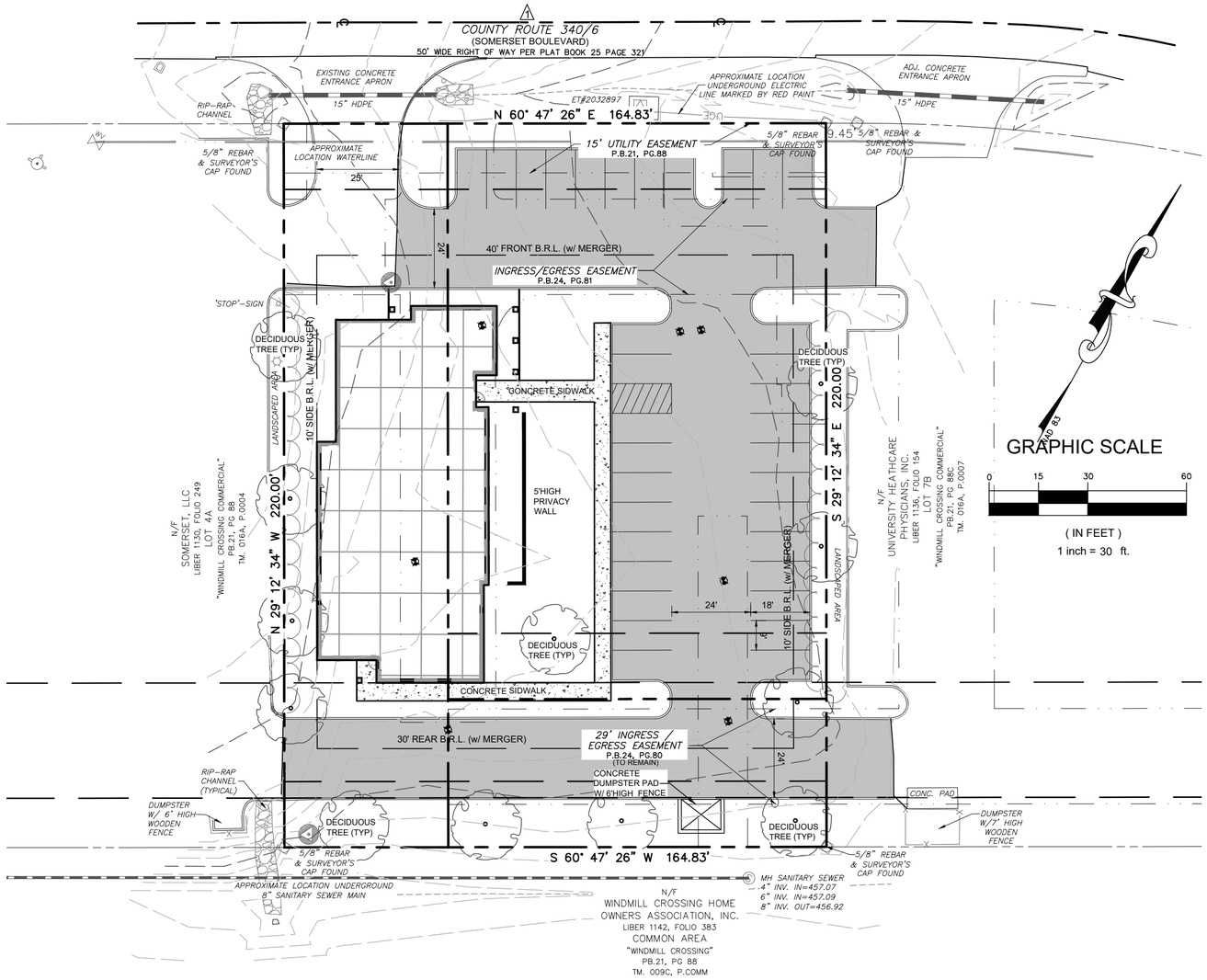
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF WEST VIRGINIA, LICENSE NO. 15067 EXPIRATION DATE: 12-31-2024

ERIC ISER REGISTERED 15067 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 03/15/23

SKETCH PLAN OF WESTOVER DENTAL
WESTOVER HOLDINGS, LLC
PART OF LIBER 1130, FOLIO 249 AND LIBER 1046, FOLIO 264
SITUATED IN WINDMILL CROSSING APPROXIMATELY 880' WEST OF THE INTERSECTION OF SOMERSET BOULEVARD AND MARLOW ROAD IN CHARLES TOWN
JEFFERSON COUNTY, WEST VIRGINIA

TRIAD
TRIAD ENGINEERING, INC.
www.triadeng.com

SHEET NUMBER:
C-1.0
FILE NO.: 03-22-0965
JOB NO.: 03-22-0965



LINETYPE LEGEND

	SUBJECT PROPERTY LINE
	ADJOINING PROPERTY LINE
	MINIMUM BUILDING RESTRICTION LINE
	EDGE OF CONCRETE
	CONTOUR, MAJOR 5'
	CONTOUR, MINOR 1'
	CURB
X X	FENCE, AS NOTED
	LANDSCAPED AREAS
	ROAD, CENTER LINE
	ROAD, EDGE OF PAVEMENT
	UNDERGROUND SANITARY SEWER
	UNDERGROUND STORM DRAIN
UGE	UNDERGROUND ELECTRIC LINE

SYMBOLS LEGEND

	ELECTRIC TRANSFORMER
	LIGHT POST
	REBAR & SURVEYOR'S CAP FOUND (AS NOTED)
S	SANITARY SEWER MANHOLE
	SIGN (AS NOTED)
	SOIL BORING

OWNER/DEVELOPER:
WESTOVER HOLDINGS, LLC
11 MEADOW BRANCH AVE
WINCHESTER, VA 22601

Austin Westover
austinwestover@gmail.com
(804)405-9873

ARCHITECT:
FAZIO ARCHITECTS
308-B CONGRESS AVE
AUSTIN, TX 78701

KEITH GREGG
keith@fazioarchitects.com
(512)494-1680

ENGINEERING/SURVEYING:
TRIAD ENGINEERING, INC
1075 SHERMAN AVE
HAGERSTOWN, MD 21790

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ERIC ISER REGISTERED 15067 STATE OF WEST VIRGINIA 03/15/23 PROFESSIONAL ENGINEER

SKETCH PLAN (CONTOURS & LANDSCAPING OF WESTOVER DENTAL

WESTOVER HOLDINGS, LLC
PART OF LIBER 1130, FOLIO 249 AND LIBER 1046, FOLIO 264

SITUATED IN WINDMILL CROSSING APPROXIMATELY 880' WEST OF THE INTERSECTION OF SOMERSET BOULEVARD AND MARLOW ROAD IN CHARLES TOWN
JEFFERSON COUNTY, WEST VIRGINIA

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SHEET NUMBER:
C-1.1
FILE NO.: 03-22-0965
JOB NO.: 03-22-0965

Planning Commission
101 East Washington Street
Charles Town, WV 25414

SCHEDULED

AGENDA ITEM (ID #)

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

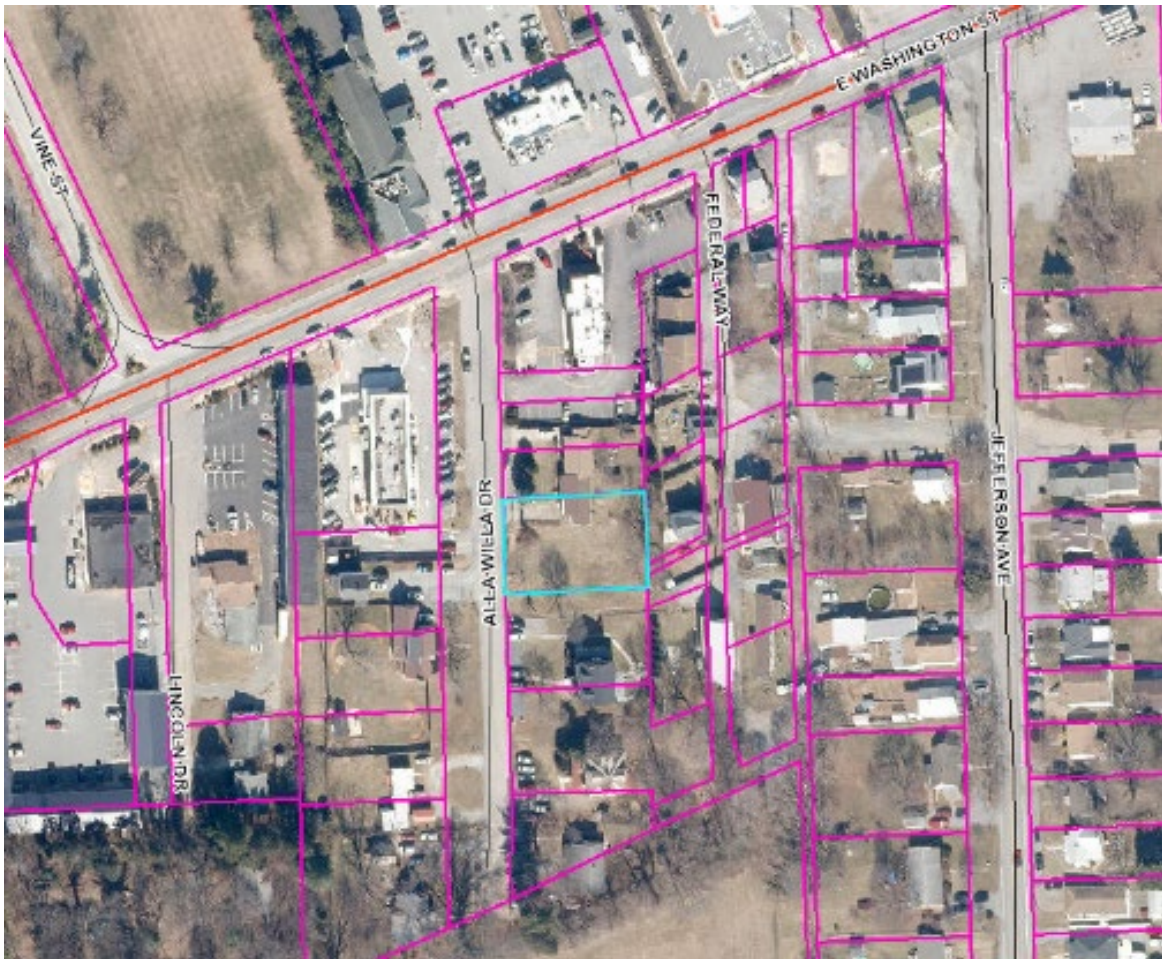
SLD2023-03 Ali Hadavand Casino - PC Technical Review

ATTACHMENTS:

- 1. Staff Report.pdf
- 2. Application.pdf
- 3. Narrative.pdf
- 4. Plans.pdf

Sketch Plan Completeness Review
SLD2023-03/200403

Date: For the March 27th, 2023 Planning Commission meeting
Applicant: Ali Hadavand
Property Owner: Shirley Rockwell
Report by: James Newman, City Planner, Zoning/Subdivision Administrator.
Proposal: Development of site as a casino, and merger of two parcels into one.
Property Location: TD 03 / Map: 7 / Pcl: 12, located on Alla Willa Drive.
Current Zoning: General Commercial (GC).



PROJECT OVERVIEW

Per Jefferson County Geographic Information Systems, the property is .14 acres in size. The applicant is proposing to develop the site as a Casino. The property is made of two parcels.

SKETCH PLAN COMPLETENESS

The sketch plan meets the requirement of being a complete application as stated in Subdivision Ordinance Section 1332.03.C.2.C. This does not mean the subdivision application meets the criteria for approval; it merely means that the application is deemed complete by staff, per the technical requirements of the Ordinance.

ZONING REVIEW

The property is zoned General Commercial, as are all adjacent properties located within the City. There is no minimum lot size. The proposed setbacks conform to the Zoning ordinance requirements, once the parcels are combined.

The proposed use of the property as a casino requires approval of a Special Exception Use Permit by the Board of Zoning Appeals. The BZA will review that application at a public hearing on April 18th, 2023.

CONCLUSION

Staff deems the application complete; the Planning Commission should vote to determine the application is complete. If deemed complete, a public hearing would be scheduled for April 24th, 2023.

Sketch Plan Application No._____

SKETCH PLAN APPLICATION

SUBDIVISION AND LAND DEVELOPMENT ORDINANCE
ARTICLE 1332, SUBDIVISION AND LAND DEVELOPMENT APPLICATION & APPROVAL REQUIREMENTS

To assist the Subdivision Administrator in the review of a Sketch Plan Application, the Applicant must utilize this form to supply the City with the information prescribed under Section 1332.03 of the Charles Town S/LD Ordinance. The submission of this form, along with the prescribed information and required fees, shall serve as the Applicant's Sketch Plan Application as required by Ordinance Section 1332.03. Applicant is responsible to ensure the standards of Ordinance Section 1332.04, Sketch Plan Requirements, are met and provided herein is a checklist of the Sketch Plan requirements.

1. DATE 3/1, 2023

2. APPLICATION TYPE* ☑ Zoning Use Permit, Special Exception Use and Sketch Plan requirements found in the Supplemental Regulations of the Zoning Ordinance
   - Submit Three (3) 11" x 17" copies of the Sketch Plan shall be submitted and in Adobe PDF format

   ☐ Major S/LD Development
   - Submit Three (3) 18" x 24" copies of the Sketch Plan shall be submitted and in Adobe PDF format

*There are two types of Sketch Plan submissions:

1. For Zoning Use Permit, Special Exception Use and Sketch Plan requirements found in the Supplemental Regulations of the Zoning Ordinance. Submission standards are found in Section 1332.04(D).
2. For a Sketch Plan for a Major S/LD application, submission standards are found in Section 1332.04(E)

3. APPLICANT'S NAME* Ali Hadaward

Address: 1927 Rock Cliff Dr

Telephone Number 304 279-4747 Fax Number ( )

Email Address hadaward1979@gmail.com

4. PROPERTY OWNER'S NAME Shirley Rockwell

Address: 111 Alla Willa Charles Town, WV 25414

Telephone Number ( ) Fax Number ( )

Email Address

5. LEGAL DESCRIPTION OF THE SUBJECT PROPERTY (list all parcels that apply)

Property Address: Lot 3a + 4a Alla Willa

Tax Map # and Parcel: Tx map 7 Parcel 0012

Deed Book and Page #: DB 390 P 085

Property Area in Square Feet or Acres: .28

6. DESCRIPTION OF PROJECT AND PROPOSED USE(S) OF THE PROPERTY:

Build a building for use of Slot Parlor

7. DESCRIPTION OF THE EXISTING (OR FORMER) USE(S) OF THE PROPERTY AND CURRENT ZONING:

No use currently. General Commercial Zoning

*Applicants include: Property owner(s), Engineer(s), Surveyor(s), or Consultant(s)

8. ARE THERE ANY ANTICIPATED WAIVERS OR VARIANCES? IF YES, PROVIDE DETAILS.

No

9. HAS THE PROPERTY BEEN THE SUBJECT OF ANY COURT ACTION?

☐ Yes (Please specify nature of all proceedings and current status and attach any documents showing court decisions, etc.)

No

☐ No

10. PARCEL HISTORY (List all pending or previously approved applications on the subject parcels inventoried above, including previous site plan applications if this application is a site plan amendment)

Application No.	Project Name and Phase	Status	Approval Date

RECEIVED

FEB 28 2023

BY:_____

FEBRUARY 27,2023

LOTS 3A & 4A ALLA WILLA DRIVE

I, SHIRLEY J. ROCKWELL DO HEREBY GRANT ALI HADAVAND AUTHORIZATION TO APPLY FOR A SPECIAL EXCEPTION USE FOR MY LOTS 3A & 4A, MAP 7 PARCEL 12 ON ALLA WILLA DRIVE IN CHARLES TOWN, WV 25414

SHIRLEY J. ROCKWELL Shirley J. Rockwell

111 ALLA WILLA DRIVE

CHARLES TOWN, WV 25414

OFFICIAL SEAL
STATE OF WEST VIRGINIA
NOTARY PUBLIC
JACKIE SMITH
28 MILLWRIGHT ROAD
KEARNEYSVILLE, WV 25430
MY COMM. EXP. SEPTEMBER 24, 2023

11. INTERESTED PARTY ADDRESSES, FOR PUBLIC NOTICE (including across street) (Interested parties are defined as adjacent properties within 100 feet).

Owner	# and Street	City, State, Zip

APPLICANT CERTIFICATION

I certify that, to the best of my knowledge, the submitted information and statements are true and correct. I also certify that I have received and read Section 1332.02 of the Charles Town S/LD Ordinance and relevant provisions of the Charles Town City Code.

Signature of Applicant

_____ Date 3/1/2023

Signature of Property Owner (If different than Applicant)

_____ Date _____

Please submit an original completed Application and specified number of Site Plan copies to the following:

Subdivision Administrator
City of Charles Town
101 E. Washington Street
Charles Town, WV 25414

FOR CITY USE ONLY

Application Number:_____ Date Application Received:_____

Fee: $_____ Paid:$_____ Check No._____

Receipt No._____

Subdivision Administrator Approval:_____ Date:_____

Planning Commission Approval:_____ Date:_____

Comments:_____

_____

_____

_____

_____

_____

CHARLES TOWN, WEST VIRGINIA
Department of Community Development
Division of Planning and Zoning

101 East Washington Street, P.O. Box 14
Charles Town, West Virginia 25414

Phone: (304) 725-2311

Fax (304) 725-1014

File Number: _____
Staff Initials: _____
Fees Paid: _____

https://goo.gl/KGzDMZ

Sketch Plan Review Checklist
Amended 2017 Subdivsion Ordinance

(please check one) _____ **Major S/LD Application** or
_✓_ **Zoning Use Permit, Special Exception Use, or Sketch Plan (requirements found in the Supplemental Regulations of the Zoning Ordinance)**

Project Name: _____

Property Owner Information					
Property Owner:	Shirley Rockwell				
Mailing Address:	111 Alle Willa Charlestown WV 25414				
City:		State:		Zip Code:	
Phone Number:		Email:			
Signature:				Date:	

Applicant's Registered Engineer or Surveyor or Design Consultant					
Name:	James Golden				
Mailing Address:					
City:		State:		Zip Code:	
Phone Number:	304-261-4931	Email:	jimgoldenpe@hotmail.com		

Physical Property Details					
Physical Address:	Alle Willa Lot 3a + 4A				
City:		State:		Zip Code:	
Tax District:	7	Map No:		Parcel No:	0012
Parcel Size:		Deed Book:	390	Page No:	85

Zoning of Subject Property			Is the Project to Be:	Is Property In:
Urban Reserve (UR)	Residential Medium-High Density (R-15)	Neighborhood Commercial (NC)	Planned Unit Development (PUD)	Historic Overlay District (HOD)
General Commercial (GC)	Old Town Residential (OT-R)			Floodplain Overlay District (FOD)
Old Town Mixed Use Commercial (OT-MUC)	Neighborhood Residential (NR)			

City Use Only	1st Review	2nd Review	3rd Review	4th Review
Submittal Date				
Zoning Administrator				
City Planner				
GIS Addressing				
Return Date				

Conditions of Approval (Attach Additional Comments As Needed)

Will join 2 properties

Instructions

1. This checklist is provided as a quick reference guide only. The Consultant/Developer is responsible for reading the regulations and fully complying with all the requirements. All references to the Subdivision Ordinance and Zoning Ordinance are cited for informational purposes only.

2. The checklist shall be completed by the Engineer/Surveyor or Design Consultant and attached to the Sketch Plan review submission.

Requried Submittal Information

_____ 1 Check for Appiciation Fees

_____ 1 Completed Application and Checklist (Signed by owner)

_____ 3 Sets of Sketch Plans and Adobe PDF Format

From: ali hadavand
To: James Newman
Subject: narative
Date: Tuesday, February 28, 2023 10:21:25 AM

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2) I would only have 1 person working during each of the 3 shifts. The only time I would have 2 people there is during shift change.

3) My ***"Julia's"*** locations are strictly for gambling. We do offer food and drinks too. We only give out a maximum of 2 drinks. The locations are super quiet. My employees are told to not bother the customers and leave them alone on the machines. We don't partake in the "bar scene" and it's not a typical bar.

4) I currently have another Julia's in Charles town in a area where there is residential housing next to it and we have had a complaint from anyone there. Our lighting is directed only towards our parking lot to make sure customers do not trip or are not scared at night. You can not hear anything from the outside of slot parlors, it's totally quiet. There will be light traffic coming in and out as we only cater to a limited number of customers at a time. We don't handle any waste material so there is no concern for smell.

5) In order to build our building on this property we will need to merge the lots so we will be merging them.

Ali Hadavand
304-279-4747
https://www.linkedin.com/in/ali-hadavand-b21b705

Patient Care Transportation - COO
http://patienttrans.com/site/index.html
https://m.facebook.com/patientcaretrans/

RydeWizz - Founder/Owner
http://www.rydewizz.com/
https://www.facebook.com/RydeWizz-105677941167297/

Dice LLC - Founder/Owner
Beware - This email comes from outside the City of Charles Town.

NOTES:

EXTERIOR LIGHT AIMED DOWNWARD TO ILLUMINATE PARKING LOT
THIS IS THE ONLY LIGHT, SO MAKES LITTLE TO NO GLARE. HOWEVER, ADDITIONAL TREES WILL BE PLANTED IF NEEDED TO NOT DISTURB NEIGHBORS.

IMPERVIOUS AREA:
BUILDING = 1960 SQ FT
SIDEWALK = 336 SQ FT
PARKING = 2000 SQ FT
DUMPSTER PAD = 200 SQ FT

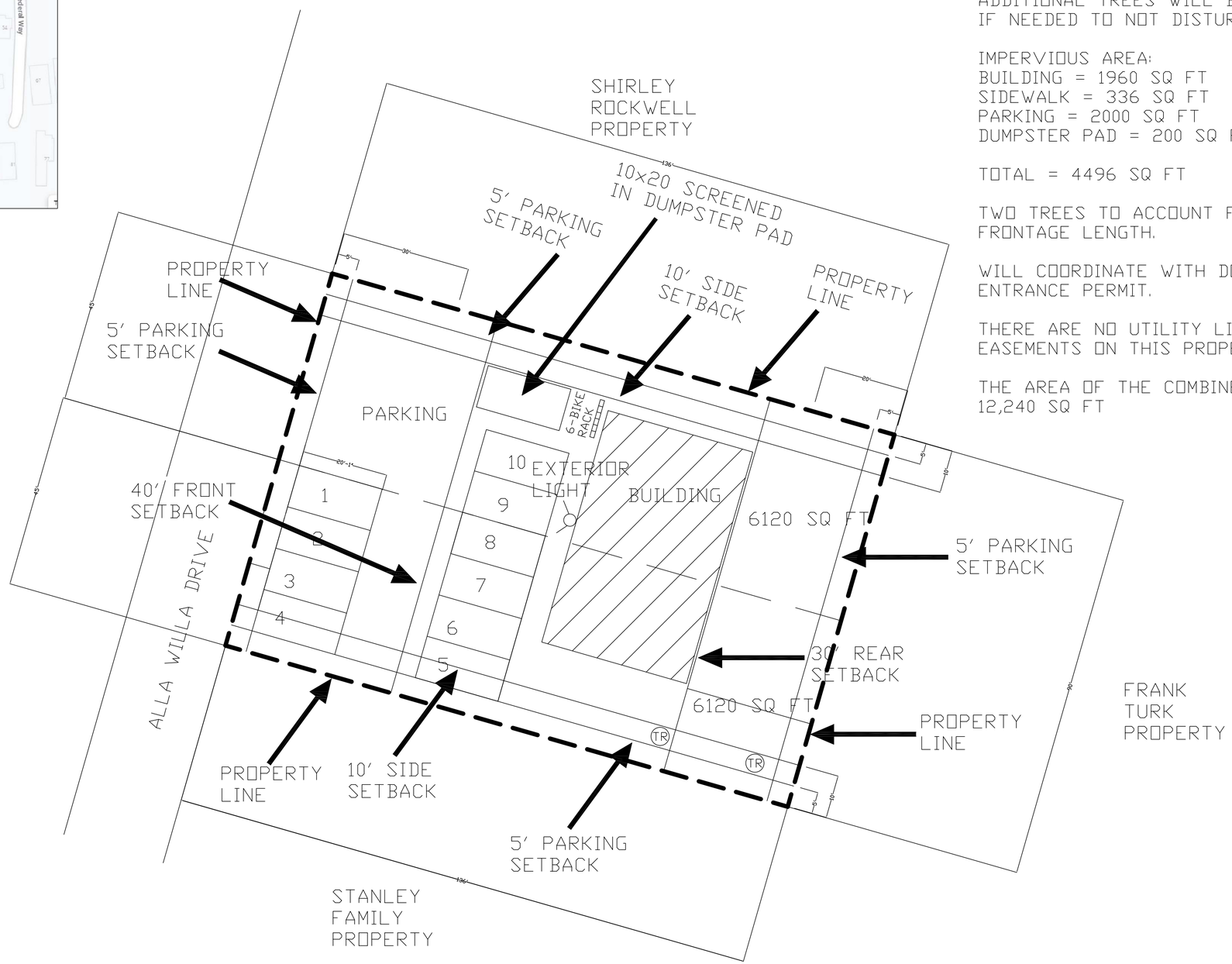
TOTAL = 4496 SQ FT

TWO TREES TO ACCOUNT FOR 90' OF FRONTAGE LENGTH.

WILL COORDINATE WITH DOH FOR ENTRANCE PERMIT.

THERE ARE NO UTILITY LINES OR EASEMENTS ON THIS PROPERTY.

THE AREA OF THE COMBINED LOTS IS 12,240 SQ FT



SITE LAYOUT

SCALE
0' 10' 20' 30' 40' 50'

SHIRLEY ROCKWELL
111 ALLA WILLA
CHARLES TOWN, WV 25414

N

GENERAL COMMERCIAL ZONING

DISTRICT 3, TAX MAP 7, PARCEL 0012

DATE: MARCH 20, 2023

ENGINEER:

JIM GOLDEN
304-261-4931

SEALS

3/20/2023

ADDRESS:
ALI HADAVAND
316 FONTANA CIRCLE
MARTINSBURG, WV 25401

REVISIONS

DATE	REMARKS

NOTES

SITE

Planning Commission
101 East Washington Street
Charles Town, WV 25414

Meeting: 03/27/23
Department: Planning Commission
Category: Report
Initiator:

SCHEDULED

AGENDA ITEM (ID #)

Election of Officers:
-Chair
-Co-Chair
-Secretary

ATTACHMENTS: