NASHVILLE ENVIRONMENTAL FIELD OFFICE RECEIVED
JUN 22 2018

NASHVILLE ENVIRONMENTAL FIELD OFFICE RECEIVED
MAY 17 2018

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Resources
William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor, Nashville, TN 37243 TENNESSEE DEPT OF ENVIRONMENT & CONSERVATION
Toll Free Number: 1-888-891-TDEC (8332)

Notice of Intent (NOI) for General NPDES Permit for Stormwater Discharges from Construction Activities (TNR100000)

Site or Project Name: 106/110 Duke Street		**Existing NPDES Tracking Number: TNR**	
Street Address or Location: 110 Duke Street , Nashville TN 37207		Start date:	6/1/2018
		Estimated end date:	6/1/2019
Site Activity Description: Construction of 30 Townhomes		Latitude (dd.dddd):	36.206991
		Longitude (-dd.dddd):	-86.766343
County(ies): Davidson	MS4 Jurisdiction:	Acres Disturbed:	1.01
		Total Acres:	1.01

Does a topographic map show dotted or solid blue lines ☐ and/or wetlands ☐ on or adjacent to the construction site?
If wetlands are located on-site and may be impacted, attach wetlands delineation report.
If an Aquatic Resource Alteration Permit has been obtained for this site, what is the permit number? ARAP permit No.:

Receiving waters: Pages Branch

Attach the SWPPP with the NOI: ■ SWPPP Attached | Attach a site location map: ■ Map Attached

Site Owner/Developer Entity (*Primary Permittee*): (person, company, or legal entity that has operational or design control over construction plans and specifications):

Site Owner/Developer Signatory (V.P. level/higher - signs certification below): (individual responsible for site): Bailey Neal		Signatory's Title or Position (V.P. level/higher - signs certification below):	
Mailing Address: 5533 Kendall Drive		City: Nashville	State: tn Zip: 37209
Phone: ( )	Fax: ( )	E-mail: bailey@villagebuildersin.com	

Optional Contact:		Title or Position:	
Mailing Address:		City:	State: Zip:
Phone: ( )	Fax: ( )	E-mail:	

Owner or Developer Certification (must be signed by president, vice-president or equivalent, or ranking elected official) (Primary Permittee)

I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Owner or Developer Name (print or type): Bailey Neal | Signature: Bailey Neal | Date: 5/16/18

Contractor(s) Certification (must be signed by president, vice-president or equivalent, or ranking elected official) (Secondary Permittee)

I certify under penalty of law that I have reviewed this document, any attachments, and the SWPPP referenced above. Based on my inquiry of the construction site owner/developer identified above and/or my inquiry of the person directly responsible for assembling this NOI and SWPPP, I believe the information submitted is accurate. I am aware that this NOI, if approved, makes the above-described construction activity subject to NPDES permit number TNR100000, and that certain of my activities on-site are thereby regulated.

Contractor company name (print or type):			
Contractor signatory (print/type) (V.P. level or higher):		Signature:	Date:
Mailing Address:		City:	State: Zip:
Phone: ( )	Fax: ( )	E-mail:	

Other Contractor company name (print or type):			
Other Contractor signatory (print/type) (V.P. level or higher):		Signature:	Date:
Mailing Address:		City:	State: Zip:
Phone: ( )	Fax: ( )	E-mail:	

OFFICIAL STATE USE ONLY

Received Date: 5-15-18	Reviewer:	Field Office: 04	Permit Number TNR: 242609	Exceptional TN Water:	
Fee(s): 250.	T & E Aquatic Flora and Fauna:		Impaired Receiving Stream:	Notice of Coverage Date:	

(Continued on reverse)

STONE & HOWORTH PLC
OPERATING ACCOUNT
2737 LARMON DR
NASHVILLE, TN 37204-2822

1625

87-861/640

Date 6/22/18

Pay to the Order of TN DEPT. OF ENVIRONMENT & CONSERVATION $ 250.00

TWO-HUNDRED FIFTY AND 00/100 Dollars

Security details on back.

INSBANK
866-866-BANK (2265)
www.insbanktn.com

For 2018-010 DUKE 110 SWPPP
TN R 242 109

MP

OWNER'S CERTIFICATION OF THE STORMWATER POLLUTION PREVENTION PLAN

GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Bailey NP

Signature of Owner

Bailey Neal

Printed Name

Managing Member

Title

5/16/18

Date

NASHVILLE ENVIRONMENTAL FIELD OFFICE RECEIVED

MAY 17 2018

TENNESSEE DEPT OF ENVIRONMENT & CONSERVATION

Stormwater Pollution Prevention Plan

106 &110 Duke Street Townhomes

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106 & 110 Duke Street
City of Nashville
Davidson County, Tennessee

May 7, 2018

S + H ENGINEERING DESIGN CONSULTING

Prepared for:

Legacy South Builders, LLC
2305 Cruzen Street
Nashville, TN 37211

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1.0 EXECUTIVE SUMMARY

This SWPPP has been prepared for activities associated with construction of the proposed 30 residential units located on 106 and 110 Duke Street in the City of Nashville, Tennessee. This SWPPP includes the elements necessary to comply with the national baseline general permit for construction activities enacted by the U.S. Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES) program and all local governing agency requirements as specified by the City of Nashville. This SWPPP must be implemented at the start of construction.

This SWPPP has been developed in accordance with the "Tennessee Department of the Environment and Conservation (TDEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity" General Permit Number TNR100000, effective May 23, 2011 through May 23, 2016 (still adheared to for this SWPPP). The SWPPP and accompanying plans identify and detail stormwater management (SWM), pollution prevention, and erosion and sediment control measures necessary during and following completion of construction.

This SWPPP and the accompanying plans entitled "106 & 110 Duke Street, City of Nashville, Davidson County Tennessee" have been submitted as a set. These engineering drawings are considered an integral part of this SWPPP, therefore this SWPPP is not considered complete without them. References made herein to "the plans" or to a specific "sheet" refer to these drawings.

This report considers the impacts associated with the intended development with the purpose of:

1. Maintaining existing drainage patterns as much as possible while continuing the conveyance of upland watershed runoff;

2. Controlling increases in the rate of stormwater runoff resulting from the proposed development so as not to adversely alter downstream conditions; and

3. Mitigating potential stormwater quality impacts and preventing soil erosion and sedimentation resulting from stormwater runoff generated both during and after construction.

The analysis and design completed and documented in this report is intended to be part of the application made for a building permit from the City of Nashville.

1.1 Project Description

Legacy South Builders is proposing the construction of a 30 residential unit community. The property is located at 106 & 110 Duke Street in the City of Nashville.

This SWPPP includes post-construction stormwater management practices as well as erosion and sediment controls.

This project is located within a regulated, traditional land use control Municipal Separate Stormwater Sewer System (MS4).

Runoff from the project site will discharge via sheet flow at the southwest corner of the property. The storm water ultimately flows into the Cumberland River.

Project construction activities will consist of site grading and construction of the proposed townhomes and parking/drive area. Construction phase pollutant sources anticipated at the site are disturbed (exposed) soil, vehicle fuels and lubricants, chemicals associated with building construction, and building materials. Without adequate control there is the potential for each type of pollutant to be transported by stormwater.

1.1 Stormwater Pollution Controls

The proposed measures outlined herein have been designed to provide both quality and quantity controls by treating and detaining runoff prior to its discharge off site. These measures have been designed and evaluated in accordance with the following standards and guidelines:

- Tennessee Erosion and Sediment Control Handbook – 4th Edition (August 2012).
- Supplemental Best Management Practices (BMP) Manual
- The Guide to Selection and Design of Stormwater Best Management Practices (March 2003)

A stormwater detention system in line with a stormwater quality unit will be used to treat the water quality volume produced from the proposed development.

Pre- and post-development surface runoff rates have been evaluated for the 2-, 5- 10-, 25-, 50-, and 100-year 24-hour storm events. Comparison of pre- and post-development watershed conditions demonstrates that the peak rate of runoff from the project site will not be increased; therefore, the project will not have a significant adverse impact on the adjacent or downstream properties or receiving water courses.

The proposed stormwater collection system consisting of pipes, open drainage ways, catch basins, and on-site stormwater management facilities including permeable pavement and bioretention areas will adequately collect, treat, and convey the stormwater.

Stormwater quality will be enhanced through the implementation of the proposed permeable pavement and bioretention facilities along with erosion and sediment control measures and maintenance practices outlined herein.

The post-construction stormwater management practice(s) will be the responsibility of the homeowners association. Policy and procedures are in place, which ensure operation and maintenance of the practice(s) in accordance with the operation and maintenance plan outline within Section 7 of the report.

1.1 Conclusion

This SWPPP has been prepared in conformance with the current Tennessee Standards and Specifications for Erosion and Sediment Control and Supplimental BMP Manual.

It is our opinion that the proposed development will not adversely impact adjacent or downstream properties if the stormwater management facilities are properly constructed and maintained in accordance with the requirements outlined herein.

2.0 SWPPP IMPLEMENTATION RESPONSIBILITIES

A summary of the responsibilities and obligations of all parties involved with compliance with the TDEC General Permit TNR100000 conditions is outlined in the subsequent sections. For a complete listing of the definitions, responsibilities, and obligations, refer to the TDEC General Permit TNR100000 presented in Appendix A.

2.1 Definitions

1. "Owner" or "Operator" means the person, persons, or legal entity which owns or leases the property on which the construction activity is occurring; and/or an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications. There may be occasions during the course of a project in which there are multiple Owners/Operators, all of which will need to file and maintain the appropriate SWPPP documents and plans, including without limitation, the Notice of Intent (NOI), Notice of Coverage (NOC) and Notice of Termination (NOT).

2. "Owner's/Operator's Engineer" shall be that person or entity retained by an Owner/Operator to design and oversee the implementation of the SWPPP.

3. "Contractor" shall be that person or entity identified as such in the construction contract with the Owner/Operator. The term "Contractor" shall also include the Contractor's authorized representative, as well as any and all subcontractors retained by the Contractor.

4. "Qualified Inspector" means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed Landscape Architect, or other Department endorsed individual(s).

   It can also mean someone working under the direct supervision of and at the same company as, the licensed Professional Engineer or licensed Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that an individual performing a site inspection has passed the TDEC Level 1 Certification.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

5. "Qualified Professional" means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, licensed Landscape Architect, or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics in order to prepare a SWPPP that conforms to the Department's technical standards. All components of the SWPPP that involve the practice of engineering, shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of Tennessee.

6. "Trained Contractor" means an employee from a contracting (construction) company that has received training, which has been endorsed by the Department, from a Soil and Water Conservation District, CPESC, Inc. or other Department endorsed entity, in proper erosion and sediment control principles.

   It can also mean an employee from the contracting (construction) company that meets the "qualified inspector" qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they meet or exceed TDEC requirements).

   The "trained contractor" will be responsible for the day to day implementation of the SWPPP.

2.2 Owner's/Operator's Responsibilities

1. Retain the services of a "Qualified Professional", as defined under Section 2.1, to provide the services outlined in Section 2.3 "Owner's/Operator's Engineer's Responsibilities".

2. Pay any and all fees, get all permits as required by the City of Nashville.

3. Retain the services of an independent certified materials testing and inspection firm operating under the direction of a licensed Professional Engineer to perform regular tests, inspections, and certifications of the construction materials used in the construction of all post-construction stormwater management practices.

4. Prior to the commencement of construction activity, identify the contractor(s) and subcontractor(s) that will be responsible for implementing the erosion and sediment control measures and stormwater management practices described in this SWPPP.

Have each of these contractors and subcontractors identify at least one "Trained Contractor", as defined under Section 2.1, that will be responsible for the implementation of the SWPPP. Ensure that the Contractor has at least one "Trained Contractor" on site on a daily basis when soil disturbance activities are being performed.

5. Schedule a pre-construction meeting which shall include the Metro Nashville representatives, Owner's/Operator's Engineer, Contractor, and their sub-contractors to discuss responsibilities as they relate to the implementation of this SWPPP.

6. Require the Contractor to fully implement the SWPPP prepared for the site by the Owner's/Operator's Engineer to ensure that the provisions of the SWPPP are implemented from the commencement of construction activity until all areas of disturbance have achieved final stabilization.

7. Maintain a copy of the General Permit (TN100000), NOI, NOC, SWPPP, inspection reports, Spill Prevention, Countermeasures, and Cleanup ("SPCC") Plan, inspection records, and other required records on the job site so that they may be made available to the regulatory agencies.

8. Post at the site, in a publicly accessible location, a copy of the General Permit (TN100000), the City of Nashville Grading Permit and the twice weekly inspection reports.

9. Prepare a written summary of projects status with respect to compliance with the general permit at a minimum frequency of every three months during which coverage under the permit exists. The summary should address the status of achieving the overall goal of the SWPPP. The summary shall be maintained at the site in a publicly accessible location.

10. Prior to completion of all site work, ensure one of the following:

    a) the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

    b) for post-construction stormwater management practice(s) that are privately owned, the Owner/Operator has a deed restriction in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan,

    c) for post-construction stormwater management practice(s) that are owned by a public or private institution (e.g. school, college, university), or government agency or authority, the Owner/Operator has policy and procedures are in place that ensure operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

11. Request and receive all SWPPP records from the Owner's/Operator's Engineer and archive those records for a minimum of five years after the completion of work.

12. Require the implementation of the Post-Construction Inspections and Maintenance procedures outlined in Section 7.1.5.

13. The Owner/Operator must keep the SWPPP current at all times. At a minimum, the Owner/Operator shall amend the SWPPP:

    a) Whenever the current provisions prove to be ineffective in minimizing pollutants in stormwater discharges from the project site;

    b) Whenever there is a change in design, construction, or operation at the construction site that has or could have an effect on the discharge of pollutants; and

    c) To address issues or deficiencies identified during an inspection by the "qualified inspector," the Department, or other Regulatory Authority.

2.3 Owner's/Operator's Engineers Responsibilities

1. Prepare the SWPPP using good engineering practices, best management practices, and in compliance with all federal, state, and local regulatory requirements.

2. Provide copies of the SWPPP to the Nashville field office once all signatures and attachments are complete.

3. Prepare a construction Site Log Book to be used in maintaining a record of all inspection reports generated throughout the duration of construction.

4. Participate in a pre-construction meeting with the City of Nashville representative, Owner/Operator, Contractor, and their sub-contractors to discuss responsibilities as they relate to the implementation of this SWPPP.

5. Enter Contractor's information in Section 2.5 "SWPPP Participants" once a Contractor is selected by the Owner/Operator.

6. Retain the services of a TN licensed land surveyor to perform an as-built topographic survey of the completed post-construction stormwater management facilities. All new stormwater management faculties including infiltration basins, detention ponds, bioretention area or rain gardens shall be contained within a maintenance easement and recorded on the final plan. If a stormwater management facility is not constructed no As-Built Survey is required.

7. Conduct an initial assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate erosion and sediment control measures described within this SWPPP have been adequately installed and implemented to ensure overall preparedness of the site.

8. Provide on-site inspections to determine compliance with the SWPPP. Site inspections shall occur at an interval twice per week and at least 72 hours apart. An inspection report shall be completed at the completion of each inspection and included with the onsite SWPPP documents. A sample inspection form is provided in Appendix A.

9. Review the Contractor's SWPPP records on a periodic basis to ensure compliance with the requirements for daily reports and inspections and maintenance logs.

10. Maintain the construction Site Log Book throughout the duration of construction.

11. Update the SWPPP each time there is a significant modification to the pollution prevention measures or a change of the principal Contractor working on the project who may disturb site soil.

12. Based on the as-built survey and material testing certifications performed by others, perform evaluations of the completed stormwater management facilities to determine whether they were constructed in accordance with this SWPPP.

13. Conduct a final site assessment and prepare a certification letter to the Owner/Operator indicating that, upon review of the material testing and inspection reports prepared by the firm retained by the Owner/Operator, completion of the topographic survey, and evaluation of the completed stormwater management facilities, the stormwater management facilities have been constructed substantially in accordance with the contract documents and should function as designed.

14. Transfer the SWPPP documents, along with all permit certificates, construction Site Log Book, and written records required by the General Permit to the Owner/Operator for archiving.

2.4 Contractor's Responsibilities

1. Identify at least one Trained Contractor that will be responsible for implementation of this SWPPP. Ensure that at least one Trained Individual is on site on a daily basis when soil disturbance activities are being performed.

2. Provide the names and addresses of all subcontractors working on the project site. Require all subcontractors who will be involved with construction activities that will result in soil disturbance to identify at least one Trained Contractor that will be on site on a daily basis when soil disturbance activities are being performed; and to sign a copy of the Contractor's Certification Form and forward to the Owner's/Operator's

Engineer for inclusion into the Site Log Book. This information must be retained as part of the Site Log Book.

3. Maintain a Spill Prevention and Response Plan in accordance with requirements outlined in Section 5.4 of this SWPPP. This plan shall be provided to the Owner's/Operator's Engineer for inclusion in the Site Log Book.

4. Participate in a pre-construction meeting which shall include the City of Nashville (if requested) representative, Owner/Operator, Owner's/Operator's Engineer, and all sub-contractors to discuss responsibilities as they relate to the implementation of this SWPPP.

5. Implement site stabilization (temporary and permanent), erosion and sediment control measures, and other requirements of the SWPPP.

6. Conduct daily inspections of erosion and sediment control measures installed at the site to ensure that they remain in effective operating condition at all times. Prepare, and retain written documentation of inspections as well as of all repairs/maintenance activities performed. This information must be retained as part of the Site Log Book.

7. Maintain a record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated. A log for keeping such records is provided in Appendix A.

8. Begin implementing corrective actions within one business day of receipt of notification by the Qualified Inspector that deficiencies exist with the erosion and sedimentation control measures employed at the site. Corrective actions shall be completed within a reasonable time frame.

2.5 SWPPP Participants

1.	Owner's/Operator's Engineer:	S + H Group, LLC 2606 Eugenia Avenue Suite D Nashville, TN 37211 Phone: (518) 331-2124
2.	Owner/Operator:	Legacy South Builders, LLC 2305 Cruzen Drive Nashville, TN 37211
3.	Contractor:	TBD

3.0 SITE CHARACTERISTICS

3.1 Land Use

The subject site for the proposed construction is located along Duke Street, Davidson County Tennessee. The subject site is identified as tax parcel numbers 0710708900 and 07107009000 (all combined for this project and SWPPP) the total parcel size is approximately 1.69 (+/-) acres as shown on the drawings.

The subject site is currently developed with a house existing on both parcels of land. The property is slightly sloped from northeast to southwest with runoff contributing to the Cumberland River approximately 3.00 mi to the southeast via overland flow. Stormwater will be directed to the southwest corner of the lot where a level spreader will be installed dissipate the flow to sheet flow off the property.

3.2 Soils

The United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey for Davidson County was reviewed and provided surficial soil conditions for the study area. The SCS identified the presence of Maury Urban Land Complex soil type. Soil data was provided by the UCS and is presented in Table 1.

Table 1: USDA Soil Data

MAP SYMBOL/ DESCRIPTION	HYDRO-LOGIC SOIL GROUP	SLOPE (%)	SOIL PROFILE		K Sat (in/hr)	N DEPTH TO WATER TABLE (FT)	DEPTH TO BEDROCK (IN)
			DEPTH (IN)	USDA TEXTURE			
McB – Maury – Urban Land Complex	B	2-7	0-7 7-24 24-65	Silt loam; Silty Clay loam Silty Clay	0.60- 6.00	>6.5	>6.5

The Soil Conservation Service defines the hydrologic soil groups as follows:

- Type A Soils: Soils having a high infiltration rate and low runoff potential when thoroughly wet. These soils consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a moderate rate of water transmission.

- Type B Soils: Soils having a moderate infiltration rate when thoroughly wet and consists mainly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately course textures. These soils have a moderate rate of water transmission.

- Type C Soils: Soils having a low infiltration rate when thoroughly wet and consists chiefly of soils with a layer that impedes downward movement of water and soils

with moderately fine-to-fine texture. These soils have a low rate of water transmission.

- Type D Soils: Soils having a very low infiltration rate and high runoff potential when thoroughly wet. These soils consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very low rate of water transmission.

The soils information for the study area is presented in Appendix B.

3.3 Groundwater

Depth to groundwater is greater than 6.5 ft across the subject site according to USDA Soil Conservation Service Soil Survey for Davidson County as shown in Table 1 "USDA Soil Data".

3.4 Topography

The overall subject site is gently sloping, with slopes ranging from approximately 2- 4- percent of the project site. Site elevations range from approximately 502 feet above sea level at the northeastern property corner to 490 feet at the southwestern corner.

3.5 Wetlands

According to the National Wetlands Inventory (NWI) mapping[1], there are no wetlands in the project vicinity. The nearest NWI wetland is a freshwater pond located approximately 0.25 mi to the northeast.

3.6 Surface Waters and Flood Plains

According to the most recently available GIS data there are no mapped regulated streams on the subject site and no portion of the subject site is located in the 100-year FEMA Flood Zone.

3.7 Rainfall Data

Rainfall data utilized in the modeling and analysis was taken from National Weather Service (NWS) Technical Paper 40 (TP-40), Rainfall Frequency Atlas of the U.S. Weather Bureau, published by the U.S. Department of Commerce. Rainfall data specific to the portion of Davidson County under consideration, for various 24-hour storm events, are presented in Table 2:

[1] National Wetlands Inventory, Wetlands Digital Data, Available online at http://www.fws.gov/wetlands/Data/Mapper.html, site accessed 2/22/16.

Table 2: Rainfall Data

STORM EVENT	24-HOUR RAINFALL
2-year	2.04–inches
5-year	3.56–inches
10-year	4.63–inches
25-year	6.05–inches
50-year	7.12–inches
100-year	8.20–inches

These values were used to evaluate the pre- and post-development stormwater runoff conditions.

3.8 Pervious and Impervious Areas

The following comparison of the existing and proposed impervious areas was also used for the stormwater calculations. A summary of the existing and proposed (square feet) conditions are presented in Table 3:

Table 3: Existing and Proposed Impervious Area

	Existing	Proposed
Total Lot Area	70,567	70,567
Total Pervious	58,609	41,382
Total Impervious	11,543	29,185

3.9 Percolation Testing

Infiltration test were performed at the project site. Results can be found attached in Appendix F.

4.0 CONSTRUCTION SEQUENCE

Described below are the major construction activities that are the subject of this SWPPP. They are presented in the order (or sequence) they are expected to begin, but each activity will not necessarily be completed before the next begins. Also, these activities could occur in a different order if necessary to maintain adequate erosion and sediment control.

The Contractor will be responsible for implementing the following erosion and sediment control measures. The Contractor may designate these tasks to certain subcontractors as the contractor sees fit, but the ultimate responsibility for implementing these controls and ensuring their proper function remains with the Contractor. The order of activities will be as follows:

1. Prior to the commencement and earth moving the contractor is to verify that all EPSC measures have been installed in accordance with the plans and specifications.

2. Selectively clear only the areas required for the installation of the stabilized construction entrances/exits and temporary sediment and erosion and sediment control measures.

3. Install stabilized construction entrances/exits for all construction entrances/exits. This will be the first construction work on the project.

4. Install sediment control barriers down slope from construction activities that disturb site soil. Refer to the plans for the slit-fence location.

5. Transplant all identified trees and shrubs.

6. Begin clearing and grubbing operations. Clearing and grubbing shall be done only in areas where earthwork will be performed and only in areas where construction is planned to commence within 15 days after clearing and grubbing.

7. Frequent watering of the excavation and fill areas shall be done to minimize wind erosion.

8. Commence site grading and other construction activities.

9. Install stormwater infrastructure including conveyance systems and detention basins. All detention area shall be protected from construction traffic and other construction site sediments though the use of silt fence.

10. Disturbed areas of the site, where construction activity has ceased for more than 15 days, shall be temporarily or permanently seeded, mulched, and watered in accordance to the seeding schedule on the plans.

11. Remove stabilized construction entrance(s) only prior to final stabilization (These areas are to be removed last).

12. Carry out final grading, seeding, mulching, and landscaping.

13. Complete final ground stabilization including the placement of sod.

14. Remove silt fencing only after all exposed tributary surfaces are stabilized.

15. Complete on-site final stabilization.

16. Remove temporary sediment controls only after all paving is complete and exposed surfaces are completely stabilized, and cleanout all stormwater collection conveyance, and treatment facilities.

5.0 CONSTRUCTION PHASE POLLUTION CONTROLS

The SWPPP and accompanying plans identify the temporary and permanent erosion and sediment control measures that have been incorporated into the design of this project. These measures will be implemented during construction, to minimize soil erosion and control sediment transport off-site, and after construction, to control the quality and quantity of stormwater runoff from the developed site.

Erosion control measures, designed to minimize soil loss, and sediment control measures, intended to retain eroded soil and prevent it from reaching water bodies or adjoining properties, have been developed in accordance with the following documents:

- Tennessee Erosion and Sediment Control Handbook – 4th Edition (August 2012).
- City of Metro Nashville Supplemental Best Management Practices (BMP) Manual
- The Guide to Selection and Design of Stormwater Beset Management Practices (March 2003)

The SWPPP and accompanying plans outline the construction scheduling for implementing the erosion and sediment control measures. The SWPPP and accompanying plans include limitations on the duration of soil exposure, criteria and specifications for placement and installation of the erosion and sediment control measures, a maintenance schedule, and specifications for the implementation of erosion and sediment control practices and procedures.

Temporary and permanent erosion and sediment control measures that shall be applied during construction generally include:

1. Minimizing soil erosion and sedimentation by stabilization of disturbed areas and by removing sediment from construction-site discharges.
2. Preservation of existing vegetation as much as possible. Following the completion of construction activities in any portion of the site permanent vegetation shall be established on all exposed soils.
3. Site preparation activities shall be planned to minimize the area and duration of soil disruption.
4. Permanent traffic corridors shall be established and “routes of convenience” shall be avoided.

5.1 Temporary Erosion and Sediment Control Measures

Temporary erosion and sediment control measures are included as part of the construction documents and are designed to control the rainfall from a 2-year, 24-hour return interval storm. These generally include the following:

1. Stabilized Construction Entrance

   Prior to construction, stabilized construction entrances will be installed, as shown on the detail plan, to reduce the tracking of sediment onto public roadways. For this project the exiting driveway shall be used to minimize ground disturbance.

   Construction traffic must enter and exit the site at the stabilized construction entrance. The intent is to trap dust and mud that would otherwise be carried off-site by construction traffic.

   The entrance shall be maintained in a condition, which will control tracking of sediment onto public rights-of-way or streets. When necessary, the placement of additional aggregate atop the filter fabric will be done to assure the minimum thickness is maintained. All sediments and soils spilled, dropped, or washed onto the public rights-of-way must be removed immediately. Periodic inspection and needed maintenance shall be provided after each substantial rainfall event.

2. Dust Control

   Water trucks or hoses shall be used as needed during construction to reduce dust generated on the site. Dust control must be provided by the general Contractor to a degree that is acceptable to the Owner, and in compliance with the applicable local and state dust control requirements.

3. Temporary Soil Stockpile

   Materials, such as topsoil, will be temporarily stockpiled (if necessary) on the site during the construction process. Stockpiles shall be located in an area away from storm drainage, water bodies and/or courses, and will be properly protected from erosion by a surrounding silt fence barrier.

4. Silt Fencing

   Prior to the initiation of and during construction activities, a geotextile filter fabric (or silt fence) will be established along the perimeter of areas to be disturbed as a result of the construction, which lie up gradient of water courses or adjacent properties. These barriers may extend into non-impact areas to ensure adequate protection of adjacent lands.

   Clearing and grubbing will be performed only as necessary for the installation of the sediment control barrier. To ensure effectiveness of the silt fencing, daily site personnel will perform inspections and inspections immediately after significant storm events. Maintenance of the fence will be performed as needed. Trapped sediment is to be removed from sediment controls at or before 50% design capacity.

5. Temporary Seeding

Within 15 days after construction activity ceases on any particular area of the site, all disturbed areas where there will not be construction for longer than 15 days shall be temporarily seeded and mulched to minimize erosion and sediment loss. Temporary seeding shall be performed in accordance with the Tennessee Erosion and Sediment Control Handbook. The table below provides temporary seeding guidelines:

Species	**Rate (lb/acre)**
Rye	120

Seeding dates

East .....Above 2500 feet: Feb. 15 - May 15
Below 2500 feet: Feb. 1- May 1
Middle ..... Jan. 1 - May 1
West ..... Dec. 1 - Apr. 15

Soil amendments

Follow recommendations of soil tests or apply 2,000 lb/acre ground agricultural limestone and 750 lb/acre 10-10-10 fertilizer.

Mulch

Apply 4,000 lb/acre straw. Anchor straw by tacking with asphalt, netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

Maintenance

Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

5.2 Permanent Erosion and Sediment Control Measures

Permanent erosion and sediment control measures are included as part of the construction documents and include the following:

1. Establishment of Permanent Vegetation

   Disturbed areas that will be vegetated must be seeded in accordance with the contract documents. The type of seed, mulch, and maintenance measures as described in the contract documents shall also be followed.

   All areas at final grade must be seeded and mulched within 14 days after completion of the major construction activity. All seeded areas should be protected with mulch.

Final site stabilization is achieved when all soil-disturbing activities at the site has been completed and a uniform, perennial vegetative cover with a density of 80 percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

Permanent stabilization includes sod and or seeding based on the requirement of the Tennessee Erosion and Sediment control handbook and as outline in the table below. The project site is located within Region II.

Zone		Best	Marginal	Rate/Mix (lb/ac PLS)
Region I	Poorly drained soils	Feb 1 – Mar 20 Sept 1 – Sept 30	Mar 20 – Apr 30 Sept 30 – Oct 31	80 Pensacola bahiagrass 30 Bermudagrass (hulled) 20 Korean lespedeza** 10 Kobe lespedeza**
	Well drained soils	Apr 1 – July 15		50 Pensacola bahiagrass 15 Bermudagrass (hulled) 30 Korean lespedeza** 15 Foxtail millet**
	High maintenance	Apr 1 – July 15		40 Bermudagrass (hulled)
Region II	Low maintenance; Slopes and Poor, shallow soils	Aug 25 – Sept 15 **Feb 15 – Mar 21**	Sept 15 – Oct 25 Mar 21 – Apr 15	100 Pensacola bahiagrass 40 Bermudagrass (hulled) 20 Korean lespedeza** 10 Kobe lespedeza**
	Low maintenance; Moderate slopes; soils >6 in. depth	Aug 25 – Sept 15 **Feb 15 – Mar 21**	Sept 15 – Oct 25 Mar 21 – Apr 15	80 Pensacola bahiagrass 30 Bermudagrass (hulled) 20 Korean lespedeza** 10 Kobe lespedeza**
	High maintenance	Aug 15 – Oct 15	Feb 15 – Apr 15	200 KY 31 fescue**

5.3 Other Pollutant Controls

Control of sediments has been described previously. Other aspects of this SWPPP are listed below:

1. Solid Waste Disposal

   No solid materials, including building materials, are allowed to be discharged from the site with stormwater. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers will be emptied periodically by a contract trash disposal service and hauled away from the site.

   Substances that have the potential for polluting surface and/or groundwater must be controlled by whatever means necessary in order to ensure that they do not discharge from the site. As an example, special care must be exercised during

equipment fueling and servicing operations. If a spill occurs, it must be contained and disposed so that it will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of soil. In this regard, potentially polluting substances should be handled in a manner consistent with the impact they represent.

2. Sanitary Facilities

   Temporary sanitary facilities will be provided by the Contractor throughout the construction phase. They must be utilized by all construction personnel and will be serviced by a commercial Contractor. These facilities must comply with state and local sanitary or septic system regulations.

3. Water Source

   Non-stormwater components of site discharge must be clean water. Water used for construction, which discharges from the site, must originate from a public water supply or private well approved by the Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site. It can be retained in the ponds until it infiltrates and evaporates.

4. Long-Term Pollutant Controls

   In addition to the permanent stormwater management facilities, identified on the accompanying plans, stormwater pollutant control measures installed during construction that will also provide benefits after construction include temporary sediment basins and rip-rapped outfalls. Temporary sediment basins that do not interfere with normal operations and appear to provide long-term benefits may be left in place after construction is completed, as directed by the Operator.

5.4 Construction Housekeeping Practices

During the construction phase, the general Contractor will implement the following measures:

1. Material resulting from the clearing and grubbing operation will be stockpiled up slope from adequate sedimentation controls.

2. The general Contractor will designate areas for equipment cleaning, maintenance, and repair. The general Contractor and subcontractors will utilize those areas.

3. The use of detergents for large scale washing is prohibited (i.e., vehicles, buildings, pavement surfaces, etc.)

4. Spill Prevention and Response

A Spill Prevention and Response Plan shall be developed for the site by the Contractor. The plan shall detail the steps needed to be followed in the event of an accidental spill and shall identify contact names and phone numbers of people and agencies that must be notified.

The plan shall include Material Safety Data Sheets (MSDS) for all materials to be stored on-site. All workers on-site will be required to be trained on safe handling and spill prevention procedures for all materials used during construction. Regular tailgate safety meetings shall be held and all workers that are expected on the site during the week shall be required to attend.

5. Material Storage

Construction materials shall be stored in a dedicated staging area. The staging area shall be located in an area that minimizes the impacts of the construction materials effecting stormwater quality.

Chemicals, paints, solvents, fertilizers, and other toxic material must be stored in waterproof containers. Except during application, the contents must be kept in trucks or within storage facilities. Runoff containing such material must be collected, removed from the site, treated and disposed at an approved solid waste or chemical disposal facility.

6.0 STORMWATER MANAGEMENT PLAN

The goals of this Stormwater Management Plan are to analyze the peak rate of runoff under pre- and post-development conditions, to maintain the pre-development rate of runoff in order to minimize impacts to adjacent or downstream properties, and to minimize the impact of the quality to runoff exiting the site.

These objectives will be met by applying Best Management Practices (BMPs) to limit peak runoff rates.

6.1 Stormwater Management Systems

The existing residence did not have any stormwater management systems.

The proposed system will consist of permeable pavers, a bioretention pond, one 20 ft level spreader to dissipate stormwater to sheet flow off site.

6.2 Hydrologic and Hydraulic Analysis

This report presents the pre-development and post-development features and conditions associated with surface water runoff within the study area. For both cases, the drainage patterns, drainage structures, soil types, and ground cover types are considered in this study.

1. Methodology

The methodology used for the hydrologic and hydraulic analysis was obtained from the United States Department of Agriculture (USDA) Soil Conservation Service's (SCS) Technical Release No. 20, as utilized by the application program HydroCAD. HydroCAD, developed by Applied Microcomputer Systems of Chocorua, New Hampshire, is a Computer-Aided-Design (CAD) program for analyzing the hydrologic and hydraulic characteristics of a given watershed and associated stormwater management facilities. It utilizes the latest techniques to predict the consequences of any given storm.

HydroCAD has the capability of computing hydrographs (which represents discharge rates characteristic of specified watershed conditions, precipitation, and geologic factors) combining hydrographs and routing flows though pipes, streams and ponds. Documentation for HydroCAD can be found on their website: http://www.hydrocad.net/.

For this analysis, the watershed and drainage system was broken down into a network consisting of four types of components as described below:

1. Subcatchment: A relatively homogeneous area of land, which produces a volume and rate of runoff unique to that area.

2. Reach: Uniform streams, channels or pipes that convey stormwater from one point to another.

3. Pond: Natural or man-made impoundment, which temporarily stores stormwater runoff and empties in a manner determined by its geometry and the hydraulic structure located at its outlets.

4. Link: A multi-purpose mechanism used to introduce a hydrograph from another file.

Subcatchments, reaches, ponds and links are represented by hexagons, squares, triangles, and broken boxes respectively, on the watershed routing diagrams provided with the computations included in Appendix C and Appendix D.

2. Analysis

The analysis of hydrologic and hydraulic conditions and proposed stormwater management facilities, servicing the study area, was performed by dividing the tributary watershed into relative homogeneous sub-catchments. The separation of the watershed into sub-catchments was dictated by watershed conditions, methods of collection, conveyance, and points of discharge. Watershed characteristics for each subcatchment were then assessed from United States Geological Service (USGS) 7.5-minute topographic maps, aerial photographs, a topographical survey, soil surveys, site investigations, and land use maps.

Proposed stormwater management facilities were designed and evaluated in accordance with the *TDEC Erosion & Sediment Control Handbook* and local

regulatory requirements. The hydrologic and hydraulic analysis considered the SCS, Type II 24-hour storm events identified in Table 3.

Table 4: Design Events

Facility	24 Hour Storm Event
Permeable Pavement & Level 2 Bioretention	2-year
	10-year
	25-year
	50-year
	100-year

3. Study Area and Design Points (DP)

   The study area consists of an overall watershed that encompasses the project site and a run-on area of approximately 72,000 square feet that contributes to the stormwater runoff from the project site. The project site is lite to moderately sloping from northeast to southwest. The project site was broken down into smaller watersheds, or subcatchments, to allow for analysis of runoff conditions for pervious and impervious areas. Each of these locations contributes to a single Design Point (DP). A design point was identified at the southwest corner of the property where stormwater leaves the project site.

   A description of the design point and descriptions of each subcatchment are in Section 6.3 Pre-Development Watershed Conditions. Section 6.4 discusses the Post-Development Conditions as well as the proposed detention basins. Figures showing the watersheds and subcatchments are provided at the beginning of each of the hydraulic calculation section for pre- and post- watershed conditions.

6.3 Pre-Development Watershed Conditions

The Study Area Watershed Delineation Map has been provided in Appendix B. The results of the computer modeling used to analyze the overall watershed under pre-development conditions are presented in Appendix C. The pre-development discharge rates are presented in Table 5.

Design Point 1 (Pond 1P): Design Point 1 is the existing low point at the southwest property corner. The design point receives the entire site drainage

Subcatchment 1S: Subcatchment 1S includes all existing areas on site.

6.4 Post-Development Watershed Conditions

The proposed construction at the project site will increase the impervious area of the property. The analysis of post-development conditions considered existing drainage patterns, soil types, ground cover to remain, planned site development, site grading and, stormwater management facilities proposed as part of site improvements. To reduce the peak run off rate for the entire property permeable pavement and bioretention were utilized. While the design points have remained unchanged between the existing and proposed conditions the watershed boundaries have been adjusted to account for the improvements, regarding the flow to the proposed detention facilities.

The post development modeling had the following changes.

Subcatchment 1S: Subcatchment 1S includes the permeable pavement driveway, along with the contributing areas that will flow to the pavement.

Subcatchment 2S: Subcatchment 2S includes the level 2 bioretention facility, along with the contributing areas that will flow to the bioretention pond.

Subcatchment 3S: Subcatchment 3S includes the remaining proposed pervious and impervious surfaces on site.

Figure 3 in Appendix B shows the proposed subcatchments. The results of the computer modeling used to analyze the overall watershed under post-development conditions are presented in Appendix D. A summary of the post-development discharge rates is presented in Table 5.

6.5 Hydrologic and Hydraulic Calculations

Comparison of pre- and post-development watershed conditions demonstrates that the peak rate of runoff from the subject site will not be increase and therefore will not pose a significant adverse impact to the adjacent or downstream properties or receiving water courses. Table 4 "Summary of Pre- and Post-Development Peak Discharge Rates" summarizes the results of the analyses for such comparison.

Table 5: Summary of Pre- & Post-Development Peak Discharge Rates

	Pre- vs. Post-Development Discharge Rate (cfs)											
Design Point (DP)	2- year 24-hour Storm		5-year 24-hour Storm		10-year 24-hour Storm		25-year 24-hour Storm		50-year 24 hour Storm		100-year 24 hour Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	**2.04**	**1.32**	**3.56**	**2.50**	**4.63**	**4.38**	**6.05**	**6.36**	**7.12**	**7.39**	**8.20**	**8.20**

The results of the computer modeling used to analyze the stormwater management system under pre- and post-development conditions are presented in Appendix C and Appendix D, respectively.

6.6 Proposed Water Quantity and Quality Controls

1. Water Quantity Controls

   The proposed stormwater quantity controls will include an overall reduction in the impervious area of the project site. The location and amount of plantings has also been increased which will aid in the dispersing and absorption of water flow.

   The proposed quantity controls have been designed and sized to provide extreme flood protection ($Q_{f_{100}}$), where:

   - Extreme Flood Protection Volume ($Q_{f_{100}}$) requirements are designed to:

     1. Prevent the increased risk of flood damage from large storm events.

     2. Protect the physical integrity of the stormwater management practices. This requires storage to assure that the post-development 100 year 24 hour peak discharge rates do not exceed pre-development rates.

7.0 INSPECTIONS, MAINTENANCE, AND REPORTING

7.1 Inspection and Maintenance Requirements

7.1.1 Pre-Construction Inspection and Certification

Prior to the commencement of construction, the Owner's/Operator's Engineer shall conduct an assessment of the site and certify that the appropriate erosion and sediment control measures have been adequately installed and implemented. The Contractor shall contact the Owner's/Operator's Engineer once the erosion and sediment control measures have been installed.

7.1.2 Construction Phase Inspections and Maintenance

A Qualified Inspector, as defined in the General Permit TNR-100000, shall conduct regular site inspections between the time this SWPPP is implemented and final site stabilization. Site inspections shall occur at an interval of at least once every seven calendar days.

The purpose of site inspections is to assess performance of pollutant controls. Based on these inspections, the qualified inspector will decide whether it is necessary to modify this SWPPP, add or relocate sediment barriers, or whatever else may be needed in order to prevent pollutants from leaving the site via stormwater runoff. The general contractor has the duty to cause pollutant control measures to be repaired, modified, maintained, supplemented, or whatever else is necessary in order to achieve effective pollutant control.

Examples of particular items to evaluate during site inspections are listed below. This list is not intended to be comprehensive. During each inspection the inspector must evaluate overall pollutant control system performance as well as particular details of individual system components. Additional factors should be considered as appropriate to the circumstances.

1. Locations where vehicles enter and exit the site must be inspected for evidence of off-site sediment tracking. A stabilized construction entrance will be constructed where vehicles enter and exit. This entrance will be maintained or supplemented as necessary to prevent sediment from leaving the site on vehicles.
2. Sediment barriers must be inspected and, if necessary, they must be enlarged or cleaned in order to provide additional capacity. All material from behind sediment barriers will be stockpiled on the up slope side. Additional sediment barriers must be constructed as needed.
3. Inspections will evaluate disturbed areas and areas used for storing materials that are exposed to rainfall for evidence of, or the potential for, pollutants entering the drainage system. If necessary, the materials must be covered or original covers must be repaired or supplemented.
4. Grassed areas will be inspected to confirm that a healthy stand of grass is maintained. The site has achieved final stabilization once all areas are covered with building foundation or pavement, or have a stand of grass with at least 80 percent density. The density of 80 percent or greater must be maintained to be considered

as stabilized. Areas must be watered, fertilized, and reseeded as needed to achieve this goal.

5. All discharge points must be inspected to determine whether erosion control measures are effective in preventing significant impacts to receiving waters.
6. The system shall be maintained and inspected according to the "Post-Construction Inspections and Maintenance" as outlined in Section I-01 of the "Tennessee Guide to Selection & Design of Stormwater BMPs".
7. Maintenance of the systems may include but not be limited to excavation and replacement of the infiltration bed every 5 years.

The inspection reports must be completed entirely and additional remarks should be included if needed to fully describe a situation. An important aspect of the inspection report is the description of additional measures that need to be taken to enhance plan effectiveness. The inspection report must identify whether the site was in compliance with the SWPPP at the time of inspection and specifically identify all incidents of non-compliance.

Within one business day of the completion of an inspection, the qualified inspector shall notify the Owner/Operator and appropriate contractor (or subcontractor) of any corrective actions that need to be taken. The contractor (or subcontractor) shall begin implementing corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

In addition to the inspections performed by the Owner's/Operator's Engineer, the Contractor shall perform routine inspections that include a visual check of all erosion and sediment control measures. All inspections and maintenance shall be performed in accordance with the inspection and maintenance schedule provided on the accompanying plans. Sediment removed from erosion and sediment control measures will be exported from the site, stockpiled for later use, or used immediately for general non-structural fill.

It is the responsibility of the general contractor to assure the adequacy of site pollutant discharge controls. Actual physical site conditions or contractor practices could make it necessary to install more structural controls than are shown on the accompanying plans. (For example, localized concentrations of runoff could make it necessary to install additional sediment barriers.) Assessing the need for additional controls and implementing them or adjusting existing controls will be a continuing aspect of this SWPPP until the site achieves final stabilization.

7.1.3 Temporary Suspension of Construction Activities

For constructions sites where soil disturbance activities have been temporarily suspended (e.g. Winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the frequency of Qualified Inspector inspections can be reduced to once every 30 calendar days. Prior to reducing the frequency of inspections, the Owner/Operator shall notify the City of Nashville contact person in writing.

7.1.4 Partial Project Completion

For constructions sites where soil disturbance activities have been shut down with partial project completion, all areas disturbed as of the project shutdown date have achieved final stabilization, and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational, the Qualified Inspector inspections can stop. Prior to the shutdown, the Owner/Operator shall notify the City of Nashville contact person in writing

7.1.5 Post-Construction Inspections and Maintenance

Inspections and maintenance of post-construction stormwater management facilities shall be performed by a Qualified Inspector, as defined herein, and shall conducted on an annual basis to ensure that the stormwater management systems are in place and operable. Inspections and maintenance include checking all cleanouts and removing any sediment that has collected in the system. The following areas of the system shall at a minimum be checked.

General System:

1. All cleanouts from downspouts.
2. All cleanouts related to the stormwater management system and identified in the plans.
3. All grates related to the storm water management system.
4. Visual inspection of the detention basins.
5. Visual inspection of the level spreaders

As Needed:

1. Inspect to insure that all vegetation is healthy and replace as necessary to ensure desired density.
2. Inspect and remove leaves and debris from inlets and outlets.
3. Inspect sumps for detention basin and clean if necessary.

Annually:

1. Spring inspection and cleanup
2. Inspect and replace vegetation as necessary
3. Inspect level spreaders, sumps and StormTech system.

Records shall be kept for all annual inspection in accordance to the Reporting Requirement in Section 7.2.

If any portion of the systems is found to damaged or not be functioning as designed the owner shall contract the engineer of record and or replace the portion of the system to meet the original design specifications.

7.2 Reporting Requirements

7.2.1 Inspection and Maintenance Reports

Inspection/maintenance reports shall be prepared prior to and during construction in accordance with the schedule outlined herein. The reports shall be prepared to identify and document the maintenance of the erosion and sediment control measures. A sample inspection form is provided in Appendix A and shall only be prepared if required by the City of Nashville.

Specifically, each inspection shall record the following information:

1. Date and time of inspection.

2. Name and title of person(s) performing inspection.

3. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection.

4. A description of the condition of the runoff at all points of discharge (including conveyance systems and overland flow) from the construction site. This shall include identification of any discharges of sediment from the construction site.

5. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any discharges of sediment to the surface waterbody.

6. Identification of all erosion and sediment control practices that need repair or maintenance.

7. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or repaired.

8. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection.

9. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards.

10. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s).

11. Digital photographs, with date stamp, which show the condition of all practices that have been identified as needing corrective action or have undergone corrective action, must be attached to the associated inspection report.

7.2.2 Site Log Book

The Owner/Operator shall retain a copy of the SWPPP at the construction-site from the date of initiation of construction activities to the date of final stabilization.

During construction, the Owner's/Operator's Engineer shall maintain a record of all SWPPP inspection reports at the site in the Site Log Book. The Site Log Book shall be maintained on-site and made available to the permitting authority.

7.2.3 Post Construction Records and Archiving

Following construction, the Owner/Operator shall retain copies of the SWPPP, the complete construction Site Log Book, and records of all data used to complete the NOI to be covered by this permit, for a period of at least five years from the date that the site is finally stabilized.

8.0 CONCLUSION

Stone & Howorth, PLC has completed a Stormwater Pollution Prevention Plan for the planned construction at 106 & 110 Duke Street , City of Nashville, Davidson County Tennessee. The analyses included the review of watershed conditions, hydrologic and hydraulic analysis using computer modeling, and an evaluation of the proposed improvements across the subject site.

The Stormwater Management Plan allows for the maintenance of existing drainage patterns while continuing the conveyance of stormwater runoff from upland watershed areas.

The Stormwater Management Plan controls increases in the stormwater rate of runoff resulting from the proposed development without adversely affecting downstream conditions. This is demonstrated by comparing pre- and post-development flows for various storm events. Table 5 "Summary of Pre- and Post-Development Peak Discharge Rates" summarizes the results of the analyses for such comparison.

The comparison of pre- and post-development watershed rate of runoff demonstrates that off-site peak flow conditions at the design points will pose no significant adverse impacts to the adjacent or downstream properties or receiving water courses.

The proposed stormwater collection system consisting of pipes, open drainage ways and on-site stormwater management facilities will adequately collect, treat, and convey the stormwater.

Stormwater quality will be enhanced through the implementation of the proposed stormwater management facilities, erosion and sediment control measures and maintenance practices outlines herein.

In conclusion, it is our opinion that the proposed development will not adversely impact adjacent or downstream properties if the stormwater management facilities are properly constructed and maintained in accordance with the requirements outlines herein.

Appendix A

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Resources
William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor, Nashville, TN 37243
Toll Free Number: 1-888-891-TDEC (8332)

Notice of Intent (NOI) for General NPDES Permit for Stormwater Discharges from Construction Activities (TNR100000)

Site or Project Name: 106/110 Duke Street		**Existing NPDES Tracking Number: TNR**	
Street Address or Location: 110 Duke Street , Nashville TN 37207		Start date:	6/1/1/2018
		Estimated end date:	6/1/2019
Site Activity Description: Construction of 30 Townhomes		Latitude (dd.dddd):	36.206991
		Longitude (-dd.dddd):	-86.766343
County(ies): Davidson	MS4 Jurisdiction:	Acres Disturbed:	1.01
		Total Acres:	1.01

Does a topographic map show dotted or solid blue lines ☐ and/or wetlands ☐ on or adjacent to the construction site?

If wetlands are located on-site and may be impacted, attach wetlands delineation report.
If an Aquatic Resource Alteration Permit has been obtained for this site, what is the permit number? ARAP permit No.:

Receiving waters: Pages Branch

Attach the SWPPP with the NOI: ■ SWPPP Attached | Attach a site location map: ■ Map Attached

Site Owner/Developer Entity (*Primary Permittee*)**:** (person, company, or legal entity that has operational or design control over construction plans and specifications):

Site Owner/Developer Signatory (V.P. level/higher - signs certification below): (individual responsible for site): Bailey Neal		Signatory's Title or Position (V.P. level/higher - signs certification below):	
Mailing Address: 5533 Kendall Drive		City: Nashville	State: tn Zip: 37209
Phone: ( )	Fax: ( )	E-mail: bailey@villagebuilderstn.com	

Optional Contact:		Title or Position:	
Mailing Address:		City:	State: Zip:
Phone: ( )	Fax: ( )	E-mail:	

Owner or Developer Certification (must be signed by president, vice-president or equivalent, or ranking elected official) (Primary Permittee)

I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Owner or Developer Name (print or type): Bailey Neal	Signature:	Date:

Contractor(s) Certification (must be signed by president, vice-president or equivalent, or ranking elected official) (Secondary Permittee)

I certify under penalty of law that I have reviewed this document, any attachments, and the SWPPP referenced above. Based on my inquiry of the construction site owner/developer identified above and/or my inquiry of the person directly responsible for assembling this NOI and SWPPP, I believe the information submitted is accurate. I am aware that this NOI, if approved, makes the above-described construction activity subject to NPDES permit number TNR100000, and that certain of my activities on-site are thereby regulated.

Contractor company name (print or type):

Contractor signatory (print/type) (V.P. level or higher):		Signature:	Date:
Mailing Address:		City: State:	Zip:
Phone: ( )	Fax: ( )	E-mail:	

Other Contractor company name (print or type):			
Other Contractor signatory (print/type) (V.P. level or higher):		Signature:	Date:
Mailing Address:		City: State:	Zip:
Phone: ( )	Fax: ( )	E-mail:	

OFFICIAL STATE USE ONLY

Received Date:	Reviewer:	Field Office:	Permit Number **TNR:**	Exceptional TN Water:
Fee(s):	T & E Aquatic Flora and Fauna:		Impaired Receiving Stream:	Notice of Coverage Date:

(Continued on reverse)

Notice of Intent (NOI) for General NPDES Permit for Stormwater Discharges from Construction Activities (TNR100000)

Purpose of this form: A completed notice of intent (NOI) must be submitted to obtain coverage under the Tennessee General NPDES Permit for Discharges of Stormwater Associated with Construction Activity (permit). **Requesting coverage under this permit means that an applicant has obtained and examined a copy of this permit, and thereby acknowledges applicant's claim of ability to be in compliance with permit terms and conditions.** This permit is required for stormwater discharge(s) from construction activities including clearing, grading, filling and excavating (including borrow pits) of one or more acres of land. This form should be submitted at least 30 days prior to the commencement of land disturbing activities, or no later than 48 hours prior to when a new operator assumes operational control over site specifications or commences work at the site.

Permit fee: The correct permit fee (see table below) must accompany the NOI and is based on total acreage to be disturbed by an entire project, including any associated construction support activities (e.g. equipment staging yards, material storage areas, excavated material disposal areas, borrow or waste sites).

Acres Disturbed	= or > 150 acres	= or > 50 < 150 acres	= or > 20 < 50 acres	= or > 5 < 20 acres	= or > 1 < 5 acres	Subsequent coverage*
Fee	$10,000	$6,000	$3,000	$1,000	$250	$100

* Subsequent Primary Operators seeking coverage under an actively covered larger plan of development or sale

Who must submit an NOI: Per Section 2 of the permit, all site operators must submit an NOI form. "Operator" for the purpose of this permit and in the context of stormwater associated with construction activity means any person associated with a construction project who meets either or both of the following two criteria: (1) The person has operational or design control over construction plans and specifications, including the ability to make modifications to those plans and specifications. This person is typically the owner or developer of the project or a portion of the project (e.g. subsequent builder), or the person that is the current land owner of the construction site. This person is considered the primary permittee; or (2) The person has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions. This person is typically a contractor or a commercial builder who is hired by the primary permittee, and is considered a secondary permittee.

Owners, developers and all contractors that meet the definition of the operator in subsection 2.2 of the permit shall apply for permit coverage on the same NOI, insofar as possible. After permit coverage has been granted to the primary permittee, any subsequent NOI submittals must include the site's previously assigned permit tracking number and the project name. The comprehensive site-specific SWPPP shall be prepared in accordance with the requirements of part 3 of the permit and must be submitted with the NOI unless the NOI being submitted is to only add a contractor (secondary permittee) to an existing coverage.

Notice of Coverage: The division will review the NOI for completeness and accuracy and prepare a notice of coverage (NOC). Stormwater discharge from the construction site is authorized as of the effective date of the NOC.

Complete the NOI: Type or print clearly, using ink and not markers or pencil. Answer each item or enter "NA," for not applicable, if a particular item does not fit the circumstances or characteristics of your construction site or activity. If you need additional space, attach a separate piece of paper to the NOI form. **The NOI will be considered incomplete without a permit fee, a map, and the SWPPP.**

Describe and locate the project: Use the legal or official name of the construction site. If a construction site lacks street name or route number, give the most accurate geographic information available to describe the location (reference to adjacent highways, roads and structures; e.g. intersection of state highways 70 and 100). Latitude and longitude (expressed in decimal degrees) of the center of the site can be located on USGS quadrangle maps. The quadrangle maps can be obtained at the USGS World Wide Web site: http://www.usgs.gov/; latitude and longitude information can be found at numerous other web sites. Attach a copy of a portion of a 7.5 minute quad map, showing location of site, with boundaries at least one mile outside the site boundaries. Provide estimated starting date of clearing activities and completion date of the project, and an estimate of the number of acres of the site on which soil will be disturbed, including borrow areas, fill areas, stockpiles and the total acres. For linear projects, give location at each end of the construction area.

MS4 Jurisdiction: If this construction site is located within a Municipal Separate Storm Sewer System (MS4), please list the MS4 name. A list of MS4s may be found at: http://www.tn.gov/environment/article/permit-water-stormwater-discharges-permitting

Give name of the receiving waters: Trace the route of stormwater runoff from the construction site and determine the name of the river(s), stream(s), creek(s), wetland(s), lake(s) or any other water course(s) into which the stormwater runoff drains. Note that the receiving water course may or may not be located on the construction site. If the first water body receiving construction site runoff is unnamed ("unnamed tributary"), determine the name of the water body that the unnamed tributary enters.

ARAP permit may be required: **If your work will disturb or cause alterations of a stream or wetland, you must obtain an appropriate Aquatic Resource Alteration Permit (ARAP).** If you have a question about ARAP permits, contact your local Environmental Field Office (EFO).

Submitting the form and obtaining more information: Note that this form must be signed by the company President, Vice-President, or a ranking elected official in the case of a municipality, for details see subpart 2.5. For more information, contact your local EFO at the toll-free number 1-888- 891-8332 (TDEC). Submit the completed NOI form (keep a copy for your records) to the appropriate EFO for the county(ies) where the construction activity is located, addressed to **Attention: Stormwater NOI Processing**.

EFO:	**Street Address:**	**Zip Code:**	**EFO:**	**Street Address:**	**Zip Code:**
Memphis	8383 Wolf Lake Drive, Bartlett	38133-4119	Cookeville	1221 South Willow Ave.	38506
Jackson	1625 Hollywood Drive	38305-4316	Chattanooga	1301 Riverfront Parkway, Suite 206	37402
Nashville	711 R S Gass Boulevard	37243	Knoxville	3711 Middlebrook Pike	37921
Columbia	1421 Hampshire Pike	38401	Johnson City	2305 Silverdale Road	37601

Department of Environment and Conservation
Division of Water Pollution Control

NOTICE OF TERMINATION (NOT) – STORM WATER DISCHARGES CONSTRUCTION ACTIVITY

This form is required to be submitted when requesting termination of coverage from the General NPDES Permit for Discharges of Storm Water Associated with Construction Activities. The purpose of this form is to notify the Tennessee Department of Environment and Conservation that you, as a permitted operator of storm water discharges from a construction activity, no longer have responsibilities related to erosion and sediment controls at the construction site. Submission of this form shall in no way relieve the permittee of permit obligations required prior to submission of this form. Please submit this form to the local Division of Water Pollution Control, Environmental Field Office (EFO) address (see table below), and marked "**Storm Water Notice of Termination**". For more information, contact your local EFO at the toll-free number 1-888-891-8332 (TDEC). **Type or print clearly, using ink and not markers or pencil.**

Site Name:	**Tracking No.**
Street Address or Location:	
Site Description:	

Site Owner/Developer: (person, company, or legal entity that has operational or design control over construction plans and specifications)

Site Owner/Developer Contact: (individual responsible for site)	Title or Position: Owners Representative		
Mailing Address:	City: Nashville	State: TN	Zip: 37215
Phone: ( )	E-mail:		

Check the reason for termination of permit coverage:

	Storm water discharge associated with construction activity is no longer occurring and the area previously under construction has been restabilized (i.e., termination of initial permittee coverage). Explain:
	You are no longer the operator of the facility/site (i.e., termination of primary or secondary permittee coverage). Name of Permittee requesting termination of coverage: Explain:

Certification and Signature (must be signed by president, vice-president or equivalent, or ranking elected official)

I certify under penalty of law that either: (a) all storm water discharges associated with construction activity from the portion of the identified facility where I was an operator have ceased or have been eliminated or (b) I am no longer an operator at the construction site. I understand that by submitting this notice of termination, I am no longer authorized to discharge storm water associated with construction activity under this general permit, and that discharging pollutants in storm water associated with construction activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Clean Water Act.

For the purposes of this certification, elimination of storm water discharges associated with construction activity means that all disturbed soils at the portion of the construction site where the operator had control have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time to insure final stabilization is maintained, or that all storm water discharges associated with construction activities from the identified site that are authorized by a NPDES general permit have otherwise been eliminated from the portion of the construction site where the operator had control.

Operator name; print or type	Signature	Date

EFO	Street Address	Zip Code	EFO	Street Address	Zip Code
Memphis	8383 Wolf Lake Drive Bartlett, TN	38133-4119	Cookeville	1221 South Willow Ave.	38506
Jackson	1625 Hollywood Drive	38305	Chattanooga	540 McCallie Avenue STE 550	37402-2013
Nashville	711 R S Gass Boulevard	37243	Knoxville	3711 Middlebrook Pike	37921
Columbia	1421 Hampshire Pike	38401	Johnson City	2305 Silverdale Road	37601

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION (TDEC)
Division of Water Resources
William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor, Nashville, Tennessee 37243
1-888-891-8332 (TDEC)
General NPDES Permit for Stormwater Discharges from Construction Activities (CGP)

Construction Stormwater Inspection Certification (Twice-Weekly Inspections)

Site or Project Name: 106/110 Duke Street			**NPDES Tracking Number: TNR**	
Primary Permittee Name:			Date of Inspection:	
Current approximate disturbed acreage:		Has rainfall been checked/documented daily? ☐ Yes ☐ No	Name of Inspector:	
Current weather conditions:			Inspectorôs TNEPSC Certification Number:	

Please check the box if the following items are on-site:

☐ Notice of Coverage (NOC) ☐ Stormwater Pollution Prevention Plan (SWPPP) ☐ Twice-weekly inspection documentation

☐ Site contact information ☐ Rain Gage ☐ Off-site Reference Rain Gage Location: _____

Best Management Practices (BMPs):

Are the Erosion Prevention and Sediment Controls (EPSCs) functioning correctly: If ñNo,ò describe below in Comment Section			
1.	Are all applicable EPSCs installed and maintained per the SWPPP?	☐Yes	☐No
2.	Are EPSCs functioning correctly at all disturbed areas/material storage areas per section 4.1.5?	☐Yes	☐No
3.	Are EPSCs functioning correctly at outfall/discharge points such that there is no objectionable color contrast in the receiving stream, and no other water quality impacts per section 5.3.2?	☐Yes	☐No
4.	Are EPSCs functioning correctly at ingress/egress points such that there is no evidence of track out?	☐Yes	☐No
5.	If applicable, have discharges from dewatering activities been managed by appropriate controls per section 4.1.4? If ñNo,ò describe below the measures to be implemented to address deficiencies.	☐Yes	☐No
6.	If construction activity at any location on-site has temporarily/permanently ceased, was the area stabilized within 14 days per section 3.5.3.2? If ñNo,ò describe below each location and measures taken to stabilize the area(s).	☐Yes	☐No
7.	Have pollution prevention measures been installed, implemented, and maintained to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters per section 4.1.5? If ñNo,ò describe below the measures to be implemented to address deficiencies.	☐Yes	☐No
8.	If a concrete washout facility is located on site, is it clearly identified on the project and maintained? If ñNo,ò describe below the measures to be implemented to address deficiencies. ☐ N/A	☐Yes	☐No
9.	Have all previous deficiencies been addressed? If ñNo,ò describe the remaining deficiencies in the Comments section. ☐ Check if deficiencies/corrective measures have been reported on a previous form.	☐Yes	☐No

Comment Section. If the answer is ñNoò for any of the above, please describe the problem and corrective actions to be taken. Otherwise, describe any pertinent observations:

Certification and Signature (must be signed by the certified inspector and the permittee per Sections 3.5.8.2 (g) and 7.7.2 of the CGP)

I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Inspector Name and Title:	Signature:	Date:
Primary Permittee Name and Title:	Signature:	Date:

Construction Stormwater Inspection Certification Form (Twice-Weekly Inspections)

Purpose of this form/ Instructions

An inspection, as described in section 3.5.8.2. of the General Permit for Stormwater Discharges from Construction Activities (ñPermitò), shall be performed at least twice every calendar week and documented on this form. Inspections shall be performed at least 72 hours apart. Where sites or portion(s) of construction sites have been temporarily stabilized, or runoff is unlikely due to winter conditions (e.g., site covered with snow or ice), such inspection only has to be conducted once per month until thawing results in runoff or construction activity resumes.

Inspectors performing the required twice weekly inspections must have an active certification by completing the ñFundamentals of Erosion Prevention and Sediment Control Level Iò course. (http://www.tnepsc.org/). A copy of the certification or training record for inspector certification should be kept on site.

Qualified personnel, as defined in section 3.5.8.1 of the Permit (provided by the permittee or cooperatively by multiple permittees) shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, locations where vehicles enter or exit the site, and each outfall.

Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the siteôs drainage system. Erosion prevention and sediment control measures shall be observed to ensure that they are operating correctly.

Outfall points (where discharges leave the site and/or enter waters of the state) shall be inspected to determine whether erosion prevention and sediment control measures are effective in preventing significant impacts to receiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected. Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking.

Based on the results of the inspection, any inadequate control measures or control measures in disrepair shall be replaced or modified, or repaired as necessary, before the next rain event if possible, but in no case more than 7 days after the need is identified.

Based on the results of the inspection, the site description identified in the SWPPP in accordance with section 3.5.1 of the Permit and pollution prevention measures identified in the SWPPP in accordance with section 3.5.2 of the Permit, shall be revised as appropriate, but in no case later than 7 days following the inspection. Such modifications shall provide for timely implementation of any changes to the SWPPP, but in no case later than 14 days following the inspection.

All inspections shall be documented on this Construction Stormwater Inspection Certification form. Alternative inspection forms may be used as long as the form contents and the inspection certification language are, at a minimum, equivalent to the divisionôs form and the permittee has obtained a written approval from the division to use the alternative form. Inspection documentation will be maintained on site and made available to the division upon request. Inspection reports must be submitted to the division within 10 days of the request.

Trained certified inspectors shall complete inspection documentation to the best of their ability. Falsifying inspection records or other documentation or failure to complete inspection documentation shall result in a violation of this permit and any other applicable acts or rules.

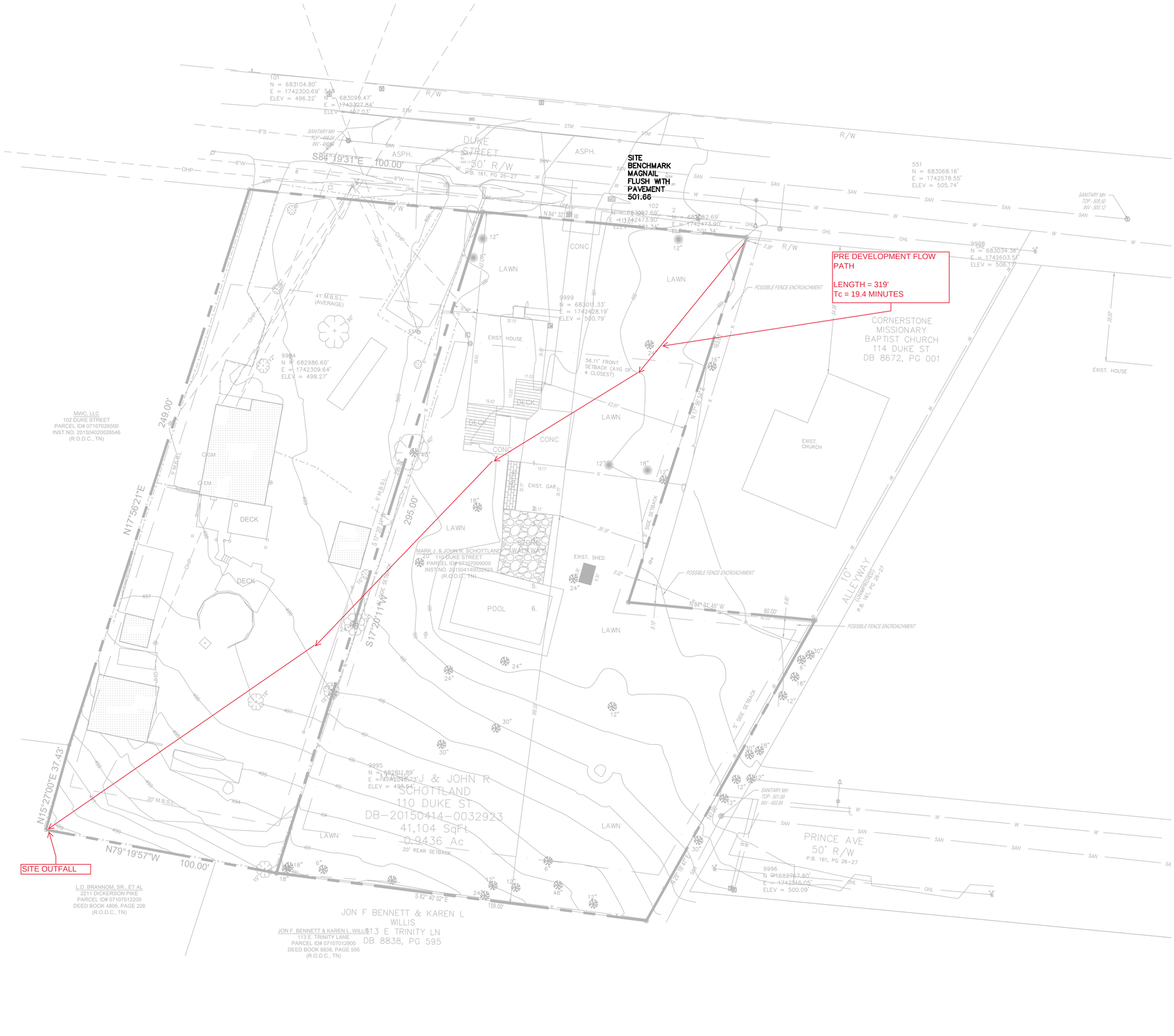
Appendix B

SURVEY NOTES

1. SURVEY PROVIDED BY BA LAND PROFESSIONAL ON MARCH 29, 2018.

EXISTING AREAS

IMPERVIOUS - .265 ACRES
GRAVEL - .01 ACRAS
PERVIOUS - 1.335 ACRES



TENNESSEE811
KNOW WHAT'S BELOW.
CALL BEFORE YOU DIG

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

0 20 40 60
1"=20'

106/110 DUKE STREET

NASHVILLE, TENNESSEE

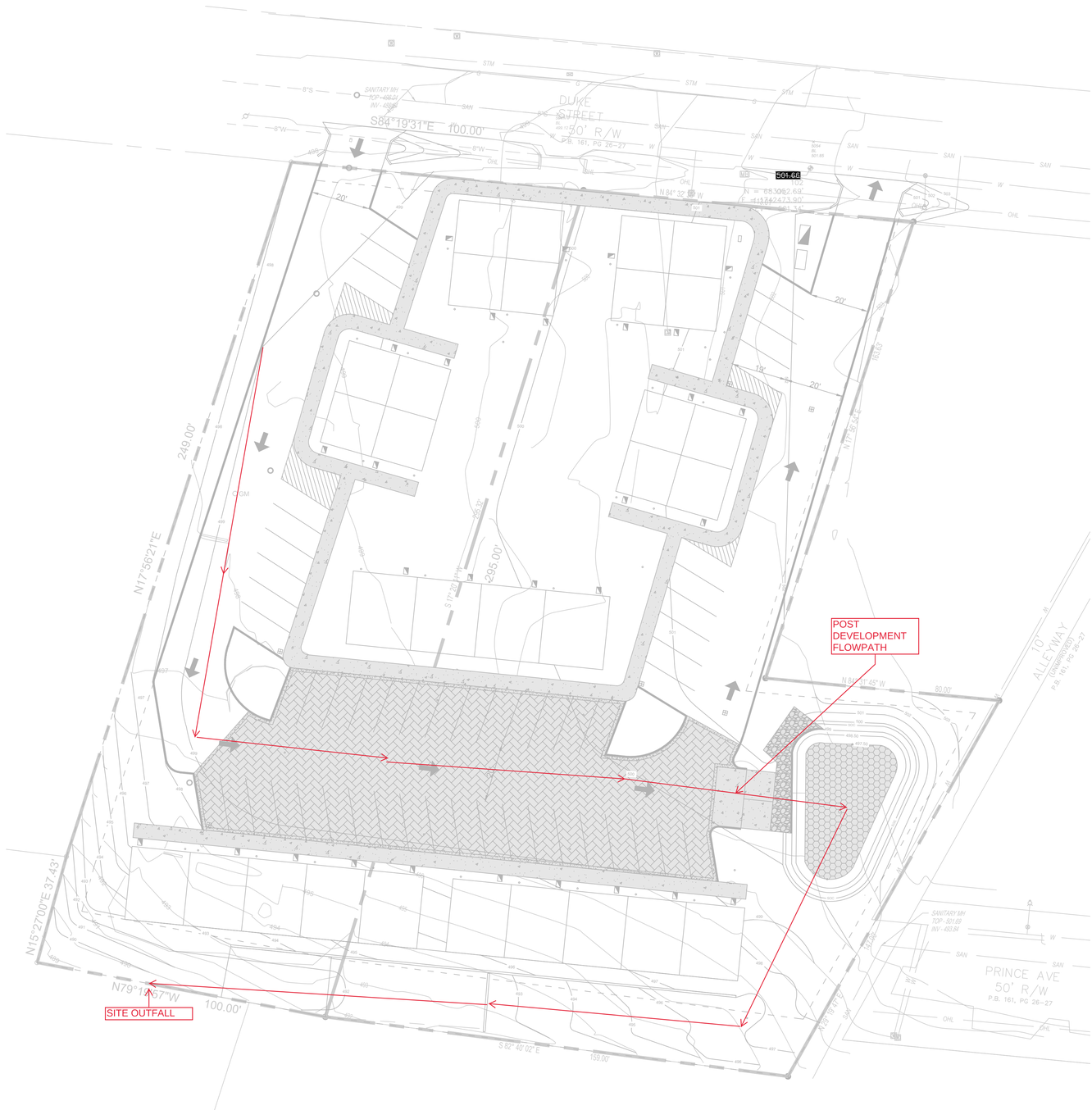
SHEET TITLE: PRE DEVELOPMENT FLOW PATHS

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

DATE: APRIL 30, 2018
SCALE: 1"= 20'
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: EX.A

PROPOSED AREAS

IMPERVIOUS - 0.69 ACRES
PAVERS - 0.20 ACRES
BIORETENTION - 0.02 ACRES
PERVIOUS - 0.70 ACRES



PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

TENNESSEE 811
KNOW WHAT'S BELOW.
CALL BEFORE YOU DIG

0 20 40 60
1"=20'

106/110 DUKE STREET

NASHVILLE, TENNESSEE

SHEET TITLE: POST DEVELOPMENT FLOW PATHS

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

DATE: APRIL 30, 2018
SCALE: 1"= 20'
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: EX.B

United States Department of Agriculture

NRCS

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 Davidson County, Tennessee

February 21, 2018

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

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.

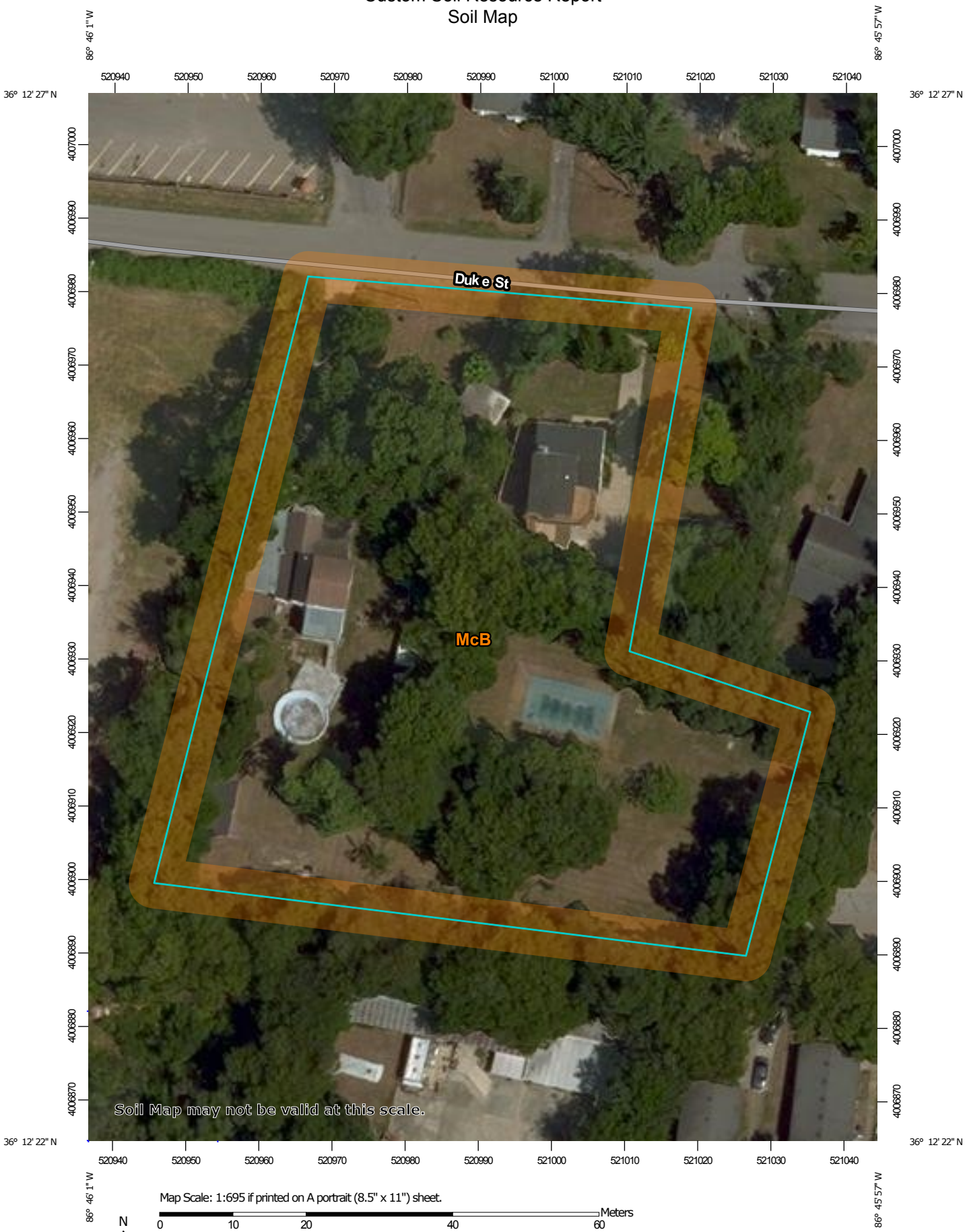
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: 1:695 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N 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 1:15,800.

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: Davidson County, Tennessee
Survey Area Data: Version 15, Sep 25, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 12, 2014—Aug 13, 2014

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
McB	Maury-Urban land complex, 2 to 7 percent slopes	1.4	100.0%
Totals for Area of Interest		**1.4**	**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.

Davidson County, Tennessee

McB—Maury-Urban land complex, 2 to 7 percent slopes

Map Unit Setting

National map unit symbol: kknq
Mean annual precipitation: 39 to 57 inches
Mean annual air temperature: 48 to 70 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Maury and similar soils: 60 percent
Urban land: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Maury

Setting

Landform: Hillslopes
Landform position (three-dimensional): Crest
Parent material: Loess over clayey residuum and/or alluvium derived from limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 24 inches: silty clay loam
H3 - 24 to 65 inches: silty clay

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Urban Land

Typical profile

H1 - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

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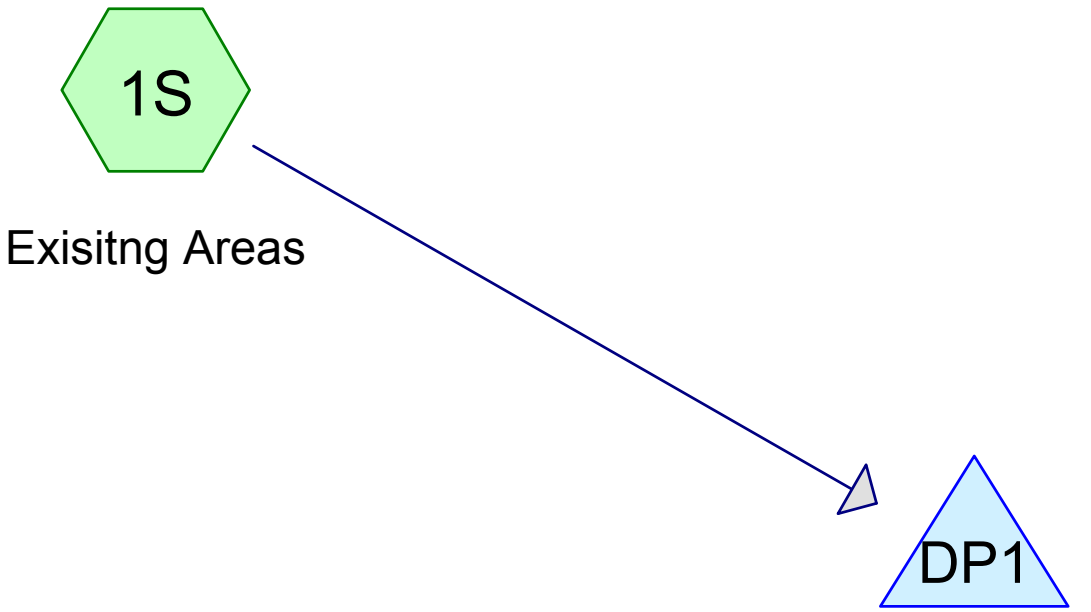
Appendix C



Subcat Reach Pond Link

Routing Diagram for 110 Duke Street Pre-Model 2.21.18 (1)
Prepared by {enter your company name here}, Printed 4/25/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.010	85	Gravel (1S)
0.265	98	Impervious Area On Site (1S)
1.335	69	Remaining Yard (1S)
1.610	**74**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.610	Other	1S
1.610		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.010	0.010	Gravel	1S
0.000	0.000	0.000	0.000	0.265	0.265	Impervious Area On Site	1S
0.000	0.000	0.000	0.000	1.335	1.335	Remaining Yard	1S
0.000	**0.000**	**0.000**	**0.000**	**1.610**	**1.610**	**TOTAL AREA**	

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exisitng Areas Runoff Area=1.610 ac 16.46% Impervious Runoff Depth=1.16"
Flow Length=319' Tc=19.4 min CN=74 Runoff=2.04 cfs 0.156 af

Pond DP1: Site Outfall Inflow=2.04 cfs 0.156 af
Primary=2.04 cfs 0.156 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.156 af Average Runoff Depth = 1.16"
83.54% Pervious = 1.345 ac 16.46% Impervious = 0.265 ac

Summary for Subcatchment 1S: Exisitng Areas

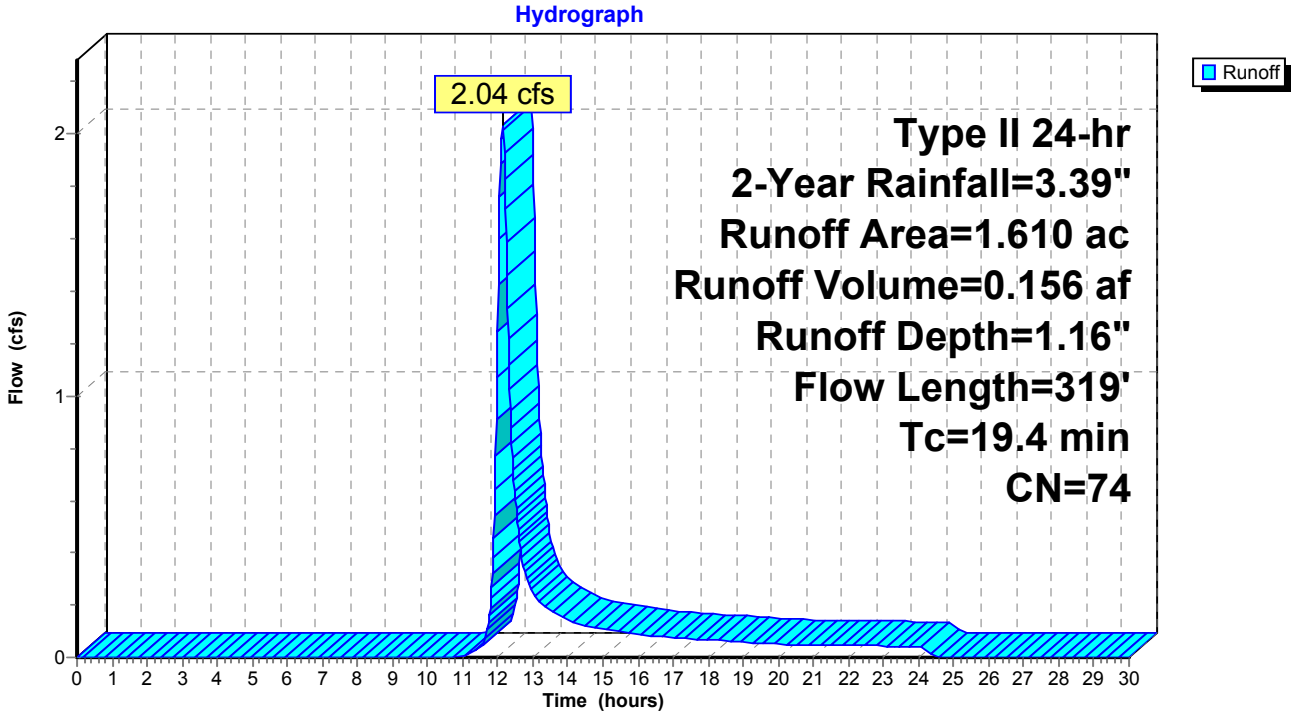
Runoff = 2.04 cfs @ 12.13 hrs, Volume= 0.156 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-Year Rainfall=3.39"

	Area (ac)	CN	Description
*	0.265	98	Impervious Area On Site
*	1.335	69	Remaining Yard
*	0.010	85	Gravel
	1.610	74	Weighted Average
	1.345		83.54% Pervious Area
	0.265		16.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.39"
1.1	219	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	319	Total			

Subcatchment 1S: Exisitng Areas



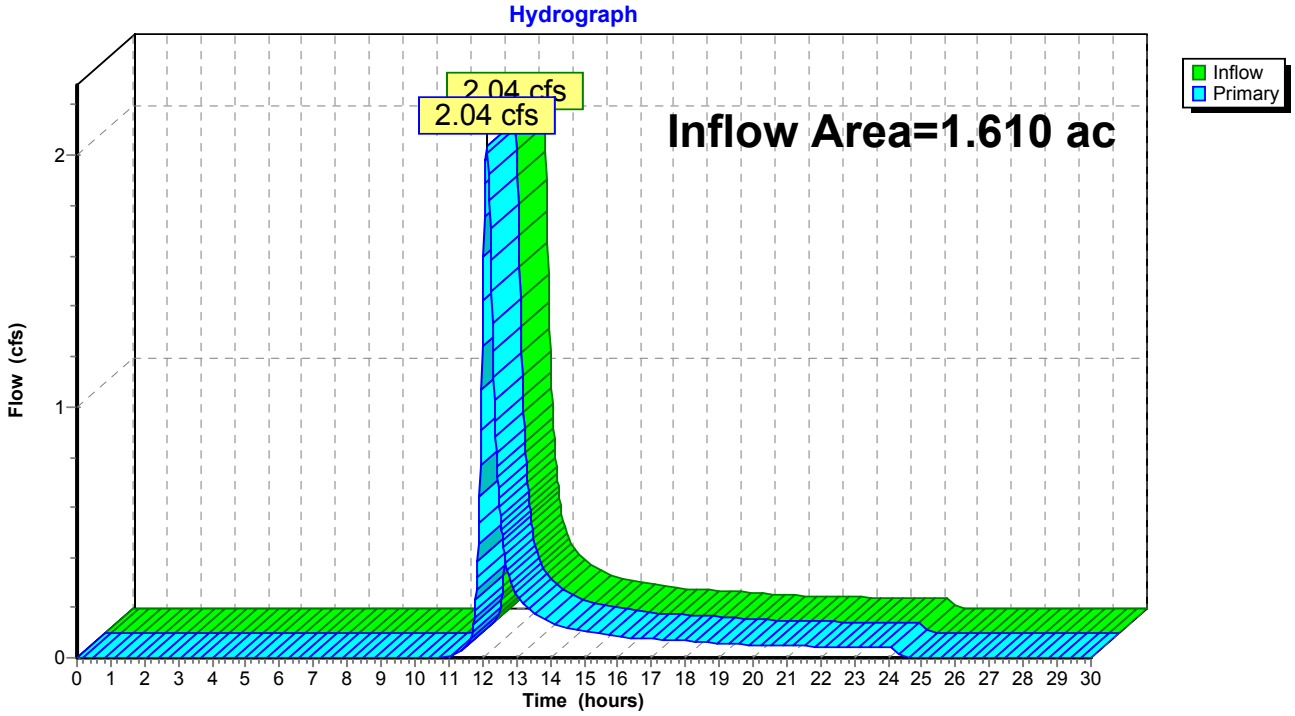
Summary for Pond DP1: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 16.46% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 2.04 cfs @ 12.13 hrs, Volume= 0.156 af
Primary = 2.04 cfs @ 12.13 hrs, Volume= 0.156 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond DP1: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exisitng Areas Runoff Area=1.610 ac 16.46% Impervious Runoff Depth=1.97"
Flow Length=319' Tc=19.4 min CN=74 Runoff=3.56 cfs 0.265 af

Pond DP1: Site Outfall Inflow=3.56 cfs 0.265 af
Primary=3.56 cfs 0.265 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.265 af Average Runoff Depth = 1.97"
83.54% Pervious = 1.345 ac 16.46% Impervious = 0.265 ac

Summary for Subcatchment 1S: Exisitng Areas

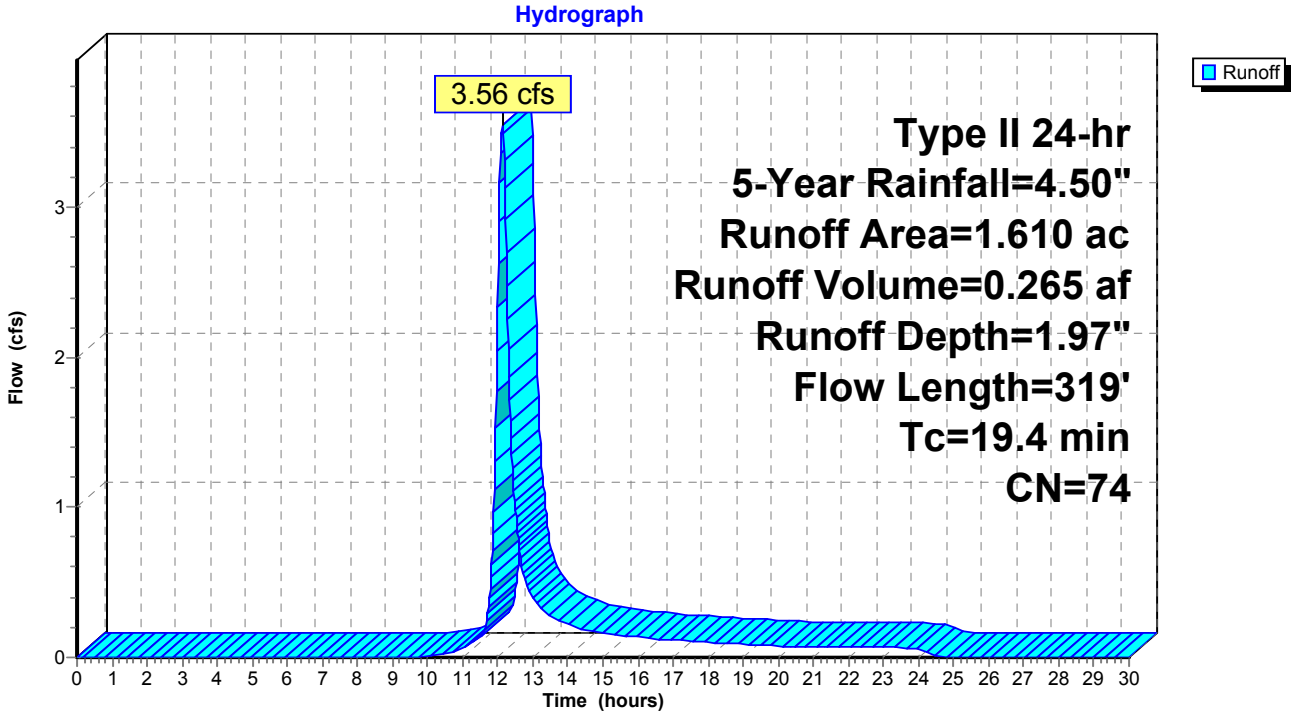
Runoff = 3.56 cfs @ 12.13 hrs, Volume= 0.265 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 5-Year Rainfall=4.50"

	Area (ac)	CN	Description
*	0.265	98	Impervious Area On Site
*	1.335	69	Remaining Yard
*	0.010	85	Gravel
	1.610	74	Weighted Average
	1.345		83.54% Pervious Area
	0.265		16.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.39"
1.1	219	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	319	Total			

Subcatchment 1S: Exisitng Areas



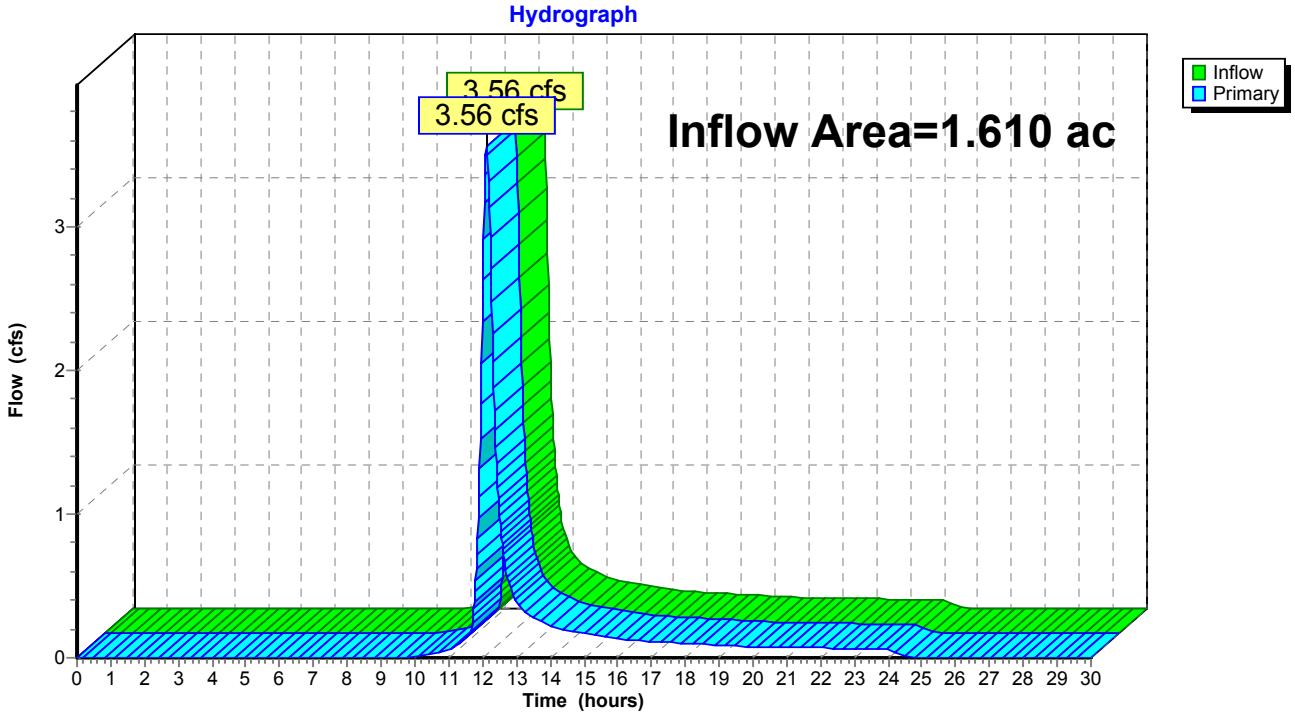
Summary for Pond DP1: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 16.46% Impervious, Inflow Depth = 1.97" for 5-Year event
Inflow = 3.56 cfs @ 12.13 hrs, Volume= 0.265 af
Primary = 3.56 cfs @ 12.13 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond DP1: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exisitng Areas Runoff Area=1.610 ac 16.46% Impervious Runoff Depth=2.55"
Flow Length=319' Tc=19.4 min CN=74 Runoff=4.63 cfs 0.342 af

Pond DP1: Site Outfall Inflow=4.63 cfs 0.342 af
Primary=4.63 cfs 0.342 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.342 af Average Runoff Depth = 2.55"
83.54% Pervious = 1.345 ac 16.46% Impervious = 0.265 ac

Summary for Subcatchment 1S: Exisitng Areas

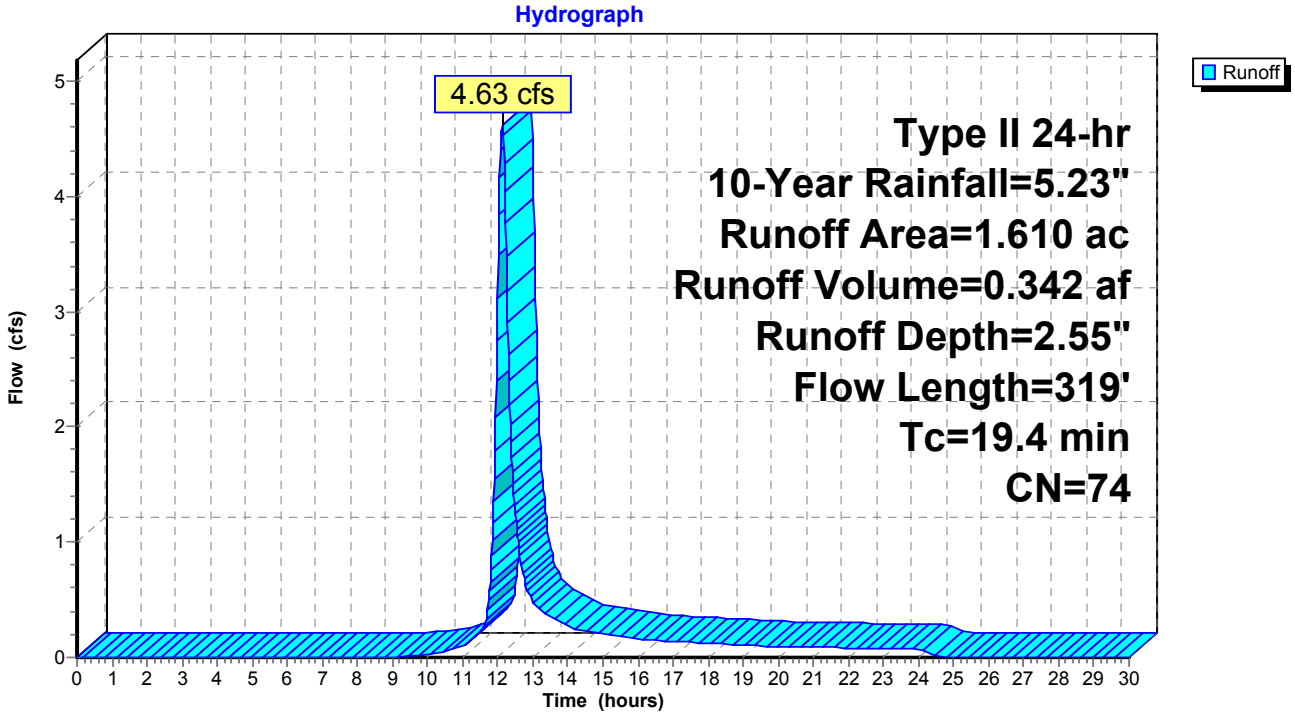
Runoff = 4.63 cfs @ 12.12 hrs, Volume= 0.342 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
*	0.265	98	Impervious Area On Site
*	1.335	69	Remaining Yard
*	0.010	85	Gravel
	1.610	74	Weighted Average
	1.345		83.54% Pervious Area
	0.265		16.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.39"
1.1	219	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	319	Total			

Subcatchment 1S: Exisitng Areas



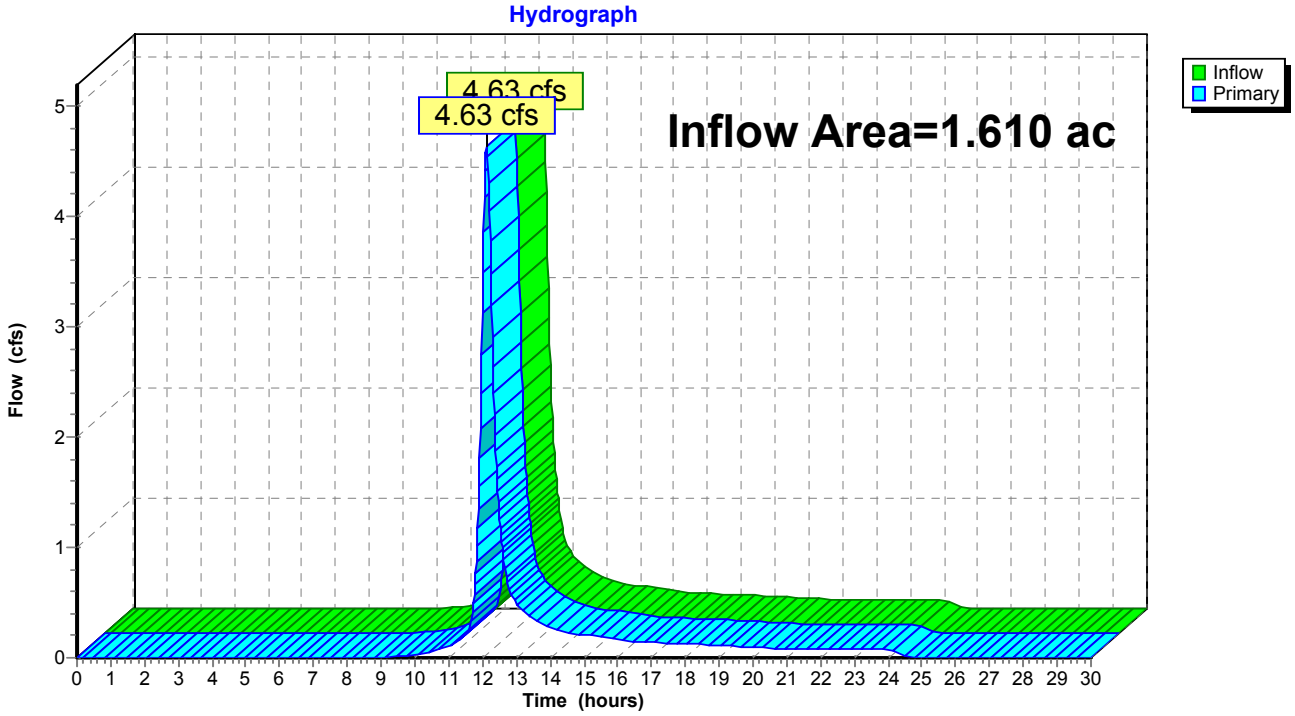
Summary for Pond DP1: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 16.46% Impervious, Inflow Depth = 2.55" for 10-Year event
Inflow = 4.63 cfs @ 12.12 hrs, Volume= 0.342 af
Primary = 4.63 cfs @ 12.12 hrs, Volume= 0.342 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond DP1: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exisitng Areas Runoff Area=1.610 ac 16.46% Impervious Runoff Depth=3.32"
Flow Length=319' Tc=19.4 min CN=74 Runoff=6.05 cfs 0.445 af

Pond DP1: Site Outfall Inflow=6.05 cfs 0.445 af
Primary=6.05 cfs 0.445 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.445 af Average Runoff Depth = 3.32"
83.54% Pervious = 1.345 ac 16.46% Impervious = 0.265 ac

Summary for Subcatchment 1S: Exisitng Areas

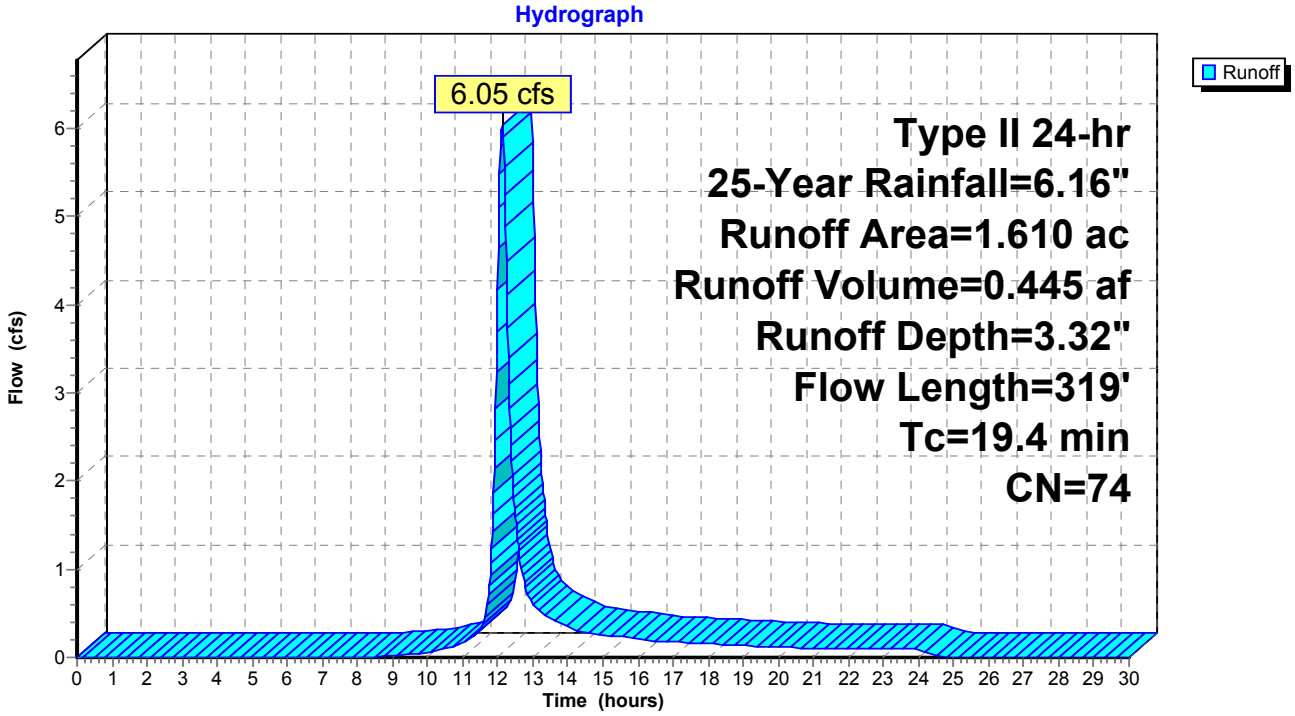
Runoff = 6.05 cfs @ 12.12 hrs, Volume= 0.445 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 25-Year Rainfall=6.16"

	Area (ac)	CN	Description
*	0.265	98	Impervious Area On Site
*	1.335	69	Remaining Yard
*	0.010	85	Gravel
	1.610	74	Weighted Average
	1.345		83.54% Pervious Area
	0.265		16.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.39"
1.1	219	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	319	Total			

Subcatchment 1S: Exisitng Areas



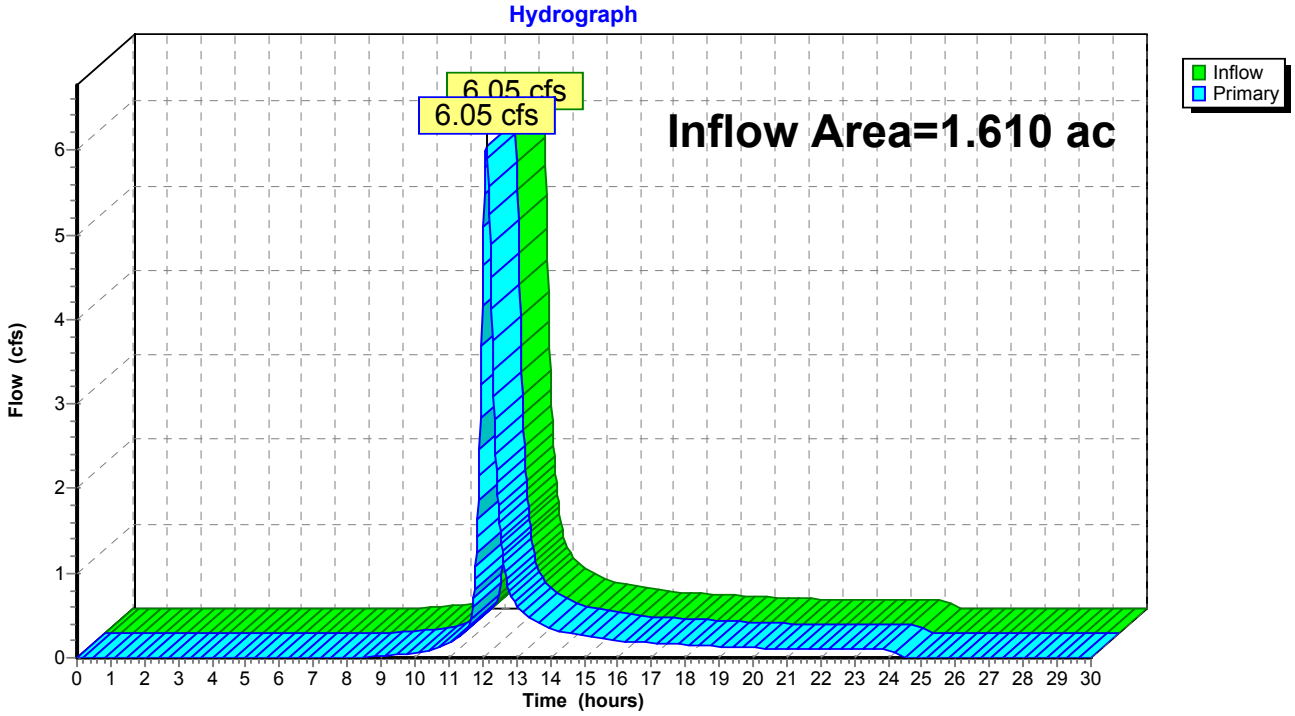
Summary for Pond DP1: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 16.46% Impervious, Inflow Depth = 3.32" for 25-Year event
Inflow = 6.05 cfs @ 12.12 hrs, Volume= 0.445 af
Primary = 6.05 cfs @ 12.12 hrs, Volume= 0.445 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond DP1: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exisitng Areas Runoff Area=1.610 ac 16.46% Impervious Runoff Depth=3.91"
Flow Length=319' Tc=19.4 min CN=74 Runoff=7.12 cfs 0.525 af

Pond DP1: Site Outfall Inflow=7.12 cfs 0.525 af
Primary=7.12 cfs 0.525 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.525 af Average Runoff Depth = 3.91"
83.54% Pervious = 1.345 ac 16.46% Impervious = 0.265 ac

Summary for Subcatchment 1S: Exisitng Areas

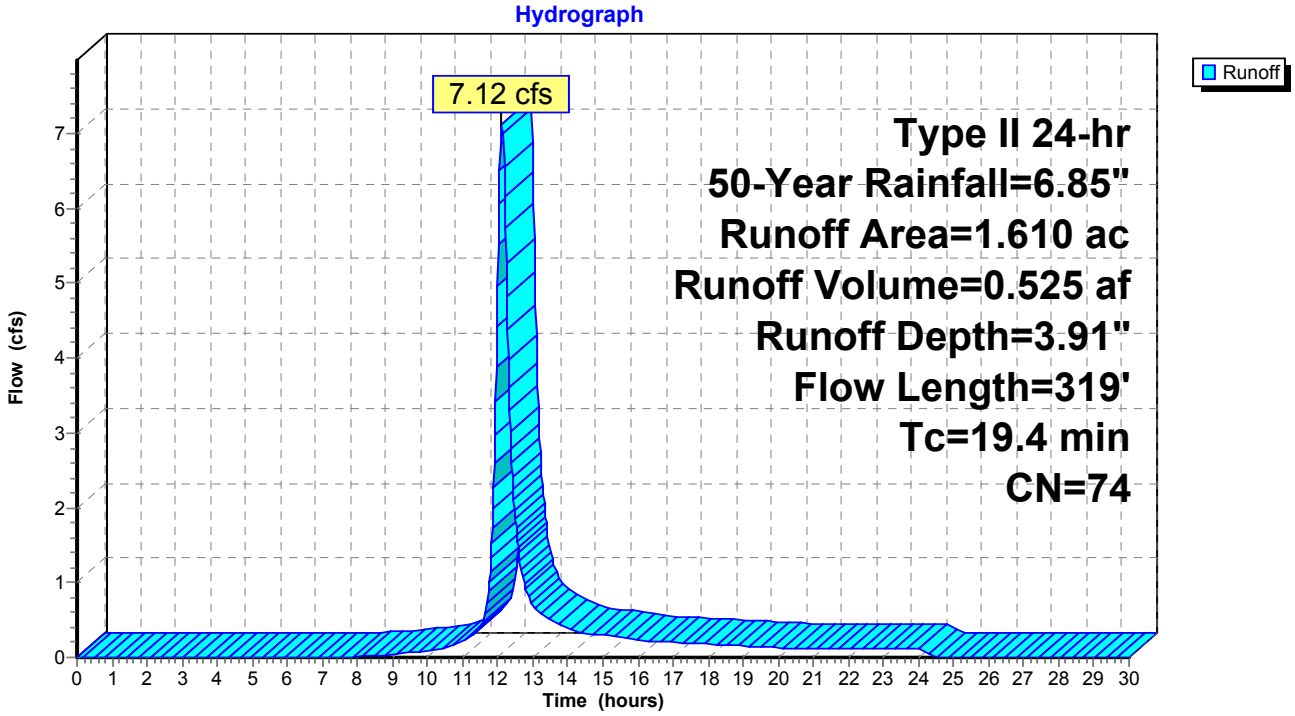
Runoff = 7.12 cfs @ 12.12 hrs, Volume= 0.525 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 50-Year Rainfall=6.85"

	Area (ac)	CN	Description
*	0.265	98	Impervious Area On Site
*	1.335	69	Remaining Yard
*	0.010	85	Gravel
	1.610	74	Weighted Average
	1.345		83.54% Pervious Area
	0.265		16.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.39"
1.1	219	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	319	Total			

Subcatchment 1S: Exisitng Areas



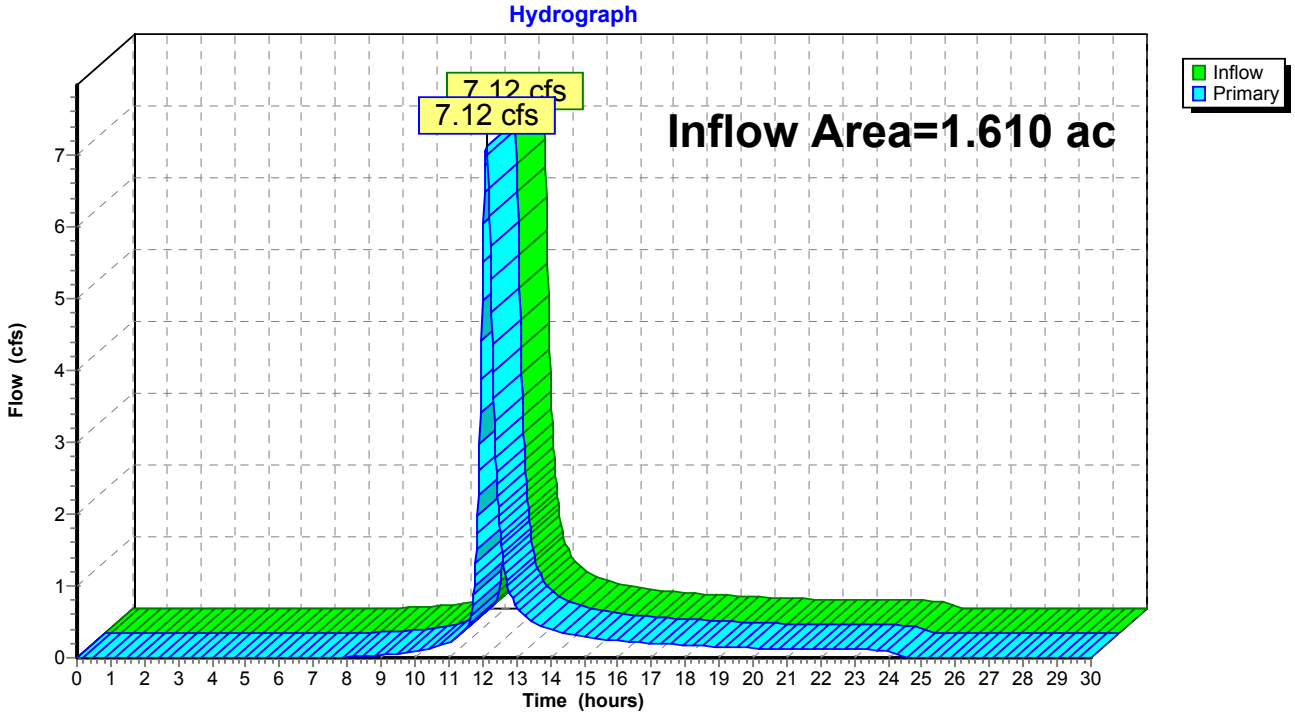
Summary for Pond DP1: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 16.46% Impervious, Inflow Depth = 3.91" for 50-Year event
Inflow = 7.12 cfs @ 12.12 hrs, Volume= 0.525 af
Primary = 7.12 cfs @ 12.12 hrs, Volume= 0.525 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond DP1: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exisitng Areas Runoff Area=1.610 ac 16.46% Impervious Runoff Depth=4.51"
Flow Length=319' Tc=19.4 min CN=74 Runoff=8.20 cfs 0.605 af

Pond DP1: Site Outfall Inflow=8.20 cfs 0.605 af
Primary=8.20 cfs 0.605 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.605 af Average Runoff Depth = 4.51"
83.54% Pervious = 1.345 ac 16.46% Impervious = 0.265 ac

Summary for Subcatchment 1S: Exisitng Areas

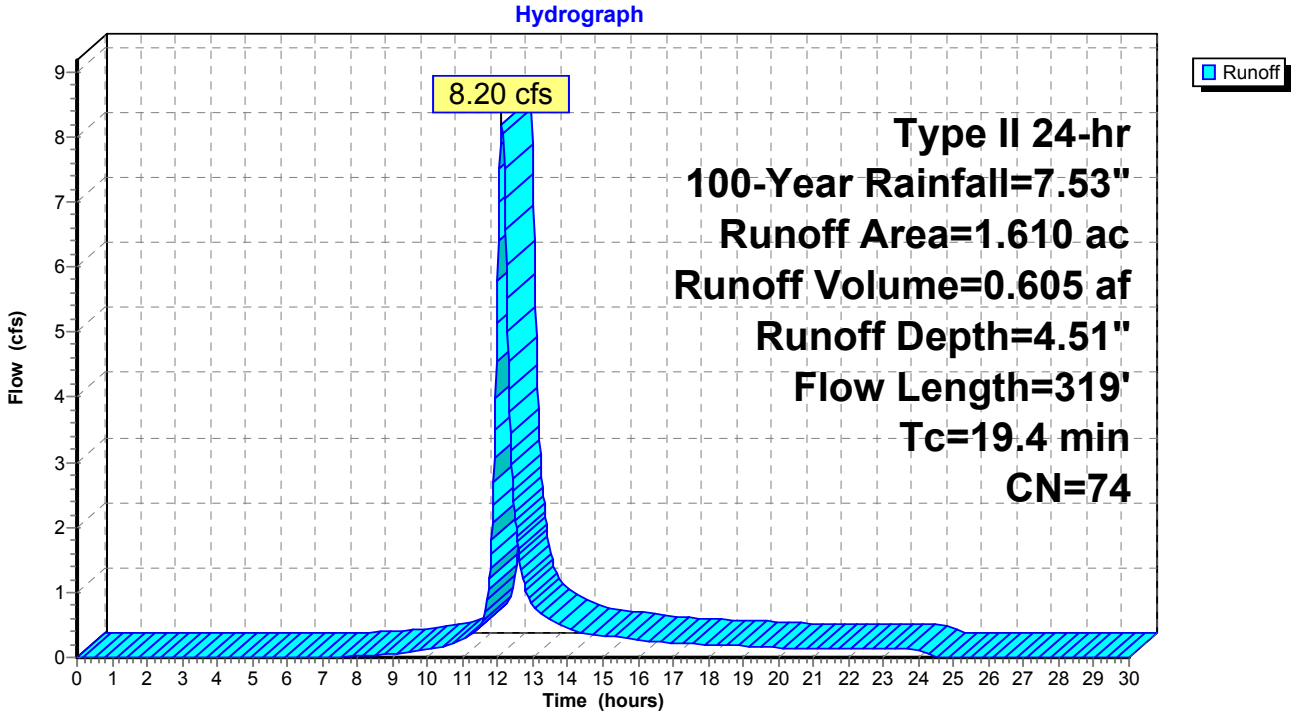
Runoff = 8.20 cfs @ 12.12 hrs, Volume= 0.605 af, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-Year Rainfall=7.53"

	Area (ac)	CN	Description
*	0.265	98	Impervious Area On Site
*	1.335	69	Remaining Yard
*	0.010	85	Gravel
	1.610	74	Weighted Average
	1.345		83.54% Pervious Area
	0.265		16.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.39"
1.1	219	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	319	Total			

Subcatchment 1S: Exisitng Areas



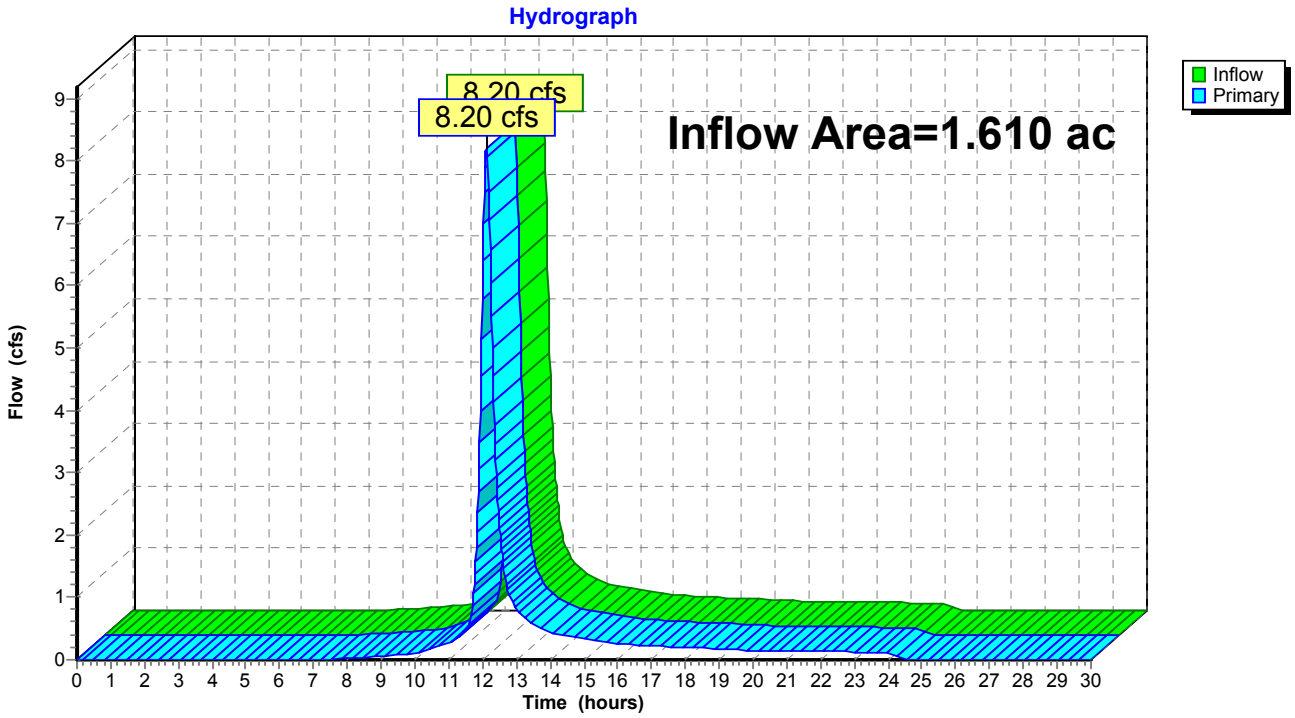
Summary for Pond DP1: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

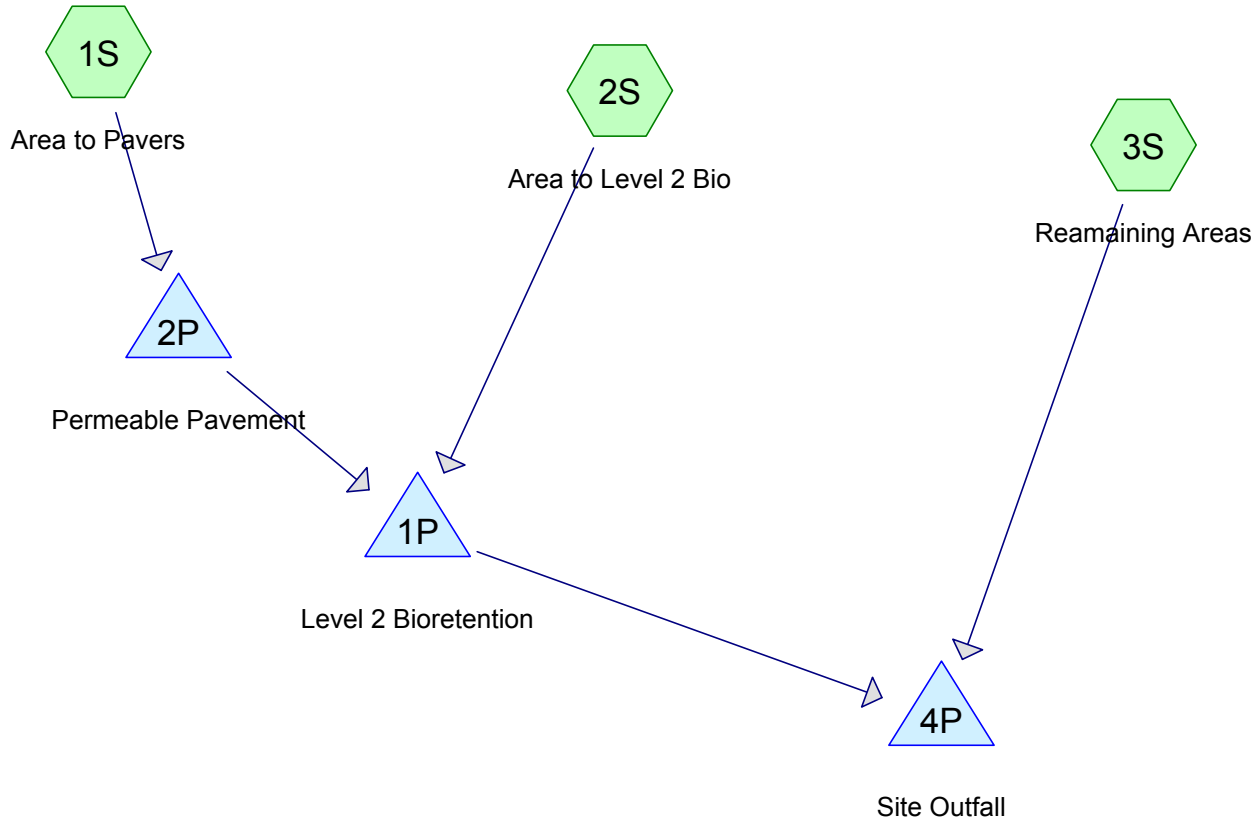
Inflow Area = 1.610 ac, 16.46% Impervious, Inflow Depth = 4.51" for 100-Year event
Inflow = 8.20 cfs @ 12.12 hrs, Volume= 0.605 af
Primary = 8.20 cfs @ 12.12 hrs, Volume= 0.605 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond DP1: Site Outfall



Appendix D



Subcat Reach Pond Link

Routing Diagram for 110 Duke Street Post Model 2.21.18 (3)
Prepared by {enter your company name here}, Printed 4/25/2018
HydroCAD® 10.00 s/n 07854 © 2013 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.740	69	50-75% Grass cover, Fair, HSG B (3S)
0.100	98	Pavement (2S)
0.200	98	Paver Driveway (1S)
0.200	98	Portion of Pavement (1S)
0.080	98	Sidewalks (1S, 2S)
0.290	98	Units (1S, 2S)
1.610	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.740	HSG B	3S
0.000	HSG C	
0.000	HSG D	
0.870	Other	1S, 2S
1.610		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.740	0.000	0.000	0.000	0.740	50-75% Grass cover, Fair	3S
0.000	0.000	0.000	0.000	0.100	0.100	Pavement	2S
0.000	0.000	0.000	0.000	0.200	0.200	Paver Driveway	1S
0.000	0.000	0.000	0.000	0.200	0.200	Portion of Pavement	1S
0.000	0.000	0.000	0.000	0.080	0.080	Sidewalks	1S, 2S
0.000	0.000	0.000	0.000	0.290	0.290	Units	1S, 2S
0.000	**0.740**	**0.000**	**0.000**	**0.870**	**1.610**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	493.00	488.75	64.0	0.0664	0.012	12.0	0.0	0.0
2	2P	497.75	497.50	15.0	0.0167	0.010	6.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area to Pavers Runoff Area=0.610 ac 100.00% Impervious Runoff Depth=3.16"
Tc=5.0 min CN=98 Runoff=3.01 cfs 0.160 af

Subcatchment 2S: Area to Level 2 Bio Runoff Area=0.260 ac 100.00% Impervious Runoff Depth=3.16"
Tc=5.0 min CN=98 Runoff=1.28 cfs 0.068 af

Subcatchment 3S: Reamaining Areas Runoff Area=0.740 ac 0.00% Impervious Runoff Depth=0.89"
Tc=5.0 min CN=69 Runoff=1.18 cfs 0.055 af

Pond 1P: Level 2 Bioretention Peak Elev=495.52' Storage=1,552 cf Inflow=1.28 cfs 0.068 af
Primary=0.09 cfs 0.034 af Secondary=0.01 cfs 0.026 af Outflow=0.11 cfs 0.060 af

Pond 2P: Permeable Pavement Peak Elev=496.42' Storage=0.077 af Inflow=3.01 cfs 0.160 af
Primary=0.00 cfs 0.000 af Secondary=0.11 cfs 0.160 af Outflow=0.11 cfs 0.160 af

Pond 4P: Site Outfall Inflow=1.25 cfs 0.089 af
Primary=1.25 cfs 0.089 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.284 af Average Runoff Depth = 2.11"
45.96% Pervious = 0.740 ac 54.04% Impervious = 0.870 ac

Summary for Subcatchment 1S: Area to Pavers

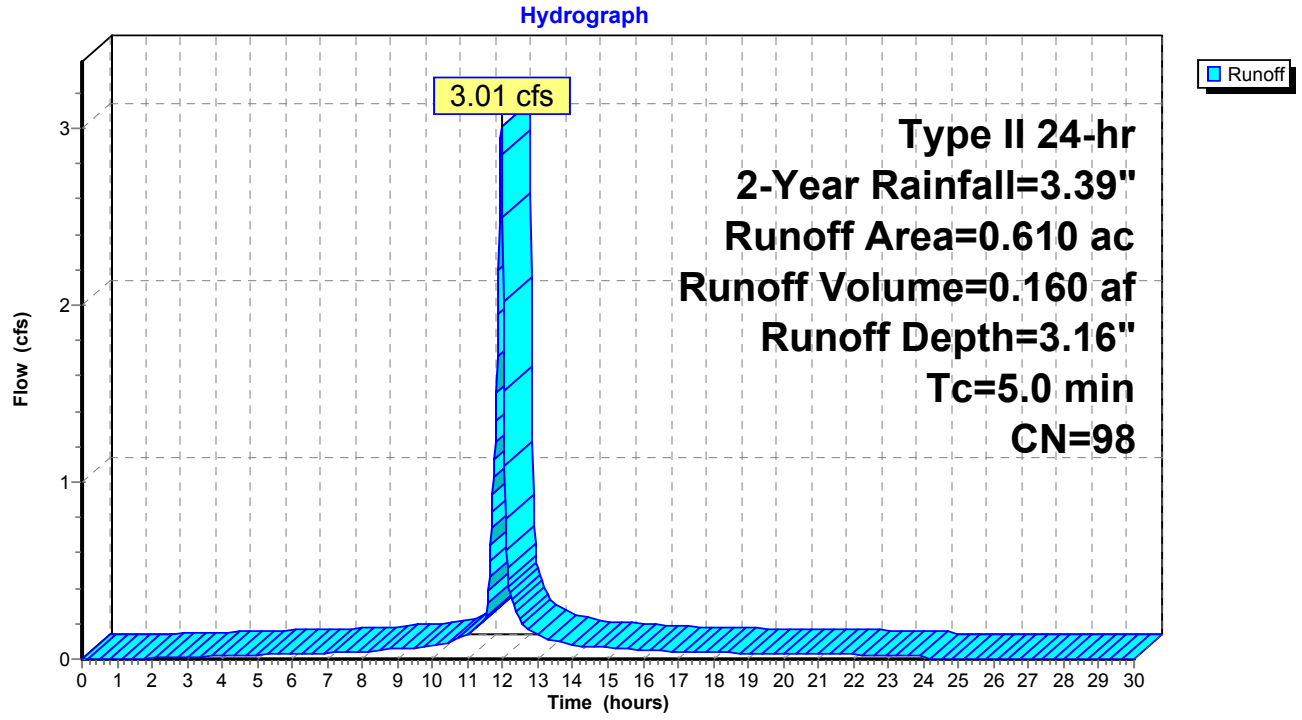
Runoff = 3.01 cfs @ 11.96 hrs, Volume= 0.160 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-Year Rainfall=3.39"

	Area (ac)	CN	Description
*	0.170	98	Units
*	0.200	98	Paver Driveway
*	0.040	98	Sidewalks
*	0.200	98	Portion of Pavement
	0.610	98	Weighted Average
	0.610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 1S: Area to Pavers



Summary for Subcatchment 2S: Area to Level 2 Bio

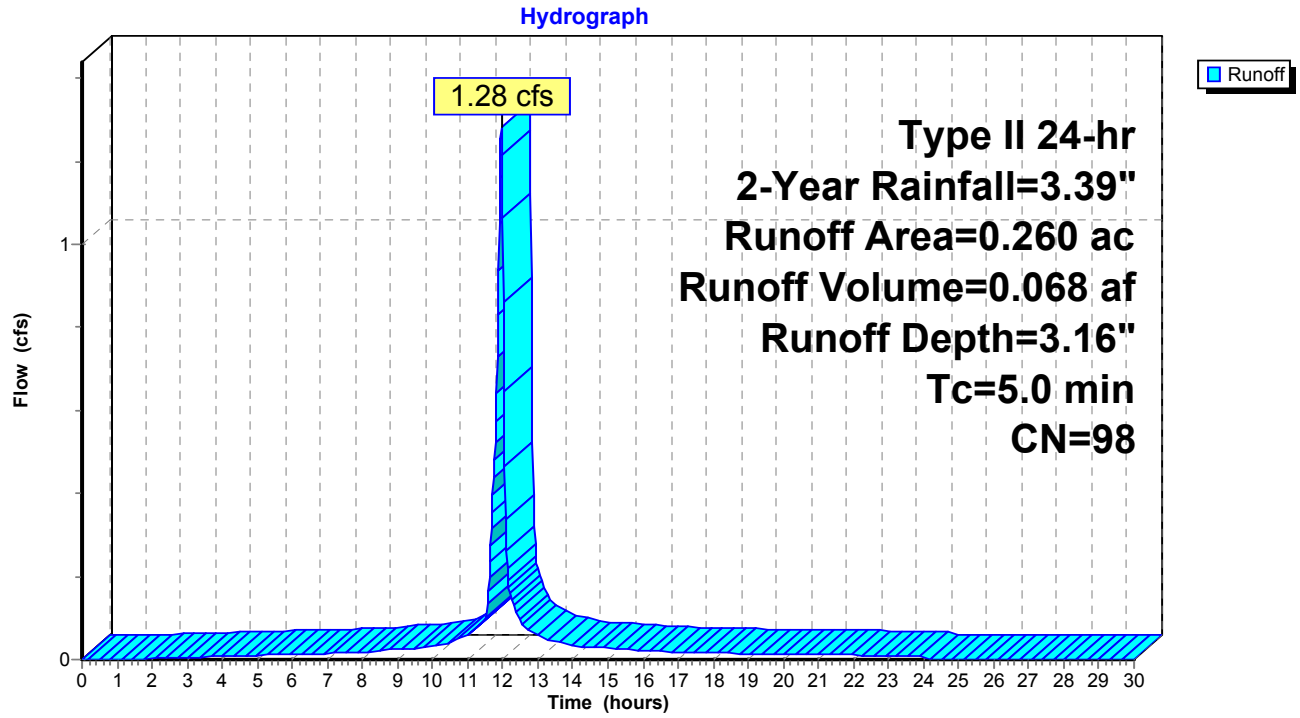
Runoff = 1.28 cfs @ 11.96 hrs, Volume= 0.068 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-Year Rainfall=3.39"

	Area (ac)	CN	Description
*	0.120	98	Units
*	0.040	98	Sidewalks
*	0.100	98	Pavement
	0.260	98	Weighted Average
	0.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 2S: Area to Level 2 Bio



Summary for Subcatchment 3S: Reamaining Areas

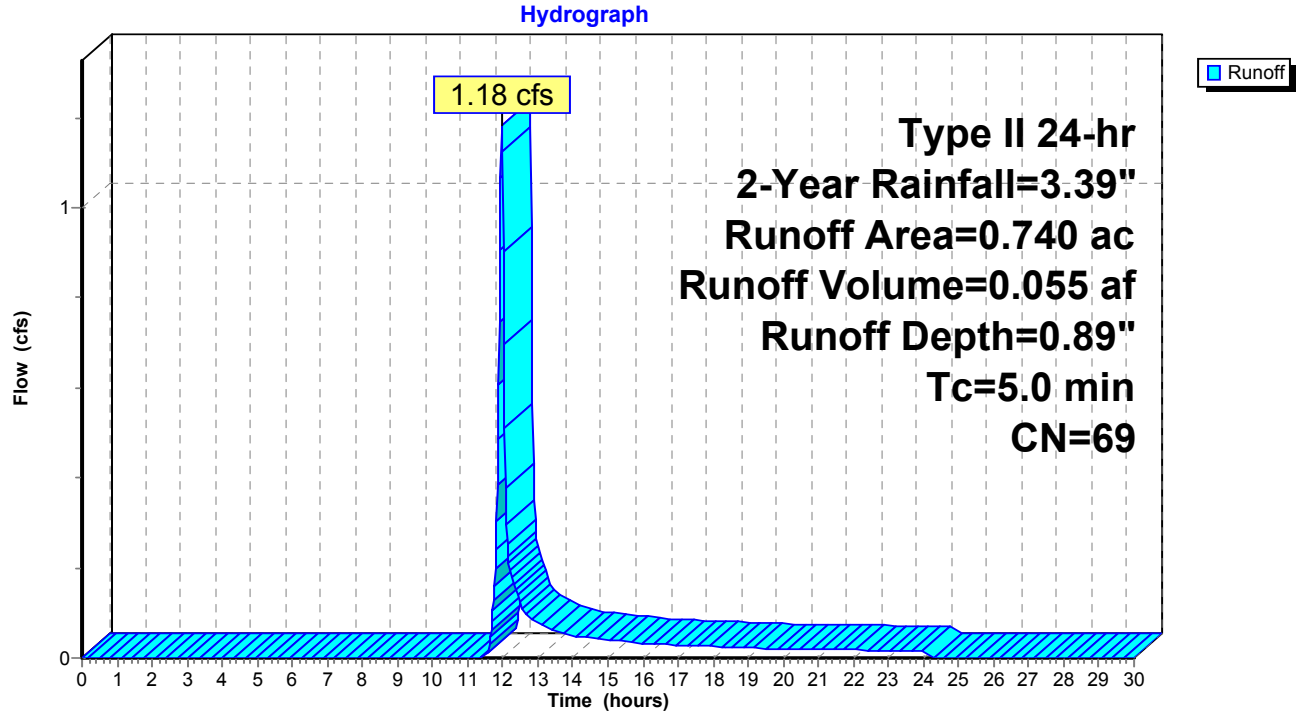
Runoff = 1.18 cfs @ 11.97 hrs, Volume= 0.055 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 2-Year Rainfall=3.39"

Area (ac)	CN	Description
0.740	69	50-75% Grass cover, Fair, HSG B
0.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 3S: Reamaining Areas



Summary for Pond 1P: Level 2 Bioretention

Inflow Area = 0.870 ac,100.00% Impervious, Inflow Depth = 0.94" for 2-Year event
Inflow = 1.28 cfs @ 11.96 hrs, Volume= 0.068 af
Outflow = 0.11 cfs @ 12.44 hrs, Volume= 0.060 af, Atten= 92%, Lag= 28.9 min
Primary = 0.09 cfs @ 12.44 hrs, Volume= 0.034 af
Secondary = 0.01 cfs @ 12.44 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 495.52' @ 12.44 hrs Surf.Area= 1,066 sf Storage= 1,552 cf

Plug-Flow detention time= 253.7 min calculated for 0.060 af (88% of inflow)
Center-of-Mass det. time= 193.8 min (944.2 - 750.3)

Volume	Invert	Avail.Storage	Storage Description
#1	491.50'	6,350 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

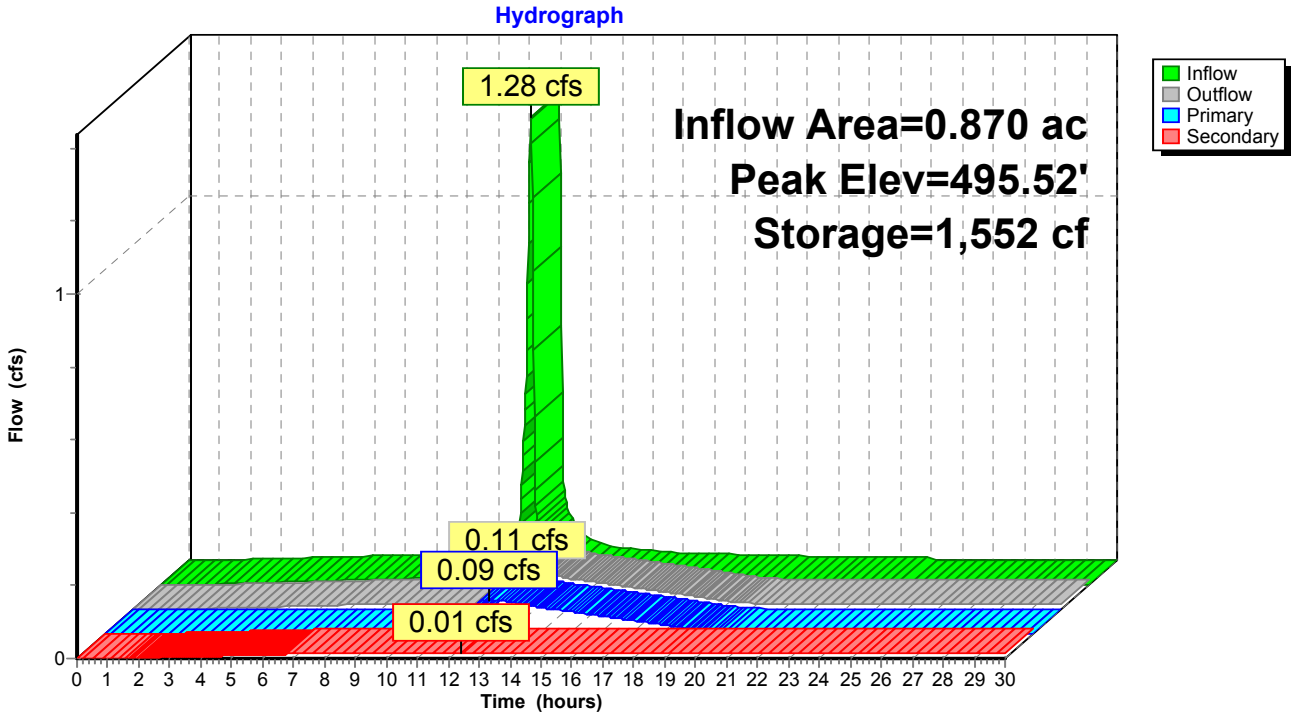
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.50	1,066	0.0	0	0
494.50	1,066	40.0	1,279	1,279
497.50	1,066	25.0	800	2,079
498.50	1,531	100.0	1,299	3,377
499.00	1,784	100.0	829	4,206
500.00	2,505	100.0	2,145	6,350

Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	**12.0" Round Culvert** L= 64.0' Ke= 0.700 Inlet / Outlet Invert= 493.00' / 488.75' S= 0.0664 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	497.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	493.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	491.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.09 cfs @ 12.44 hrs HW=495.52' (Free Discharge)
└**1=Culvert** (Passes 0.09 cfs of 4.75 cfs potential flow)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.09 cfs @ 7.55 fps)

Secondary OutFlow Max=0.01 cfs @ 12.44 hrs HW=495.52' (Free Discharge)
└**4=Exfiltration** (Controls 0.01 cfs)

Pond 1P: Level 2 Bioretention



Summary for Pond 2P: Permeable Pavement

Inflow Area = 0.610 ac,100.00% Impervious, Inflow Depth = 3.16" for 2-Year event
Inflow = 3.01 cfs @ 11.96 hrs, Volume= 0.160 af
Outflow = 0.11 cfs @ 13.43 hrs, Volume= 0.160 af, Atten= 96%, Lag= 88.4 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.11 cfs @ 13.43 hrs, Volume= 0.160 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 496.42' @ 13.43 hrs Surf.Area= 0.210 ac Storage= 0.077 af

Plug-Flow detention time= 266.5 min calculated for 0.160 af (100% of inflow)
Center-of-Mass det. time= 266.4 min (1,016.8 - 750.3)

Volume	Invert	Avail.Storage	Storage Description
#1	495.50'	0.252 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

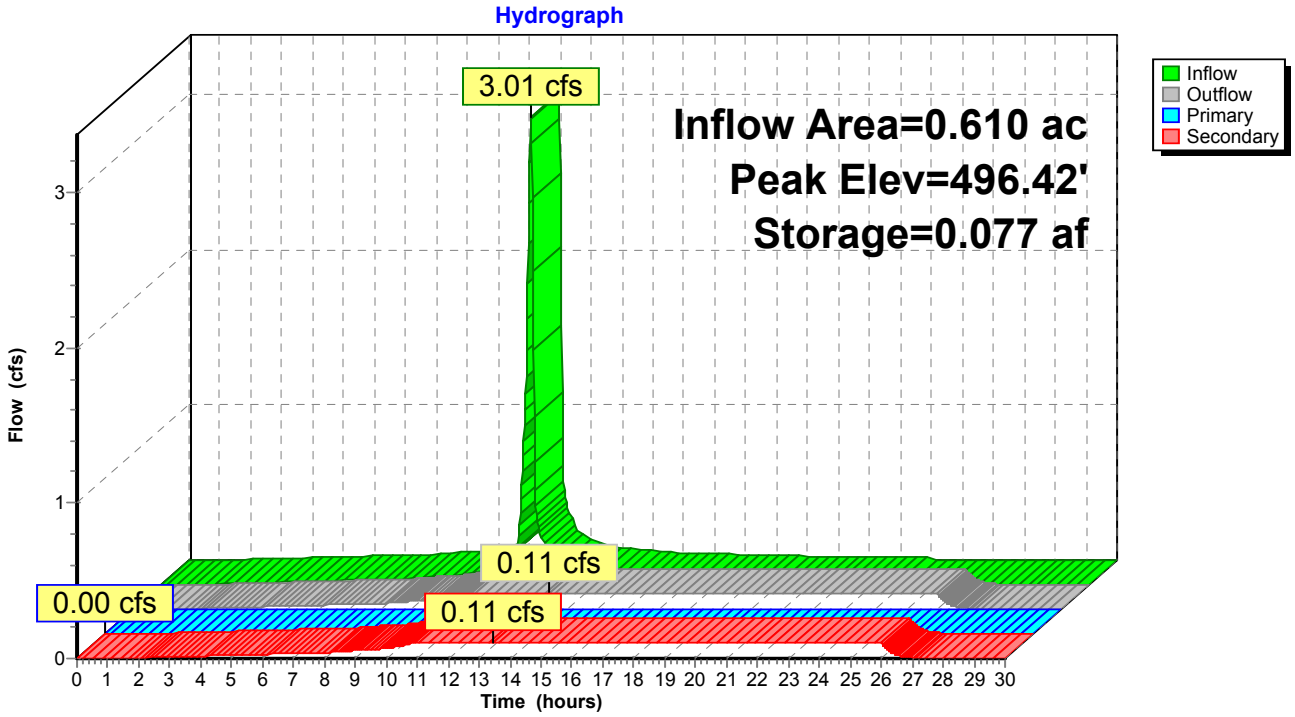
Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
495.50	0.210	0.0	0.000	0.000
498.50	0.210	40.0	0.252	0.252
499.00	0.210	0.0	0.000	0.252

Device	Routing	Invert	Outlet Devices
#1	Primary	497.75'	**6.0" Round Culvert** L= 15.0' Ke= 0.900 Inlet / Outlet Invert= 497.75' / 497.50' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	497.75'	**0.5" Vert. Orifice/Grate** C= 0.600
#3	Secondary	495.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=495.50' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.11 cfs @ 13.43 hrs HW=496.42' (Free Discharge)
└**3=Exfiltration** (Controls 0.11 cfs)

Pond 2P: Permeable Pavement



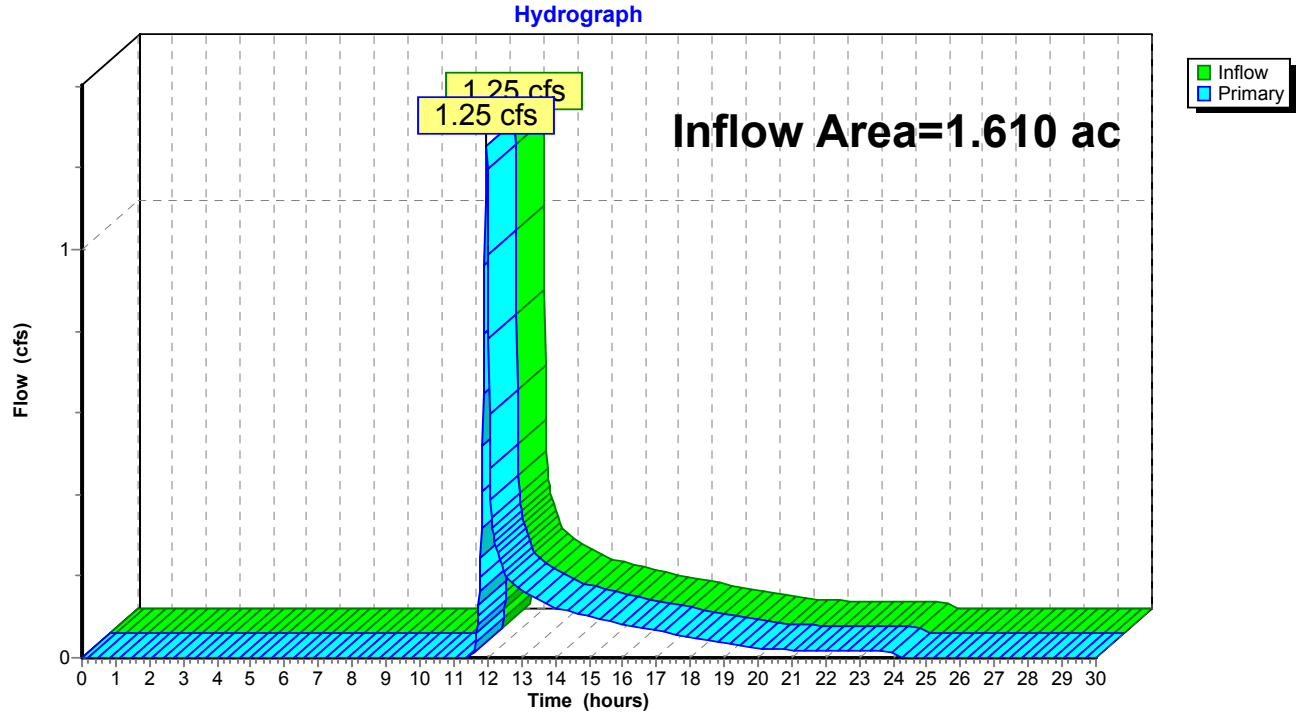
Summary for Pond 4P: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 54.04% Impervious, Inflow Depth = 0.66" for 2-Year event
Inflow = 1.25 cfs @ 11.97 hrs, Volume= 0.089 af
Primary = 1.25 cfs @ 11.97 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond 4P: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area to Pavers Runoff Area=0.610 ac 100.00% Impervious Runoff Depth=4.26"
Tc=5.0 min CN=98 Runoff=4.02 cfs 0.217 af

Subcatchment 2S: Area to Level 2 Bio Runoff Area=0.260 ac 100.00% Impervious Runoff Depth=4.26"
Tc=5.0 min CN=98 Runoff=1.71 cfs 0.092 af

Subcatchment 3S: Reamaining Areas Runoff Area=0.740 ac 0.00% Impervious Runoff Depth=1.60"
Tc=5.0 min CN=69 Runoff=2.19 cfs 0.099 af

Pond 1P: Level 2 Bioretention Peak Elev=497.53' Storage=2,111 cf Inflow=1.71 cfs 0.092 af
Primary=0.18 cfs 0.056 af Secondary=0.01 cfs 0.028 af Outflow=0.20 cfs 0.083 af

Pond 2P: Permeable Pavement Peak Elev=496.84' Storage=0.112 af Inflow=4.02 cfs 0.217 af
Primary=0.00 cfs 0.000 af Secondary=0.11 cfs 0.203 af Outflow=0.11 cfs 0.203 af

Pond 4P: Site Outfall Inflow=2.30 cfs 0.155 af
Primary=2.30 cfs 0.155 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.408 af Average Runoff Depth = 3.04"
45.96% Pervious = 0.740 ac 54.04% Impervious = 0.870 ac

Summary for Subcatchment 1S: Area to Pavers

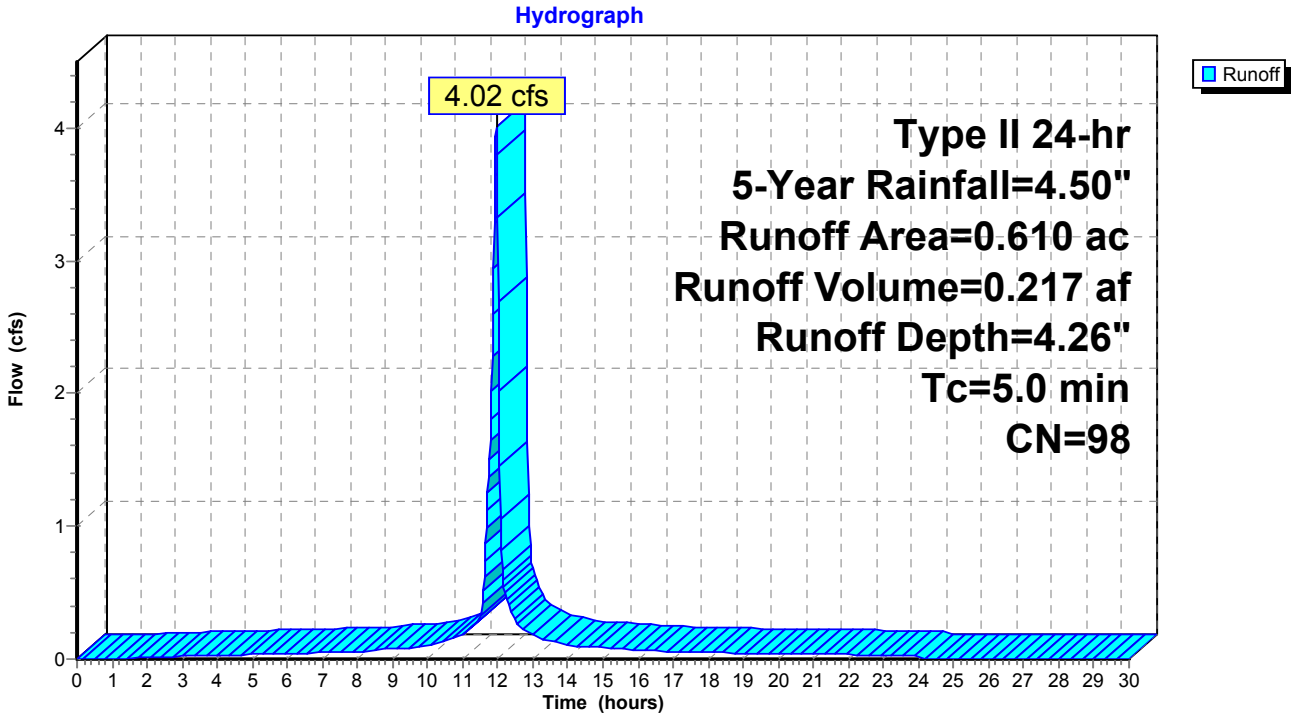
Runoff = 4.02 cfs @ 11.96 hrs, Volume= 0.217 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 5-Year Rainfall=4.50"

	Area (ac)	CN	Description
*	0.170	98	Units
*	0.200	98	Paver Driveway
*	0.040	98	Sidewalks
*	0.200	98	Portion of Pavement
	0.610	98	Weighted Average
	0.610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 1S: Area to Pavers



Summary for Subcatchment 2S: Area to Level 2 Bio

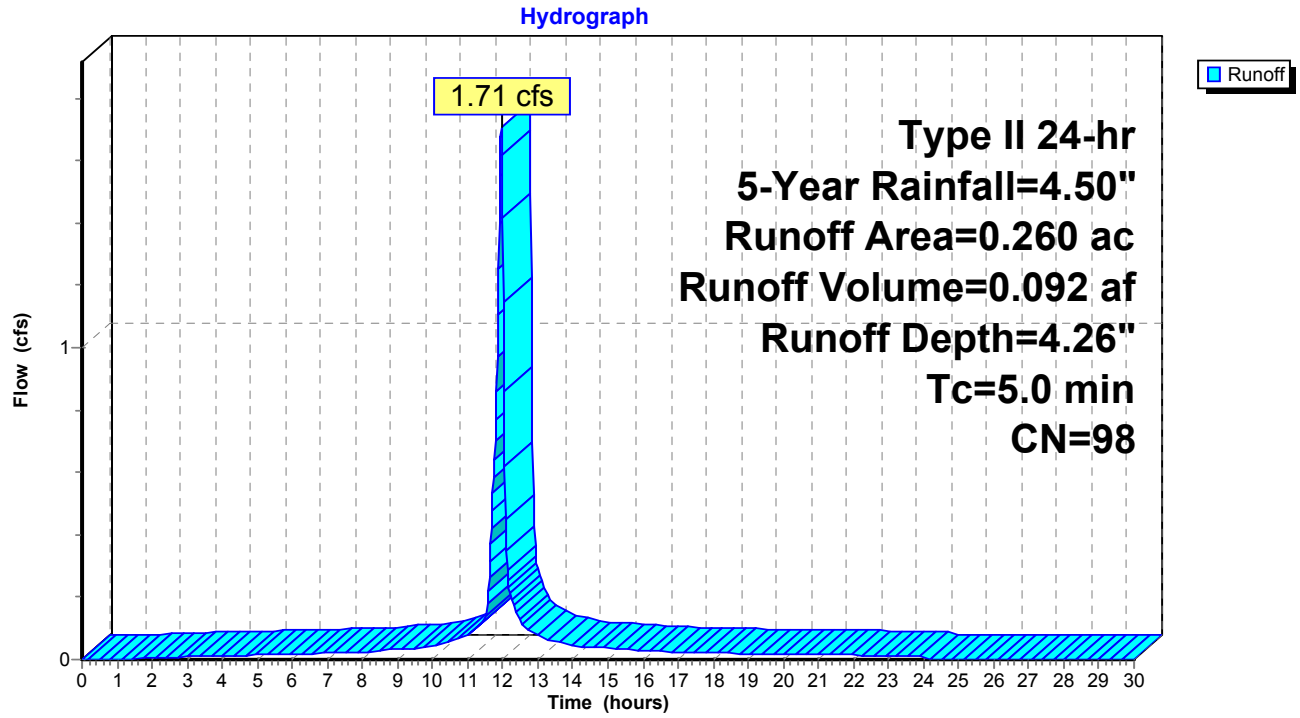
Runoff = 1.71 cfs @ 11.96 hrs, Volume= 0.092 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 5-Year Rainfall=4.50"

	Area (ac)	CN	Description
*	0.120	98	Units
*	0.040	98	Sidewalks
*	0.100	98	Pavement
	0.260	98	Weighted Average
	0.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 2S: Area to Level 2 Bio



Summary for Subcatchment 3S: Reamaining Areas

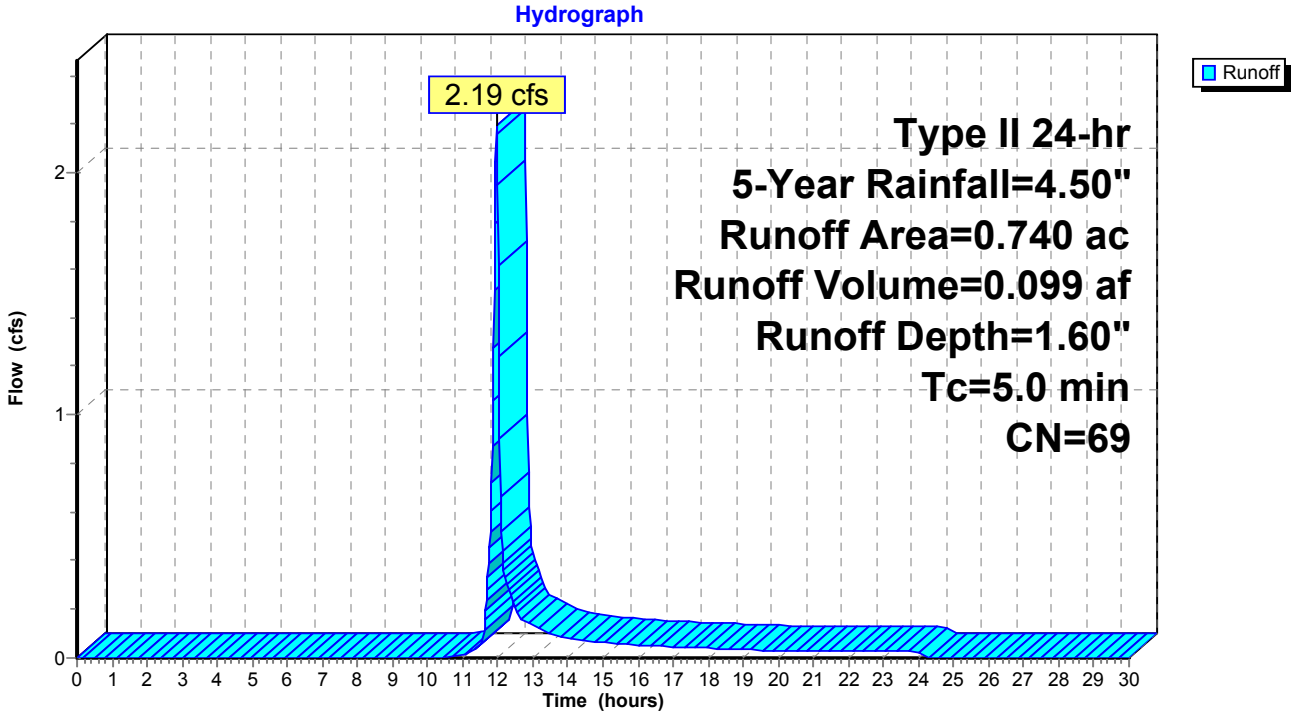
Runoff = 2.19 cfs @ 11.97 hrs, Volume= 0.099 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 5-Year Rainfall=4.50"

Area (ac)	CN	Description
0.740	69	50-75% Grass cover, Fair, HSG B
0.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 3S: Reamaining Areas



Summary for Pond 1P: Level 2 Bioretention

[79] Warning: Submerged Pond 2P Primary device # 1 OUTLET by 0.03'

Inflow Area = 0.870 ac,100.00% Impervious, Inflow Depth = 1.27" for 5-Year event
Inflow = 1.71 cfs @ 11.96 hrs, Volume= 0.092 af
Outflow = 0.20 cfs @ 12.23 hrs, Volume= 0.083 af, Atten= 89%, Lag= 16.5 min
Primary = 0.18 cfs @ 12.23 hrs, Volume= 0.056 af
Secondary = 0.01 cfs @ 12.23 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 497.53' @ 12.23 hrs Surf.Area= 1,080 sf Storage= 2,111 cf

Plug-Flow detention time= 241.3 min calculated for 0.083 af (90% of inflow)
Center-of-Mass det. time= 190.5 min (935.3 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	491.50'	6,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

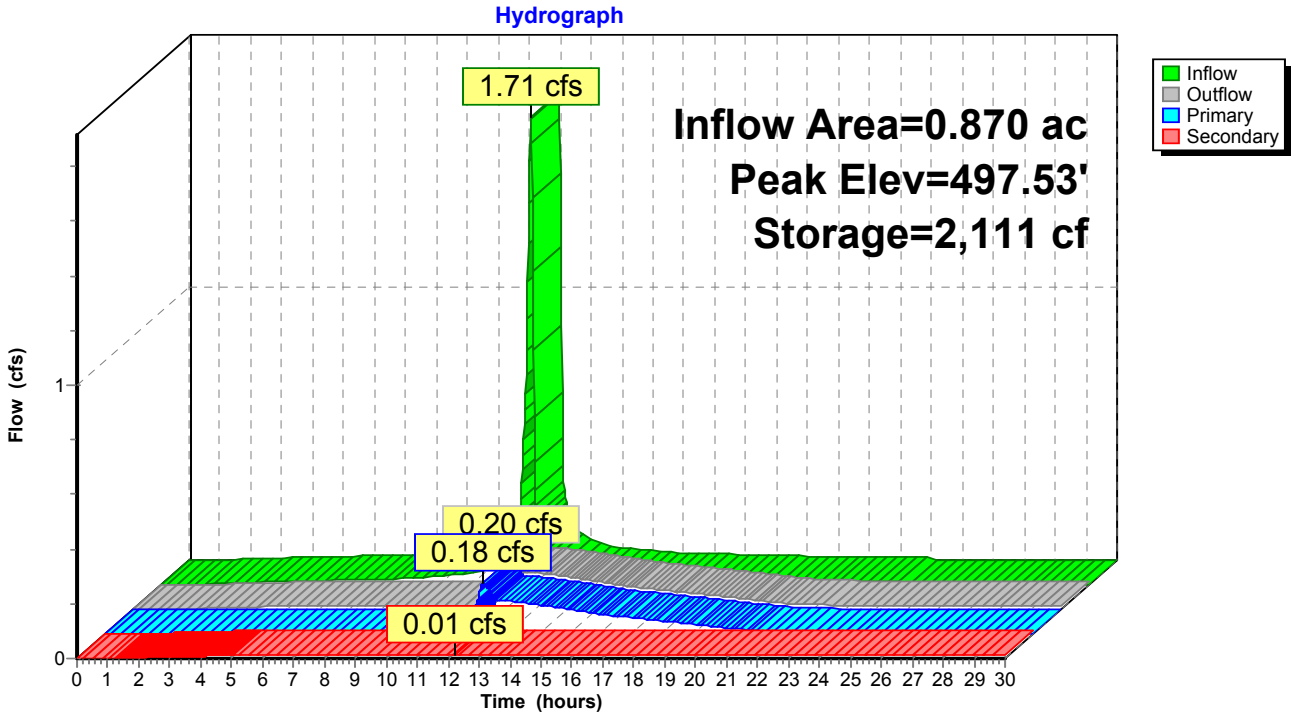
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.50	1,066	0.0	0	0
494.50	1,066	40.0	1,279	1,279
497.50	1,066	25.0	800	2,079
498.50	1,531	100.0	1,299	3,377
499.00	1,784	100.0	829	4,206
500.00	2,505	100.0	2,145	6,350

Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	**12.0" Round Culvert** L= 64.0' Ke= 0.700 Inlet / Outlet Invert= 493.00' / 488.75' S= 0.0664 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	497.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	493.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	491.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.18 cfs @ 12.23 hrs HW=497.53' (Free Discharge)
↑—**1=Culvert** (Passes 0.18 cfs of 6.70 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 0.05 cfs @ 0.57 fps)
—**3=Orifice/Grate** (Orifice Controls 0.12 cfs @ 10.18 fps)

Secondary OutFlow Max=0.01 cfs @ 12.23 hrs HW=497.53' (Free Discharge)
↑—**4=Exfiltration** (Controls 0.01 cfs)

Pond 1P: Level 2 Bioretention



Summary for Pond 2P: Permeable Pavement

Inflow Area = 0.610 ac,100.00% Impervious, Inflow Depth = 4.26" for 5-Year event
Inflow = 4.02 cfs @ 11.96 hrs, Volume= 0.217 af
Outflow = 0.11 cfs @ 14.00 hrs, Volume= 0.203 af, Atten= 97%, Lag= 122.9 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.11 cfs @ 14.00 hrs, Volume= 0.203 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 496.84' @ 14.00 hrs Surf.Area= 0.210 ac Storage= 0.112 af

Plug-Flow detention time= 386.2 min calculated for 0.203 af (94% of inflow)
Center-of-Mass det. time= 349.3 min (1,094.1 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	495.50'	0.252 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

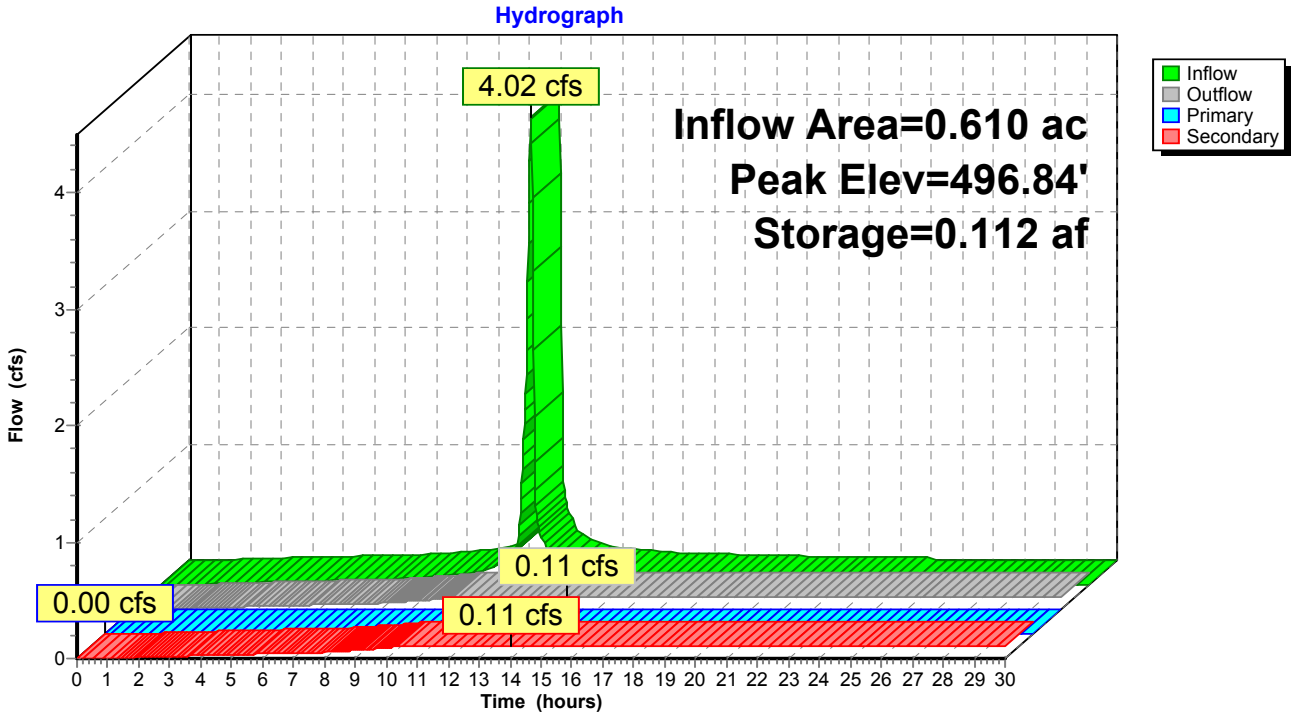
Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
495.50	0.210	0.0	0.000	0.000
498.50	0.210	40.0	0.252	0.252
499.00	0.210	0.0	0.000	0.252

Device	Routing	Invert	Outlet Devices
#1	Primary	497.75'	**6.0" Round Culvert** L= 15.0' Ke= 0.900 Inlet / Outlet Invert= 497.75' / 497.50' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	497.75'	**0.5" Vert. Orifice/Grate** C= 0.600
#3	Secondary	495.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=495.50' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.11 cfs @ 14.00 hrs HW=496.84' (Free Discharge)
└**3=Exfiltration** (Controls 0.11 cfs)

Pond 2P: Permeable Pavement



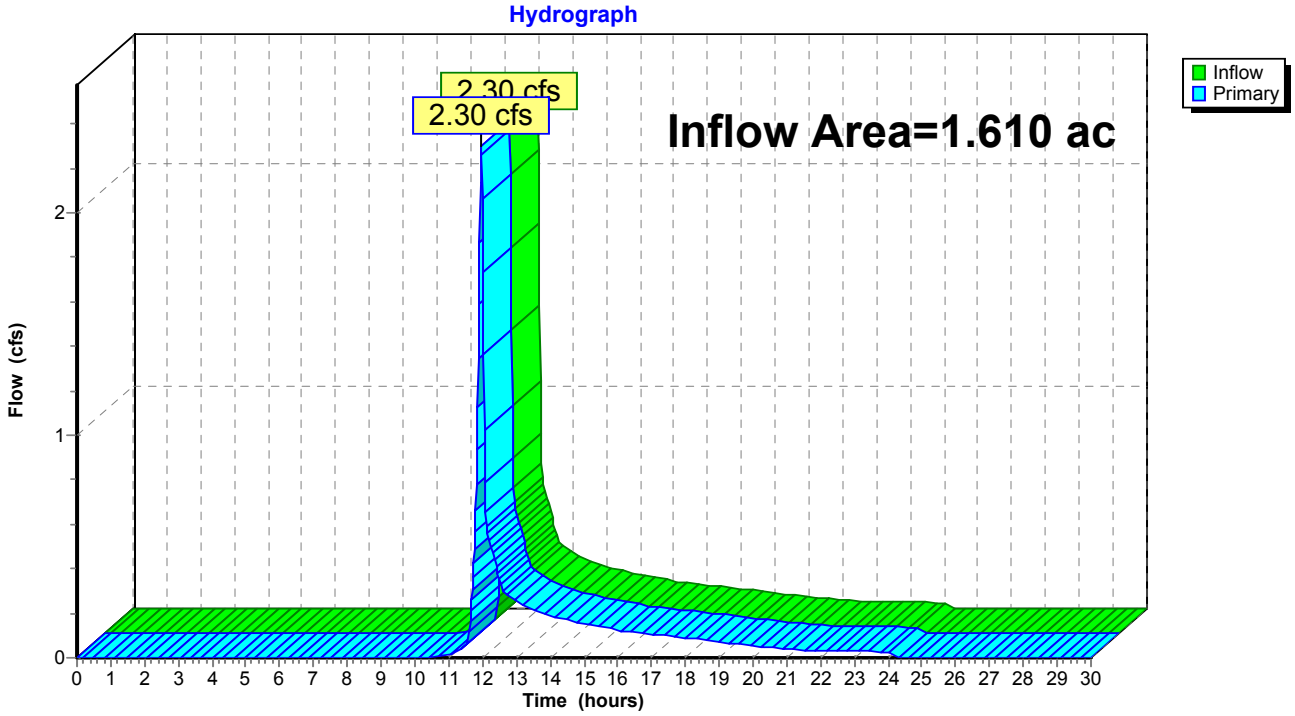
Summary for Pond 4P: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 54.04% Impervious, Inflow Depth = 1.15" for 5-Year event
Inflow = 2.30 cfs @ 11.97 hrs, Volume= 0.155 af
Primary = 2.30 cfs @ 11.97 hrs, Volume= 0.155 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond 4P: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area to Pavers Runoff Area=0.610 ac 100.00% Impervious Runoff Depth=4.99"
Tc=5.0 min CN=98 Runoff=4.68 cfs 0.254 af

Subcatchment 2S: Area to Level 2 Bio Runoff Area=0.260 ac 100.00% Impervious Runoff Depth=4.99"
Tc=5.0 min CN=98 Runoff=1.99 cfs 0.108 af

Subcatchment 3S: Reamaining Areas Runoff Area=0.740 ac 0.00% Impervious Runoff Depth=2.13"
Tc=5.0 min CN=69 Runoff=2.92 cfs 0.131 af

Pond 1P: Level 2 Bioretention Peak Elev=497.67' Storage=2,269 cf Inflow=1.99 cfs 0.108 af
Primary=0.88 cfs 0.071 af Secondary=0.01 cfs 0.028 af Outflow=0.89 cfs 0.099 af

Pond 2P: Permeable Pavement Peak Elev=497.13' Storage=0.137 af Inflow=4.68 cfs 0.254 af
Primary=0.00 cfs 0.000 af Secondary=0.11 cfs 0.209 af Outflow=0.11 cfs 0.209 af

Pond 4P: Site Outfall Inflow=3.04 cfs 0.202 af
Primary=3.04 cfs 0.202 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.493 af Average Runoff Depth = 3.68"
45.96% Pervious = 0.740 ac 54.04% Impervious = 0.870 ac

Summary for Subcatchment 1S: Area to Pavers

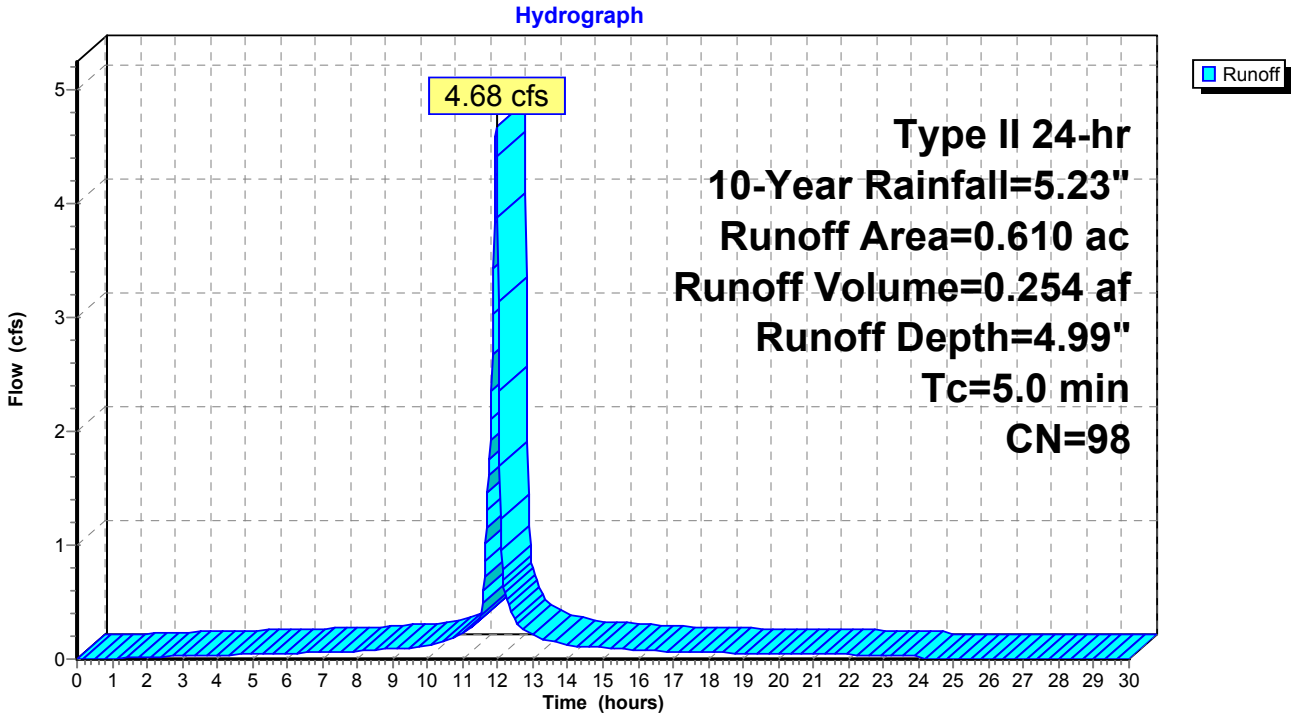
Runoff = 4.68 cfs @ 11.96 hrs, Volume= 0.254 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
*	0.170	98	Units
*	0.200	98	Paver Driveway
*	0.040	98	Sidewalks
*	0.200	98	Portion of Pavement
	0.610	98	Weighted Average
	0.610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 1S: Area to Pavers



Summary for Subcatchment 2S: Area to Level 2 Bio

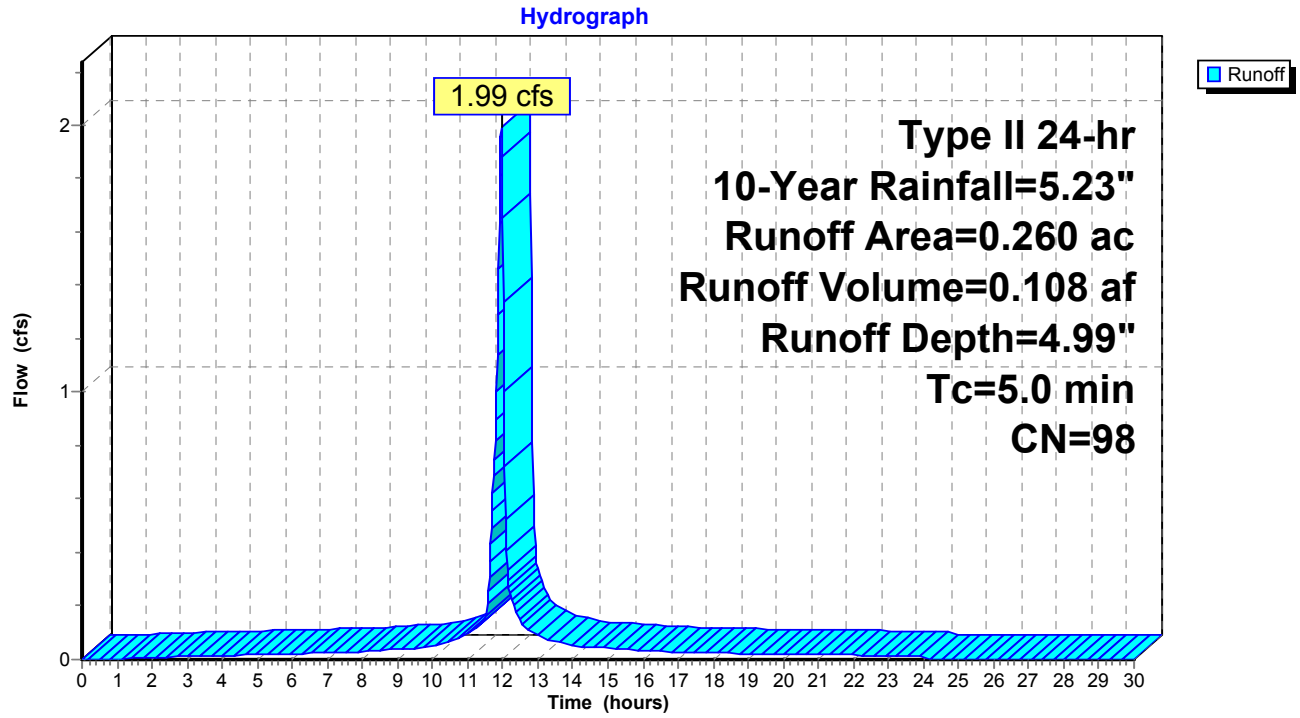
Runoff = 1.99 cfs @ 11.96 hrs, Volume= 0.108 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-Year Rainfall=5.23"

	Area (ac)	CN	Description
*	0.120	98	Units
*	0.040	98	Sidewalks
*	0.100	98	Pavement
	0.260	98	Weighted Average
	0.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 2S: Area to Level 2 Bio



Summary for Subcatchment 3S: Reamaining Areas

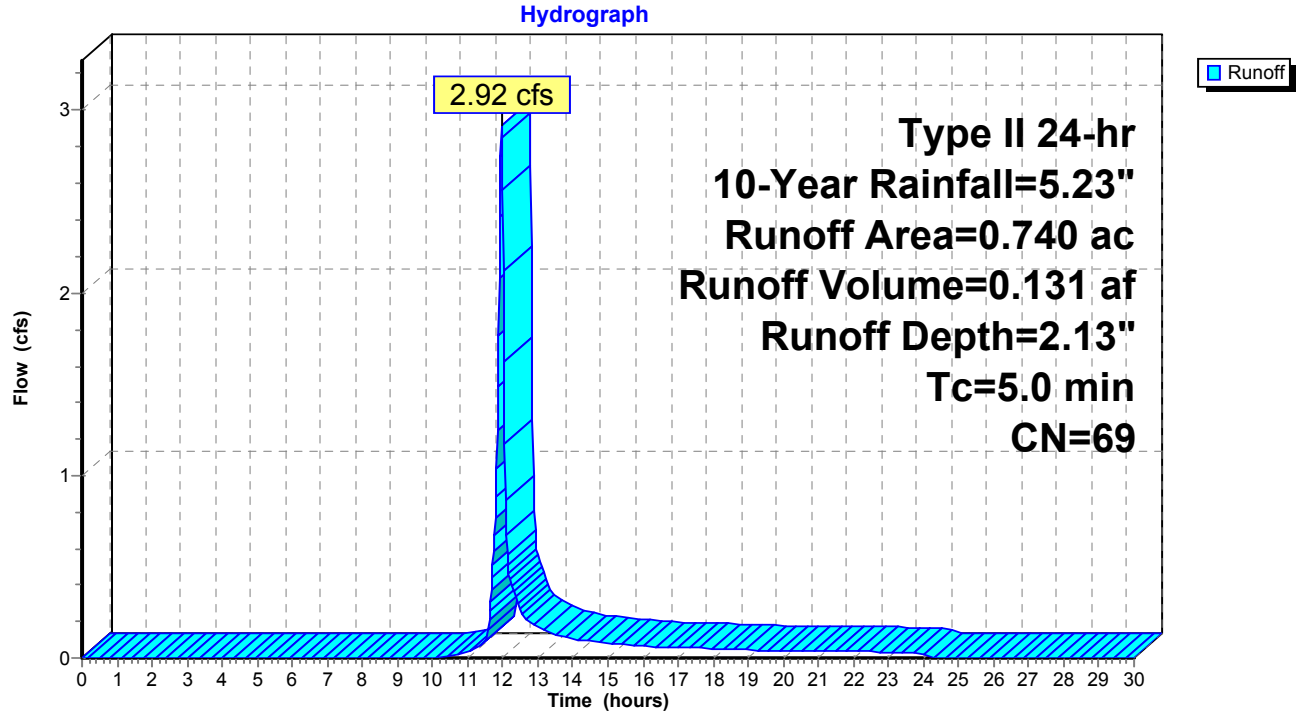
Runoff = 2.92 cfs @ 11.96 hrs, Volume= 0.131 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.740	69	50-75% Grass cover, Fair, HSG B
0.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 3S: Reamaining Areas



Summary for Pond 1P: Level 2 Bioretention

[79] Warning: Submerged Pond 2P Primary device # 1 OUTLET by 0.17'

Inflow Area = 0.870 ac,100.00% Impervious, Inflow Depth = 1.49" for 10-Year event
Inflow = 1.99 cfs @ 11.96 hrs, Volume= 0.108 af
Outflow = 0.89 cfs @ 12.05 hrs, Volume= 0.099 af, Atten= 55%, Lag= 5.6 min
Primary = 0.88 cfs @ 12.05 hrs, Volume= 0.071 af
Secondary = 0.01 cfs @ 12.05 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 497.67' @ 12.05 hrs Surf.Area= 1,146 sf Storage= 2,269 cf

Plug-Flow detention time= 220.1 min calculated for 0.099 af (92% of inflow)
Center-of-Mass det. time= 174.0 min (916.2 - 742.2)

Volume	Invert	Avail.Storage	Storage Description
#1	491.50'	6,350 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

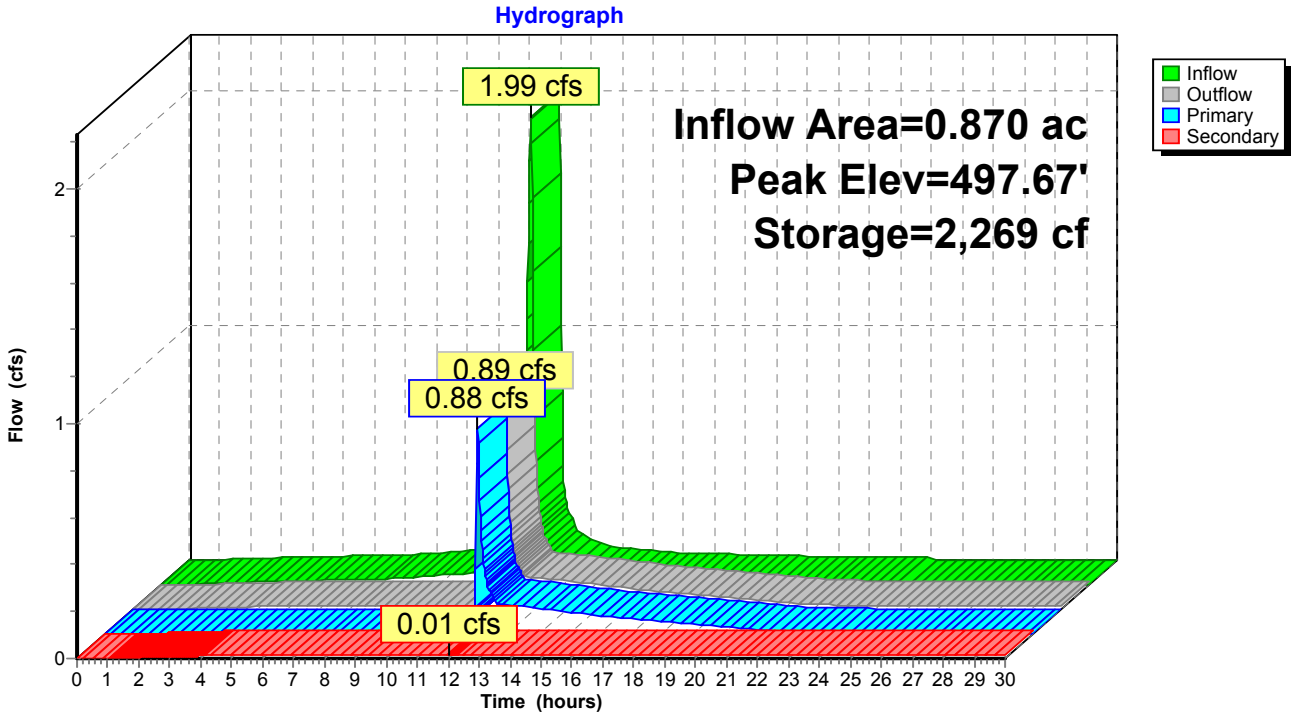
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.50	1,066	0.0	0	0
494.50	1,066	40.0	1,279	1,279
497.50	1,066	25.0	800	2,079
498.50	1,531	100.0	1,299	3,377
499.00	1,784	100.0	829	4,206
500.00	2,505	100.0	2,145	6,350

Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	**12.0" Round Culvert** L= 64.0' Ke= 0.700 Inlet / Outlet Invert= 493.00' / 488.75' S= 0.0664 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	497.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	493.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	491.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.84 cfs @ 12.05 hrs HW=497.67' (Free Discharge)
└**1=Culvert** (Passes 0.84 cfs of 6.81 cfs potential flow)
  ├**2=Orifice/Grate** (Weir Controls 0.71 cfs @ 1.34 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 10.33 fps)

Secondary OutFlow Max=0.01 cfs @ 12.05 hrs HW=497.67' (Free Discharge)
└**4=Exfiltration** (Controls 0.01 cfs)

Pond 1P: Level 2 Bioretention



Summary for Pond 2P: Permeable Pavement

Inflow Area = 0.610 ac,100.00% Impervious, Inflow Depth = 4.99" for 10-Year event
Inflow = 4.68 cfs @ 11.96 hrs, Volume= 0.254 af
Outflow = 0.11 cfs @ 14.64 hrs, Volume= 0.209 af, Atten= 98%, Lag= 160.8 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.11 cfs @ 14.64 hrs, Volume= 0.209 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 497.13' @ 14.64 hrs Surf.Area= 0.210 ac Storage= 0.137 af

Plug-Flow detention time= 407.1 min calculated for 0.209 af (82% of inflow)
Center-of-Mass det. time= 331.7 min (1,074.0 - 742.2)

Volume	Invert	Avail.Storage	Storage Description
#1	495.50'	0.252 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

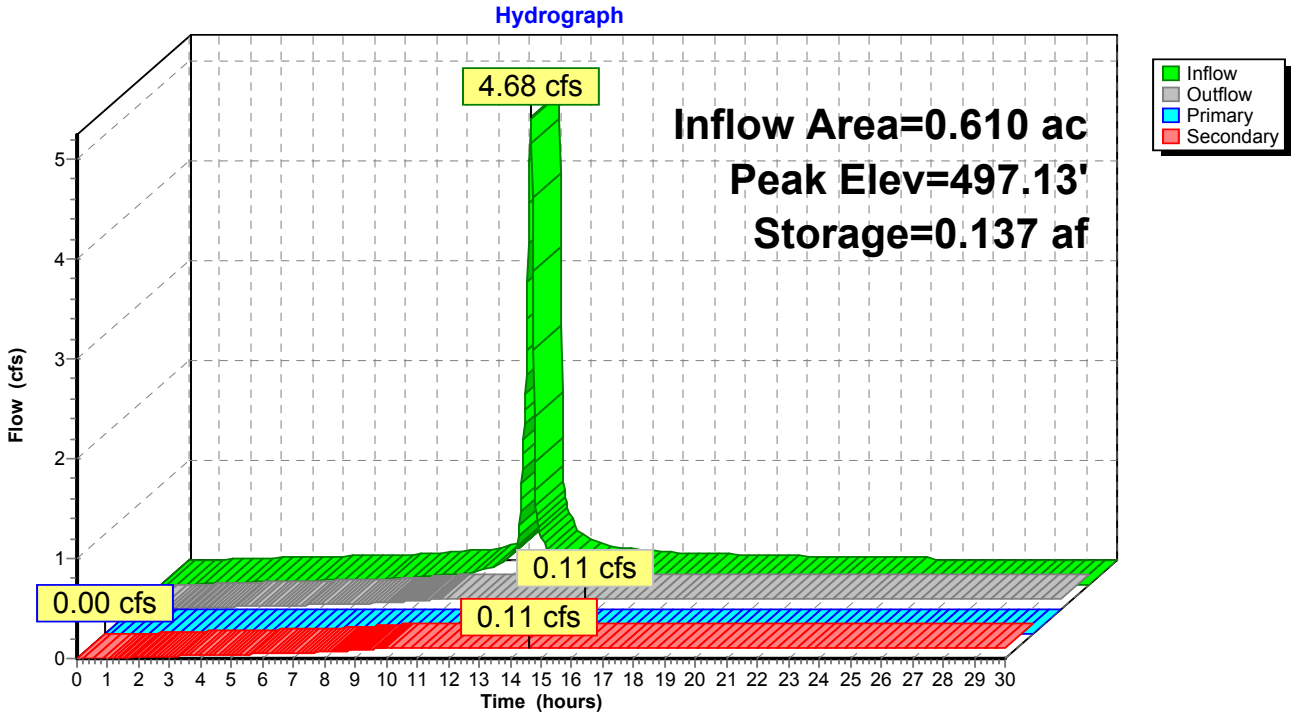
Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
495.50	0.210	0.0	0.000	0.000
498.50	0.210	40.0	0.252	0.252
499.00	0.210	0.0	0.000	0.252

Device	Routing	Invert	Outlet Devices
#1	Primary	497.75'	**6.0" Round Culvert** L= 15.0' Ke= 0.900 Inlet / Outlet Invert= 497.75' / 497.50' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	497.75'	**0.5" Vert. Orifice/Grate** C= 0.600
#3	Secondary	495.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=495.50' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.11 cfs @ 14.64 hrs HW=497.13' (Free Discharge)
└**3=Exfiltration** (Controls 0.11 cfs)

Pond 2P: Permeable Pavement



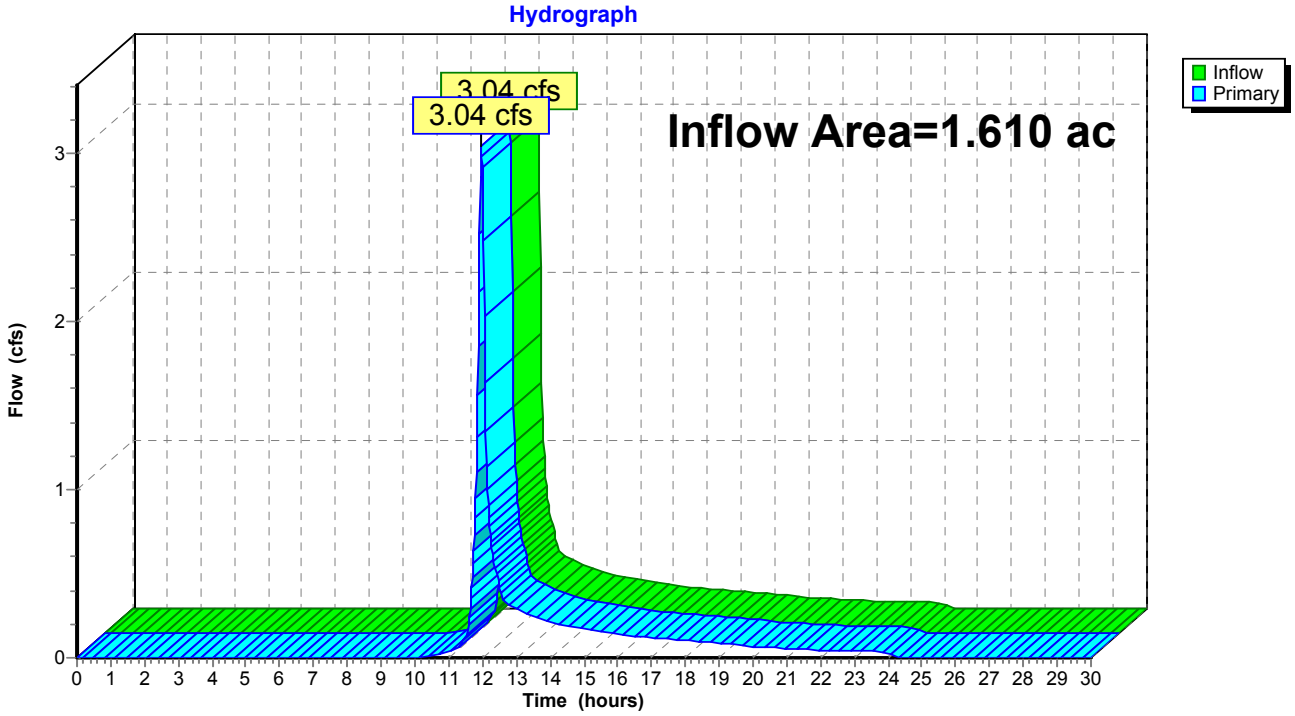
Summary for Pond 4P: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 54.04% Impervious, Inflow Depth = 1.51" for 10-Year event
Inflow = 3.04 cfs @ 11.97 hrs, Volume= 0.202 af
Primary = 3.04 cfs @ 11.97 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond 4P: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area to Pavers Runoff Area=0.610 ac 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=5.52 cfs 0.301 af

Subcatchment 2S: Area to Level 2 Bio Runoff Area=0.260 ac 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=2.35 cfs 0.128 af

Subcatchment 3S: Reamaining Areas Runoff Area=0.740 ac 0.00% Impervious Runoff Depth=2.84"
Tc=5.0 min CN=69 Runoff=3.89 cfs 0.175 af

Pond 1P: Level 2 Bioretention Peak Elev=497.78' Storage=2,398 cf Inflow=2.35 cfs 0.128 af
Primary=1.67 cfs 0.091 af Secondary=0.01 cfs 0.029 af Outflow=1.69 cfs 0.119 af

Pond 2P: Permeable Pavement Peak Elev=497.52' Storage=0.170 af Inflow=5.52 cfs 0.301 af
Primary=0.00 cfs 0.000 af Secondary=0.11 cfs 0.216 af Outflow=0.11 cfs 0.216 af

Pond 4P: Site Outfall Inflow=5.17 cfs 0.266 af
Primary=5.17 cfs 0.266 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.604 af Average Runoff Depth = 4.50"
45.96% Pervious = 0.740 ac 54.04% Impervious = 0.870 ac

Summary for Subcatchment 1S: Area to Pavers

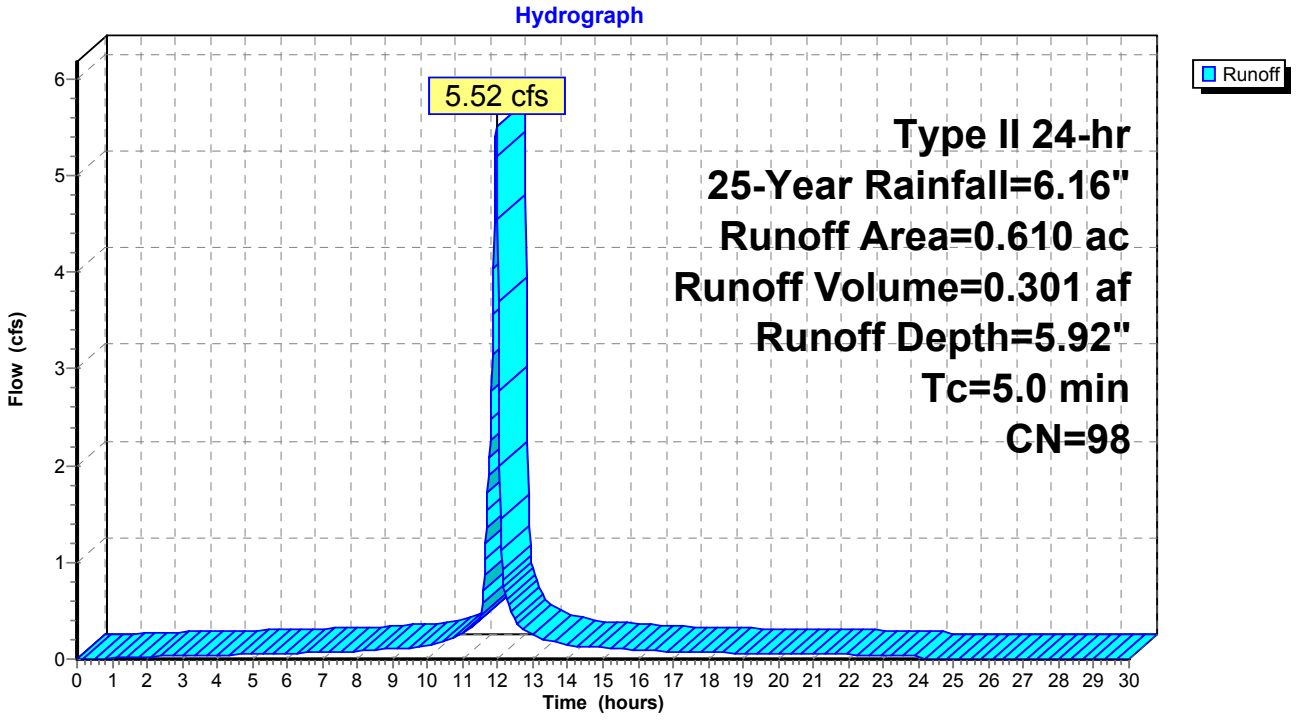
Runoff = 5.52 cfs @ 11.96 hrs, Volume= 0.301 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 25-Year Rainfall=6.16"

	Area (ac)	CN	Description
*	0.170	98	Units
*	0.200	98	Paver Driveway
*	0.040	98	Sidewalks
*	0.200	98	Portion of Pavement
	0.610	98	Weighted Average
	0.610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 1S: Area to Pavers



Summary for Subcatchment 2S: Area to Level 2 Bio

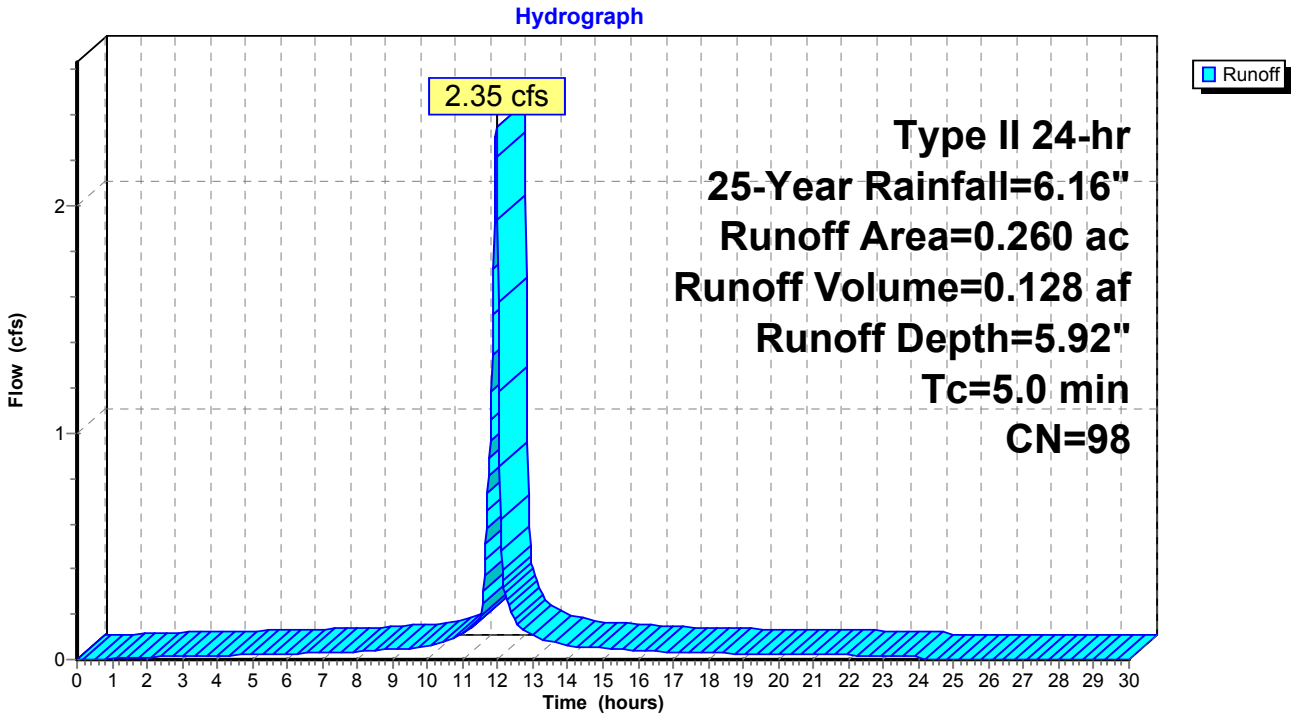
Runoff = 2.35 cfs @ 11.96 hrs, Volume= 0.128 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 25-Year Rainfall=6.16"

	Area (ac)	CN	Description
*	0.120	98	Units
*	0.040	98	Sidewalks
*	0.100	98	Pavement
	0.260	98	Weighted Average
	0.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 2S: Area to Level 2 Bio



Summary for Subcatchment 3S: Reamaining Areas

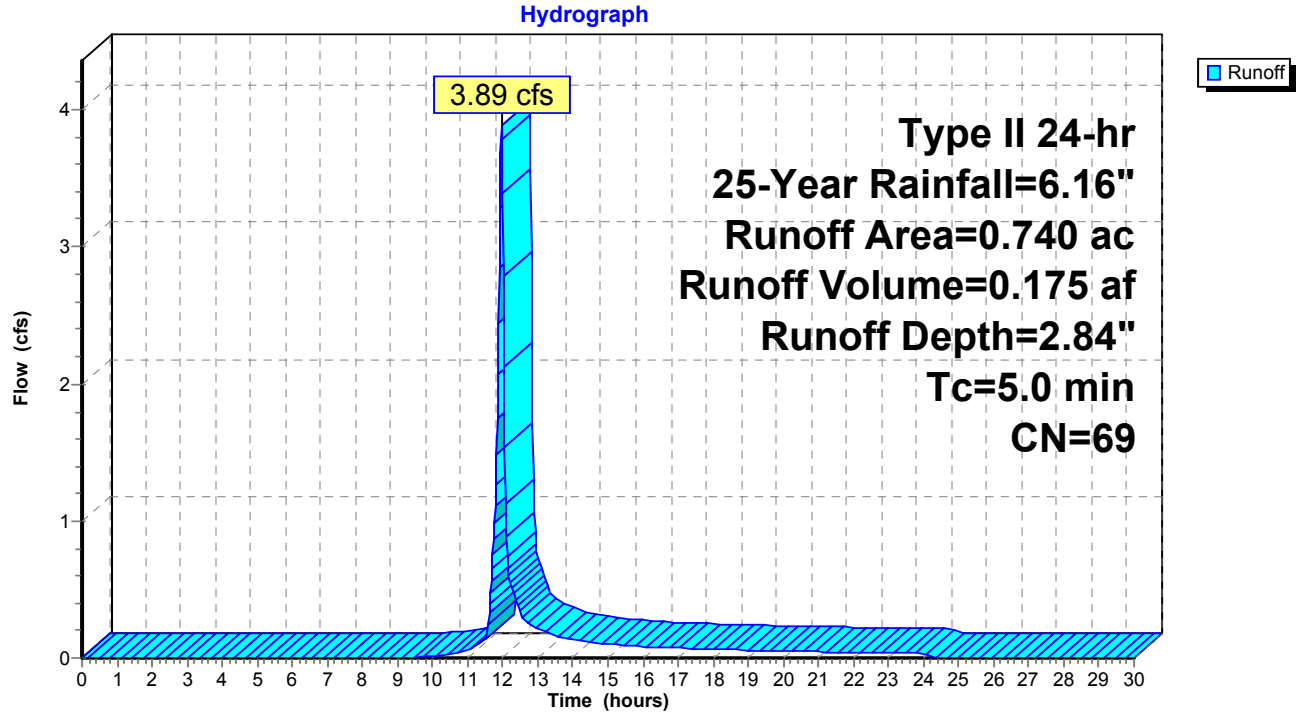
Runoff = 3.89 cfs @ 11.96 hrs, Volume= 0.175 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 25-Year Rainfall=6.16"

Area (ac)	CN	Description
0.740	69	50-75% Grass cover, Fair, HSG B
0.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 3S: Reamaining Areas



Summary for Pond 1P: Level 2 Bioretention

[81] Warning: Exceeded Pond 2P by 0.89' @ 12.00 hrs

Inflow Area = 0.870 ac,100.00% Impervious, Inflow Depth = 1.77" for 25-Year event
Inflow = 2.35 cfs @ 11.96 hrs, Volume= 0.128 af
Outflow = 1.69 cfs @ 12.01 hrs, Volume= 0.119 af, Atten= 28%, Lag= 3.6 min
Primary = 1.67 cfs @ 12.01 hrs, Volume= 0.091 af
Secondary = 0.01 cfs @ 12.01 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 497.78' @ 12.01 hrs Surf.Area= 1,197 sf Storage= 2,398 cf

Plug-Flow detention time= 200.2 min calculated for 0.119 af (93% of inflow)
Center-of-Mass det. time= 159.3 min (899.0 - 739.7)

Volume	Invert	Avail.Storage	Storage Description
#1	491.50'	6,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

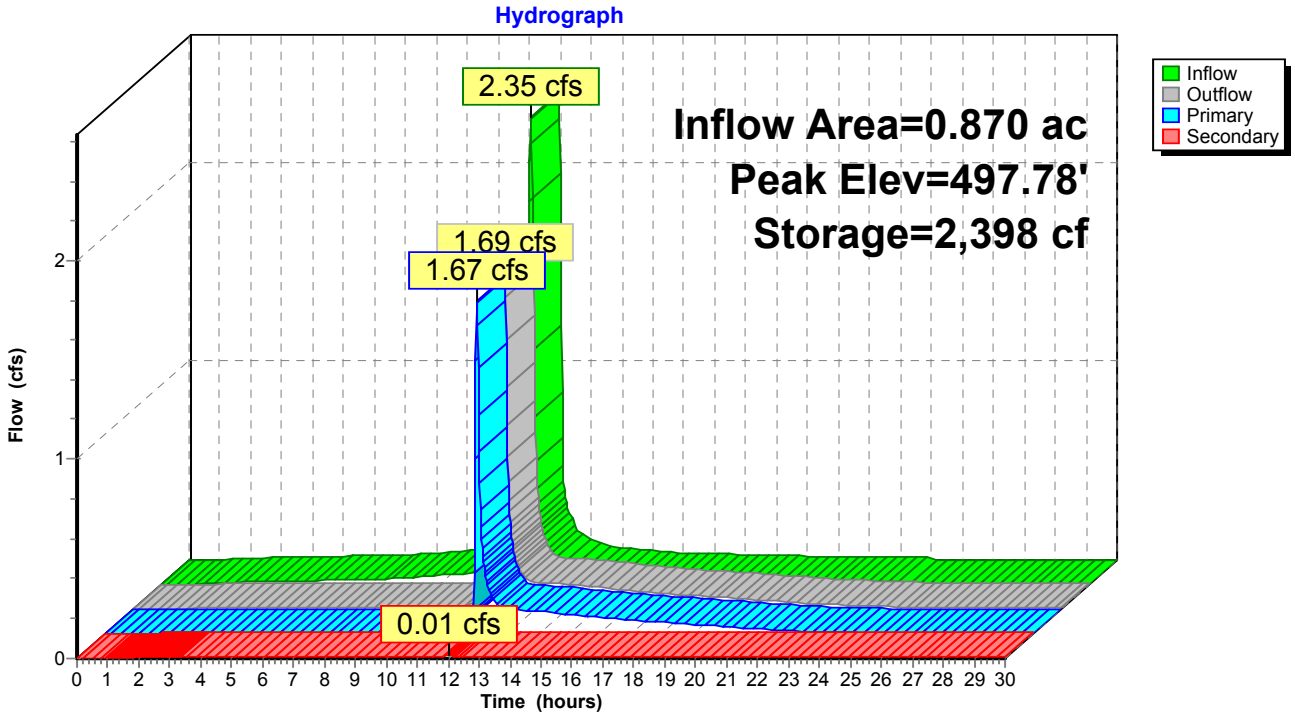
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.50	1,066	0.0	0	0
494.50	1,066	40.0	1,279	1,279
497.50	1,066	25.0	800	2,079
498.50	1,531	100.0	1,299	3,377
499.00	1,784	100.0	829	4,206
500.00	2,505	100.0	2,145	6,350

Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	**12.0" Round Culvert** L= 64.0' Ke= 0.700 Inlet / Outlet Invert= 493.00' / 488.75' S= 0.0664 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	497.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	493.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	491.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=1.65 cfs @ 12.01 hrs HW=497.78' (Free Discharge)
└**1=Culvert** (Passes 1.65 cfs of 6.90 cfs potential flow)
  ├**2=Orifice/Grate** (Weir Controls 1.52 cfs @ 1.73 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 10.46 fps)

Secondary OutFlow Max=0.01 cfs @ 12.01 hrs HW=497.78' (Free Discharge)
└**4=Exfiltration** (Controls 0.01 cfs)

Pond 1P: Level 2 Bioretention



Summary for Pond 2P: Permeable Pavement

Inflow Area = 0.610 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 5.52 cfs @ 11.96 hrs, Volume= 0.301 af
Outflow = 0.11 cfs @ 15.35 hrs, Volume= 0.216 af, Atten= 98%, Lag= 203.6 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.11 cfs @ 15.35 hrs, Volume= 0.216 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 497.52' @ 15.35 hrs Surf.Area= 0.210 ac Storage= 0.170 af

Plug-Flow detention time= 407.3 min calculated for 0.216 af (72% of inflow)
Center-of-Mass det. time= 312.0 min (1,051.7 - 739.7)

Volume	Invert	Avail.Storage	Storage Description
#1	495.50'	0.252 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

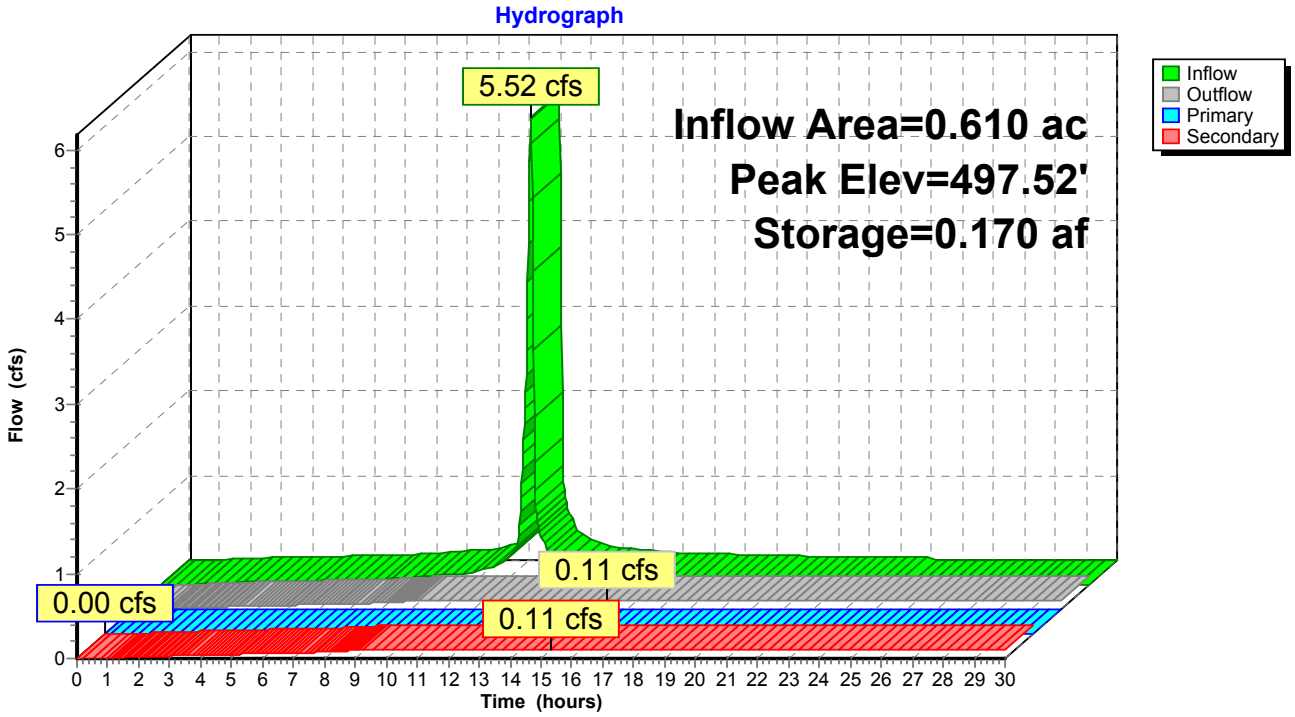
Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
495.50	0.210	0.0	0.000	0.000
498.50	0.210	40.0	0.252	0.252
499.00	0.210	0.0	0.000	0.252

Device	Routing	Invert	Outlet Devices
#1	Primary	497.75'	**6.0" Round Culvert** L= 15.0' Ke= 0.900 Inlet / Outlet Invert= 497.75' / 497.50' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	497.75'	**0.5" Vert. Orifice/Grate** C= 0.600
#3	Secondary	495.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=495.50' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.11 cfs @ 15.35 hrs HW=497.52' (Free Discharge)
└**3=Exfiltration** (Controls 0.11 cfs)

Pond 2P: Permeable Pavement



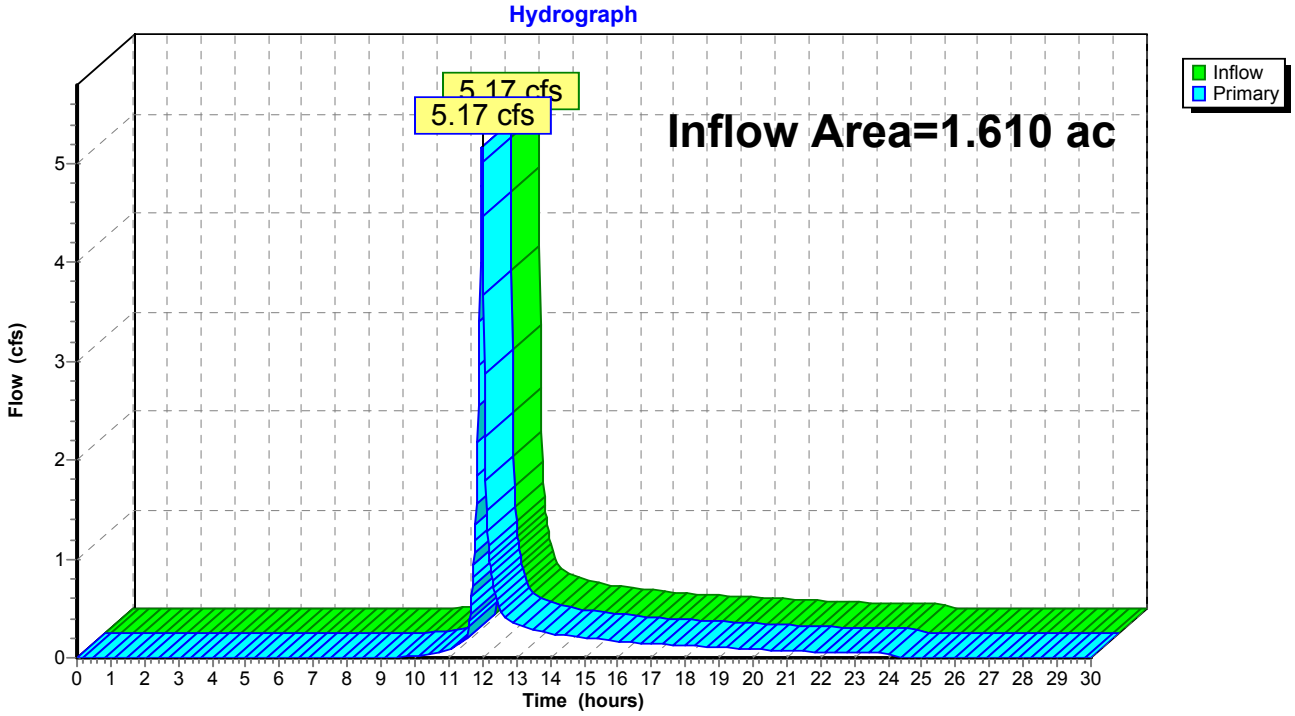
Summary for Pond 4P: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 54.04% Impervious, Inflow Depth = 1.98" for 25-Year event
Inflow = 5.17 cfs @ 11.98 hrs, Volume= 0.266 af
Primary = 5.17 cfs @ 11.98 hrs, Volume= 0.266 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond 4P: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area to Pavers Runoff Area=0.610 ac 100.00% Impervious Runoff Depth=6.61"
Tc=5.0 min CN=98 Runoff=6.14 cfs 0.336 af

Subcatchment 2S: Area to Level 2 Bio Runoff Area=0.260 ac 100.00% Impervious Runoff Depth=6.61"
Tc=5.0 min CN=98 Runoff=2.62 cfs 0.143 af

Subcatchment 3S: Reamaining Areas Runoff Area=0.740 ac 0.00% Impervious Runoff Depth=3.39"
Tc=5.0 min CN=69 Runoff=4.64 cfs 0.209 af

Pond 1P: Level 2 Bioretention Peak Elev=497.84' Storage=2,465 cf Inflow=2.62 cfs 0.144 af
Primary=2.13 cfs 0.106 af Secondary=0.01 cfs 0.029 af Outflow=2.15 cfs 0.134 af

Pond 2P: Permeable Pavement Peak Elev=497.83' Storage=0.196 af Inflow=6.14 cfs 0.336 af
Primary=0.00 cfs 0.000 af Secondary=0.11 cfs 0.221 af Outflow=0.11 cfs 0.221 af

Pond 4P: Site Outfall Inflow=6.54 cfs 0.315 af
Primary=6.54 cfs 0.315 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.688 af Average Runoff Depth = 5.13"
45.96% Pervious = 0.740 ac 54.04% Impervious = 0.870 ac

Summary for Subcatchment 1S: Area to Pavers

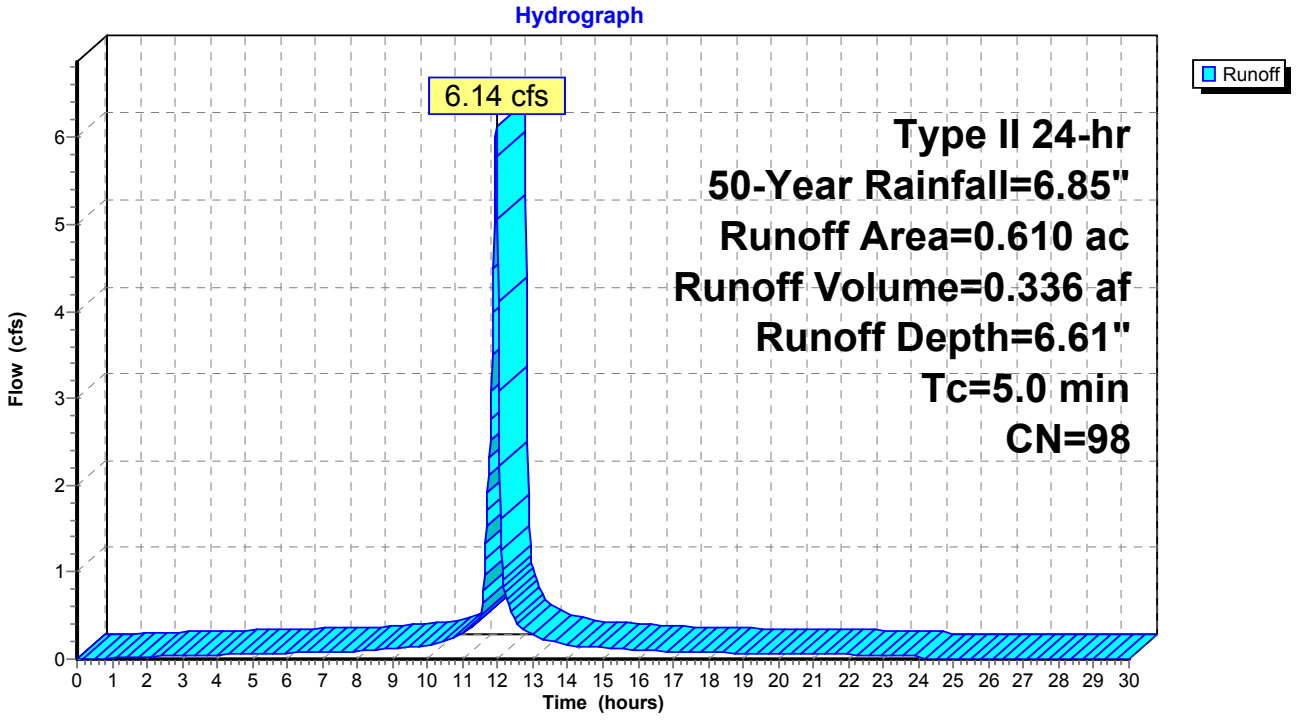
Runoff = 6.14 cfs @ 11.96 hrs, Volume= 0.336 af, Depth= 6.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 50-Year Rainfall=6.85"

	Area (ac)	CN	Description
*	0.170	98	Units
*	0.200	98	Paver Driveway
*	0.040	98	Sidewalks
*	0.200	98	Portion of Pavement
	0.610	98	Weighted Average
	0.610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 1S: Area to Pavers



Summary for Subcatchment 2S: Area to Level 2 Bio

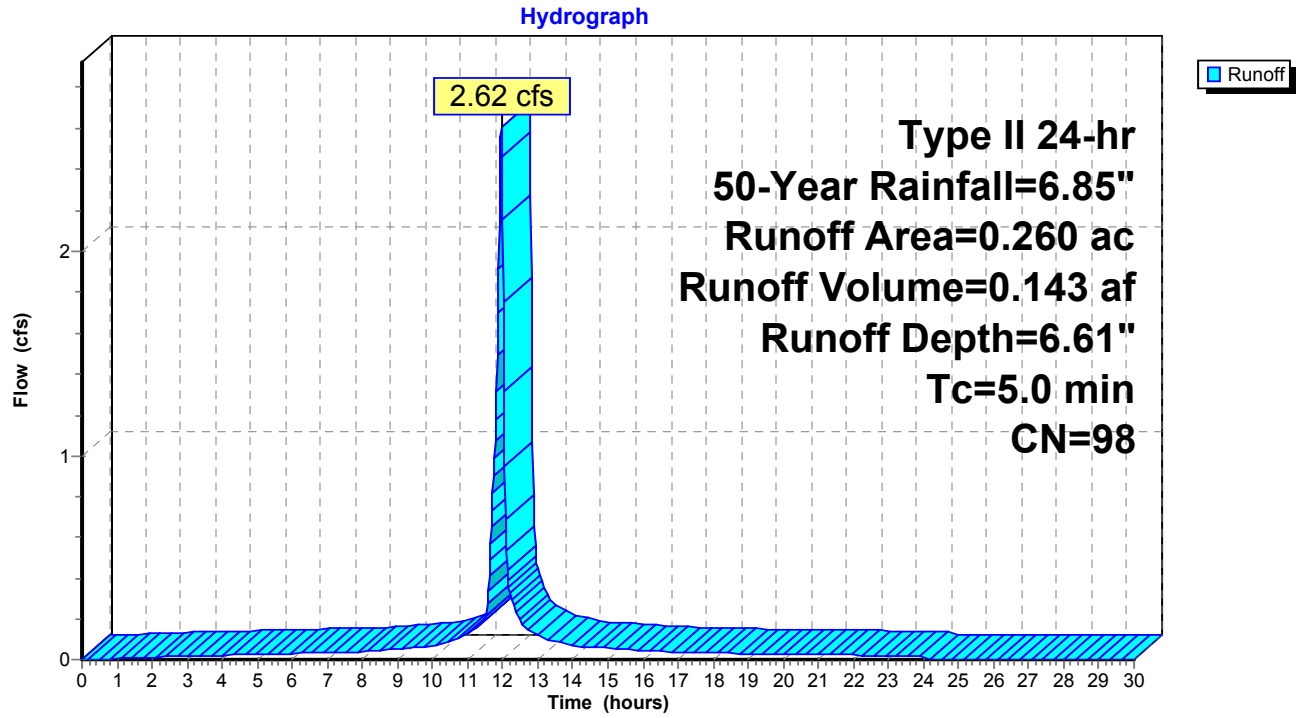
Runoff = 2.62 cfs @ 11.96 hrs, Volume= 0.143 af, Depth= 6.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 50-Year Rainfall=6.85"

	Area (ac)	CN	Description
*	0.120	98	Units
*	0.040	98	Sidewalks
*	0.100	98	Pavement
	0.260	98	Weighted Average
	0.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 2S: Area to Level 2 Bio



Summary for Subcatchment 3S: Reamaining Areas

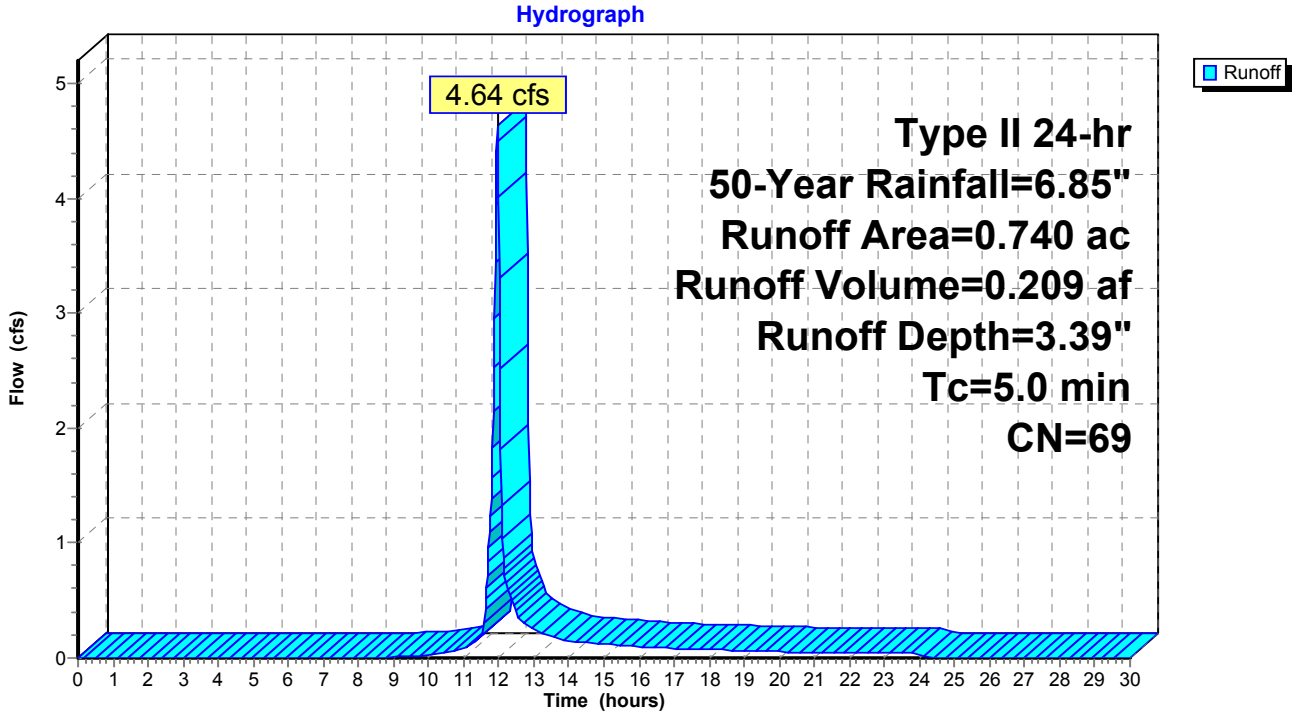
Runoff = 4.64 cfs @ 11.96 hrs, Volume= 0.209 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 50-Year Rainfall=6.85"

Area (ac)	CN	Description
0.740	69	50-75% Grass cover, Fair, HSG B
0.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 3S: Reamaining Areas



Summary for Pond 1P: Level 2 Bioretention

[81] Warning: Exceeded Pond 2P by 0.92' @ 11.96 hrs

Inflow Area = 0.870 ac,100.00% Impervious, Inflow Depth = 1.98" for 50-Year event
Inflow = 2.62 cfs @ 11.96 hrs, Volume= 0.144 af
Outflow = 2.15 cfs @ 12.00 hrs, Volume= 0.134 af, Atten= 18%, Lag= 2.7 min
Primary = 2.13 cfs @ 12.00 hrs, Volume= 0.106 af
Secondary = 0.01 cfs @ 12.00 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 497.84' @ 12.00 hrs Surf.Area= 1,223 sf Storage= 2,465 cf

Plug-Flow detention time= 189.5 min calculated for 0.134 af (94% of inflow)
Center-of-Mass det. time= 151.4 min (890.3 - 738.9)

Volume	Invert	Avail.Storage	Storage Description
#1	491.50'	6,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

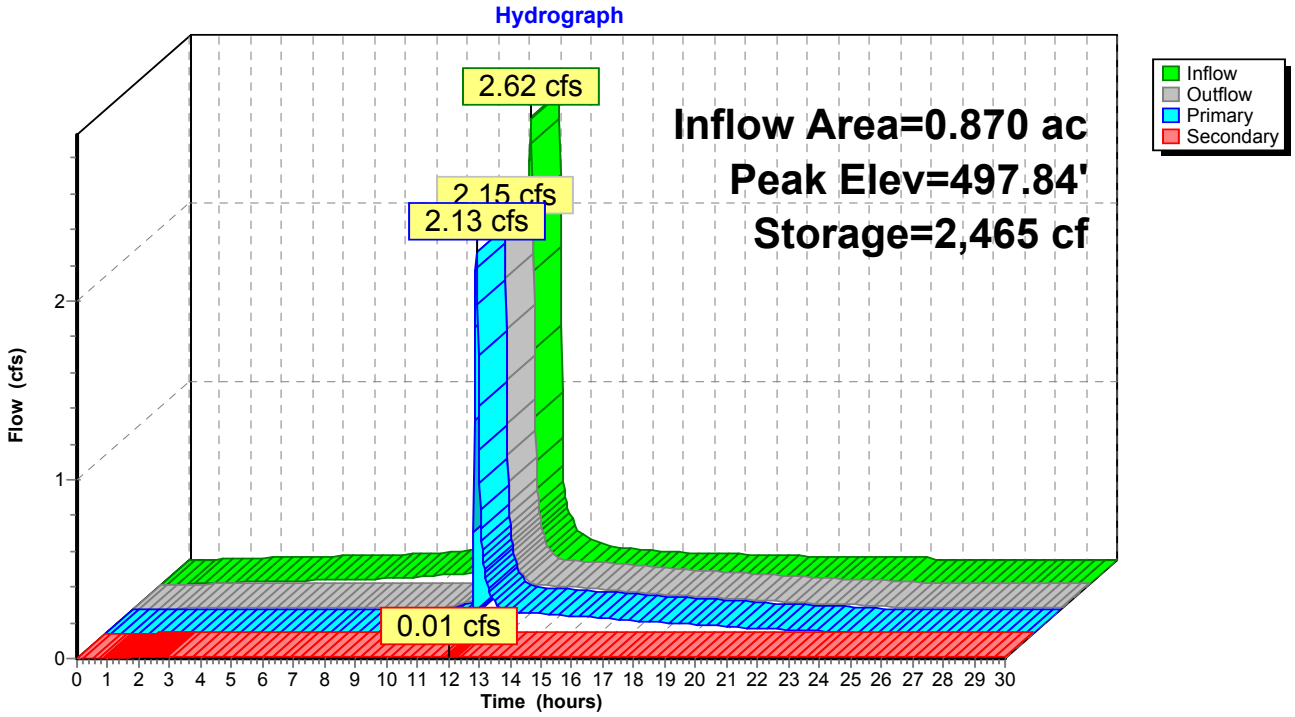
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.50	1,066	0.0	0	0
494.50	1,066	40.0	1,279	1,279
497.50	1,066	25.0	800	2,079
498.50	1,531	100.0	1,299	3,377
499.00	1,784	100.0	829	4,206
500.00	2,505	100.0	2,145	6,350

Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	**12.0" Round Culvert** L= 64.0' Ke= 0.700 Inlet / Outlet Invert= 493.00' / 488.75' S= 0.0664 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	497.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	493.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	491.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=2.14 cfs @ 12.00 hrs HW=497.84' (Free Discharge)
└**1=Culvert** (Passes 2.14 cfs of 6.95 cfs potential flow)
  ├**2=Orifice/Grate** (Weir Controls 2.01 cfs @ 1.90 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 10.52 fps)

Secondary OutFlow Max=0.01 cfs @ 12.00 hrs HW=497.84' (Free Discharge)
└**4=Exfiltration** (Controls 0.01 cfs)

Pond 1P: Level 2 Bioretention



Summary for Pond 2P: Permeable Pavement

Inflow Area = 0.610 ac,100.00% Impervious, Inflow Depth = 6.61" for 50-Year event
Inflow = 6.14 cfs @ 11.96 hrs, Volume= 0.336 af
Outflow = 0.11 cfs @ 15.70 hrs, Volume= 0.221 af, Atten= 98%, Lag= 224.6 min
Primary = 0.00 cfs @ 15.70 hrs, Volume= 0.000 af
Secondary = 0.11 cfs @ 15.70 hrs, Volume= 0.221 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 497.83' @ 15.70 hrs Surf.Area= 0.210 ac Storage= 0.196 af

Plug-Flow detention time= 403.6 min calculated for 0.221 af (66% of inflow)
Center-of-Mass det. time= 299.0 min (1,037.1 - 738.1)

Volume	Invert	Avail.Storage	Storage Description
#1	495.50'	0.252 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

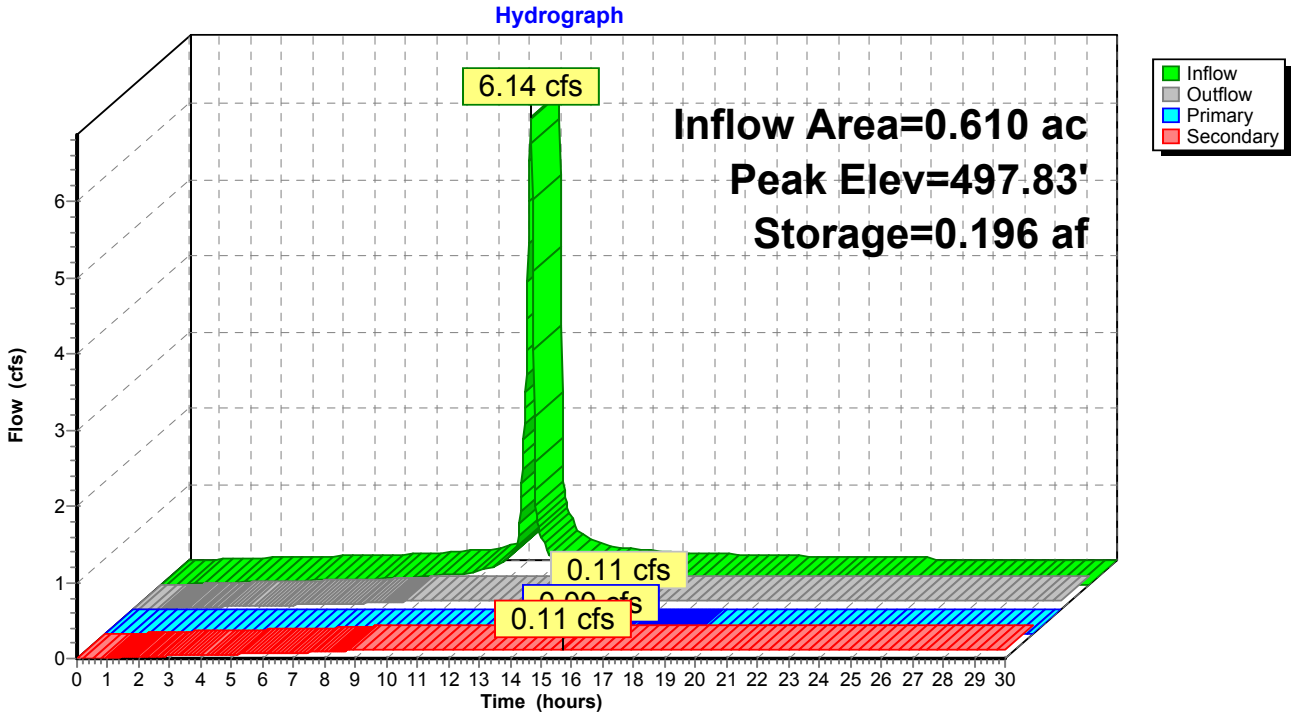
Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
495.50	0.210	0.0	0.000	0.000
498.50	0.210	40.0	0.252	0.252
499.00	0.210	0.0	0.000	0.252

Device	Routing	Invert	Outlet Devices
#1	Primary	497.75'	**6.0" Round Culvert** L= 15.0' Ke= 0.900 Inlet / Outlet Invert= 497.75' / 497.50' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	497.75'	**0.5" Vert. Orifice/Grate** C= 0.600
#3	Secondary	495.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.00 cfs @ 15.70 hrs HW=497.83' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 0.02 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 1.16 fps)

Secondary OutFlow Max=0.11 cfs @ 15.70 hrs HW=497.83' (Free Discharge)
└**3=Exfiltration** (Controls 0.11 cfs)

Pond 2P: Permeable Pavement



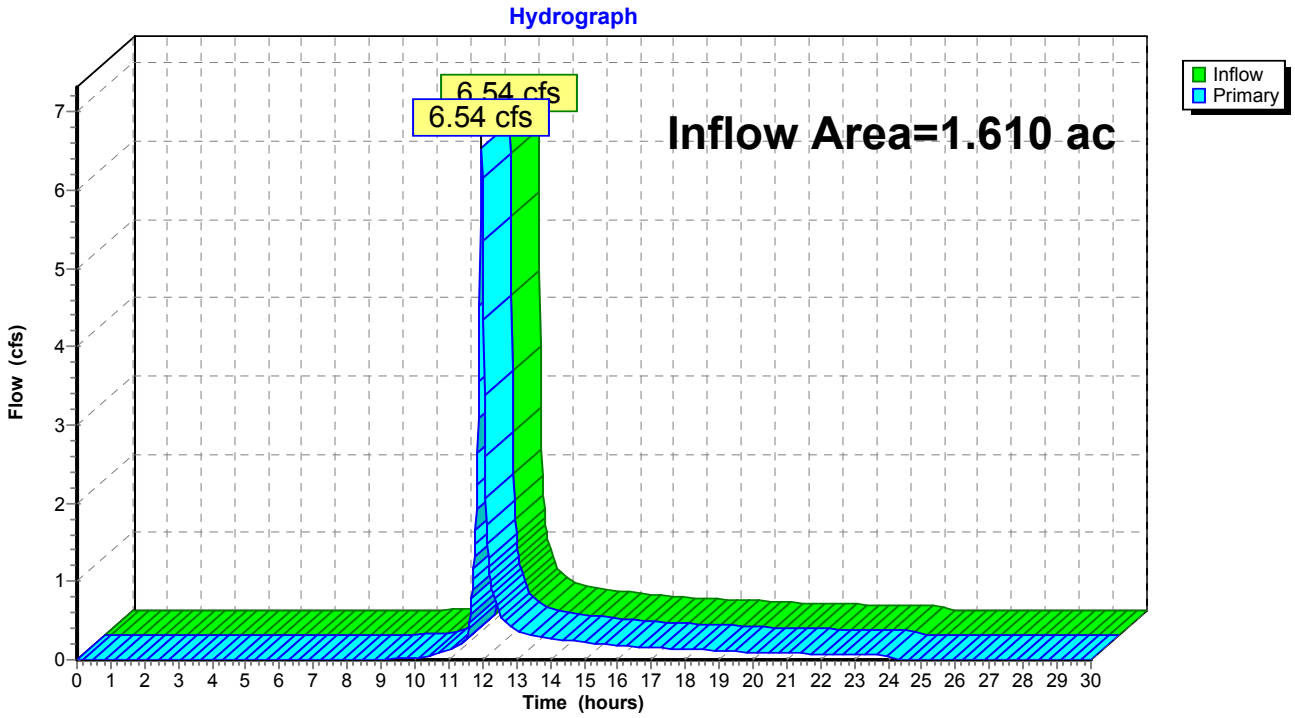
Summary for Pond 4P: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 54.04% Impervious, Inflow Depth = 2.35" for 50-Year event
Inflow = 6.54 cfs @ 11.98 hrs, Volume= 0.315 af
Primary = 6.54 cfs @ 11.98 hrs, Volume= 0.315 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond 4P: Site Outfall



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area to Pavers Runoff Area=0.610 ac 100.00% Impervious Runoff Depth=7.29"
Tc=5.0 min CN=98 Runoff=6.75 cfs 0.371 af

Subcatchment 2S: Area to Level 2 Bio Runoff Area=0.260 ac 100.00% Impervious Runoff Depth=7.29"
Tc=5.0 min CN=98 Runoff=2.88 cfs 0.158 af

Subcatchment 3S: Reamaining Areas Runoff Area=0.740 ac 0.00% Impervious Runoff Depth=3.95"
Tc=5.0 min CN=69 Runoff=5.39 cfs 0.244 af

Pond 1P: Level 2 Bioretention Peak Elev=497.88' Storage=2,519 cf Inflow=2.88 cfs 0.161 af
Primary=2.47 cfs 0.122 af Secondary=0.01 cfs 0.029 af Outflow=2.49 cfs 0.151 af

Pond 2P: Permeable Pavement Peak Elev=498.13' Storage=0.221 af Inflow=6.75 cfs 0.371 af
Primary=0.00 cfs 0.003 af Secondary=0.11 cfs 0.225 af Outflow=0.11 cfs 0.228 af

Pond 4P: Site Outfall Inflow=7.72 cfs 0.366 af
Primary=7.72 cfs 0.366 af

Total Runoff Area = 1.610 ac Runoff Volume = 0.772 af Average Runoff Depth = 5.76"
45.96% Pervious = 0.740 ac 54.04% Impervious = 0.870 ac

Summary for Subcatchment 1S: Area to Pavers

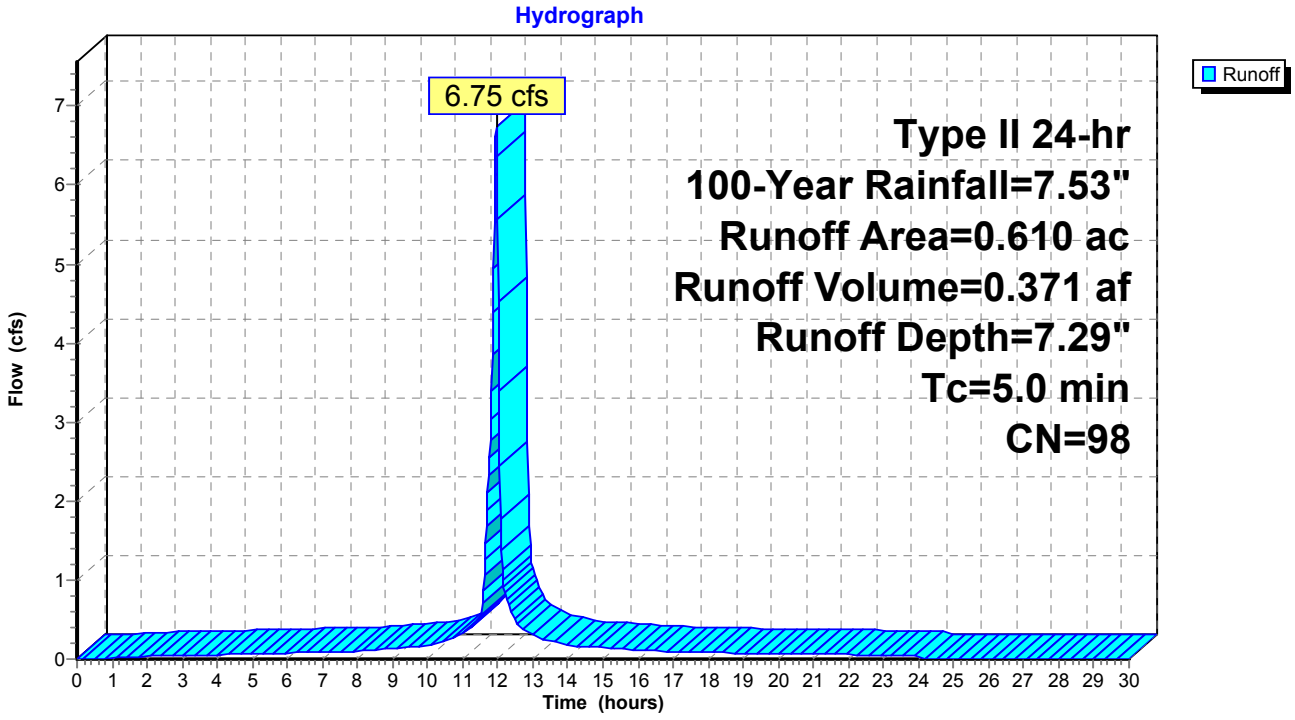
Runoff = 6.75 cfs @ 11.96 hrs, Volume= 0.371 af, Depth= 7.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-Year Rainfall=7.53"

	Area (ac)	CN	Description
*	0.170	98	Units
*	0.200	98	Paver Driveway
*	0.040	98	Sidewalks
*	0.200	98	Portion of Pavement
	0.610	98	Weighted Average
	0.610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 1S: Area to Pavers



Summary for Subcatchment 2S: Area to Level 2 Bio

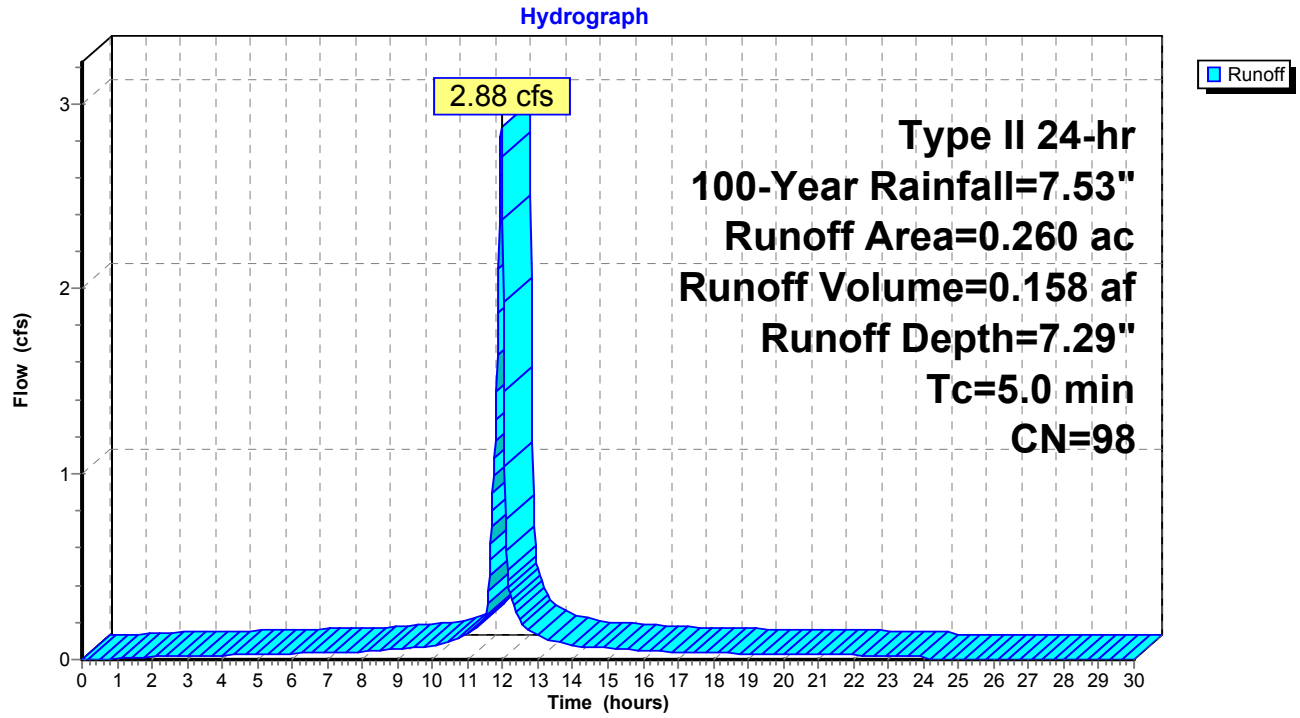
Runoff = 2.88 cfs @ 11.96 hrs, Volume= 0.158 af, Depth= 7.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-Year Rainfall=7.53"

	Area (ac)	CN	Description
*	0.120	98	Units
*	0.040	98	Sidewalks
*	0.100	98	Pavement
	0.260	98	Weighted Average
	0.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 2S: Area to Level 2 Bio



Summary for Subcatchment 3S: Reamaining Areas

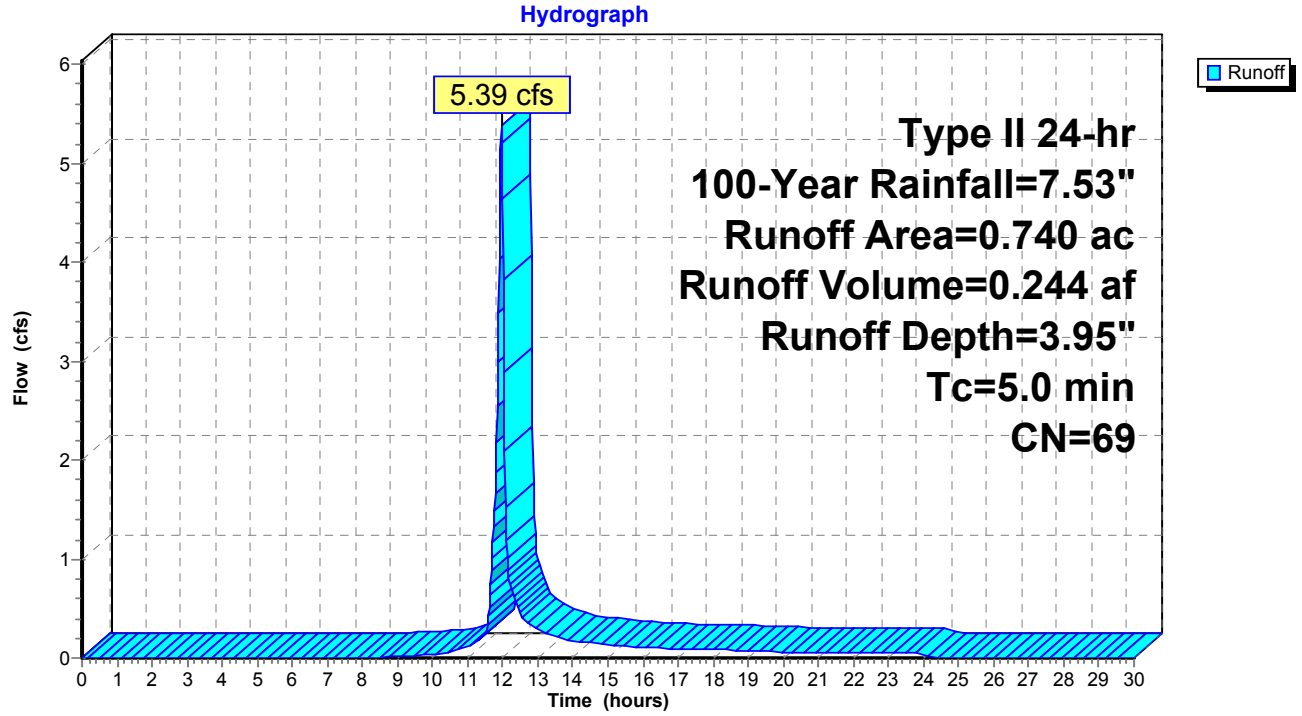
Runoff = 5.39 cfs @ 11.96 hrs, Volume= 0.244 af, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type II 24-hr 100-Year Rainfall=7.53"

Area (ac)	CN	Description
0.740	69	50-75% Grass cover, Fair, HSG B
0.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Min Per TR-55**

Subcatchment 3S: Reamaining Areas



Summary for Pond 1P: Level 2 Bioretention

[81] Warning: Exceeded Pond 2P by 0.90' @ 11.94 hrs

Inflow Area = 0.870 ac,100.00% Impervious, Inflow Depth = 2.22" for 100-Year event
Inflow = 2.88 cfs @ 11.96 hrs, Volume= 0.161 af
Outflow = 2.49 cfs @ 11.99 hrs, Volume= 0.151 af, Atten= 14%, Lag= 2.2 min
Primary = 2.47 cfs @ 11.99 hrs, Volume= 0.122 af
Secondary = 0.01 cfs @ 11.99 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 497.88' @ 11.99 hrs Surf.Area= 1,243 sf Storage= 2,519 cf

Plug-Flow detention time= 180.3 min calculated for 0.151 af (94% of inflow)
Center-of-Mass det. time= 144.5 min (887.8 - 743.3)

Volume	Invert	Avail.Storage	Storage Description
#1	491.50'	6,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

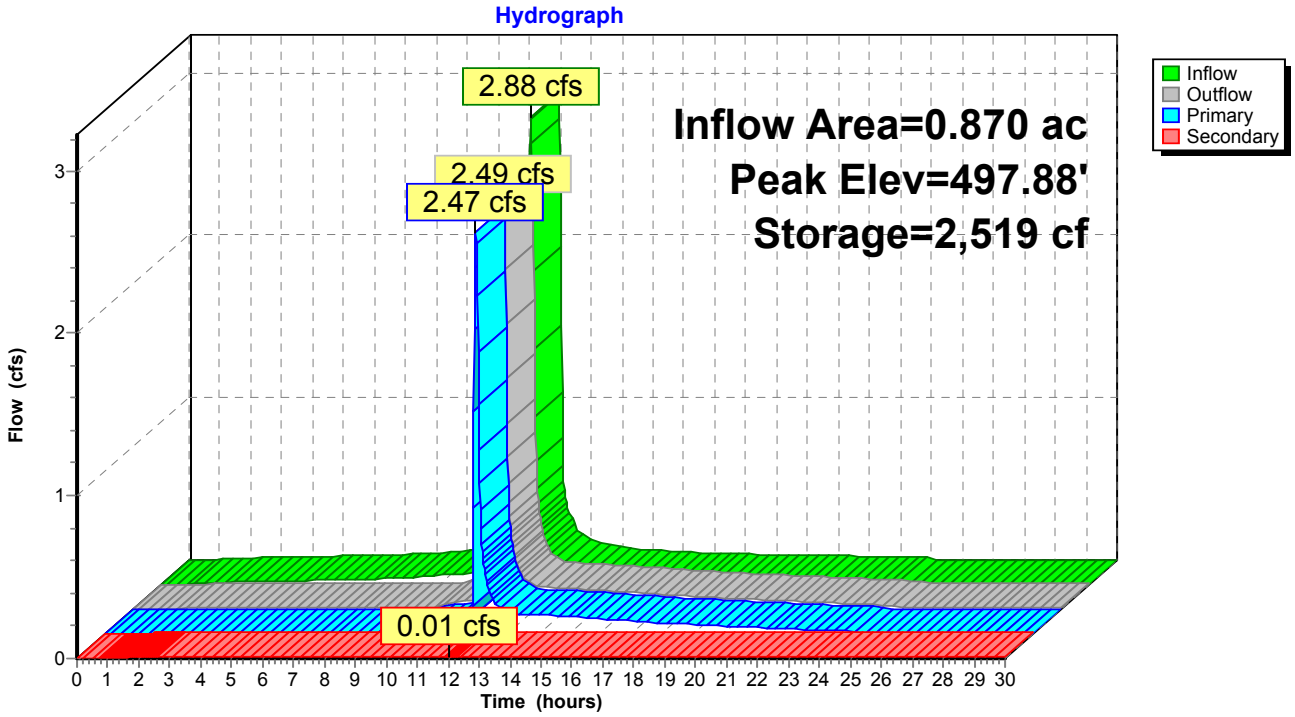
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
491.50	1,066	0.0	0	0
494.50	1,066	40.0	1,279	1,279
497.50	1,066	25.0	800	2,079
498.50	1,531	100.0	1,299	3,377
499.00	1,784	100.0	829	4,206
500.00	2,505	100.0	2,145	6,350

Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	**12.0" Round Culvert** L= 64.0' Ke= 0.700 Inlet / Outlet Invert= 493.00' / 488.75' S= 0.0664 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	497.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	493.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	491.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=2.46 cfs @ 11.99 hrs HW=497.88' (Free Discharge)
└**1=Culvert** (Passes 2.46 cfs of 6.98 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 2.33 cfs @ 2.96 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 10.57 fps)

Secondary OutFlow Max=0.01 cfs @ 11.99 hrs HW=497.88' (Free Discharge)
└**4=Exfiltration** (Controls 0.01 cfs)

Pond 1P: Level 2 Bioretention



Summary for Pond 2P: Permeable Pavement

Inflow Area = 0.610 ac,100.00% Impervious, Inflow Depth = 7.29" for 100-Year event
Inflow = 6.75 cfs @ 11.96 hrs, Volume= 0.371 af
Outflow = 0.11 cfs @ 15.96 hrs, Volume= 0.228 af, Atten= 98%, Lag= 240.0 min
Primary = 0.00 cfs @ 15.96 hrs, Volume= 0.003 af
Secondary = 0.11 cfs @ 15.96 hrs, Volume= 0.225 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 498.13' @ 15.96 hrs Surf.Area= 0.210 ac Storage= 0.221 af

Plug-Flow detention time= 399.3 min calculated for 0.228 af (62% of inflow)
Center-of-Mass det. time= 288.0 min (1,024.8 - 736.8)

Volume	Invert	Avail.Storage	Storage Description
#1	495.50'	0.252 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

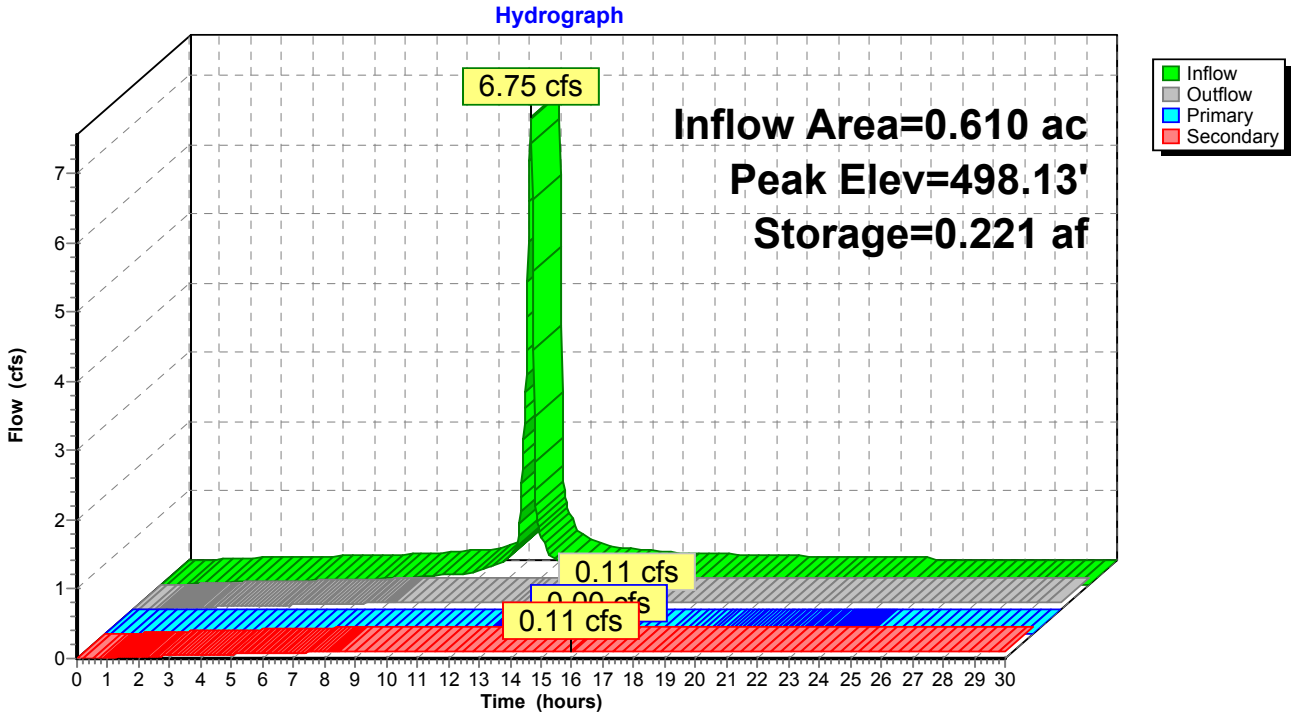
Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
495.50	0.210	0.0	0.000	0.000
498.50	0.210	40.0	0.252	0.252
499.00	0.210	0.0	0.000	0.252

Device	Routing	Invert	Outlet Devices
#1	Primary	497.75'	**6.0" Round Culvert** L= 15.0' Ke= 0.900 Inlet / Outlet Invert= 497.75' / 497.50' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	497.75'	**0.5" Vert. Orifice/Grate** C= 0.600
#3	Secondary	495.50'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'

Primary OutFlow Max=0.00 cfs @ 15.96 hrs HW=498.13' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 0.26 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 2.88 fps)

Secondary OutFlow Max=0.11 cfs @ 15.96 hrs HW=498.13' (Free Discharge)
└**3=Exfiltration** (Controls 0.11 cfs)

Pond 2P: Permeable Pavement



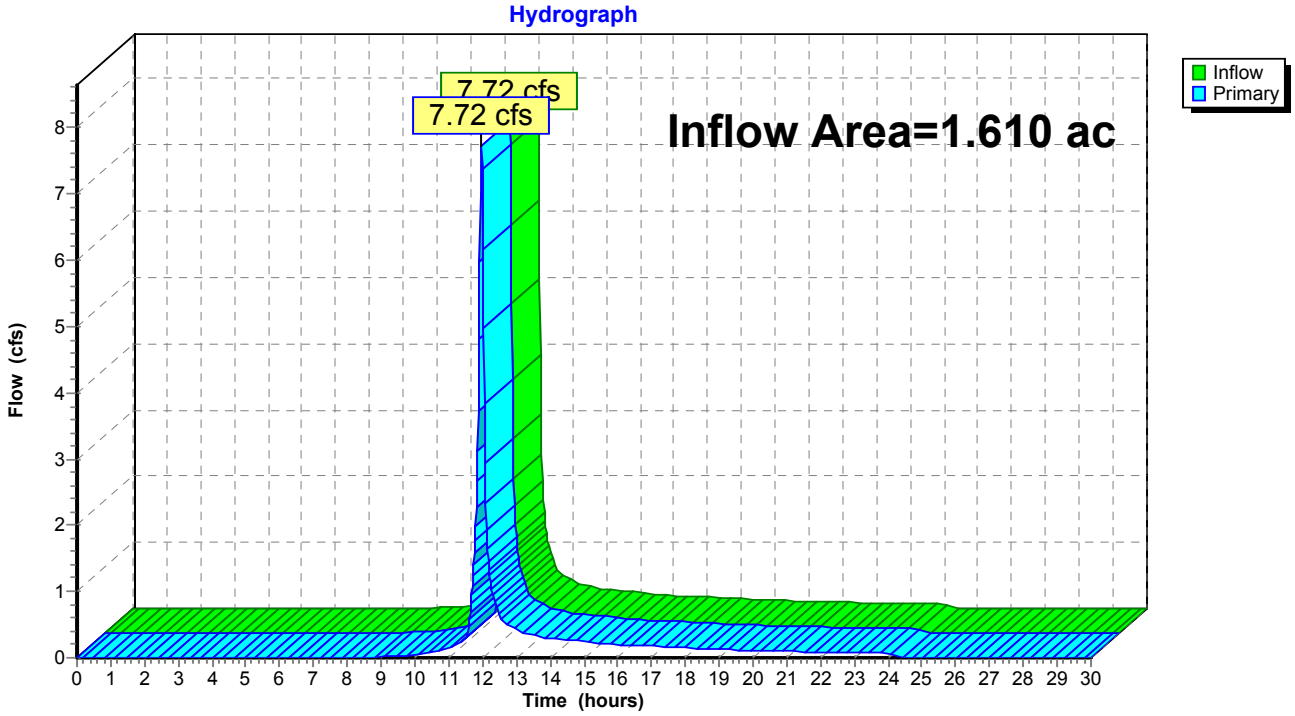
Summary for Pond 4P: Site Outfall

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.610 ac, 54.04% Impervious, Inflow Depth = 2.73" for 100-Year event
Inflow = 7.72 cfs @ 11.97 hrs, Volume= 0.366 af
Primary = 7.72 cfs @ 11.97 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Pond 4P: Site Outfall



Appendix E

Proprietary BMP Inspections and Maintenance Checklist

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name:_____

Address _____ Phone Number_____

Site Status: _____

Date: _____ Time: _____ Site conditions:_____

Inspection Frequency Key: A=annual (required); M=monthly (recommended); S=after major storms (recommended)

Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	*A/M*			
Inlets and Outlets free of debris?	*A/M*			
Facility (internally) free of debris?	*A/M*			
Vegetation				
Surrounding area fully stabilized? (no evidence of eroding material into proprietary BMP)	*A/M*			
Grass mowed?	*A/M*			
Water retention where required				
Water holding chambers at normal pool?	*A/M*			
Evidence of erosion?				
Sediment Deposition				
Filtration Chamber free of sediments?	*A*			
Sedimentation and/or trash below manufacturer's recommended cleanout?	*A*			
Structural Components				
Any evidence of structural deterioration?	*A*			
Grates in good condition?	*A*			
Spalling or cracking of structural parts?	*A*			
Outlet/Overflow Spillway	*A*			
Other				
Noticeable odors?	*A*			
Any evidence of filter(s) clogging?	*A/M*			
Evidence of flow bypassing facility?	*A*			

Inspector Comments:_____

_____

_____

_____

Overall Condition of Facility: ☐ Acceptable ☐ Unacceptable

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed," list Maintenance actions and their completion dates below:

Maintenance Action Needed	Due Date

The next routine inspection is scheduled for approximately: _____
(date)

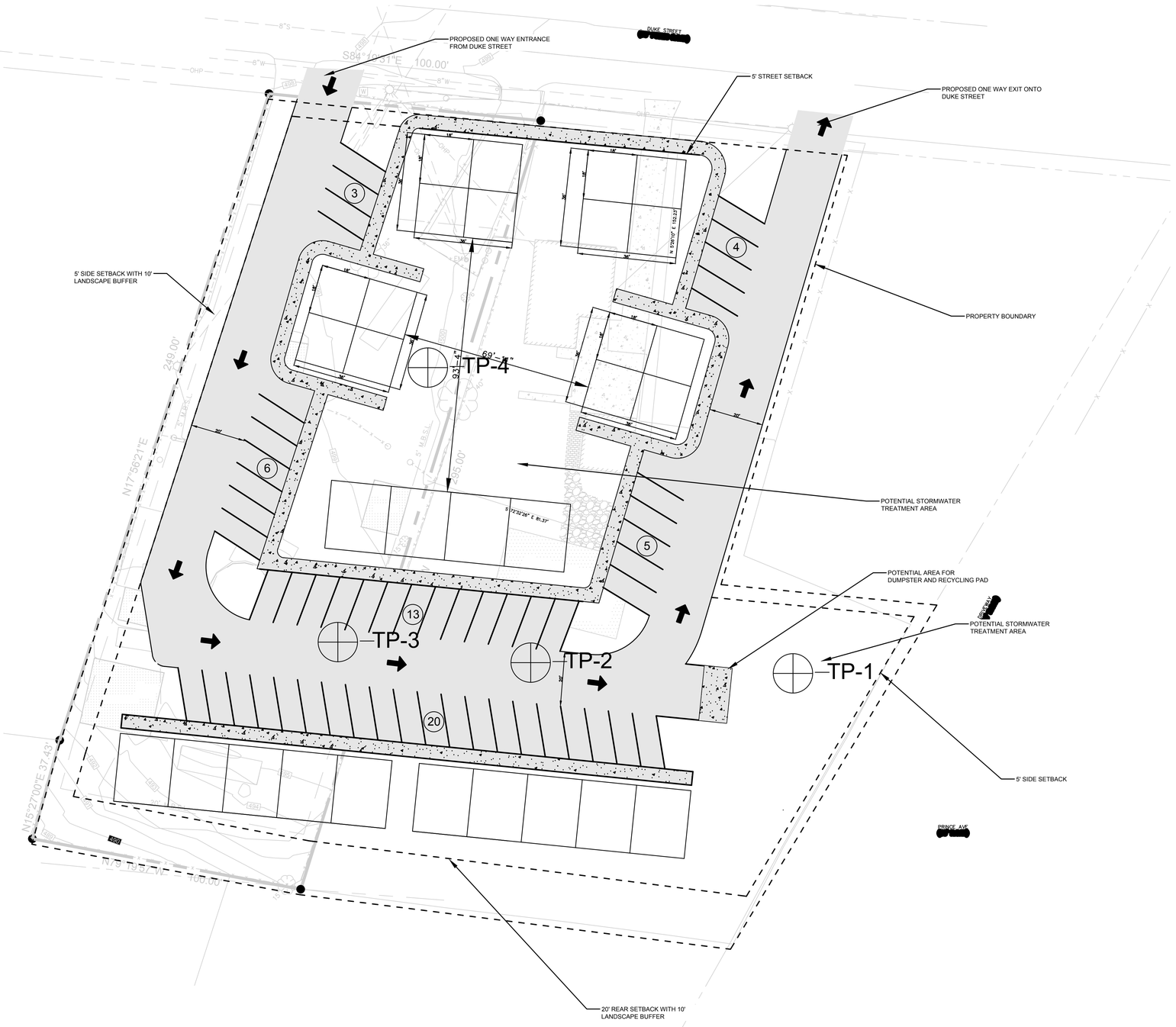
Inspected by: (signature) _____

Inspected by: (printed) _____

Appendix F

Infiltration Test Results
110 Duke Street

	Test 1 (4.0 Feet)			Test 2 (2.5 Feet)				Test 3 (2.5 Feet)				Test 4 (4.5 Feet)			
Reading	Time Checked	Deta Pipe 1 (in)	Delta Pipe 2 (in)	Reading	Time Checked	Delta Pipe 1 (in)	Delta Pipe 2(in)	Reading	Time Checked	Delta Pipe 1 (in)	Delta Pipe 2 (in)	Reading	Time Checked	Delta Pipe 1(in)	Delta Pipe 2(in)
1	9:30	0.75	0.25	1	9:30	1.5	1	1	9:35	12.5	0.75	1	9:37	2	0.5
2	10:30	0.75	0.25	2	10:30	1.75	1	2	10:35	7	0.5	2	10:37	1.5	0.75
3	11:30	0.75	0.25	3	11:30	1.5	1	3	11:35	6.5	0.75	3	11:37	2	0.75
4	12:30	0.75	0.25	4	12:30	1.5	1	4	12:35	6.5	0.5	4	12:37	1.75	0.75



SITE SUMMARY

1. EXISTING SITE ~ 70,425 SF / 1.62 ACRES

2. SETBACKS
   - 2.1. FRONT - 5' FROM PROPERTY LINE
   - 2.2. REAR - 20' FROM PROPERTY LINE
   - 2.3. SIDES - 5' FROM PROPERTY LINE

3. PROPOSED AREAS
   - 3.1. BUILDING FOOTPRINTS - 12,184 SF
   - 3.2. PAVEMENT - 21,775 SF
   - 3.3. SIDEWALK - 4,651 SF
   - 3.4. GREEN AREA - 31,815 SF
   - 3.5. ISR = 55%

4. PARKING
   - 4.1. SPOTS PROVIDED
     - 4.1.1. 51 REGULAR

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

TENNESSEE 811
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0 20 40 60
1"=20'

106/110
DUKE STREET
NASHVILLE, TENNESSEE

Sheet Title:
PRELIMINARY
SITE LAYOUT

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

Date: JANUARY 30, 2018
Scale: 1" = 20'
Drawn by: J.JACOBY
Reviewed by: T.SMITH
Sheet Number:
FIG.2

106/110 DUKE STREET
CONSTRUCTION DOCUMENTS

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

VICINITY MAP

CONTACTS:

OWNER:

LEGACY
309 CHURCH STREET
NASHVILLE, TN 37203
CONTACT: BAILEY NEAL
EMAIL: bailey@villagebuilderstn.com
PHONE: (615) 351-5506

METRO PUBLIC WORKS:

720 SOUTH 5TH STREET
NASHVILLE, TN 37206
CONTACT: RORY ROWAN
EMAIL: rory.rowan@nashville.gov
PHONE: (615) 862-8782

METRO COUNCIL:

DISTRICT 2
COUNCIL MEMBER: DeCosta Hastings

ENGINEER:

S+H
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN, 37211
CONTACT: TRIPP SMITH, PE
EMAIL: tripp@shgroupllc.com
PHONE: (615) 645-1560

MWS - STORMWATER:

800 2ND AVE S
NASHVILLE, TN 37210
CONTACT: STEVE MISHU, PE
EMAIL: steve.mishu@nashville.gov
PHONE: (615) 862-4780

INDEX OF DRAWINGS

PREPARED BY:
S + H Group, LLC
2606 Eugenia Avenue
Suite D
Nashville, TN 37211

TRIPP P. SMITH
LICENSED ENGINEER
AGRICULTURE
No. 119178
STATE OF TENNESSEE
4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE: COVER SHEET

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE SUITE D
NASHVILLE TN 37211
TEL: 615.645.1560

DATE: APRIL 30, 2018
SCALE: NOT TO SCALE
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: C0.0

SURVEY NOTES

1. SURVEY PROVIDED BY BA LAND PROFESSIONAL ON MARCH 29, 2018.

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

0 20 40 60

1"=20'

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106/110 DUKE STREET

NASHVILLE, TENNESSEE

SHEET TITLE: EXISTING CONDITIONS

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

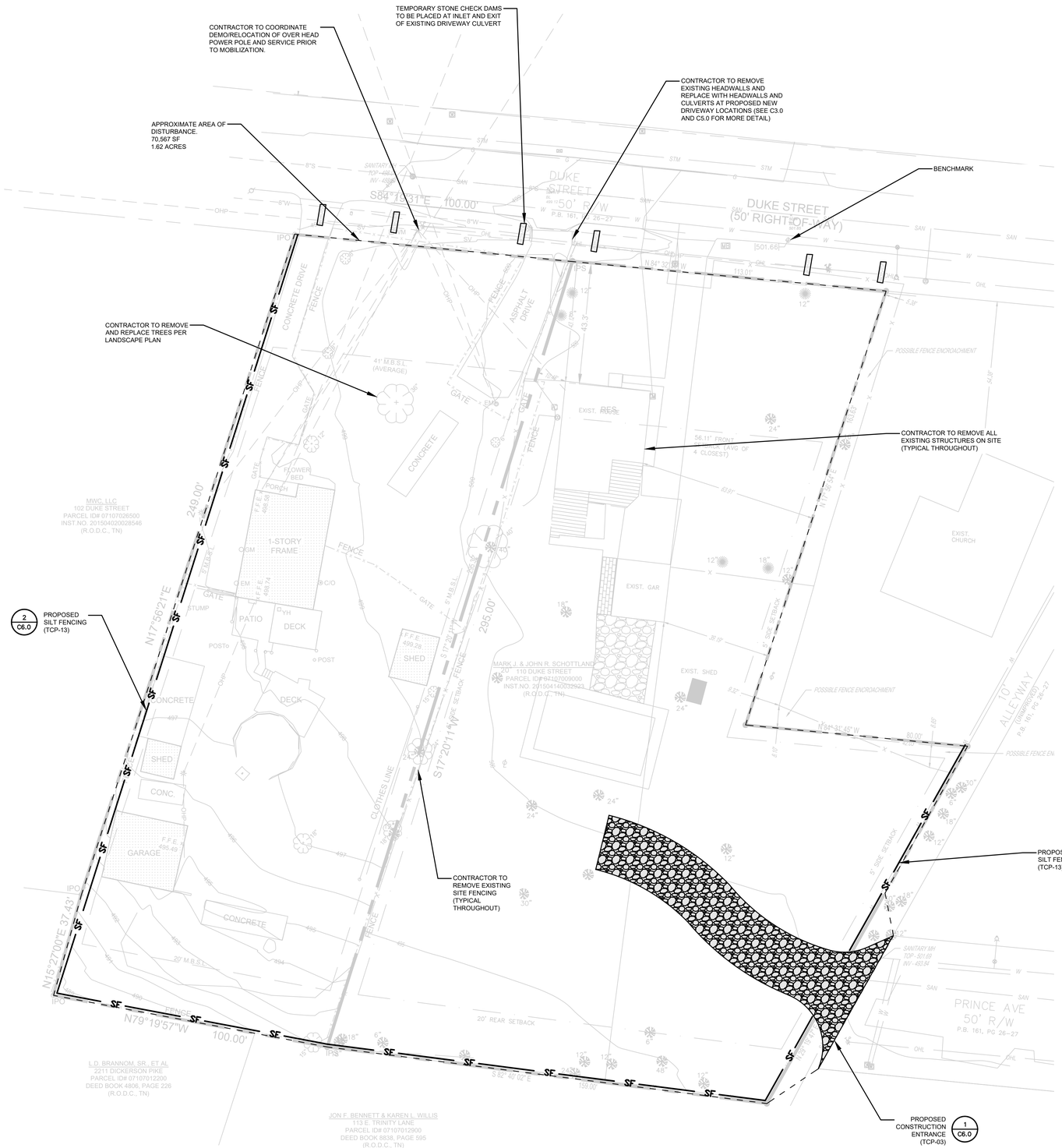
DATE: APRIL 30, 2018

SCALE: 1" = 20'

DRAWN BY: J.JACOBY

REVIEWED BY: T.SMITH

SHEET NUMBER: C1.0



EROSION PREVENTION AND SEDIMENT CONTROL NOTES

1. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED AND APPROVED BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF ANY GRADING OR GROUND DISTURBANCE.
2. THE CONTRACTOR SHALL INSTALL ALL EROSION AND SEDIMENT CONTROL MEASURES AS IDENTIFIED ON THE DRAWINGS.
3. DO NOT OPERATE OR STORE HEAVY EQUIPMENT, OR HANDLE AND/OR STORE CONSTRUCTION DEBRIS OR MATERIALS, WITHIN THE DRIPLINE OF EXISTING OR PROPOSED TREES.
4. THE CONTRACTOR IS TO CONFORM TO ALL CODES AND REGULATIONS AND RECEIVE APPROVAL AND/OR OBTAIN PERMITS FOR ANY CONSTRUCTION AS REQUIRED BY THE GOVERNING JURISDICTIONS OF THE PROJECT.
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12. ACCUMULATED SEDIMENT SHOULD BE REMOVED FROM BEHIND SEDIMENT CONTROL STRUCTURES SUCH AS SILT FENCES, SEDIMENT PONDS, SEDIMENT TRAPS, CHECK DAMS, ETC, WHEN 50% FULL.
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EPSC LEGEND

- CONSTRUCTION ENTRANCE
- SF — SILT FENCING
- SOC — SILT SOC

NOC NOTE:

THE PROJECT ASSOCIATED WITH THESE SUBMITTED PLANS IS COVERED UNDER TENNESSEE CONSTRUCTION GENERAL PERMIT TNRXXXXXX. THE TOTAL DISTURBED AREA IS: 1.62 ACRES.

CHECK ALL THAT APPLY: THE SITE DISCHARGES INTO WATERS IDENTIFIED BY TDEC AS:
__IMPAIRED FOR SILTATION __ IMPAIRED FOR HABITAT ALTERATION __ EXCEPTIONAL

_____ SIGNATURE _____ DATE

CIRCLE ONE: DEVELOPER PROJECT ENGINEER OTHER:_____

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PARCEL IDENTIFICATION NUMBER

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BENCHMARK

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EL - 501.66

0 20 40 60
1"=20'

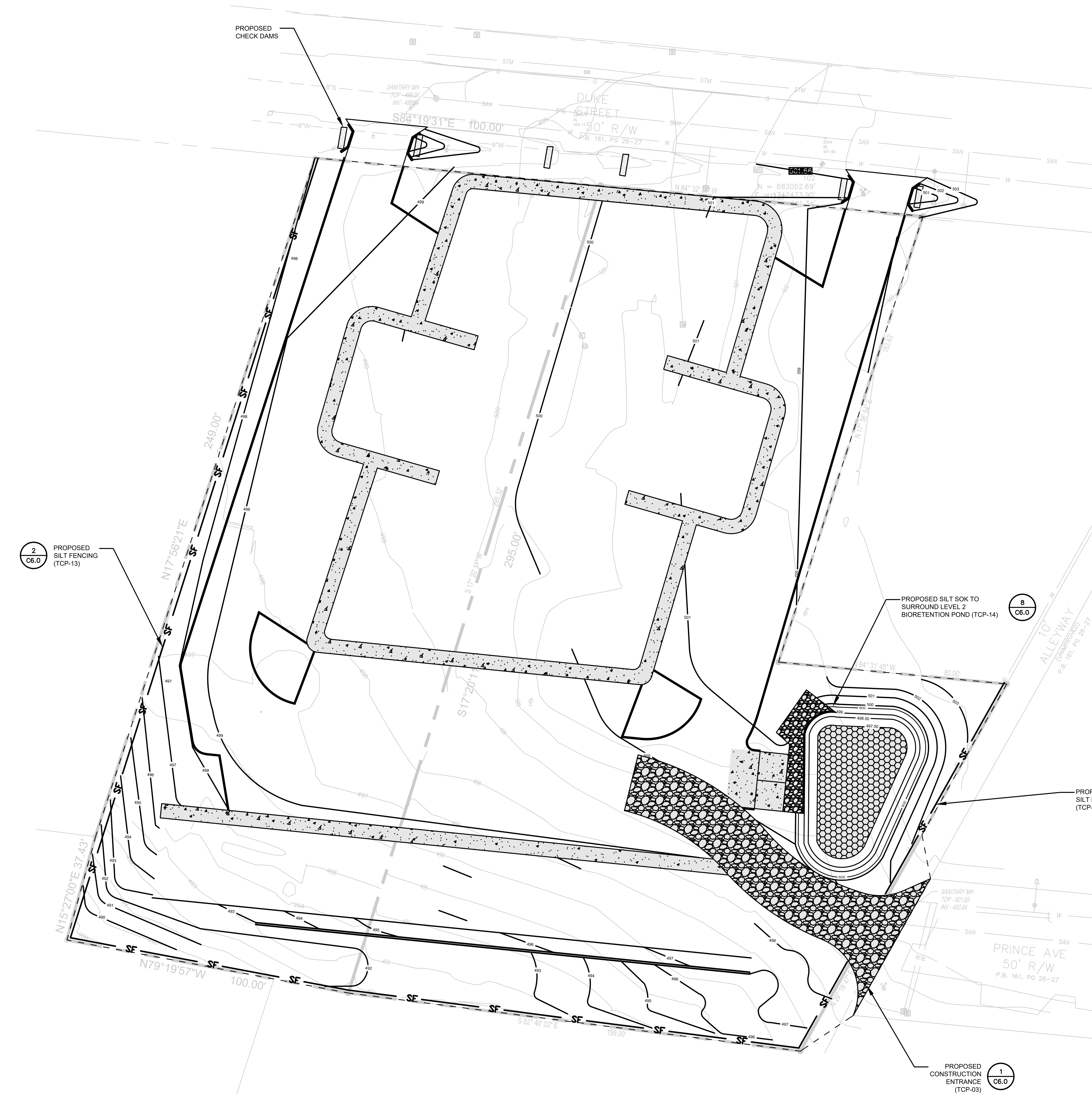
FRANK P. SMITH REGISTERED LANDSCAPE ARCHITECT AGRICULTURE No. 113781 STATE OF TENNESSEE
4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE: INITIAL EROSION CONTROL PLAN

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1060

DATE: APRIL 30, 2018
SCALE: 1" = 20'
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: C2.0



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EPSC LEGEND

Symbol	Description
	CONSTRUCTION ENTRANCE
SF	SILT FENCING
SOC	SILT SOC

NOC NOTE:

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SIGNATURE DATE

CIRCLE ONE: DEVELOPER PROJECT ENGINEER OTHER:___________

N

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

0 20 40 60
1"=20'

TENNESSEE 811
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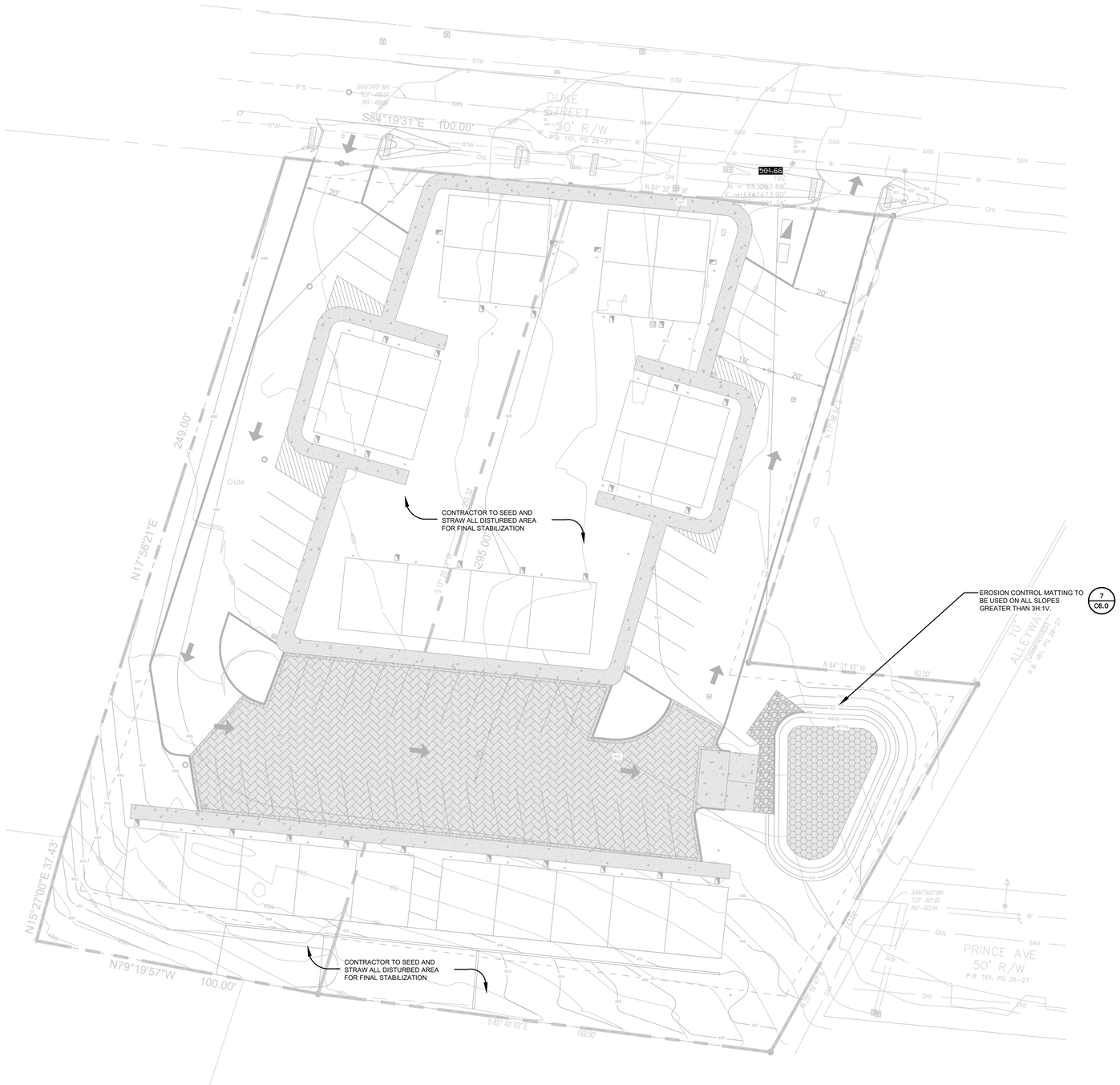
FRANK P. SMITH REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113781 STATE OF TENNESSEE
4/30/2018

106/110
DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE: INTERMEDIATE EROSION CONTROL PLAN

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

DATE: APRIL 30, 2018
SCALE: 1" = 20'
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: C2.1



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EPSC LEGEND

	CONSTRUCTION ENTRANCE
SF	SILT FENCING
SOC	SILT SOC

NOC NOTE:

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_____ _____
SIGNATURE DATE

CIRCLE ONE: DEVELOPER PROJECT ENGINEER OTHER:_____

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PARCEL IDENTIFICATION NUMBER

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BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

0 20 40 60
1"=20'

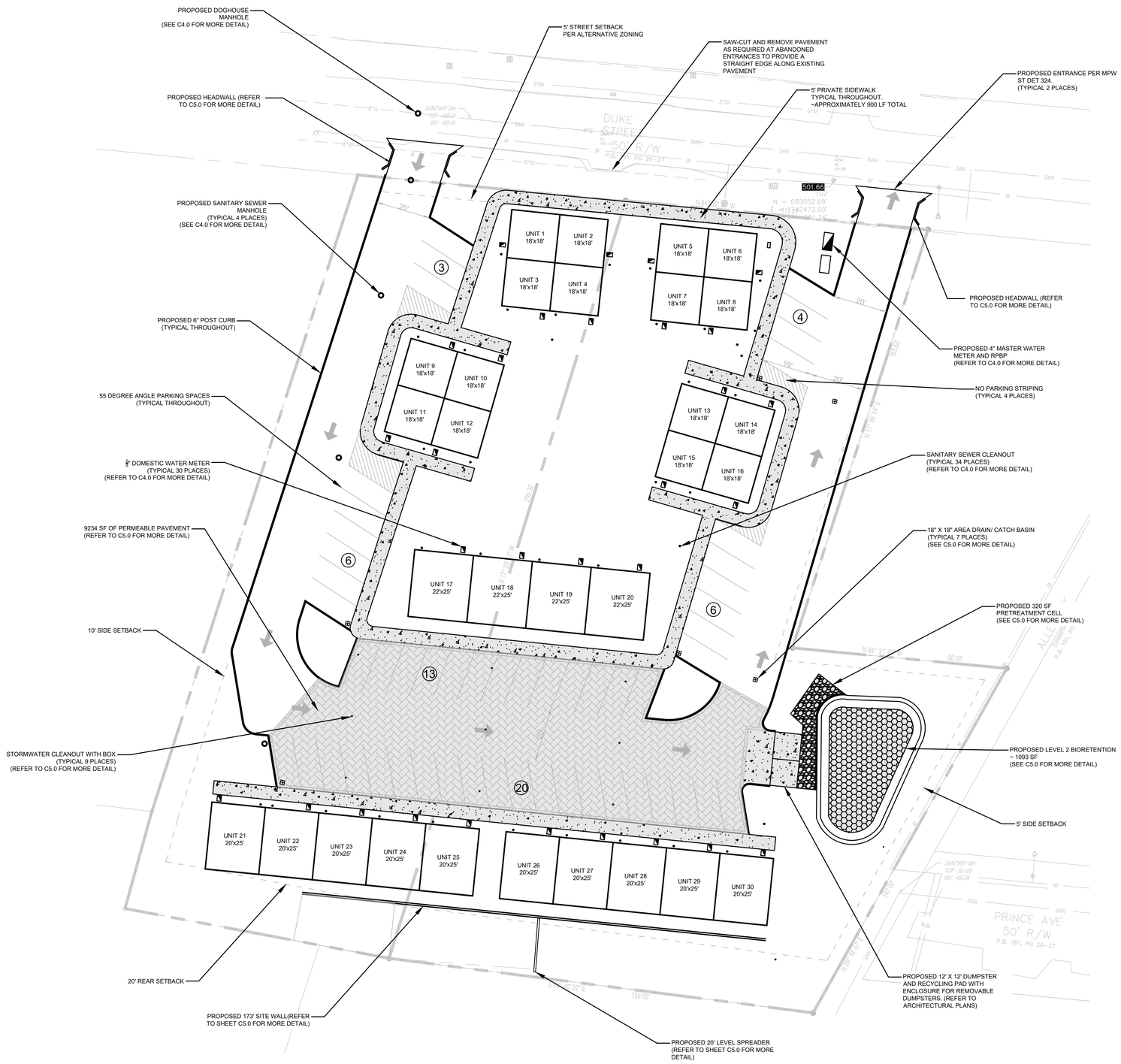
FRANK P. SMITH, JR. REGISTERED AGRICULTURAL ENGINEER NO. 113781 STATE OF TENNESSEE
4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

Sheet Title: FINAL EROSION CONTROL PLAN

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

Date: APRIL 30, 2018
Scale: 1"= 20'
Drawn By: J.JACOBY
Reviewed By: T.SMITH
Sheet Number: C2.2



SITE SUMMARY

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   - 2.2. REAR - 20' FROM PROPERTY LINE
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   - 3.5. ISR = 55%

4. PARKING
   - 4.1. SPOTS PROVIDED
     - 4.1.1. 51 REGULAR

GENERAL NOTES:

1. DRIVEWAY WIDTH IS REQUIRED TO BE 20' MINIMUM.
2. VEGETATION STRIPS AND SIDEWALKS ARE SHOWN AS THEY ARE ANTICIPATED TO BE IMPLEMENTED ON THIS PROJECT. COORDINATION WITH METRO PLANNING, ZONING, AND METRO PUBLIC WORKS IS REQUIRED FOR VEGETATION STRIP AND SIDEWALK REQUIREMENTS.
3. 16 TOTAL UNITS ARE LAID OUT WITH DIMENSIONS OF 20' X 40'
4. IT IS ANTICIPATED THAT ONE 8 CUBIC YARD DUMPSTER AND ONE 8 CUBIC YARD RECYCLING CONTAINER WILL BE REQUIRED FOR THE PROPOSED DEVELOPMENT. PADS ARE TO BE 10' BY 10'. LOCATION SHOWN IS APPROXIMATE.
5. ALL DRAINAGE GRATES WITHIN THE PUBLIC RIGHT OF WAY SHALL BE PER THE BIKE FRIENDLY VANE GRATE FOUND ON SHEET C6.3 DETAIL 5.
6. OWNER INTENDS TO PAY FEE INTO PEDESTRIAN BENEFIT BONE IN-LIEU OF INSTALLING SIDEWALKS

METRO PUBLIC WORKS NOTES:

1. ALL REPAIRS SHALL INCLUDE FULL LANE WIDTH RESURFACING.
2. ALL REPAIRS SHALL UTILIZE A 2-FOOT CUTBACK ON ALL SIDES EXCEPT THE EDGE OF PAVEMENT.
3. NEW UTILITY CUTS WILL BE MILLED AND PAVED TO ANY EXISTING UTILITY CUT OR DAMAGED PAVEMENT WITHIN 10 FEET. IF EXISTING CUT OR DAMAGED PAVEMENT IS LESS THAN 10 FEET IN LENGTH, THE EXISTING CUT SHALL ALSO BE MILLED AND PAVED.
4. ASPHALT REPAIR GREATER THAN 24 INCHES, ADJACENT TO CURB & GUTTER ALONG A ROADWAY SHALL HAVE A FULL LANE WIDTH PAVING.
5. FLOWABLE FILL IS REQUIRED ON ALL DOWNTOWN STREETS, COLLECTORS, & ARTERIAL STREETS. FLOWABLE FILL MAY ALSO BE REQUIRED ON OTHER STREETS AT THE DISCRETION OF THE UTILITY INSPECTORS.
6. ALL REPAIRS WILL HAVE A 1-YEAR WARRANTY.
7. PERMIT OFFICE WILL NEED TO BE NOTIFIED, WHEN REPAIRS ARE FINISHED, TO START WARRANTY PERIOD.
8. SEE METRO STANDARDS 270 THROUGH 275.
9. CURB RAMPS SHALL BE PROVIDED TO ALLOW ALL USERS TO MAKE THE TRANSITION IN GRADE FROM THE STREET TO THE SIDEWALK.
10. CURB RAMPS SHALL BE CONSTRUCTED TO THE DIMENSIONS AND FINISHED ELEVATIONS AS SPECIFIED IN THE PLANS AND/OR CONTRACT DOCUMENTS AND SHALL ALSO CONFORM TO THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT. SURFACE TEXTURE OF THE CURB RAMP SHALL BE STABLE, FIRM, AND SLIP-RESISTANT. THE SURFACE SHALL BE COARSE BROOMED FINISH TRANSVERSE TO THE SLOPE OF THE RAMP. CARE SHALL BE TAKEN TO ASSURE AN UNIFORM GRADE ON THE CURB RAMP. LONGITUDINAL AND TRANSVERSE JOINT MARKINGS SHALL NOT BE ALLOWED ON THE LANDINGS OR RAMPS.
11. DRAINAGE AND UTILITY STRUCTURES SHALL NOT BE PLACED IN CURB RAMPS OR LANDINGS.
12. THE GUTTER LINE PROFILE OF THE STREET SHALL BE MAINTAINED THROUGH THE AREA OF THE CURB RAMP.
13. THE FURNISHING ZONE BUFFERS PEDESTRIANS FROM THE ADJACENT ROADWAY, AND IS ALSO THE AREA WHERE ELEMENTS SUCH AS STREET LIGHTS, CONTROLLER BOXES, HYDRANTS, SIGNS, PARKING METERS, DRIVEWAY APRONS, GRATES, HATCH COVERS, AND STREET FURNITURE ARE PROPERLY LOCATED.

LEGEND:

- LEVEL 2 BIORETENTION
- FIRE HYDRANT
- 5/8" DOMESTIC WATER METER & SERVICE ASSEMBLY
- SANITARY SEWER CEANOUT
- SANITARY SEWER MANHOLE

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

TENNESSEE 811
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1"=20'

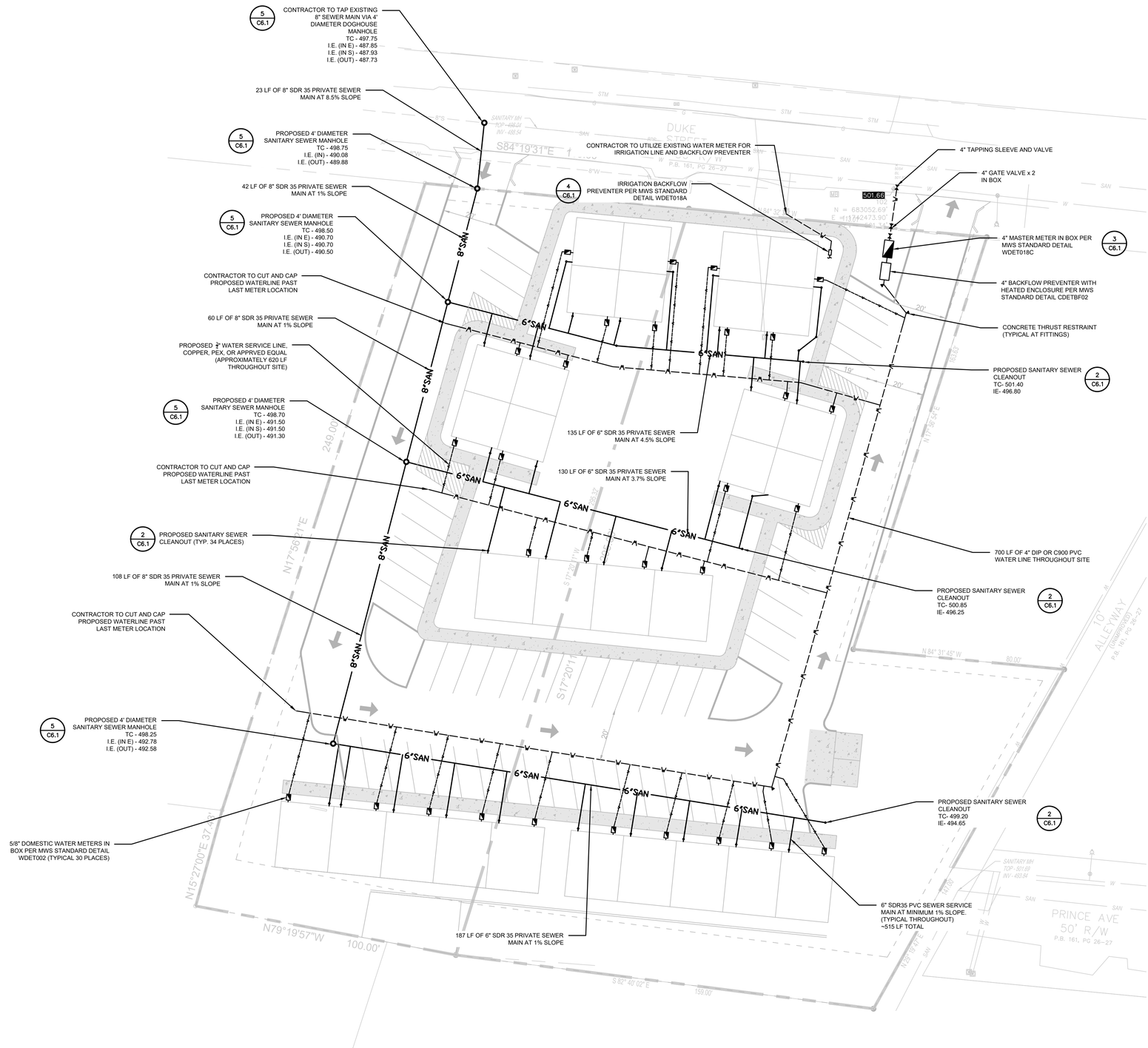
FRANK P. SMITH — REGISTERED ENGINEER — AGRICULTURE — No. 112761 — STATE OF TENNESSEE
4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE: SITE PLAN

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

DATE: APRIL 30, 2018
SCALE: 1" = 20'
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: C3.0



WATER AND SEWER NOTES

1. ALL WATER AND SEWER CONSTRUCTION SHALL BE IN ACCORDANCE WITH SPECIFICATIONS AND STANDARD DETAILS OF METRO WATER SERVICES.
2. THE CONTRACTOR IS RESPONSIBLE FOR REIMBURSING THE METRO WATERS SERVICES THE COST OF INSPECTION.
3. THE CONTRACTOR IS TO PROVIDE AND MAINTAIN THE CONSTRUCTION IDENTIFICATION SIGN FOR PRIVATE DEVELOPMENT APPROVED.
4. AFTER COMPLETION OF THE SANITARY SEWER, THE CONTRACTOR IS RESPONSIBLE FOR THE TELEVISING OF THE LINES PRIOR TO FINAL ACCEPTANCE. THE VIDEOTAPING MUST BE COORDINATED WITH METRO WATER SERVICES INSPECTION SECTION. ALL COSTS WILL BE BORNE BY THE CONTRACTOR.
5. ALL CONNECTIONS TO EXISTING MANHOLES SHALL BE BY CORING AND RESILIENT CONNECTOR METHOD.
6. REDUCED PRESSURE BACKFLOW PREVENTION DEVICES (RPBP) OR DUAL CHECK VALVE WILL BE REQUIRED ON ALL TEST AND FILL LINES (JUMPER) NEEDED FOR WATER MAIN CONSTRUCTION AND MUST BE APPROVED BY THE METRO WATER SERVICES.
7. ALL WATER METERS SHALL BE A MINIMUM OF 24" NOT TO EXCEED A MAXIMUM OF 28" BELOW FINISHED GRADE.
8. UPON COMPLETION OF CONSTRUCTION OF WATER AND/OR SEWER, THE ENGINEER SHALL PROVIDE THE DEPARTMENT WITH A COMPLETE SET OF AS-BUILT PLANS ON MOIST ERASABLE MYLARS IN REVERSE AND IN DIGITAL (*.DWG) FORMAT. SEWER PLANS SHALL BE SEALED BY A LICENSED PROFESSIONAL ENGINEER OR A REGISTERED LAND SURVEYOR AND SHALL INCLUDE ACTUAL FIELD ANGLES BETWEEN LINES, ALL ACTUAL SERVICE LINES AND TEE LOCATIONS, THE DISTANCE OF THE END OF THE SERVICE LINE TO PROPERTY CORNERS AND LINES AND/OR STATION AND OFFSET FROM SEWER CENTERLINE TO END OF SERVICE LINE, THE DEPTH TO THE TOP OF THE END OF THE SERVICE LINE, AND SHALL REFLECT ALL ALIGNMENT AND GRADE CHANGES. WATER LINE PLANS SHALL BE SEALED BY A LICENSED PROFESSIONAL ENGINEER OR A REGISTERED LAND SURVEYOR AND SHALL INCLUDE OFFSET DISTANCE FROM THE ROADWAY CENTERLINE, OR PROPERTY LINE RIGHT OF WAY, LINE DEPTH, LOCATIONS OF HYDRANTS, VALVES, REDUCERS, TEES AND PRESSURE REDUCING DEVICES WHERE APPLICABLE. ALL DRAWINGS MUST BE COMPLETED AND SUBMITTED PRIOR TO ACCEPTANCE OF THE SEWERS OR WATER MAINS INTO THE PUBLIC SYSTEM AND ANY CONNECTIONS BEING MADE.
9. PRESSURE REGULATING DEVICES WILL BE REQUIRED ON THE CUSTOMER SIDE OF THE METER WHEN PRESSURES EXCEED 100 PSI.
10. PRESSURE REGULATING DEVICES WILL BE REQUIRED ON THE STREET SIDE OF THE METER WHEN PRESSURES EXCEED 150 PSI.
11. ALL WATER MAINS MUST BE LOCATED WITHIN THE PAVED AREA INCLUDING ALL BLOW-OFF ASSEMBLIES.

MWS STANDARD PRIVATE UTILITY PLAN NOTES:

1. ALL WATER AND/OR SEWER SERVICES, ALONG WITH APPURTENANCES, SHALL BE INSTALLED IN ACCORDANCE WITH SPECIFICATIONS AND STANDARD DETAILS OF THE METRO WATER SERVICES.
2. ALL CONNECTIONS TO EXISTING MANHOLES SHALL BE BY CORING AND RESILIENT CONNECTOR METHOD.
3. VERTICAL DOUBLE CHECK VALVE ASSEMBLIES, THAT ARE LOCATED IN INTERIOR ROOMS, CAN ONLY BE USED FOR FIRE SERVICES.
4. ALL WATER METERS SHALL BE A MINIMUM OF 24" NOT TO EXCEED A MAXIMUM OF 28" BELOW FINISHED GRADE.
5. IRRIGATION LINE SHALL BE COPPER FROM THE METER TO THE BACKFLOW PREVENTER.
6. THE MINIMUM FEES OUTLINED IN THE CAPACITY LETTER MUST BE PAID BEFORE COMMERCIAL CONSTRUCTION PLANS CAN BE REVIEWED.
7. ALL SEWER SERVICES SHALL BE 6 INCHES IN DIAMETER, FROM CONNECTION AT THE MAIN UNTIL THE FIRST CLEAN OUT ASSEMBLY.
8. BACKFLOW DEVICE TO REMAIN ACCESSIBLE AT ALL TIMES.
9. PLAN SIZE SHALL BE 24" X 36", AND SHALL SHOW CONTOURS AROUND METER BOXES.

GENERAL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR REPAIRING, RECONNECTING AND, TYING OVER ANY EXISTING SERVICES THAT ARE DISRUPTED DURING CONSTRUCTION.
2. CONTRACTOR SHALL PROVIDE SAMPLE LINE AT BLOW OFF VALVE FOR DISINFECTION AND TESTING PURPOSES IN ACCORDANCE WITH MWS SPECIFICATIONS.
3. CONTRACTOR SHALL COMPLY WITH METRO WATER SERVICES SPECIFICATIONS AND STANDARD DETAILS FOR THRUST RESTRAINT AT CONNECTIONS TO EXISTING SYSTEM AND HYDRANT ASSEMBLY INSTALLATION. WHERE RESTRAINED JOINT PIPE AND FITTINGS ARE PERMITTED, CONTRACTOR SHALL USE ACIPCO AMARILLO FAST-GRIP GASKETS AT PIPE JOINTS AND EBAA IRON MEGALUG SERIES 1100 AT MECHANICAL JOINT FITTINGS.
4. CONTRACTOR TO CORE EXISTING MANHOLE AND PROVIDE A KOR-N-SEAL BOOT OR APPROVED EQUAL AT CONNECTION TO EXISTING MANHOLE.
5. CONTRACTOR TO FIELD VERIFY ALL EXISTING INFRASTRUCTURE PRIOR TO STARTING CONSTRUCTION.

FRANK P. SMITH
REGISTERED ENGINEER
AGRICULTURE
No. 113781
STATE OF TENNESSEE
4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE:
UTILITY PLAN

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

TENNESSEE 811
KNOW WHAT'S BELOW.
CALL BEFORE YOU DIG

0 20 40 60
1"=20'

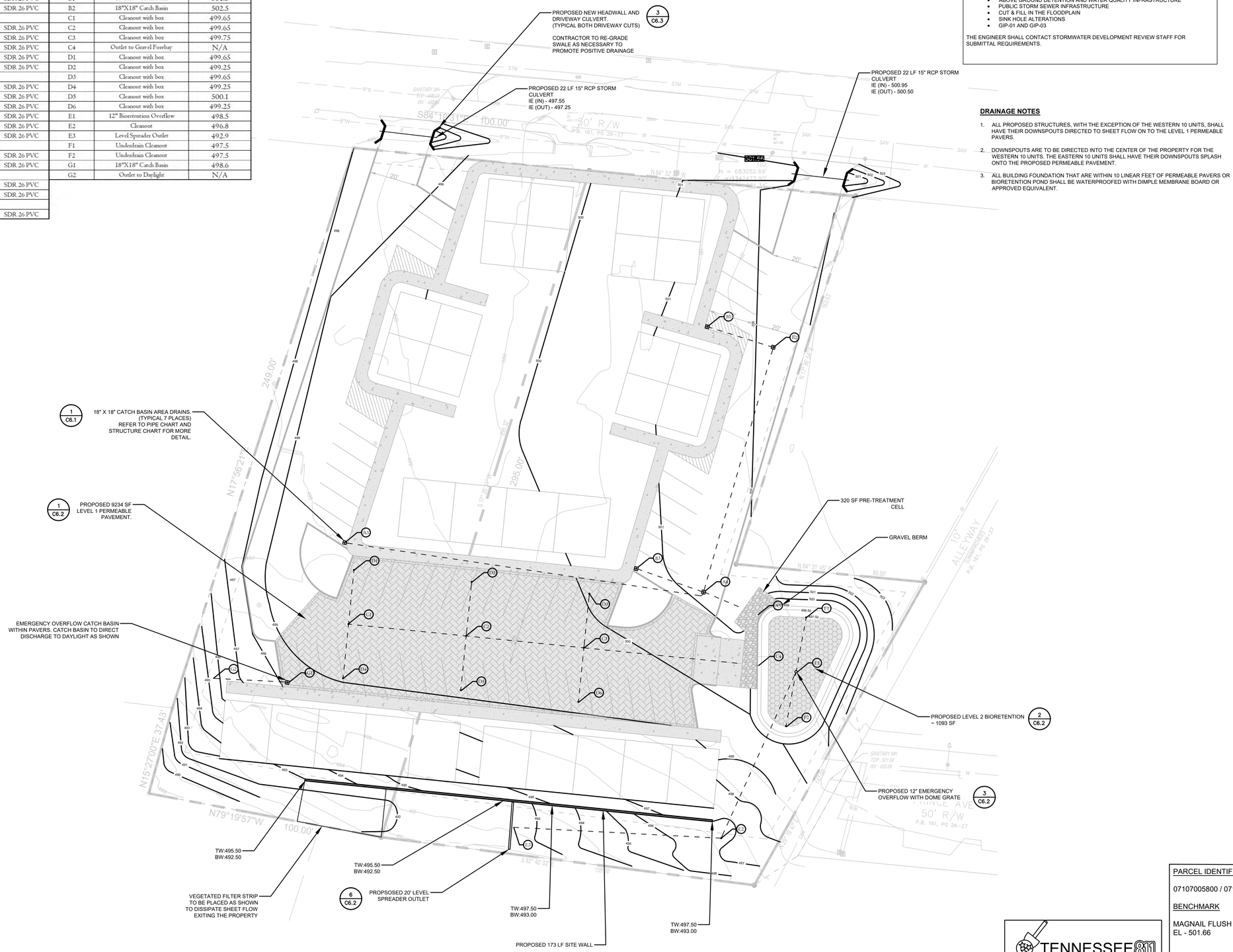
DATE: APRIL 30, 2018
SCALE: 1" = 20'
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: C4.0

Pipe Chart

From	From Invert	To	To Invert	Size (in)	Length (ft)	Slope (%)	Material
A3	498.60	A4	497.80	8	152	0.5%	SDR 26 PVC
A4	497.80	A5	497.60	8	24	0.5%	SDR 26 PVC
B1	499.20	B2	498.90	8	28	1.0%	SDR 26 PVC
B2	498.90	A4	497.80	8	106	1.0%	SDR 26 PVC
B3	498.10	A4	497.80	8	29	1.0%	SDR 26 PVC
							SDR 26 PVC
C1	498.50	C2	498.20	6	50	0.5%	SDR 26 PVC
C2	498.20	C3	497.90	6	50	0.5%	SDR 26 PVC
C3	497.90	C4	497.50	6	74	0.5%	SDR 26 PVC
D1	498.70	C1	498.50	6	23	0.5%	SDR 26 PVC
D2	498.40	C2	498.20	6	23	0.5%	SDR 26 PVC
D3	498.10	C3	497.90	6	23	0.5%	SDR 26 PVC
D4	498.70	C1	498.50	6	23	0.5%	SDR 26 PVC
D5	498.40	C2	498.20	6	23	0.5%	SDR 26 PVC
D6	498.10	C3	497.90	6	23	0.5%	SDR 26 PVC
E1	493.90	E2	493.10	8	76	1.0%	SDR 26 PVC
E2	493.10	E3	492.20	8	88	1.0%	SDR 26 PVC
F1	494.10	E1	493.90	6	23	0.5%	SDR 26 PVC
F2	494.10	E1	493.90	6	23	0.5%	SDR 26 PVC
G1	496.00	31.00	495.50	6	23	2.0%	SDR 26 PVC

Structure Chart

Location	Structure	Top of Casting
A3	18"X18" Catch Basin	499.5
A4	18"X18" Catch Basin	501.25
A5	Outlet to Gravel Forebay	N/A
B1	18"X18" Catch Basin	501.5
B2	18"X18" Catch Basin	502.5
C1	Cleanout with box	499.65
C2	Cleanout with box	499.65
C3	Cleanout with box	499.75
C4	Outlet to Gravel Forebay	N/A
D1	Cleanout with box	499.65
D2	Cleanout with box	499.25
D3	Cleanout with box	499.65
D4	Cleanout with box	499.25
D5	Cleanout with box	500.1
D6	Cleanout with box	499.25
E1	12" Bioretention Overflow	498.5
E2	Cleanout	496.8
E3	Level Spreader Outlet	492.9
F1	Underdrain Cleanout	497.5
F2	Underdrain Cleanout	497.5
G1	18"X18" Catch Basin	498.6
G2	Outlet to Daylight	N/A



FLOODPLAIN NOTES

1. ACCORDING TO THE FEMA FIRM MAP #47037C, PANEL 0237, DATED APRIL 5, 2017 THE PROJECT SITE IS IN AN AREA DESIGNATED "ZONE X" AND IS LOCATED OUTSIDE THE 500 YEAR FLOODPLAIN.

IN ACCORDANCE WITH THE METRO STORMWATER MANAGEMENT MANUAL, VOLUME 1, SECTION 3.9, AS-BUILT CERTIFICATIONS, MWS STORMWATER DIVISION MUST APPROVE THE FOLLOWING AS-BUILTS PRIOR TO ISSUANCE OF THE USE & OCCUPANCY PERMIT:

- UNDERGROUND DETENTION AND WATER QUALITY INFRASTRUCTURE
- ABOVE GROUND DETENTION AND WATER QUALITY INFRASTRUCTURE
- PUBLIC STORM SEWER INFRASTRUCTURE
- CUT & FILL IN THE FLOODPLAIN
- SINK HOLE ALTERATIONS
- GIP-01 AND GIP-03

THE ENGINEER SHALL CONTACT STORMWATER DEVELOPMENT REVIEW STAFF FOR SUBMITTAL REQUIREMENTS.

DRAINAGE NOTES

1. ALL PROPOSED STRUCTURES, WITH THE EXCEPTION OF THE WESTERN 10 UNITS, SHALL HAVE THEIR DOWNSPOUTS DIRECTED TO SHEET FLOW ON TO THE LEVEL 1 PERMEABLE PAVERS.
2. DOWNSPOUTS ARE TO BE DIRECTED INTO THE CENTER OF THE PROPERTY FOR THE WESTERN 10 UNITS. THE EASTERN 10 UNITS SHALL HAVE THEIR DOWNSPOUTS SPLASH ONTO THE PROPOSED PERMEABLE PAVEMENT.
3. ALL BUILDING FOUNDATION THAT ARE WITHIN 10 LINEAR FEET OF PERMEABLE PAVERS OR BIORETENTION POND SHALL BE WATERPROOFED WITH DIMPLE MEMBRANE BOARD OR APPROVED EQUIVALENT.

TENNESSEE 811
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG

PARCEL IDENTIFICATION NUMBER

07107005800 / 07107005700

BENCHMARK

MAGNAIL FLUSH WITH PAVEMENT
EL - 501.66

0 20 40 60
1"=20'

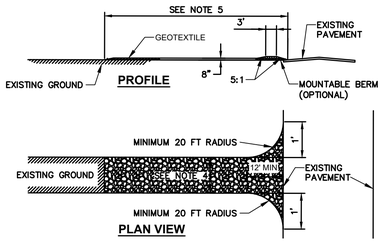
FRANK P. SMITH REGISTERED ENGINEER AGRICULTURE No. 115731 STATE OF TENNESSEE
4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

Sheet Title: GRADING AND DRAINAGE PLAN

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

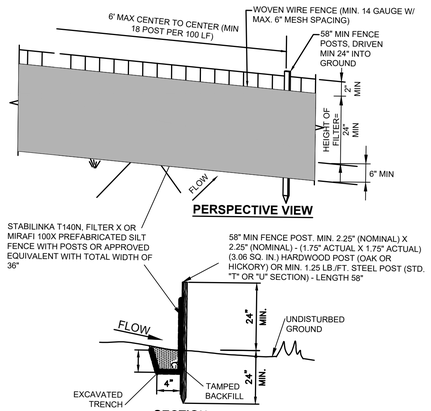
Date: APRIL 30, 2018
Scale: 1"= 20'
Drawn by: J.JACOBY
Reviewed by: T.SMITH
Sheet Number: C5.0



CONSTRUCTION ENTRANCE SPECIFICATIONS:

1. TEMPORARY CONSTRUCTION ENTRANCES SHALL BE IN ACCORDANCE WITH MWS TCP-03.
2. STONE SIZE - USE 2" WASHED WELL GRADED STONE (AASHTO #57 STONE), OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT UPON MWS APPROVAL.
3. THICKNESS - NOT LESS THAN EIGHT (8) INCHES.
4. WIDTH - 20 FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY (20) FEET IF SINGLE ENTRANCE TO SITE.
5. LENGTH - 100' MINIMUM LENGTH WOULD APPLY.
6. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
7. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
8. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
9. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
10. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
11. CONTRACTOR TO PROVIDE AN AREA FOR CONCRETE WASH DOWN AND EQUIPMENT FUELING IN ACCORDANCE WITH METRO CP-10 AND CP-13 RESPECTIVELY. CONTRACTOR TO COORDINATE EXACT LOCATION WITH NPDES DEPARTMENT DURING PRECONSTRUCTION MEETING. CONTROL OF OTHER SITE WASTES SUCH AS DISCARDED BUILDING MATERIALS, CHEMICALS, LITTER, AND SANITARY WASTES THAT MAY CAUSE ADVERSE IMPACTS TO WATER QUALITY IS ALSO REQUIRED BY THE GRADING PERMITTEE. LOCATION OF AND/ OR NOTES REFERRING TO THESE BMP'S SHALL BE SHOWN ON THE EPSC PLAN.

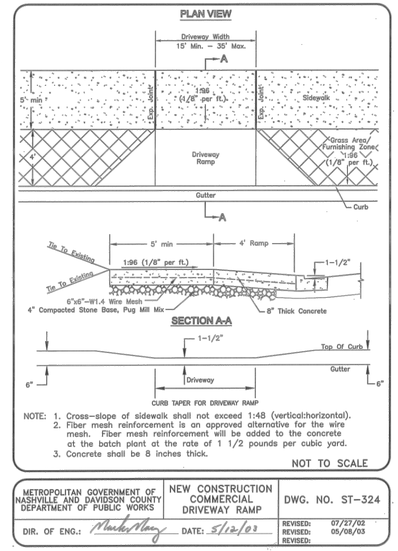
1 / C6.0 **STABILIZED CONSTRUCTION ENTRANCE DETAIL (TCP-03)**
SCALE: NOT TO SCALE



NOTES:
1. SILT FENCE INSTALLATION SHALL IN ACCORDANCE WITH MWS TCP-13.
2. TYPICAL J-HOOK DIMENSIONS SHOULD BE AT A MINIMUM WIDTH (PARALLEL TO CONTOUR) AT 10 FT WITH A DEPTH OF (PERPENDICULAR TO CONTOUR) OF 5 FT. WHERE SPACE IS LIMITED, NARROWER HOOK MAY BE USED WITH A HIGHER SPACING FREQUENCY.
3. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL "T" OR "U" TYPE OR HARDWOOD.
4. FILTER FABRIC TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAX MESH OPENING.
5. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.
6. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIALS REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
7. MAXIMUM DRAINAGE AREA FOR OVERLAND FLOW TO A SILT FENCE SHALL NOT EXCEED 1/4 ACRE PER 100 FEET OF FENCE.
8. SILT FENCE SHALL BE USED WHERE EROSION COULD OCCUR IN THE FORM OF SHEET EROSION.
9. SILT FENCE SHALL NOT BE USED WHEN A CONCENTRATION OF WATER IS FLOWING TO THE BARRIER.
10. TIEBACKS ARE ONLY NECESSARY WHEN REQUIRED BY THE ENGINEER OR NOTED IN THE PLANS.
11. MAXIMUM ALLOWABLE SLOPE LENGTHS CONTRIBUTING RUN-OFF TO A SILT FENCE ARE:

SLOPE STEEPNESS	MAXIMUM SLOPE LENGTH(FT)
2:1	25
3:1	50
4:1	75
5:1 OR FLATTER	100

2 / C6.0 **STABILIZED CONSTRUCTION ENTRANCE DETAIL (TCP-03)**
SCALE: NOT TO SCALE

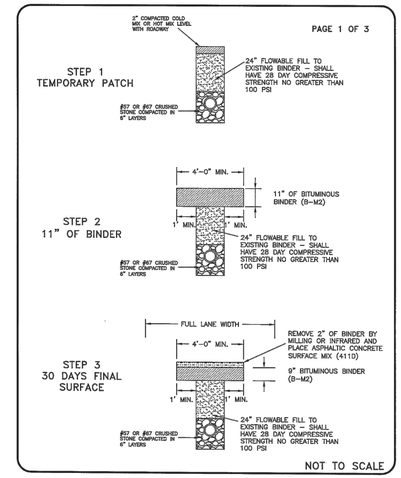


NOTE:
1. Cross–slope of sidewalk shall not exceed 1:48 (vertical:horizontal).
2. Fiber mesh reinforcement is an approved alternative for the wire mesh. Fiber mesh reinforcement will be added to the concrete at the batch plant at the rate of 1 1/2 pounds per cubic yard.
3. Concrete shall be 8 inches thick.

NOT TO SCALE

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY DEPARTMENT OF PUBLIC WORKS	NEW CONSTRUCTION COMMERCIAL DRIVEWAY RAMP	DWG. NO. ST-324
DIR. OF ENG.: Mark Macy DATE: 5/12/03		REVISED: 07/27/02 REVISED: 05/08/03 REVISED:

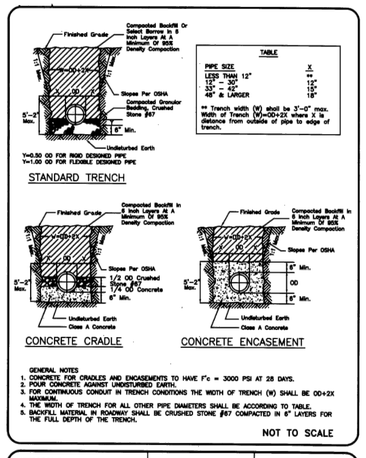
3 / C6.0 **COMMERCAIL DRIVEWAY ENTRANCE RAMP DETAIL**
SCALE: NOT TO SCALE



NOT TO SCALE

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY DEPARTMENT OF PUBLIC WORKS	FLUSH TRENCH REPAIR WITH FLOWABLE FILL	DWG. NO. ST–270b
DIR. OF ENG.: Mark Macy DATE: 7/15/15		CREATED: 07/15/15

4 / C6.0 **FLUSH TRENCH REPAIR WITH FLOWABLE FILL DETAIL**
SCALE: NOT TO SCALE

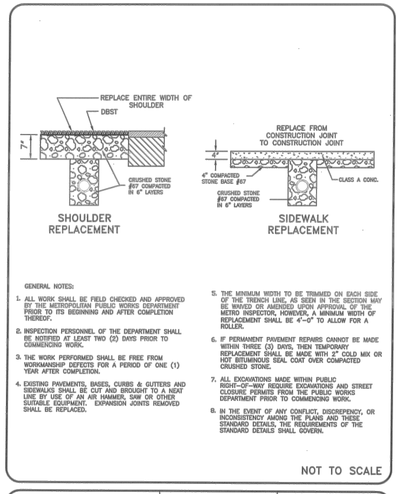


GENERAL NOTES
1. CONCRETE FOR CRADLES AND ENCASEMENTS TO HAVE f'c = 3000 PSI AT 28 DAYS.
2. POUR CONCRETE AGAINST UNDISTURBED EARTH.
3. FOR CONTINUOUS CONDUIT IN TRENCH CONDITIONS THE WIDTH OF TRENCH (W) SHALL BE OD+2X DIMENSION.
4. THE WIDTH OF TRENCH FOR ALL OTHER PIPE DIAMETERS SHALL BE ACCORDING TO TABLE.
5. BACKFILL MATERIAL IN ROADWAY SHALL BE CRUSHED STONE #67 COMPACTED IN 6" LAYERS FOR THE FULL DEPTH OF THE TRENCH.

NOT TO SCALE

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY DEPARTMENT OF PUBLIC WORKS	TRENCH BACKFILL	DWG. NO. DR–180
ASST. DIR–ENG.: Mark Macy DATE: 11/30/01 DIRECTOR: Ronald L. Turner DATE: 12-4-01		REVISED: 12/01/00

5 / C6.0 **FLUSH BACKFILL DETAIL**
SCALE: NOT TO SCALE

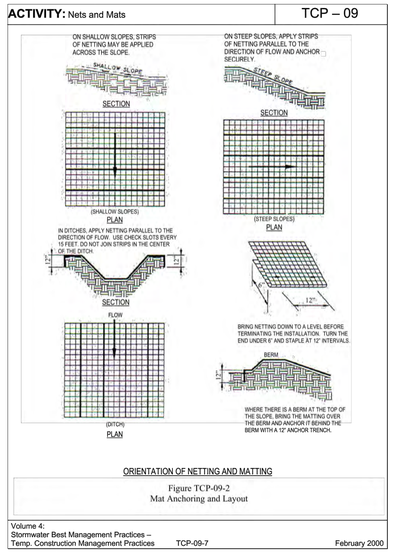


GENERAL NOTES:
1. ALL WORK SHALL BE FIELD CHECKED AND APPROVED BY THE METROPOLITAN PUBLIC WORKS DEPARTMENT PRIOR TO ITS BEGINNING AND AFTER COMPLETION THEREOF.
2. INSPECTION PERSONNEL OF THE DEPARTMENT SHALL BE NOTIFIED AT LEAST TWO (2) DAYS PRIOR TO COMMENCING WORK.
3. THE WORK PERFORMED SHALL BE FREE FROM WORKMANSHIP DEFECTS FOR A PERIOD OF ONE (1) YEAR AFTER COMPLETION.
4. EXISTING PAVEMENTS, BASES, CURBS & GUTTERS AND SIDEWALKS SHALL BE CUT AND BROUGHT TO A NEAT LINE BY USE OF AN AIR HAMMER, SAW OR OTHER SUITABLE EQUIPMENT. EXPANSION JOINTS REMOVED SHALL BE REPLACED.
5. THE MINIMUM WIDTH TO BE TRIMMED ON EACH SIDE OF THE TRENCH LINE, AS SEEN IN THE SECTION MAY BE WAIVED OR AMENDED UPON APPROVAL OF THE METRO INSPECTOR, HOWEVER, A MINIMUM WIDTH OF REPLACEMENT SHALL BE 4'–0" TO ALLOW FOR A ROLLER.
6. IF PERMANENT PAVEMENT REPAIRS CANNOT BE MADE WITHIN THREE (3) DAYS, THEN TEMPORARY REPLACEMENT SHALL BE MADE WITH 2" COLD MIX OR HOT BITUMINOUS SEAL COAT OVER COMPACTED CRUSHED STONE.
7. ALL EXCAVATIONS MADE WITHIN PUBLIC RIGHT–OF–WAY REQUIRE EXCAVATIONS AND STREET CLOSURE PERMITS FROM THE PUBLIC WORKS DEPARTMENT PRIOR TO COMMENCING WORK.
8. IN THE EVENT OF ANY CONFLICT, DISCREPENCY, OR INCONSISTENCY AMONG THE PLANS AND THESE STANDARD DETAILS, THE REQUIREMENTS OF THE STANDARD DETAILS SHALL GOVERN.

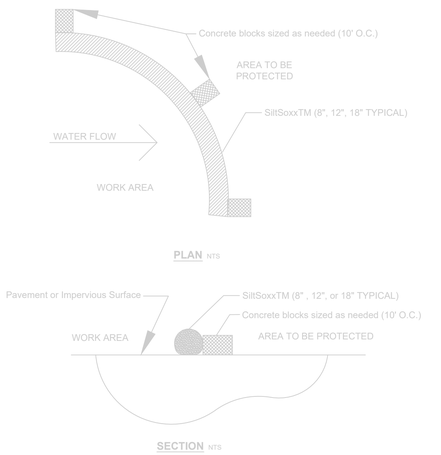
NOT TO SCALE

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY DEPARTMENT OF PUBLIC WORKS	TRENCH REPAIR OUTSIDE ROADWAY	DWG. NO. ST–272
DIR. OF ENG.: Mark Macy DATE: 7/10/06		REVISED: 12/01/00 REVISED: 06/23/04 REVISED: 09/10/04

6 / C6.0 **TRENCH REPAIR OUTSIDE OF ROADWAY DETAIL**
SCALE: NOT TO SCALE



7 / C6.0 **EROSION CONTROL MATTING DETAIL**
SCALE: NOT TO SCALE



NOTES:
1. ALL MATERIAL TO MEET SPECIFICATIONS.
2. FILTER MEDIA TO MEET APPLICATION REQUIREMENTS.
3. FILTER MEDIA TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

8 / C6.0 **SILT SOCK DETAIL**
SCALE: NOT TO SCALE

FRANK P. SMITH
REGISTERED ENGINEER
AGRICULTURE
No. 115121
STATE OF TENNESSEE
4/30/2018

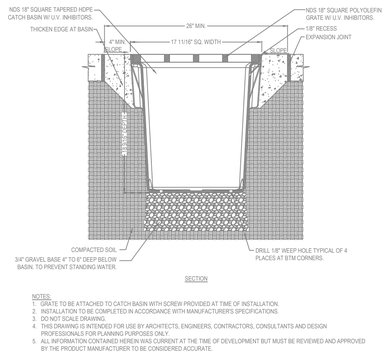
106/110
DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE:
DETAIL SHEET 1

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

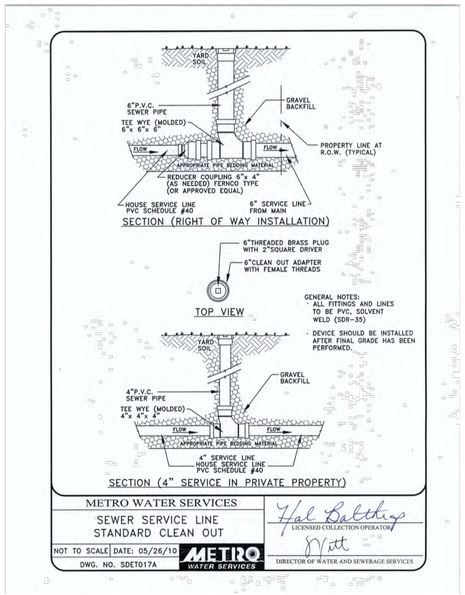
DATE: APRIL 30, 2018
SCALE: NOT TO SCALE
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH

SHEET NUMBER:
C6.0



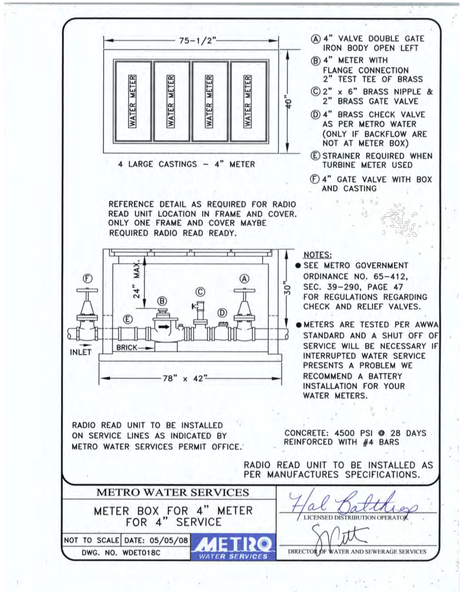
NOTES:
1. GRATE TO BE ATTACHED TO CATCH BASIN WITH SCREW PROVIDED AT TIME OF INSTALLATION.
2. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
3. DO NOT SCALE DRAWING.
4. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY.
5. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.

1 / C6.1 **18" X 18" CATCH BASIN / OUTLET**
SCALE: NOT TO SCALE



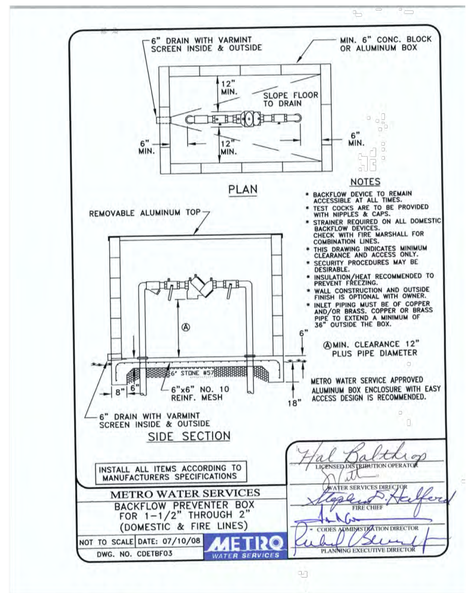
METRO WATER SERVICES	
SEWER SERVICE LINE STANDARD CLEAN OUT	Hal Batchop LICENSED COLLECTION OPERATOR
NOT TO SCALE | DATE: 05/26/10	METRO WATER SERVICES
DWG. NO. SDET017A	DIRECTOR OF WATER AND SEWERAGE SERVICES

2 / C6.1 **SEWER SERVICE LINE STANDARD CLEANOUT DETAIL**
SCALE: NOT TO SCALE



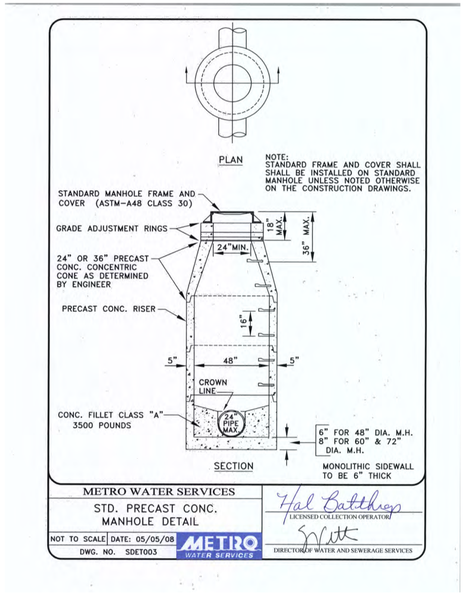
METRO WATER SERVICES	
METER BOX FOR 4" METER FOR 4" SERVICE	Hal Batchop LICENSED DISTRIBUTION OPERATOR
NOT TO SCALE | DATE: 05/05/08	METRO WATER SERVICES
DWG. NO. WDET018C	DIRECTOR OF WATER AND SEWERAGE SERVICES

3 / C6.1 **4" MASTER METER DETAIL**
SCALE: NOT TO SCALE



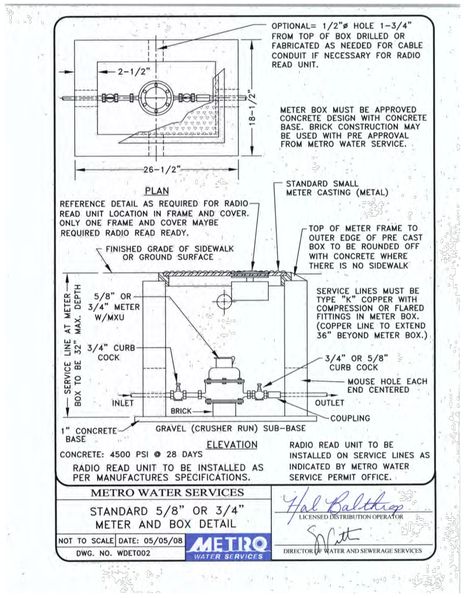
METRO WATER SERVICES	
BACKFLOW PREVENTER BOX FOR 1-1/2" THROUGH 2" (DOMESTIC & FIRE LINES)	Hal Batchop LICENSED DISTRIBUTION OPERATOR; WATER SERVICES DIRECTOR; FIRE CHIEF; CODES ADMINISTRATION DIRECTOR; PLANNING EXECUTIVE DIRECTOR
NOT TO SCALE | DATE: 07/10/08	METRO WATER SERVICES
DWG. NO. CDETBF03	

4 / C6.1 **IRRIGATION BACKFLOW PREVENTER DETAIL**
SCALE: NOT TO SCALE



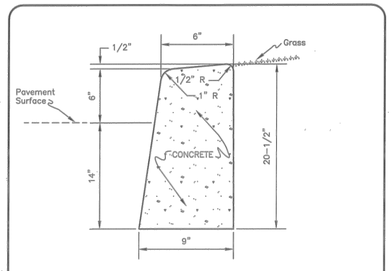
METRO WATER SERVICES	
STD. PRECAST CONC. MANHOLE DETAIL	Hal Batchop LICENSED COLLECTION OPERATOR
NOT TO SCALE | DATE: 05/05/08	METRO WATER SERVICES
DWG. NO. SDET003	DIRECTOR OF WATER AND SEWERAGE SERVICES

5 / C6.1 **STANDARD SEWER MANHOLE DETAIL**
SCALE: NOT TO SCALE



METRO WATER SERVICES	
STANDARD 5/8" OR 3/4" METER AND BOX DETAIL	Hal Batchop LICENSED DISTRIBUTION OPERATOR
NOT TO SCALE | DATE: 05/05/08	METRO WATER SERVICES
DWG. NO. WDET002	DIRECTOR OF WATER AND SEWERAGE SERVICES

6 / C6.1 **STANDARD 5/8" DOMESTIC WATER METER DETAIL**
SCALE: NOT TO SCALE

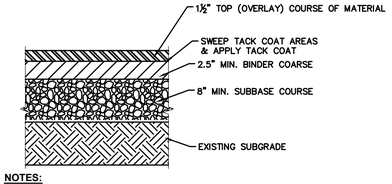


GENERAL NOTES
1. Expansion joints to be spaced a maximum of 100 feet apart or as directed by the Engineer.
2. Expansion joints will also be required at tangent points, ramps, and inlets.
3. Contraction joints are to be cut into curb every 10 feet to a depth of D/4, where D equals the thickness of the section. The spacing of 10 feet may be reduced at closures but no section of curb shall be less than 10 feet.
4. Cost of contraction joints to be included in the unit bid price for concrete curb.

NOT TO SCALE

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY DEPARTMENT OF PUBLIC WORKS	CONCRETE POST CURB	DWG. NO. ST-201
DIR. OF ENG.: Charles Nagy DATE: 5/12/03		REVISED: 07/24/00; REVISED: 05/02/03; REVISED:

7 / C6.1 **6" POST CURB DETAL**
SCALE: NOT TO SCALE



NOTES:
1. MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, DATED MAY 1, 2008, AND ALL ADDENDA THERETO.
2. HOT MIX ASPHALT (HMA) PAVEMENT SHALL CONFORM WITH SECTION 400-HOT MIX ASPHALT OF THE ABOVE REFERENCED NYSDOT STANDARD SPECIFICATIONS AND THE TYPE CALLED OUT IN THESE DRAWINGS. ALTHOUGH SECTION 400 IN ITS ENTIRETY IS REFERENCED, THE HOT MIX ASPHALT (HMA) PAVEMENT(S) SPECIFIED FOR THIS CONTRACT SHALL BE AS SPECIFIED UNDER SECTION 403-HOT MIX ASPHALT (HMA) PAVEMENTS FOR MUNICIPALITIES.
3. TACK COAT WHEN SPECIFIED OR CALLED OUT IN THESE DRAWINGS OR REQUIRED BY THE REFERENCED SPECIFICATIONS SHALL CONFORM WITH SECTION 407-TACK COAT OF THE ABOVE REFERENCED NYSDOT STANDARD SPECIFICATIONS.
4. CONTRACTOR SHALL INSTALL AN ASPHALT TRUING AND LEVELING COURSE WHERE REQUIRED.

8 / C6.1 **STANDARD ASPHALT PAVEMENT SECTION DETAIL**
SCALE: NOT TO SCALE

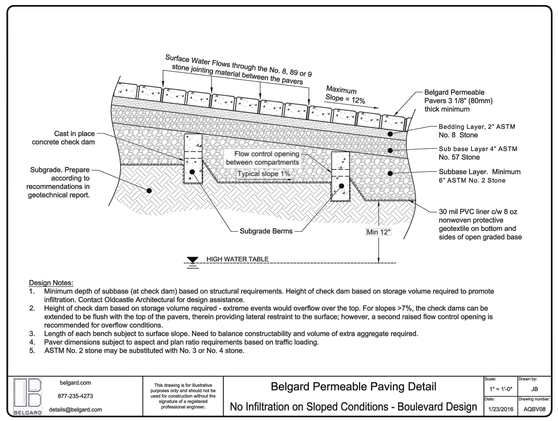
FRANK P. SMITH LICENSED LANDSCAPE ARCHITECT AGRICULTURE No. 1101 STATE OF TENNESSEE
4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE: DETAIL SHEET 2

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1560

DATE: APRIL 30, 2018
SCALE: NOT TO SCALE
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH
SHEET NUMBER: C6.1



Design Notes:

1. Minimum depth of subbase (at check dam) based on structural requirements. Height of check dam based on storage volume required to promote infiltration. Contact Oldcastle Architectural for design assistance.
2. Height of check dam based on storage volume required - extreme events would overflow over the top. For slopes >7%, the check dams can be extended to be flush with the top of the pavers, therein providing lateral restraint to the surface; however, a second raised flow control opening is recommended for overflow conditions.
3. Length of each bench subject to surface slope. Need to balance constructability and volume of extra aggregate required.
4. Paver dimensions subject to aspect and plan ratio requirements based on traffic loading.
5. ASTM No. 2 stone may be substituted with No. 3 or No. 4 stone.

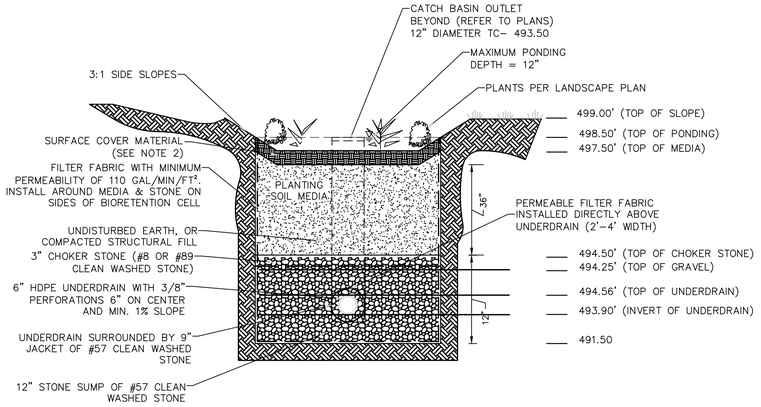
belgard.com 877-235-4273 details@belgard.com	This drawing is for illustrative purposes only and should not be used for construction without the review of a licensed professional engineer.	Belgard Permeable Paving Detail No Infiltration on Sloped Conditions - Boulevard Design	Scale: 1" = 1'-0" Date: 1/23/2016	Drawn by: JB Drawing number: AQBV08

PERMEABLE PAVEMENT NOTES

1. SUBSURFACE SUBGRADE TO BE A MAXIMUM 1%. OVER EXCAVATE AND PLACE ADDITIONAL STONE AS NEEDED TO ENSURE MAXIMUM SLOPE IS NOT EXCEEDED.
2. VEHICULAR TRAFFIC SHALL BE PROHIBITED ON THE PERVIOUS PAVEMENT UNTIL THE SITE IS STABLE TO PREVENT MUD FROM BEING DEPOSITED BY VEHICLES.
3. CONTRACTOR, ENGINEER, OR OWNERS REPRESENTATIVE SHALL NOTIFY MWS DEVELOPMENT REVIEW AT LEAST 24 HOURS PRIOR TO THE INSTALLATION OF THE PERVIOUS LAYER TO OBSERVE THE SUB-BASE MATERIAL.
4. ALL STONE TO BE CLEAN WASHED.

1 / C6.2 **LEVEL 1 PERMEABLE PAVEMENT DETAIL (GIP-03)**

SCALE: NOT TO SCALE



BIORETENTION NOTES:

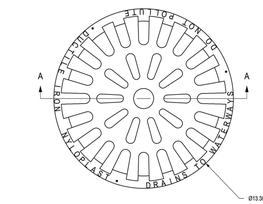
1. LEVEL 2 BIORETENTION PONDS TO BE INSTALLED PER 2016 STORMWATER MANAGEMENT MANUAL VOL. 5, LOW IMPACT DEVELOPMENT MANUAL, GREEN INFRASTRUCTURE PRACTICES-01 BIORETENTION.
2. BIORETENTION FACILITY SHALL BE A LEVEL 2 FACILITY PER MWS STANDARDS. FILTER MEDIA TO CONTAIN:
   70 - 85 SAND
   10%- 20% SILT + CLAY, WITH CLAY <10%;
   5% - 10% ORGANIC MATTER
3. 3" THICK LAYER OF MULCH TO BE PLACED ON TOP OF MEDIA.
4. CONTRACTOR, ENGINEER OR OWNERS REPRESENTATIVE SHALL NOTIFY MWS DEVELOPMENT REVIEW AT LEAST 24 HOURS PRIOR TO THE INSTALLATION OF THE PLANTING SOIL FILTER BED. AT THE COMPLETION OF THE INSTALLATION, THE ABOVE REFERENCED PERSON WILL COLLECT ONE SAMPLE PER BIORETENTION BED FOR ANALYSIS AND CONFIRMATION OF THE SOIL CHARACTERISTICS AS DEFINED BY GIP-01, FILTER MEDIA AND SURFACE COVER, SECTION 6.6, PAGE 20.
5. THE MINIMUM REQUIRED FILTER BED AREA IS 118 SQUARE FEET PER STORMWATER CALCULATIONS.
6. ALL HEAVY EQUIPMENT MUST REMAIN OUTSIDE THE BIORETENTION AREA DURING AND AFTER CONSTRUCTION.

2 / C6.2 **LEVEL 2 BIORETENTION DETAIL (GIP-01)**

SCALE: NOT TO SCALE

1299CGD

APPROX. DRAIN AREA = 82.87 SQ IN
APPROX. WEIGHT = 18.50 LBS



SECTION A-A

DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY
DIMENSIONS ARE IN INCHES
QUALITY: MATERIALS SHALL CONFORM TO ASTM A536 GRADE 70-50-05
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
LOCKING DEVICE AVAILABLE UPON REQUEST

DRAWN BY	EBC	MATERIAL	DUCTILE IRON
DATE	3-6-06		
REVISED BY	EBC	PROJECT NO./NAME	
DATE	3-15-11		
DWG SIZE	A	SCALE 1:4	SHEET 1 OF 1

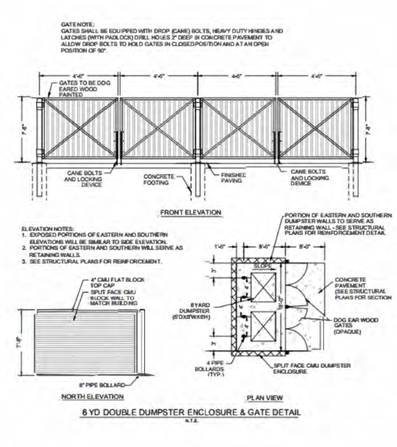
Nyloplast
3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-3499
www.nyloplast-us.com

TITLE: 12 IN DOME GRATE

DWG NO. 7901-110-206 REV D

3 / C6.2 **12" DOME GRATE DETAIL**

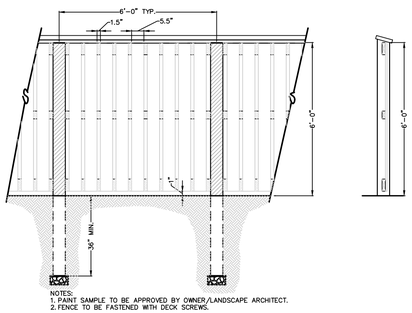
SCALE: NOT TO SCALE



6 YD DOUBLE DUMPSTER ENCLOSURE & GATE DETAIL
N.T.S.

4 / C6.2 **DUMPSTER PAD DETAIL**

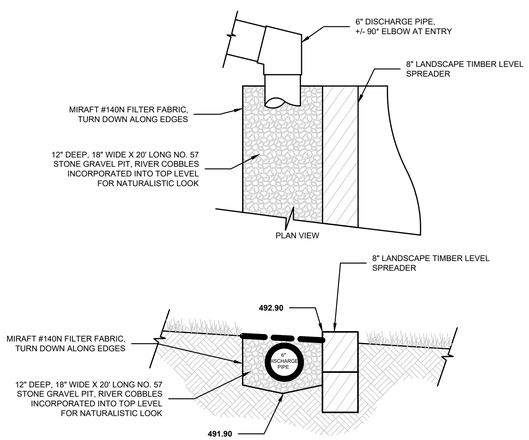
SCALE: NOT TO SCALE



NOTES:
1. PAINT SAMPLE TO BE APPROVED BY OWNER/LANDSCAPE ARCHITECT.
2. FENCE TO BE FASTENED WITH DECK SCREWS.

5 / C6.2 **OPAQUE FENCE DETAIL**

SCALE: NOT TO SCALE



6 / C6.2 **LEVEL SPREADER DETAIL**

SCALE: NOT TO SCALE

4/30/2018

106/110 DUKE STREET
NASHVILLE, TENNESSEE

SHEET TITLE: DETAIL SHEET 3

S + H ENGINEERING DESIGN CONSULTING
2606 EUGENIA AVENUE
SUITE D
NASHVILLE, TN 37211
TEL: 615.645.1060

DATE: APRIL 30, 2018
SCALE: NOT TO SCALE
DRAWN BY: J.JACOBY
REVIEWED BY: T.SMITH

SHEET NUMBER: C6.2