

September 1, 2022

Via Hand Delivery and Email - jvite@westorange.org

Ms. Jamilet Baquerizo Vite, Planning Board Secretary
Township of West Orange
66 Main Street
West Orange, NJ 07052

Re: Altera 769, LLC
Application for Final Major Site Plan Approval (Phase 2)
769 Northfield Avenue – Block 166.15, Lot 1.09

Dear Ms. Vite:

We represent Altera 769, LLC, the owner and applicant (the “Applicant”), with respect to the enclosed Final Major Site Plan Application concerning the property located at 769 Northfield Avenue and designated as Block 166.15, Lot 9 on the Tax Maps of the Township of West Orange (the “Property”). In furtherance thereof, enclosed please find six (6) sets of the each of the following documents for filing with the Township of West Orange Planning Board (the “Planning Board”):

- Executed Development Application;
- 10% Ownership Disclosure Statement of the Applicant;
- 200 Foot Property Owners List certified by the Township Tax Assessor dated July 8, 2022;
- Completed Site Plan Checklist;
- Certification of Taxes Paid dated August 26, 2022;
- Executed Tree Removal Permit Application;
- Final Major Site Plans prepared by Dynamic Engineering dated August 17, 2022 and consisting of eighteen (18) sheets;
- Stormwater Management Report prepared by Dynamic Engineering dated January 2022, last revised August 2022; and

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- Stormwater Management Facilities Operation and Maintenance Manual prepared by Dynamic Engineering dated January 2022, last revised August 2022.

Also enclosed please find two (2) checks made payable to the Township of West Orange in the amount of \$230.60 and \$2,250.00, representing the application and escrow fees, along with the completed W9.

The Applicant respectfully requests that this matter be deemed complete and scheduled for a hearing date at the earliest convenience of the Planning Board.

Thank you for the courtesies extended in this matter. Please feel free to contact me if you have any questions or require additional information.

Very truly yours

/s/ Lisa A. John-Basta

Lisa A. John-Basta
Member

LAJ:dmf



TOWNSHIP OF WEST ORANGE APPLICATION PACKAGE PLANNING BOARD OR ZONING BOARD OF ADJUSTMENT

1. Zoning/Planning Board Application
2. Checklists:
 - “C” and “D” Applications Interpretations and Appeals
 - Major/Minor Site Plan or Subdivision (52 Items)
 - Sustainability Checklist
3. Fee Schedules
4. W-9 Form
5. Zoning Board of Adjustment Meeting Schedule
6. Planning Board & Site Plan Review Advisory Board Meeting Schedule
7. Tree Removal Application Procedure
8. Tree Removal Application

BEFORE preparing or submitting an Application, it is strongly suggested that you contact the Planning Board Secretary or Zoning Board Secretary. We will be happy to assist you or answer any questions pertaining to the filing of an application to the Planning Board (325-4111) or Zoning Board of Adjustment (325-4108).

PLEASE NOTE:

- ! The application must be typed or neatly printed.**
- ! Twenty (20) copies total - no exceptions. (Nineteen (19) copies shall be submitted with one (1) original.)**
- ! Each application, including the original must have attached any enclosures as required.**
- ! Refer to the Zoning Ordinance for all application requirements.**
- ! Application fees and escrow must be submitted at the time of filing.
(If an escrow fee is required, a completed W-9 form must accompany the fees).**
- ! All experts must be licensed to practice in the State of New Jersey.**
- ! Any additional documents submitted after the original filing of the Application must include twenty copies total (nineteen (19) copies with one (1) original) to the Zoning Board or Planning Board and must be submitted at least 10 days before the Applicant's public meeting date.**

After the Board hears the Application and renders a decision, a Resolution will be read and voted on at the next scheduled regular meeting. Upon receipt of the signed Resolution, the Applicant must submit eight (8) full size sets of final site plans, signed and sealed, to the Board Secretary for signatures. Once the Applicant receives a copy of the signed site plan, the Applicant may then apply for building permits.

TOWNSHIP OF WEST ORANGE APPLICATION FORM FOR THE PLANNING BOARD OR ZONING BOARD OF ADJUSTMENT

A. APPLICANT INFORMATION

Full Legal Name: Altera 769, LLC
(Last) (First)
Mailing Address: 5910 N. Central Expressway, Suite 1360, Dallas, Texas 75206
(Street) (City) (State) (Zip)
Telephone Number: (972) 897-4961 Email: etillman@alteradevco.com

Is the Applicant an: ☐ Individual, ☐ Corporation, ☐ Partnership, ☒ Other LLC

If the Applicant is a corporation or partnership, a list of the names and addresses of persons having a 10% interest or more in the corporation or partnership must be attached. **See attached.**

Relationship of the applicant to the property: ☒ Owner, ☐ Tenant or Lessee, ☐ Purchaser under contract
(with consent of owner, ☐ Other (please specify) _____)

If the applicant is not the owner of the property in question, the applicant must submit an affidavit with the owner(s) authorization to proceed with this process.

B. PROPERTY OWNER INFORMATION

☒ Check here if same as applicant. If the owner is not the applicant, please complete the following:

Owner's Name: _____

Address: _____

Telephone Number: (____) _____ Email: _____

C. PROPERTY INFORMATION

Street Address: 769 Northfield Avenue

Block Number(s): 166.15; Lot Number(s): 9

Tax Plate: 101; Zone of Property: OB-1

The location of the property is approximately 360 feet from the intersection of Northfield Avenue
_____ and Vizcaya Blvd. (closest intersection.)

Has there been any previous Zoning Board of Adjustment or Planning Board hearings involving this property?

☒ Yes, Date(s): * See below; ☐ No

If yes, please attach copies of the written decisions adopted by the Board to each application. Enclosed

Please attach a list of all contiguous or adjacent property owned by the applicant or owner. ☒ None

Is this property listed in "The Historic Sites Survey" prepared by Robert Guter 7/9/1992 ☐ Yes ☒ No

* Prior approvals:

1) Planning Board Resolution adopted May 4, 1988 - site plan approval with variance relief

2) Planning Board Resolution adopted April 6, 2022 - preliminary and final site plan with variance relief for Phase 1 & preliminary site plan with variance relief for Phase 2

D. TYPE OF APPLICATION

Indicate the type of application being submitted, check all boxes that apply. Note that more than one variance may be necessary, please indicate the number of each type needed:

- 1) ☐ Interpretation of ordinance or map.
- 2) ☐ Appeal of action of Zoning Officer.
- 3) ☐ Variance "C1" Reason: ☐ shape of property; ☐ physical features; ☐ exceptional situation.
- 4) ☐ Variance "C2".
- 5) ☐ Variance "D".
- 6) ☐ Subdivision without variances: ☐ major; ☐ minor; ☐ preliminary; ☐ final; ☐ preliminary and final.
- 7) ☐ Subdivision with variances: ☐ major; ☐ minor; ☐ preliminary; ☐ final; ☐ preliminary and final.
- 8) ☒ Site Plan: ☐ preliminary; ☒ final; ☐ preliminary and final; ☒ with variances; ☐ without variances.
- 9) ☐ Amended Site Plan.
- 10) ☐ Conditional Use.
- 11) ☐ Conceptual.
- 12) ☐ Home Professional Office.
- 13) ☐ Home Occupation.
- 14) ☐ Soil Removal Permit.

Please list the specific Sections of the Ordinance for which a variance is sought. If additional space is required, please attach a list.

Section: _____; Proposed: _____; Description: See attached list of variance relief requested

Section: _____; Proposed: _____; Description: _____

Section: _____; Proposed: _____; Description: _____

Section: _____; Proposed: _____; Description: _____

E. DESCRIPTION OF PROPERTY

Existing Use of the Property Medical office building

Briefly describe the major elements of your proposal: (a more detailed description is required in Section G.)

As set forth more fully on the Attachment, Applicant is seeking final major site plan approval for Phase II, which involves the construction of additional parking spaces along with ancillary improvements.

The property is 212,742 (square feet); 4.88 (acres)

Impervious Surface Coverage: Present: 57.3%; Proposed: 70.1% (94.4% per effective lot area)

Building Coverage: Present: 11.3%; Proposed: 11.5% (14.8% per effective lot area)

Is the property located:

- | | | |
|--|---|--|
| Within 200 feet of another municipality? | ☐ Yes | ☒ No |
| Adjacent to an existing or proposed county road? | ☒ Yes | ☐ No |
| Adjacent to other county land? | ☐ Yes | ☒ No |
| Adjacent to a state highway? | ☐ Yes | ☒ No |

F. EXPERTS

The following information is respectfully requested to enable the Board to facilitate the processing of this application:

APPLICANT'S ATTORNEY: Lisa A. John-Basta, Esq., Chiesa Shahinian & Giantomasi PC

Telephone Number: (973) 530-2083 Email: ljohn-basta@csglaw.com

Address: One Boland Drive, West Orange, New Jersey 07052

APPLICANT'S ENGINEER: Robert J. Colucco PE, Dynamic Engineering

Telephone Number: (908) 879-9229 Email: rcolucco@dynamiccec.com

Address: 245 Main Street, Suite 110, Chester, New Jersey 07930

APPLICANT'S ARCHITECT: _____

Telephone Number: () _____ Email: _____

Address: _____

APPLICANT'S PLANNER: _____

Telephone Number: () _____ Email: _____

Address: _____

OTHER EXPERT(S): _____

Telephone Number: () _____ Email: _____

Address: _____

If necessary, please list any additional experts below, including address, telephone number and email address.

G. REQUIREMENTS FOR VARIANCES

- 4A) Please attach a written statement labeled “**PROPOSAL**”, describe the major elements of your proposal, and describe in detail the physical and use changes proposed. **See attached**
- 4B) Please attach a written statement labeled “**REASONS FOR RELIEF**”, which fully answers **4C-1, 4C-2** or **4D** (Special Reasons) **AND** part **4E** (Negative Criteria).
- 4C-1) (*For C1 variances only*) The strict application of the provisions of the Zoning Ordinance would result in the peculiar and exceptional practical difficulties or exceptional undue hardship under *N.J.S.A. 40:55D-70c(1)*. List in detail wherein this case conforms to this requirement, including, if applicable, reference to the exceptional narrowness, shallowness, or shape of the property, or the exceptional topographical conditions affecting the property which applicant contends warrants the granting of the variance.
- 4C-2) (*For C2 variances only*) State how the purposes of the Municipal Land Use Law would be advanced by a deviation from the zoning ordinance requirements and the benefits of the deviation would substantially outweigh any detriment according to *N.J.S.A 40:55D-70c(2)*. Please list all benefits of the deviation to the Township and any adverse effects. State how the benefits of the deviation would substantially outweigh any detriment to the Township.
- 4D) (*For D variances only*) State the special reasons under *N.J.S.A 40:55D-70d* affecting this property.
- 4E) The granting of this variance will not be substantially detrimental to the public good and will not substantially impair the intent of the zone plan and zoning ordinance. List in detail the reasons, among others, why the variance can be granted without being materially detrimental to the welfare of the community or injurious to the property or improvements of others in the neighborhood and zone.

H. PLAT SUBMISSION

- 4F) Please list all maps and other exhibits accompanying this application. Attach an additional sheet if necessary.

ITEM	SIGNED BY	DATE/REVISION
Final Major Site Plan Phase 2	Robert J. Colucco III - Dynamic Engineering	8/17/2022
Stormwater Management Report	Robert J. Colucco III - Dynamic Engineering	January 2022; last revised August 2022
Stormwater Management Facilities O&M Manual	Robert J. Colucco III - Dynamic Engineering	January 2022; last revised August 2022

I. NOTICE

Applicant is responsible to publish and serve notice of this application in accordance with Zoning Board of Adjustment/Planning Board requirements; however, notice may not be served until this application is certified as complete and the administrative officer has assigned the applicant a public hearing date.

J. VERIFICATION AND AUTHORIZATION

SIGNATURE IS REQUIRED FOR ALL OF THE FOLLOWING:

APPLICANT'S VERIFICATION

I hereby certify that the above statements made by me and the information contained in the papers submitted in connection with this application are true. I am aware that if any of the foregoing statements are willfully false, I am subject to punishment.

Applicant's Signature: _____

On behalf of Altera 769, LLC

Date: _____

8/30/22

CONTINUANCE

Should the Planning Board/Zoning Board of Adjustment have a full and heavy agenda, or discussion and meeting regarding this application requiring carrying the matter past the statute time limit, the applicant grants permission for such an extension.

Applicant's Signature: _____

On behalf of Altera 769, LLC

Date: _____

8/30/22

OWNER'S AUTHORIZATION – MUST BE SIGNED

On behalf of Altera 769, LLC, I hereby certify that I reside at 5910 N. Central Expressway, Suite 1360, Dallas

in the County of Dallas and the State of Texas;

and that I am the owner of all that certain lot, piece or parcel of land known as Block(s) 166.15;

Lot(s) 9 on the Tax Map of West Orange which property is the subject of the above application, and that said application is hereby authorized by me. Furthermore, I authorize inspection of the site which is the subject of this application.

Owner's Signature: _____

On behalf of Altera 769, LLC

Date: _____

8/30/22

THIS APPLICATION DOES NOT RELIEVE THE APPLICANT FROM COMPLYING WITH OTHER TOWNSHIP ORDINANCES SUCH AS THE TREE REMOVAL ORDINANCE AND OBTAINING THE NECESSARY APPROVALS AND PERMITS UNDER SUCH ORDINANCES.

**TOWNSHIP OF WEST ORANGE
APPLICATION ATTACHMENT**

ALTERA 769, LLC

D. Specific Sections of the Ordinance for which variance relief is sought:

Phase II – Final Major Site Plan Approval		
Section	Permitted/Required	Proposed
25-28.8	Maximum disturbance area permitted is 20% for slope areas of 20-25% slope.	39.7% previously approved; 30.8% proposed
25-28.8	Disturbances of slopes of 25% or more is prohibited.	35.2% previously approved; 34.4% proposed

G.4A. Development Proposal

The Applicant has applied for final site plan approval in connection with its Phase II development of the property. The Phase II development consists of the construction of 54 additional parking spaces for a total of 282 spaces. In connection with the Phase II development, the Applicant seeks to modify the variances that were previously granted by the Planning Board as part of the Phase II preliminary site plan approval for disturbance of steep slopes as more fully detailed in Section D.

G.4B. Reasons for Relief

The Applicant respectfully submits that the due to existing conditions uniquely affecting the property variance relief is warranted pursuant to N.J.S.A.40:55D-70.(c)(1). Additionally, the proposed improvements will advance the purposes of the Municipal Land Use Law, N.J.S.A. 40:55D-2, including: (a) to promote the public health, safety, morals and welfare; (c) to provide adequate light, air, and open space; (g) to provide sufficient space in appropriate locations for a variety of uses in order to meet the needs of all New Jersey citizens; and (i) to promote a desirable visual environment through the façade upgrades and addition of the canopy.

The Applicant also respectfully submits that its proposed improvements will not be substantially detrimental to the public good and will not substantially impair the intent of the zoning plan or zoning ordinance. The Applicant reserves the right to provide additional testimony in furtherance of the requested variance relief at the public hearing on this matter.

DISCLOSURE STATEMENT

Pursuant to N.J.S.A. 40:55D-48.1, the following is a list of all 10% or more interest holders in the Applicant (Altera 769, LLC):

<u>MEMBER</u>	<u>ADDRESS</u>	<u>INTEREST</u>
HSRE-Altera I, LLC	769 Northfield Avenue West Orange, NJ 07052	100%

CHECK LIST OF REQUIRED ITEMS "C" AND "D" APPLICATIONS INTERPRETATIONS AND APPEALS

***APPLICATIONS FOR MAJOR/MINOR SITE PLAN OR SUBDIVISION MUST REFER TO THE
SITE PLAN/SUBDIVISION CHECKLIST -52 ITEMS. 20 Total (original and 19 copies).***

All checked items are required; please complete and submit to Board Secretary:

- ✓ **Completed Application Form, 20 Total** (original and 19 copies), including:
 - ✓ the written proposal;
 - ✓ list of variances being requested;
 - ✓ property information;
 - ✓ applicant and owner information;
 - ✓ statement or legal brief which clarifies why the variance should be granted and the specific reasons or hardship that pertain to the proposal, or
 - ✓ in the case of an appeal or interpretation, a statement or legal brief that clarifies the position of the applicant.
- ✓ **Survey** – original signed and sealed by New Jersey licensed Land Surveyor, **20 Total** (original and 19 copies).
- ✓ **Site Plan, all dimensions**, including setbacks, must be shown and prepared by New Jersey licensed Professional except for an owner occupied, single family home, in which case the property owner may prepare the site plan, **20 Total** (original and 19 copies).
- ✓ **Floor plans, all dimensions** must be shown-prepared by New Jersey licensed Architect except for an owner occupied, single family home, in which case the property owner may prepare the floor plan, **20 Total** (original and 19 copies).
- ✓ **List of property owners** within 200' certified by the Municipal Tax Assessor (original).
- ✓ **Proof that taxes have been paid**, certified by the Municipal Tax Collector (original).
- ✓ **A 200' radius map**, **20 Total** (original and 19 copies).
- ✓ **Application fee** (non-refundable) also a **Digitizing Fee**.
- ✓ **Elevations of three sides**, in the case of an existing structure with no proposed structural changes, photographs may be used, **20 Total** (original and 19 copies).
- ✓ **Height dimensions** to be included on all elevations, **20 Total** (original and 19 copies).
- ✓ **All plans and documents** for West Orange COAH requirements.
- ✓ **For all Major Subdivision applications**, major site plan applications and all applications applying for a "D" variance, a Planner's report prepared by a New Jersey licensed Planner must be submitted, **20 Total** (original and 19 copies).
- ✓ **For all Major Subdivision applications**, and major site plan applications, a Traffic Study prepared by a New Jersey licensed Engineer must be submitted, **20 Total** (original and 19 copies).
- ✓ **All Site Plan applications** must submit a tree removal application and a tree replacement plan and provide a report according to Chapter 31 of the West Orange general ordinances, **20 Total** (original and 19 copies).

Your application will not be deemed complete unless all these items are included. It is absolutely necessary that all dimensions and elevations be shown on the site plan and floor plan.

Please note: other materials may be requested by the Planning Director or Board Members.

TOWNSHIP OF WEST ORANGE

Site Plan/Subdivision Checklist

APPLICANT: Altera 769, LLC

ALL DOCUMENTS MUST BE PREPARED, SIGNED AND SEALED BY NEW JERSEY LICENSED PROFESSIONAL.																													
Item Number	Description	Pre-Application - Concept Plan	Minor Application		General Development Plan	Subdivision		Site Plan		Major Application			COMPLETE	INCOMPLETE	WAIVER REQUESTED														
			Subdivision	Site Plan		Preliminary	Final	Preliminary	Final																				
1	<u>PROJECT-PLAT INFORMATION</u>	X	X	X	X	X	X	X	X	X	X	X	X	X	X														
1	<u>Item:</u> Name, address of owner and applicant																												
2	<u>Item:</u> Name, signature, license number, seal and address of engineer, land surveyor, architect, professional planner, and/or landscape architect, as applicable, involved in preparation of plat																												
3	<u>Item:</u> Title block denoting type of application, tax map sheet, county, name of municipality, block & lot, and street location																												
4	<u>Item:</u> A key map at specified scale showing location of tract with reference to surrounding properties, streets, municipal boundaries, etc , within 500' Comment: Describes setting; may be less detailed in pre-application-concept plan and GDP stages	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X													
5	<u>Item:</u> A schedule of required and provided zone district(s) requirements including lot area, width, depth, yard setbacks, building coverage, open space, parking, etc Comment: Schedule may be less detailed in pre-application-concept plan stages	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X													
6	<u>Item:</u> North arrow and scale	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X													
7	<u>Item:</u> Proof that taxes are current		X	X	X	X	X	X	X	X	X	X	X	X	X	X													
8	<u>Item:</u> Signature blocks for Chairman, Secretary and Municipal Engineer		X	X	X	X	X	X	X	X	X	X	X	X	X	X													
9	<u>Item:</u> Appropriate certification blocks as required by Map Filing Law		X				X	X						N/A															
10	<u>Item:</u> Monumentation as specified by Map Filing Law Comment: Monumentation required only for final subdivision		X											N/A															
11	<u>Item:</u> Date of current property survey Comment: Required by Map Filing Law for final subdivision and site plan; necessary for vesting on GDP			X	X	X	X	X	X	X	X	X	X	X	X	X													

ALL DOCUMENTS MUST BE PREPARED, SIGNED AND SEALED BY NEW JERSEY LICENSED PROFESSIONAL.			Pre-Application - Concept Plan	Major Application				COMPLETE	INCOMPLETE	WAIVER REQUESTED	
Item Number	Description	Minor Application		General Development Plan	Subdivision		Site Plan				
		Subdivision			Site Plan	Preliminary					Final
	12. Item: One (1) of four (4) standardized sheets: 30" x 42", 24" x 36", 15" x 21", 8.5" x 13" Comment: Required by Map Filing Law for minor and major subdivisions.		X	X			X	X		X	
	13. Item: Metes and bounds description showing dimensions, bearings, curve data, length of tangents, radii, arcs, chords and central angles for all centerlines and right-of-way, and centerline curves on streets.		X				X			X	
	14. Item: Affidavit of ownership. Comment: Map Filing Law for minor and major subdivision.	X	X		X		X	X		X	
	15. Item: Acreage of tract to the nearest tenth of an acre (for GDP--to nearest acre).		X	X	X		X	X		X	
	16. Item: Date of original and all revisions. Comment: Item necessary for continuity-history of project.		X	X	X		X	X		X	
	17. Item: Size and location of any existing or proposed structures with all setbacks dimensioned. Comment: Item important for detailed planning.	X	X	X	X		X	X		X	
	18. Item: Location and dimensions of any existing or proposed streets (for GDP and pre-application- concept plan -- general locations). Comment: Item important for detailed planning.	X	X	X	X		X	X		X	
	19. Item: All proposed lot lines and area of lots in square feet.		X	X			X	X		X	
	20. Item: Copy and/or delineation of any existing or proposed deed restrictions or covenants. €	X	X	X	X		X	X		X	
	21. Item: Any existing or proposed easement or land reserved for or dedicated to public use. €	X	X	X	X		X	X		N/A	
	22. Item: Development stages or staging plans (for GDP--general staging). Comment: Not applicable at pre-application- concept plan stage; minor plans usually not built in stages.				X		X	X		N/A	

ALL DOCUMENTS MUST BE PREPARED, SIGNED AND SEALED BY NEW JERSEY LICENSED PROFESSIONAL.									
Item Number	Description	Pre-Application - Concept Plan	Minor Application		General Development Plan	Subdivision		Site Plan	
			Subdivision	Site Plan		Preliminary	Final	Preliminary	Final
23.	Item: List of required regulatory approvals or permits. Comment: Basic planning information. §		X	X	X		X		X
24.	Item: List of variances required or requested. § Comment: Basic planning information.		X	X		X	X	X	X
25.	Item: Requested or obtained design waivers or exceptions. § Comment: Describes location of all adjacent structures; not necessary at pre-application-concept plan stages; required at site plan stages; required at site plan only if notice is required by ordinance.								X
26.	Item: Payment of application fees. Comment: Fee not imposed for pre-application conference.	X	X	X	X	X	X	X	X
27.	Item: Property owners and lines of all parcels within 200' identified on most recent tax map sheet. Comment: Describes location of all adjacent structures; not necessary at pre-application-concept plan stages; required at site plan only if notice is required by ordinance.								X
28.	Item: All existing street, water courses, flood plains, wetlands or other environmentally sensitive areas on and within 200' of site. Comment: while detailed specification of environmentally sensitive areas may not be necessary at pre-application-concept plan and GDP stages, general specification of and sensitivity to such conditions is an important planning consideration.								N/A
29.	Item: Existing right-of-way and/or easements on and within 200' of tract. Comment: Rights-of-way and easements are often unknown at the pre-application-concept (see however, item 28).	X		X	X	X	X	X	X
30.	Item: Topographical features of subject property from U.S.G.S. map. Comment: More detailed topographic information is needed for major subdivision.	X		X	X	X	X	X	X
					COMPLETE				
					INCOMPLETE				
					WAIVER REQUESTED				

ALL DOCUMENTS MUST BE PREPARED, SIGNED AND SEALED BY NEW JERSEY LICENSED PROFESSIONAL.		Pre-Application - Concept Plan	Minor Application		Major Application					COMPLETE	INCOMPLETE	WAIVER REQUESTED
Item Number	Description		General Development Plan	Subdivision		Site Plan						
				Preliminary	Final	Preliminary	Final					
31.	Item: Existing and proposed contour intervals based on U.G.S. & G.S. datum. Contours to extend at least 200' beyond subject property as follows: up to 3% grade - 1' 3% + grade - 2' <u>Comment:</u> Major site plan and subdivision requires level of detail of Item 31 as opposed to Item 30.			X	X			X	X	X		
32.	Item: Boundary, limits, nature and extent of wooded areas, specimen trees, and other significant physical features (detail may vary). <u>Comment:</u> Basic for good planning.	X	X	X		X		X	X			
33.	Item: Existing system of drainage of subject site and of any larger tract or basin of which it is a part. <u>Comment:</u> See Item 31. Extensive level of detail required only for major subdivision and site plan.											
34.	Item: Drainage Area Map. <u>Comment:</u> Necessary for major application; inapplicable at GDP stage.					X		X	X	X		
35.	Item: Drainage Calculations. <u>Comment:</u> Required for minor applications if deemed necessary by Planning Board; not required at GDP stage because storm water management evaluated at major subdivision and site plan stage.		X	X		X		X	X	X		
36.	Item: Proposed utility infrastructure plans, including sanitary sewer, water, storm water management, telephone, electric & cable TV. <u>Comment:</u> Information necessary for minor site plan because of potential effect on utility systems. Only general location for electric, telephone and cable TV required.		X			X		X	X	X		
37.	Item: Proposed utility infrastructure plans, including sanitary sewer, water, storm water management, telephone, electric and cable TV. <u>Comment:</u> Information necessary for minor site plan because of potential effect on utility systems. Only general location for telephone, electric and cable TV required.				X	X		X	X	X		

ALL DOCUMENTS MUST BE PREPARED, SIGNED AND SEALED BY NEW JERSEY LICENSED PROFESSIONAL..			Pre-Application - Concept Plan	Minor Application		Major Application					COMPLETE	INCOMPLETE	WAIVER REQUESTED	
Item Number	Description	General Development Plan		Subdivision		Subdivision		Site Plan						
				Preliminary	Final	Preliminary	Final	Preliminary	Final					
38.	Item: Soil Erosion and Sediment Control Plan. Comment: Required for soil disturbance over 5,000 sq. ft.					X					X			
39.	Item: Spot and finished elevations at all property corners, corners of all structures or dwellings, existing or proposed first floor elevations. Comment: Not required for minor subdivision because not involving construction of buildings.					X						X		
40.	Item: Construction details as required by ordinance. Comment: Such level of detail necessary only for major applications.											X		
41.	Item: Road and paving cross-sections and profiles. Comment: See Item 40.													
42.	Item: Proposed street names. Comment: Applicable only when new road is proposed.													
43.	Item: New block and lot numbers confirmed with local assessor or municipal designee. Comment: Needed whenever a new lot is created.													
44.	Item: Lighting plan & details. Comment: Not applicable for minor subdivision because just creating lots.				X									
45.	Item: Landscape plan & details prepared by a professional landscape architect Comment: Required for site plans because of magnitude of required landscaping.													
46.	Item: Solid waste management plan. Comment: Site plan consideration only; see Item 44.													
47.	Item: Site identification signs, traffic control signs, and directional signs. Comment: See Item 44.													

SUSTAINABILITY CHECKLIST FORM

SUSTAINABLE BUILDING AND DESIGN STANDARDS	APPLICANT'S RESPONSE TO THE SUSTAINABILITY CHECKLIST FORM	TOWNSHIP REVIEWER'S COMMENTS
Name of LEED Accredited Professional working on project:		
List of Energy Star and WaterSense appliances, fixtures and construction techniques:	Aavart Patel, LEED AP BD+C (Rotwein + Blake Architects)	
List of green and recycled building materials in new construction, renovation, and maintenance:	Fixtures and appliances have not been specified yet. Core & Shell has one unisex toilet with Lavatory and will comply.	
Waste Management Plan for recycling and/or reuse of 60 percent of all construction and demolition of waste generated in projects larger than \$25,000:	Building materials and finishes have not been fully selected yet. Applicant will try to comply with recycled material and green material if options are available for selected materials	
Use of any water efficient landscaping:	Construction and demolition waste will meet the 60% threshold	
Use of any on-site renewable energy systems such as:	Native plans were proposed which are water efficient	
(i) Solar		
(ii) Wind		
(iii) Geothermal		
Details of roofing materials designed to reduce the urban heat island effect such as:	Not feasible based on existing structural or other site conditions	
(i) Construction of roof top gardens to reduce solar gain in summer and insulate in winter		
(ii) Use of roofing materials that are no darker than a light gray or demonstrate how alternate roofing materials reduce the urban heat island effect	Applicant will use white or grey color TPO roofing membrane. Roof garden or other green roof strategies are not feasible based on existing structural conditions.	
Details of any sustainable stormwater systems employed such as:		
(i) Bioswales/ raingardens		
(ii) Permeable surfaces		
(iii) Grey water systems		
(iv) Retention and detention facilities		
(v) Continuous trenching		
A list of native and well adapted species used in landscaping to eliminate the need for fertilization and pesticides:	A stormwater detention basin consisting of a network of underground pipes has been proposed for the Phase I portion of the development to accommodate the stormwater runoff generated by the minor parking addition in the rear of the lot. An aboveground stormwater bioretention basin has been proposed for the Phase II portion of the development to accommodate the stormwater runoff generated by the rear parking expansion. Additional details are provided within the Stormwater Management Report filed with this application.	
	Red maple, Eastern Red Cedar, Eastern White Pine, Inkberry Holly, Potentilla and Bar Harbor Juniper are all Native plants proposed on this project. Gingko and Linden are urban tolerant trees well suited to parking lots.	

Note: Please indicate for each of the sustainable building/design items listed, the extent to which the measure is being incorporated in the project or, alternatively, indicate the reason(s) why it is not being incorporated in the project.



Permit No: _____
Date Issued: _____

Township of West Orange

Application for Tree Removal and Replacement Permit

DEAD TREES DO NOT REQUIRE THE ISSUANCE OF A TREE REMOVAL PERMIT

ALL questions must be answered for the Applications to be considered COMPLETE.

Application Date: _____

This Application for a Tree Removal and Replacement Permit is made with reference to and the intent to comply with all applicable laws, rules, and regulations, including the General Revised Ordinances of the Township of West Orange.

1. Name of Applicant: Altera 769, LLC
Street Address: 5910 N. Central Expressway, Suite 1360
City/State/Zip: Dallas, Texas 75206
Home Phone: _____ Work/Cell Phone: 972-897-4961
Email: etillman@alteradevco.com
2. Location of Property Subject to Proposed Tree Removal Activity
Street Address: 769 Northfield Avenue
Block: 166.15 Lot: 9
3. Property Owner(s) of Record
Name of Owner: Altera 769, LLC
Street Address: 5910 N. Central Expressway, Suite 1360
City/State/Zip: Dallas, Texas 75206
Home Phone: _____ Work/Cell Phone: 972-897-4961
Email: etillman@alteradevco.com
4. Status of Applicant (Check One)
☐ Tenant ☒ Owner ☐ Contract Purchaser ☐ Other: _____
If the Applicant is not the owner, attach hereto the notarized consent of the owner.
5. Has this property been the subject of an application and/or otherwise involved in a matter before the West Orange Planning Board and/or Board of Adjustment?
Yes ☒ No ☐ If yes, please state the dates and action taken or pending, identify the Township Agency who or is handling the matter, and enclose a copy of the resolution conserved by the Agency, if applicable: 1) Planning Board Resolution - approved - resolution adopted May 4, 1988 - site plan approval with variance relief
2) Planning Board Resolution - approved - resolution adopted April 6, 2022 - preliminary and final site plan with variance relief for Phase 1 & preliminary site plan with variance relief for Phase 2
6. Has the property received a construction permit and/or is there a construction permit pending?
Yes ☒ No ☐ If yes, please state the reason for and the date of application or the date of the issuance of the permit:
Project is currently under construction; Applicant is seeking final site plan approval for Phase 2

Permit No: _____
Date Issued: _____

7. Describe or attach the landscaping replacement planting plan, if applicable, including the number, size and species of trees to be replaced. Attach additional sheets if necessary: See attached Landscape Plan
8. Describe or attach grading plan if more than six (6) inches of soil will be removed or added within the drip line of a tree or trees on the site:
No regrading is proposed within the driplines of existing trees to remain.
See attached Landscape Plan with proposed grading shown.
9. Map, drawing or diagram must be attached hereto. List the names, address, phone number and email of the preparer of the map drawing or diagram attached:
Dynamic Engineering, Maria Roller LLA, PP, 245 Main Street, Suite 110
Chester, New Jersey 07930 (908)-879-9229 mroller@dynamiccec.com
10. List the number, species, and diameter of each tree to be removed: See attached Demolition Plan/Tree Removal Plan and Chart
11. State reason for tree removal: Building and parking additions
12. Identify the Licensed Tree Expert or Licensed Tree Care Operator who will be providing tree removal services:
Name: TBD
License Number _____
Address: _____
City/State/Zip: _____
Work Phone: _____ Cell Phone: _____
Email: _____
13. Proposed date to commence tree removal: TBD
Proposed date to complete tree removal: TBD

It is understood that the undersigned may be subject to statutory penalties for each violation of the terms and conditions of the West Orange Tree Preservation, Removal and Replacement Ordinance. The undersigned agrees to post a copy of the Tree Removal Permit on the site and to present a copy for review upon request.


Applicant's Signature

Edward Tillman
Print Name Legibly

8/30/22
Date

Permit No: _____
Date Issued: _____

For Administrative Purposes Only:

Numbers of trees approved for removal: _____ (living) _____ (dead/dying)

Number of trees replaced: _____

Additional replacement /preservation requirements: _____

Circle One: Basic Permit Fee: **\$25.00** Total Development Application Fee: **\$300.00** Total

Signature of Forester: _____ Date: _____

West Orange Ordinance #2177-08 defines a tree as "a self-supporting single stem perennial woody plant having a diameter of at least four inches measured at a point of 4.5 feet (or 54 inches) from the ground at the base of the tree on its uphill side.

Up to three (3) live trees may be removed on an improved residential lot within any 365-day period without the necessity of obtaining a tree removal permit.

Buffer Report

THE TOWNSHIP OF WEST ORANGE

Office of the Assessor

66 Main Street

West Orange, New Jersey 07052

Telephone: (973) 325-4060

Facsimile: (973) 669-4859

Highlighted feature(s)

Subject Property(s) (1)

Town	Block	Lot	Qualifier	Location	Owner	Owner Address	Owner City/State	Owner Zip
West Orange Township	166.15	9		769 NORTHFIELD AVENUE	ALTUS GROUP US, INC.	PO BOX 92129	SOUTHLAKE TX	76092

§

List of adjoining feature(s) that intersect 200 foot buffer from Subject Property(s).

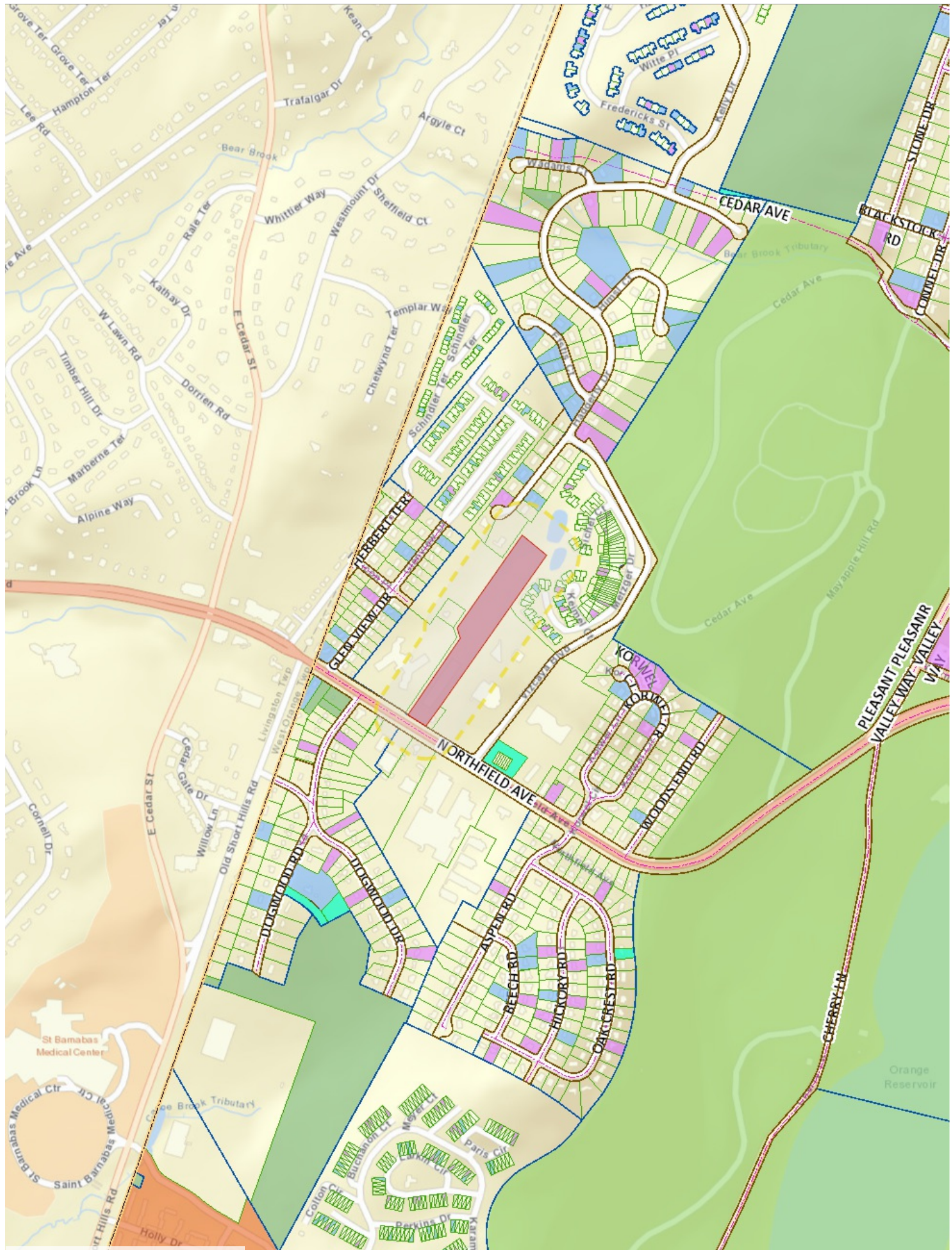
Adjoining Properties (34)

Town	Block	Lot	Qualifier	Location	Owner	Owner Address	Owner City/State	Owner Zip
West Orange Township	165	11.01		772 NORTHFIELD AVENUE	772 NORTHFIELD LLC % RADNET INC	1510 COTNER AVE	LOS ANGELES, CA	90025
West Orange Township	165	14		768 NORTHFIELD AVENUE	GRABOWSKI LTD. LIABILITY CO.	770 NORTHFIELD AVENUE	WEST ORANGE, N.J.	07052
West Orange Township	165	15		760 NORTHFIELD AVENUE	JCF 760 NORTHFIELD AVENUE, LLC	901 ROUTE 10 EAST	WHIPPANY, NJ	07981
West Orange Township	165.02	1		776 NORTHFIELD AVENUE	NORTHFIELD MEDICAL ENTERPRISES	776 NORTHFIELD AVENUE	WEST ORANGE, NEW JERSEY	07052
West Orange Township	165.02	2		780 NORTHFIELD AVENUE	780 NORTHFIELD LLC,	780 NORTHFIELD AVE.	WEST ORANGE, NJ	07052
West Orange Township	165.02	4		782 NORTHFIELD AVENUE	YURY PATIN, LLC	45 BEVERLY ROAD	SUMMIT, NJ	07901
West Orange Township	166.15	7		787 NORTHFIELD AVENUE	787 NORTHFIELD AVE REAL ESTATE CO	787 NORTHFIELD AVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	7.01		777 NORTHFIELD AVENUE	SMITH, CHRISTOPHER & MARLENA	777 NORTHFIELD AVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	9		769 NORTHFIELD AVENUE	ALTUS GROUP US, INC.	PO BOX 92129	SOUTHLAKE TX	76092
West Orange Township	166.15	11.02		767 NORTHFIELD AVENUE	LMK REALTY LLC,	767 NORTHFIELD AVE	WEST ORANGE, NJ	07052

Town	Block	Lot	Qualifier	Location	Owner	Owner Address	Owner City/State	Owner Zip
West Orange Township	166.15	11.03		747 NORTHFIELD AVENUE	NEW LIFE APOSTOLIC CHURCH	747 NORTHFIELD AVENUE	WEST ORANGE,N.J.	07052
West Orange Township	166.15	11.04		METZGER DRIVE	VIZCAYA AT WEST ORANGE	METZGER DRIVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0005	20 METZGER DRIVE	HIRSH, HELENE & NORMAN	20 METZGER DRIVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0006	18 METZGER DRIVE	BACHNER, MICHAEL & MARGIE	18 METZGER DR.	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0007	16 METZGER DRIVE	LEIT, CAROL	16 METZGER DR	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0008	14 METZGER DRIVE	MILLIN, MONICA	14 METZGER DRIVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0009	12 METZGER DRIVE	TOFEL, BETH	12 METZGER DR	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0010	10 METZGER DRIVE	RAEBURN, ROY H. & CHARMION	10 METZGER DRIVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0011	8 METZGER DRIVE	FEINSTEIN, MARJORIE	8 METZGER DRIVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0012	6 METZGER DRIVE	PEARLMAN, PETER S & JOAN P	6 METZGER DR	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0013	4 METZGER DRIVE	ALPERT, MICHAEL & ROSENBLATT, ROBER	4 METZGER DRIVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0014	2 METZGER DRIVE	WEISS, ERIC & HYL A	2 METZGER DRIVE	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0020	12 KEIMEL COURT	SALZ, SANFORD & GALE	12 KEIMEL COURT	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0021	14 KEIMEL COURT	NORTHERN DANCER HOLDINGS LLC	14 KEIMEL CT	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0022	16 KEIMEL COURT	FAN, LING	16 KEIMEL COURT	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0023	18 KEIMEL COURT	JIANG, PING	18 KEIMEL COURT	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0024	20 KEIMEL COURT	SCHECHNER, ARTHUR	19647 OAKBROOK CIRCLE	BOCA RATON, FL	33434
West Orange Township	166.15	11.04	C0029	19 SICHEL COURT	ABORN, RICHARD A. & ABBEY J	19 SICHEL COURT	WEST ORANGE, NJ	07052
West Orange Township	166.15	11.04	C0030	17 SICHEL COURT	SINHA, DEBASISH & SOMA	17 SICHEL COURT	WEST ORANGE, NJ	07052
West Orange Township	166.15	66		5 HAGGERTY DRIVE	YARTEY, PHILIP & OFORI, THELMA	5 HAGGERTY DRIVE	WEST ORANGE, NJ	07068
West Orange Township	166.15	67		3 HAGGERTY DRIVE	PATEL, ASHOK	3 HAGGERTY DR.	WEST ORANGE, NJ	07052
West Orange Township	166.15	68		1 HAGGERTY DRIVE	SHAFIR, WALTER & INNA	1 HAGGERTY DR.	WEST ORANGE, NJ	07052
West Orange Township	166.15	69		2 HAGGERTY DRIVE	BROCK, DEMETRIUS & MARISSA	2 HAGGERTY DRIVE	WEST ORANGE, NJ	07052

Town	Block	Lot	Qualifier	Location	Owner	Owner Address	Owner City/State	Owner Zip
West Orange Township	166.15	70		4 HAGGERTY DRIVE	DZIK-JURASZ, ANDRZEJ & O'NEEL, JAYNE	4 HAGGERTY DRIVE	WEST ORANGE, NJ	07052

Buffer Report - Map



PUBLIC UTILITIES

ELECTRIC & GAS

Public Service Electric & Gas Company
Manager - Corporate Properties
80 Park Plaza, T6B
Newark, NJ 07102

WATER

New Jersey American Water Company
167 John F. Kennedy Parkway
Short Hills, NJ 07078

CABLE TV

Comcast Cablevision
800 Rahway Avenue
Union, NJ 07083

TELEPHONE

Verizon
1 Verizon Way
Basking Ridge, New Jersey 07920-1025

SEWER

Township of West Orange
Municipal Building
66 Main Street
West Orange, NJ 07052



TOWNSHIP OF WEST ORANGE

66 MAIN STREET, WEST ORANGE, N.J. 07052

OFFICE OF THE TAX COLLECTOR

ROBERT D. PARISI
Mayor

Tel: (973) 325-4075
Fax: (973) 736-9182
Email: klongo@westorange.org
cwahlers@westorange.org

VERIFICATION OF TAXES & SEWER CHARGES PAID

DATE: 8/26/22

BLOCK: 166.15

LOT: 9 QUAL: _____

NAME: Altera 769, LLC

ADDRESS: 769 Northfield Avenue

TAXES PAID UNTIL: 10/31/22

2022 SEWER PAID IN FULL: YES NO

TOWNSHIP OF WEST ORANGE
TAX COLLECTOR
66 MAIN STREET
WEST ORANGE, NJ 07052
PHONE (973) 325-4075
FAX (973) 736-9182



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FINAL MAJOR SITE PLAN PHASE II

FOR ALTERA 769, LLC PROPOSED SITE IMPROVEMENTS

BLOCK 166.15, LOT 9; TAX MAP SHEET 101 - LATEST REV. DATED 06/2011
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY, NEW JERSEY

200' PROPERTY OWNERS LIST

PROPERTY OWNER	BLOCK	LOT	PROPERTY OWNER	BLOCK	LOT
772 NORTHFIELD LLC C/O RANET INC 1510 DUNN AVE LOS ANGELES, CA 90025	165	11.01	WESS, ERIC & HILYA 2 METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04
GRABOWSKI LTD. LIABILITY CO. 770 NORTHFIELD AVENUE WEST ORANGE, NJ 07052	165	14	KALZ, SANFORD & GALE 17 KAMEL COURT WEST ORANGE, NJ 07052	166.15	11.04
JSC 760 NORTHFIELD AVENUE, LLC 901 ROUTE 10 EAST WHIPPANY, NJ 07981	165	15	NORTHERN BANCOR HOLDINGS LLC 14 KAMEL CT WEST ORANGE, NJ 07052	166.15	11.04
NORTHFIELD MEDICAL ENTERPRISES 776 NORTHFIELD AVENUE WEST ORANGE, NEW JERSEY 07052	165.02	1	FAN, LING 18 KAMEL COURT WEST ORANGE, NJ 07052	166.15	11.04
780 NORTHFIELD LLC 780 NORTHFIELD AVE WEST ORANGE, NJ 07052	165.02	2	JANG, PING 18 KAMEL COURT WEST ORANGE, NJ 07052	166.15	11.04
YURY PATAL, LLC 45 BEZGER ROAD SUMMIT, NJ 07901	165.02	4	SCHNEIDER, ARTHUR 1847 OAKBROOK CIRCLE BOCA RATON, FL 33434	166.15	11.04
787 NORTHFIELD AVE REAL ESTATE CO 787 NORTHFIELD AVE WEST ORANGE, NJ 07052	166.15	7	ASPIN, RICHARD A. & ARBEY J 19 SICHEL COURT WEST ORANGE, NJ 07052	166.15	11.04
SMITH, CHRISTOPHER & MARLENA 777 NORTHFIELD AVE WEST ORANGE, NJ 07052	166.15	7.01	SINNA, DEBASISH & SONIA 17 SICHEL COURT WEST ORANGE, NJ 07052	166.15	11.04
LWK REALTY LLC 767 NORTHFIELD AVE WEST ORANGE, NJ 07052	166.15	11.02	YARLEY, PHILIP & OFORI, THELMA 5 HAGGERTY DRIVE WEST ORANGE, NJ 07068	166.15	66
NEW LIFE APOSTOLIC CHURCH 747 NORTHFIELD AVENUE WEST ORANGE, NJ 07052	166.15	11.03	PATEL, ASHOK 5 HAGGERTY DR WEST ORANGE, NJ 07052	166.15	67
VICAYA AT WEST ORANGE METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04	SHAFER, WALTER & INNA 5 HAGGERTY DR WEST ORANGE, NJ 07052	166.15	68
HISH, HELENE & NORMAN 90 METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04	BROOK, DEMETRIUS & MARISSA 5 HAGGERTY DRIVE WEST ORANGE, NJ 07052	166.15	69
BACHNER, MICHAEL & MARGIE 16 METZGER DR WEST ORANGE, NJ 07052	166.15	11.04	LOK, JURASZ, ADARCEJ & O'NEEL, JAYNE 5 HAGGERTY DRIVE WEST ORANGE, NJ 07052	166.15	70
LEIT, CAROL 16 METZGER DR WEST ORANGE, NJ 07052	166.15	11.04	AGENCIES TO BE CONTACTED: PSE&G 80 PARK PLAZA NEWARK, NEW JERSEY 07102 VERIZON TELEPHONE 240 BRAD STREET NEWARK, NEW JERSEY 07102 HUDSON ESSEX PASSAC SOIL CONSERVATION DISTRICT 800 ORCHARD STREET BLOOMFIELD, NEW JERSEY 07003		
MULIK, MONICA 14 METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04			
TORIEL, BETH 12 METZGER DR WEST ORANGE, NJ 07052	166.15	11.04			
BAEBER, ROY H. & CHARMON 10 METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04			
FENSTEIN, MARJORIE 6 METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04			
GERBER, ROBERT & NANCY 6 METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04			
ALPERT, MICHAEL & ROSENBLATT, ROBER 4 METZGER DRIVE WEST ORANGE, NJ 07052	166.15	11.04			

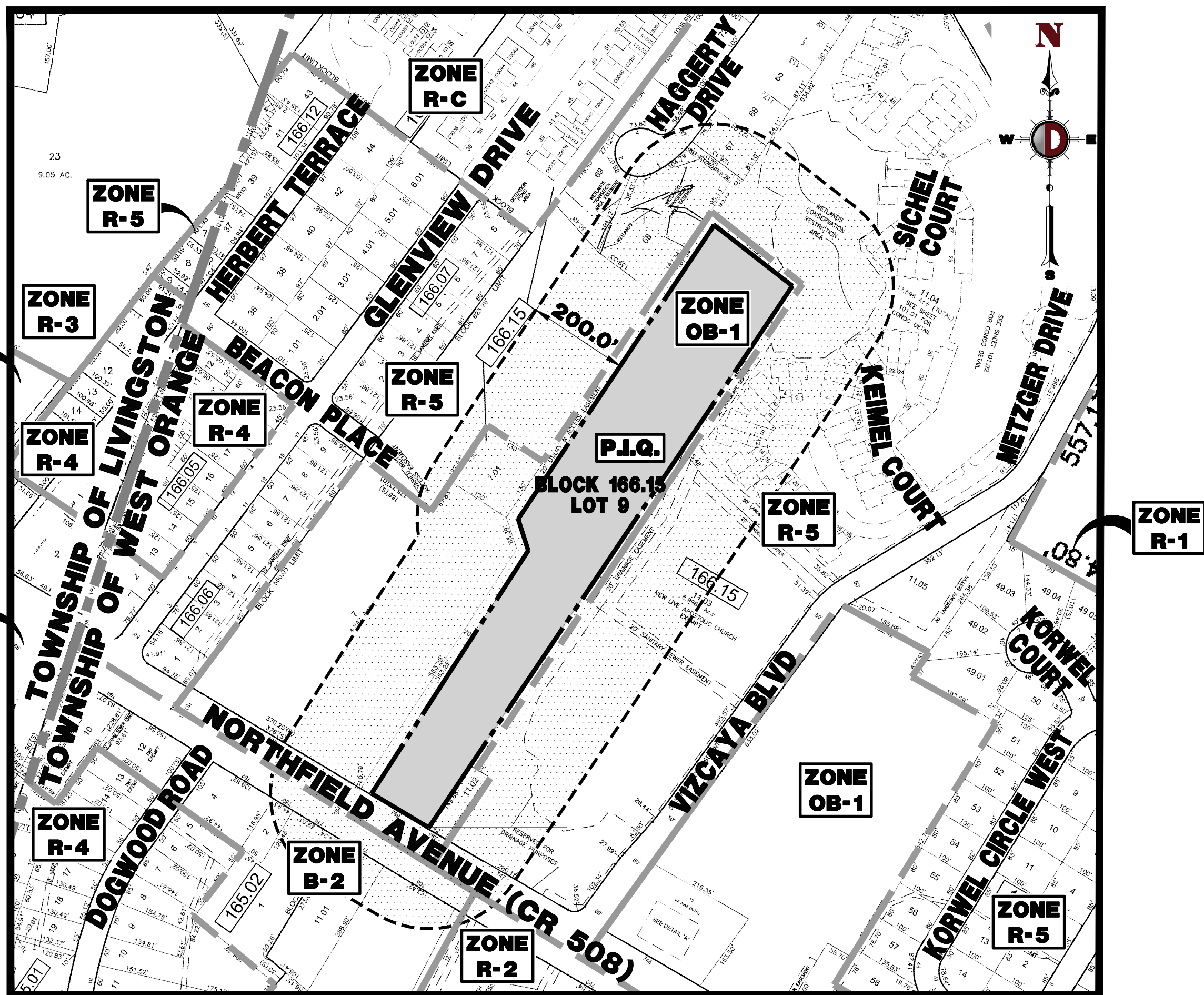
PLANNING BOARD APPROVAL

APPROVED AT THE PLANNING BOARD OF THE TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ

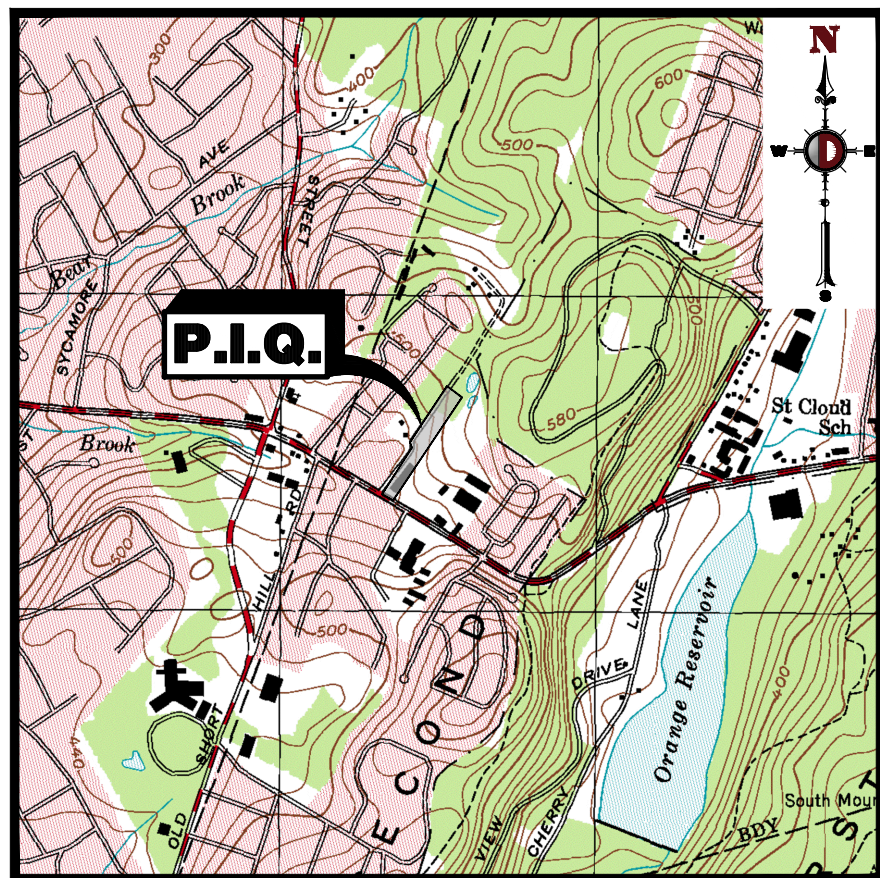
CHAIRMAN _____ DATE _____

SECRETARY _____ DATE _____

MUNICIPAL ENGINEER _____ DATE _____



AREA MAP
1" = 200'

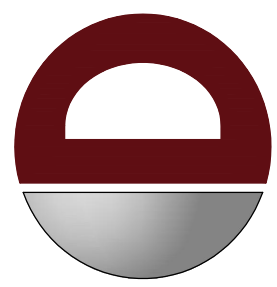


KEY MAP
1" = 2000'

DRAWING INDEX

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GRADING, DRAINAGE & UTILITY PLAN	7 of 15
LANDSCAPE PLAN	8 of 15
LIGHTING PLAN	9 of 15
SOIL EROSION & SEDIMENT CONTROL PLAN	10 of 15
SOIL EROSION & SEDIMENT CONTROL NOTES & DETAILS	11 of 15
CONSTRUCTION DETAILS	12 - 15 of 15
STEEP SLOPES CALCULATIONS - EXISTING	1 of 2
STEEP SLOPES CALCULATIONS - PROPOSED	2 of 2
VEHICLE CIRCULATION PLAN - REFUSE	1 of 1

PREPARED BY
DYNAMIC ENGINEERING CONSULTANTS, P.C.
245 MAIN STREET - SUITE 110
CHESTER, NJ 07930
WWW.DYNAMICCEC.COM



DYNAMIC
ENGINEERING CONSULTANTS, P.C.
TRAFFIC • SURVEY • PLANNING

THIS PLAN SET IS FOR PERMITTING PURPOSES
ONLY AND MAY NOT BE USED FOR CONSTRUCTION

DESIGNED BY: JCS
CHECKED BY: JCU
DRAWN BY: SRM

PROJECT: ALTERA 769, LLC
PROPOSED SITE IMPROVEMENTS
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ



PROTECT YOURSELF
ALL STATES REQUIRE NOTIFICATION OF
EXCAVATORS, DESIGNERS, OR ANY PERSON
PREPARING TO DIGGING THE EARTH'S
SURFACE ANYWHERE IN ANY STATE
FOR STATE-SPECIFIC DIRECT PHONE NUMBERS VISIT:
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Chester, NJ 07930
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Columbus, OH • 614.399.1111
Dallas, TX • 972.399.1111
Denver, CO • 303.399.1111
Detroit, MI • 313.399.1111
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San Francisco, CA • 415.399.1111
Seattle, WA • 206.399.1111
Tampa, FL • 813.399.1111
Washington, DC • 202.399.1111
Wichita, KS • 316.399.1111

www.dynamiccec.com

ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE:

COVER SHEET

SCALE: (H) AS
(V) SHOWN

DATE: 08/17/2022

PROJECT No:

2530-99-006

SHEET No:

1

Rev. #:

0

[illegible]

THIS PLAN SET IS FOR PERMITTING PURPOSES
ONLY AND MAY NOT BE USED FOR CONSTRUCTION

DESIGNED BY:	CHECKED BY:	CHECKED BY:
--------------	-------------	-------------

DESIGNED BY:	CHECKED BY:	CHECKED BY:
--------------	-------------	-------------

DESIGNED BY:	CHECKED BY:	CHECKED BY:
--------------	-------------	-------------

DESIGNED BY:	CHECKED BY:	CHECKED BY:
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PROJECT: **ALTERA 769, LLC**
PROPOSED SITE IMPROVEMENTS
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ



PROTECT YOURSELF
ALL STATES REQUIRE NOTIFICATION OF
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 Cheshire, New Jersey • T: 908.879.9229
 Newark, New Jersey • T: 973.755.2100
 Torrington, New Jersey • T: 732.974.0198
 Newkirk, Pennsylvania • T: 267.885.0078
 Philadelphia, Pennsylvania • T: 215.253.4888
 Bethlehem, Pennsylvania • T: 610.588.4400
 Allen, Texas • T: 972.533.2100
 Houston, Texas • T: 281.709.6400
 Austin, Texas • T: 512.646.2646
 Delray Beach, Florida • T: 561.921.8520

www.dynamicsec.com

ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE:

AERIAL PLAN

SCALE: (H) 1" = 100' (V)	DATE: 08/17/2022
PROJECT No: 2530-99-006	

SHEET No: 2	Rev. #: 0
OF	0

GENERAL NOTES:

1. THIS PLAN HAS BEEN PREPARED BASED ON REFERENCES INCLUDING:

BOUNDARY & TOPOGRAPHIC SURVEY DYNAMIC SURVEY, LLC 1504 MAIN STREET, LAKE COMO, NJ 07719 PROJECT NO.: 2530-99-001S DATED: 06/25/2020 REVISED: 07/30/2021	ALTA/ACSM LAND TITLE SURVEY DYNAMIC SURVEY, LLC 20 WATERVIEW BOULEVARD PARIS, PA 17054 PROJECT NO.: 070301021 DATED: 10/07/1999 LAST REVISED: 05/02/07	FIRST FLOOR PLAN ROTHMAN & BLAKE 16 WICHLAR ROAD, SUITE B LEXINGTON, NJ 07038 DATED: 07/29/2021
---	--	---

2. APPLICANT/OWNER: ALTERA 769, LLC
5910 N. CENTRAL EXPRESSWAY, SUITE 1360
DALLAS, TEXAS 75206

3. PARCEL DATA: BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY, NJ
ZONE: OB-1 (OFFICE BUILDING DISTRICT)
USE: OFFICE BUILDING (PERMITTED USE) (§ 25-ATTACHMENT 2)

4. SCHEDULE OF ZONING REQUIREMENTS (§§ 25-11.2) (§ 25-ATTACHMENT 3) (§ 25-11.6)

ZONE REQUIREMENT	ZONE OB-1	EXISTING	PROPOSED
MINIMUM LOT AREA	10,000 SF (0.23 Ac)	212,742 SF (4.88 Ac)	212,742 SF (4.88 Ac)
MINIMUM LOT WIDTH	60'	130.98'	130.98'
MINIMUM BUILDING SETBACKS			
-FRONT (NORTHFIELD AVENUE)	30'	102.4'	102.4'
-REAR	30'	860.5'	824.4'
-SIDE (RESIDENTIAL)	75'	29.8' (E)	29.8' (E)
-SIDE (NON-RESIDENTIAL)	10' & 8'	30.1'	30.1'
MAXIMUM BUILDING HEIGHT	35' / 2.5 STORIES	41.8 / 3 STORIES (E)	41.8 / 3 STORIES (E)
MAXIMUM LOT COVERAGE	50%	57.3% (E)	70.1% (94.1% PER EFFECTIVE LOT AREA) (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)
MAXIMUM BUILDING COVERAGE	40%	11.3% (23,391 SF)*	11.5% (24,507 SF)* (14.8% PER EFFECTIVE LOT AREA)
MINIMUM OPEN SPACE**	11.3% (23,391 SF)	36.7% (78,138 SF)	25.9% (55,050 SF)

N/S: NO STANDARD N/A: NOT APPLICABLE (E): EXISTING NON-CONFORMANCE (V): VARIANCE

**INCLUDES BUILDING OVERHANG

*1 SQ. FT. OF OPEN SPACE MUST BE PROVIDED FOR EVERY 1 SQ. FT. OF BUILDING AREA

5. PARKING REQUIREMENTS (§§ 25-12.1, § 25-12.2)

MINIMUM PARKING SPACE SIZE: 9'X18' REQUIRED;

MINIMUM STANDARD SPACE SIZE: 8'X15' EXISTING (N/A)

90' PARKINGS: 9' X 18' EXISTING; 9' X 18' PROPOSED (COMPLIES)

MINIMUM COMPACT SPACE SIZE: 8'X15' EXISTING (N/A)

MINIMUM ASIDE WIDTH FOR 0', 12' REQUIRED; 12.6' EXISTING

MINIMUM ASIDE WIDTH FOR 90', 24' REQUIRED; 24' PROPOSED (COMPLIES)

MINIMUM NUMBER OF PARKING SPACES:

MEDICAL, DENTAL, PSYCHIATRIC AND CHIROPRATIC OFFICES: 1 FOR EACH 150 SF OF GROSS FLOOR AREA

THEREFORE:

(67,803 SF) * (1) PARKING SPACE/150 SF = 452 SPACES

TOTAL REQUIRED PARKING: 452 SPACES

TOTAL EXISTING PARKING: 224 SPACES (E)

TOTAL PROPOSED PARKING: 280 SPACES (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)

ELECTRIC VEHICLE CHARGING STATION (EVSE) SPACES:

MEDICAL OFFICE USE - 4% OF THE TOTAL OFF-STREET PARKING SPACES FOR 151 OR MORE TOTAL SPACES

THEREFORE:

280 PARKING SPACES REQUIRED * 0.04% = 11 EV SPACE REQUIRED; 11 EV SPACE PROPOSED (COMPLIES)

A PARKING SPACE PREPARED WITH EVSE OR MAKE-READY EQUIPMENT SHALL COUNT AS AT LEAST TWO (2) PARKING SPACES FOR THE PURPOSE OF

COMPLYING WITH A MINIMUM PARKING SPACE REQUIREMENT. THIS SHALL ACCOUNT FOR NO MORE THAN 10 PERCENT OF THE TOTAL REQUIRED PARKING.

THEREFORE:

452 PARKING SPACES REQUIRED * 10% = 45 PARKING SPACES MAX. CREDIT

THEREFORE:

280 PARKING SPACES PROPOSED + 11 EV SPACE CREDIT = 291 SPACES PROPOSED (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)

6. LANDSCAPING AND BUFFER REQUIREMENTS (§§ 25-11.3, § 25-12.1)

THERE SHALL BE A MINIMUM OF ONE (1) TREE PLUS GROUND LEVEL PLANTING FOR EACH TEN (10) PARKING SPACES PROPOSED (COMPLIES)

THEREFORE:

(280 PARKING SPACES)/10 = 28 TREES

TOTAL TREES REQUIRED: 28

TOTAL TREES PROPOSED: 28 (COMPLIES)

THE MAXIMUM LENGTH OF A SINGLE ROW OF PARKING SHALL BE 20 SPACES, AT WHICH POINT A LANDSCAPED AREA WITH A MINIMUM WIDTH OF 8' SHALL

BE PROVIDED. (20 SPACES, 2.3 ISLANDS EXISTING (E), 20 SPACES, 0' ISLANDS PROPOSED (COMPLIES)

IN ADDITION TO THE SETBACK REQUIREMENTS LISTED IN SUBSECTION 25-5.1 OF THE TABLE OF DISTRICT REGULATIONS, ALONG ANY SIDE OR REAR

PROPERTY LINE WHICH IS ALSO THE BOUNDARY LINE BETWEEN A RESIDENTIAL DISTRICT AND A RESIDENTIAL DISTRICT OR IS CONTIGUOUS TO A

RESIDENTIAL USE IN A RESIDENTIAL ZONE, A BUFFER STRIP SHALL BE PLANTED AND MAINTAINED IN PERPETUITY WITH TREES AND SHRUBBERY OF SUCH

SIZES AND DENSITIES AS TO ADOQUALLY SCREEN THE BUILDINGS FROM SUCH ADJUTING RESIDENTIAL DISTRICT OR USE IN A RESIDENTIAL ZONE.

THE REQUIRED BUFFER WIDTH SHALL BE FIFTY (50) FEET IN ALL NONRESIDENTIAL ZONES

THE ABOVE REQUIREMENTS SHALL BE REDUCED FOR LOTS THAT ARE LESS THAN 40,000 SQUARE FEET IN AREA AND/OR LESS THAN 300 FEET IN WIDTH.

ON SUCH SMALLER LOTS, THE REQUIRED BUFFER WIDTH SHALL BE 10 PERCENT OF LOT WIDTH OR DEPTH, BUT NOT LESS THAN 20 FEET. 20' REQUIRED;

0' EXISTING (E)

7. TREE REMOVAL REQUIREMENTS (§§ 25-27.4, § 25-27.8)

REMOVAL OF TREES ON A SLOPE OF 15% OR GREATER PROHIBITED (V)

MINIMUM OF 30% OF EXISTING TREES ARE REQUIRED TO BE PRESERVED: 63% PROPOSED (COMPLIES)

34% OF EXISTING TREES TO REMAIN BETWEEN PHASE 1 AND PHASE 2 (COMPLIES)

8. LIMITATION ON DEVELOPMENT OF SLOPES OF 20% OR GREATER (§ 25-28.8)

MAXIMUM DEVELOPMENT OF SLOPES OF 20%-25% 20% PERMITTED; 30.8% PROPOSED (V - PREVIOUSLY APPROVED FOR UP TO 39.7% AT MARCH 2, 2022 PLANNING BOARD HEARING)

DISTURBANCE OF SLOPES OF 25% OR MORE ARE PROHIBITED: 34.4% PROPOSED (V - PREVIOUSLY APPROVED FOR UP TO 35.2% AT MARCH 2, 2022 PLANNING BOARD HEARING)

USE STEP SLOPES CALCULATIONS)

ALL RETAINING WALLS GREATER THAN FOUR FEET IN HEIGHT SHALL REQUIRE A VARIANCE AND CERTIFICATION BY A PROFESSIONAL ENGINEER THAT THE

WALL WILL BE CONSTRUCTED IN ACCORDANCE WITH APPROVED PLANS; 4' PROPOSED. (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)

9. LIGHTING REQUIREMENTS (§§ 25-14.1, § 25-14.3)

MAXIMUM ILLUMINATION AT RESIDENTIAL PROPERTY LINE SHALL NOT EXCEED 0.3 FC; 2.1 FC PROPOSED (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)

MAXIMUM ILLUMINATION AT OTHER PROPERTY LINES: 0.5 FC PERMITTED; 1.8 PROPOSED (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)

MINIMUM LIGHT FOOT CANDLE: 18' PERMITTED; 42% EXISTING (E); 25' PROPOSED (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)

MINIMUM PEDESTRIAN WALKWAY: 0.6 FC; 10' FC PROPOSED (COMPLIES)

MINIMUM PARKING AREA: 1.5 FC; 10' FC PROPOSED (V - PREVIOUSLY APPROVED AT MARCH 2, 2022 PLANNING BOARD HEARING)

10. THE APPLICANT REQUESTS ANY AND ALL SUBMISSION VARIANTS THAT ARE NOT SPECIFICALLY IDENTIFIED HEREIN. TESTIMONY WILL BE SUPPLIED AT THE PUBLIC

HEARING TO SUPPORT SAID SUBMISSION VARIANTS.

11. PRIOR TO INSURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE TO MAKE SURE THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED.

NO CONSTRUCTION OR FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AND THOROUGHLY REVIEWED ALL PLANS AND OTHER DOCUMENTS BY ALL

OF THE PERMITTING AUTHORITIES.

12. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS AND THE REQUIREMENTS AND STANDARDS OF THE LOCAL GOVERNING

AUTHORITY.

13. THE APPLICANT REQUESTS AND RECOMMENDATIONS SET FORTH THEREIN ARE A PART OF THE REQUIRED CONSTRUCTION DOCUMENTS AND IN CASE OF CONFLICT SHALL

TAKE PRECEDENCE UNLESS SPECIFICALLY NOTED OTHERWISE ON THE PLANS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER CONSTRUCTION MANAGER OF ANY

DISCREPANCY BETWEEN SLOPS REPORT & PLANS.

14. SITE CLEARING SHALL INCLUDE THE LOCATION AND REMOVAL OF ALL UNDERGROUND TANKS, PIPES, VALVES, ETC.

15. THE PROPERTY SURVEY SHALL BE CONSIDERED A PART OF THESE PLANS.

16. ALL DIMENSIONS SHOWN ON THE PLANS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER IF ANY

DISCREPANCIES EXIST PRIOR TO CONSTRUCTION FOR NECESSARY PLAN CHANGES. NO EXTRA COMPENSATION SHALL BE PAID TO THE CONTRACTOR

FOR WORK HAVING TO BE REDONE DUE TO DIMENSIONS OR GRADES SHOWN INCORRECTLY ON THESE PLANS IF SUCH NOTIFICATION HAS NOT BEEN GIVEN.

17. SOIL MUST BE TESTED BY CONTRACTOR IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

18. ALL EXCAVATED UNSUITABLE MATERIAL MUST BE TRANSPORTED TO AN APPROVED DISPOSAL LOCATION.

19. CONTRACTOR IS RESPONSIBLE FOR ALL SHORING REQUIRED DURING EXCAVATION AND SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT OSHA STANDARDS, AS

WELL AS ANY APPLICABLE ORDINANCES OR REGULATIONS.

20. ALL CONTRACTORS MUST CARRY STATUTORY WORKERS COMPENSATION, EMPLOYERS LIABILITY INSURANCE AND APPROPRIATE LIMITS OF COMMERCIAL GENERAL LIABILITY

INSURANCE (G.S.). ALL CONTRACTORS MUST HAVE THEIR CO. POLICIES ENDORSED TO NAME DYNAMIC ENGINEERING CONSULTANTS, P.C., ITS SUBCONSULTANTS AS

ADDITIONAL INSURED AND TO PROVIDE CONTRACTUAL LIABILITY COVERAGE SUFFICIENT TO INSURE THE HOLD HARMLESS AND INDEMNIFY OBLIGATIONS ASSUMED BY

THE CONTRACTORS. ALL CONTRACTORS MUST FURNISH DYNAMIC ENGINEERING CONSULTANTS, P.C., WITH CERTIFICATES OF INSURANCE AS EVIDENCE OF THE REQUIRED

COVERAGE PRIOR TO COMMENCEMENT OF WORK AND UPON REQUEST OF EACH PARTY DURING THE COURSE OF CONSTRUCTION. IN ADDITION, ALL CONTRACTORS SHALL

WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS DYNAMIC ENGINEERING CONSULTANTS, P.C., AND ITS SUBCONSULTANTS FROM

AND AGAINST ANY DAMAGES, LIABILITIES OR COSTS, INCLUDING REASONABLE ATTORNEYS' FEES AND DEFENSE COSTS, ARISING OUT OF OR IN ANY MANNER CONNECTED

WITH THE PROJECT, INCLUDING ALL CLAIMS BY EMPLOYEES OF THE CONTRACTORS.

21. NEITHER THE PROFESSIONAL ACTIVITIES OF DYNAMIC ENGINEERING CONSULTANTS, P.C., NOR THE PRESENCE OF DYNAMIC ENGINEERING CONSULTANTS, P.C. OR ITS

EMPLOYEES AT ANY SUBCONTRACTOR'S CONSTRUCTION PROJECT SITE SHALL RELIEVE THE GENERAL CONTRACTOR OF ITS OBLIGATIONS, DUTIES AND

RESPONSIBILITIES INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION METHODS, SEQUENCE, TIMING, SCHEDULING, AND PROTECTION OF EXISTING UTILITIES.

22. THE CONTRACTOR SHALL SUPERSEDE ANY DISCREPANCIES BETWEEN PLANS, THE SITE PLAN WILL SUPERSEDE IN ALL CASES. CONTRACTOR MUST NOTIFY ENGINEER OF ANY CONFLICT

REFER TO SITE PLAN FOR ADDITIONAL NOTES.

23. CONTRACTOR TO DISURE A MAXIMUM OF 2% SLOPE IN ALL DIRECTIONS IN AREA PARKING SPACES AND ADA ACCESS AREAS. CONTRACTOR TO ENSURE A MAXIMUM

OF 5% RUNNING SLOPE AND 2% CROSS SLOPE ALONG ALL OTHER PORTIONS OF ACCESSIBLE ROUTE, WITH THE EXCEPTION OF RAMPS AND CURB RAMPS.

CONTRACTOR SHALL CLARIFY ANY QUESTIONS CONCERNING CONSTRUCTION IN ADA AREAS WITH THE ENGINEER PRIOR TO THE START OF CONSTRUCTION.

24. THE OWNER SHALL RETAIN DYNAMIC EARTH, LLC (800-879-7095) OR ALTERNATE QUALIFIED GEOTECHNICAL ENGINEER TO TEST SOIL PERMEABILITY AND PROVIDE

RESULTS TO DESIGN CERTAIN.

25. CONTRACTOR IS TO REMOVE EXISTING UNSUITABLE OR OVERLY COMPACT SOIL OR ROCK IN PLACE NEARBY GREATER THAN TO ACHIEVE REQUIRED PERMEABILITY AS DIRECTED BY THE

OWNERS GEOTECHNICAL ENGINEER, AND NEW FILL, IF NEEDED, SHALL BE OF A GRADE PERMEABILITY GREATER THAN OR EQUAL TO THE DESIGN CERTAIN.

26. CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE OWNER'S GEOTECHNICAL ENGINEER PRIOR TO ONSET OF CONSTRUCTION TO SUBMIT AND CONFIRM THE

CONTRACTOR'S PROPOSED MEANS AND MATERIALS AND TO SCHEDULE INSPECTIONS FOR BOTTOM OF BASIN, REMOVAL OF UNSUITABLE SOIL, FILL PLACEMENT, AND

FINAL BASIN PERMEABILITY TESTING.

27. THE CONTRACTOR IS RESPONSIBLE FOR AS-BUILT PLANS AND GRADE CONTROL, UNLESS DENIED OTHERWISE ELSEWHERE IN THE CONTRACT DOCUMENTS.

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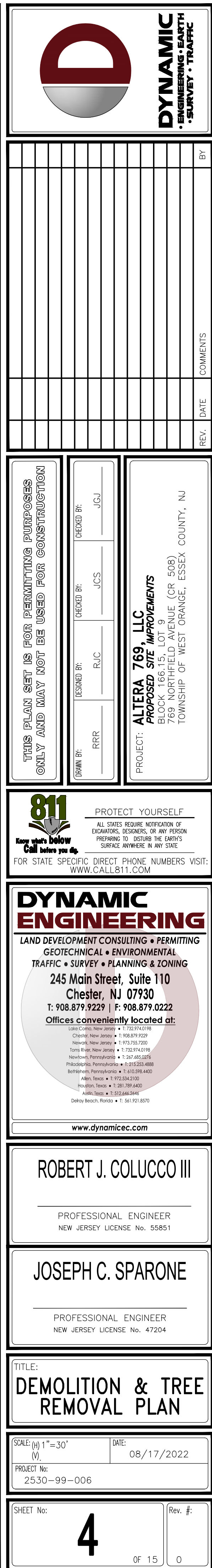
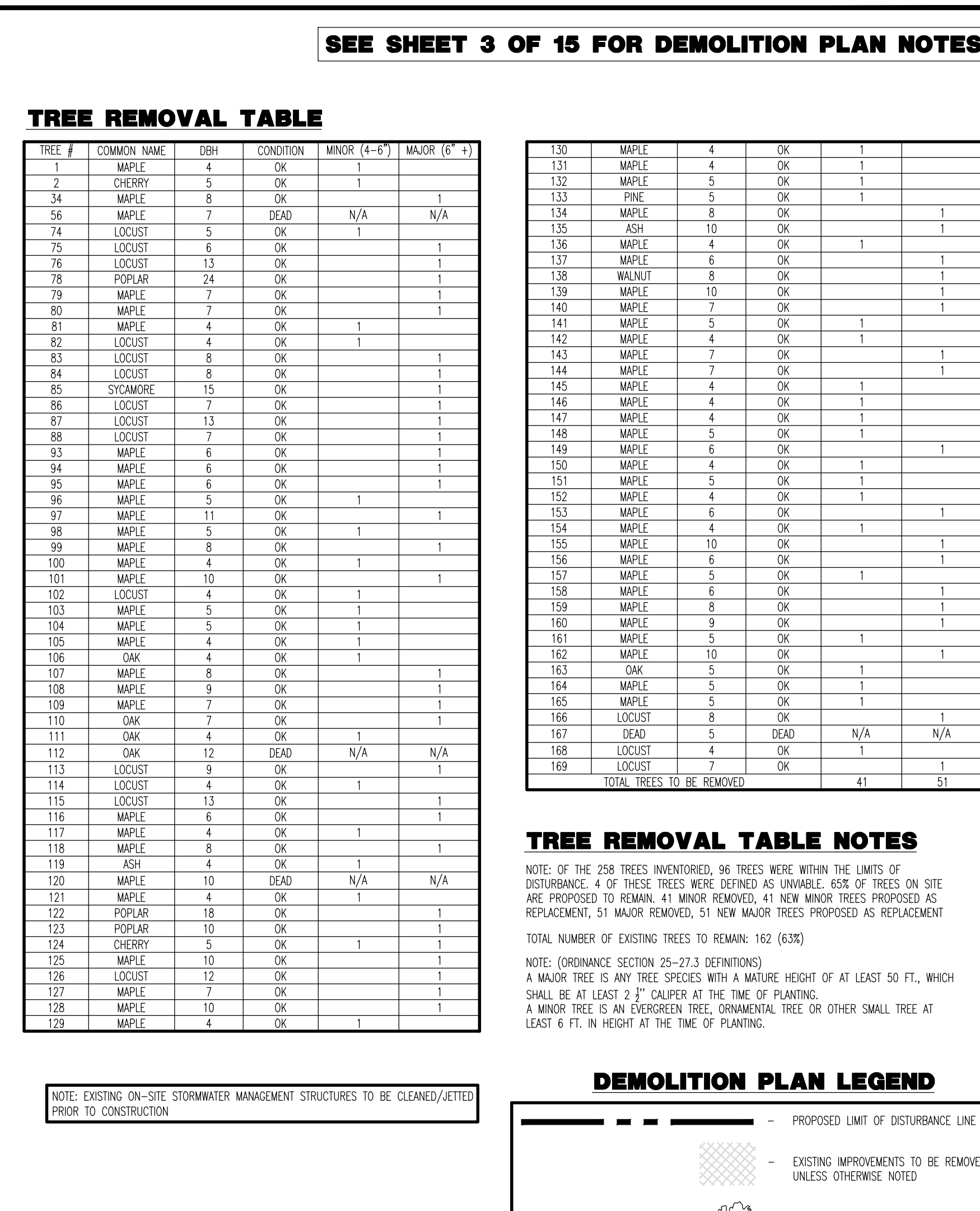
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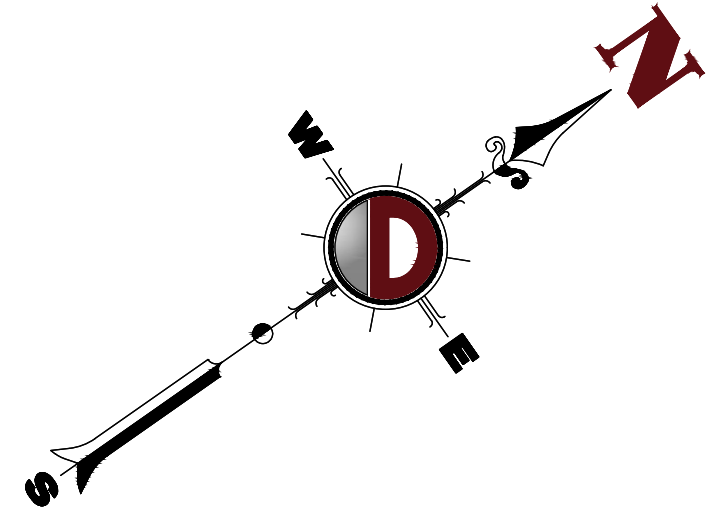
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60. CONTRACTOR IS TO REMOVE EXISTING UNSUITABLE OR OVERLY COMPACT SOIL OR ROCK IN PLACE NE



[illegible]

THIS PLAN SET IS FOR PERMITTING PURPOSES
ONLY AND MAY NOT BE USED FOR CONSTRUCTION

OWN BY:	DESIGNED BY:	CHECKED BY:
RRR	RJC	JCS
		JGJ

PROJECT: **ALTERA 769, LLC**
PROPOSED SITE IMPROVEMENTS
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ



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ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE

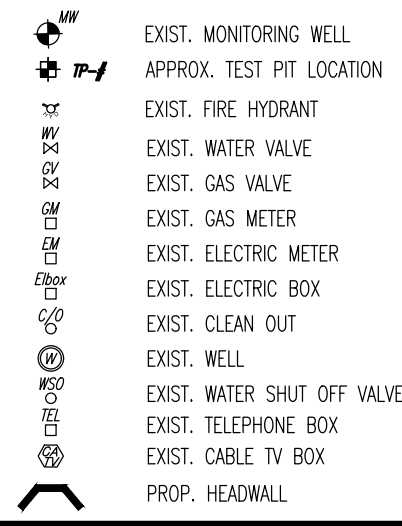
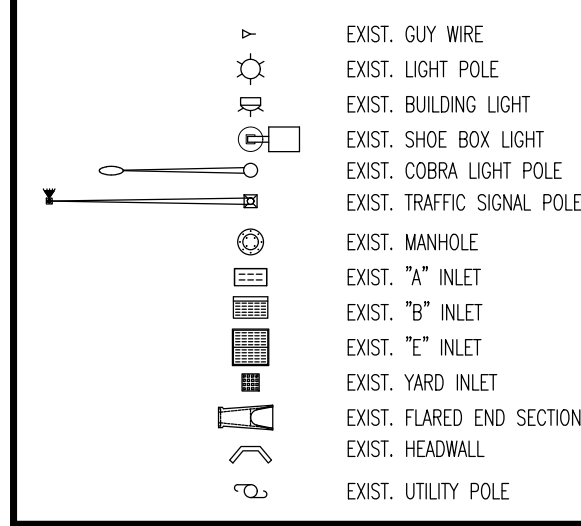
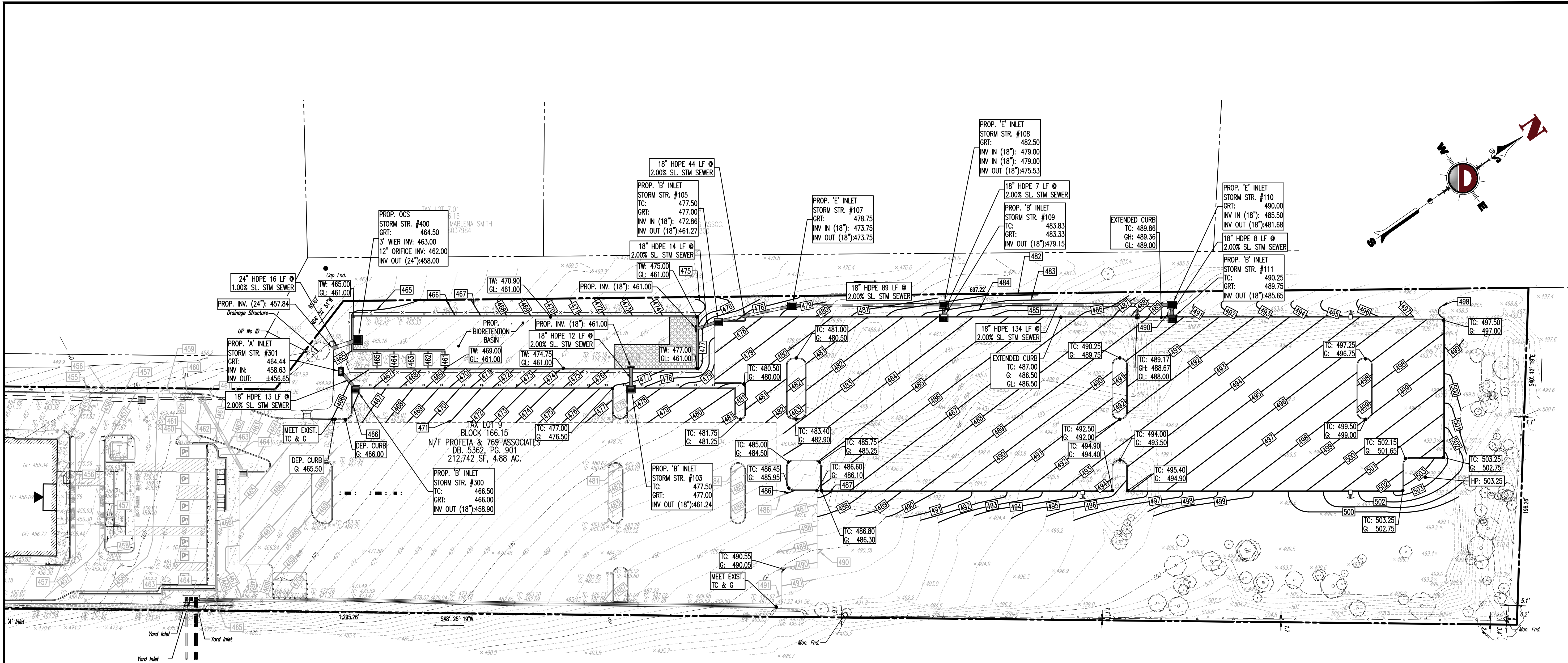
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. 17304

TITLE: **OVERALL SITE PLAN**

SCALE: (H) 1"=50' (V)	DATE: 08/17/2023
PROJECT No: 2530-99-006	

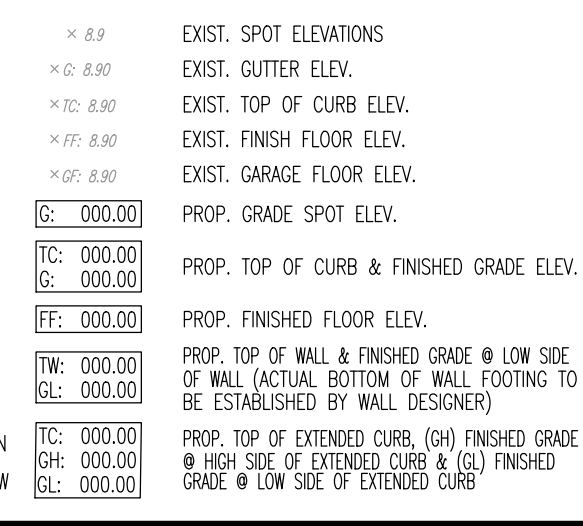
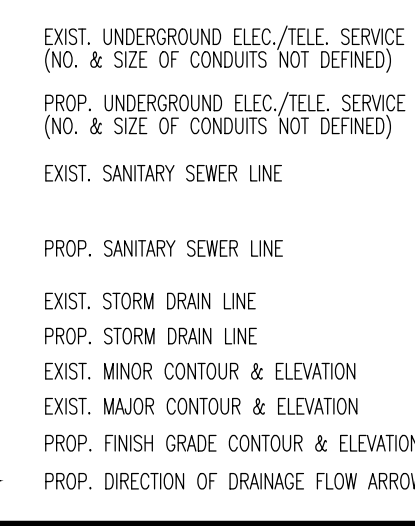
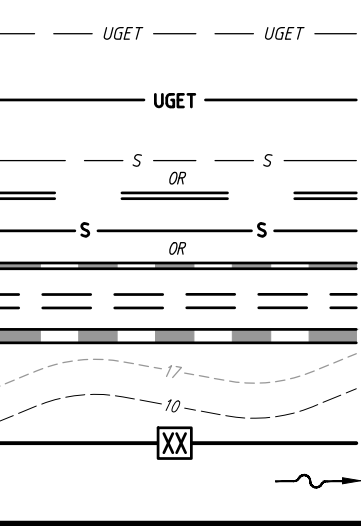
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Plotted: 08/17/22 - 12:24 PM, By: russell
File: P:\CEPC PROJECTS\2530 Altera Development\99-006 West Orange\Draw\Site Plans PH\2530990005X.dwg, ----> 07 GRADING DRAINAGE & UTILITY PLAN

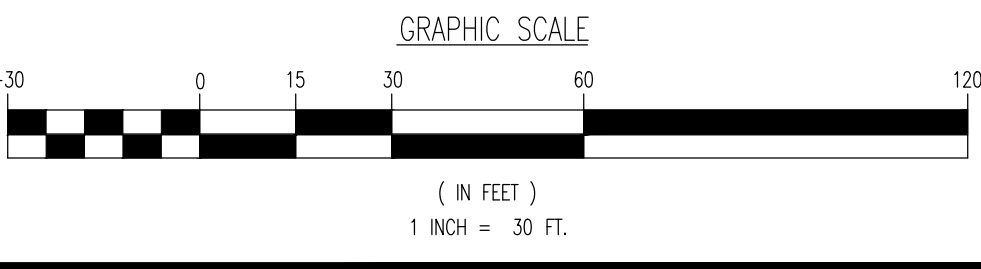


GRADING/UTILITY GRAPHIC LEGEND

PROPERTY LINE (PARCEL IN QUESTION)	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	EXIST. SPOT ELEVATIONS
OFF-SITE PROPERTY LINES	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	EXIST. GUTTER ELEV.
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	EXIST. TOP OF CURB ELEV.
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	EXIST. FINISH FLOOR ELEV.
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	EXIST. GARAGE FLOOR ELEV.
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	PROP. GRADE SPOT ELEV.
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	PROP. TOP OF CURB & FINISHED GRADE ELEV.
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	PROP. FINISHED FLOOR ELEV.
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	PROP. TOP OF WALL & FINISHED GRADE @ LOW SIDE OF WALL (ACTUAL BOTTOM OF WALL FOOTING TO BE ESTABLISHED BY WALL DESIGNER)
	EXIST. CABLE LINE	EXIST. UNDERGROUND ELEC./TELE. SERVICE (NO. & SIZE OF CONDUITS NOT DEFINED)	PROP. TOP OF EXTENDED CURB (GH) FINISHED GRADE @ LOW SIDE OF EXTENDED CURB



SEE SHEET 3 OF 15 FOR GRADING PLAN NOTES



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DATE	08/17/2022
REV.	0
COMMENTS	

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DRAWN BY: RRR
CHECKED BY: RJC
DESIGNED BY: JCS
IN CHARGE: JCU

PROJECT: **ALTERA 769, LLC**
PROPOSED SITE IMPROVEMENTS
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ

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ROBERT J. COLUCCO III
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. 55851

JOSEPH C. SPARONE
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. 47204

TITLE: **GRADING, DRAINAGE & UTILITY PLAN**

SCALE: (H) 1"=30'
(V) 1"=30'

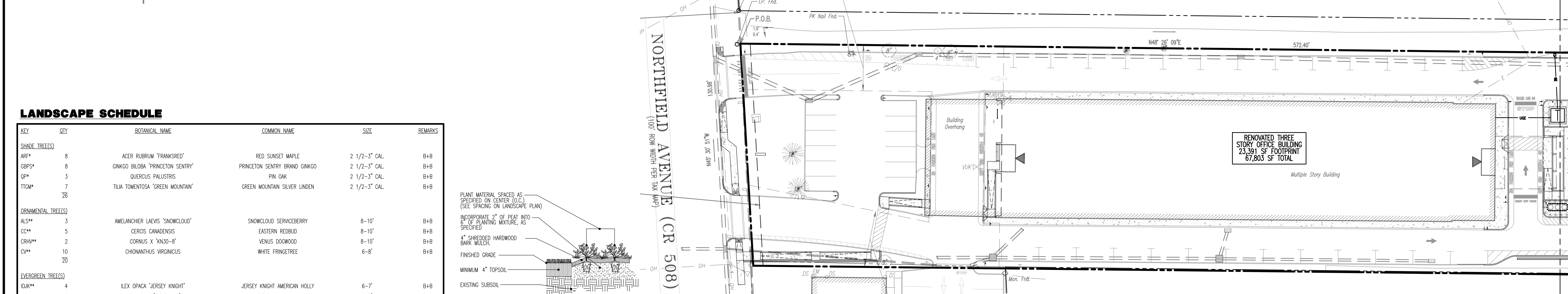
DATE: 08/17/2022

PROJECT NO: 2530-99-006

SHEET NO: **7**

Rev. #:

OF 22

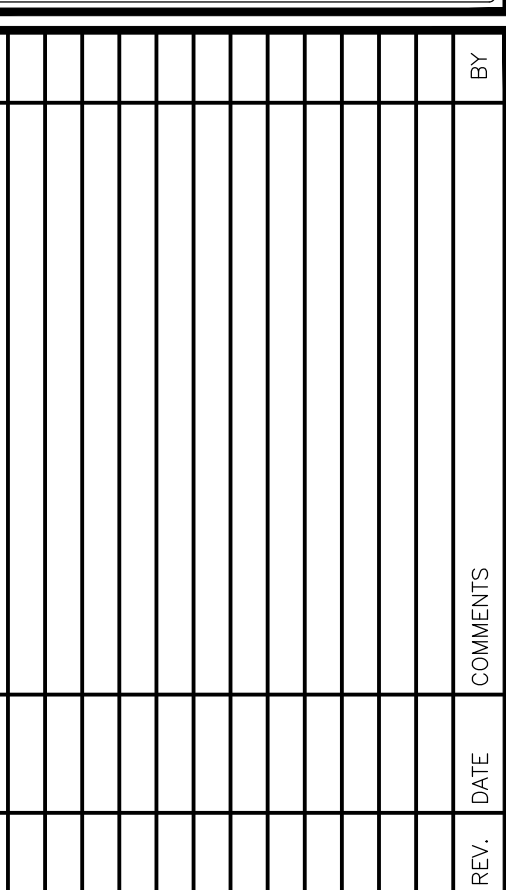
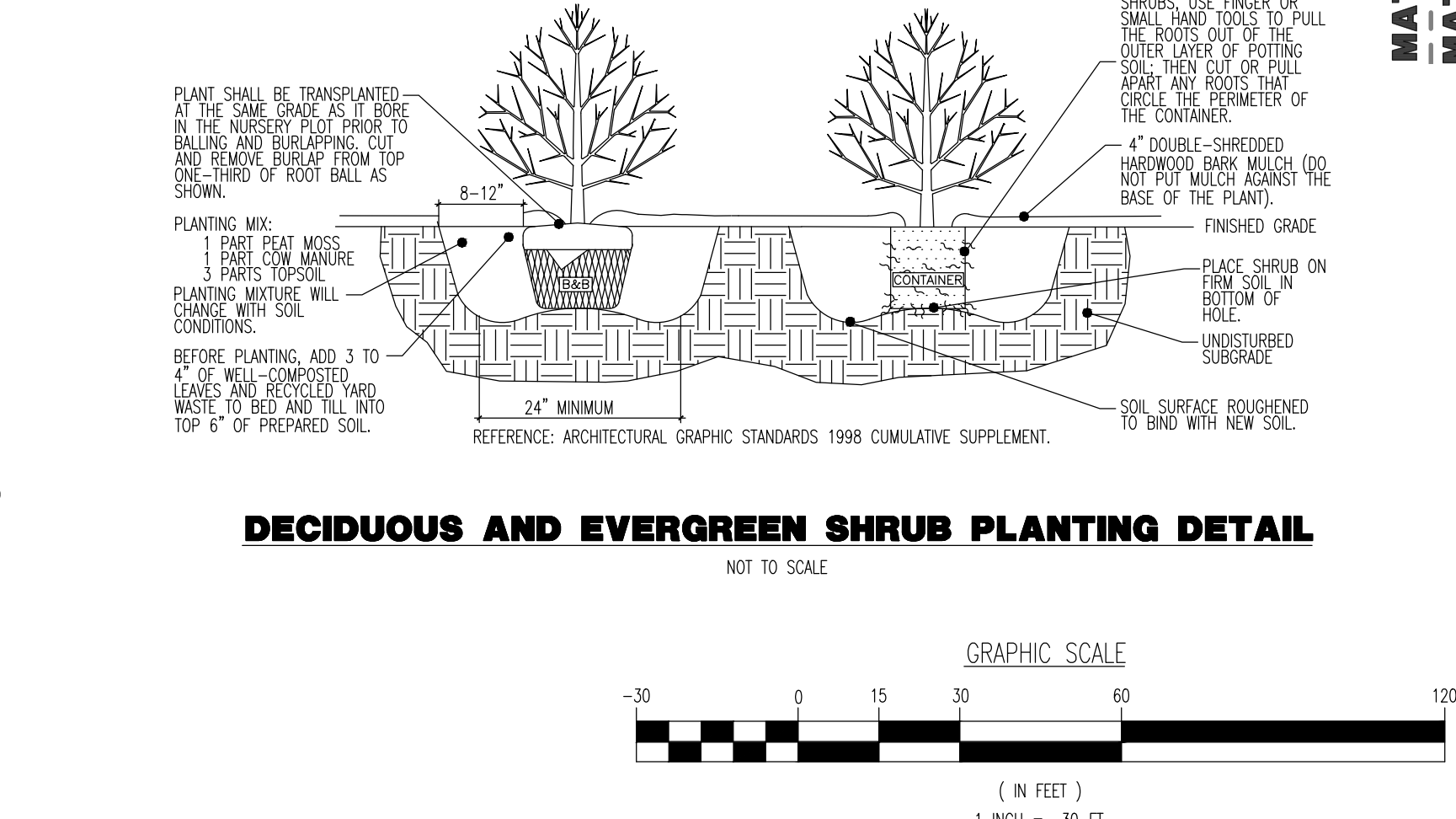
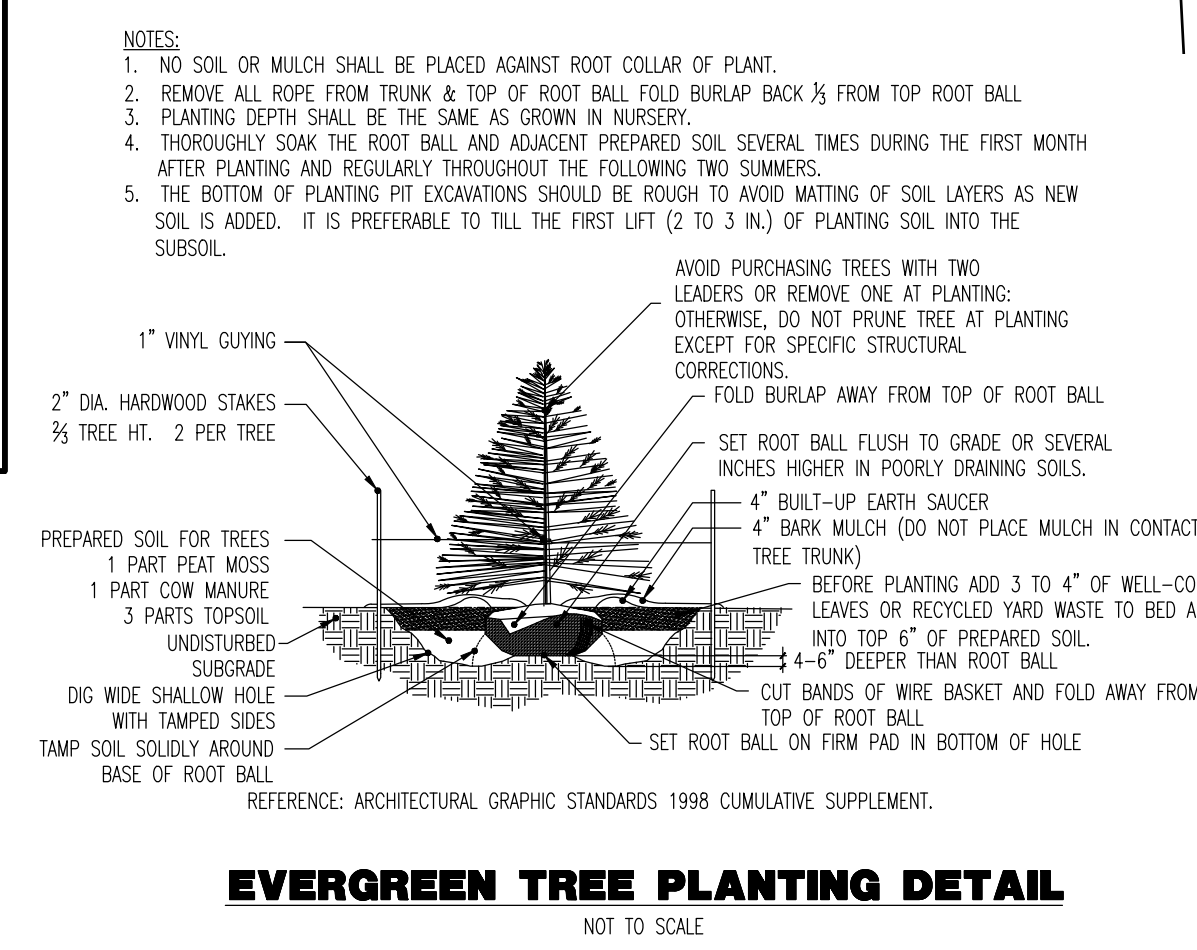


NOTE: IF ANY DISCREPANCIES OCCUR BETWEEN AMOUNTS SHOWN IN THE PLAN AND THE PLANT LIST, THE PLAN SHALL DICTATE.

*MAJOR TREE REPLACEMENT TREE
*MINOR TREE REPLACEMENT TREE

TOTAL TREES TO BE REMOVED AND REPLACED: 41 MINOR REMOVED, 41 MINOR PROPOSED AS REPLACEMENT
51 MAJOR REMOVED, 51 MAJOR PROPOSED AS REPLACEMENT

1. TREE REMOVAL PERMIT SHALL BE SECURED BY THE CONTRACTOR PRIOR TO ANY SITE DISTURBANCE IN ACCORDANCE WITH TOWNSHIP ORDINANCE SECTION 25-27.4
2. PROPOSED FINAL LANDSCAPING LOCATIONS TO BE ADJUSTED IN THE FIELD DURING INSTALLATION AS REQUIRED.



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TRAIN BY:	DESIGNED BY:	CHECKED BY:	CHECKED BY:
RRR	RJC	JCS	JGJ

PROJECT: **ALTERA 769, LLC**
PROPOSED SITE IMPROVEMENTS
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769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ



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- 7525 Parkview
Clark, New Jersey | T. 973.674.0118
- 2124 2nd Avenue
New York, New York | T. 212.463.0100
- 10150 Park Road
Baltimore, Pennsylvania | T. 410.528.0800
- 14101 New Line
Dallas, Texas | T. 972.234.2100
- 10000 Lyndon
Austin, Texas | T. 512.789.4442
- 10000 Lyndon
Dallas, Texas | T. 972.234.2100
- 16100 Highway 101
Dallas, Texas | T. 972.234.2100

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ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

MARLA A. ROLLER

LICENSED LANDSCAPE ARCHITECT
NEW JERSEY LICENSE No. 21A500053700

LE: LANDSCAPE PLAN

SCALE: (H) 1" = 30'

DATE: 08/17/2022

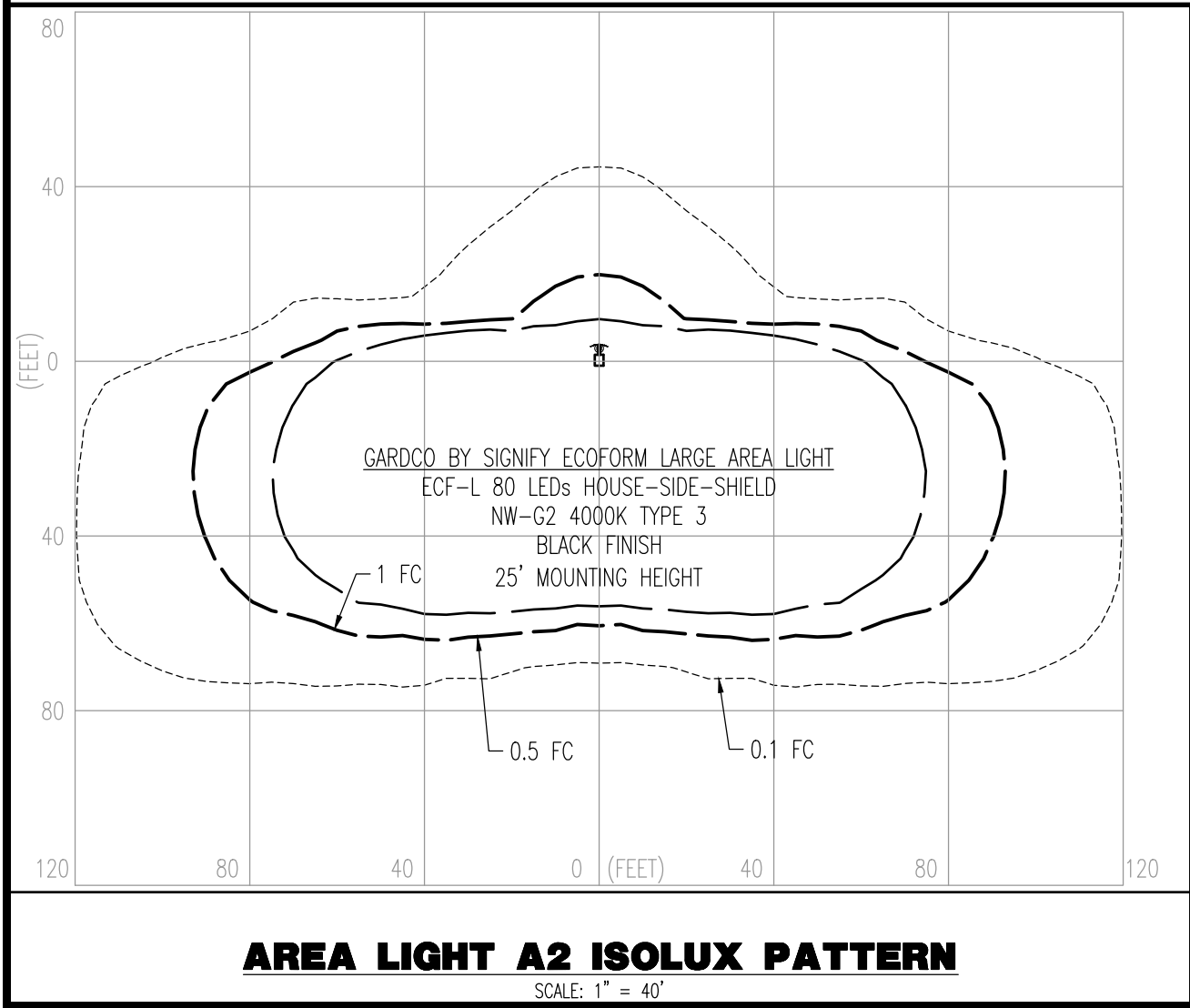
PROJECT No:
2530-99-

SHEET No:

Rev. 4

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8



LIGHTING NOTES

- THIS LIGHTING PLAN ILLUSTRATES ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA) APPROVED METHODS. ACTUAL SITE ILLUMINATION LEVELS AND PERFORMANCE OF LUMINAIRES MAY VARY DUE TO VARIATIONS IN WEATHER, ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER RELATED VARIABLE FIELD CONDITIONS.
- ALL EXISTING CONDITIONS LIGHTING LEVELS ARE REPRESENTATIVE OF AN APPROXIMATION UTILIZING LABORATORY DATA FOR SIMILAR FIXTURES AND/OR ACTUAL FIELD MEASUREMENTS TAKEN WITH A LIGHT METER. DUE TO FACTORS SUCH AS FIXTURE MAINTENANCE, EQUIPMENT TOLERANCES, WEATHER CONDITIONS, ETC., ACTUAL LIGHTING LEVELS MAY DIFFER AND THE LIGHTING LEVELS DEPICTED ON THIS PLAN SHOULD BE CONSIDERED AS APPROXIMATE.
- CONDUITS SHALL BE INSTALLED A MINIMUM OF 2 FEET BEHIND GUYARD POSTS.
- ALL WIRING METHODS AND EQUIPMENT CONSTRUCTION SHALL CONFORM TO THE CURRENT NATIONAL ELECTRICAL CODE.
- REFER TO ARCHITECTURAL PLANS FOR SITE LIGHTING DIAGRAM.

LUMINAIRE SCHEDULE

SYMBOL	QTY	LABEL	ARRANGEMENT	LLF	MOUNTING HEIGHT	LUM. LUMENS	MANUFACTURER	DESCRIPTION	FILENAME
	4	A2	SINGLE	0.99	25'	29636	GARDCO-SIGNIFY	ECF-L-80L-1.2A-NW-C2-3-HIS	ecf-l-80l-1.2a-nw-g2-3-his.i

ISO CURVES ARE MAINTAINED AND SHOWN AT 0.5 AND 0.1 FC.

(FW) = FLUSH MOUNT FOUNDATION. (PED) = PEDESTAL FOUNDATION.
THE CALCULATIONS SHOWN WERE MADE UTILIZING ACCEPTED PROCEDURES OF THE ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA. VARIATIONS IN LAMP OUTPUT, BALLAST OUTPUT, LINE VOLTAGE, DIRT DEPRECIATION, AND OTHER FACTORS MAY AFFECT ACTUAL RESULTS. UNLESS OTHERWISE STATED, ALL RESULTS ARE MAINTAINED VALUES, UTILIZING ACCEPTED LIGHT LOSS FACTORS (LLF).

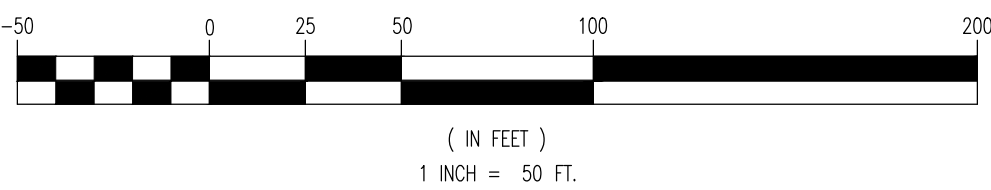
CALCULATION SUMMARY

LABEL	CALCTYPE	UNITS	AVG	MAX	MIN	AVG/MIN	MAX/MIN
OVERALL	ILLUMINANCE	FC	1.55	13.0	0	N/A	N/A
PARKING AREA	ILLUMINANCE	FC	3.67	12.8	1.0	3.67	12.80
PEDESTRIAN WALKWAY	ILLUMINANCE	FC	3.49	12.0	0.9	3.87	13.33

TOWNSHIP NOTE

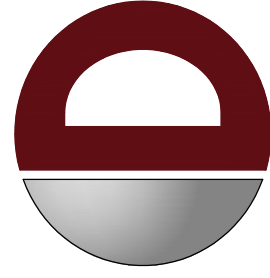
GENERAL HOURS OF OPERATION FOR THE PROPOSED LIGHTING SHALL BE BETWEEN 5 PM AND 11 PM WITH EXCEPTION OF LIGHTING NEEDED FOR SECURITY PURPOSES.

GRAPHIC SCALE



THIS PLAN TO BE UTILIZED FOR LIGHTING PURPOSES ONLY

SEE SHEET 15 OF 15 FOR ADDITIONAL LIGHTING DETAILS



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OWNER: BY: DESIGNED BY: CHECKED BY: DRAWN BY: JCU JCS JJC JJC

PROJECT: ALTERA 769, LLC PROPOSED SITE IMPROVEMENTS BLOCK 166.15, LOT 9 769 NORTHFIELD AVENUE (CR 508) TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ



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ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. 55851

JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. 47204

TITLE:

LIGHTING PLAN

SCALE: (H) 1"=30'

DATE: 08/17/2022

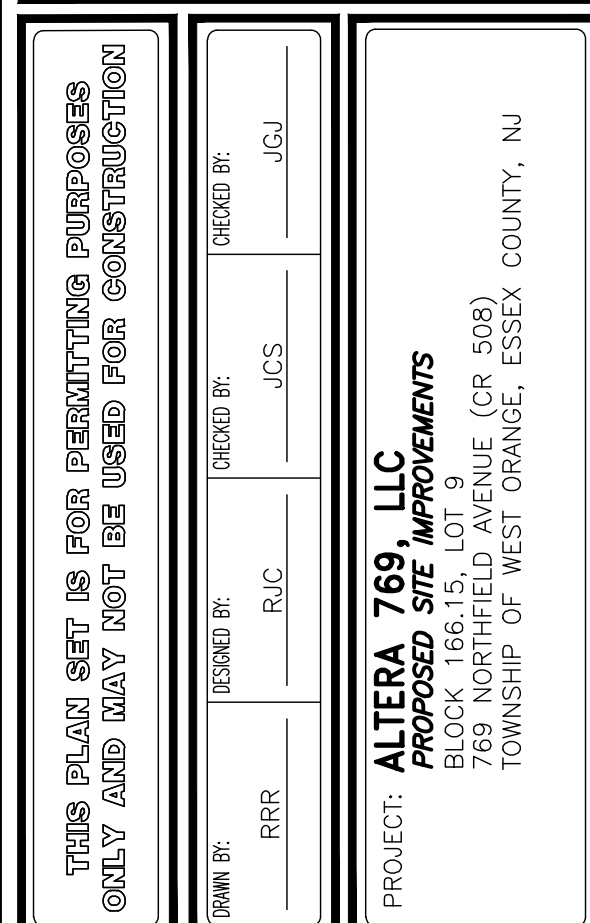
PROJECT No: 2530-99-006

SHEET No:

9

Rev. #:

OF 15 0

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PHASE 1: INSTALL SOIL EROSION SEDIMENT CONTROL MEASURES INCLUDING DOWN SLOPE PERMETER SILT FENCING AND TREE PROTECTION FENCING. (1 DAY)
PHASE 2: CLEAR AND ROUGH GRADE FOR OTHER STRUCTURES REQUIRING EXCAVATION. (2 WEEKS)
PHASE 3: EXCAVATE, CONSTRUCT AND INSTALL UNDERGROUND PIPING AND DRAINAGE STRUCTURES. (3-4 WEEKS)
PHASE 4: COMPLETE RETAINING WALL CONSTRUCTION. (2-3 MONTHS)
PHASE 5: EXCAVATE CONSTRUCT AND INSTALL SITE IMPROVEMENTS INCLUDING CURBING. (3 WEEKS)
PHASE 6: FINISH GRADE SITE (1 WEEK)
PHASE 7: INSTALL PAVERS, CONCRETE, AND FINAL VEGETATION INCLUDING SEEDING AND LANDSCAPING. (2 WEEKS)
PHASE 8: REMOVED ALL SOIL EROSION SEDIMENT CONTROL MEASURES INCLUDING INLET PROTECTION, TREE PROTECTION FENCING, AND DOWN SLOPE PERMETER SILT FENCING UPON COMPLETION. (1 DAY)

	PROP. LIMIT OF DISTURBANCE LINE
SF	PROP. SILT FENCE LINE
TPF	PROP. TREE PROTECTION FENCE LINE
	PROP. INLET FILTER



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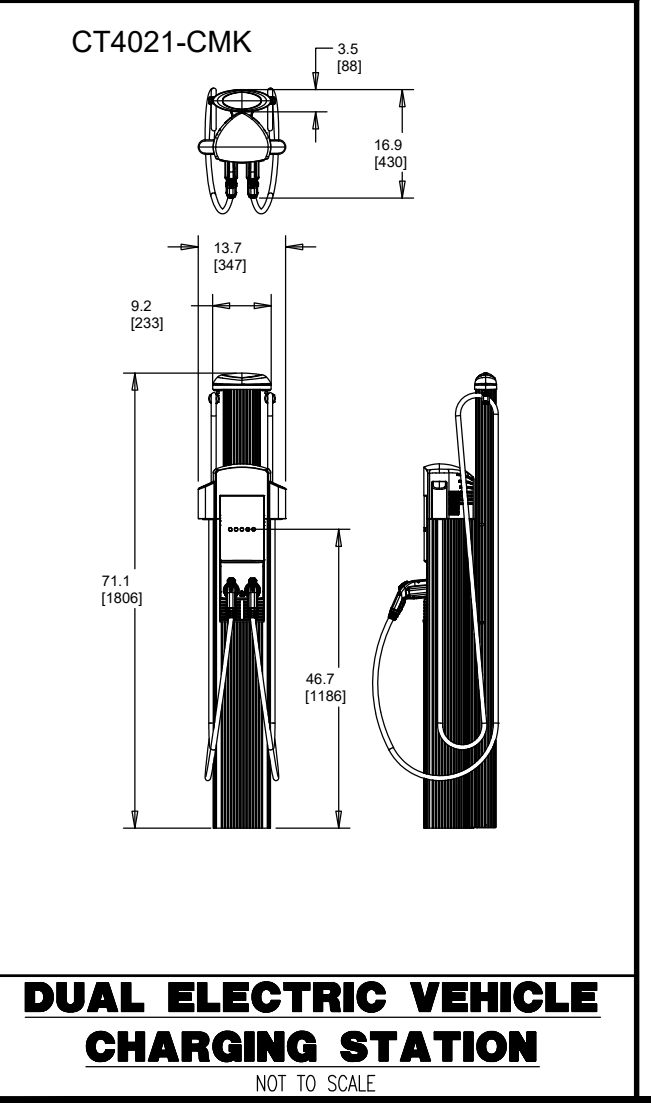
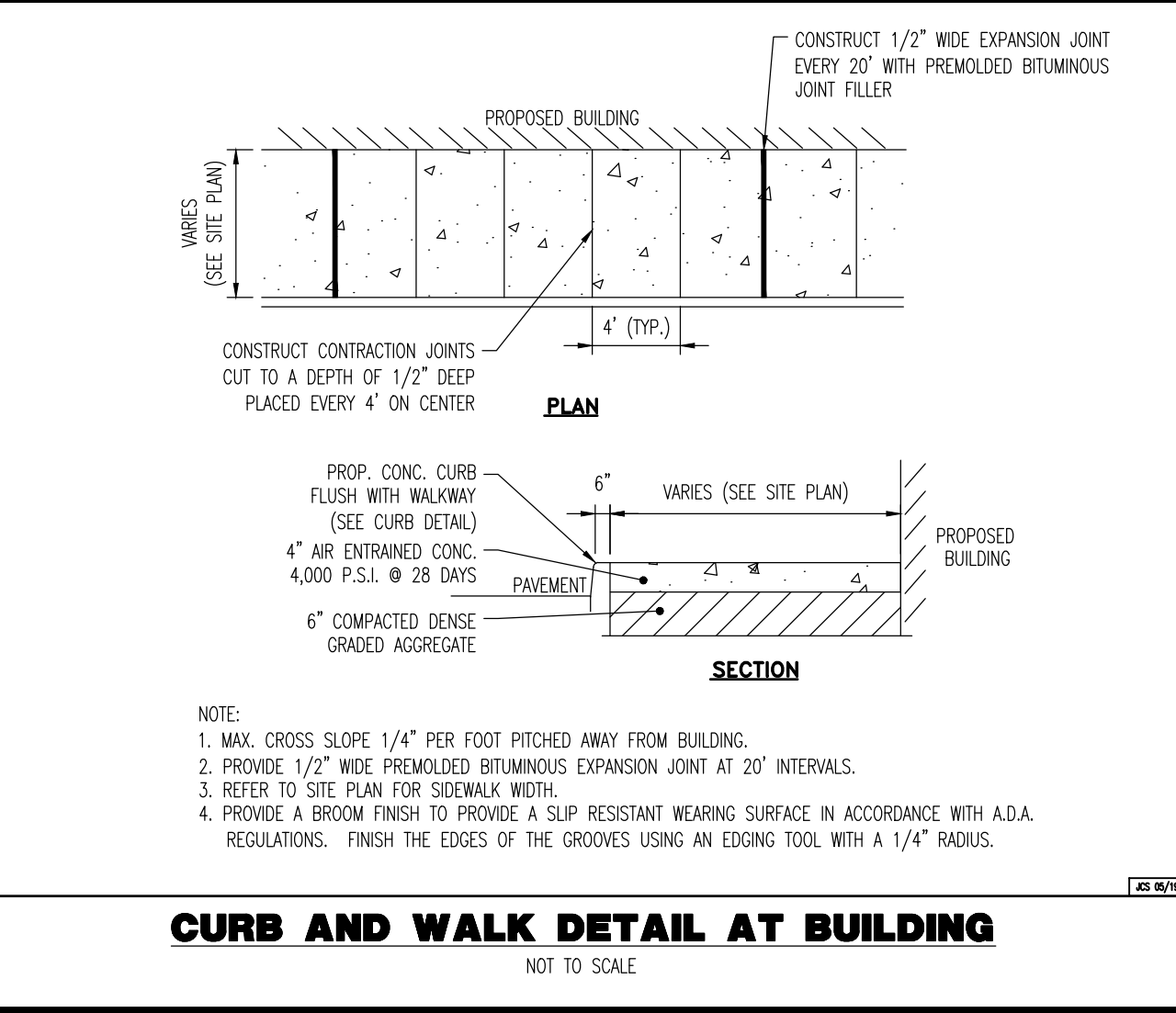
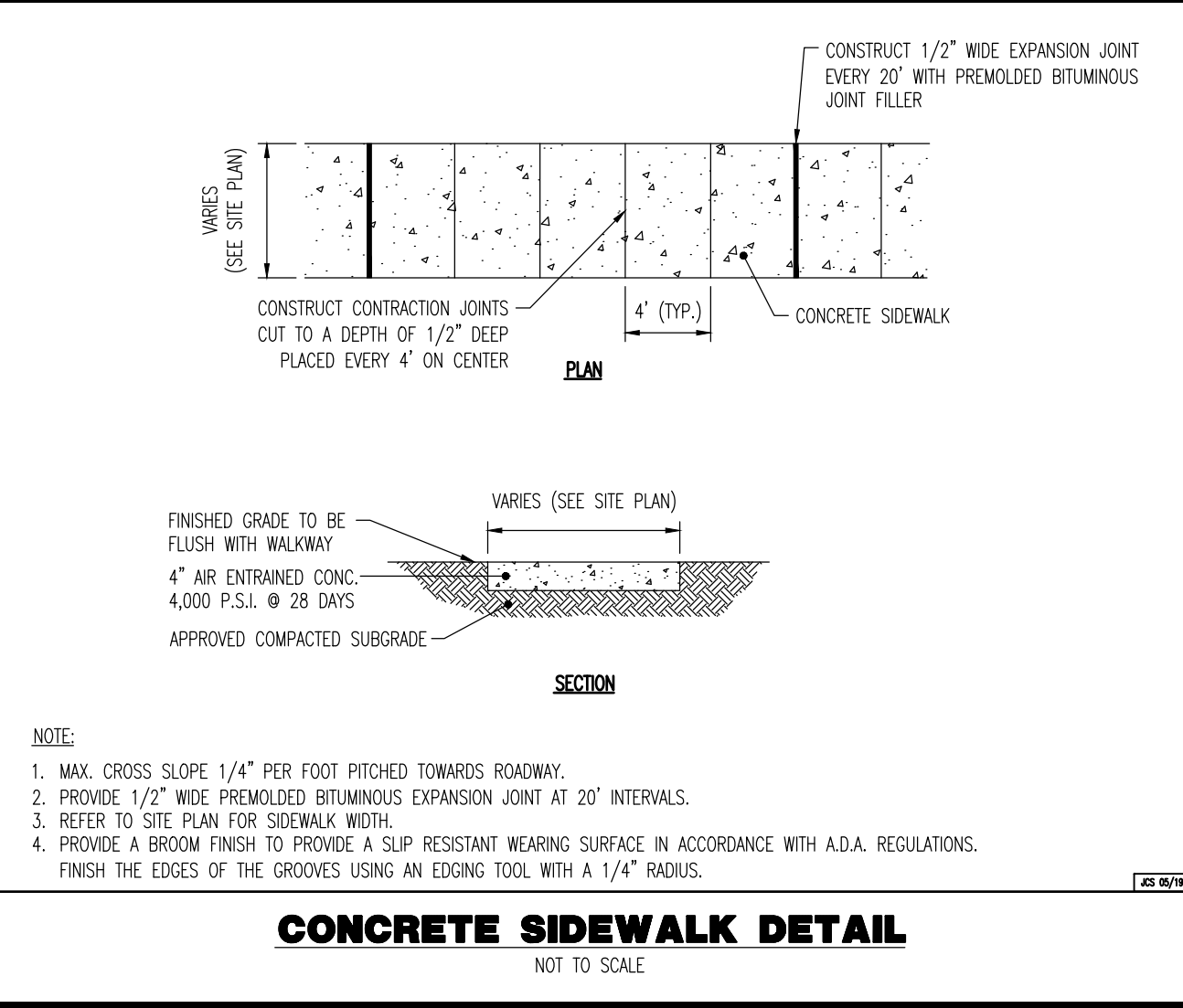
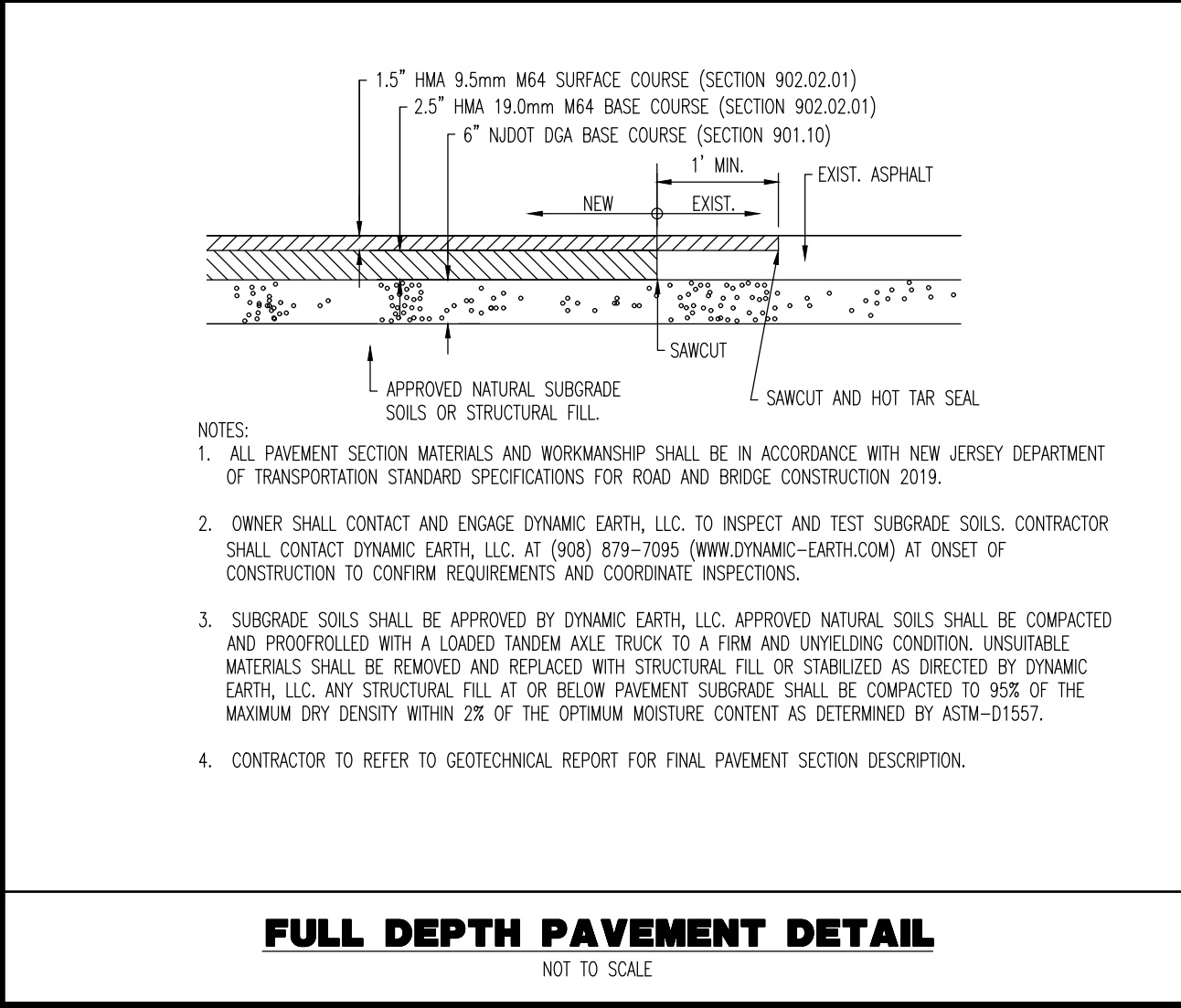
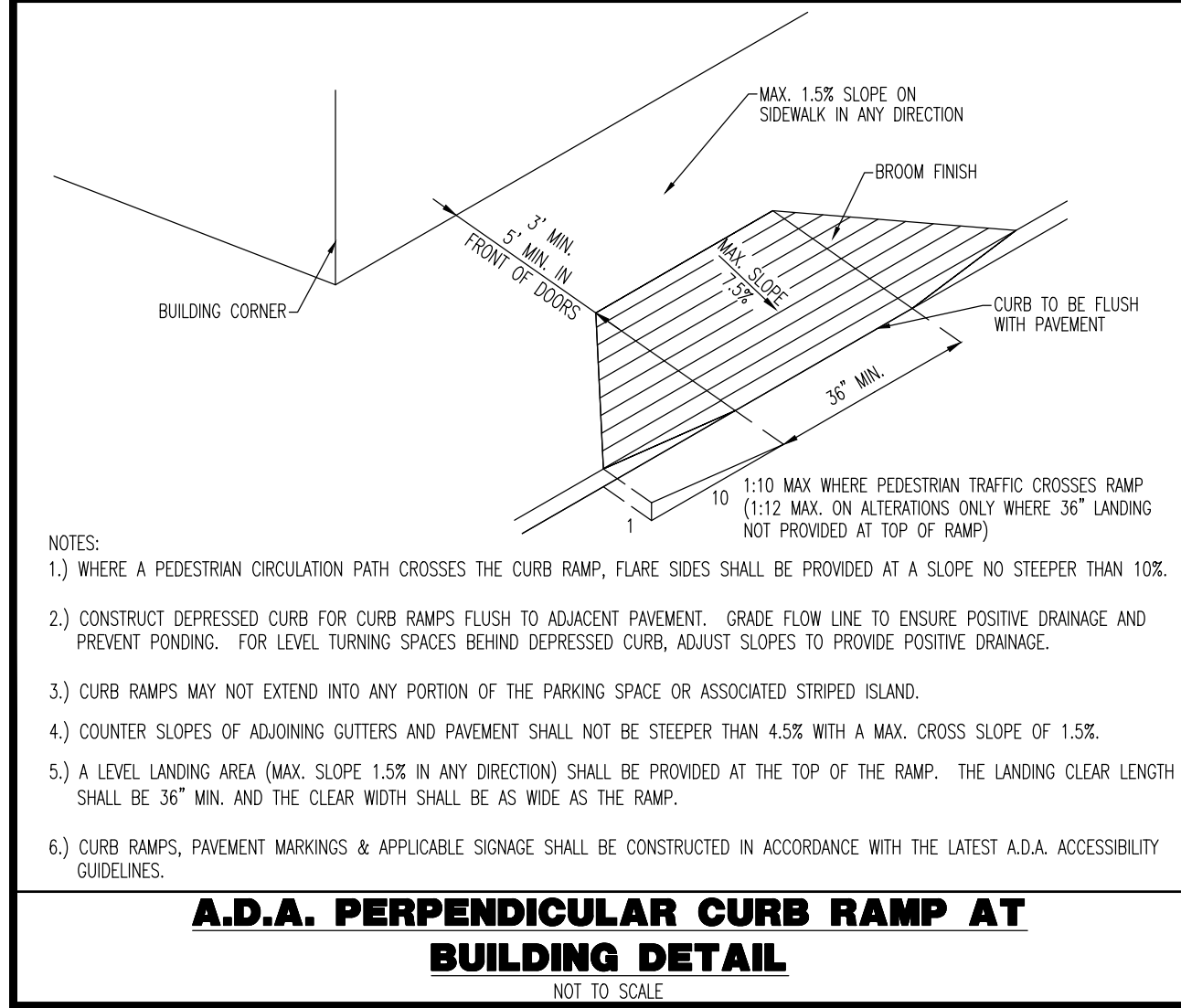
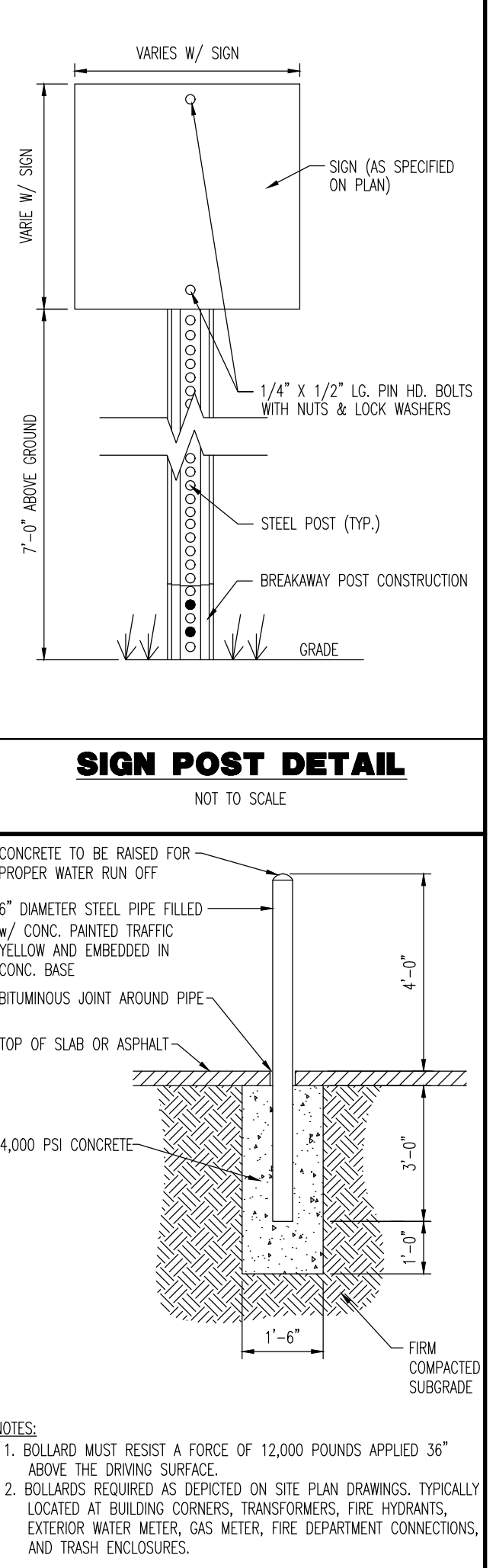
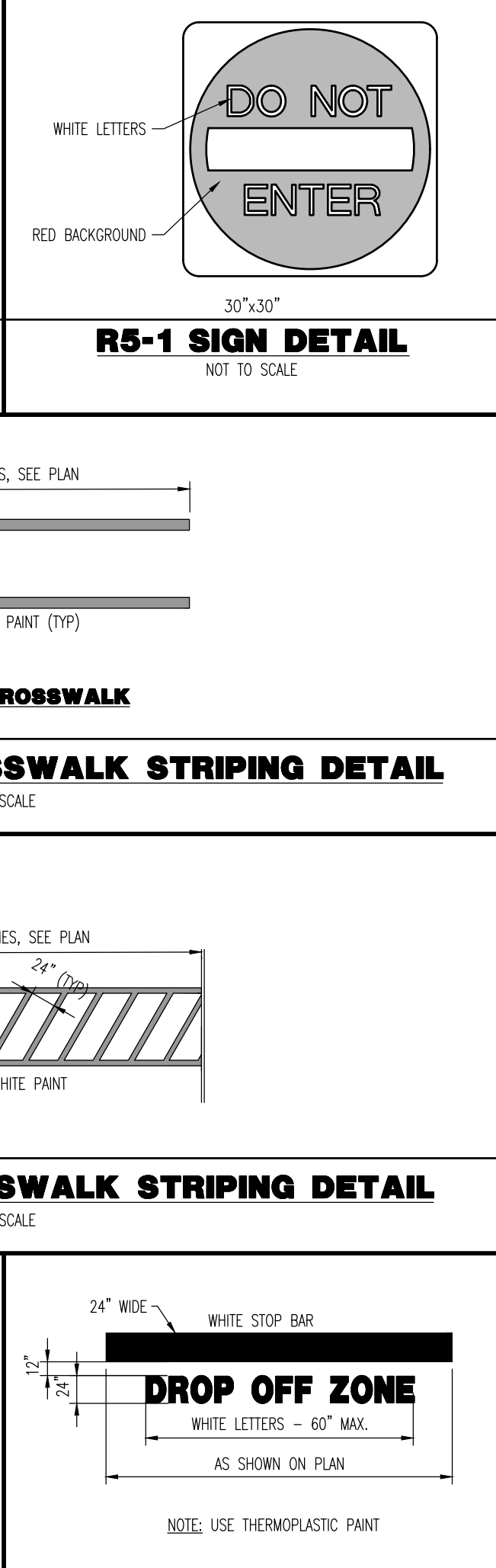
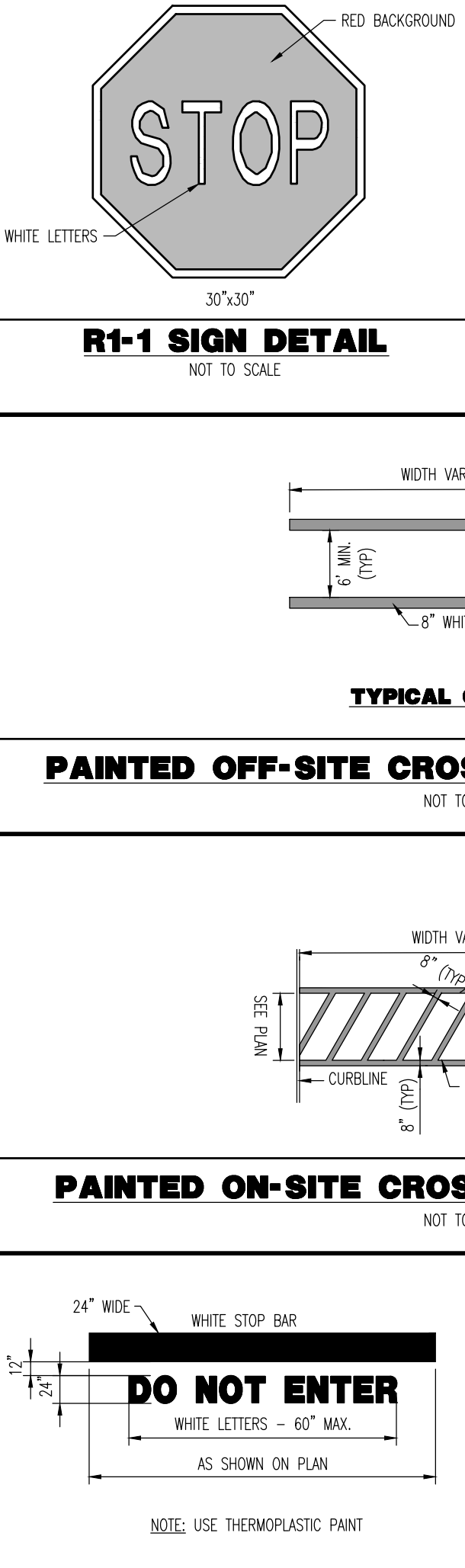
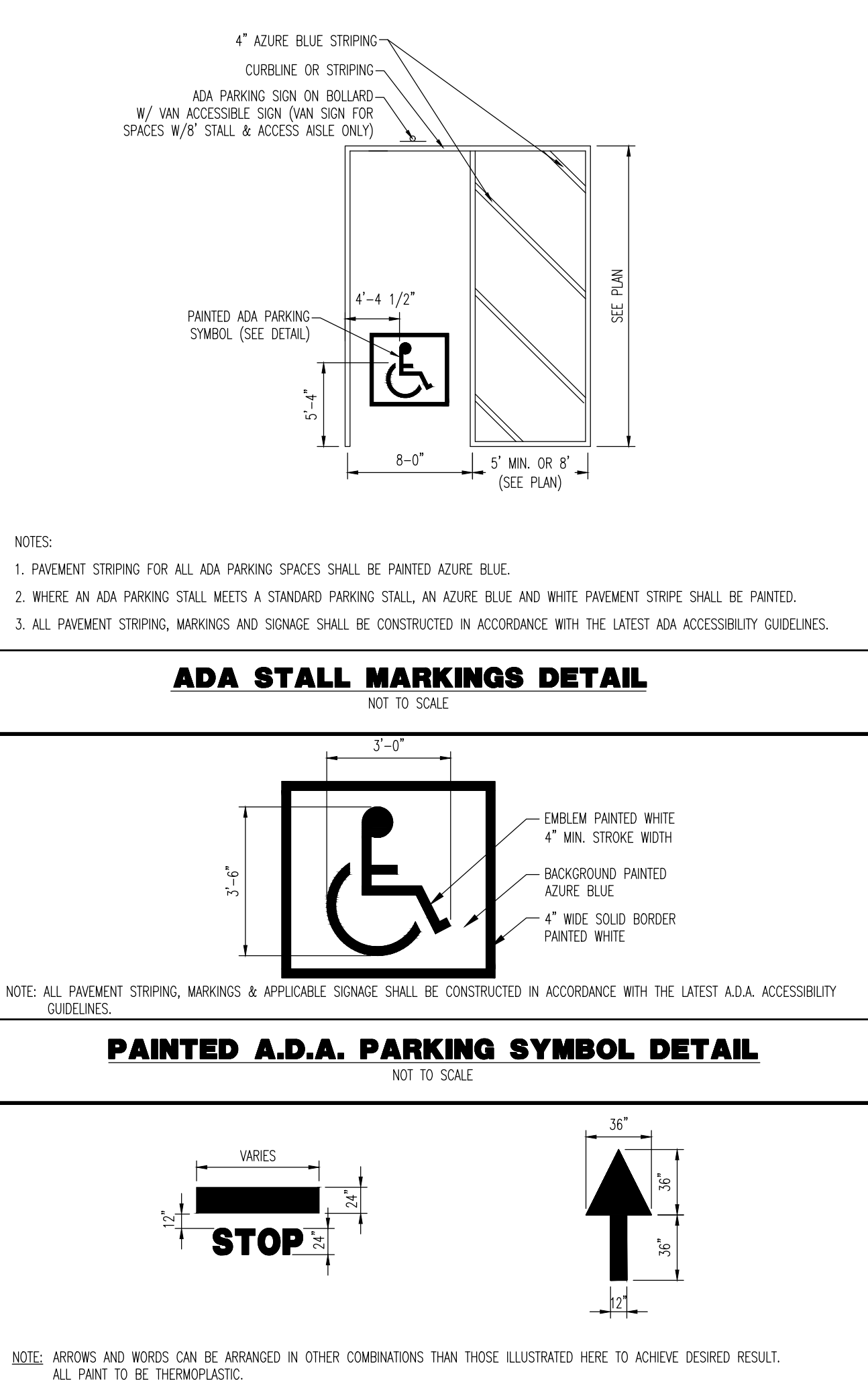
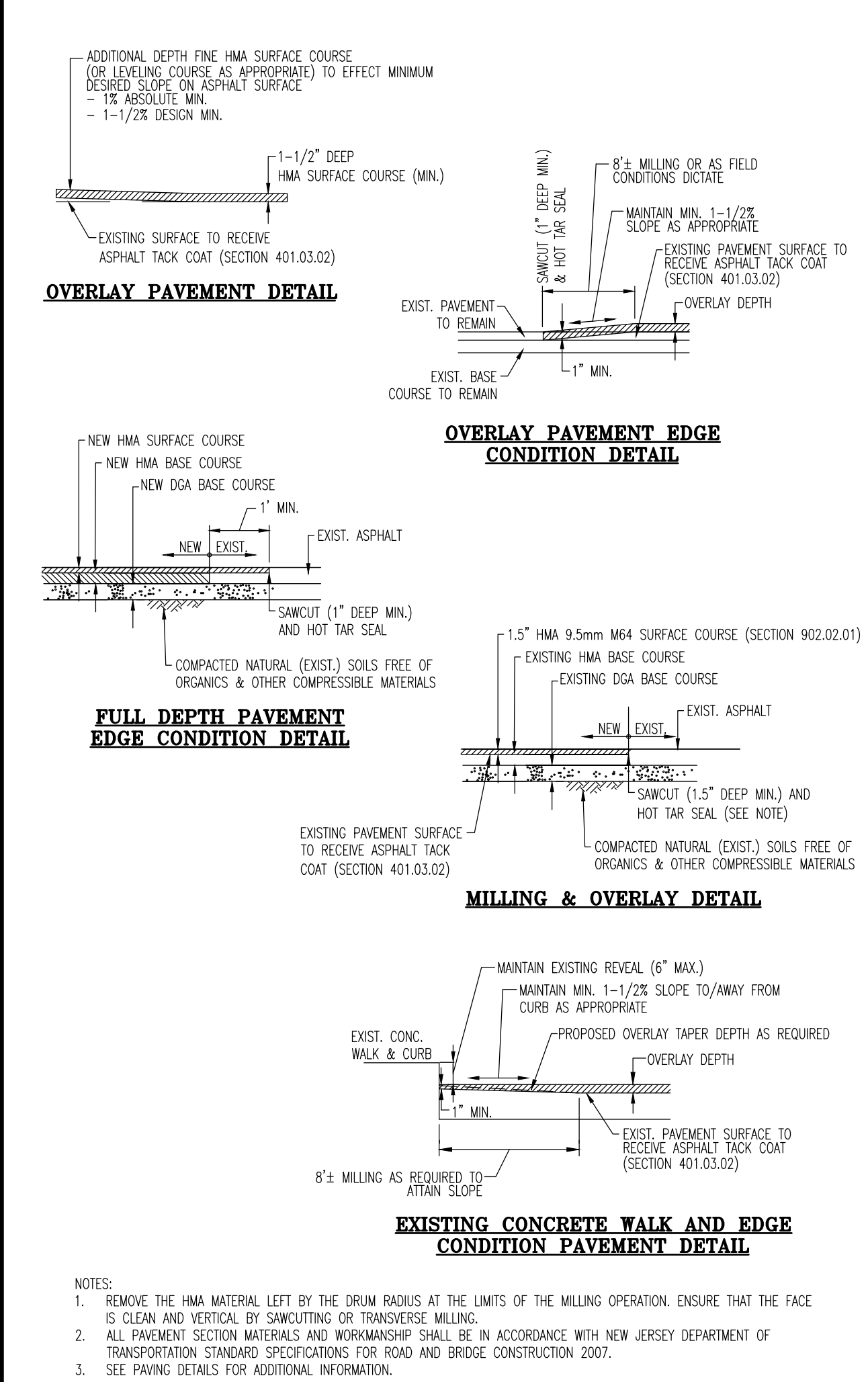
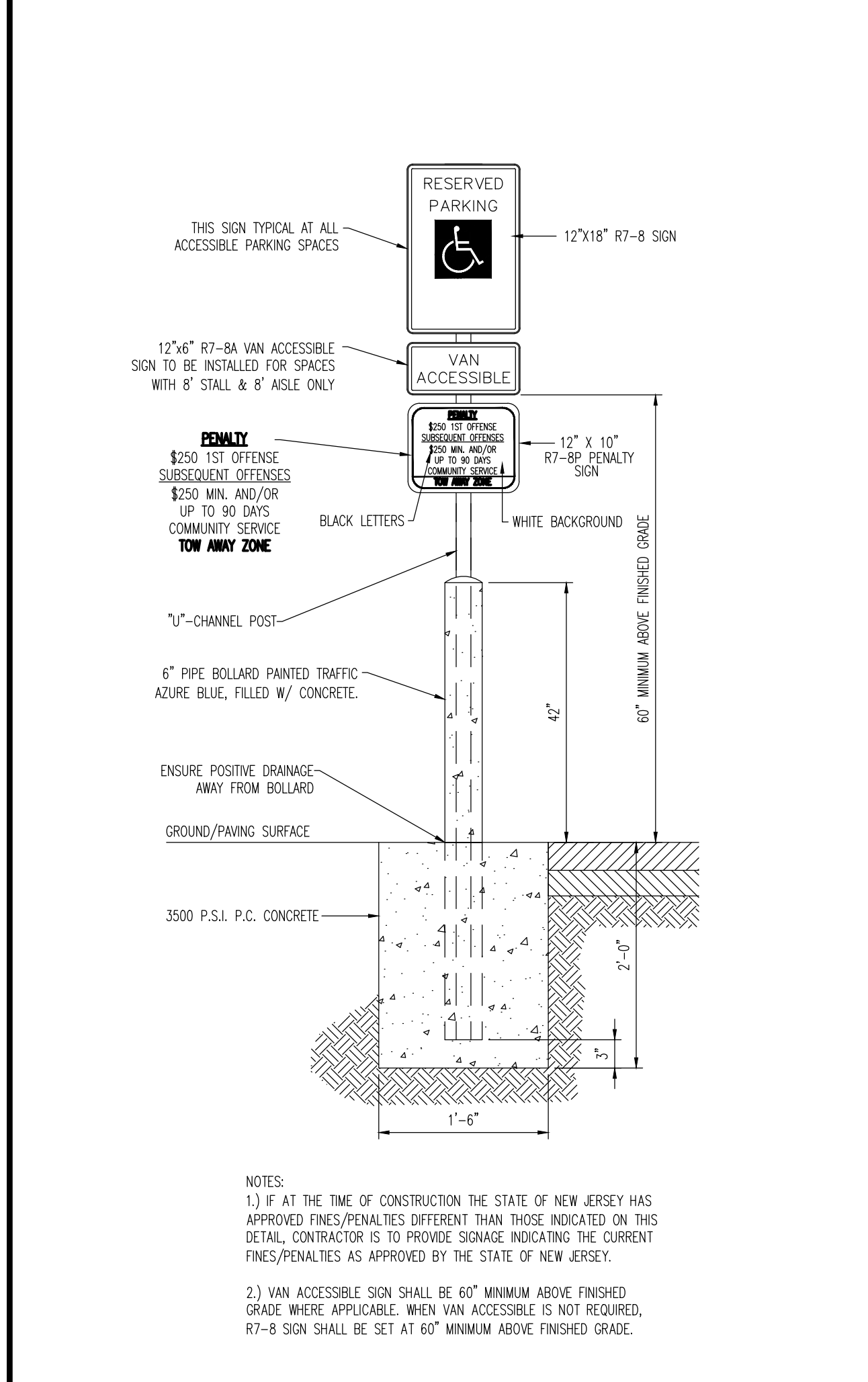
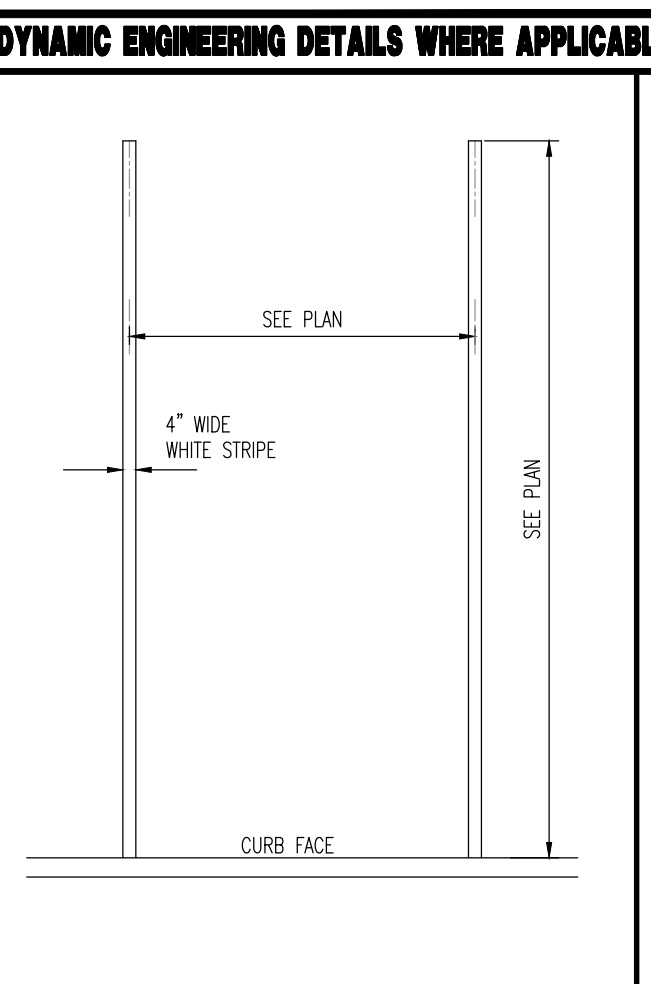
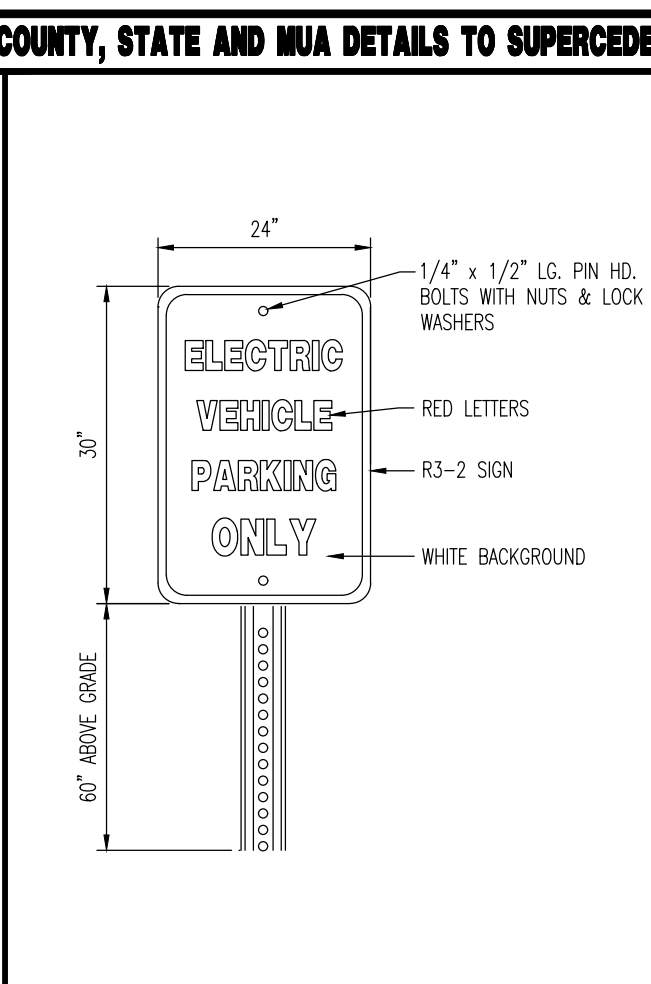
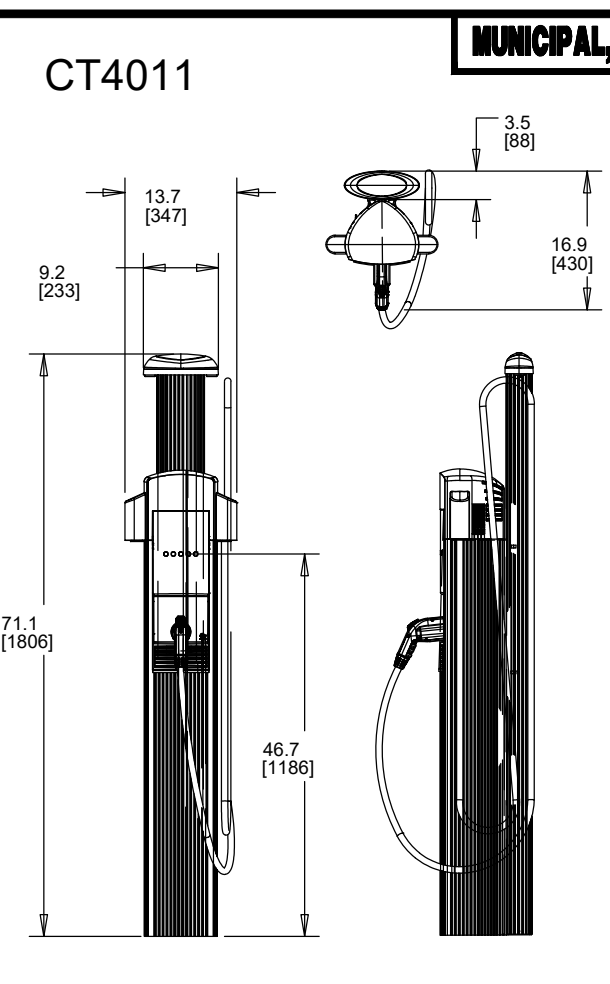
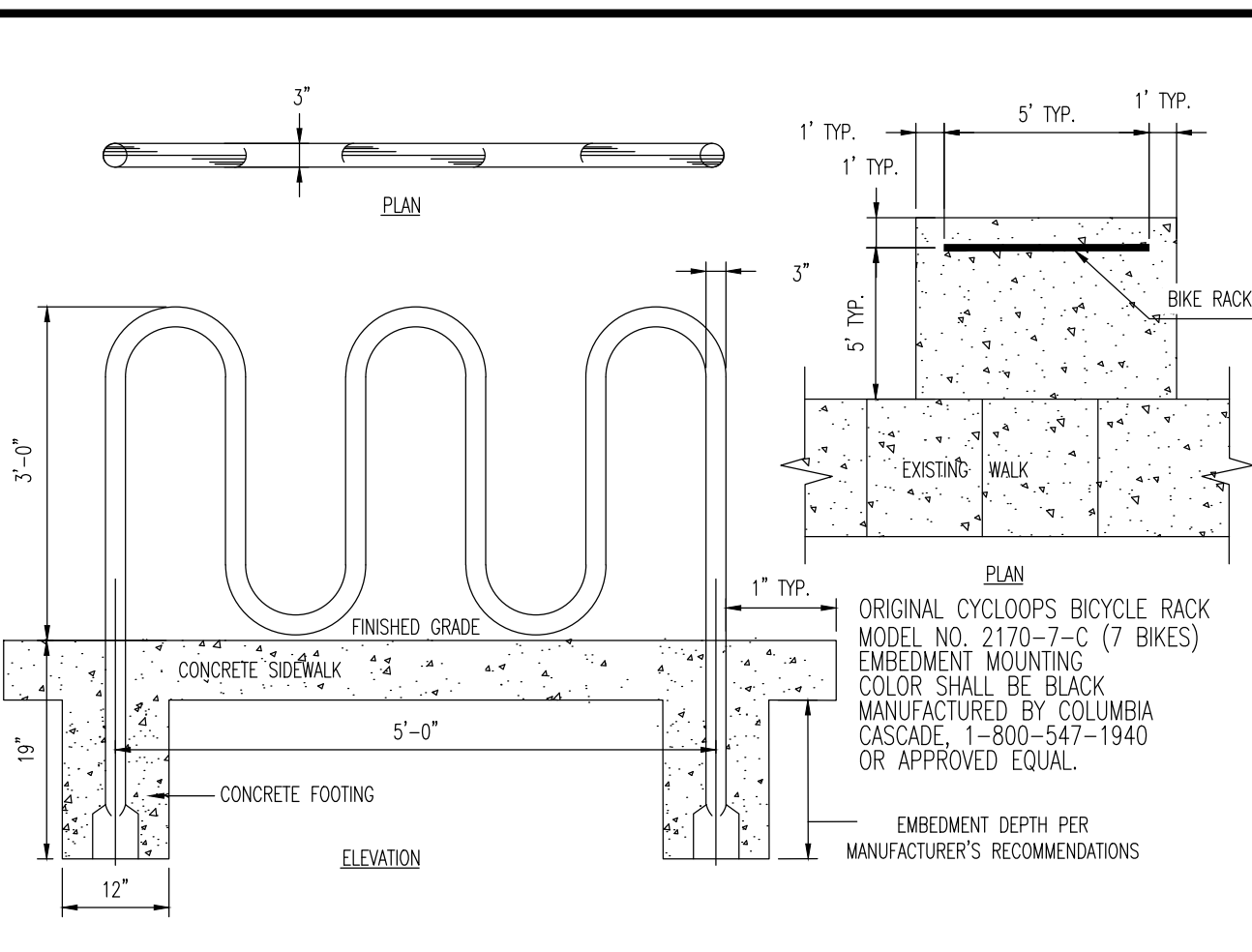
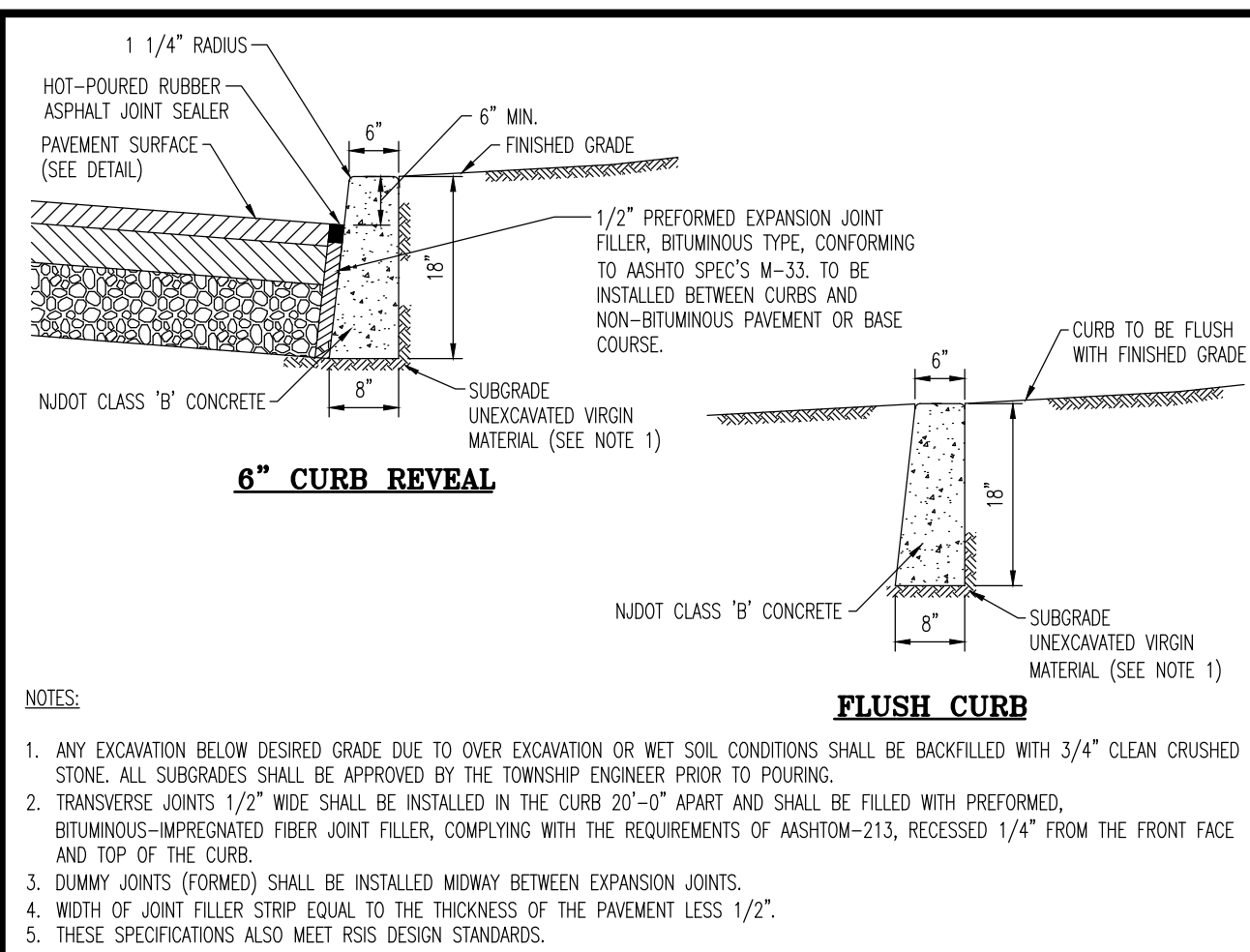
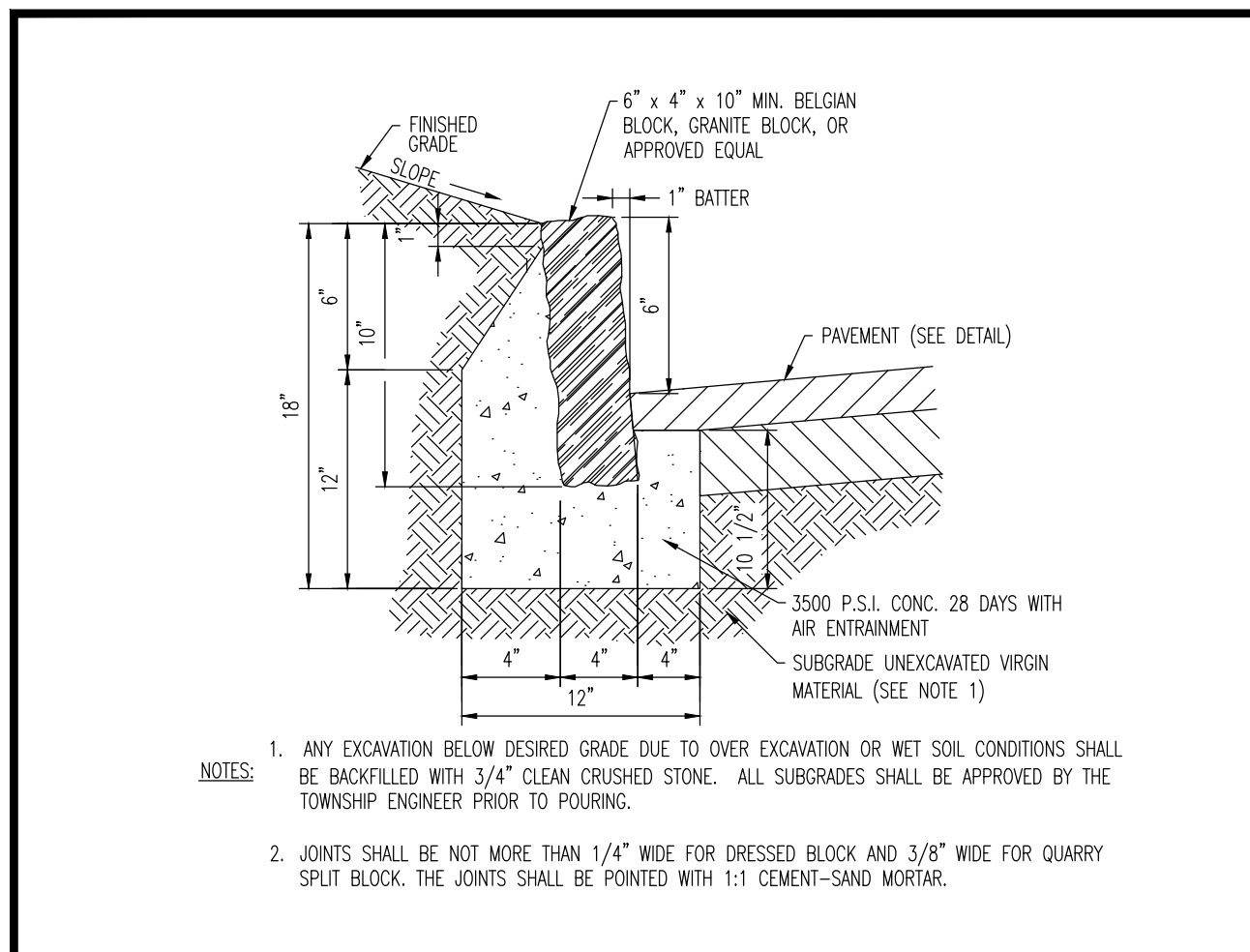
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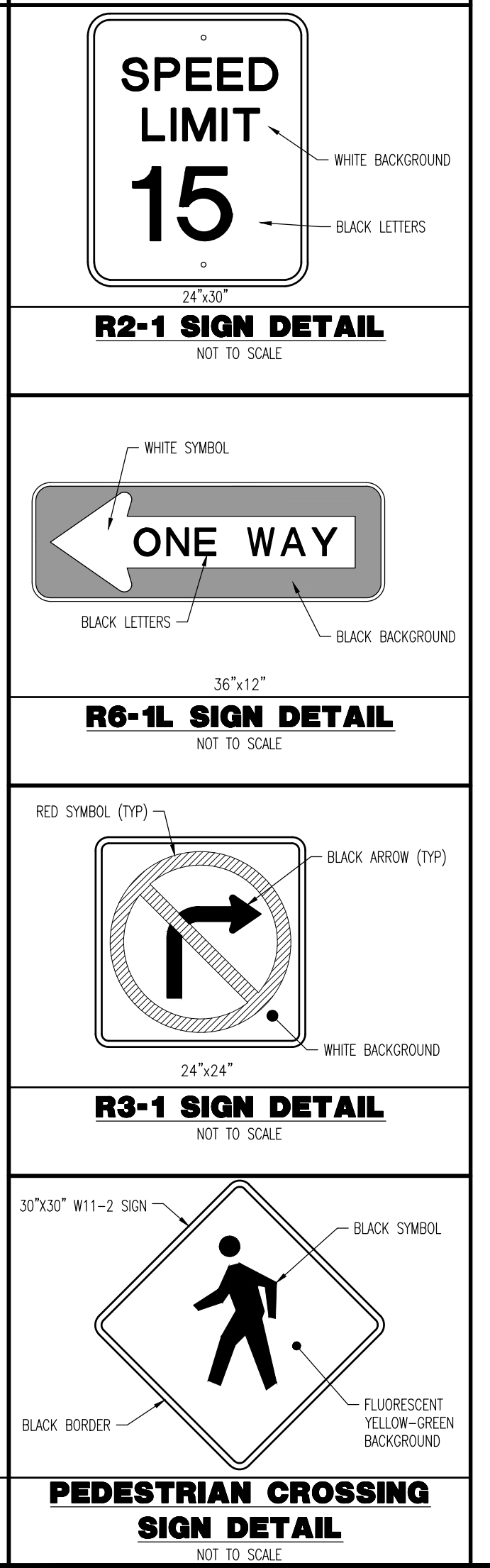
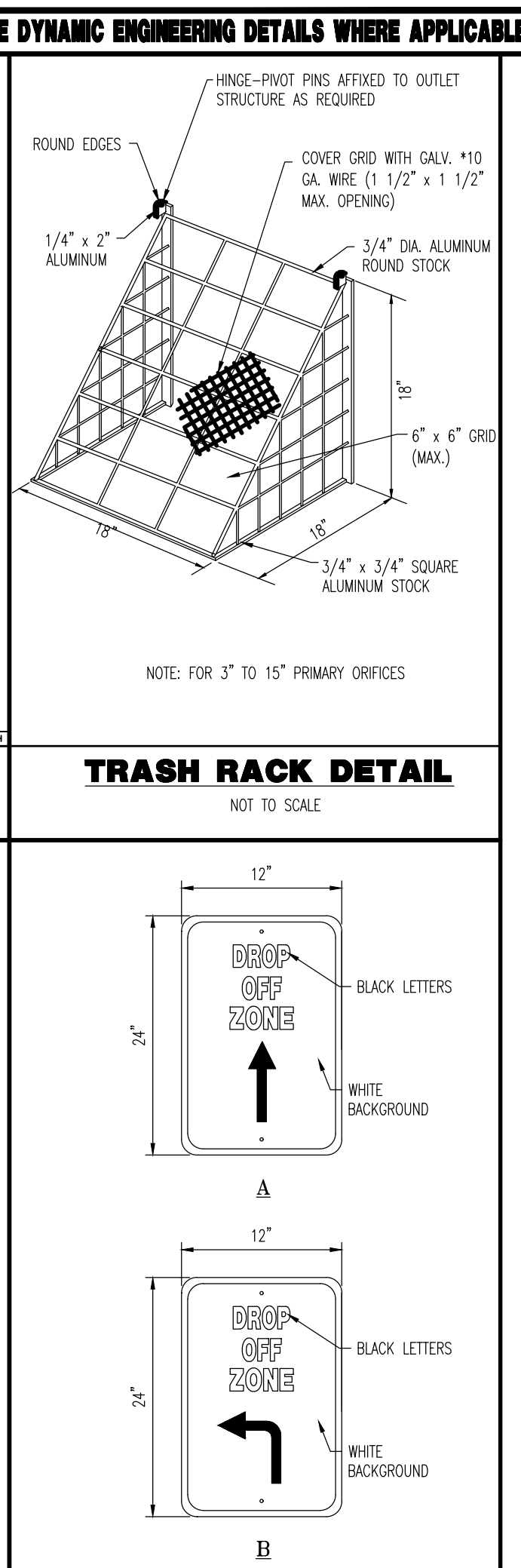
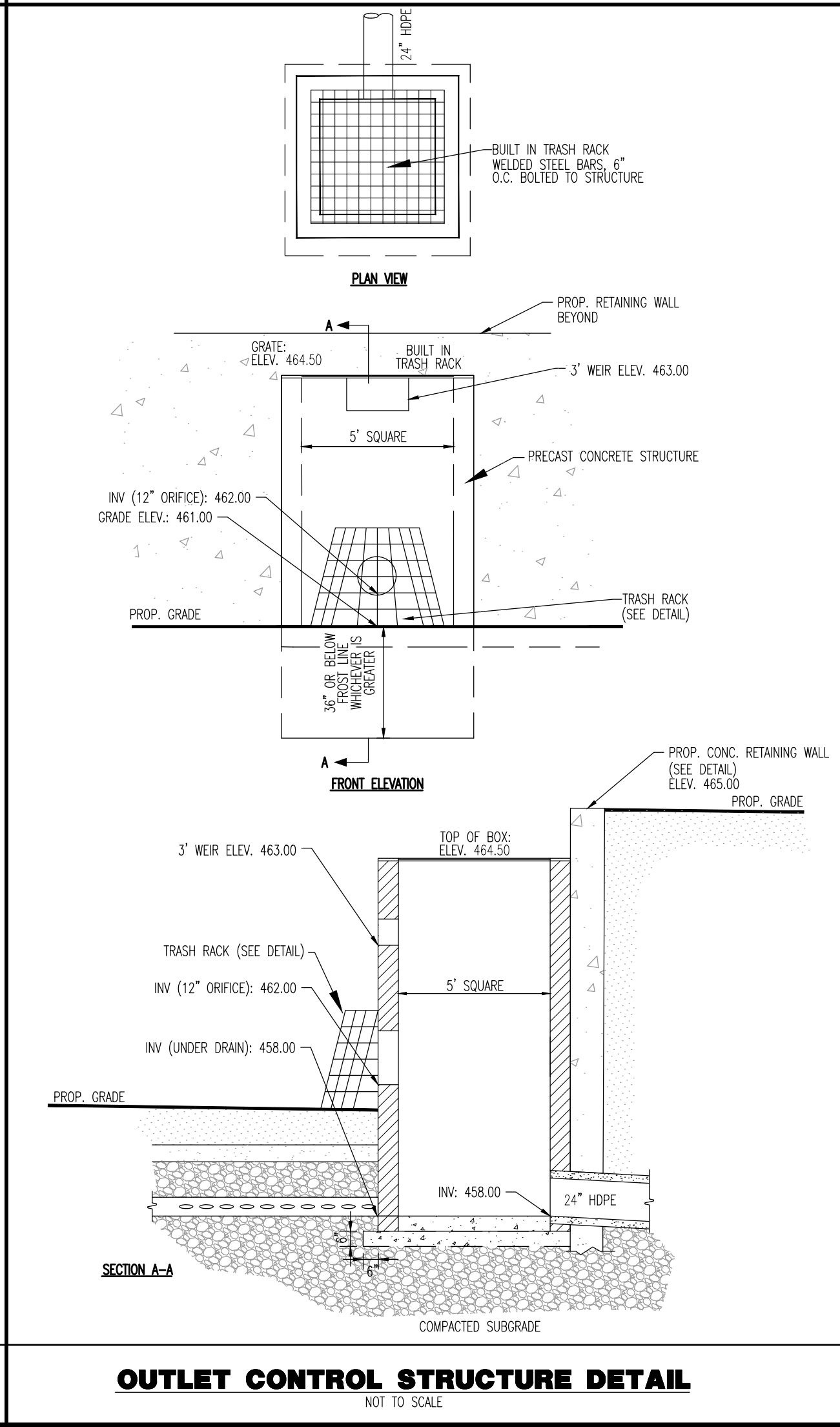
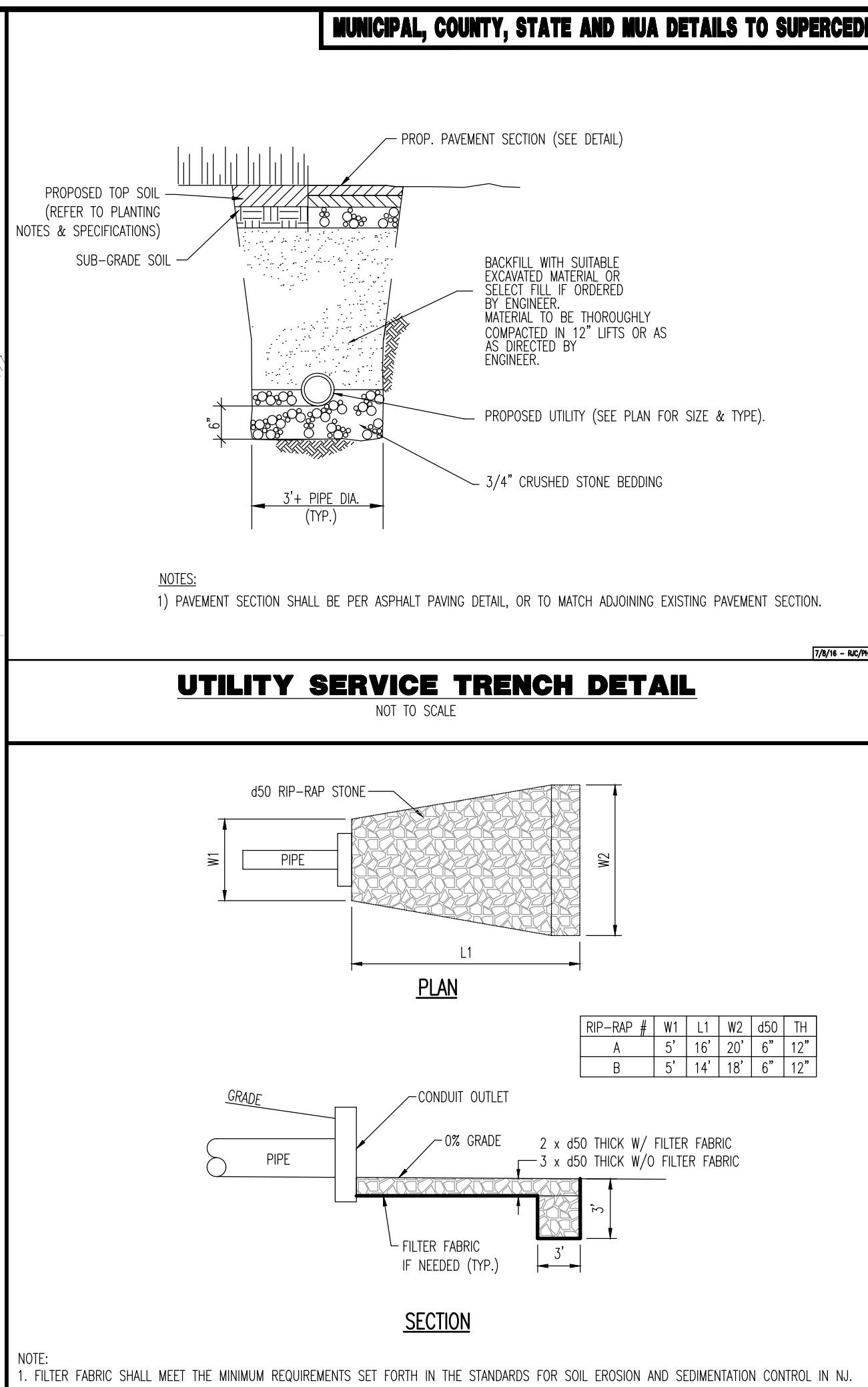
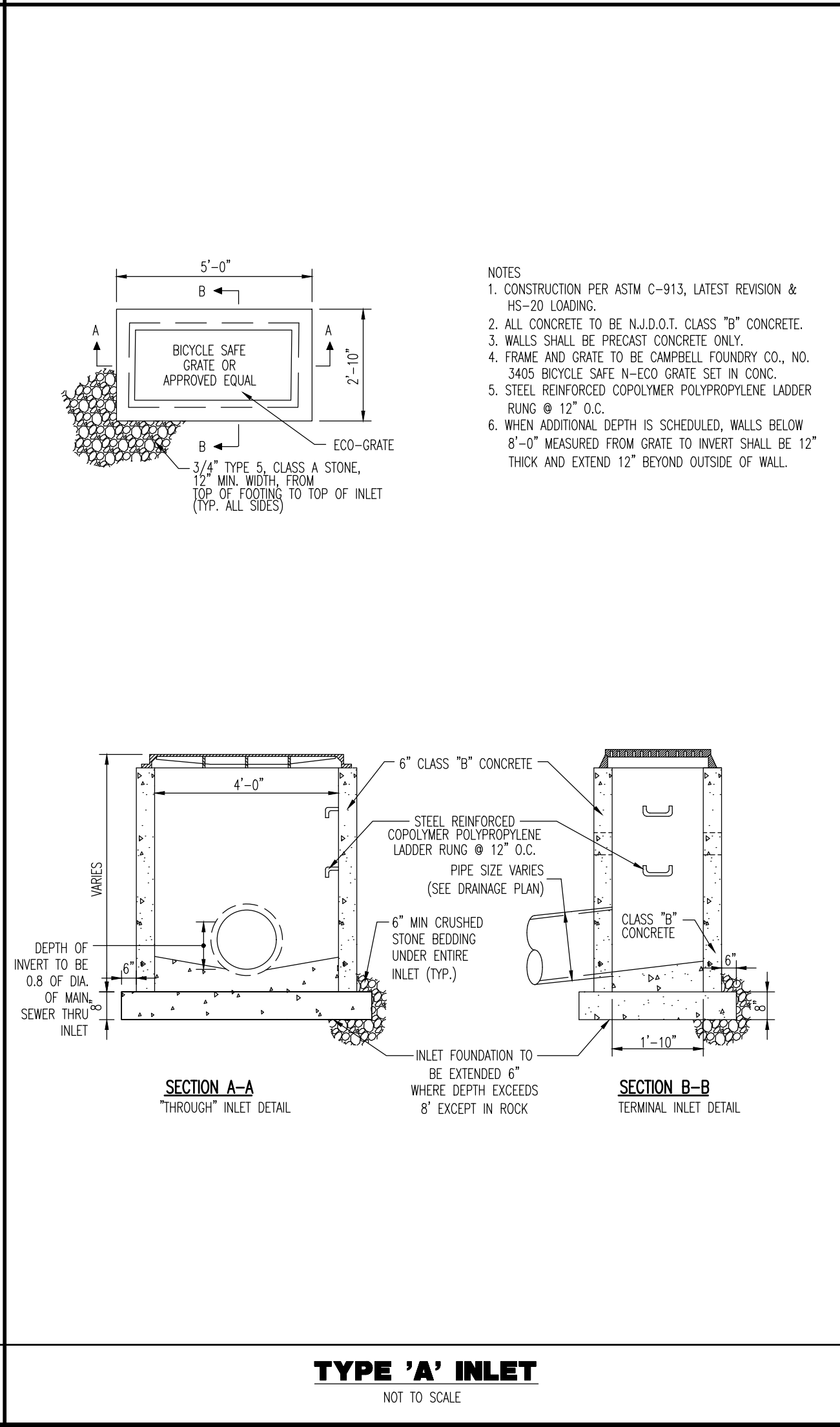
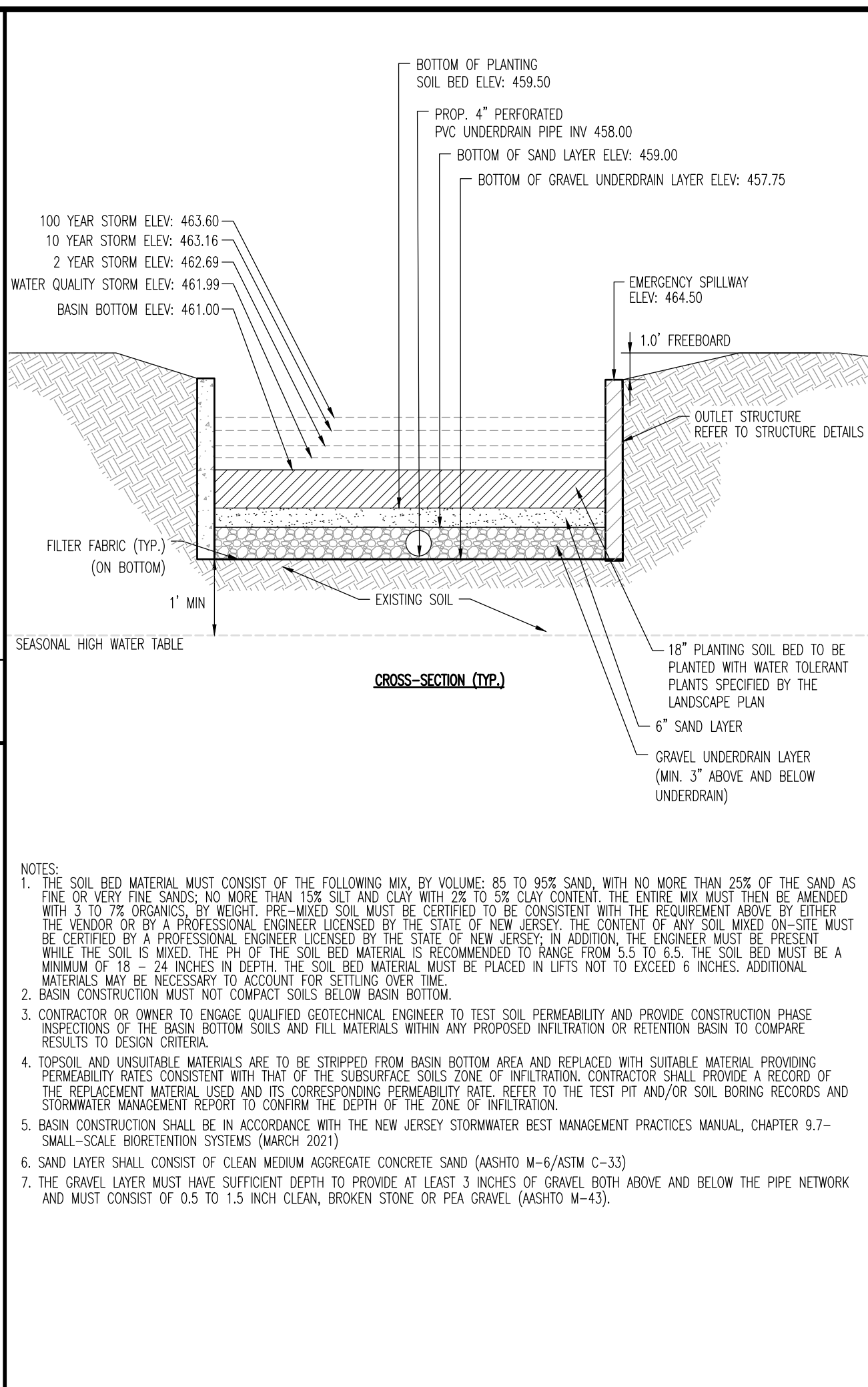
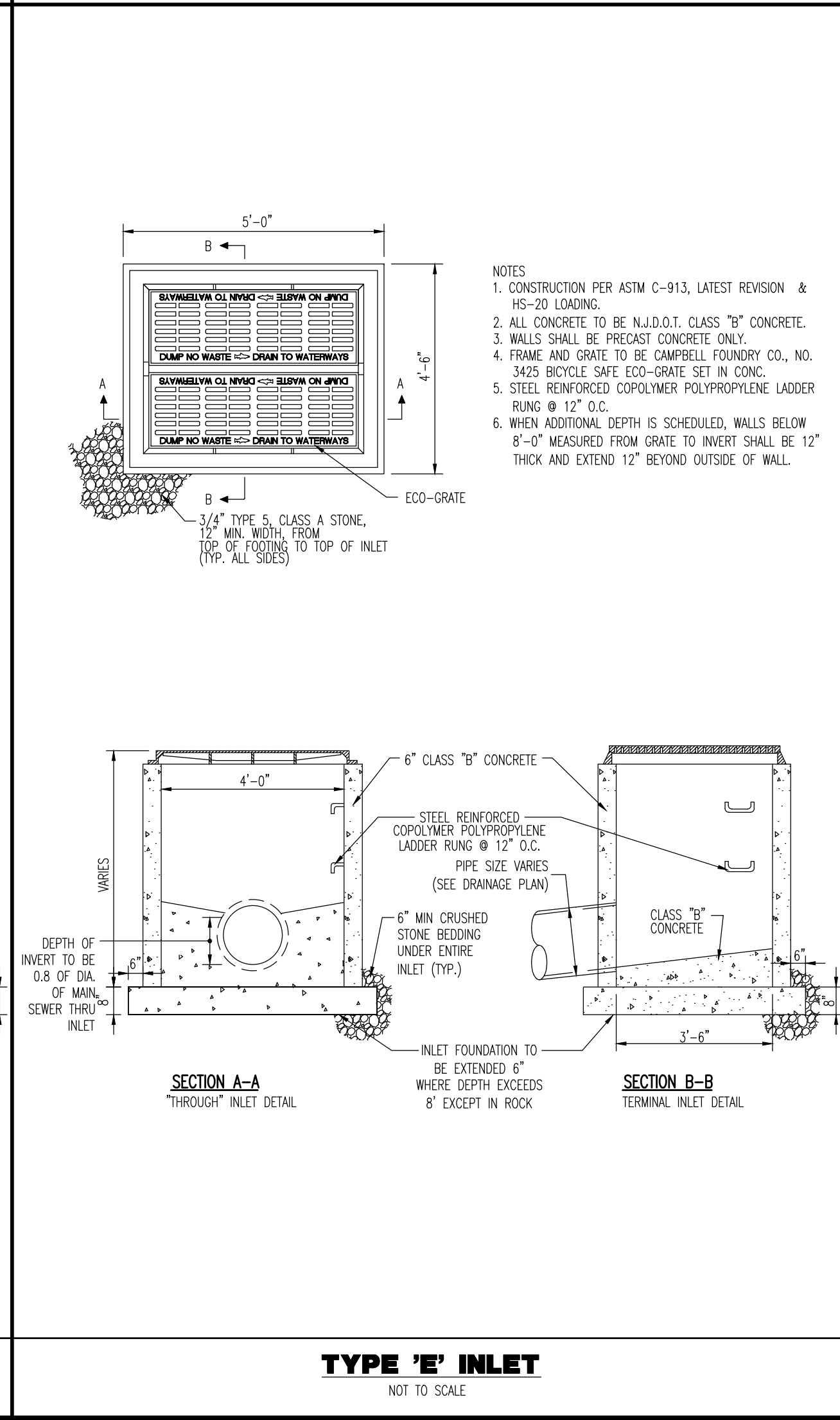
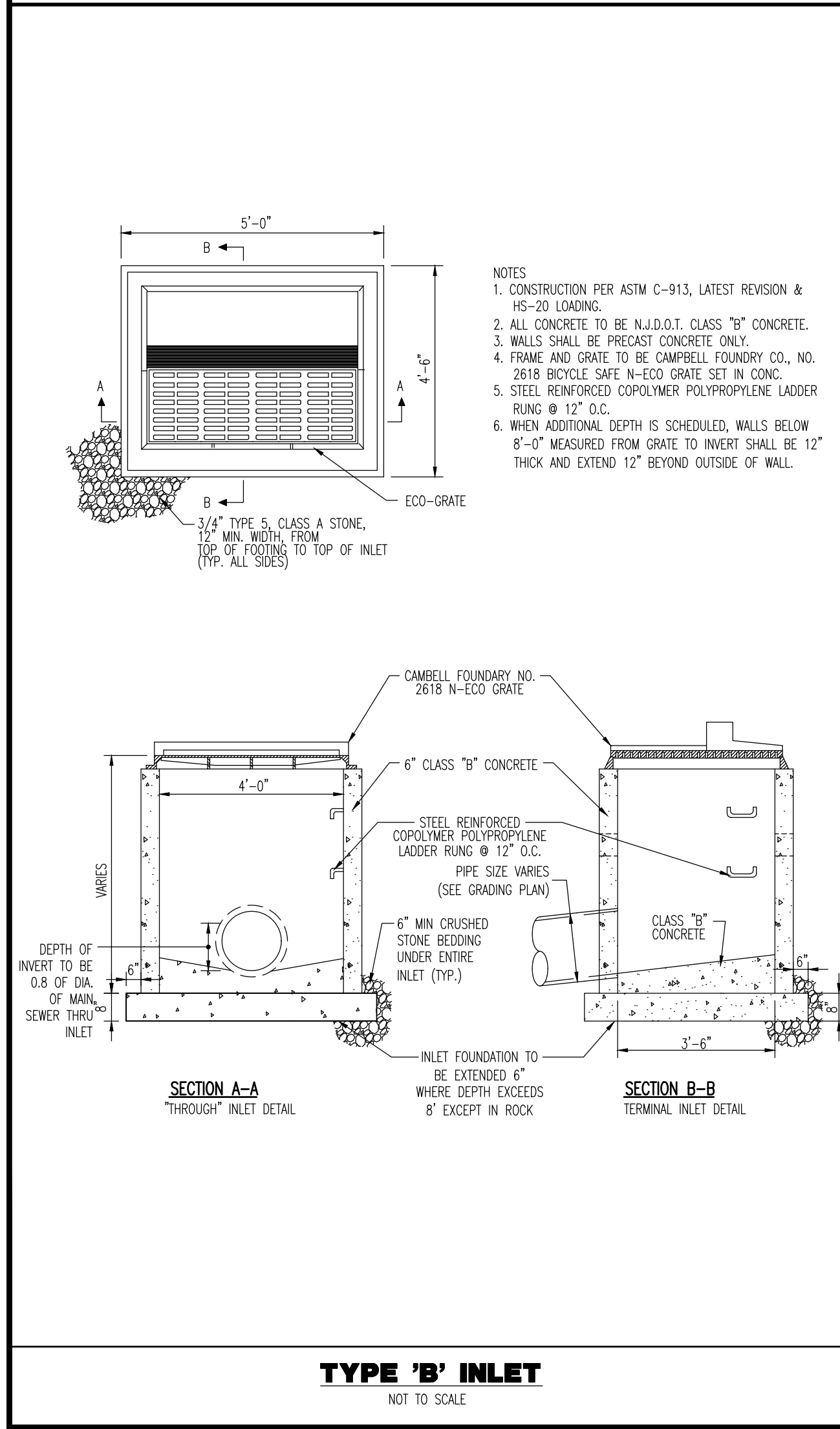
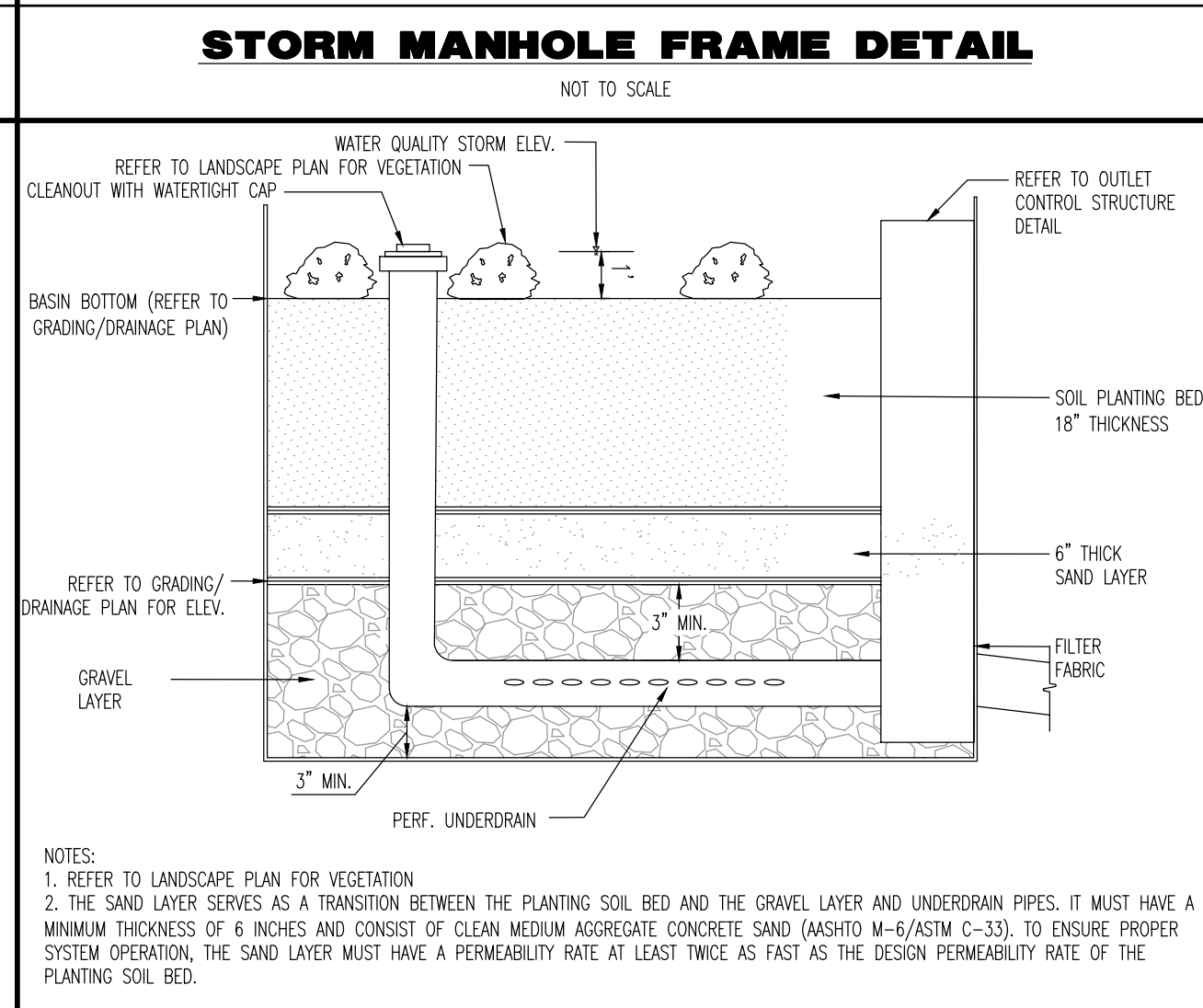
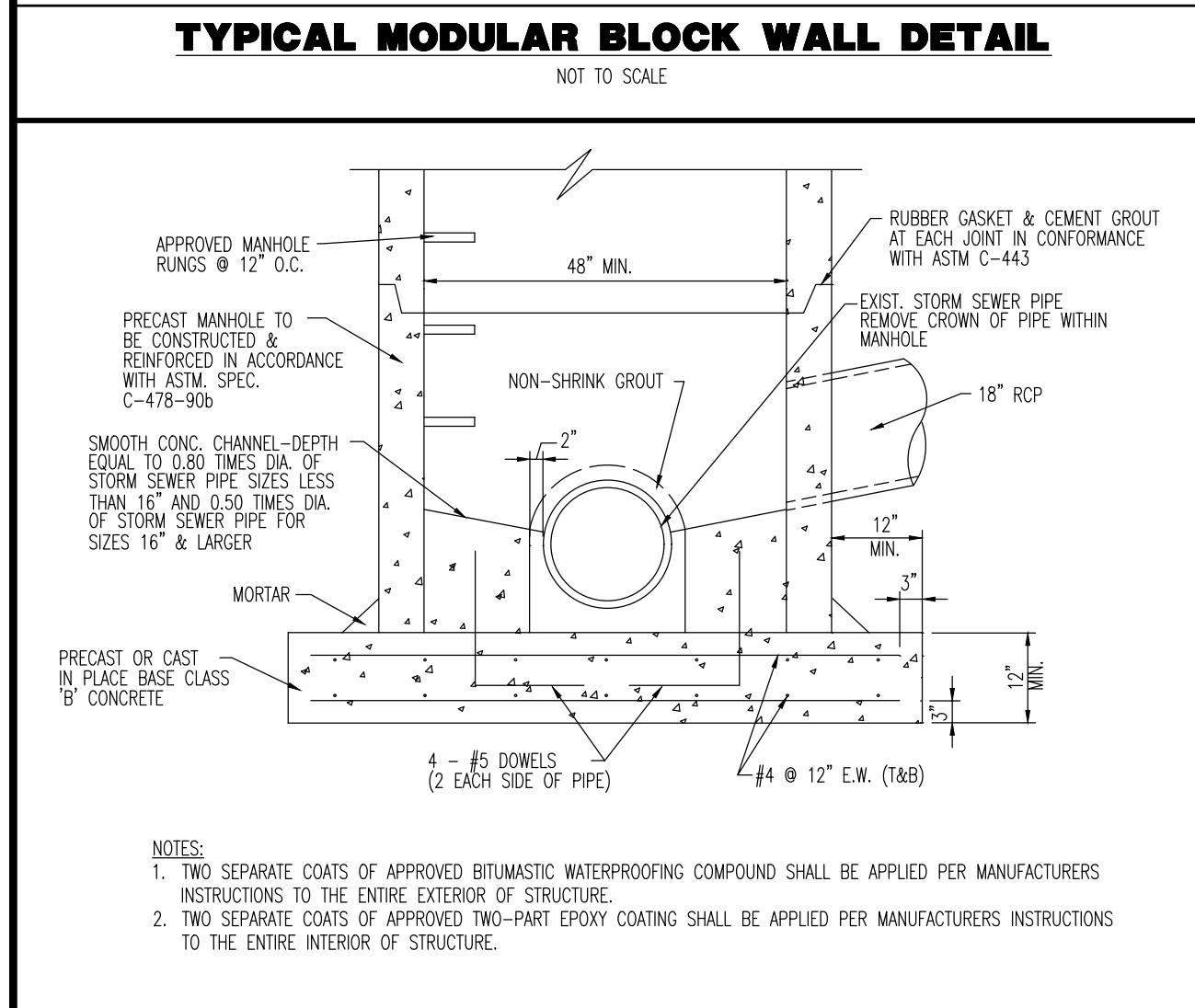
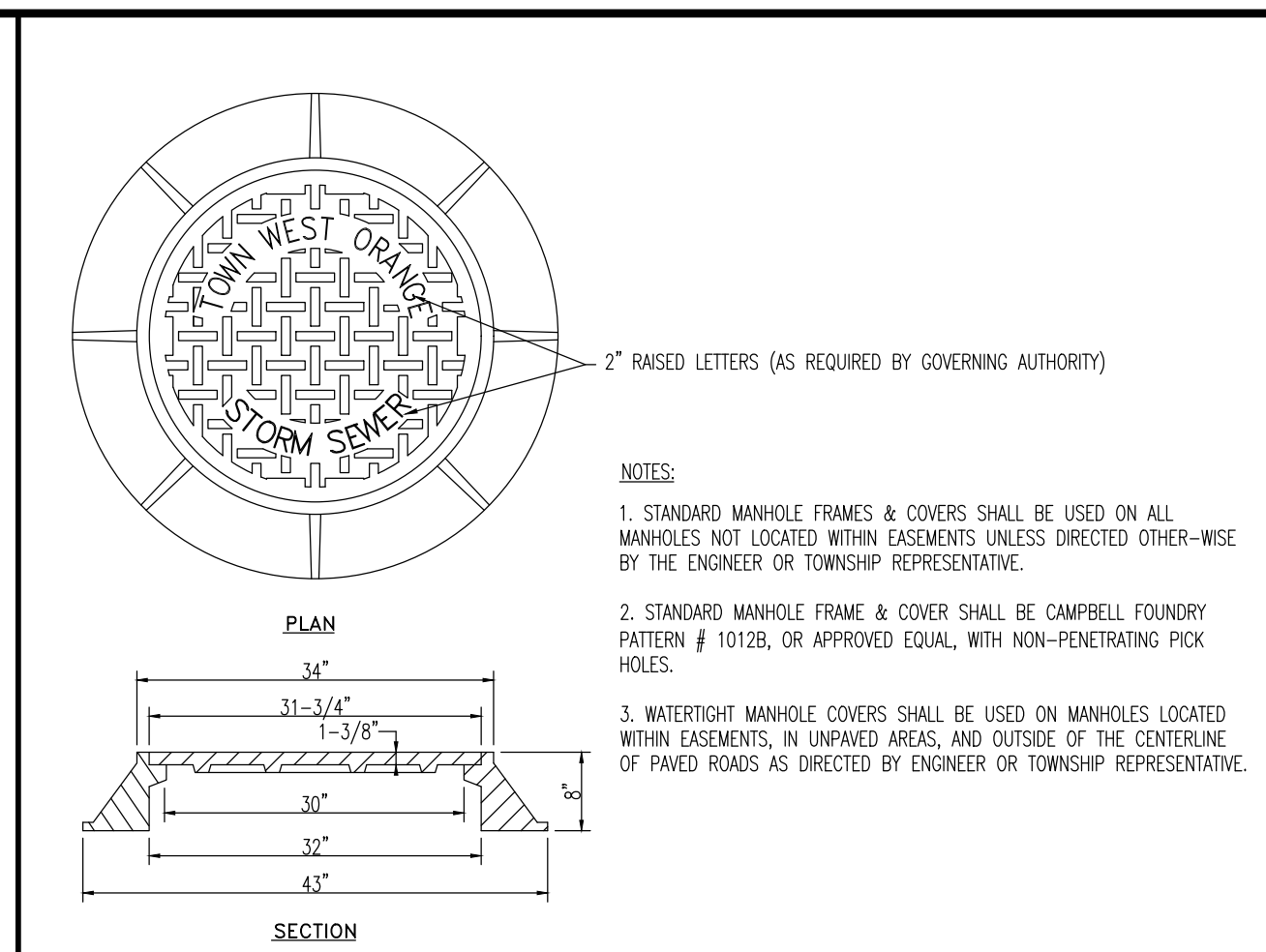
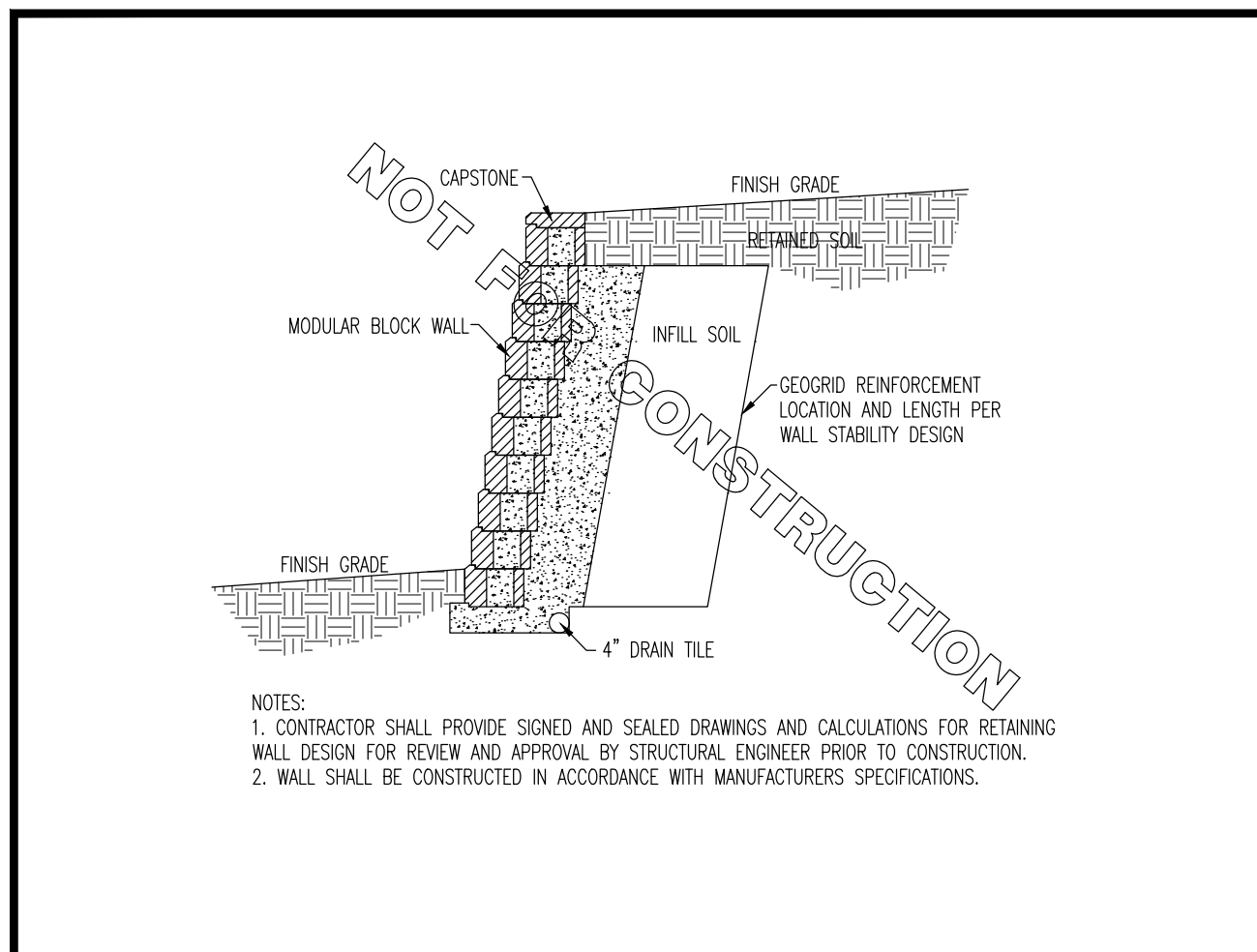
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NEW JERSEY LICENSE No. 55851

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

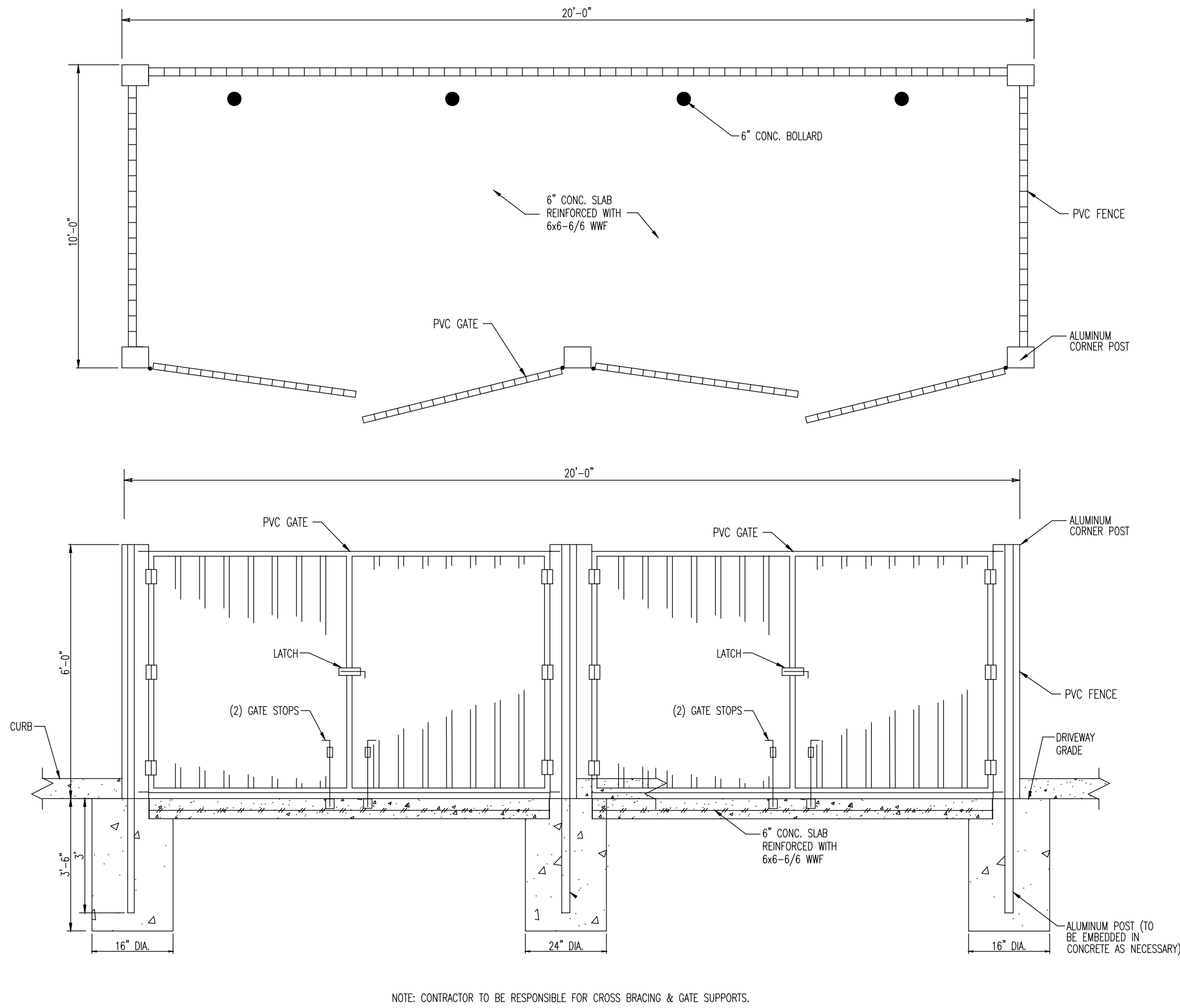
SCALE: (H) 1"=30' (V).	DATE: 08/17/2022
PROJECT No: 2530-99-006	

SHEET No:	10	Rev. #:	
	OF 15	Q	

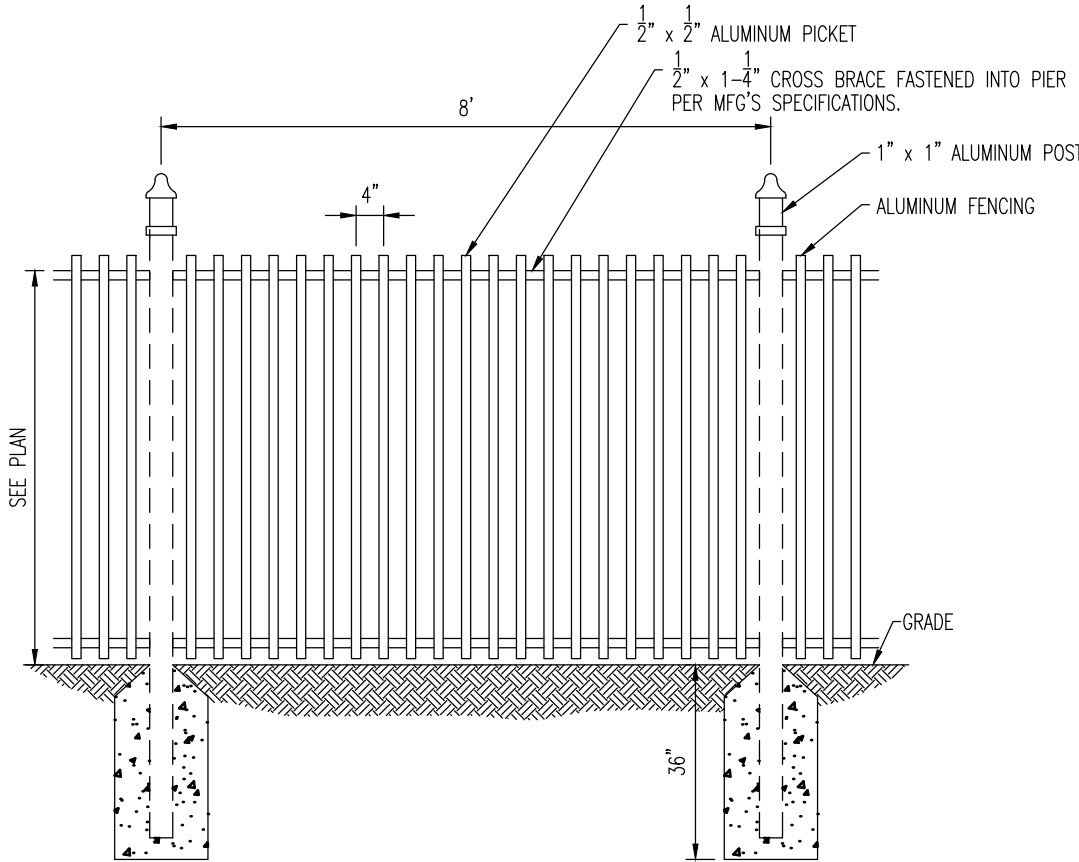


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Plotted: 08/17/22 - 12:27 PM, By: russell
File: P:\DEPC PROJECTS\2530 Altera Development\99-006 West Orange\Drawg\Site Plans PH2\0253099006SD.dwg, -----> 14. CONSTRUCTION DETAILS



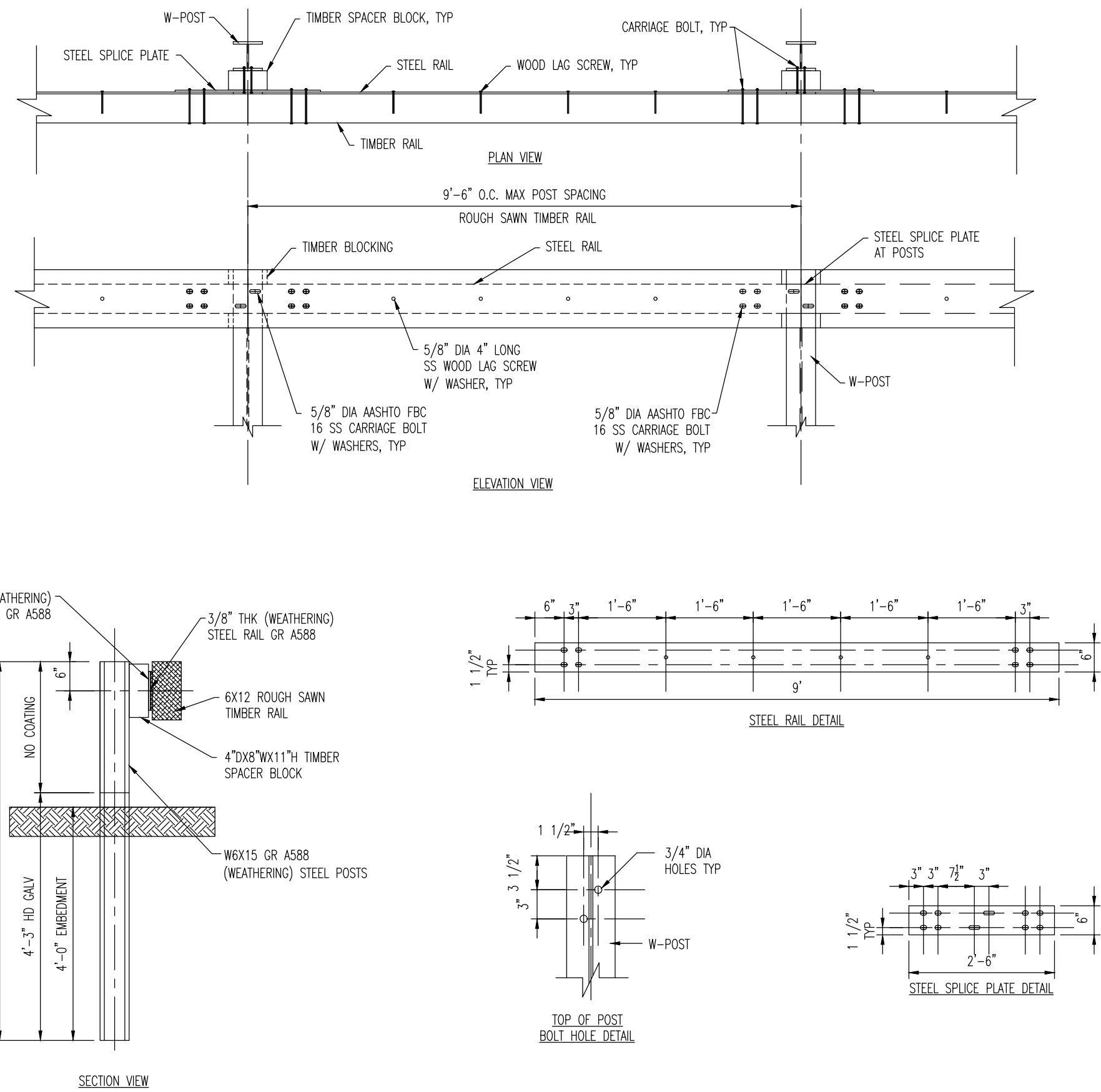
PVC TRASH ENCLOSURE DETAIL
NOT TO SCALE



DECORATIVE FENCE DETAIL
NOT TO SCALE

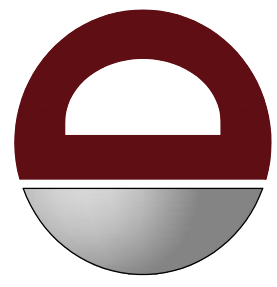


FIRE LANE SIGN DETAIL
NOT TO SCALE



TIMBER GUIDERAIL DETAIL
NOT TO SCALE

MUNICIPAL, COUNTY, STATE AND NJA DETAILS TO SUPERCEDE DYNAMIC ENGINEERING DETAILS WHERE APPLICABLE



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DESIGNED BY: J.C.J. CHECKED BY: J.C.J.
SDP RJC JCS

PROJECT: **ALTERA 769, LLC**
PROPOSED SITE IMPROVEMENTS
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ



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ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

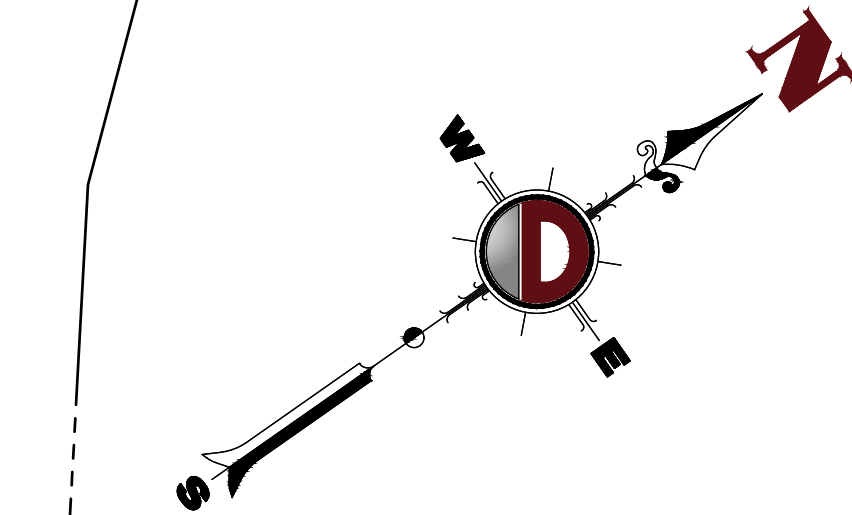
JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE:
CONSTRUCTION
DETAILS

SCALE: (H) AS
(V) SHOWN
PROJECT No:
2530-99-006

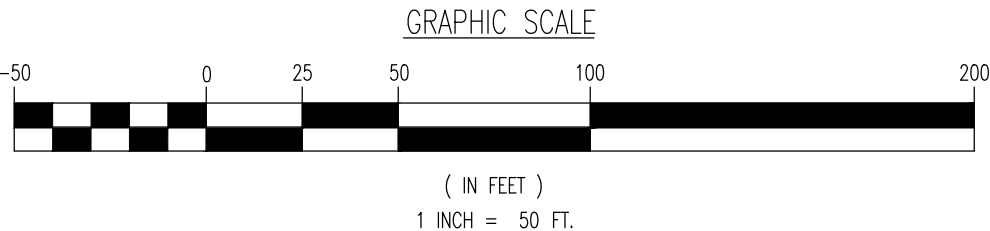
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14
Rev. #:
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GRAPHIC SCALE

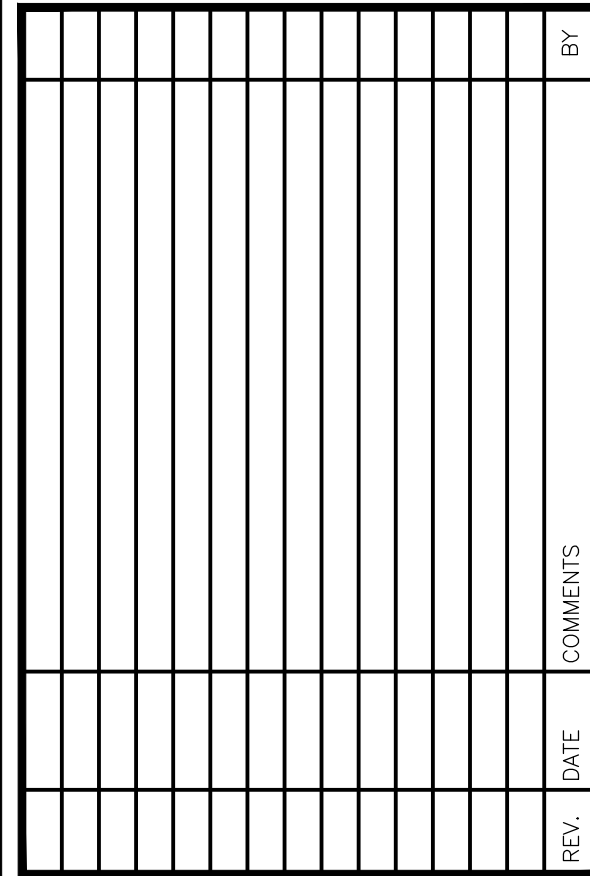
(IN FEET)
1 INCH = 50 FT.

Plotted: 08/17/22 - 12:27 PM, By: russell
File: P:\DECPC PROJECTS\2530 Altera Development\99-006 West Orange\Site Plans PH2\253099006STEO.dwg, ----> 16 STEEP SLOPES CALCULATIONS - EXISTING



TOTAL: 212,742 SF





THIS PLAN SET IS FOR PERMITTING PURPOSES
ONLY AND MAY NOT BE USED FOR CONSTRUCTION

OWNER:	3/25/2010 BY:	04/02/2010 BY:
RRR/CW/RS	RJC	JCS
		UCJ

PROJECT: **ALTERA 769, LLC**
PROPOSED SITE IMPROVEMENTS
BLOCK 166-15, LOT 9
TOWNSHIP OF WEST ORANGE (CR 549)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ



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PROFESSIONAL ENGINEER
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JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE:
VEHICLE CIRCULATION
PLAN - REFUSE

SCALE: (H) 1" = 30' (V).	DATE: 08/17/2022
PROJECT No: 2530-99-006	

SHEET No:	1	Rev. #:	0
OF 1			

STORMWATER MANAGEMENT REPORT

for

Altera 769, LLC

**Proposed Office Building
Block 166.15, Lot 9
769 Northfield Avenue (CR 508)
Township of West Orange
Essex County, New Jersey**

Prepared by:



245 Main Street
Suite 110
Chester, NJ 07930
(908) 879-9229

A handwritten signature in dark ink, appearing to read 'RJC', is positioned above a horizontal line.

Robert J. Colucco, PE
NJ Professional Engineer License #55851

January 2022
Revised August 2022
DEC #2530-99-006

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APPENDIX

- NRCS Web Soil Survey
- Runoff Curve Number (CN) Calculations
- Time of Concentration (Tc) Calculations
- Existing & Proposed Hydrographs 2yr, 10yr, & 100yr Design Storms (Hydrographs created using Hydrology Studio 2020 Computer Software)
- Existing & Proposed Hydrographs 1yr Water Quality Design Storm (Hydrographs created using Hydrology Studio 2020 Computer Software)
- Rip Rap Calculations
- Inlet Area Calculations and Stormwater Collection System Calculations (Pipe Sizing)
- Basin Drain Time Calculation
- Stormwater Basin Area Investigation Report prepared by Dynamic Earth, LLC, dated January 14, 2022
- Drainage Area Maps

I. INTRODUCTION

The intention of this study is to analyze the stormwater drainage conditions that will occur as a result of the proposed site improvements. The proposed improvements consist of the renovation of the existing office building, modifications to the existing parking lot to satisfy current ADA regulations, the expansion of the rear parking area, and other associated site improvements. The subject site is located at 769 Northfield Avenue (CR 508) in the Township of West Orange, Essex County, New Jersey and is identified as Block 166.15, Lot 9 on the Township of West Orange Tax Maps.

The scope of this study focuses on the overall drainage conditions that will result from the proposed improvements. The proposed site improvements shall result in an increase in impervious coverage of approximately 20,635 SF (9.7%).

The primary design constraints for this project are based on requirements established in the Township of West Orange Land Use Ordinance, the State of New Jersey Stormwater Regulations outlined in NJAC 7:8, and State of New Jersey Soil Conservation Requirements. More specifically, the stormwater management design will serve to maintain existing drainage patterns and will not have a negative impact on downstream facilities.

More specifically, the limit of disturbance for the development will exceed one (1) acre; therefore, the project meets the definition of a “major development” under NJAC 7:8. As such, the project has been designed to meet the applicable standards set forth by the Township of West Orange and NJAC 7:8.

II. EXISTING SITE CONDITIONS

The subject site consists of 212,742 SF (4.88 acres) of which is partially developed with one (3) three-story office building and associated paved parking areas and drive aisles. The site currently consists of 57.4% impervious surface area including building and pavement areas. Currently, stormwater runoff generated by the rear wooded area of the site sheet flows overland in a westerly direction where it is collected by on-site stormwater management structures (POI-1) and is tributary to the stormwater conveyance system located within the rear paved parking area. The majority of stormwater runoff generated by the pavement areas sheet flows in a westerly direction where it is collected by on-site inlets and conveyed to an on-site underground stormwater management structure (POI-2). Ultimately stormwater runoff is tributary to the existing underground stormwater conveyance system within Northfield Avenue (POI-3).

Based upon the Essex County Soil Survey the soil types native to the site include:

SOIL TYPE	SOIL TYPE NAME	HYDRAULIC SOIL GROUP*
BogB	Boonton Loam, 3 to 8 percent slopes	C
BogBc	Boonton Loam, 0 to 8 percent slopes, extremely stony	C
BouB	Boonton – Urban Land, Boonton Substratum Complex, 0 to 8 percent slopes	C
URBONB	Urban Land, Boonton Substratum, 0 to 8 percent slopes	C

*A field investigation of the existing on-site soils was performed by Dynamic Earth, LLC to evaluate subsoil conditions to estimate depth to the seasonal high groundwater levels and permeability rates. Based on laboratory testing, permeability rates were less than 0.06 inches per hour, which is consistent with a hydrologic soil group (HSG) D. For the purposes of the design, the site has been modeled as HSG D in the Runoff Curve Number calculations. A copy of the Runoff Curve Number calculations as well as the Stormwater Basin Area Investigation Report prepared by Dynamic Earth, LLC are provided within the Appendix of this report.

The existing site conditions have been evaluated using the following drainage sub-watershed areas as depicted on the Existing Drainage Area Map included within the Appendix within this report:

Existing DA-1: This area consists of the wooded area at the northern most part of the site. Stormwater runoff generated by this area sheet flows overland in a westerly direction, where it is collected by an existing stormwater pipe (POI-1) along the western property line. A time of concentration of 18.5 minutes has been calculated and utilized for this drainage area.

Existing DA-2: This area consists of the northern portion of the existing rear parking area and a portion of the wooded areas. Stormwater runoff generated by this area sheet flows overland to the west where it is collected by a series of existing inlets where it is ultimately conveyed to the existing stormwater management structure (POI-2). A time of concentration of 16.1 minutes has been calculated and utilized for this drainage area.

Existing DA-3: This area consists of the remainder of the subject site which includes the existing office building, remaining parking areas and open space (lawn) areas. Stormwater runoff generated by this area sheet flows overland in a southerly direction where it is collected by a series of existing inlets. Ultimately, stormwater runoff is conveyed to the existing stormwater conveyance system within Northfield Avenue (CR 508) (POI-3). A minimum time of concentration of six (6) minutes has been utilized for this drainage area.

III. PROPOSED SITE CONDITIONS

The proposed improvements consist of the renovation of the existing office building, modifications to the existing parking lot to satisfy current ADA regulations, the expansion of the rear parking area, and other associated site improvements. The proposed site improvements shall result in an increase in impervious coverage of 20,635 SF (0.47 Ac).

The existing drainage patterns on-site shall remain relatively unchanged. Stormwater runoff generated by the roof of the renovated building will remain relatively unchanged. Runoff generated by the portions of the site that are not covered with building shall continue to sheet flow west and be collected by various on-site inlets. An aboveground bioretention basin has been designed to detain stormwater runoff generated by the proposed parking lot, parking lot expansion and surrounding wooded areas in accordance with stormwater reduction requirements set forth under NJAC 7:8 and by the Township of West Orange.

The proposed site conditions have been evaluated using the following drainage sub-watershed areas as depicted on the Proposed Drainage Area Maps included within the Appendix of this report:

DA-1: This area consists of the wooded area to the northeast of the parking lot expansion. Stormwater runoff generated by this area sheet flows overland where it is ultimately collected by a proposed yard inlet, and conveyed to the proposed aboveground stormwater management basin, where it is detained and released at a controlled rate to the existing stormwater management structure (POI-2). A time of concentration of 18.8 minutes has been calculated and utilized for this drainage area.

DA-2 Undetained: This area consists of a portion of the existing rear northern parking area. Stormwater runoff generated by this area sheet flows overland to the west and is collected by a proposed inlet, where it is ultimately conveyed to the existing stormwater management structure (POI-2). A minimum time of concentration of six (6) minutes has been utilized for this drainage area.

DA-2A Detained: This area consists of a majority of the rear parking lot expansion area and a portion of the rear wooded area. Stormwater runoff generated by this area sheet flows overland to the west and is collected by proposed inlets and conveyed to the proposed aboveground stormwater management basin. Stormwater runoff is then detained and released at a controlled rate to the existing stormwater management structure (POI-2). A time of concentration of 14.7 minutes has been calculated and utilized for this drainage area.

DA-2B Detained: This area consists of a portion of the rear remaining parking lot expansion area, the aboveground stormwater management basin and portion of the rear wooded areas. Stormwater runoff generated by this area sheet flows overland to the west and is collected by a proposed inlet and conveyed to the

proposed aboveground stormwater management basin. Stormwater runoff is then detained and released at a controlled rate to the existing stormwater management structure (POI-2). A time of concentration of 13.3 minutes has been calculated and utilized for this drainage area.

DA-3: This area consists of the remainder of the subject site which includes the existing office building, remaining parking areas and open space (lawn) areas. Stormwater runoff generated by this area sheet flows overland in a southerly direction where it is collected by a series of existing inlets. Ultimately, stormwater runoff is conveyed to the existing stormwater conveyance system within Northfield Avenue (CR 508) (POI-3). A minimum time of concentration of six (6) minutes has been utilized for this drainage area.

IV. DESIGN METHODOLOGY

The intention of the design of the proposed stormwater management facilities is to provide measures as required to address applicable aspects of the Township of West Orange Land Use Ordinance, NJAC 7:8, and the New Jersey SESC standards. In order to prepare the stormwater management design for the subject project, an extensive initial investigation of the property and a topographic survey were performed. On-site review of the tract was performed by Dynamic Engineering Consultants, PC to verify existing site conditions and land cover characteristics. A Boundary, Location & Topographic Survey of the subject site was also prepared by Dynamic Survey, LLC, to depict the existing site conditions.

The calculations were established through an examination of the existing site conditions, a review of the topographical survey, and establishing our drainage area maps. The plans were designed to ensure that runoff from the proposed development could be directed to the proposed stormwater management facilities, and designed to meet applicable stormwater quantity and quality requirements set forth by the Township of West Orange and NJAC 7:8.

Based on our review of the existing site conditions, review of the survey, and establishment of the Drainage Area Maps for the existing and proposed site conditions, the calculations of this Report were established. A grading plan was also developed for the proposed site improvements with consideration to the existing drainage patterns. The plan was designed to ensure that runoff from the proposed development could be directed to the proposed stormwater management facilities and reduce peak flow rates when compared to existing conditions.

The site has been evaluated using the TR-55 'Urban Hydrology for Small Watersheds' standards. Stormwater runoff rates for the subject site were modeled using Hydrology Studio. The 2-, 10-, and 100-year design storms are based upon the New Jersey 24-Hour Rainfall Frequency Data for Essex County as published by the USDA NRCS utilizing a Type D rainfall distribution. Pervious and impervious areas were modeled separately as per the NJ Stormwater Management Best Practices (BMP) Manual.

V. ABOVEGROUND STORMWATER MANAGEMENT BASIN DESIGN

The proposed stormwater management basin has been designed to meet the applicable standards set forth by the Township of West Orange, NJAC 7:8, and NJ SESC through the use of an aboveground stormwater bioretention basin. Specifically, the basin has been designed to accommodate the 100-yr design storm while providing the requisite stormwater quantity reductions without negatively impacting downstream conditions. Associated calculations are included within the Appendix of this report and details have been provided on the accompanying engineering drawings.

The proposed basin has been designed as a Small-Scale Bioretention Basin with an underdrain which will provide treatment of runoff generated by the Water Quality Design Storm. The design of the bioretention basin complies with the standards set forth by the NJ Best Management Practices Manual, thereby providing a TSS Removal Rate of 80%, thereby satisfying the water quality aspect of NJAC 7:8. The area above the Bioretention Basin will be used to utilized to store and attenuate runoff generated by the larger storm events and provide water quantity control for same.

The bottom of the gravel storage bed for the proposed basin is at elevation 459.50 ft. As noted in the Stormwater Basin Area Investigation Report provided within the Appendix of this report, two (2) test pits were dug in the vicinity of the proposed bioretention basin location. The pits were excavated to depths at elevation 458.00 where the test was terminated at bedrock and no seasonal high-water table was observed. Therefore, the proposed basin has been designed such that the underdrain system is set a minimum of one (1') foot above the seasonal high-water table or bedrock.

As noted in the hydrograph summary included within the appendix, the volume of the runoff generated by the water quality design storm that is tributary to the bioretention basin is equal to approximately 4,996 CF. This equates to an elevation of 461.99 within the basin. The lowest quantity control orifice in the outlet control structure is proposed at elevation 462.00 in order to allow the entirety of the Water Quality Design Storm to infiltrate through the proposed soil bed and sand layer before being collected by the proposed underdrain system. Runoff generated by larger design storms will be discharged through an outlet control structure and ultimately conveyed to the existing underground stormwater management basin (POI-2).

In accordance with the New Jersey Stormwater Best Management Practices Manual, the following design considerations have been satisfied:

- Filter fabric is proposed along the sides and the bottom of the system to prevent migration of fines from the surrounding soil.

- The proposed underdrain component consists of three parts – the sand layer, the gravel layer and the network of pipes that collect runoff and transport it to the outflow section of the system.
- The capacity of the proposed underdrain is designed to allow the system to drain within 72 hours.
- The system has been designed so the seasonal high-water table (SHWT) or bedrock is at least 1 foot below the bottom of the underdrain component.
- At least one inspection port, with a removable cap, is proposed in the storage bed at least 3 feet from any edge.
- Points of access are designed in such a way as to prevent sediment or other material from entering the system and to prevent the accumulation of standing water, which could lead to mosquito breeding.

VI. RUNOFF RATES

The following is a comparison of pre and post development runoff rates:

PEAK RUNOFF RATES (POI-2)					
Design Storm	Existing Runoff	Reduction Required	Allowable Runoff	Proposed Runoff	Difference
2-yr	4.04 CFS	50%	2.02 CFS	1.83 CFS	-2.21 CFS
10-yr	7.19 CFS	75%	5.39 CFS	4.09 CFS	-3.10 CFS
100-yr	13.54 CFS	80%	10.83 CFS	9.26 CFS	-4.28 CFS

PEAK RUNOFF RATES (POI-3)			
Design Storm	Existing Runoff	Proposed Runoff	Difference
2-yr	9.02 CFS	7.40 CFS	-1.62 CFS
10-yr	14.76 CFS	12.83 CFS	-1.93 CFS
100-yr	26.22 CFS	22.52 CFS	-3.70 CFS

As can be seen above, the stormwater management system has been designed to not exceed the existing tributary runoff rates for the given design storms.

VII. WATER QUALITY

The TSS removal rate requirement set for the Township of West Orange Land Use Ordinance and NJAC 7:8 is 80% for the net increase of motor vehicle surface. Under the proposed conditions, the runoff from the proposed rear parking lot expansion within drainage areas DA-1, DA-2A, and DA-2B will be collected via a

series of proposed inlets and conveyed to the proposed aboveground bioretention basin. The bioretention basin has been designed with an 18" soil bed and mainly site tolerant vegetation; therefore providing 80% TSS removal rate in accordance with the NJDEP BMP Guidelines for the tributary areas.

VIII. GROUNDWATER RECHARGE

According to the Stormwater Basin Area Investigation Report, prepared by Dynamic Earth, LLC, dated January 14, 2022, enclosed within the Appendix of this report, the on-site soils do not exhibit permeability to allow for proper infiltration. Therefore, this project is exempt from the Groundwater Recharge requirements of the Township of West Orange and NJAC 7:8.

IX. CONCLUSION

The proposed project has been designed in a manner that will not adversely impact the existing drainage patterns, adjacent roadways or adjacent parcels. Stormwater runoff rates for the 2, 10, and 100-year design storms will comply with the runoff rate requirements of Township of West Orange and NJAC 7:8. Additionally, stormwater runoff rates to the points of interests shall be reduced compared to existing conditions. Furthermore, the proposed bioretention basin has been designed in accordance with the NJ BMP Manual requirements thereby providing the required 80% TSS removal rate for the net increase in vehicular surface study area. With that stated, it is evident that the proposed development will not have a negative impact on the existing stormwater management system within the vicinity of the subject parcel.

APPENDIX

NRCS WEB SOIL SURVEY

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 17, Aug 30, 2021

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

Date(s) aerial images were photographed: May 9, 2020—Oct 15, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BogB	Boonton loam, 3 to 8 percent slopes	1.9	26.0%
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	1.2	16.7%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	0.6	8.1%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	3.6	49.2%
Totals for Area of Interest		7.3	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.

Custom Soil Resource Report

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.

Essex County, New Jersey

BogB—Boonton loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: b066

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Boonton and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Oa - 1 to 3 inches: highly decomposed plant material

A - 3 to 5 inches: loam

BA - 5 to 8 inches: silt loam

BE - 8 to 17 inches: silt loam

Bt - 17 to 30 inches: silt loam

Btx1 - 30 to 40 inches: gravelly fine sandy loam

Btx2 - 40 to 47 inches: fine sandy loam

CBt1 - 47 to 58 inches: loamy sand

CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 20 to 36 inches to fragipan

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Haledon

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Boonton, moderately well drained

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: b128

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Boonton, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton, Extremely Stony

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Oa - 1 to 3 inches: highly decomposed plant material

A - 3 to 5 inches: loam

Custom Soil Resource Report

BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Boonton, moderately well drained, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Haledon, extremely stony

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: b12f
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Boonton and similar soils: 50 percent
Urban land, boonton substratum: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy basal till derived from basalt

Typical profile

A - 0 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 47 inches: silt loam
2CBt1 - 47 to 58 inches: loamy sand
2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, boonton substratum

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w9cn
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton substratum: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material

H2 - 12 to 47 inches: silt loam

2CBt1 - 47 to 58 inches: loamy sand

2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Boonton

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Udorthents, boonton substratum

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic layer.

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

RUSLE2 Related Attributes—Essex County, New Jersey								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
BogB—Boonton loam, 3 to 8 percent slopes								
Boonton	80	492	C	.32	3	46.1	43.8	10.1
Boonton, moderately well drained	10	492	C	.32	3	46.1	43.8	10.1
Haledon	10	492	C	.37	3	30.8	56.4	12.8
BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony								
Boonton, extremely stony	85	492	C	.32	3	46.1	43.8	10.1
Boonton, moderately well drained, extremely stony	10	492	C	.32	3	46.1	43.8	10.1
Haledon, extremely stony	5	492	C	.37	3	30.8	56.4	12.8
BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes								
Boonton	50	492	C	.32	4	46.1	43.8	10.1
Urban land, Boonton substratum	40	656	—	.49	—	30.9	53.6	15.5
Udorthents, Boonton substratum	10	492	D	.28	5	46.0	44.0	10.0

RUSLE2 Related Attributes--Essex County, New Jersey								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes								
Urban land, Boonton substratum	90	656	—	.49	—	30.9	53.6	15.5
Boonton	5	492	C	.32	4	46.1	43.8	10.1
Udorthents, Boonton substratum	5	492	D	.28	5	46.0	44.0	10.0

Data Source Information

Soil Survey Area: Essex County, New Jersey
 Survey Area Data: Version 16, Jun 1, 2020

RUNOFF CURVE NUMBER (CN) CALCULATIONS



Existing and Proposed Drainage Area Summary and Average Curve Number(CN) Calculations

Project: Altera Development Company, LLC
 Job #: 2530-99-006
 Location: Township of West Orange, Essex County, NJ

Computed By: SDP
 Checked By: RJC
 Date: 6/14/2022

Drainage Area	Impervious Area (acre)	Curve Number (CN) Used	HSG D - Open Space Area (acre)	Curve Number (CN) Used	HSG D - Wooded Area (acre)	Curve Number (CN) Used	Avg. Curve Number	Total Area (acres)	TC (Min.)
[POI-1] - EX DA-1	0.00	98	0.00	80	0.88	77	77	0.88	18.5
[POI-2] - EX DA-2	0.97	98	0.00	80	0.94	77	88	1.92	16.1
[POI-2] - EX DA-3	1.83	98	0.24	80	0.00	77	96	2.08	6.0

4.88

[POI-2] - DA-1	0.00	98	0.20	80	0.29	77	78	0.50	18.8
[POI-2] - DA-2 UNDET	0.35	98	0.03	80	0.00	77	96	0.38	6.0
[POI-2] - DA-2A DET	0.98	98	0.11	80	0.12	77	94	1.21	14.7
[POI-2] - DA-2B DET	0.27	98	0.27	80	0.17	77	86	0.71	13.3
[POI-3] - DA-3	1.82	98	0.26	80	0.00	77	96	2.08	6.0

4.88

Per Essex County Soil Survey & Dynamic Earth Report	BogB	D*	Soil	Boonton Loam, 3 to 8 percent slopes
	BogBc	D*	Soil	Boonton Loam, 0 to 8 percent slopes, extremely stony
	BouB	D*	Soil	Boonton – Urban Land, Boonton Substratum Complex, 0 to 8 percent slopes
	URBONB	D*	Soil	Urban Land, Boonton Substratum, 0 to 8 percent slopes

Description	Runoff Curve Number (CN)
Impervious Surface	98
Open Space (lawn) (good)	80
Woods	77

* Based on laboratory testing performed by Dynamic Earth, LLC, permeability rates were less than 0.01 inches per hour which is consistent with a hydrologic soil group (HSG) D. For the purposes of the design, the site has been modeled as HSG D in the Runoff Curve Number calculations.

TIME OF CONCENTRATION (T_c) CALCULATIONS

18.5 min

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-1

• Sheet Flow :

1. Surface Description
2. Manning's Roughness Coefficient, n
3. Flow Length, L { *total $L \leq 100$ ft* }
4. Two-Year 24-hour Rainfall, p_2 for . . . Essex County
5. Land Slope, s (ft/ft)
6. Travel Time, $T_t = \frac{0.007 (n L)^{0.8}}{p_2^{0.5} s^{0.4}}$

AB	BC	
Woods, Light Underbrush	Woods, Light Underbrush	
0.4	0.4	
50.0 ft	50.0 ft	
3.44 in	3.44 in	3.44 in
0.029 ft/ft	0.057 ft/ft	
0.171 hr	+	0.130 hr
	+	0.000 hr
		=
		0.301 hr

• Shallow Concentrated Flow :

7. Surface Description
8. Flow Length, L
9. Watercourse Slope, s
10. Average velocity, V { *see Figure 3.1* }
11. Travel Time, $T_t = \frac{L}{3600 V}$

CD	DE	EF
Unpaved	Unpaved	Unpaved
25.0 ft	37.0 ft	20.0 ft
0.050 ft/ft	0.027 ft/ft	0.167 ft/ft
3.61 ft/s	2.65 ft/s	6.59 ft/s
0.002 hr	+	0.004 hr
	+	0.001 hr
		=
		0.007 hr

• Channel Flow :

12. Pipe Diameter, D
13. Cross-Sectional Flow Area, A
14. Wetted Perimeter, p_w
15. Hydraulic Radius, $r = A / p_w$
16. Channel Slope, s
17. Pipe Material
18. Manning's Roughness Coefficient, n
19. Velocity, $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$
20. Flow Length, L
21. Travel Time, $T_t = \frac{L}{3600 V}$
22. Watershed or subarea Time of Concentration, T_c { *add T_t in steps 6, 11 and 21* }

FG	GH	
18 in	18 in	
1.767 sf	1.767 sf	
4.7 ft	4.7 ft	
0.4 ft	0.4 ft	
0.020 ft/ft	0.020 ft/ft	
HDPE	HDPE	
0.010	0.010	
10.96 ft/s	10.96 ft/s	
134.0	89.0	
0.003 hr	+	0.002 hr
	+	0.000 hr
		=
		0.006 hr
		0.314 hr
		18.8 min

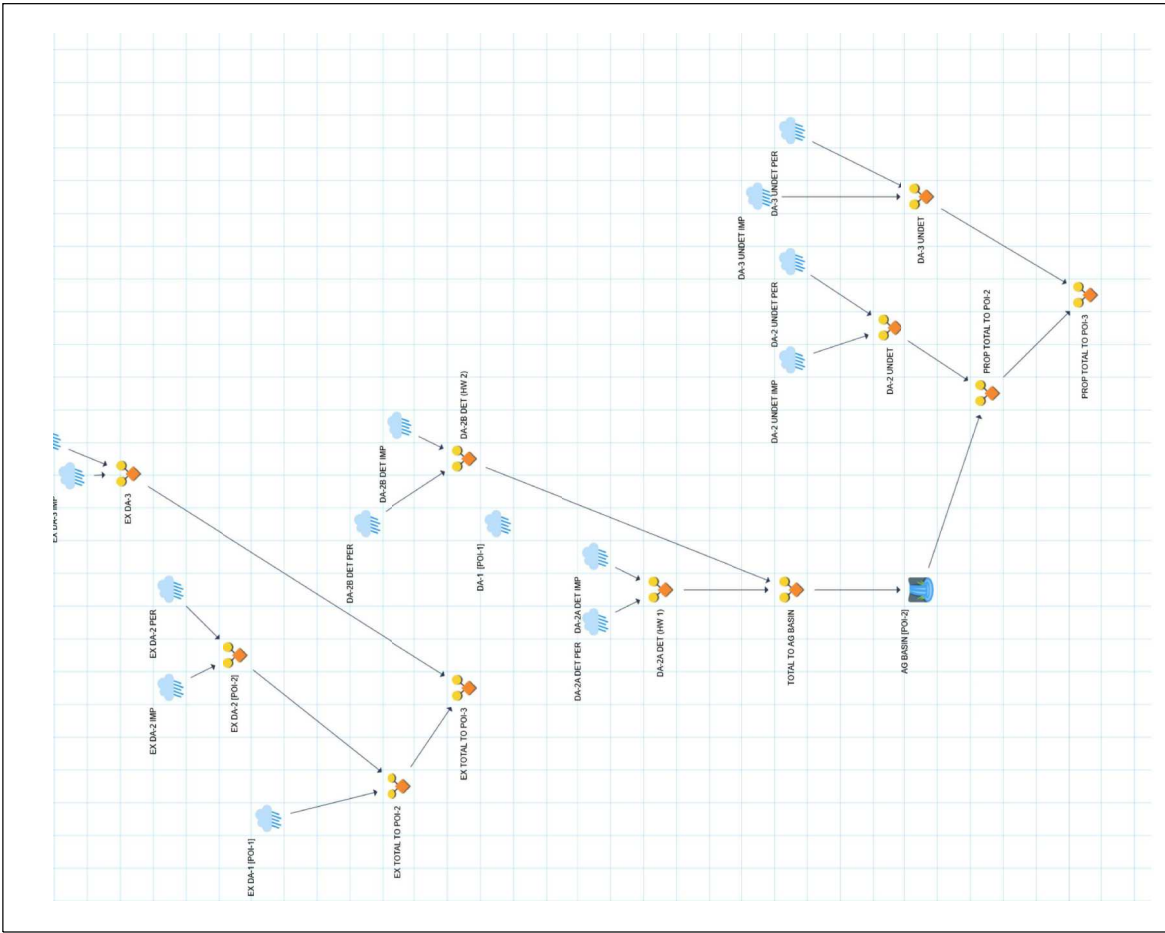
**EXISTING & PROPOSED HYDROGRAPHS
2YR, 10YR & 100YR DESIGN STORMS
(HYDROGRAPHS CREATED USING HYDROLOGY STUDIO
2020 COMPUTER SOFTWARE)**

Basin Model

Hydrology Studio v 3.0.0.24

Project Name:

06-22-2022



Hydrograph by Return Period

Hydrology Studio v 3.0.0.24

Project Name:

06-22-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)								
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	NRCS Runoff	EX DA-1 [POL-1]		0.884				1.826	2.509		3.777
3	NRCS Runoff	EX DA-2 IMP		2.180				3.330	4.115		5.542
4	NRCS Runoff	EX DA-2 PER		1.018				2.096	2.877		4.327
5	Junction	EX DA-2 [POL-2]		3.198				5.426	6.992		9.869
7	Junction	EX TOTAL TO POL-2		4.044				7.190	9.424		13.54
9	NRCS Runoff	EX DA-3 IMP		5.529				8.440	10.43		14.05
10	NRCS Runoff	EX DA-3 PER		0.414				0.800	1.073		1.573
11	Junction	EX DA-3		5.943				9.240	11.50		15.62
13	Junction	EX TOTAL TO POL-3		9.019				14.76	18.80		26.22
15	NRCS Runoff	DA-1 [POL-1]		0.518				1.050	1.432		2.141
17	NRCS Runoff	DA-2 UNDET IMP		1.057				1.614	1.995		2.686
18	NRCS Runoff	DA-2 UNDET PER		0.052				0.100	0.134		0.197
19	Junction	DA-2 UNDET		1.109				1.714	2.129		2.883
21	NRCS Runoff	DA-2A DET IMP		2.203				3.364	4.158		5.600
22	NRCS Runoff	DA-2A DET PER		0.268				0.536	0.729		1.085
23	Junction	DA-2A DET (HW 1)		2.471				3.900	4.887		6.685
25	NRCS Runoff	DA-2B DET IMP		0.688				1.050	1.298		1.748
26	NRCS Runoff	DA-2B DET PER		0.593				1.179	1.598		2.370
27	Junction	DA-2B DET (HW 2)		1.281				2.229	2.896		4.118
29	Junction	TOTAL TO AG BASIN		3.722				6.071	7.703		10.68
30	Pond Route	AG BASIN [POL-2]		1.627				3.701	5.413		8.450
32	Junction	PROP TOTAL TO POL-2		1.830				4.093	5.957		9.259
34	NRCS Runoff	DA-3 UNDET IMP		5.499				8.394	10.37		13.97
35	NRCS Runoff	DA-3 UNDET PER		0.449				0.866	1.162		1.704
36	Junction	DA-3 UNDET		5.948				9.261	11.54		15.67

Hydrograph by Return Period

Project Name: 06-22-2022

Hydrologov Studio v 3.0.0.24

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)								
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
38	Junction	PROP TOTAL TO POI-3		7.399				12.83	16.12		22.52

Hydrograph 2-yr Summary

Project Name: 06-22-2022

Hvdrológay Studio v 3.0.0.24

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POL-1]	0.884	12.23	4,428	—		
3	NRCS Runoff	EX DA-2 IMP	2,180	12.20	11,009	—		
4	NRCS Runoff	EX DA-2 PER	1,018	12.20	4,611	—		
5	Junction	EX DA-2 [POL-2]	3,198	12.20	15,620	3, 4		
7	Junction	EX TOTAL TO POL-2	4,044	12.20	20,048	1, 5		
9	NRCS Runoff	EX DA-3 IMP	5,529	12.10	19,970	—		
10	NRCS Runoff	EX DA-3 PER	0,414	12.10	1,288	—		
11	Junction	EX DA-3	5,943	12.10	21,268	9, 10		
13	Junction	EX TOTAL TO POL-3	9,019	12.10	41,316	7, 11		
15	NRCS Runoff	DA-1 [POL-1]	0,518	12.23	2,583	—		
17	NRCS Runoff	DA-2 UNDET IMP	1,057	12.10	3,619	—		
18	NRCS Runoff	DA-2 UNDET PER	0,052	12.10	162	—		
19	Junction	DA-2 UNDET	1,109	12.10	3,982	17, 18		
21	NRCS Runoff	DA-2A DET IMP	2,203	12.20	11,122	—		
22	NRCS Runoff	DA-2A DET PER	0,268	12.20	1,205	—		
23	Junction	DA-2A DET (HW 1)	2,471	12.20	12,328	21, 22		
25	NRCS Runoff	DA-2B DET IMP	0,688	12.17	3,241	—		
26	NRCS Runoff	DA-2B DET PER	0,593	12.17	2,485	—		
27	Junction	DA-2B DET (HW 2)	1,281	12.17	5,726	25, 26		
29	Junction	TOTAL TO AG BASIN	3,722	12.20	18,053	23, 27		
30	Pond Route	AG BASIN [POL-2]	1,627	12.40	13,017	29	462.69	8,532
32	Junction	PROP TOTAL TO POL-2	1,830	12.40	16,998	19, 30		
34	NRCS Runoff	DA-3 UNDET IMP	5,499	12.10	19,861	—		
35	NRCS Runoff	DA-3 UNDET PER	0,449	12.10	1,406	—		
36	Junction	DA-3 UNDET	5,948	12.10	21,267	34, 35		

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PROP TOTAL TO PO4-3	7.399	12.10	38,265	32,36		

Hydrograph Report

Project Name:

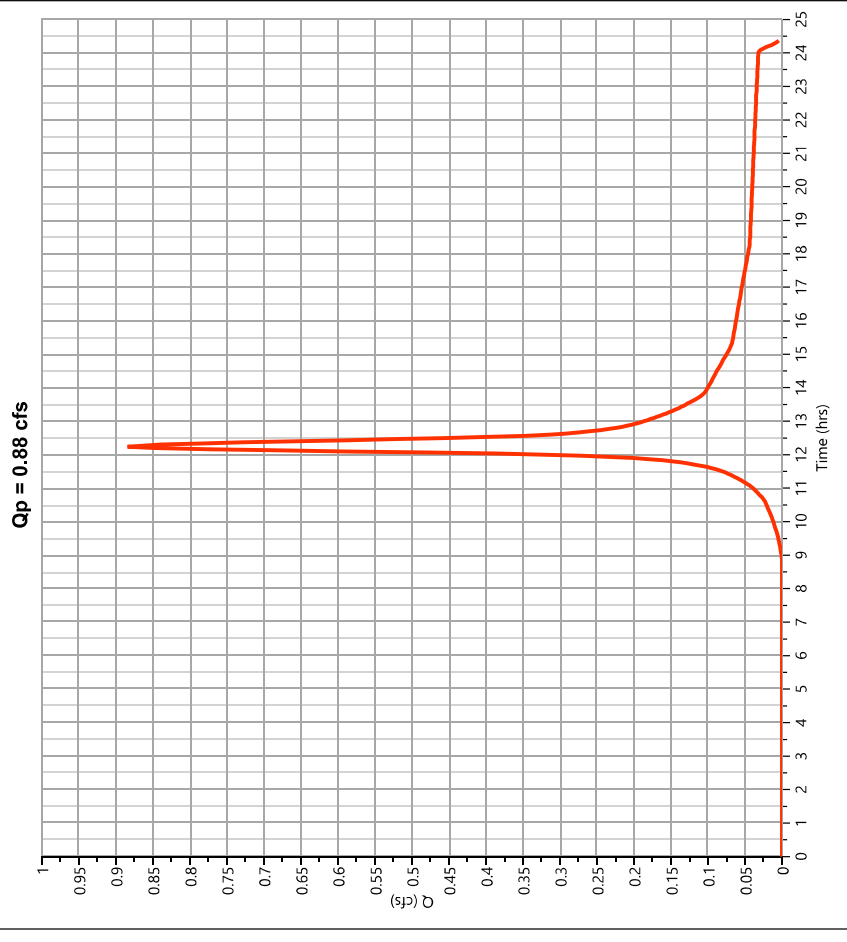
Hydrology Studio v 3.0.0.24

06-22-2022

EX DA-1 [POL-1]

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.884 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 4,428 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

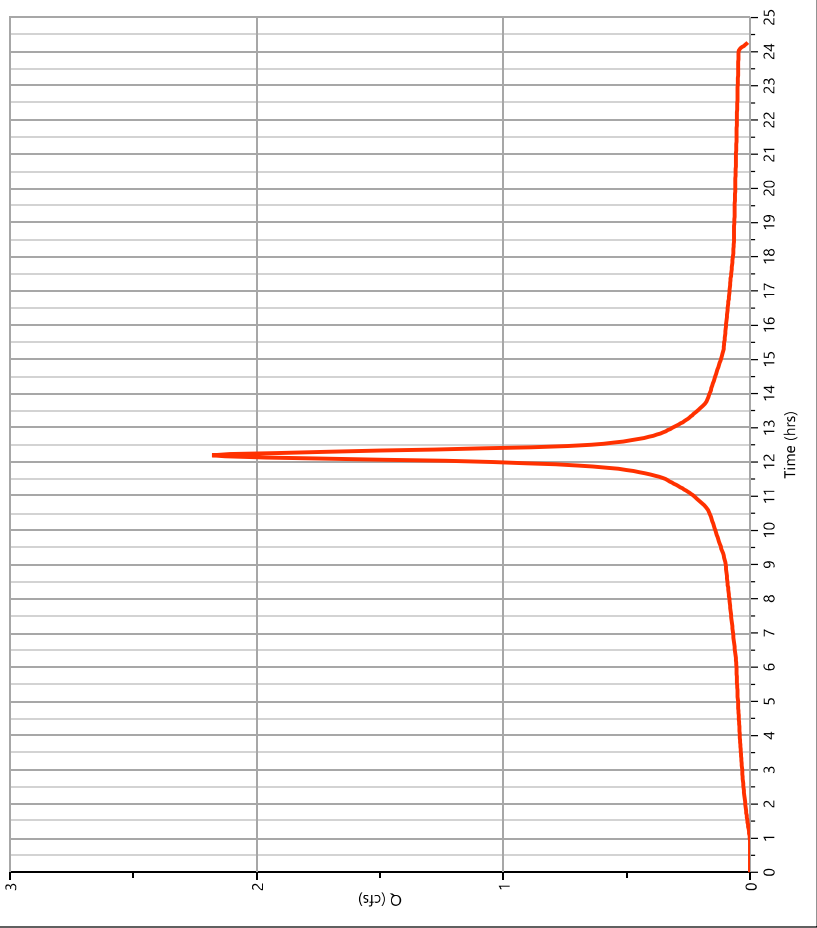
06-22-2022

EX DA-2 IMP

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.180 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 11,009 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 2.18 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

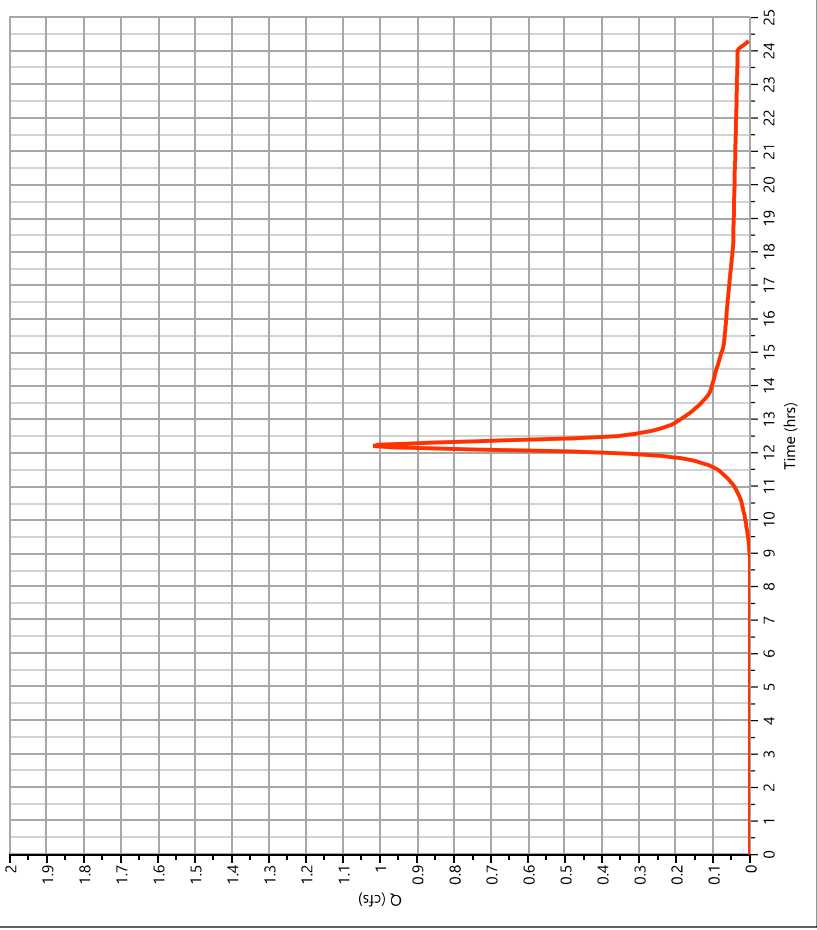
06-22-2022

EX DA-2 PER

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.018 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 4,611 cuft
Drainage Area	= 0.94 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.02 cfs



Hydrograph Report

Project Name:

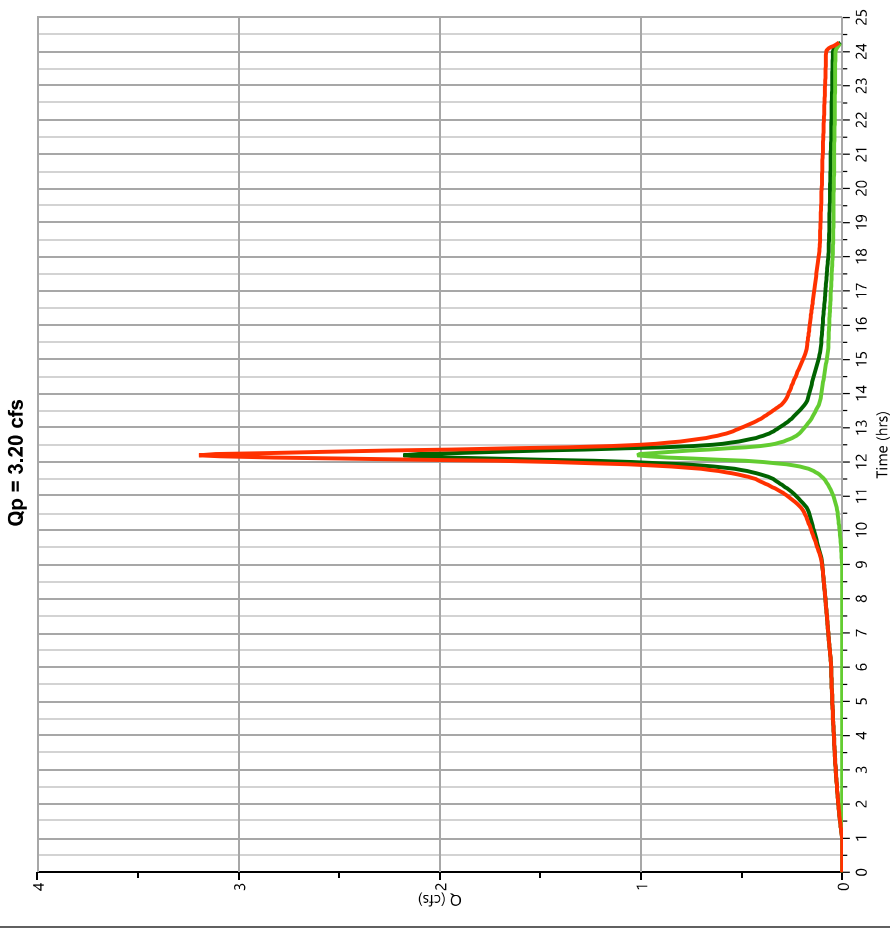
Hydrology Studio v 3.0.0.24

06-22-2022

EX DA-2 [POI-2]

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 3,198 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 15,620 cuft
Inflow Hydrographs	= 3, 4	Total Contrib. Area	= 1,91 ac



Hydrograph Report

Project Name:

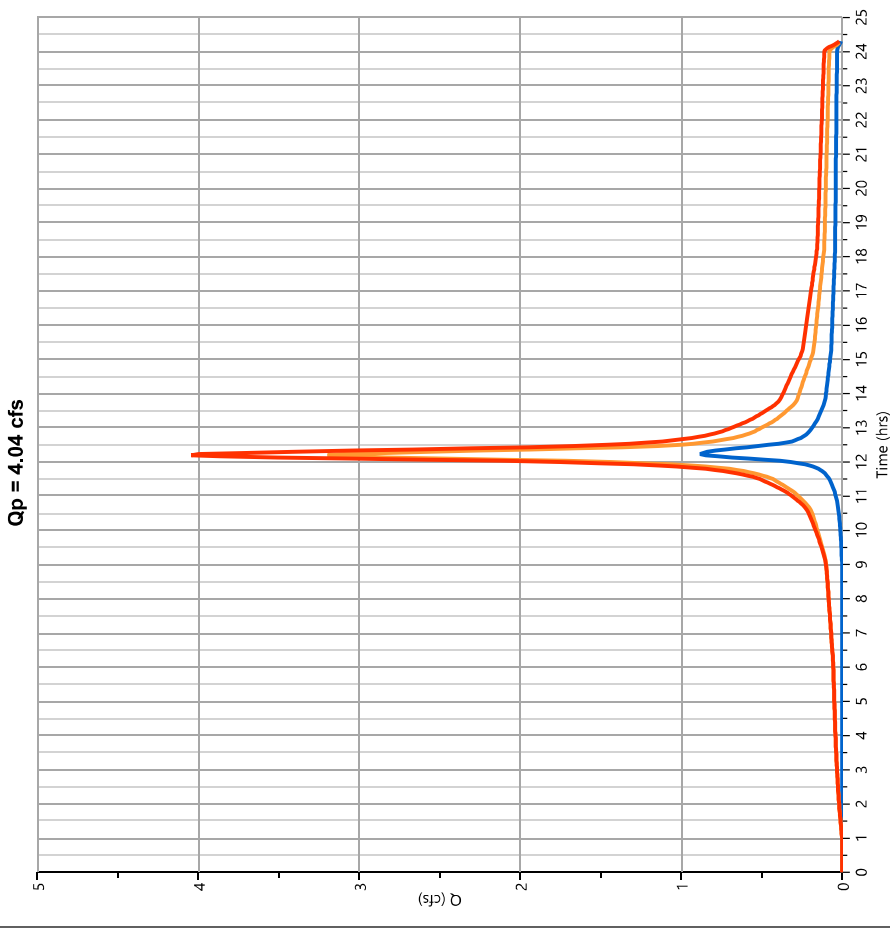
Hydrology Studio v 3.0.0.24

06-22-2022

EX TOTAL TO POI-2

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 4,044 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 20,048 cuft
Inflow Hydrographs	= 1, 5	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

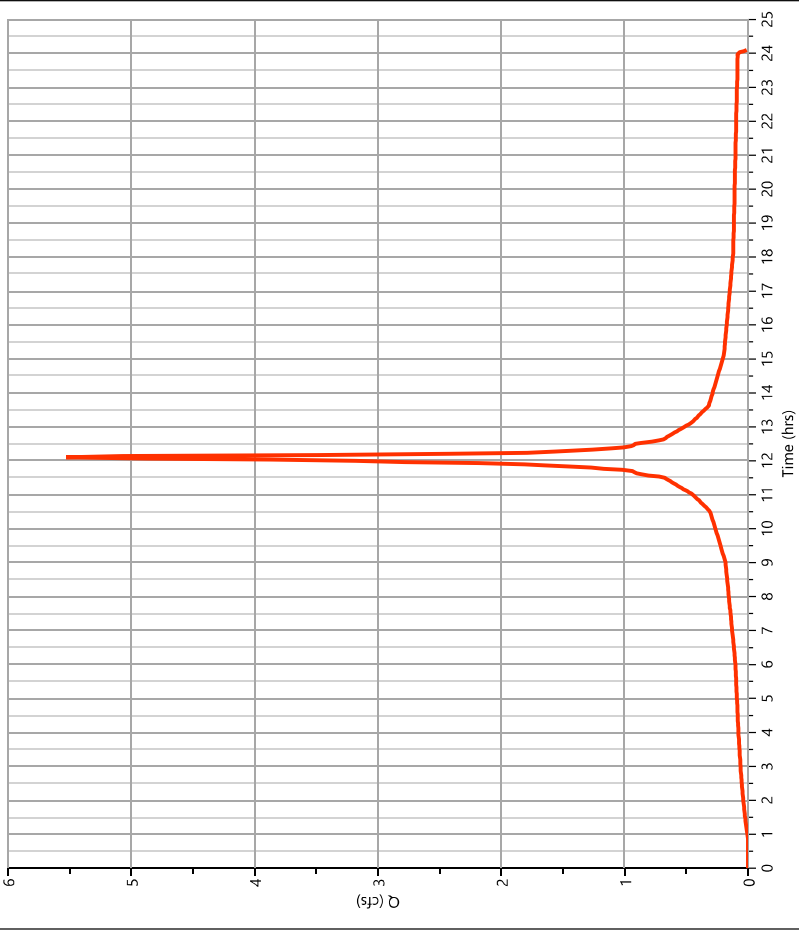
06-22-2022

EX DA-3 IMP

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.529 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 19,970 cuft
Drainage Area	= 1.83 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 5.53 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

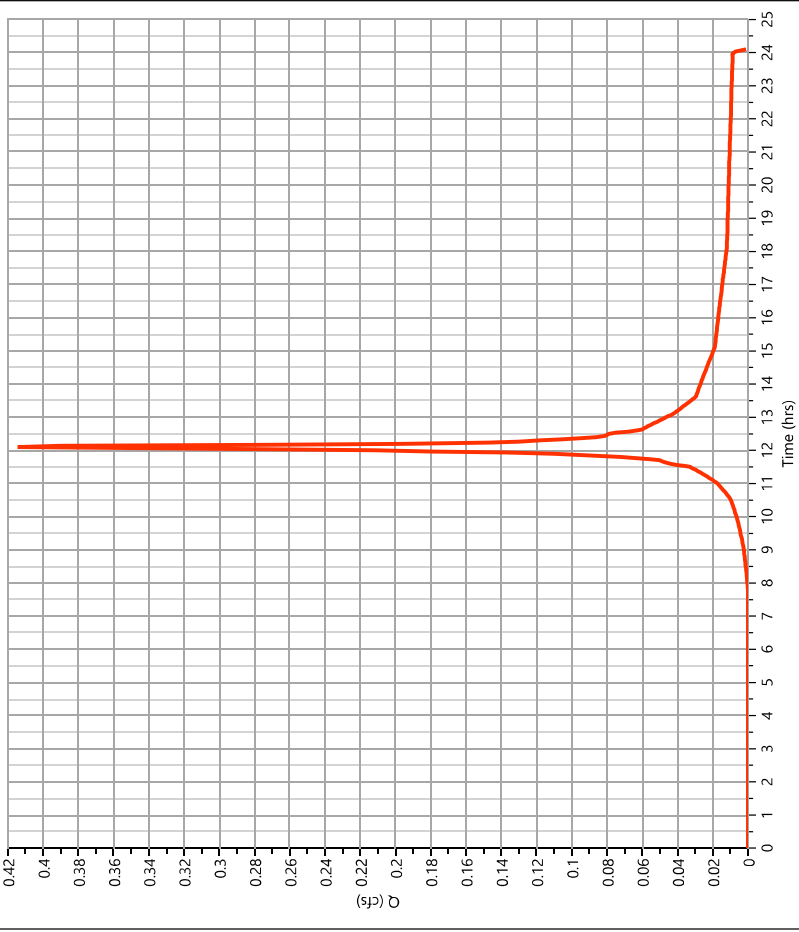
06-22-2022

EX DA-3 PER

Hyd. No. 10

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.414 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,298 cuft
Drainage Area	= 0.24 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.41 cfs



Hydrograph Report

Project Name:

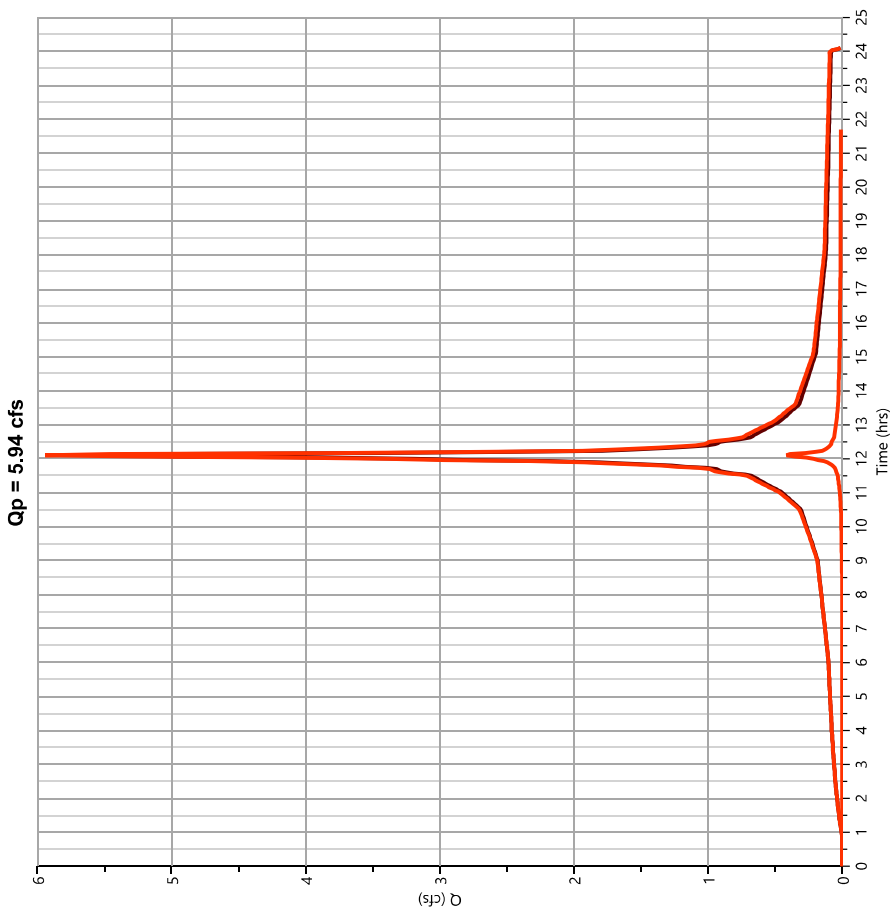
Hydrology Studio v 3.0.0.24

06-22-2022

EX DA-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 5.943 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,268 cuft
Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 2.07 ac



Hydrograph Report

Project Name:

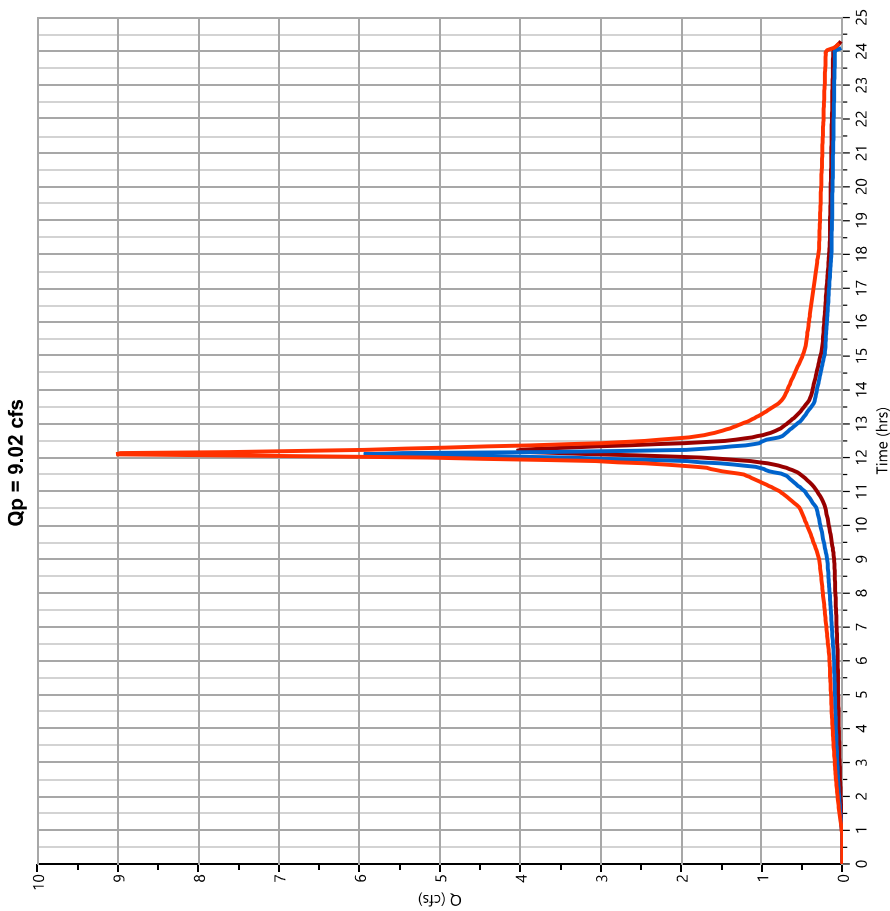
Hydrology Studio v 3.0.0.24

06-22-2022

EX TOTAL TO POI-3

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 9.019 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 41,316 cuft
Inflow Hydrographs	= 7, 11	Total Contrib. Area	= 4.86 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

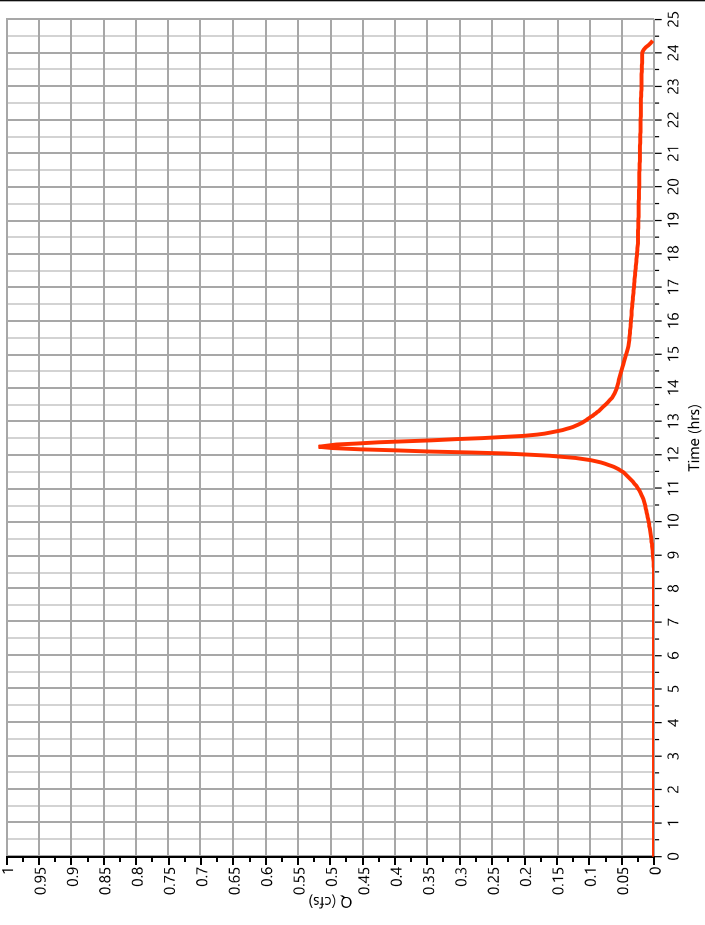
DA-1 [POI-1]

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.518 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 2,583 cuft
Drainage Area	= 0.49 ac	Curve Number	= 78*
Tc Method	= User	Time of Conc. (Tc)	= 18.8 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet	
AREA (ac)	DESCRIPTION
0.25	CN
77	WOODED
0.2	OPEN SPACE
80	
0.49	78
	Weighted CN Method Employed

Qp = 0.52 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

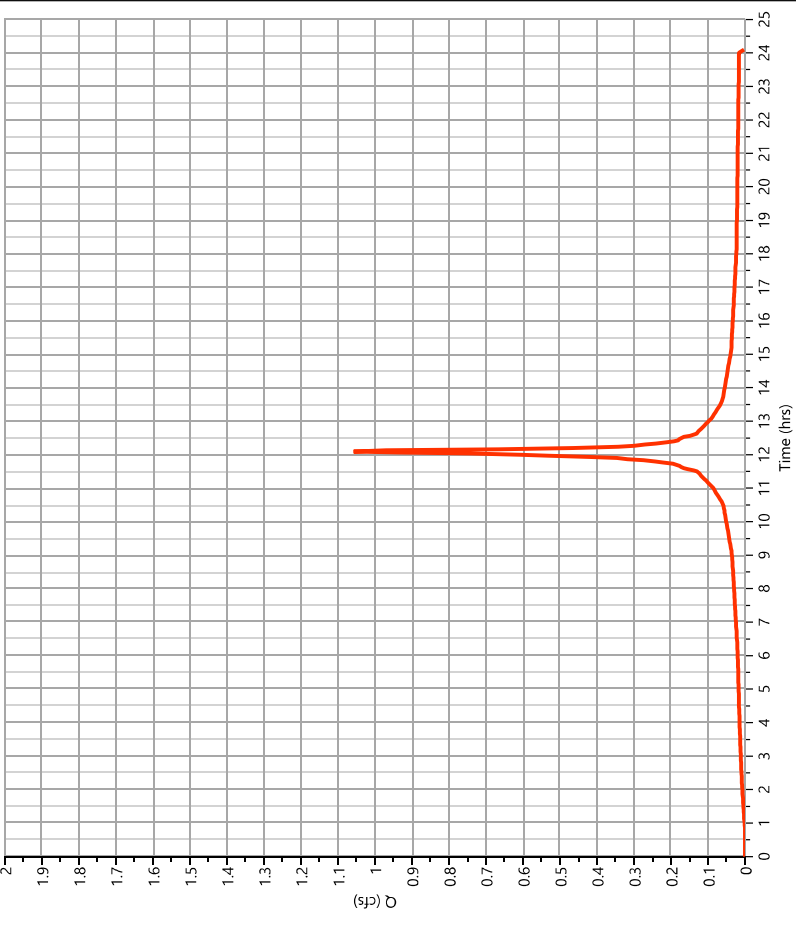
06-22-2022

DA-2 UNDET IMP

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.057 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 3,819 cuft
Drainage Area	= 0.35 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.06 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

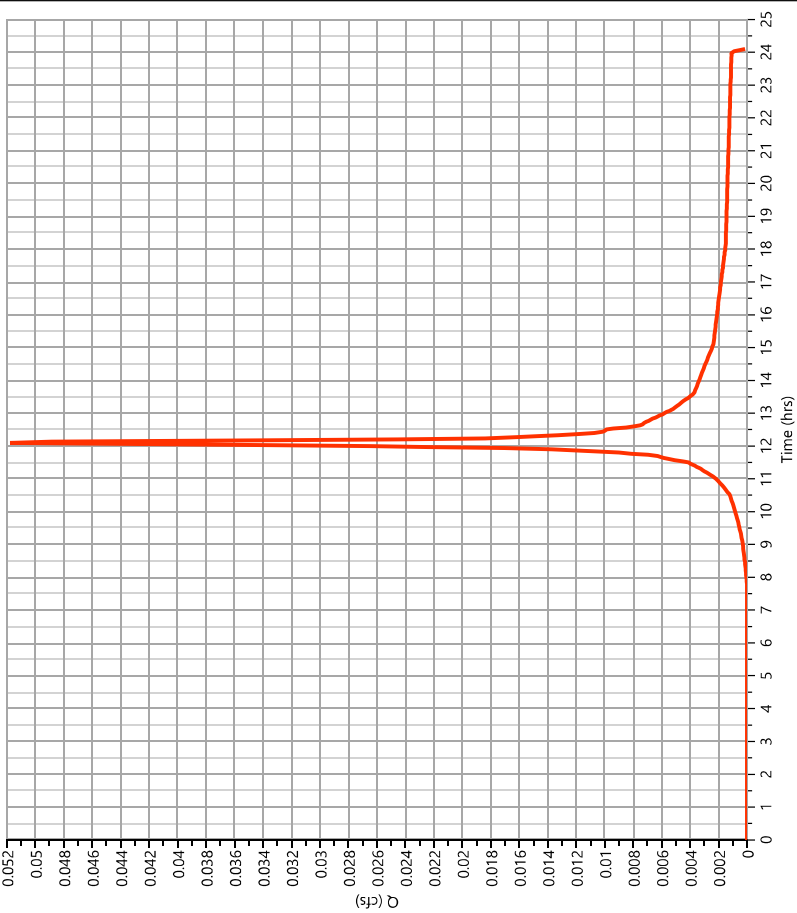
06-22-2022

DA-2 UNDET PER

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.052 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 162 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.05 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

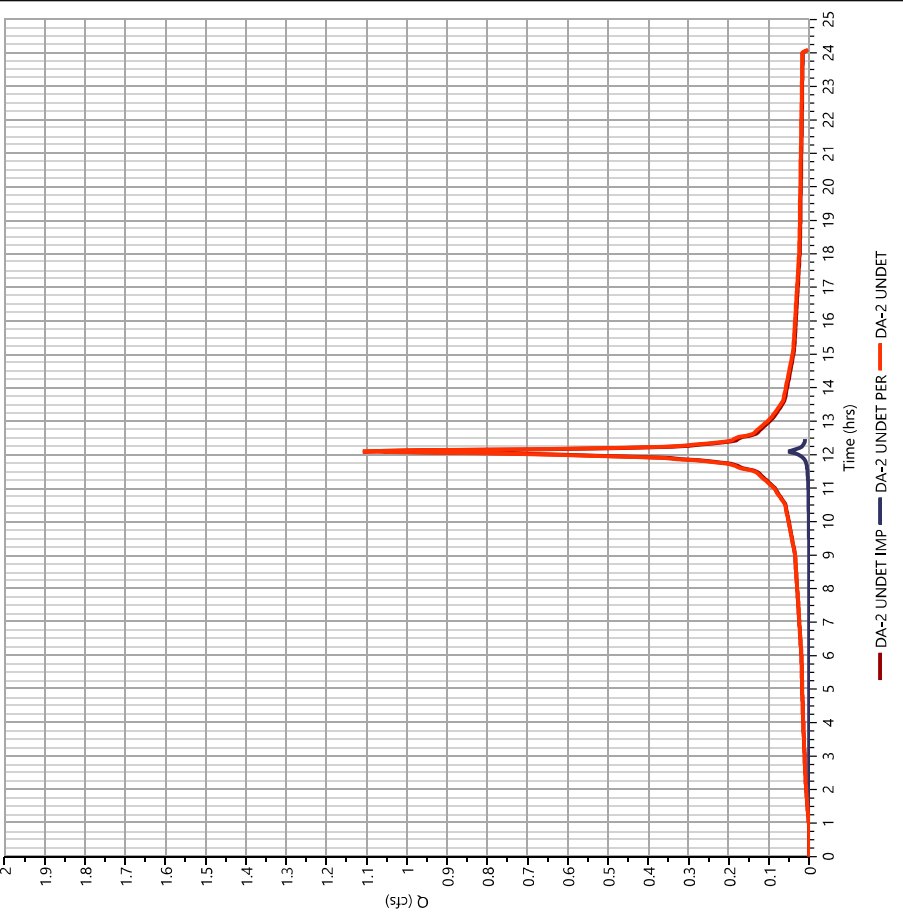
06-22-2022

DA-2 UNDET

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 1.109 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,982 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.38 ac

Qp = 1.11 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

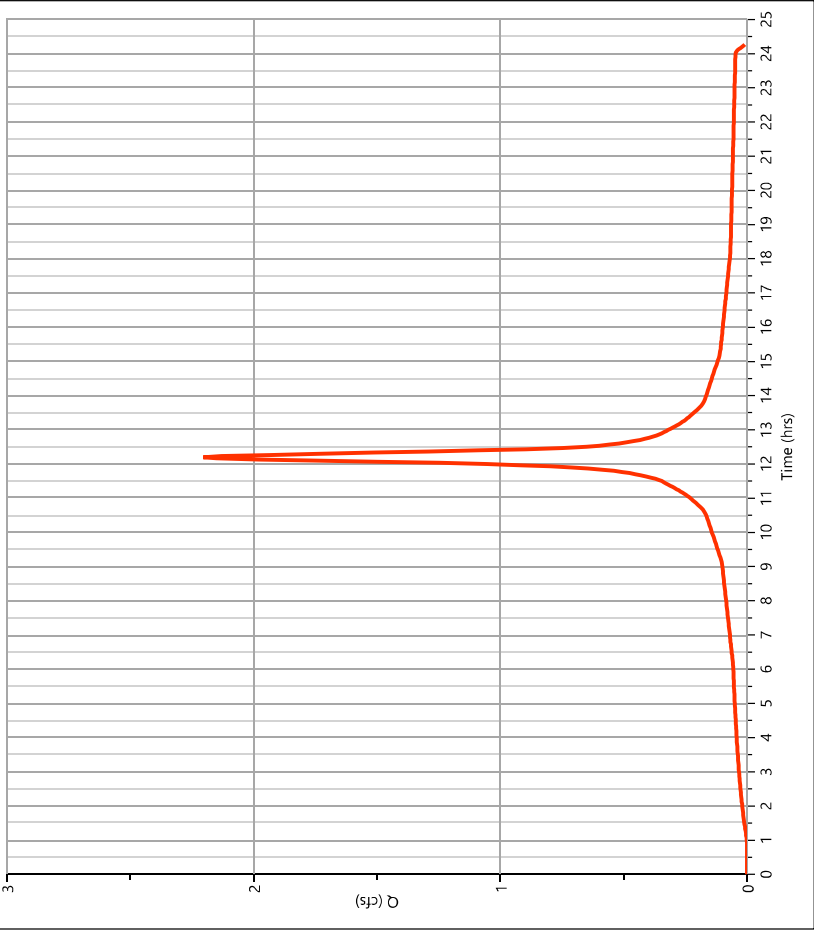
06-22-2022

DA-2A DET IMP

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2,203 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 11,122 cuft
Drainage Area	= 0.98 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 14.7 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 2,200 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

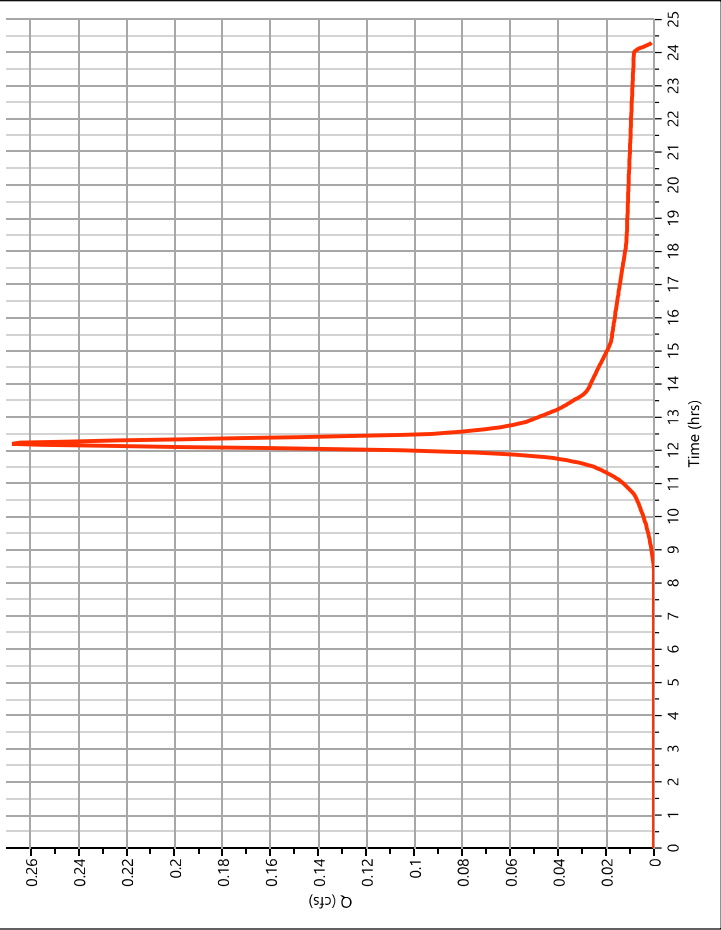
DA-2A DET PER

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.268 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 1,205 cuft
Drainage Area	= 0.23 ac	Curve Number	= 78.43*
Tc Method	= User	Time of Conc. (Tc)	= 14.7 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet		
AREA (ac)	CN	DESCRIPTION
0.11	80	OPEN SPACE
0.12	77	WOODED
0.23	78	Weighted CN Method Employed

Qp = 0.27 cfs



Hydrograph Report

Project Name:

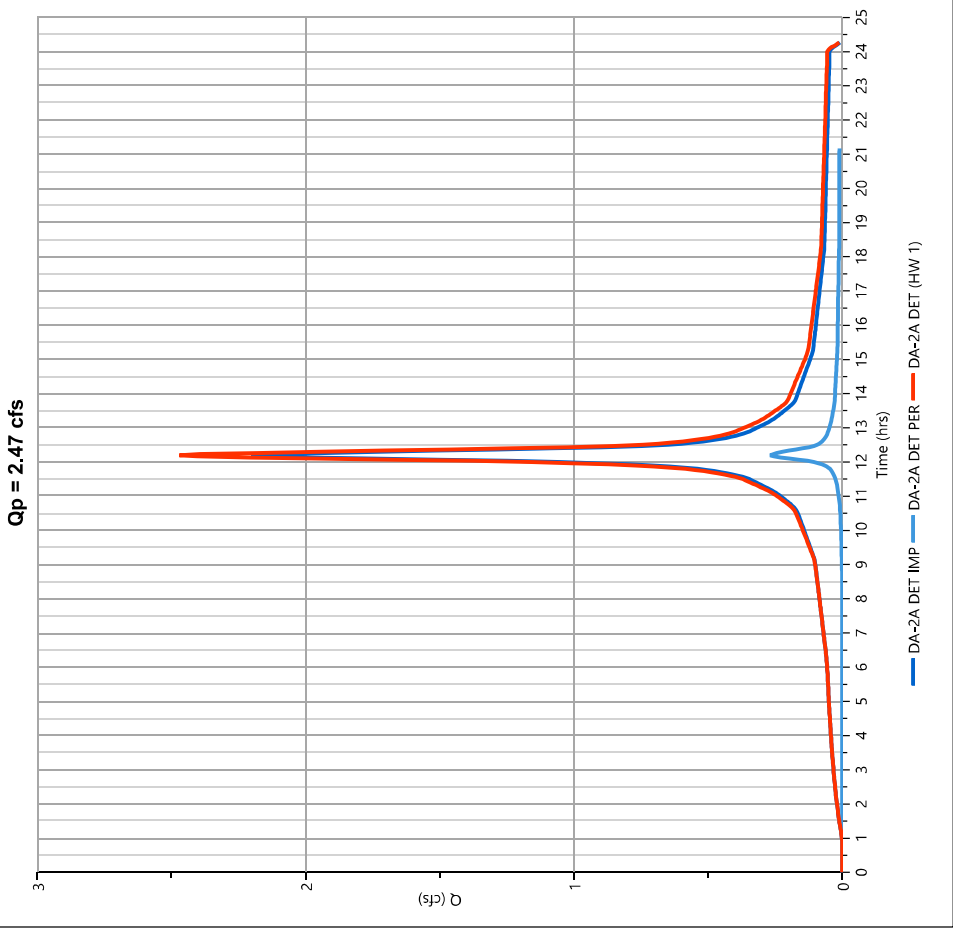
Hydrology Studio v 3.0.0.24

06-22-2022

DA-2A DET (HW 1)

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 2,471 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,328 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 1,21 ac



Hydrograph Report

Project Name:

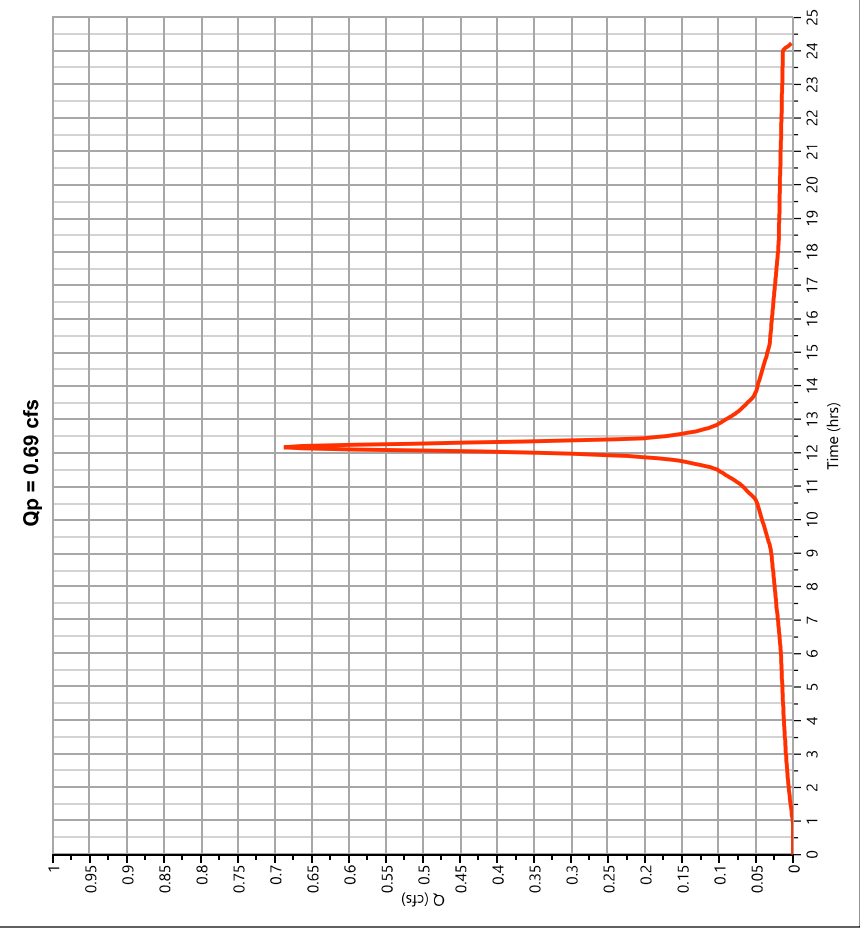
Hydrology Studio v 3.0.0.24

06-22-2022

DA-2B DET IMP

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.688 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 3,241 cuft
Drainage Area	= 0.27 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

DA-2B DET PER

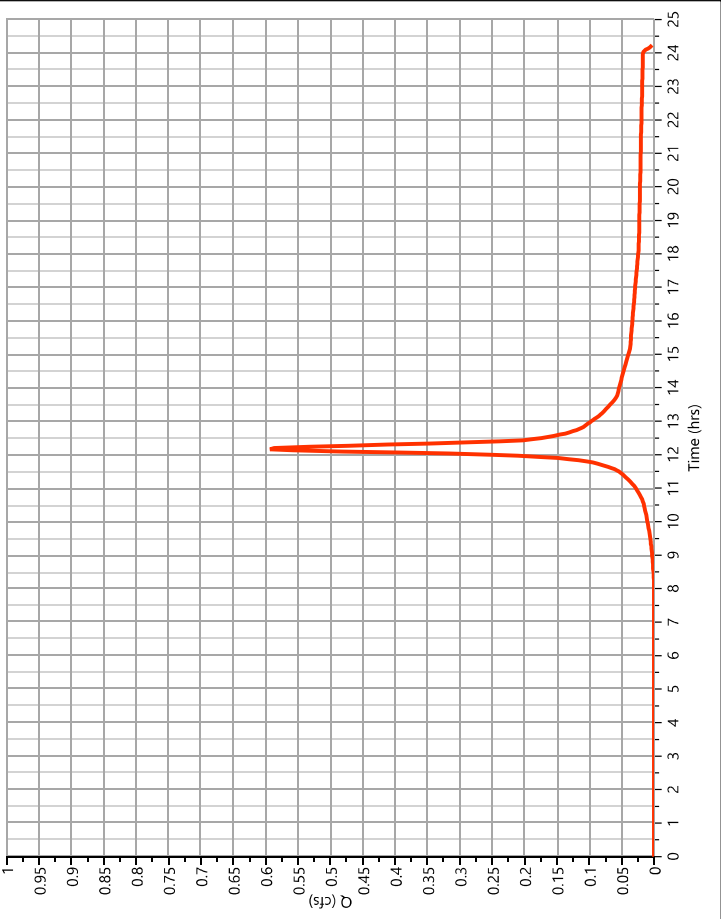
Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.593 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 2,485 cuft
Drainage Area	= 0.44 ac	Curve Number	= 78.84*
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.27	80	OPEN SPACE
0.17	77	WOODED
0.44	79	Weighted CN Method Employed

Qp = 0.59 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

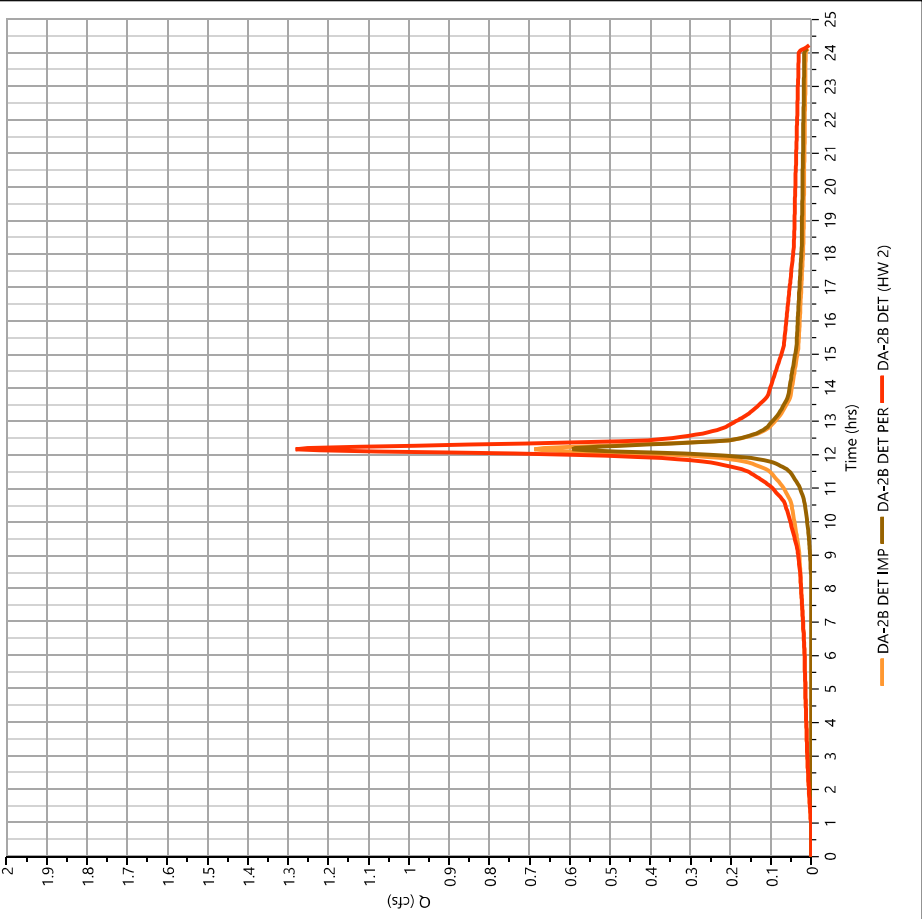
06-22-2022

DA-2B DET (HW 2)

Hyd. No. 27

Hydrograph Type	= Junction	Peak Flow	= 1,281 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,726 cuft
Inflow Hydrographs	= 25, 26	Total Contrib. Area	= 0.71 ac

Qp = 1.28 cfs



Hydrograph Report

Project Name:

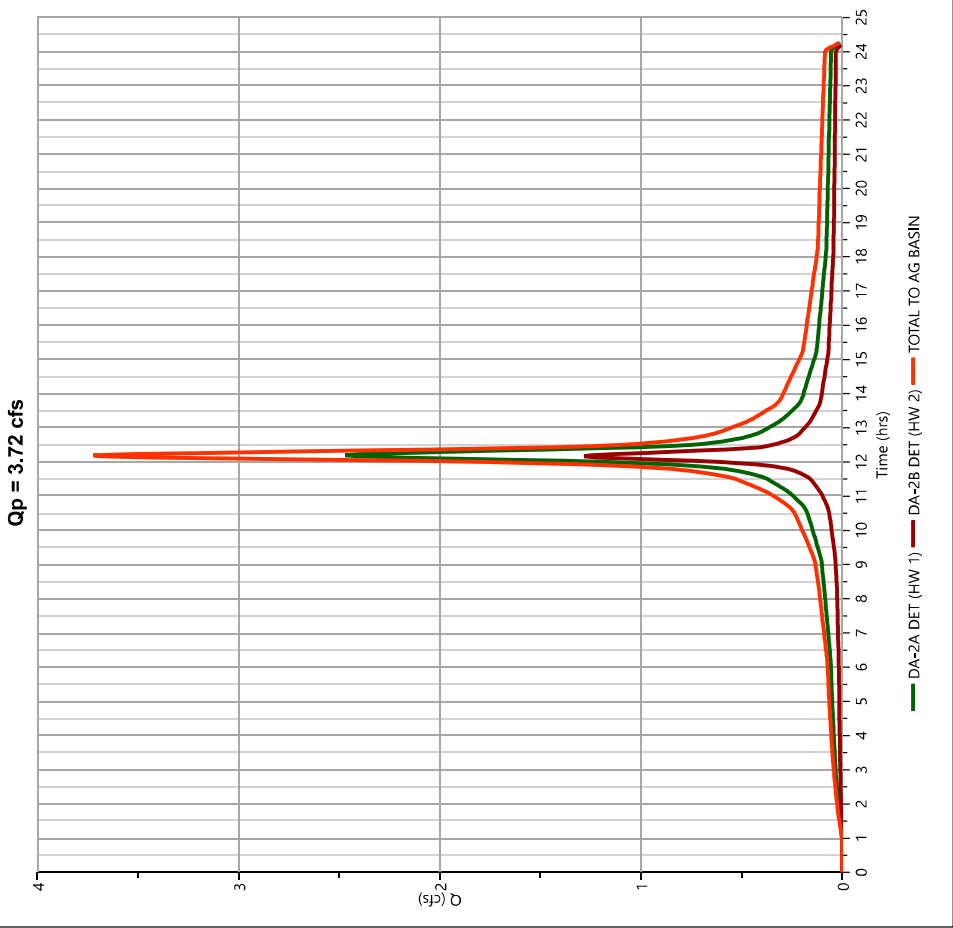
Hydrology Studio v 3.0.0.24

06-22-2022

TOTAL TO AG BASIN

Hyd. No. 29

Hydrograph Type	= Junction	Peak Flow	= 3.722 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 18,053 cuft
Inflow Hydrographs	= 23, 27	Total Contrib. Area	= 1.92 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

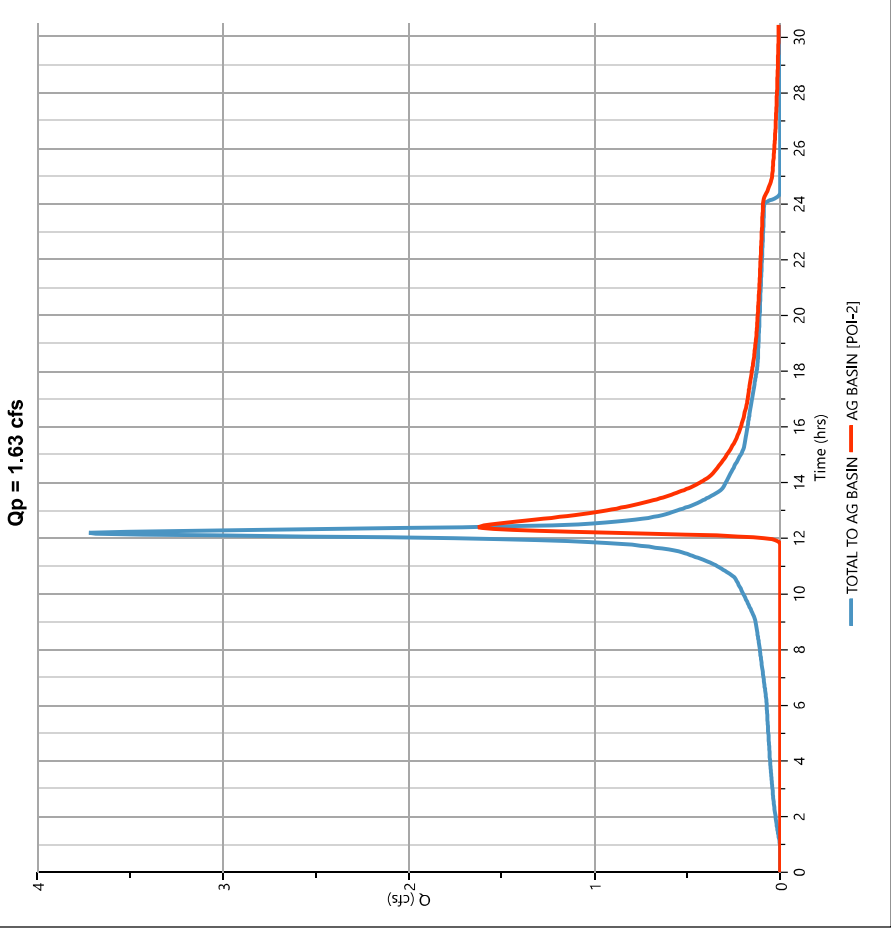
AG BASIN [POI-2]

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 1.627 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,017 cuft
Inflow Hydrograph	= 29 - TOTAL TO AG BASIN	Max. Elevation	= 462.69 ft
Pond Name	= AG BASIN	Max. Storage	= 8,532 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.59 hrs



Pond Report

AG BASIN

Stage-Storage-Discharge Summary

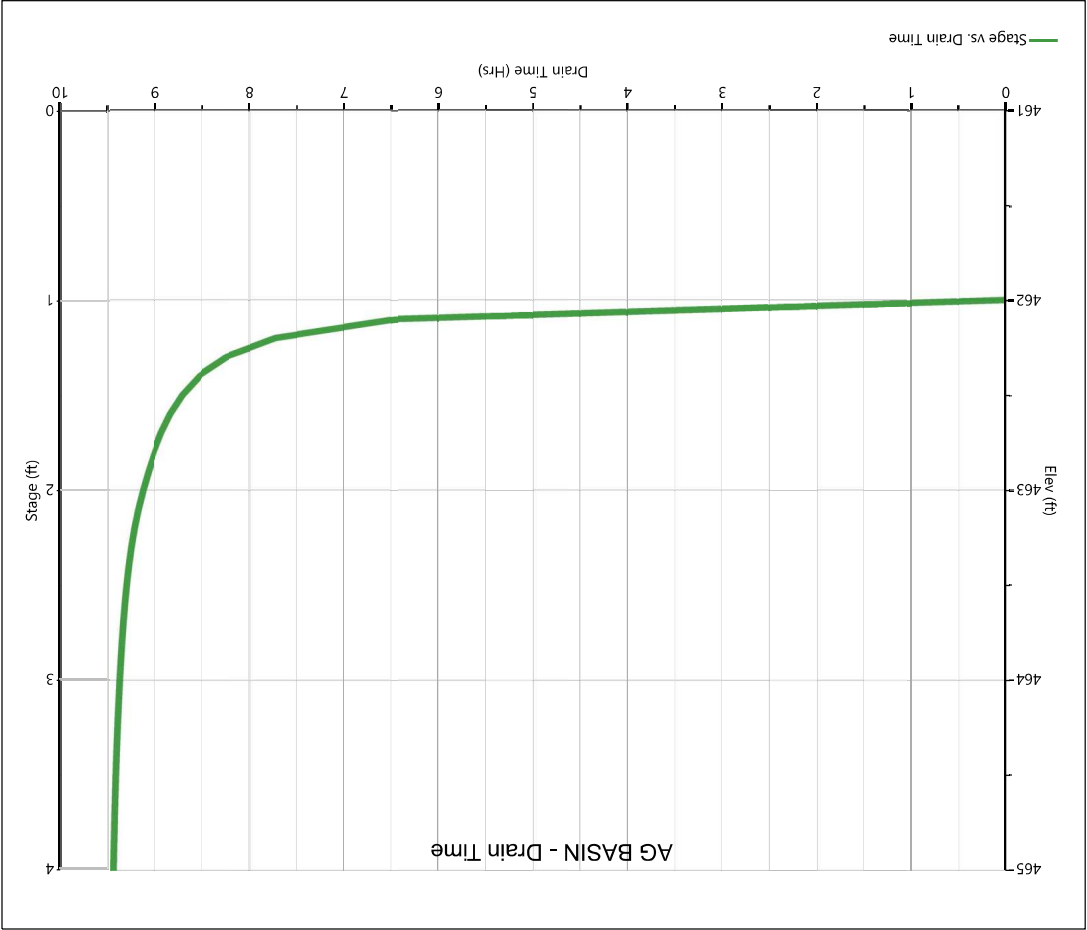
Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			PI Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	461.00	0.000	0.000	0.000			0.000	0.000						0.000
1.00	462.00	5.025	0.000 oc	0.000			0.000	0.000						0.000
2.00	463.00	10.150	2.674 oc	2.674			0.000	0.000						2.674
3.00	464.00	15.375	14.53 oc	4.631			0.000	9.900						14.53
4.00	465.00	20.700	36.60 lc	1.438			23.33	11.82 s						36.60

Suffix: key, lc = inlet control, oc = outlet control, s = submerged weir

Pond Report

AG BASIN

Pond Drawdown



Hydrograph Report

Project Name:

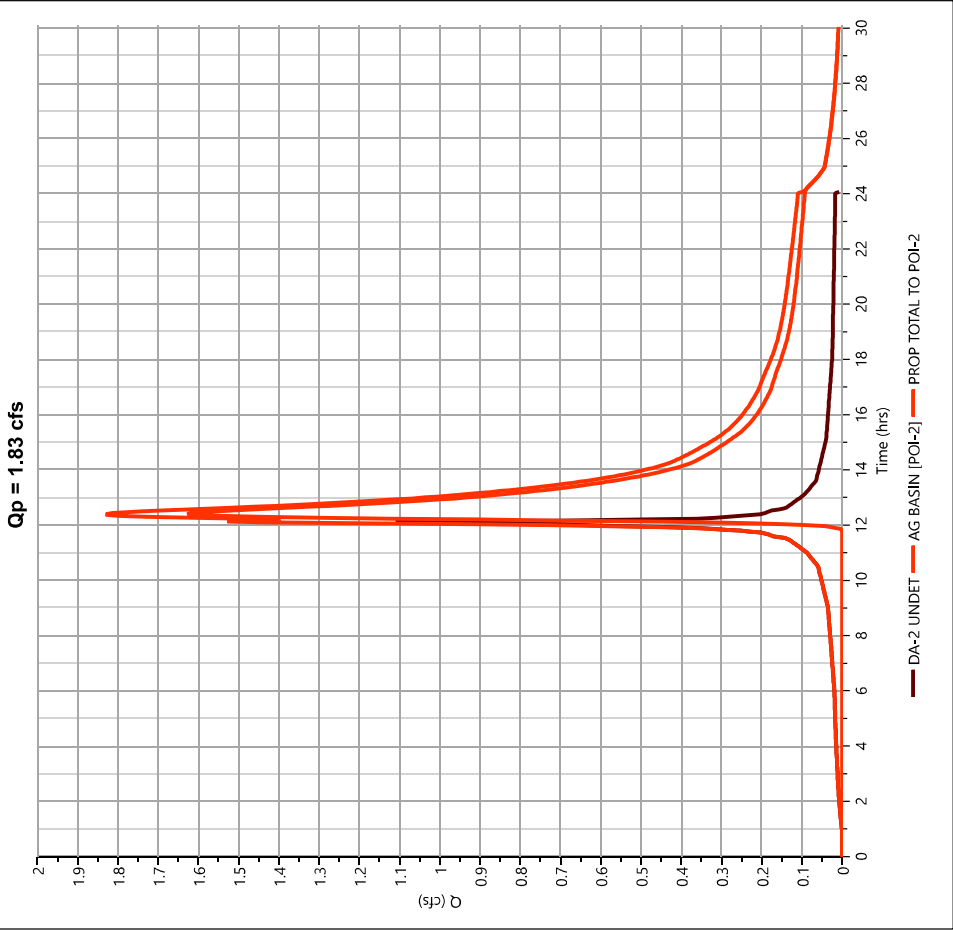
Hydrology Studio v 3.0.0.24

06-22-2022

PROP TOTAL TO POI-2

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 1,830 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 16,998 cuft
Inflow Hydrographs	= 19, 30	Total Contrib. Area	= 0.38 ac



Hydrograph Report

Project Name:

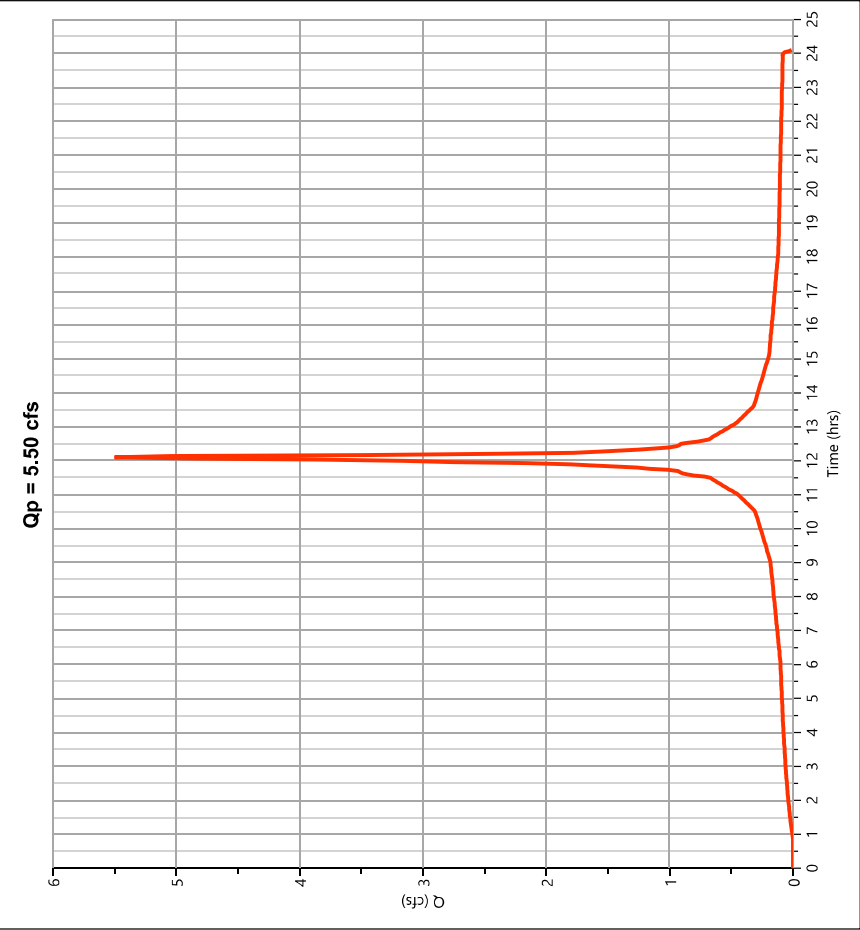
Hydrology Studio v 3.0.0.24

06-22-2022

DA-3 UNDET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5,499 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 19,861 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

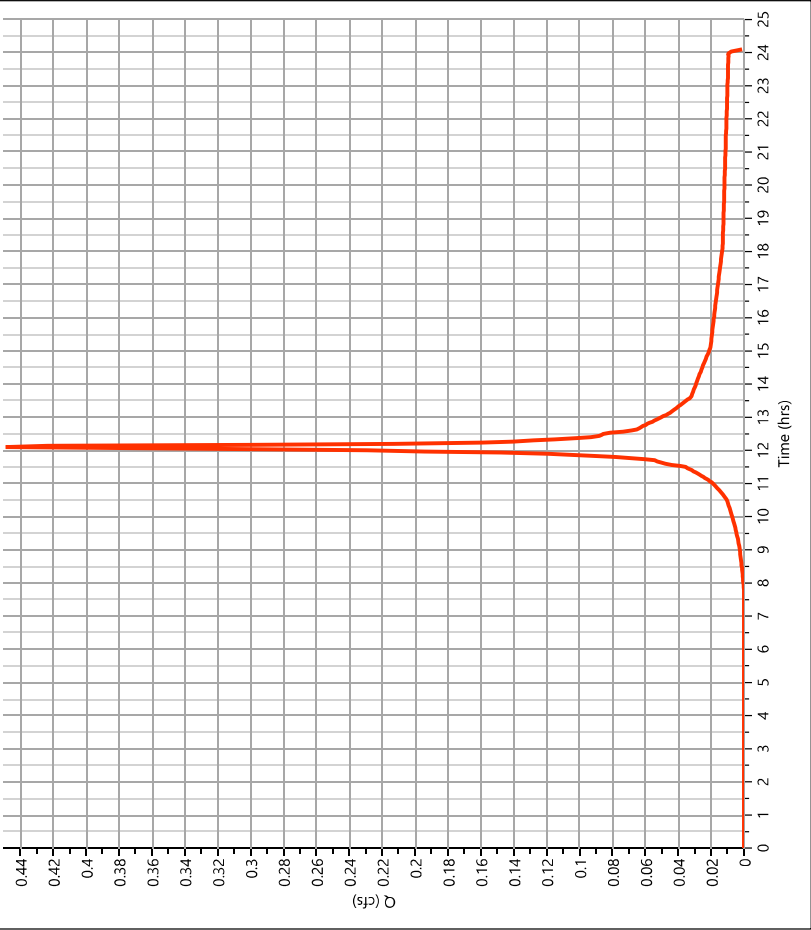
06-22-2022

DA-3 UNDET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.449 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,406 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.45 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

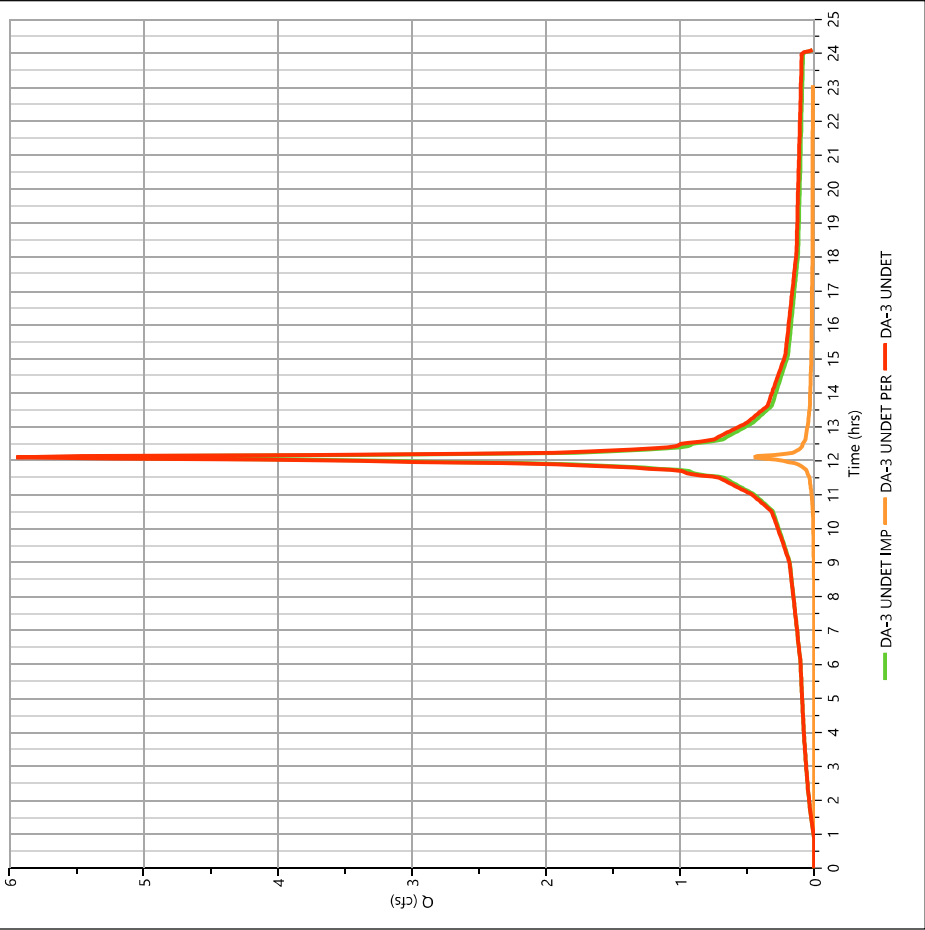
06-22-2022

DA-3 UNDET

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 5.948 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,267 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 2.08 ac

Qp = 5.95 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

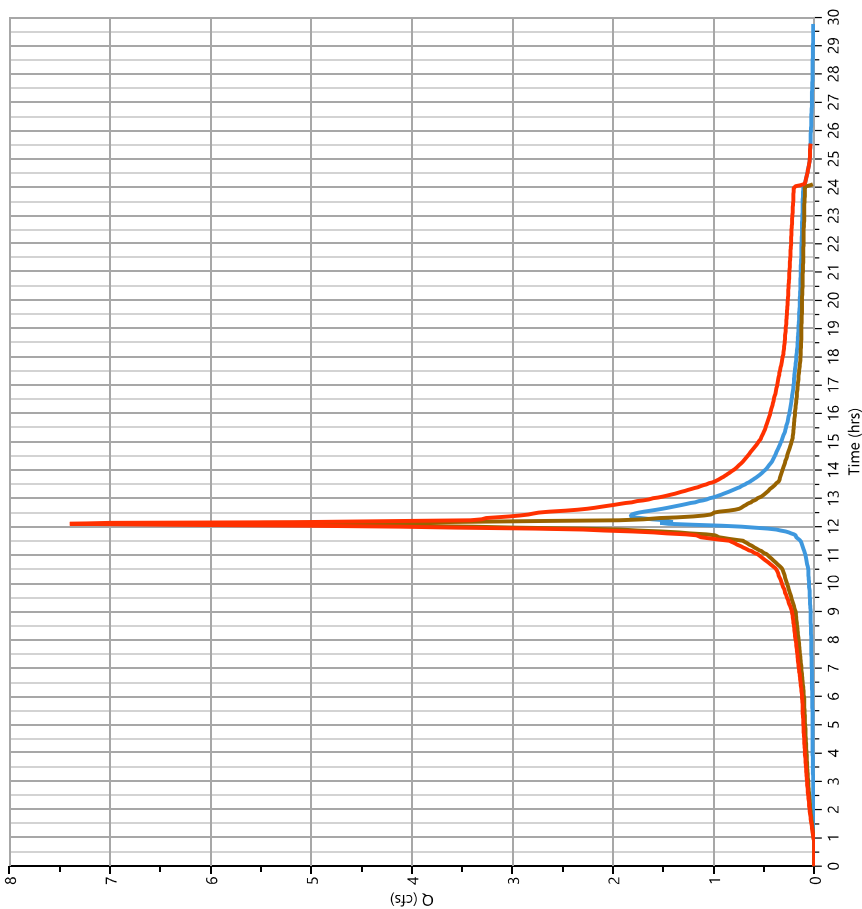
06-22-2022

PROP TOTAL TO POI-3

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 7,399 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 38,265 cuf
Inflow Hydrographs	= 32, 36	Total Contrib. Area	= 2.46 ac

Qp = 7.40 cfs



Design Storm Report

Custom Storm filename:

Hydrology Studio v 3.0.0.24

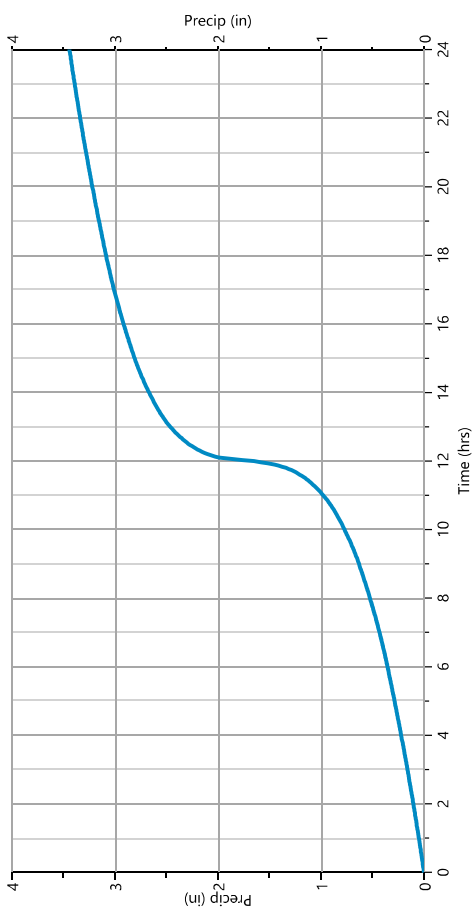
06-22-2022

Storm Distribution: NRCC-D, 24-hr

Storm Duration	Total Rainfall Volume (in)					
	1-yr	✓ 2-yr	3-yr	5-yr	10-yr	25-yr
24 hrs	0.00	3.44	0.00	0.00	5.22	6.44
						8.66

Incremental Rainfall Distribution, 2-yr

Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.009884	11.43	0.013450	11.80	0.025961	12.17	0.036968	12.53	0.013450
11.10	0.009884	11.47	0.013450	11.83	0.036969	12.20	0.036969	12.57	0.013450
11.13	0.010779	11.50	0.013451	11.87	0.036968	12.23	0.025960	12.60	0.013450
11.17	0.010779	11.53	0.017624	11.90	0.036969	12.27	0.025961	12.63	0.012602
11.20	0.010779	11.57	0.017624	11.93	0.066059	12.30	0.025960	12.67	0.012602
11.23	0.011696	11.60	0.017624	11.97	0.066060	12.33	0.018553	12.70	0.012602
11.27	0.011696	11.63	0.018553	12.00	0.066059	12.37	0.018553	12.73	0.011696
11.30	0.011696	11.67	0.018553	12.03	0.114128	12.40	0.018554	12.77	0.011696
11.33	0.012602	11.70	0.018553	12.07	0.114128	12.43	0.017624	12.80	0.011696
11.37	0.012602	11.73	0.025961	12.10	0.114128	12.47	0.017624	12.83	0.010779
11.40	0.012602	11.77	0.025961	12.13	0.036969	12.50	0.017624	12.87	0.010779



Hydrograph 10-yr Summary

Project Name:
06-22-2022

Hydrology Studio v 3.0.0.24

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	1,826	12.23	8,970	---		
3	NRCS Runoff	EX DA-2 IMP	3,330	12.20	17,106	---		
4	NRCS Runoff	EX DA-2 PER	2,086	12.20	9,342	---		
5	Junction	EX DA-2 [POI-2]	5,426	12.20	26,449	3, 4		
7	Junction	EX TOTAL TO POI-2	7,190	12.20	35,419	1, 5		
9	NRCS Runoff	EX DA-3 IMP	8,440	12.10	31,032	---		
10	NRCS Runoff	EX DA-3 PER	0,800	12.10	2,520	---		
11	Junction	EX DA-3	9,240	12.10	33,552	9, 10		
13	Junction	EX TOTAL TO POI-3	14,76	12.10	68,971	7, 11		
15	NRCS Runoff	DA-1 [POI-1]	1,050	12.23	5,157	---		
17	NRCS Runoff	DA-2 UNDET IMP	1,614	12.10	5,935	---		
18	NRCS Runoff	DA-2 UNDET PER	0,100	12.10	315	---		
19	Junction	DA-2 UNDET	1,714	12.10	6,250	17, 18		
21	NRCS Runoff	DA-2A DET IMP	3,364	12.20	17,283	---		
22	NRCS Runoff	DA-2A DET PER	0,536	12.20	2,392	---		
23	Junction	DA-2A DET (HW 1)	3,900	12.20	19,675	21, 22		
25	NRCS Runoff	DA-2B DET IMP	1,050	12.17	5,036	---		
26	NRCS Runoff	DA-2B DET PER	1,179	12.17	4,904	---		
27	Junction	DA-2B DET (HW 2)	2,229	12.17	9,940	25, 26		
29	Junction	TOTAL TO AG BASIN	6,071	12.20	29,615	23, 27		
30	Pond Route	AG BASIN [POI-2]	3,701	12.33	24,579	29	463.16	10,970
32	Junction	PROP TOTAL TO POI-2	4,093	12.33	30,829	19, 30		
34	NRCS Runoff	DA-3 UNDET IMP	8,394	12.10	30,862	---		
35	NRCS Runoff	DA-3 UNDET PER	0,666	12.10	2,730	---		
36	Junction	DA-3 UNDET	9,261	12.10	33,592	34, 35		

Hydrograph 10-yr Summary

Project Name:
06-22-2022

Hydrology Studio v 3.0.0.24

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PROP TOTAL TO POI-3	12,83	12.10	64,421	32, 36		

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

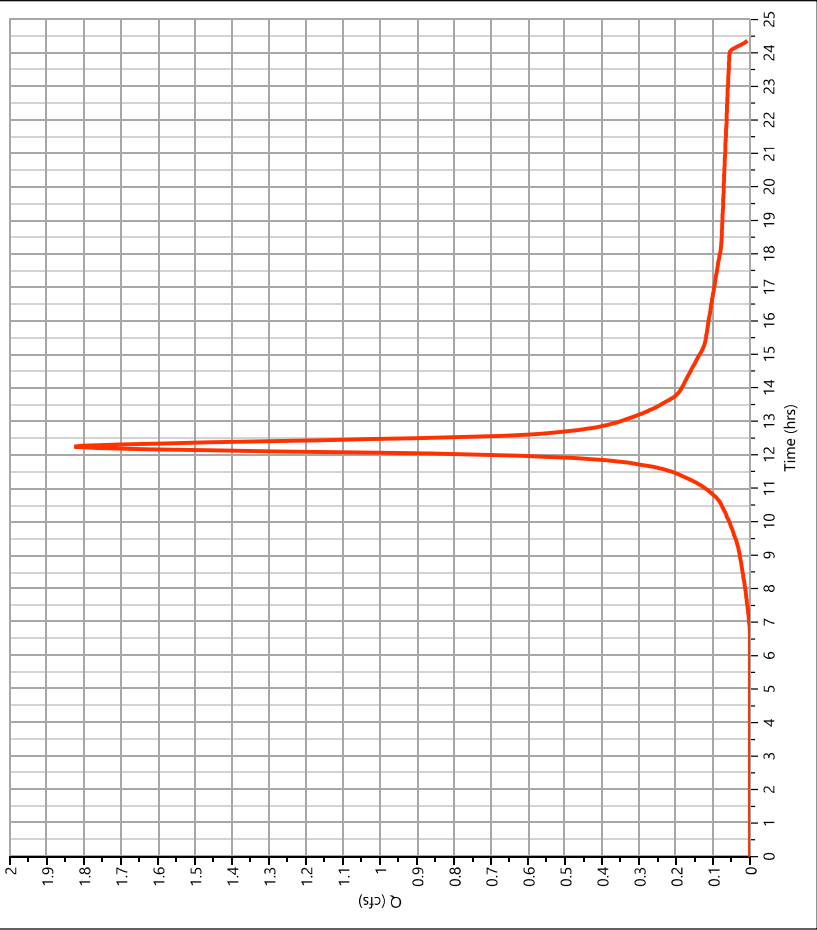
06-22-2022

EX DA-1 [POI-1]

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,826 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 8,970 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.83 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

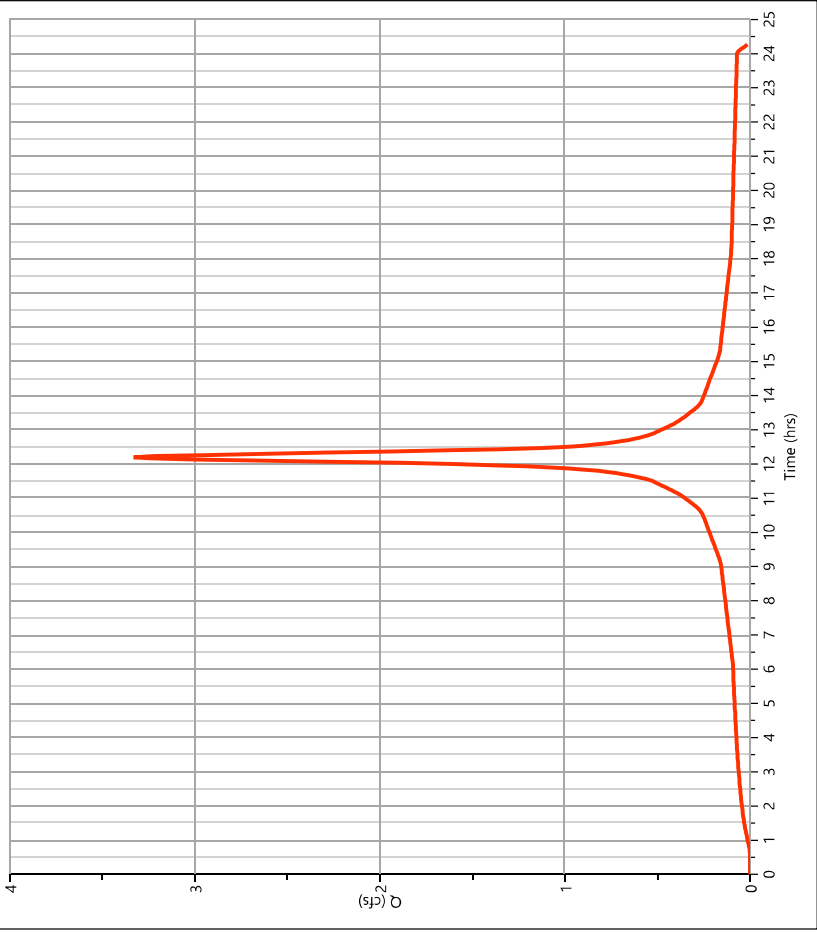
06-22-2022

EX DA-2 IMP

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3,330 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 17,106 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 3.33 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

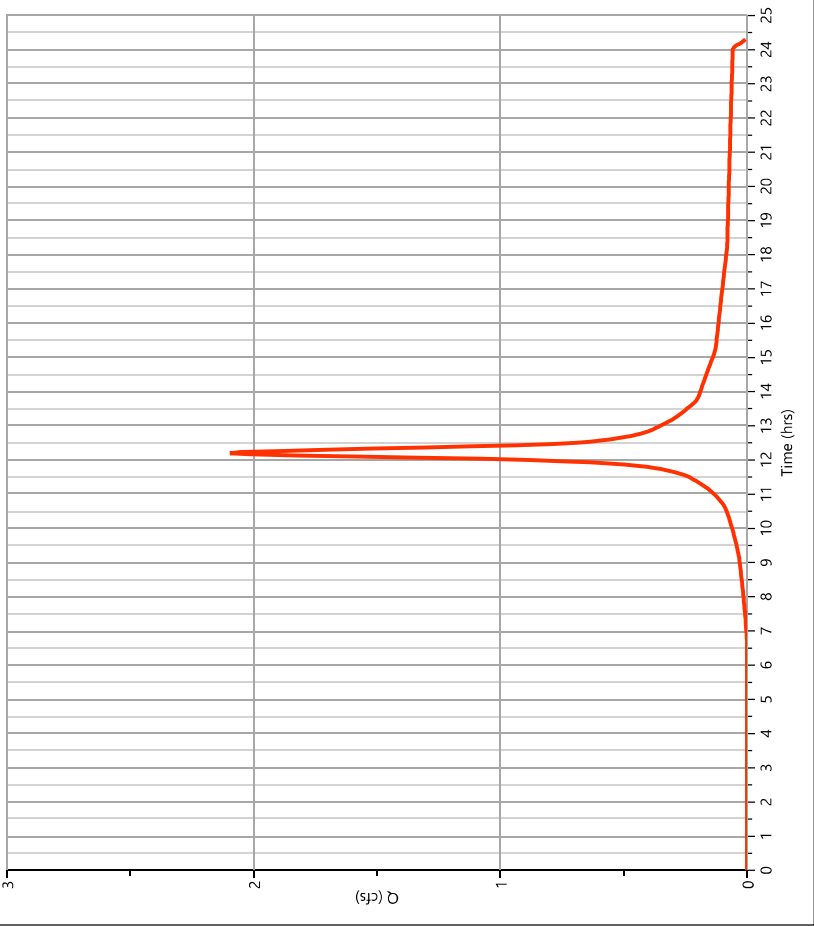
06-22-2022

EX DA-2 PER

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2,096 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 9,342 cuft
Drainage Area	= 0.94 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 2.10 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

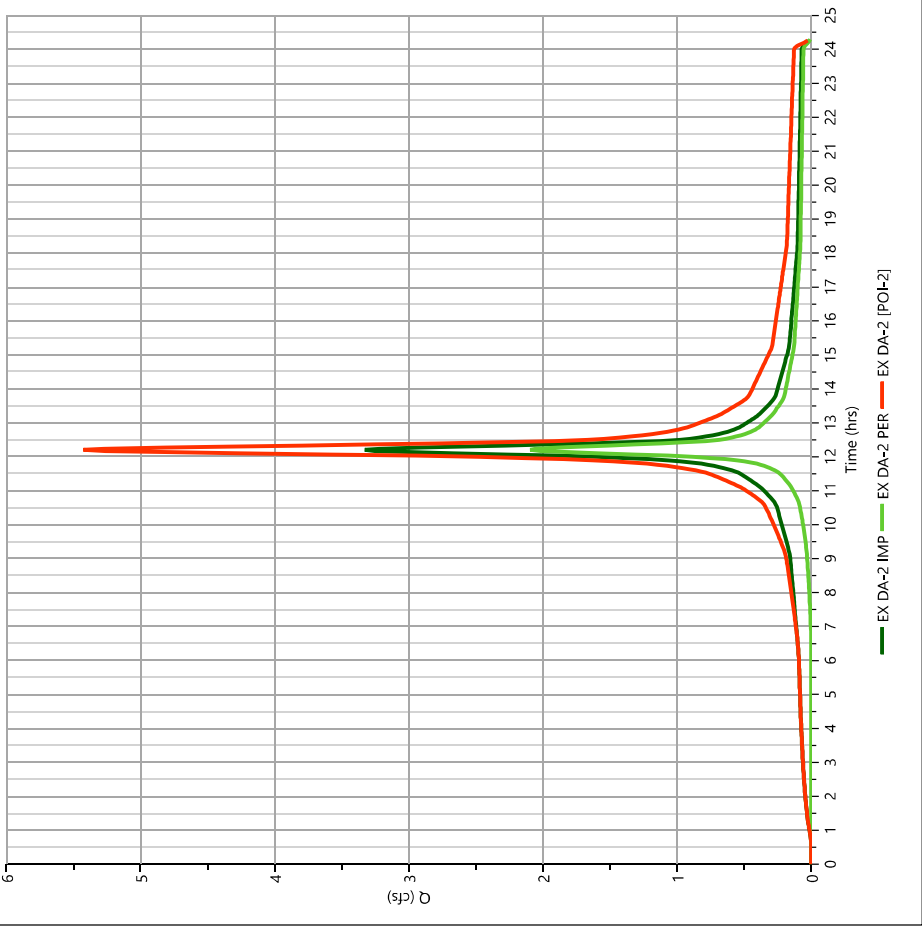
06-22-2022

EX DA-2 [POL-2]

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 5,426 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 26,449 cuft
Inflow Hydrographs	= 3, 4	Total Contrib. Area	= 1,91 ac

Qp = 5.43 cfs



Hydrograph Report

Project Name:

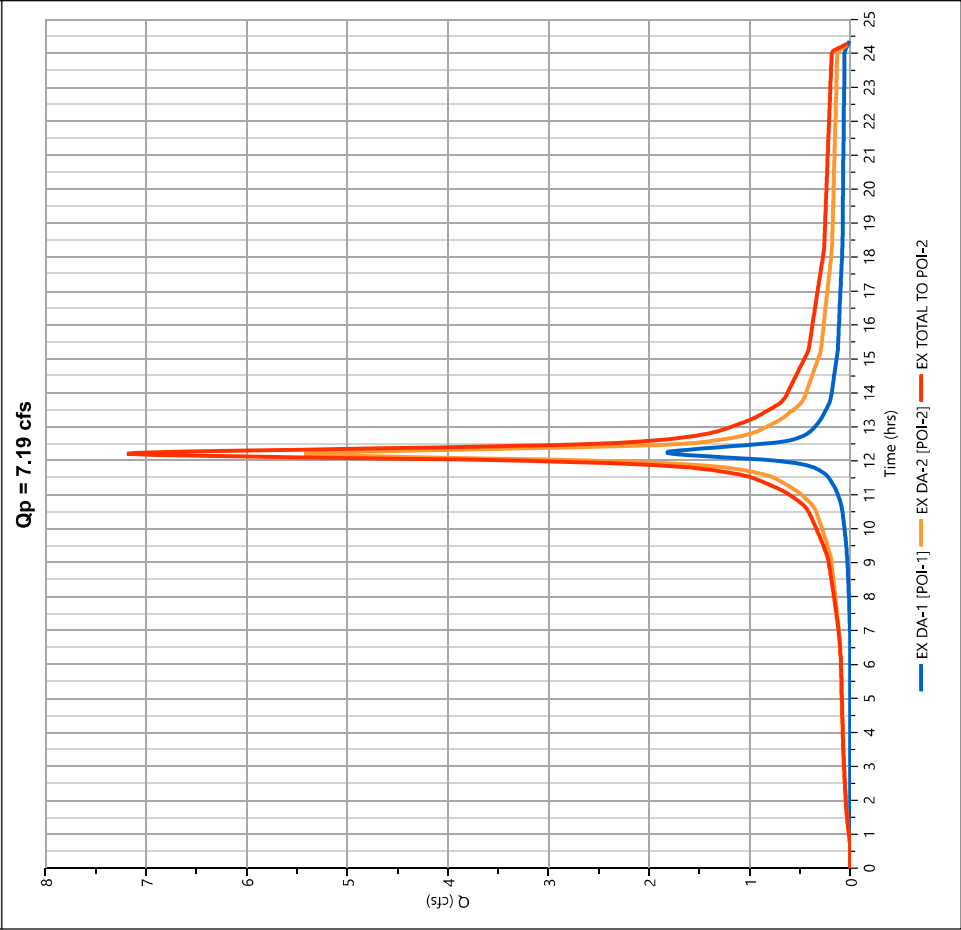
Hydrology Studio v 3.0.0.24

06-22-2022

EX TOTAL TO POI-2

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 7.190 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 35,419 cuft
Inflow Hydrographs	= 1, 5	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

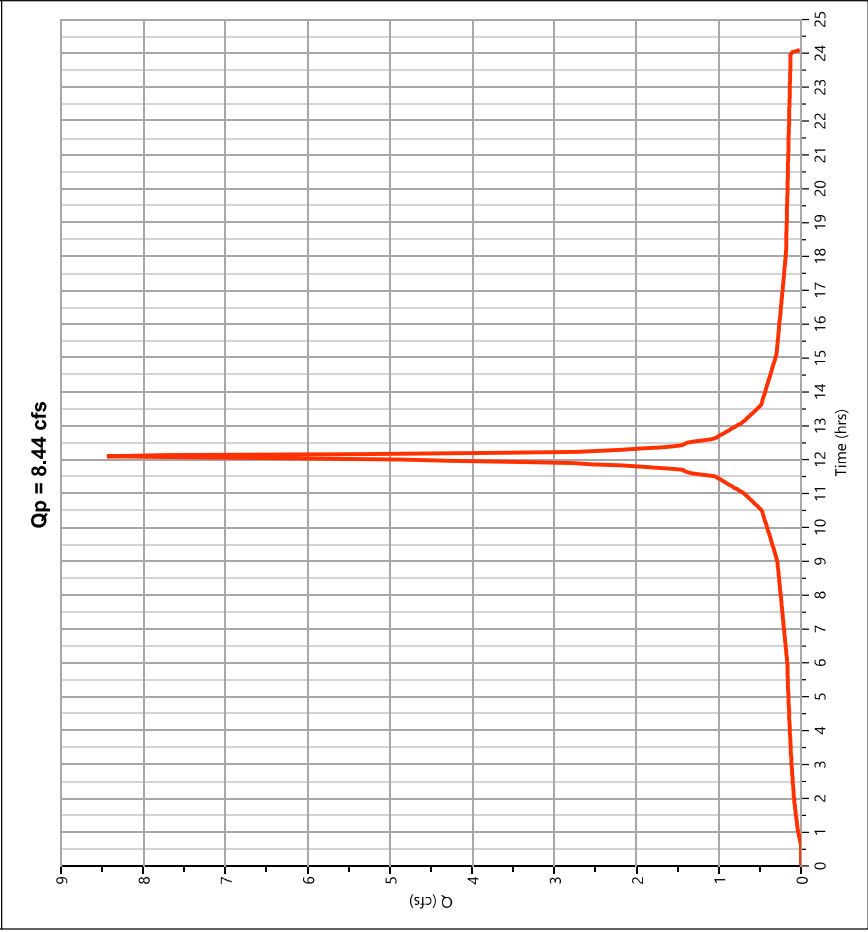
Hydrology Studio v 3.0.0.24

06-22-2022

EX DA-3 IMP

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.440 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 31,032 cuft
Drainage Area	= 1.83 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

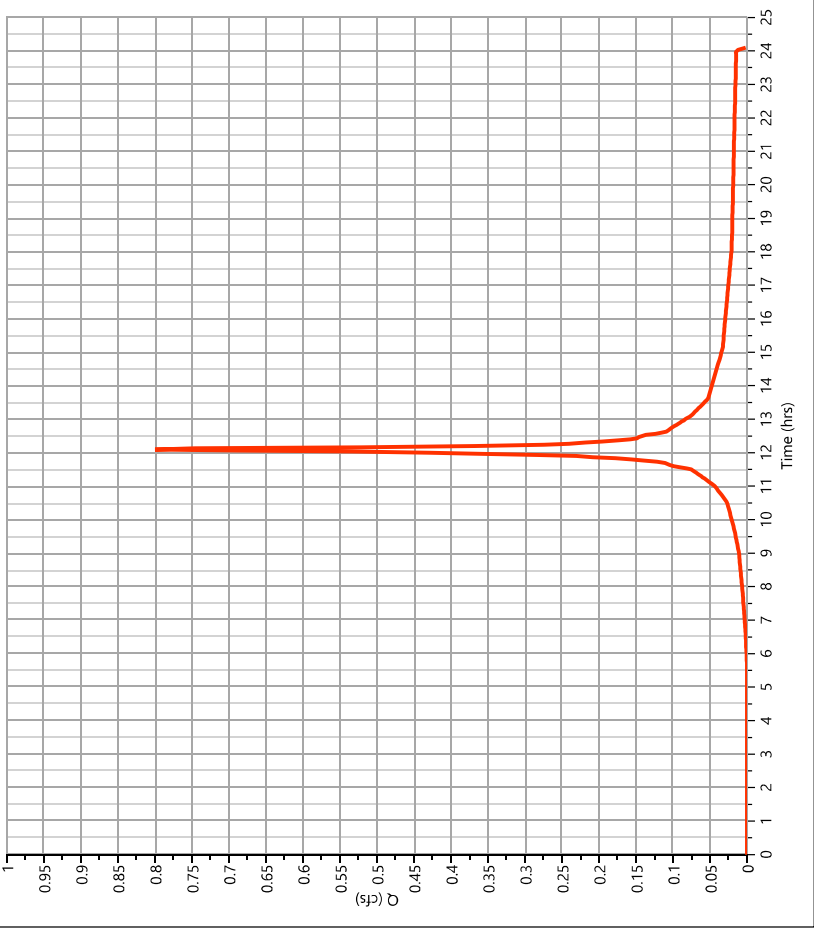
06-22-2022

EX DA-3 PER

Hyd. No. 10

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.800 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,520 cuft
Drainage Area	= 0.24 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.80 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

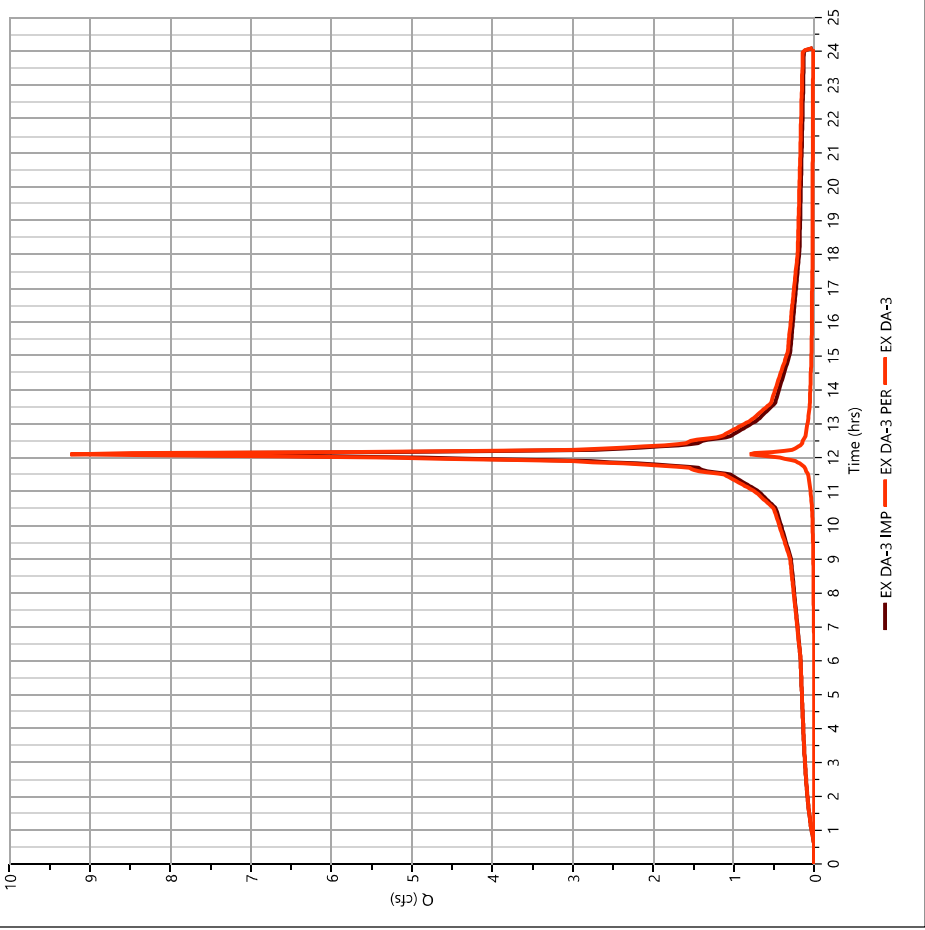
06-22-2022

EX DA-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 9.240 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 33,552 cuft
Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 2.07 ac

Qp = 9.24 cfs



Hydrograph Report

Project Name:

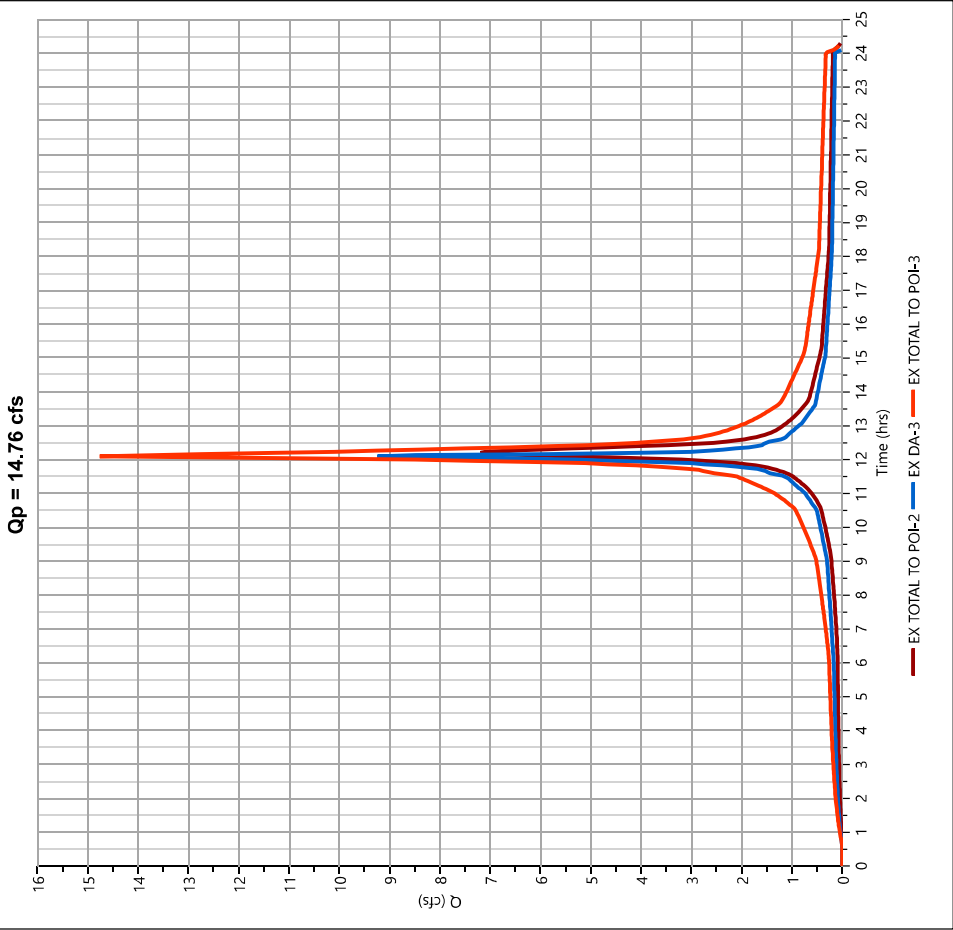
Hydrology Studio v 3.0.0.24

06-22-2022

EX TOTAL TO POI-3

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 14.76 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 68,971 cuft
Inflow Hydrographs	= 7, 11	Total Contrib. Area	= 4.86 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

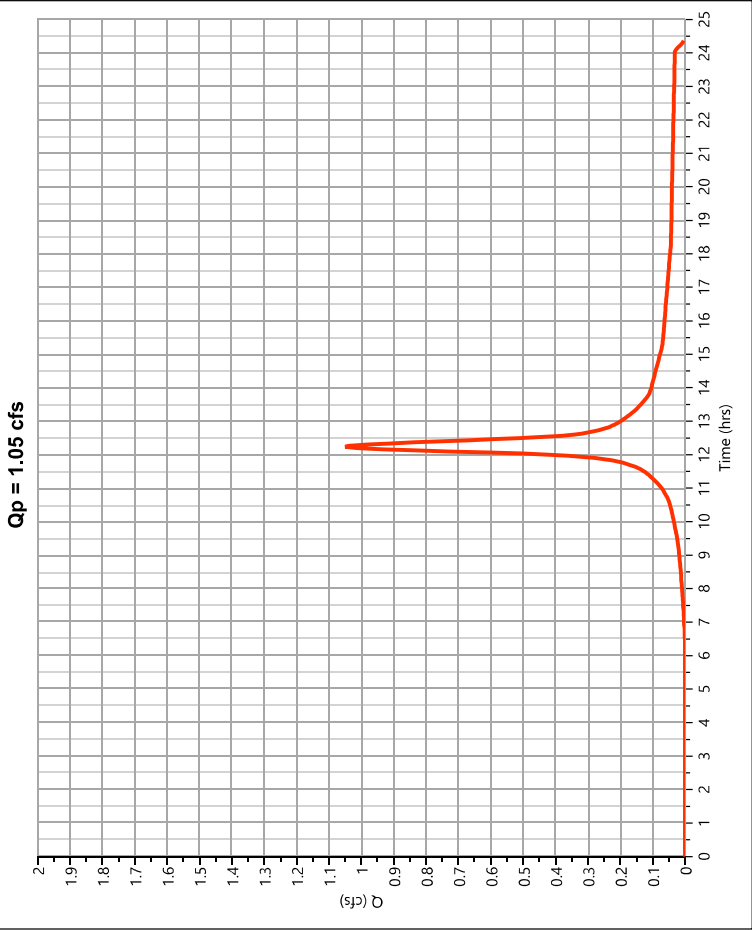
06-22-2022

DA-1 [POI-1]

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,050 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 5,157 cuft
Drainage Area	= 0.49 ac	Curve Number	= 78*
Tc Method	= User	Time of Conc. (Tc)	= 18.8 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet	
AREA (ac)	CN
0.25	77
0.2	80
0.49	78
Weighted CN Method Employed	



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

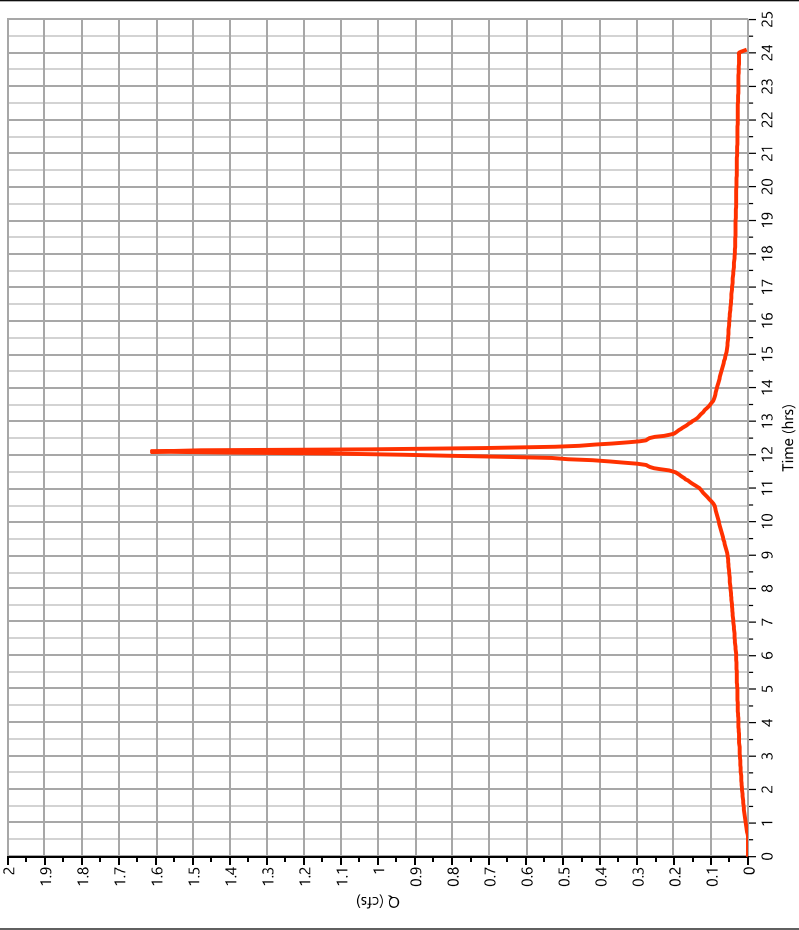
06-22-2022

DA-2 UNDET IMP

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,614 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,935 cuft
Drainage Area	= 0.35 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.61 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

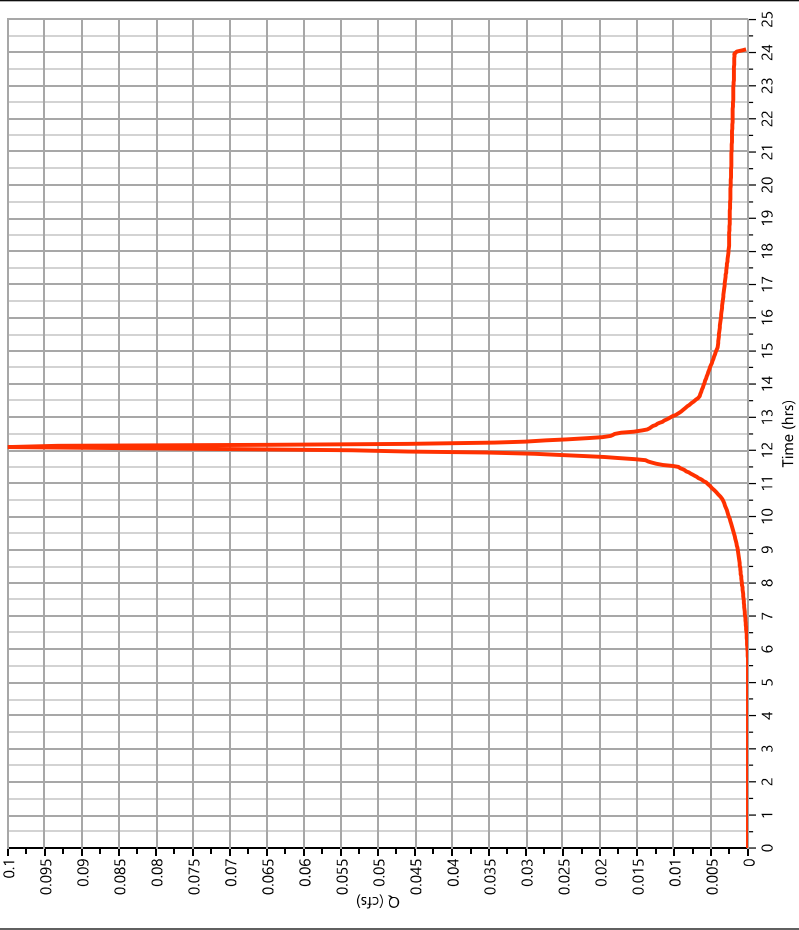
06-22-2022

DA-2 UNDET PER

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.100 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 315 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.10 cfs



Hydrograph Report

Project Name:

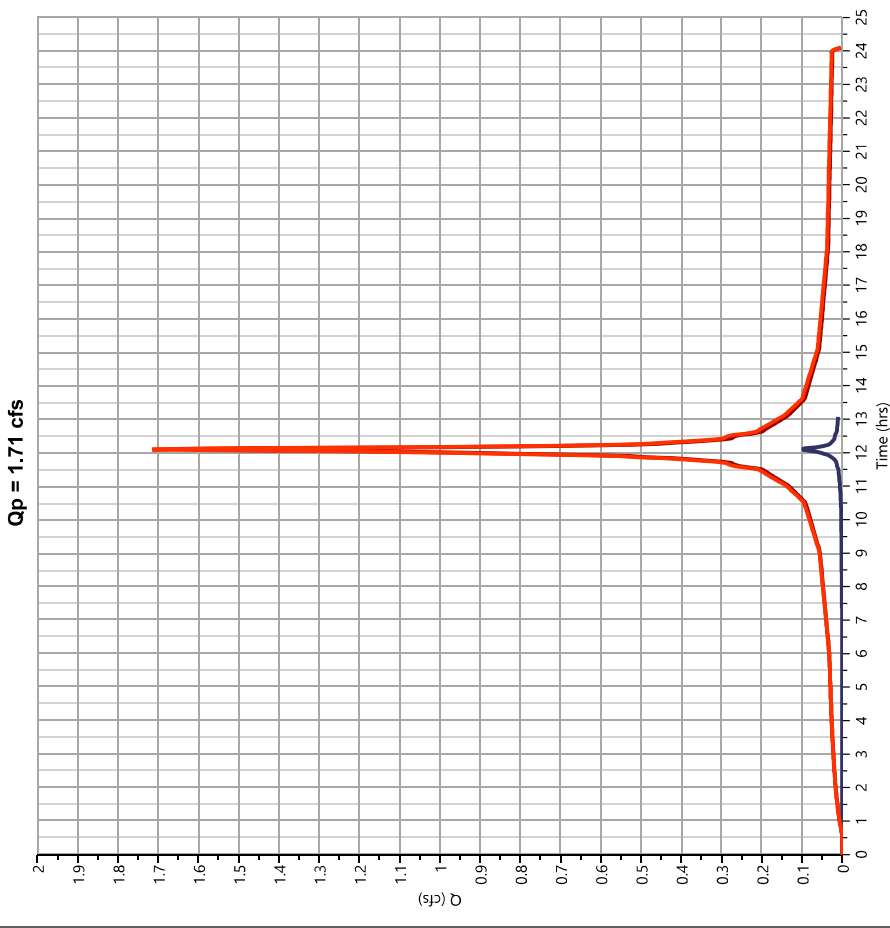
Hydrology Studio v 3.0.0.24

06-22-2022

DA-2 UNDET

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 1,714 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 6,250 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.38 ac



— DA-2 UNDET IMP — DA-2 UNDET PER — DA-2 UNDET

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

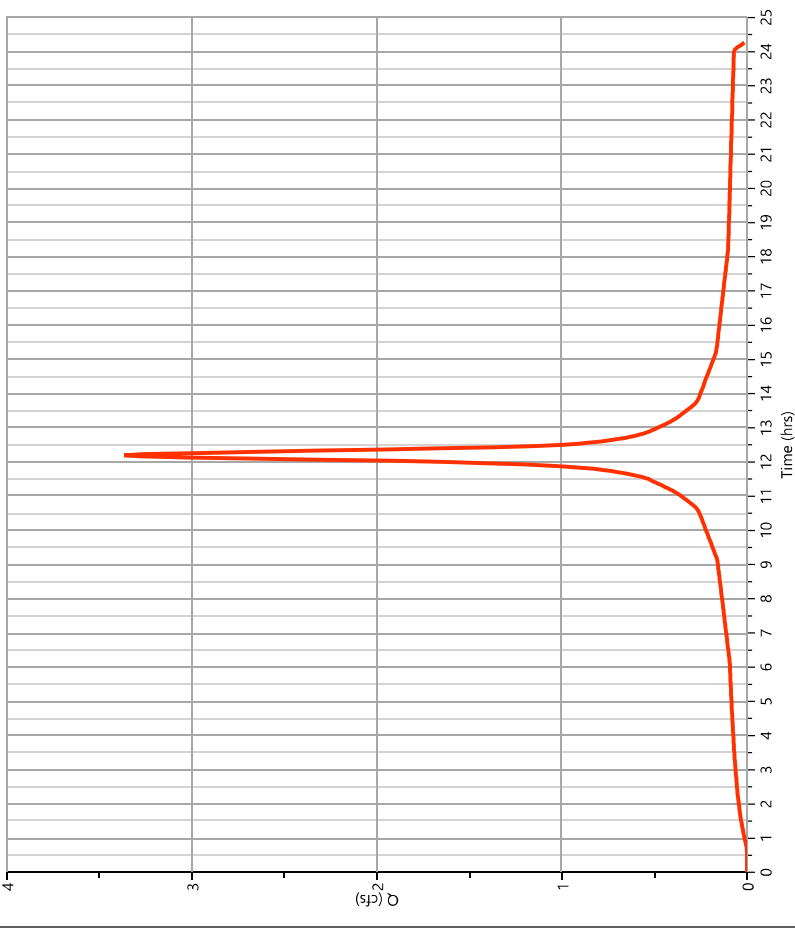
06-22-2022

DA-2A DET IMP

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3,364 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 17,283 cuft
Drainage Area	= 0.98 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 14.7 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 3.36 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

DA-2A DET PER

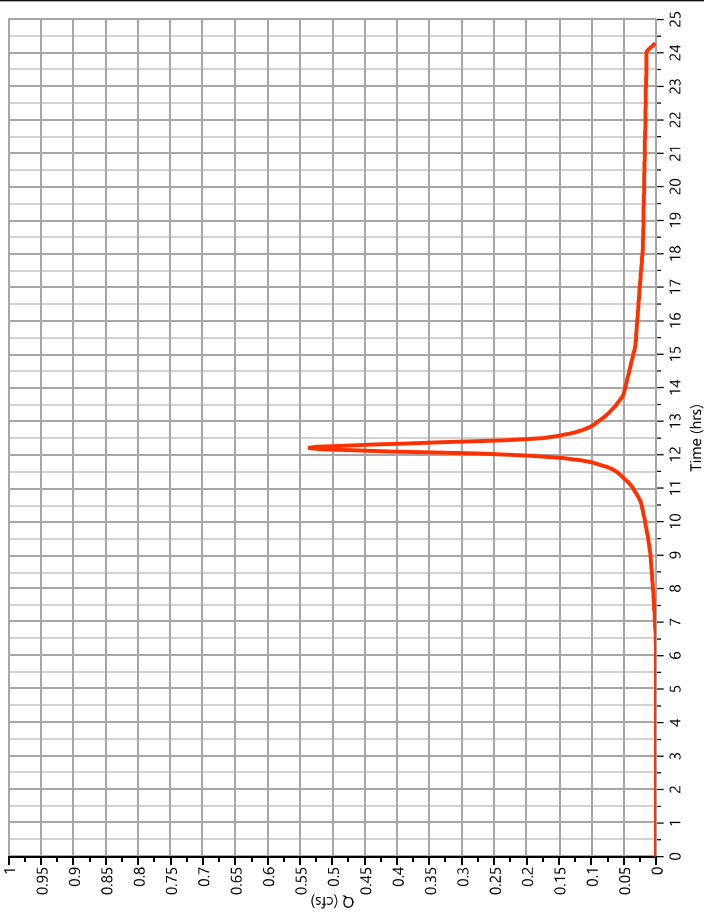
Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.536 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 2,392 cuft
Drainage Area	= 0.23 ac	Curve Number	= 78.43*
Tc Method	= User	Time of Conc. (Tc)	= 14.7 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.11	80	OPEN SPACE
0.12	77	WOODED
0.23	78	Weighted CN Method Employed

Qp = 0.54 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

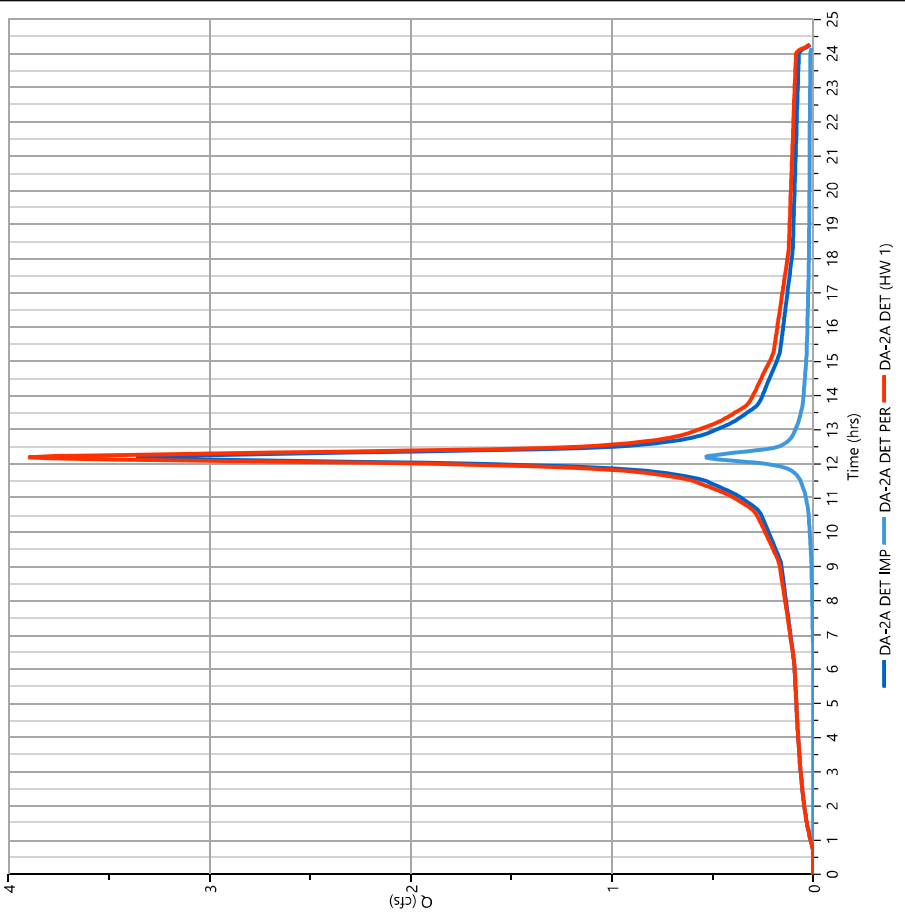
06-22-2022

DA-2A DET (HW 1)

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 3,900 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 19,675 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 1,21 ac

Qp = 3.90 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

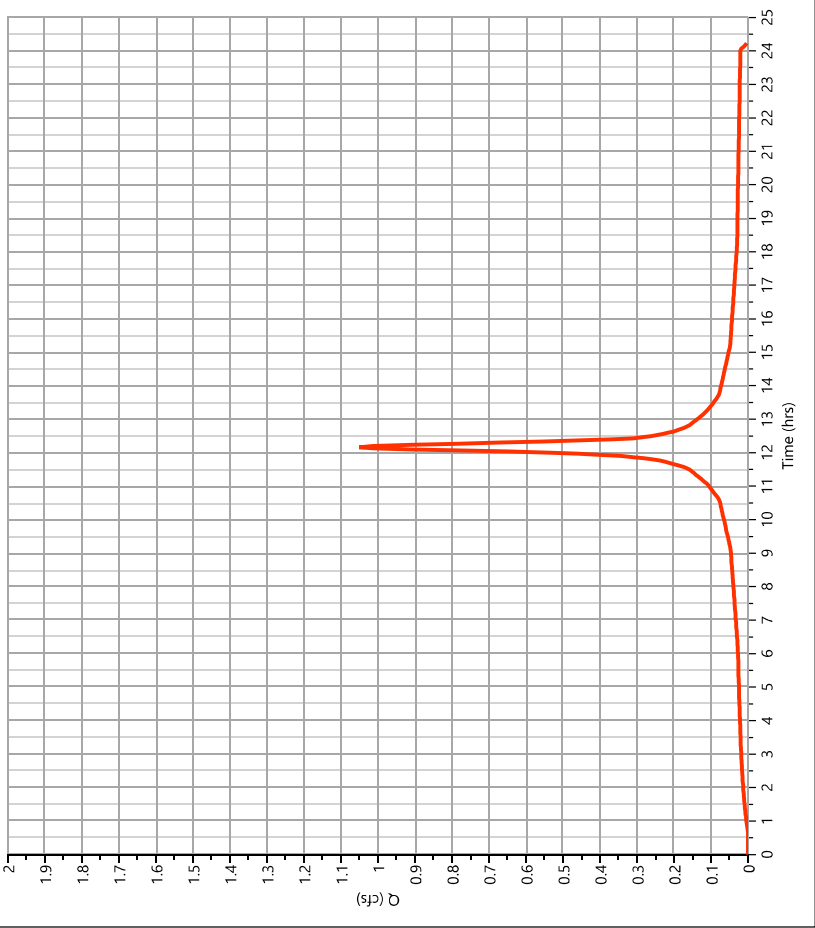
06-22-2022

DA-2B DET IMP

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,050 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 5,036 cuft
Drainage Area	= 0.27 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.05 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

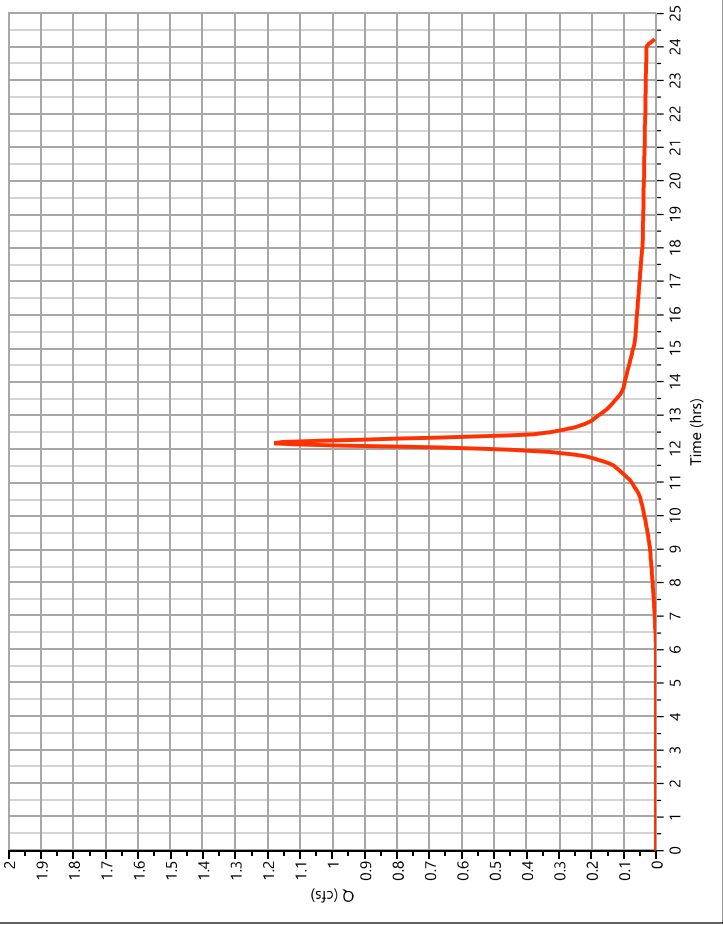
DA-2B DET PER

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,179 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 4,904 cuft
Drainage Area	= 0.44 ac	Curve Number	= 78.84*
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet		
AREA (ac)	CN	DESCRIPTION
0.27	80	OPEN SPACE
0.17	77	WOODED
0.44	79	Weighted CN Method Employed

Qp = 1.18 cfs



Hydrograph Report

Project Name:

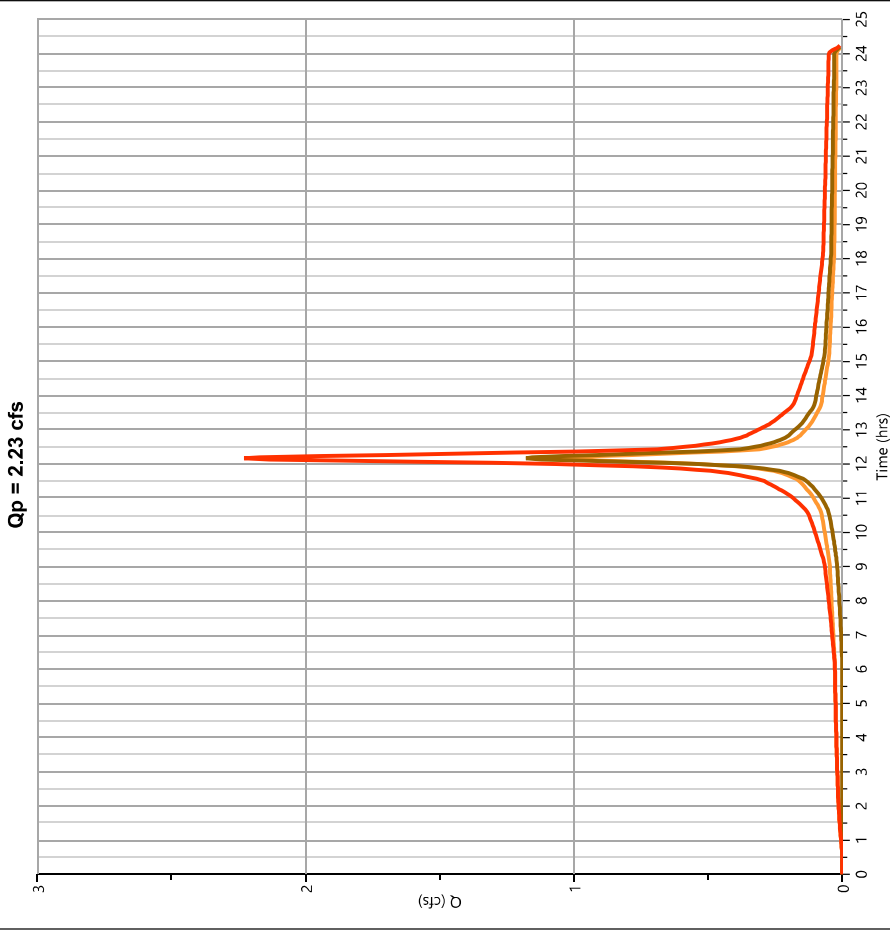
Hydrology Studio v 3.0.0.24

06-22-2022

DA-2B DET (HW 2)

Hyd. No. 27

Hydrograph Type	= Junction	Peak Flow	= 2,229 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,940 cuft
Inflow Hydrographs	= 25, 26	Total Contrib. Area	= 0.71 ac



Hydrograph Report

Project Name:

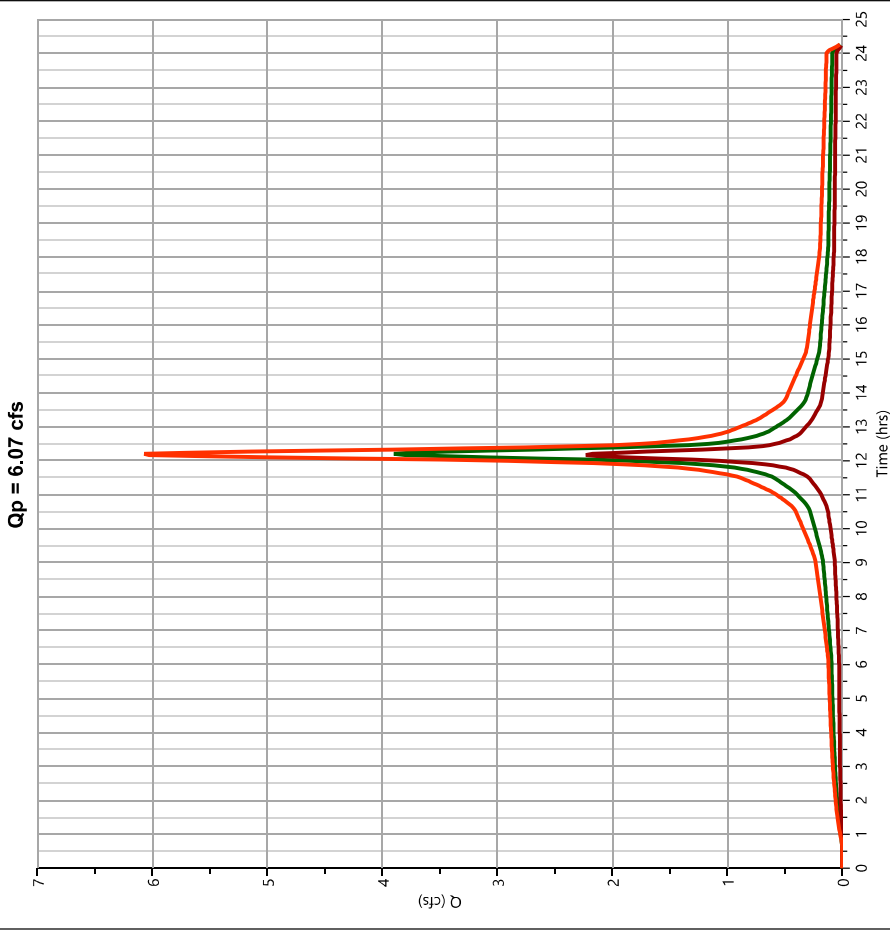
Hydrology Studio v 3.0.0.24

06-22-2022

TOTAL TO AG BASIN

Hyd. No. 29

Hydrograph Type	= Junction	Peak Flow	= 6,071 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 29,615 cuft
Inflow Hydrographs	= 23, 27	Total Contrib. Area	= 1.92 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

AG BASIN [POI-2]

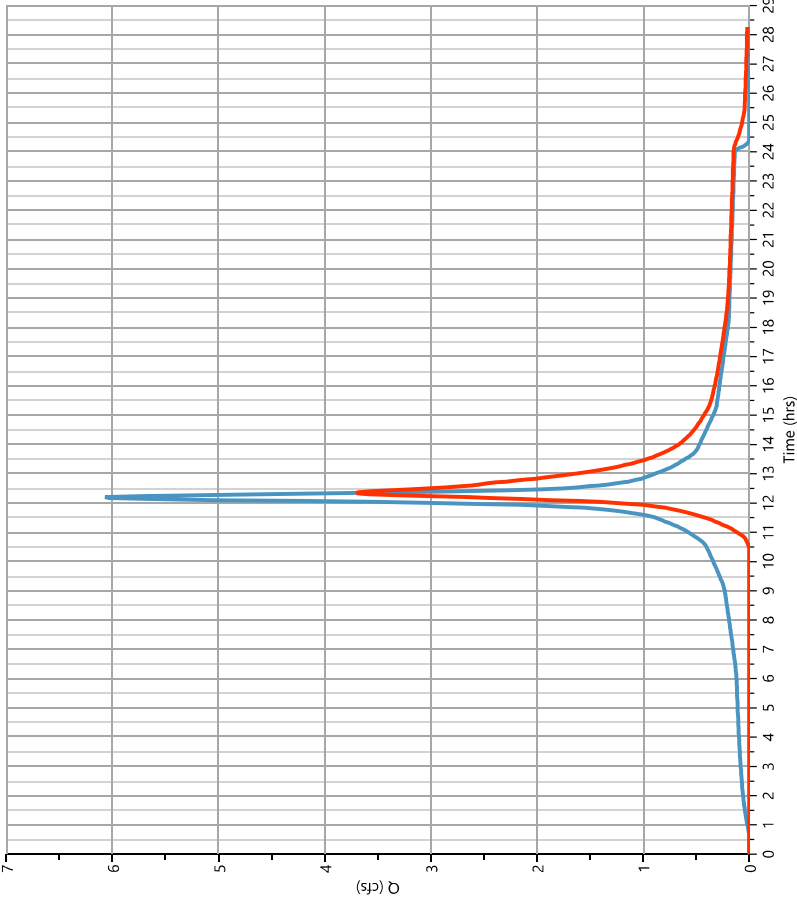
Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 3,701 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 24,579 cuft
Inflow Hydrograph	= 29 - TOTAL TO AG BASIN	Max. Elevation	= 463.16 ft
Pond Name	= AG BASIN	Max. Storage	= 10,970 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.89 hrs

Qp = 3.70 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

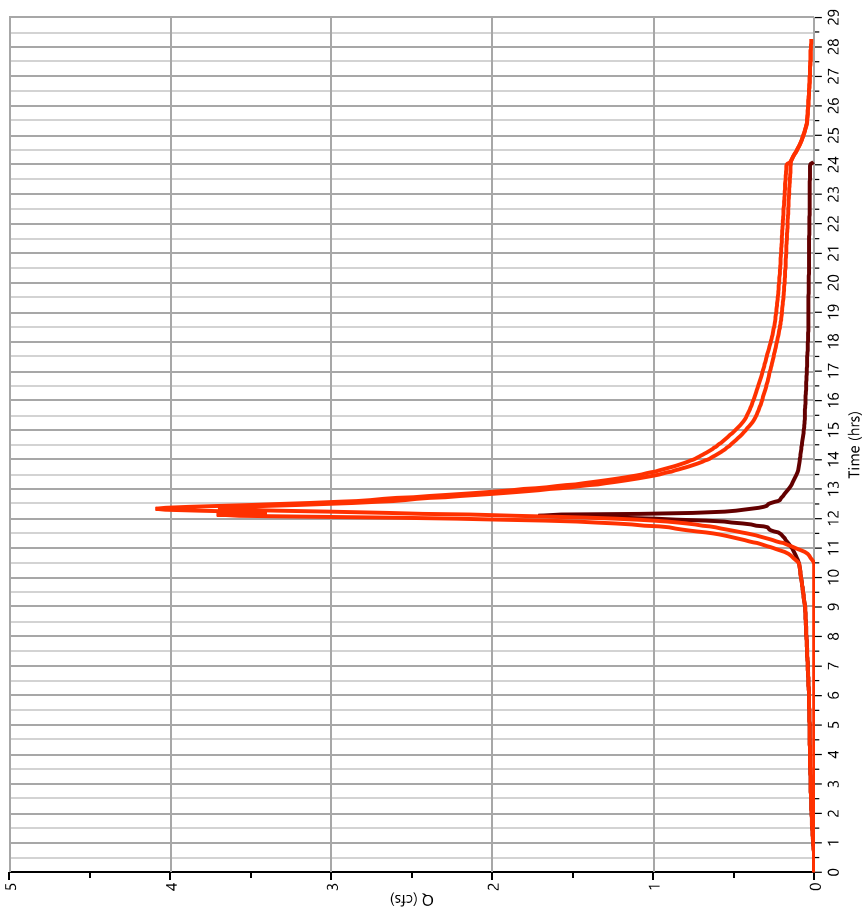
06-22-2022

PROP TOTAL TO POI-2

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 4,093 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 30,829 cuft
Inflow Hydrographs	= 19, 30	Total Contrib. Area	= 0.38 ac

Qp = 4.09 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

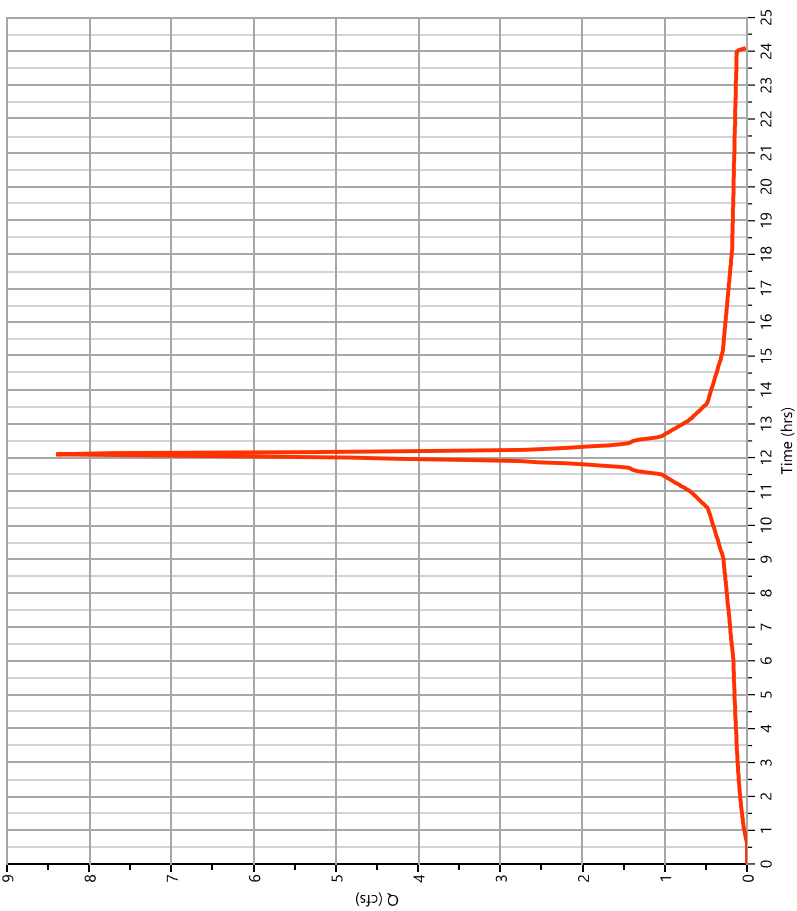
06-22-2022

DA-3 UNDET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.394 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 30,862 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 8.39 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

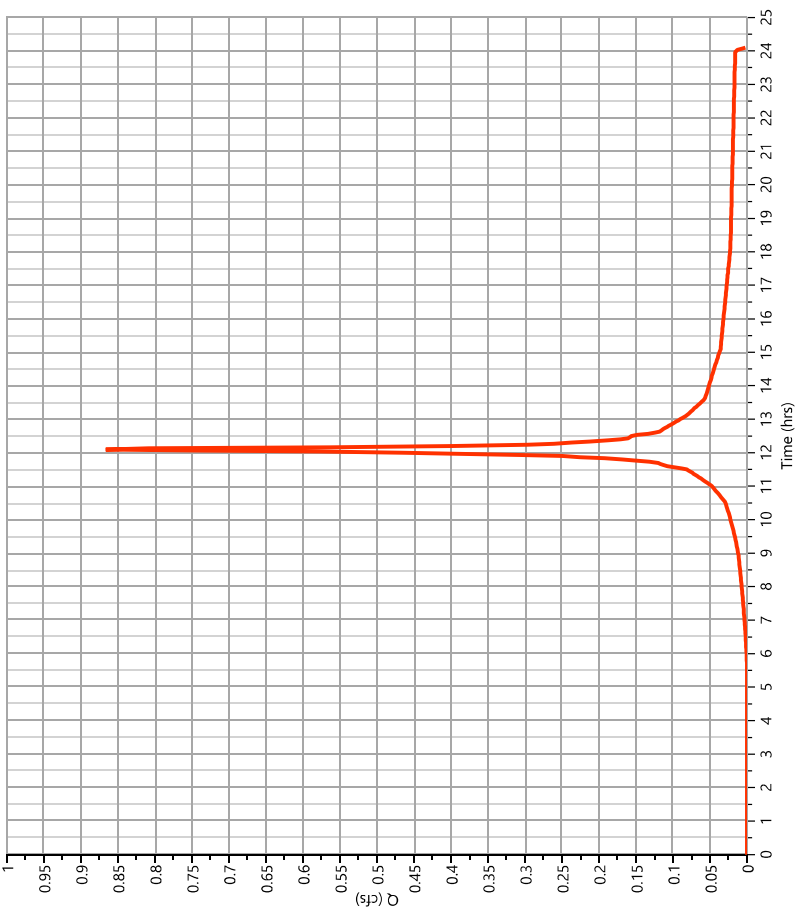
06-22-2022

DA-3 UNDET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.866 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,730 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.87 cfs



Hydrograph Report

Project Name:

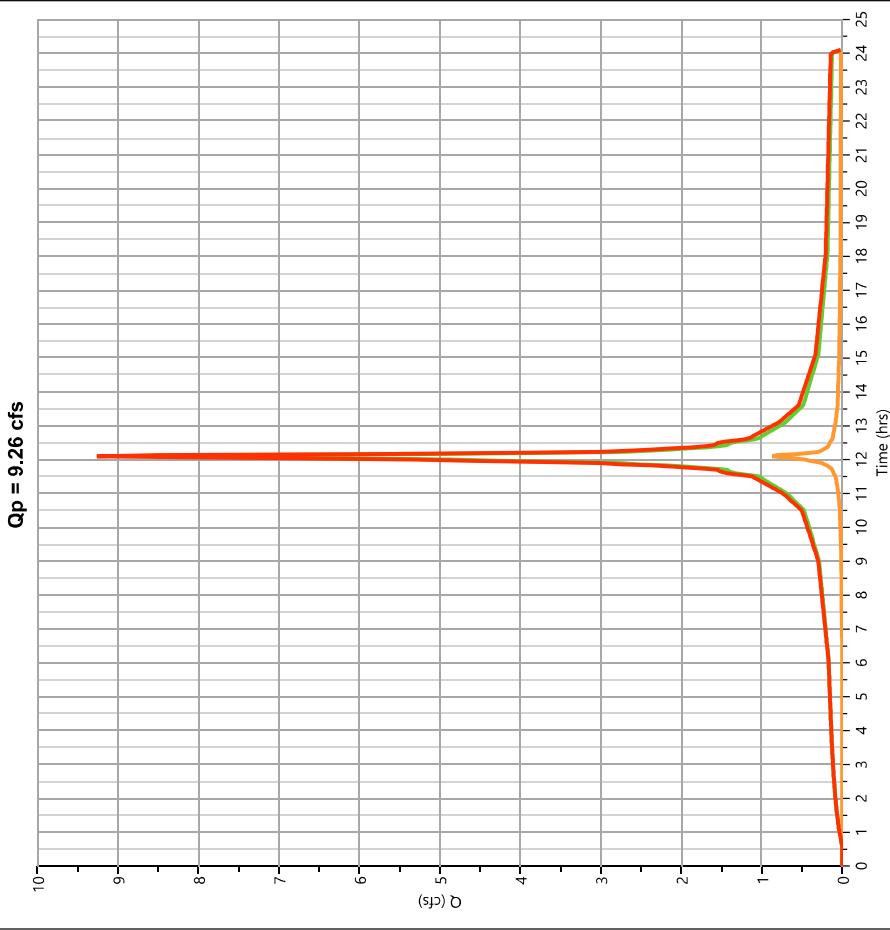
Hydrology Studio v 3.0.0.24

06-22-2022

DA-3 UNDET

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 9,261 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 33,592 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 2.08 ac



Hydrograph Report

Project Name:

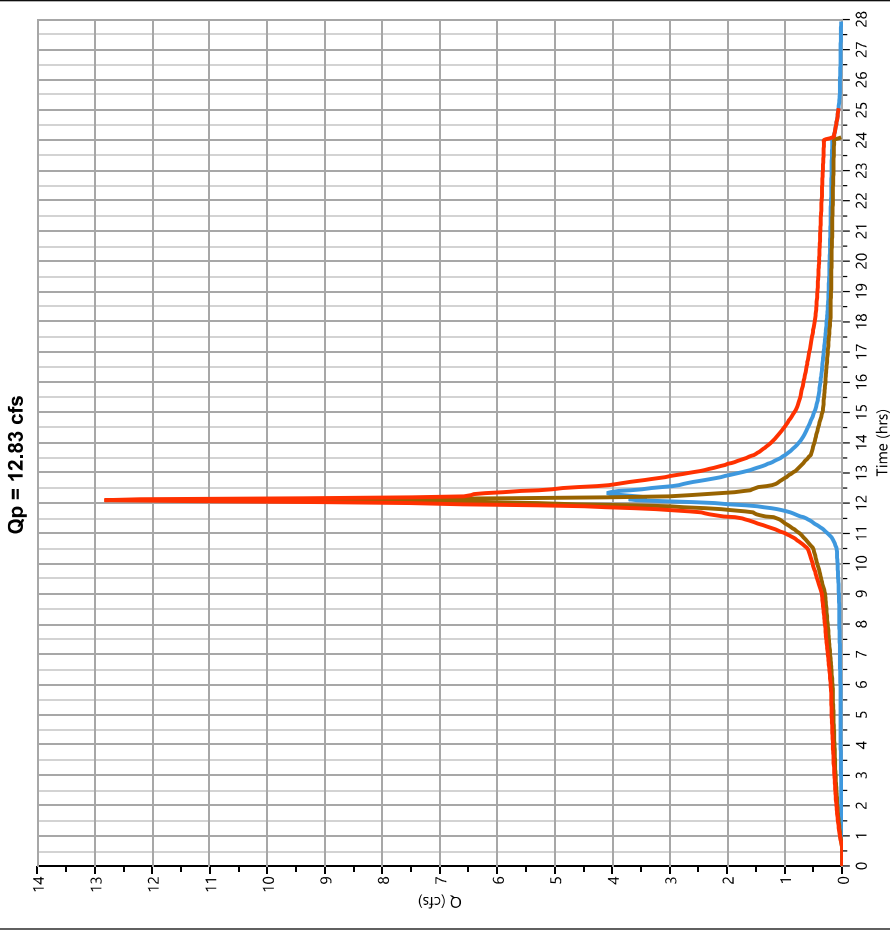
Hydrology Studio v 3.0.0.24

06-22-2022

PROP TOTAL TO POI-3

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 12.83 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 64,421 cuft
Inflow Hydrographs	= 32, 36	Total Contrib. Area	= 2.46 ac



Design Storm Report

Custom Storm filename:

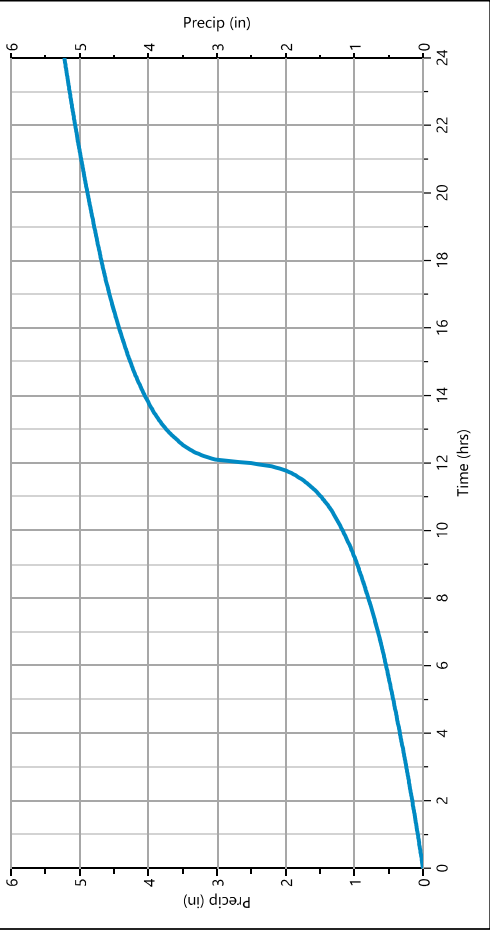
Hydrology Studio v 3.0.0.24

06-22-2022

Storm Distribution: NRCC-D, 24-hr

Storm Duration	Total Rainfall Volume (in)				
	1-yr	2-yr	3-yr	5-yr	10-yr
24 hrs	0.00	3.44	0.00	5.22	8.66

Incremental Rainfall Distribution, 10-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.014999	11.43	0.020410	11.80	0.039395	12.17	0.056096	12.53	0.020410
11.10	0.014999	11.47	0.020410	11.83	0.056098	12.20	0.056098	12.57	0.020410
11.13	0.016356	11.50	0.020411	11.87	0.056096	12.23	0.039393	12.60	0.020410
11.17	0.016356	11.53	0.026744	11.90	0.056098	12.27	0.039394	12.63	0.019123
11.20	0.016356	11.57	0.026743	11.93	0.100241	12.30	0.039393	12.67	0.019123
11.23	0.017748	11.60	0.026744	11.97	0.100242	12.33	0.028153	12.70	0.019123
11.27	0.017748	11.63	0.028153	12.00	0.100241	12.37	0.028153	12.73	0.017748
11.30	0.017748	11.67	0.028153	12.03	0.173183	12.40	0.028154	12.77	0.017747
11.33	0.019122	11.70	0.028153	12.07	0.173183	12.43	0.026744	12.80	0.017748
11.37	0.019123	11.73	0.039394	12.10	0.173183	12.47	0.026743	12.83	0.016356
11.40	0.019122	11.77	0.039394	12.13	0.056098	12.50	0.026744	12.87	0.016356



Hydrograph 100-yr Summary

Project Name:

06-22-2022

Hydrology Studio v 3.0.0.24

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POL-1]	3.777	12.23	18,793	---		
3	NRCS Runoff	EX DA-2 IMP	5.542	12.20	28,906	---		
4	NRCS Runoff	EX DA-2 PER	4.327	12.20	19,572	---		
5	Junction	EX DA-2 [POL-2]	9.869	12.20	48,478	3, 4		
7	Junction	EX TOTAL TO POL-2	13.54	12.20	67,271	1, 5		
9	NRCS Runoff	EX DA-3 IMP	14.05	12.10	52,436	---		
10	NRCS Runoff	EX DA-3 PER	1.573	12.10	5,102	---		
11	Junction	EX DA-3	15.62	12.10	57,538	9, 10		
13	Junction	EX TOTAL TO POL-3	26.22	12.13	124,809	7, 11		
15	NRCS Runoff	DA-1 [POL-1]	2.141	12.23	10,680	---		
17	NRCS Runoff	DA-2 UNDET IMP	2.686	12.10	10,029	---		
18	NRCS Runoff	DA-2 UNDET PER	0.197	12.10	638	---		
19	Junction	DA-2 UNDET	2.883	12.10	10,667	17, 18		
21	NRCS Runoff	DA-2A DET IMP	5.600	12.20	29,204	---		
22	NRCS Runoff	DA-2A DET PER	1.085	12.20	4,930	---		
23	Junction	DA-2A DET (HW 1)	6.685	12.20	34,134	21, 22		
25	NRCS Runoff	DA-2B DET IMP	1.748	12.17	8,510	---		
26	NRCS Runoff	DA-2B DET PER	2.370	12.17	10,057	---		
27	Junction	DA-2B DET (HW 2)	4.118	12.17	18,567	25, 26		
29	Junction	TOTAL TO AG BASIN	10.68	12.20	52,701	23, 27		
30	Pond Route	AG BASIN [POL-2]	8.450	12.30	47,664	29	463.60	13,238
32	Junction	PROP TOTAL TO POL-2	9.259	12.27	58,331	19, 30		
34	NRCS Runoff	DA-3 UNDET IMP	13.97	12.10	52,150	---		
35	NRCS Runoff	DA-3 UNDET PER	1.704	12.10	5,527	---		
36	Junction	DA-3 UNDET	15.67	12.10	57,677	34, 35		

Hydrograph 100-yr Summary

Project Name:
06-22-2022

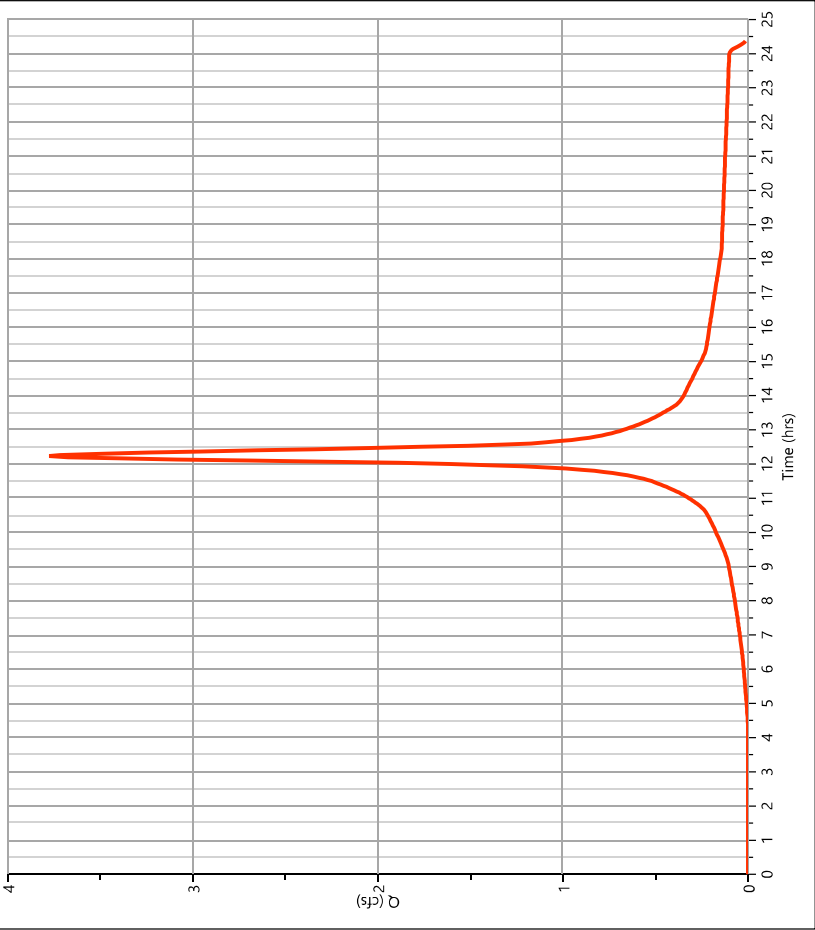
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PROP TOTAL TO POI-3	22.52	12.10	116,008	32, 36		

Hydrograph Report

Project Name:
06-22-2022

Hydrology Studio v 3.0.0.24			EX DA-1 [POI-1]			Hyd. No. 1		
Hydrograph Type	= NRCS Runoff		Peak Flow	= 3,777 cfs				
Storm Frequency	= 100-yr		Time to Peak	= 12.23 hrs				
Time Interval	= 2 min		Runoff Volume	= 18,793 cuft				
Drainage Area	= 0.88 ac		Curve Number	= 77				
Tc Method	= User		Time of Conc. (Tc)	= 18.5 min				
Total Rainfall	= 8.66 in		Design Storm	= NRCC-D				
Storm Duration	= 24 hrs		Shape Factor	= 484				

Qp = 3.78 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

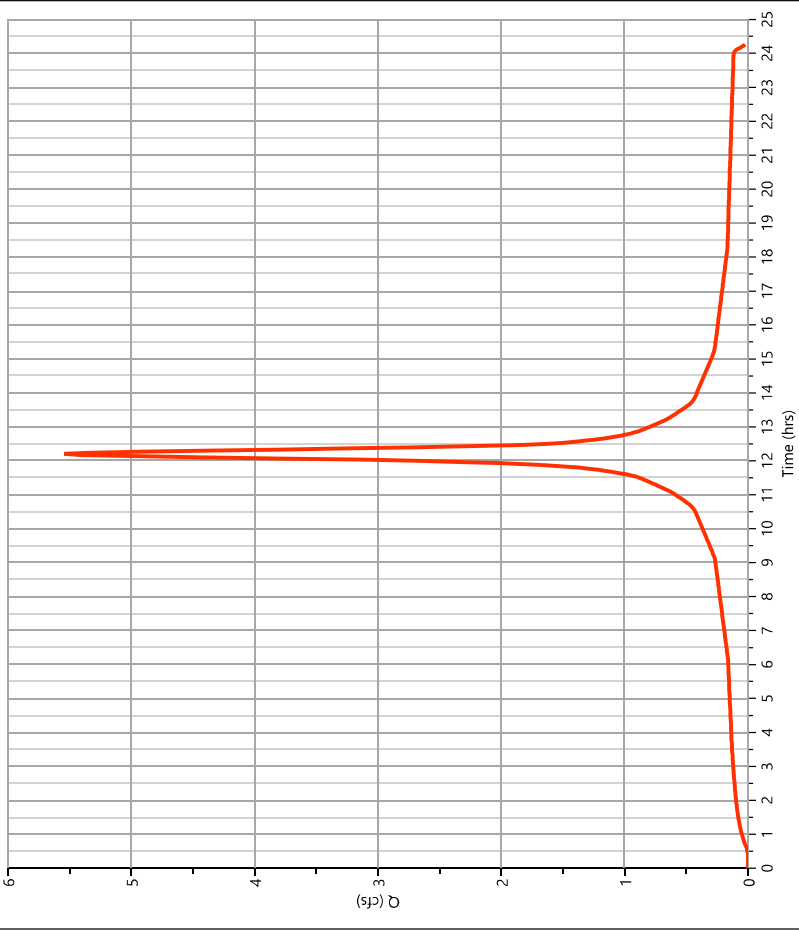
06-22-2022

EX DA-2 IMP

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.542 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 28,906 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 5.54 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

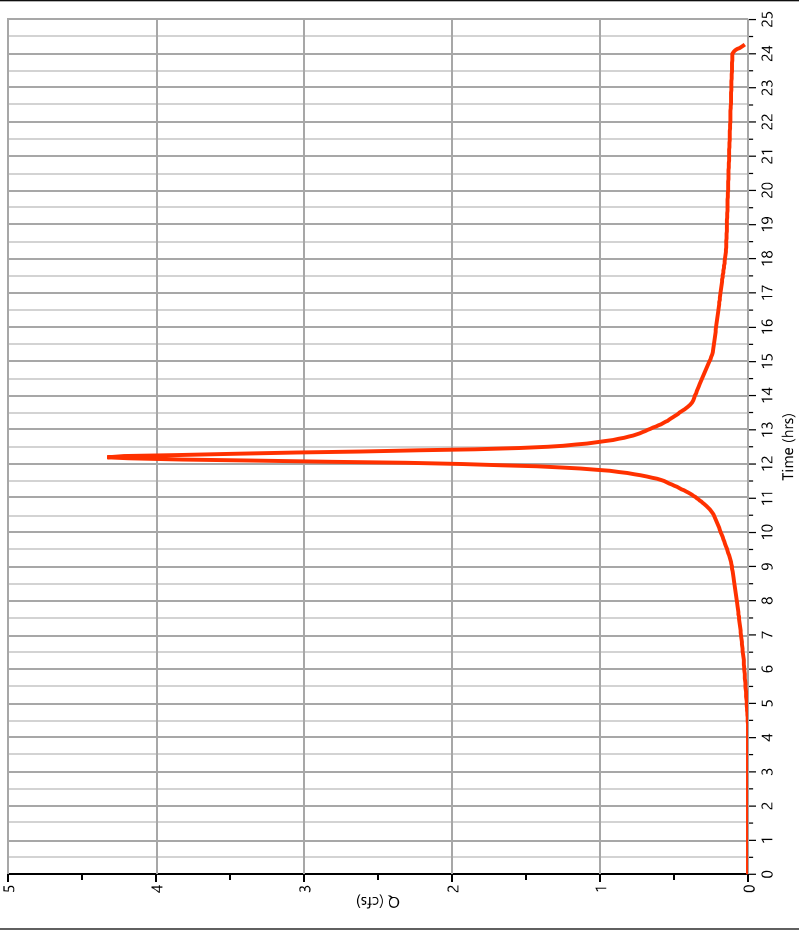
06-22-2022

EX DA-2 PER

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.327 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 19,572 cuft
Drainage Area	= 0.94 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 4.33 cfs



Hydrograph Report

Project Name:

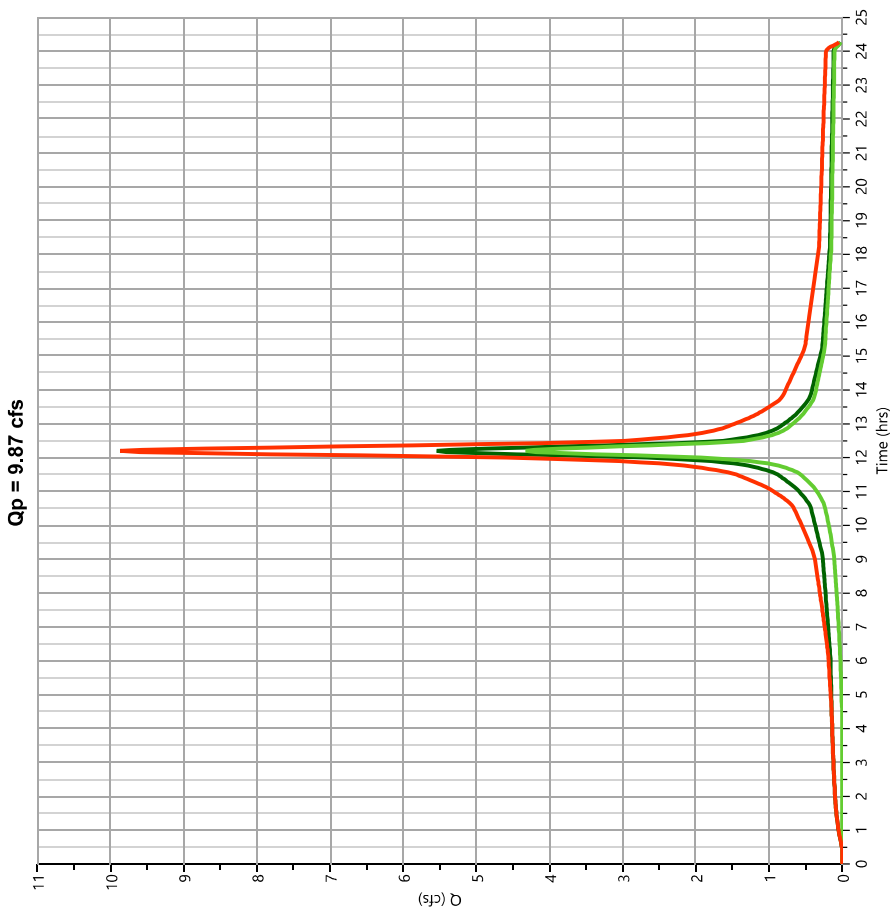
Hydrology Studio v 3.0.0.24

06-22-2022

EX DA-2 [POI-2]

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 9,869 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 48,478 cuft
Inflow Hydrographs	= 3, 4	Total Contrib. Area	= 1,91 ac



Hydrograph Report

Project Name:

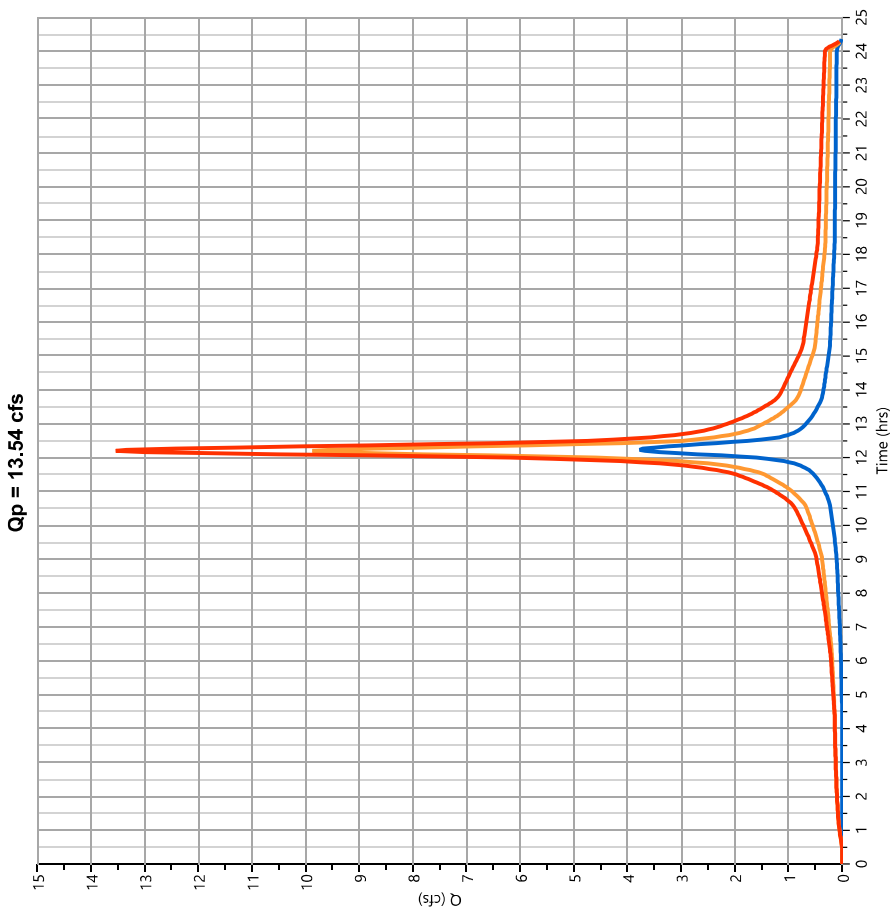
Hydrology Studio v 3.0.0.24

06-22-2022

EX TOTAL TO POI-2

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 13.54 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 67,271 cuft
Inflow Hydrographs	= 1, 5	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

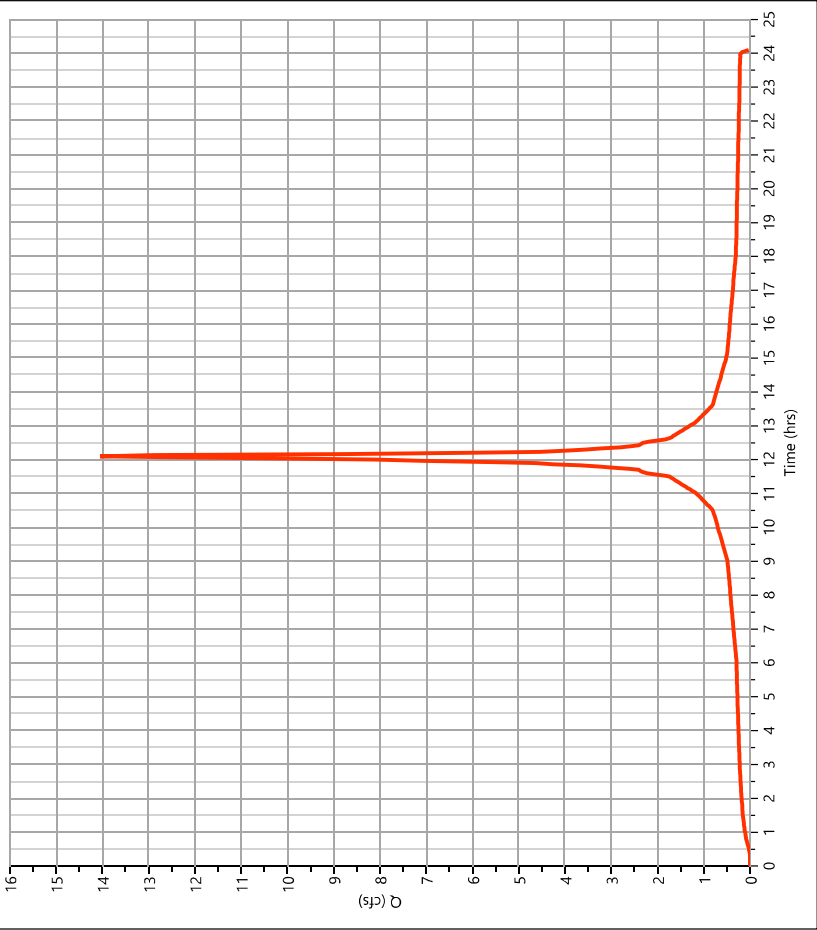
06-22-2022

EX DA-3 IMP

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.05 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 52,436 cuft
Drainage Area	= 1.83 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 14.05 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

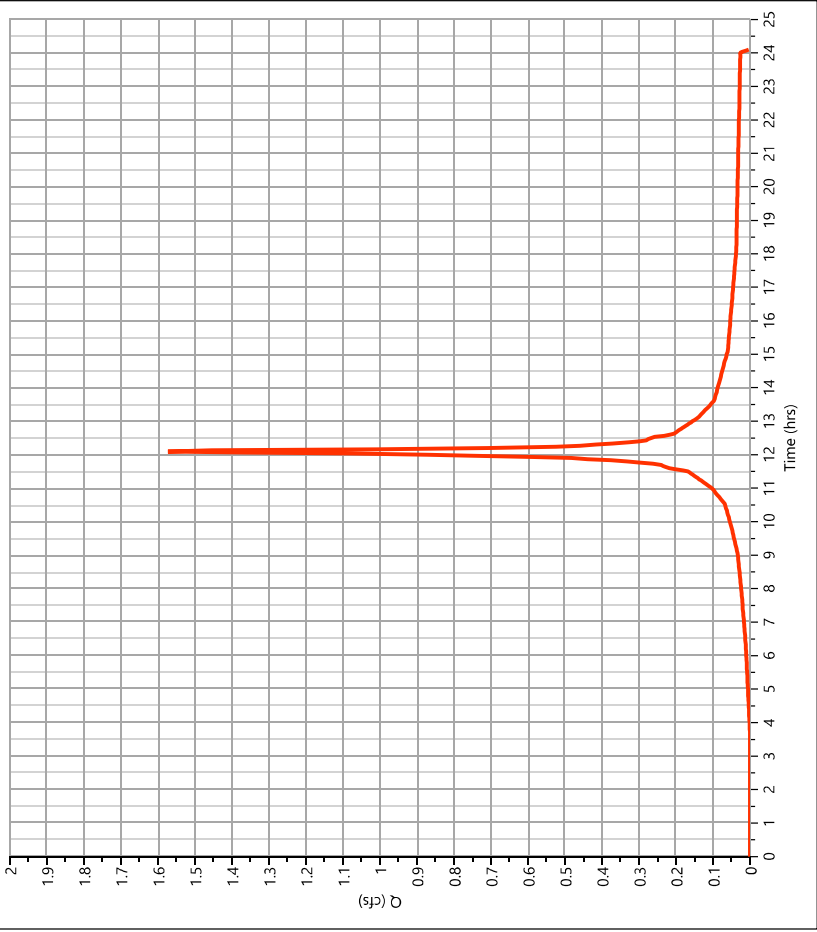
06-22-2022

EX DA-3 PER

Hyd. No. 10

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.573 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,102 cuft
Drainage Area	= 0.24 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.57 cfs



Hydrograph Report

Project Name:

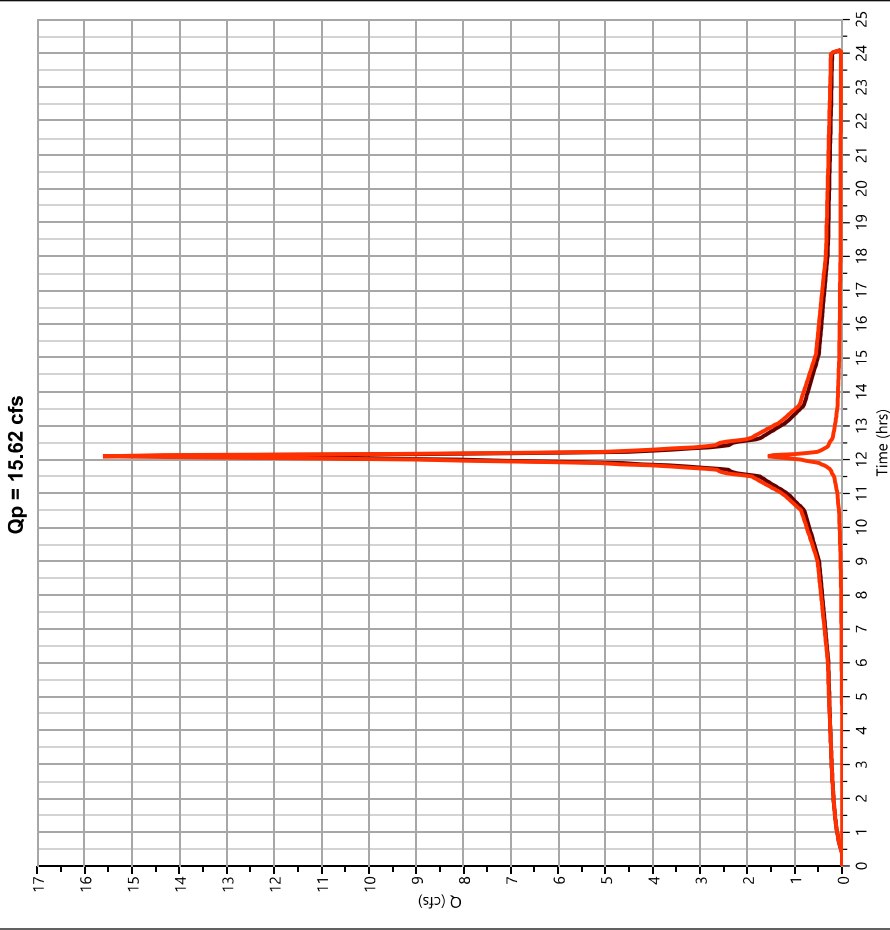
Hydrology Studio v 3.0.0.24

06-22-2022

EX DA-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 15.62 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,538 cuft
Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 2.07 ac



Hydrograph Report

Project Name:

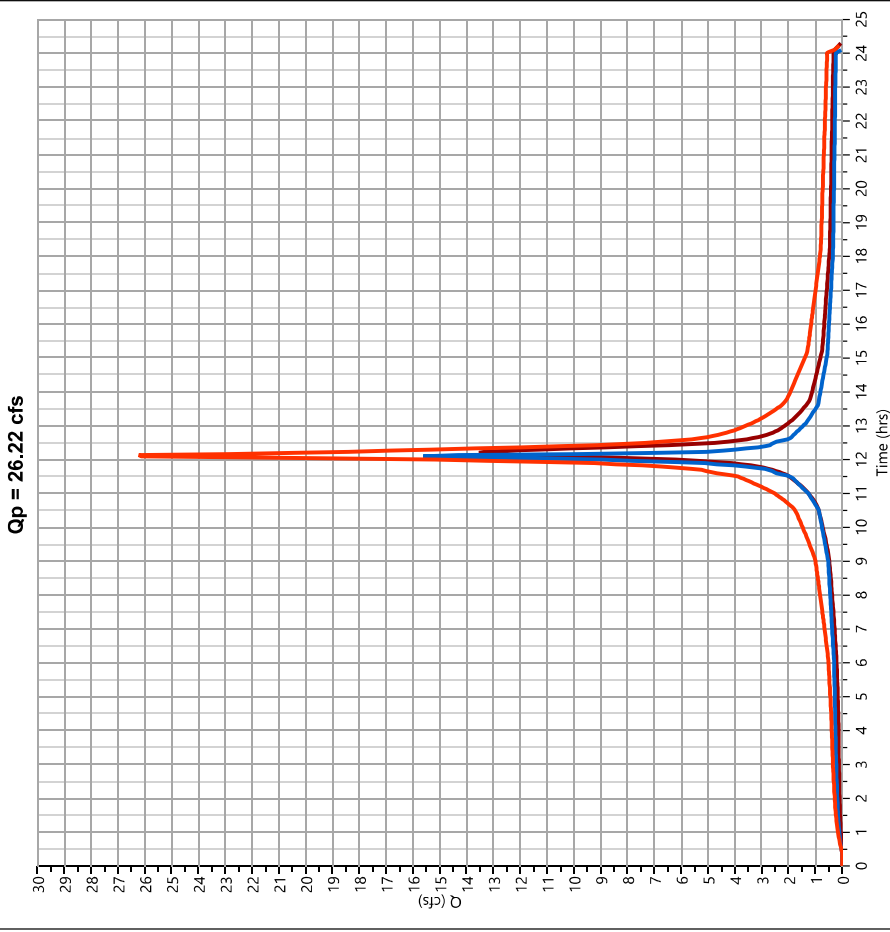
Hydrology Studio v 3.0.0.24

06-22-2022

EX TOTAL TO POI-3

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 26.22 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 124,809 cuft
Inflow Hydrographs	= 7, 11	Total Contrib. Area	= 4.86 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

DA-1 [POI-1]

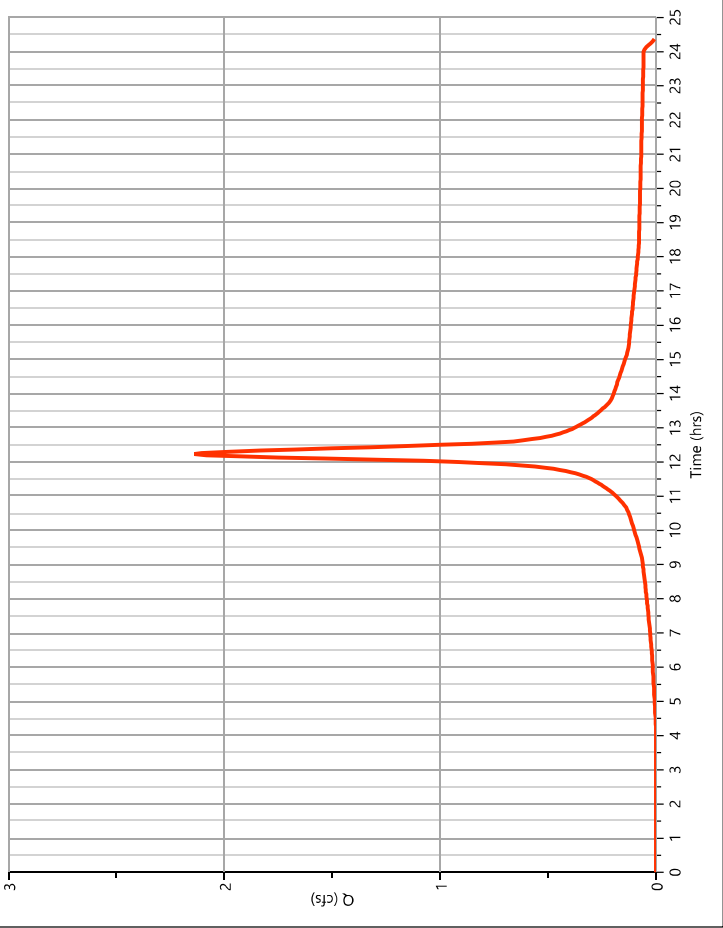
Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2,141 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 10,680 cuft
Drainage Area	= 0.49 ac	Curve Number	= 78*
Tc Method	= User	Time of Conc. (Tc)	= 18.8 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.25	77	WOODED
0.2	80	OPEN SPACE
0.49	78	Weighted CN Method Employed

Qp = 2.14 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

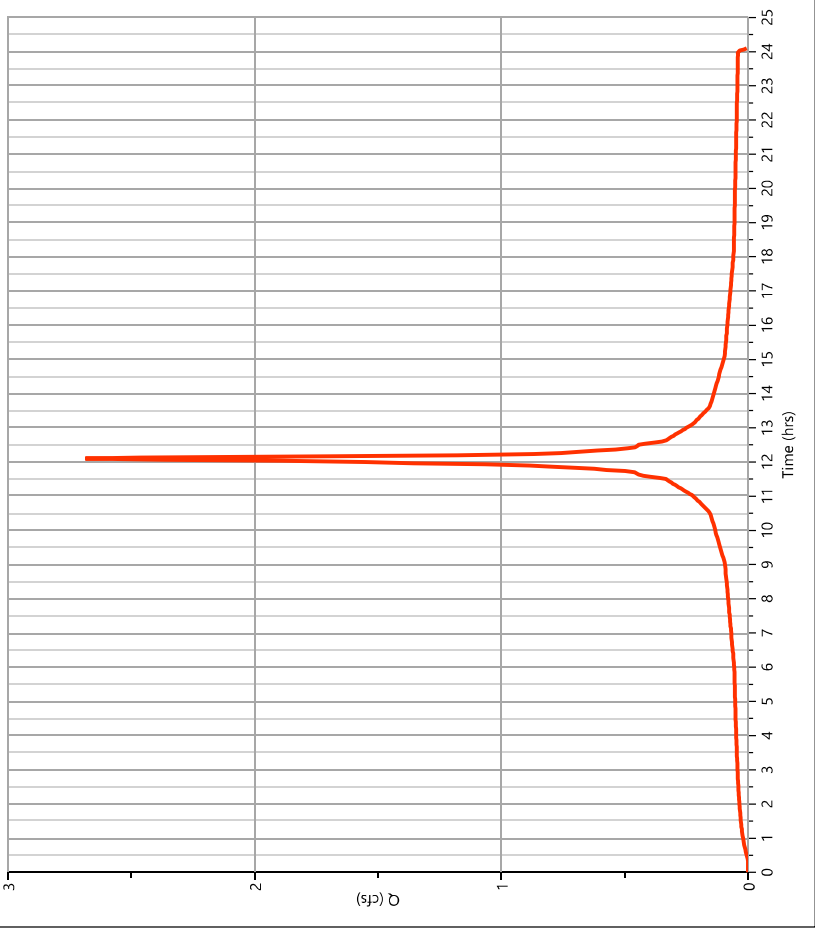
06-22-2022

DA-2 UNDET IMP

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2,686 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 10,029 cuft
Drainage Area	= 0.35 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 2.69 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

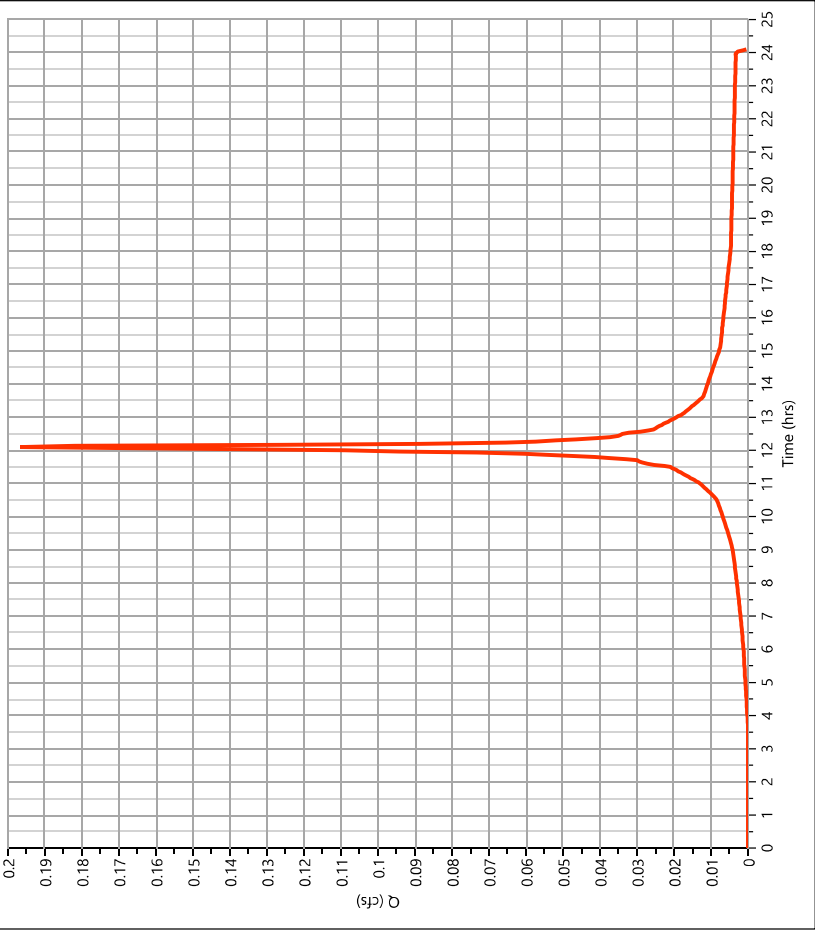
06-22-2022

DA-2 UNDET PER

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.197 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 638 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.20 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

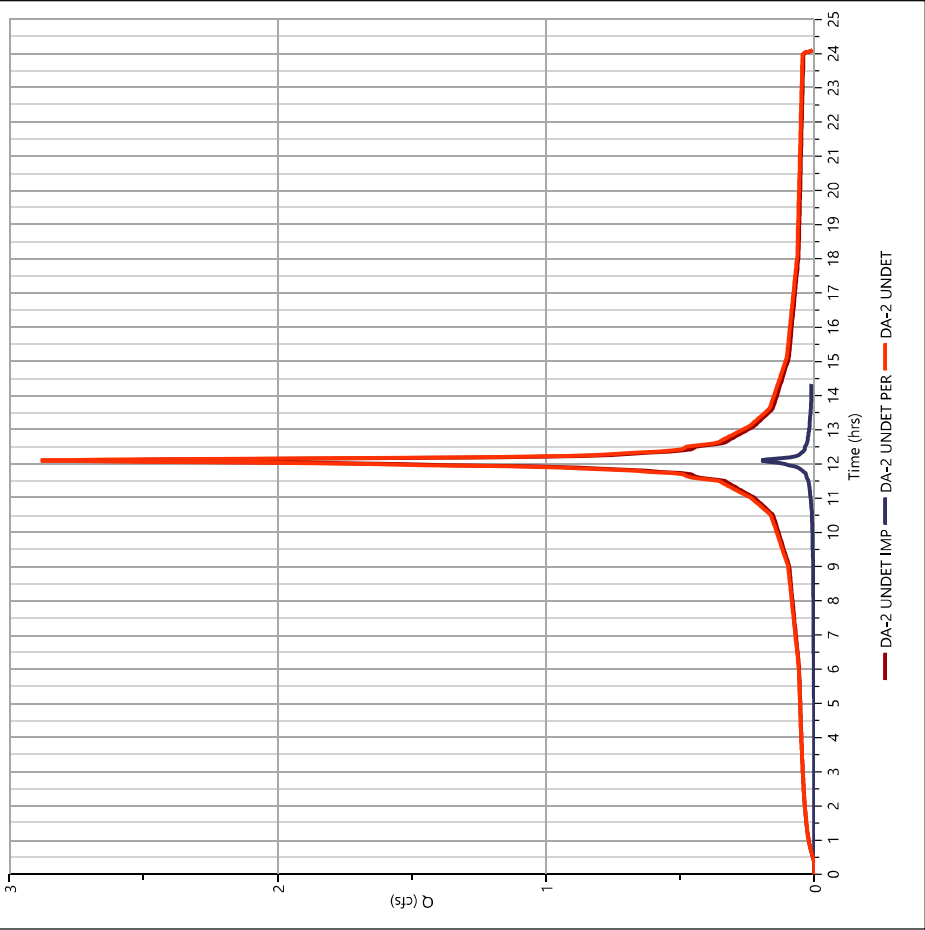
06-22-2022

DA-2 UNDET

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 2.883 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 10,667 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.38 ac

Qp = 2.88 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

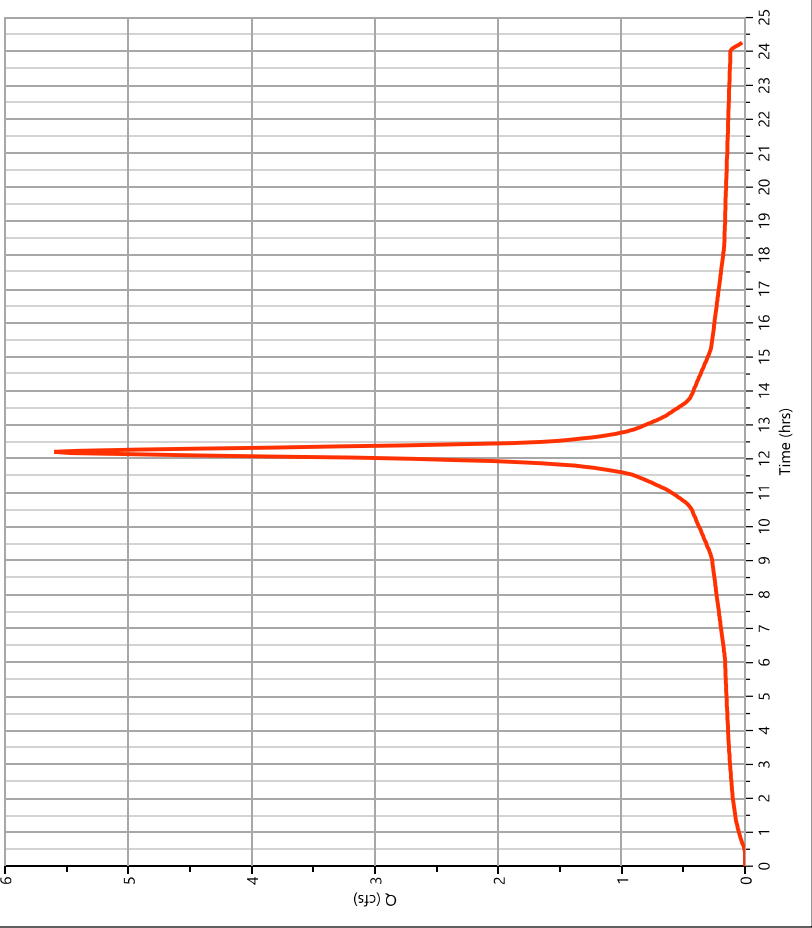
06-22-2022

DA-2A DET IMP

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5,600 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 29,204 cuft
Drainage Area	= 0.98 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 14.7 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 5.60 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

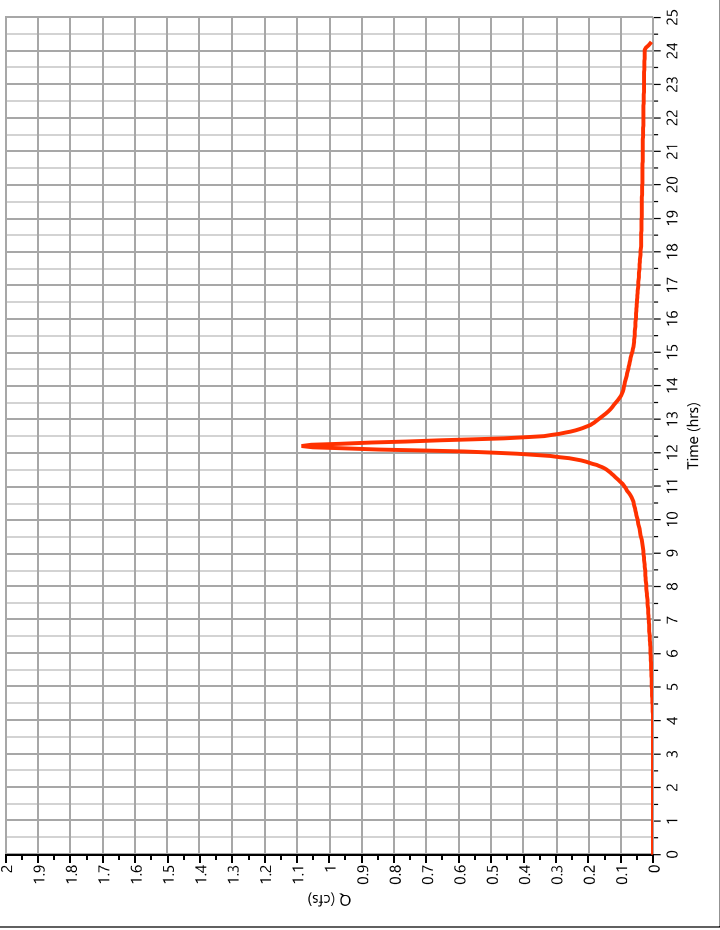
DA-2A DET PER

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,085 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 4,930 cuft
Drainage Area	= 0.23 ac	Curve Number	= 78.43*
Tc Method	= User	Time of Conc. (Tc)	= 14.7 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet		
AREA (ac)	CN	DESCRIPTION
0.11	80	OPEN SPACE
0.12	77	WOODED
0.23	78	Weighted CN Method Employed

Qp = 1.09 cfs



Hydrograph Report

Project Name:

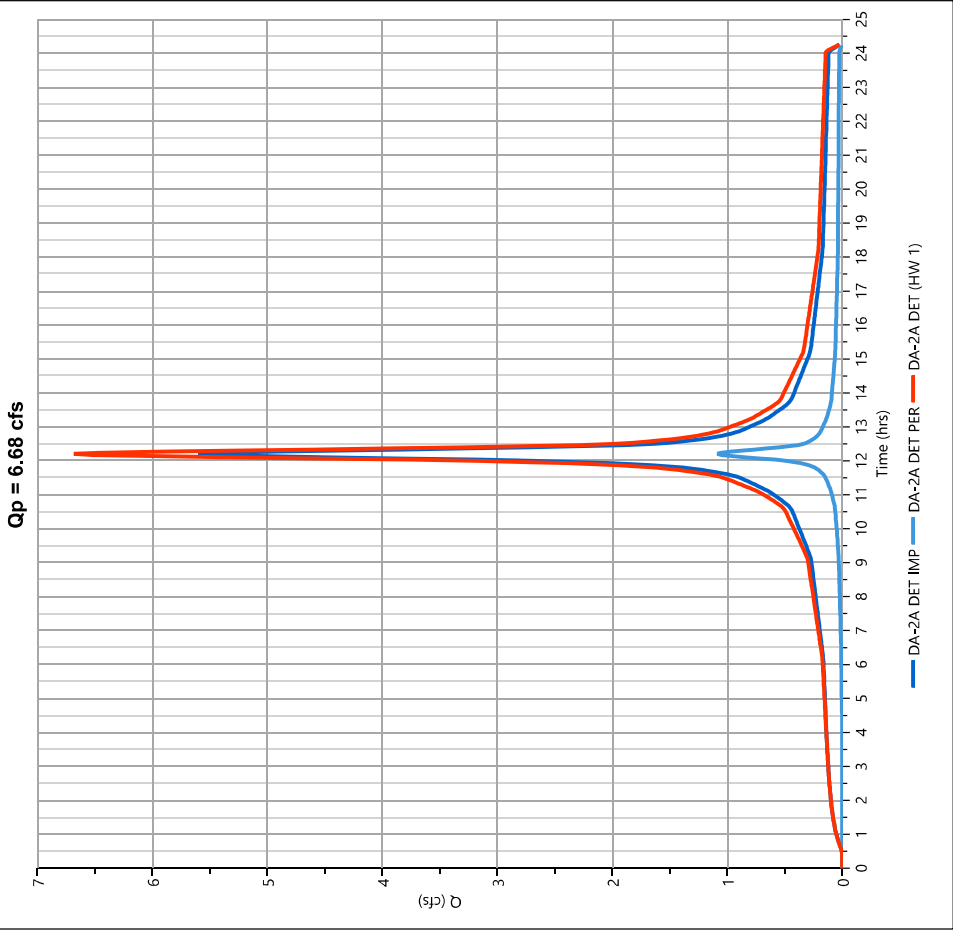
Hydrology Studio v 3.0.0.24

06-22-2022

DA-2A DET (HW 1)

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 6.685 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 34,134 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 1,21 ac



Hydrograph Report

Project Name:

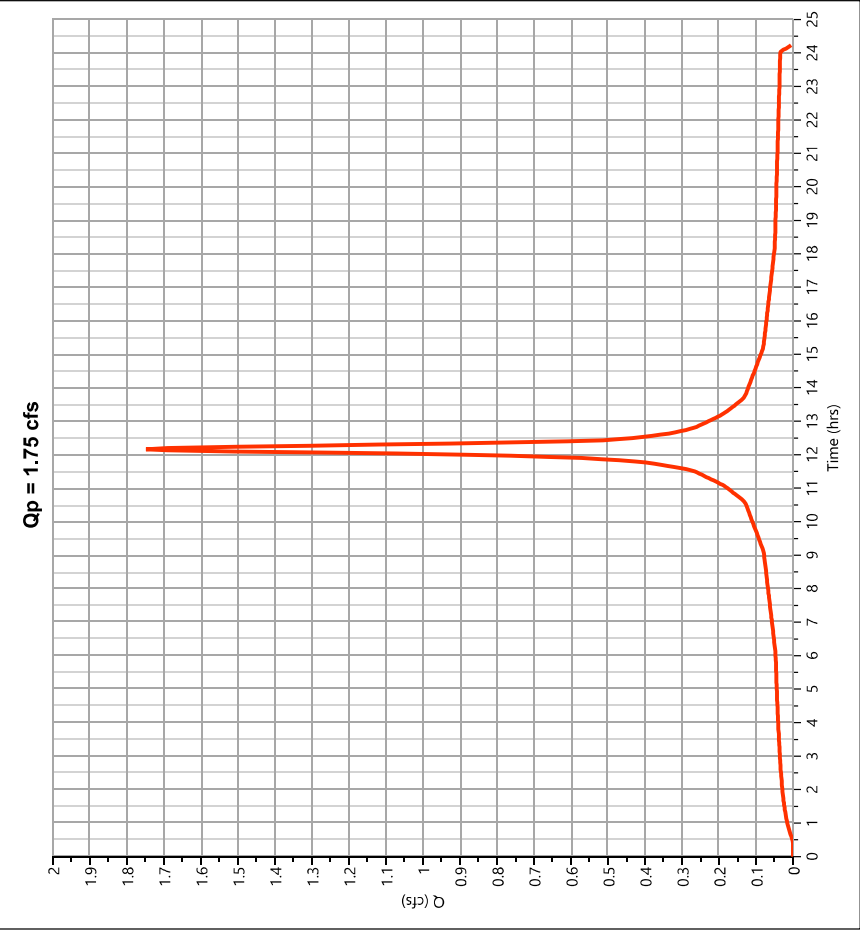
Hydrology Studio v 3.0.0.24

06-22-2022

DA-2B DET IMP

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,748 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 8,510 cuft
Drainage Area	= 0.27 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

DA-2B DET PER

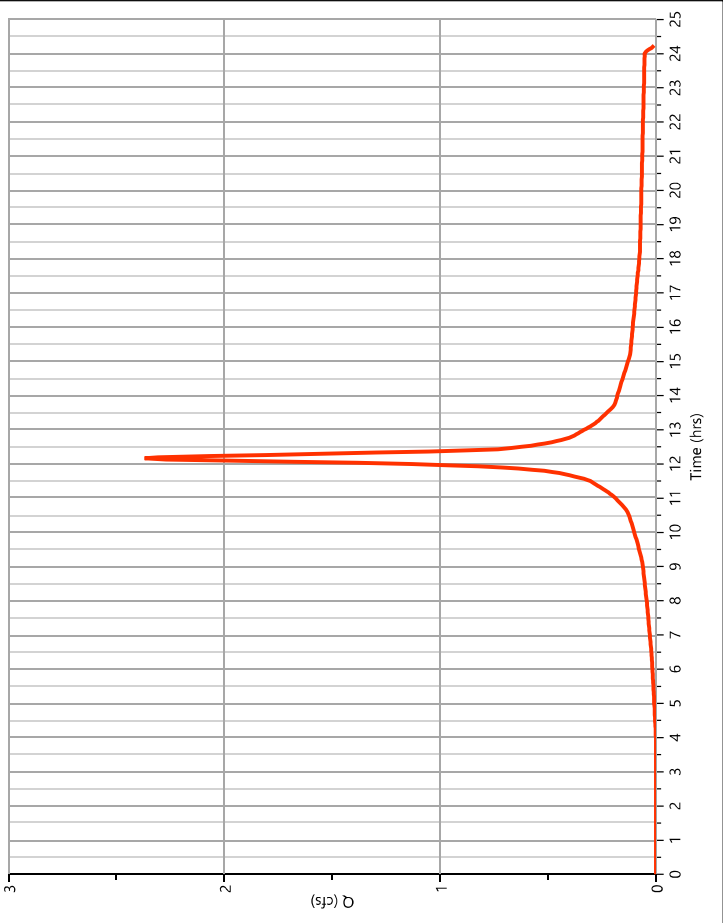
Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2,370 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 10,057 cuft
Drainage Area	= 0.44 ac	Curve Number	= 78.84*
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

* Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.27	80	OPEN SPACE
0.17	77	WOODED
0.44	79	Weighted CN Method Employed

Qp = 2.37 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

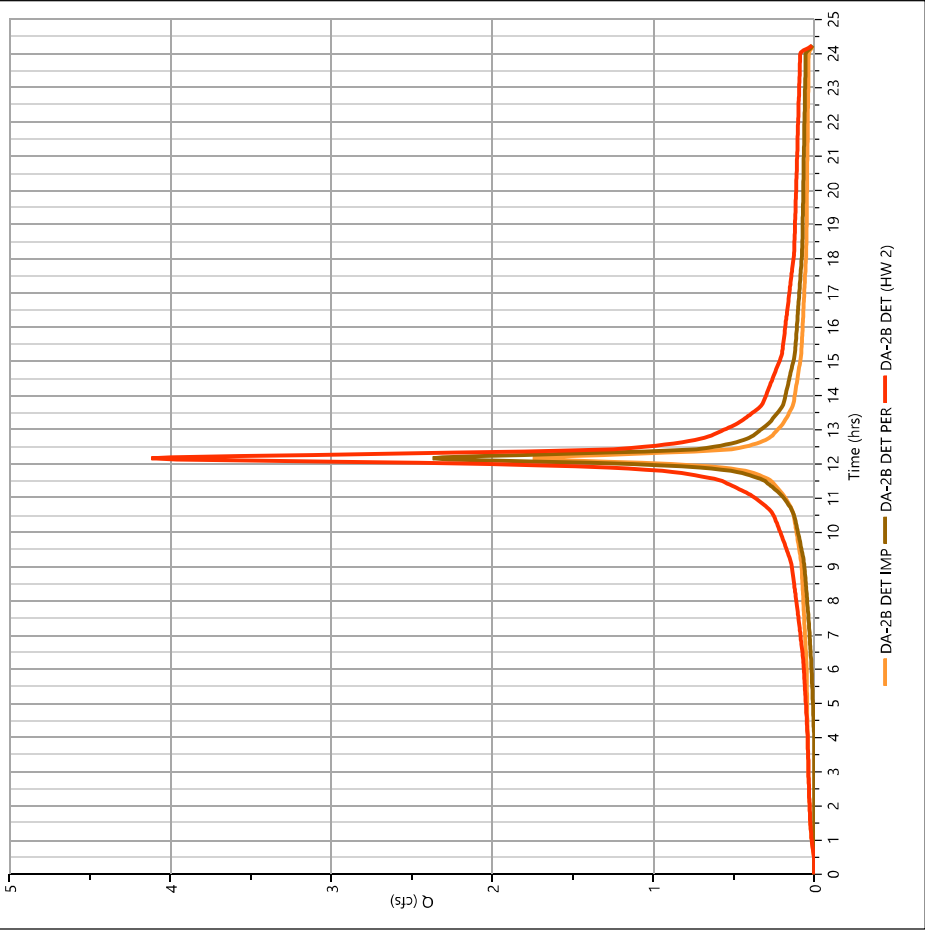
06-22-2022

DA-2B DET (HW 2)

Hyd. No. 27

Hydrograph Type	= Junction	Peak Flow	= 4,118 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 18,567 cuft
Inflow Hydrographs	= 25, 26	Total Contrib. Area	= 0.71 ac

Qp = 4.12 cfs



Hydrograph Report

Project Name:

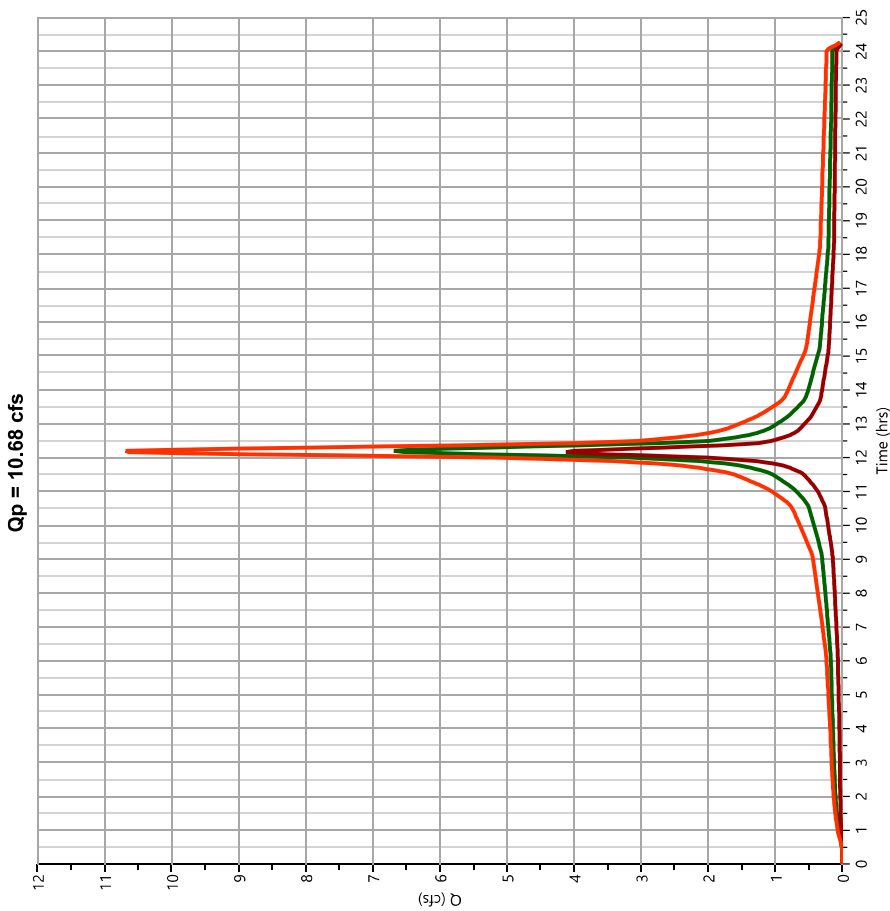
Hydrology Studio v 3.0.0.24

06-22-2022

TOTAL TO AG BASIN

Hyd. No. 29

Hydrograph Type	= Junction	Peak Flow	= 10.68 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 52,701 cuft
Inflow Hydrographs	= 23, 27	Total Contrib. Area	= 1.92 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

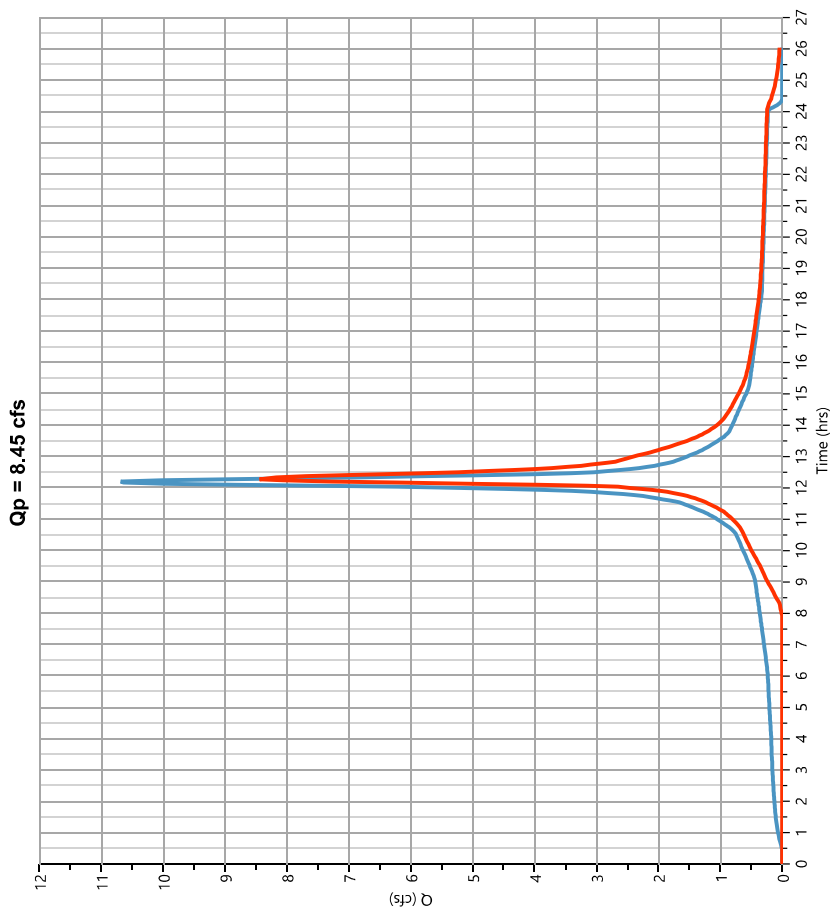
AG BASIN [POI-2]

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 8.450 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Hydrograph Volume	= 47,664 cuft
Inflow Hydrograph	= 29 - TOTAL TO AG BASIN	Max. Elevation	= 463.60 ft
Pond Name	= AG BASIN	Max. Storage	= 13,238 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.38 hrs



Hydrograph Report

Project Name:

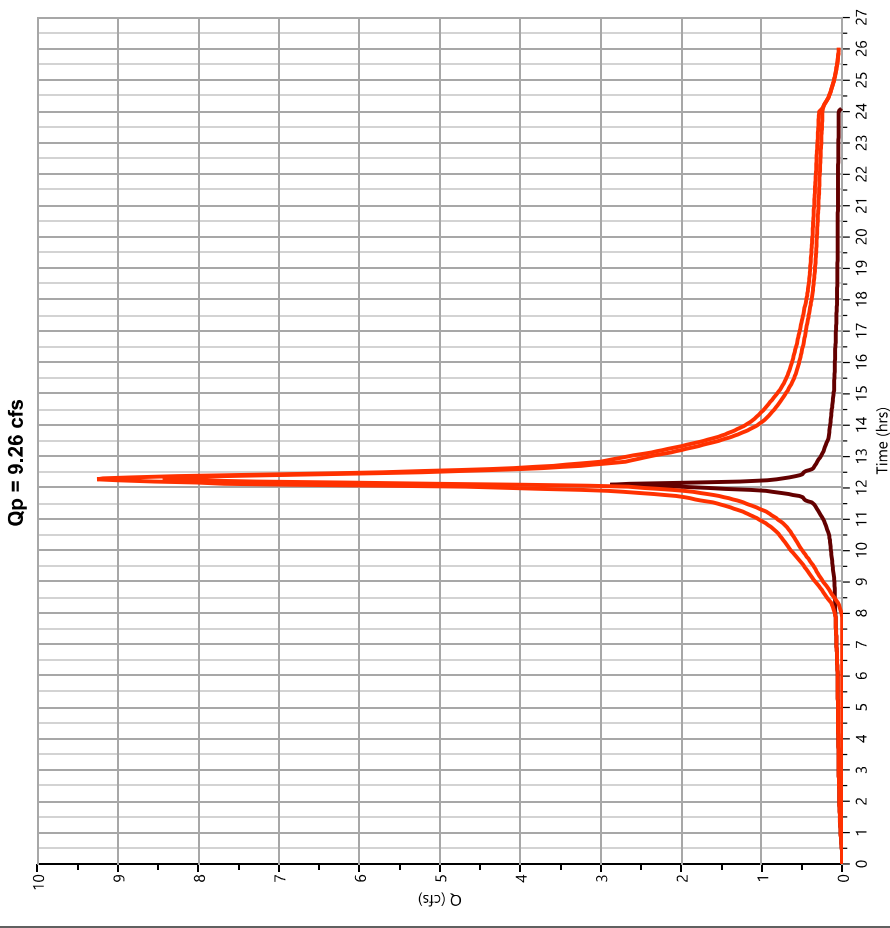
Hydrology Studio v 3.0.0.24

06-22-2022

PROP TOTAL TO POI-2

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 9,259 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 58,331 cuft
Inflow Hydrographs	= 19, 30	Total Contrib. Area	= 0.38 ac



— DA-2 UNDET — AG BASIN [POI-2] — PROP TOTAL TO POI-2

Hydrograph Report

Project Name:

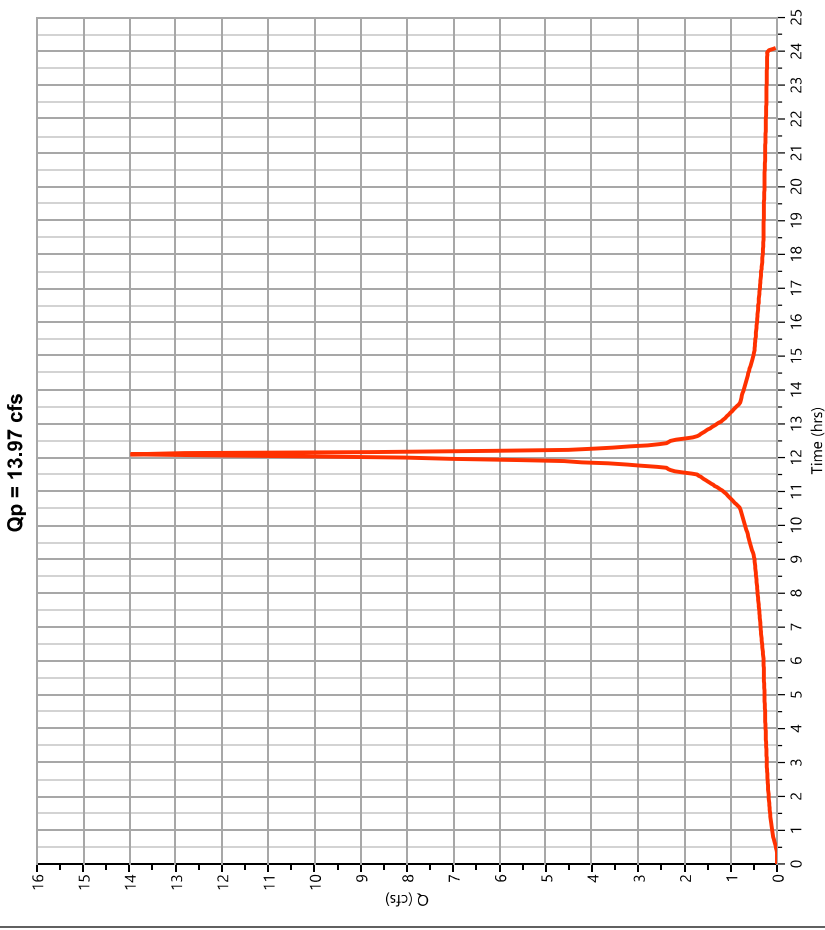
Hydrology Studio v 3.0.0.24

06-22-2022

DA-3 UNDET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.97 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 52,150 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

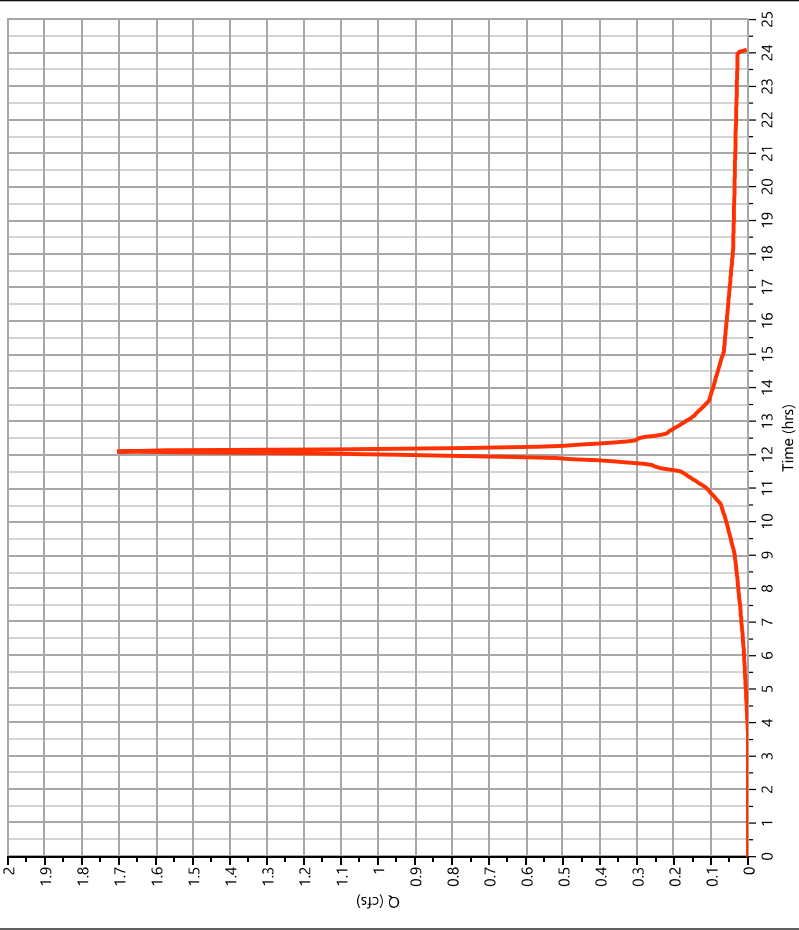
06-22-2022

DA-3 UNDET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.704 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,527 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.70 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

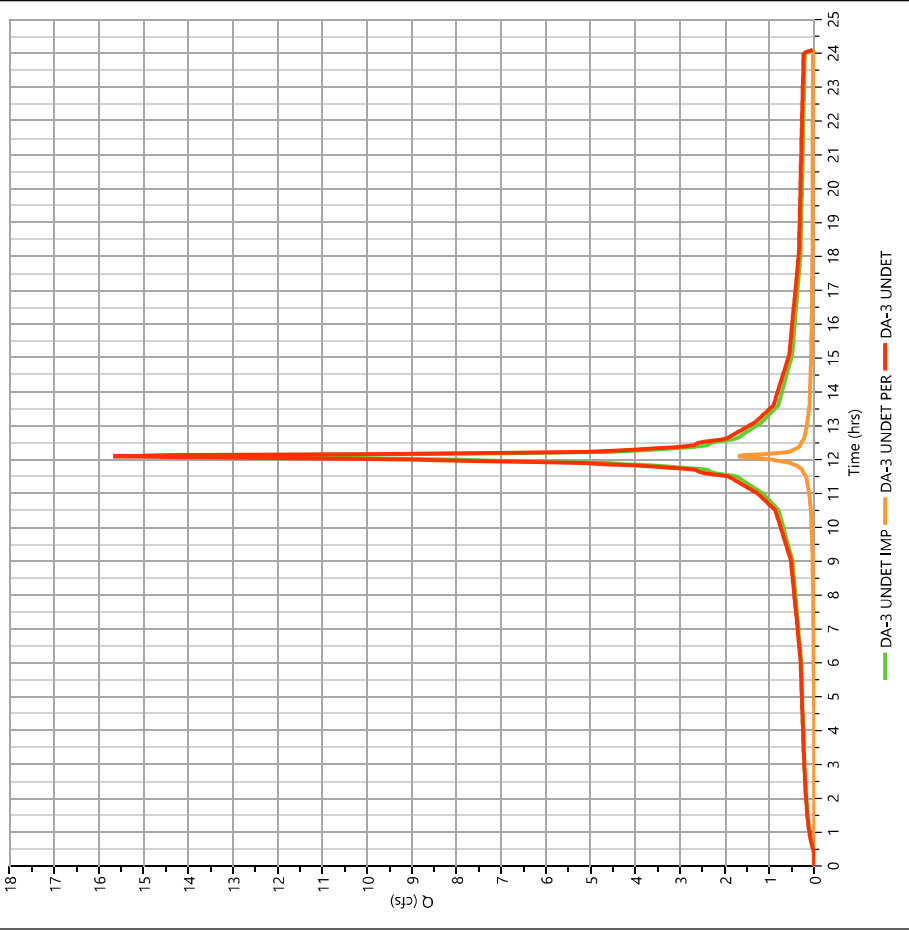
06-22-2022

DA-3 UNDET

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 15.67 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,677 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 2.08 ac

Qp = 15.67 cfs



Hydrograph Report

Hydrology Studio v 3.0.0.24

Project Name:

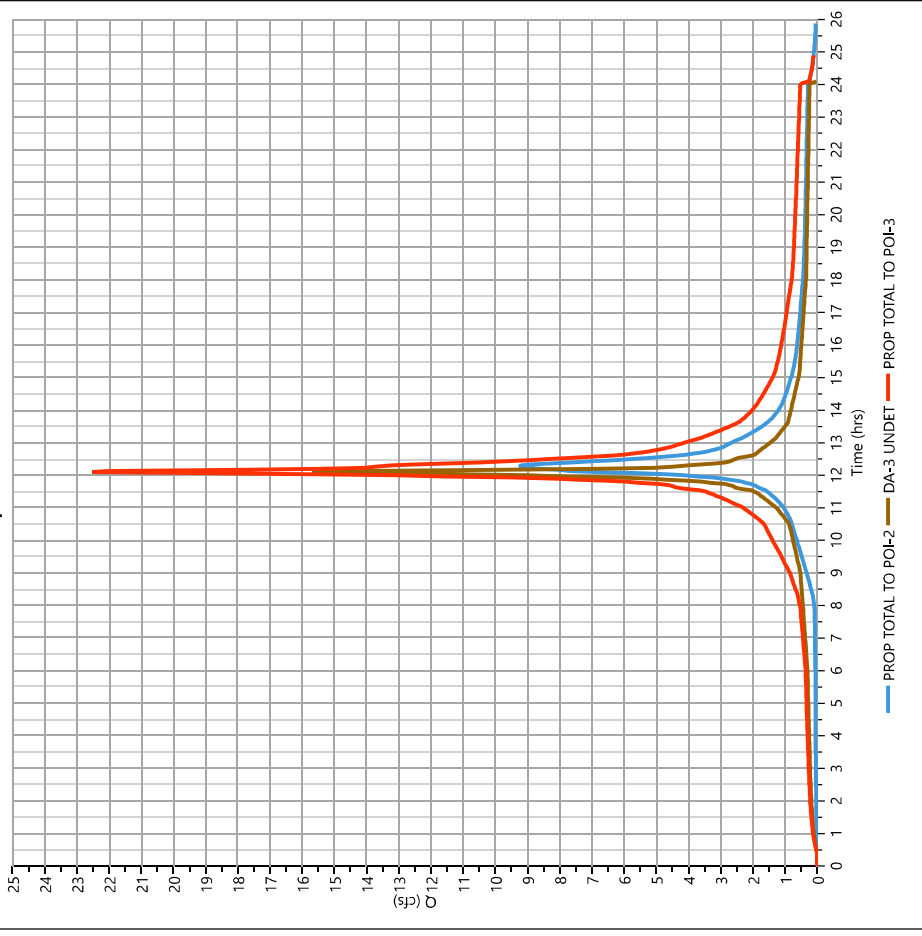
06-22-2022

PROP TOTAL TO POI-3

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 22.52 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 116,008 cuft
Inflow Hydrographs	= 32, 36	Total Contrib. Area	= 2.46 ac

$Q_p = 22.52 \text{ cfs}$



Design Storm Report

Hydrology Studio v 3.0.0.24

Custom Storm filename:

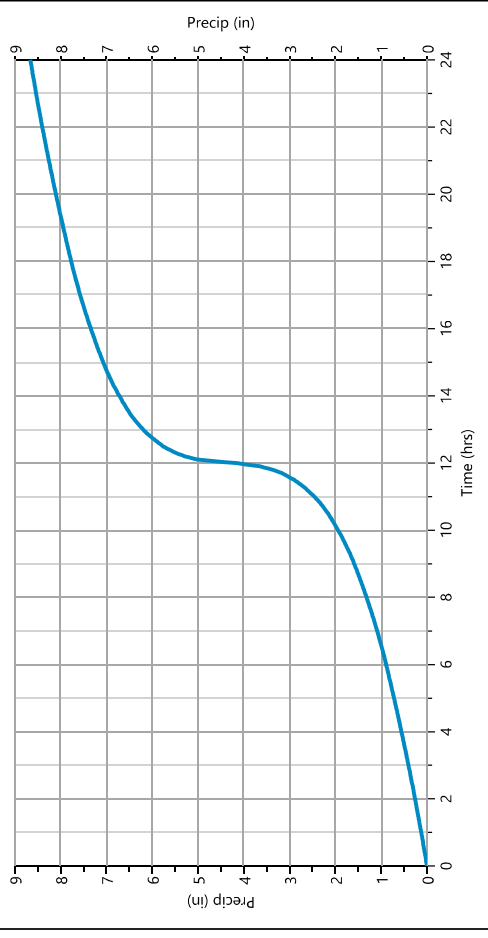
06-22-2022

Storm Distribution: NRCC-D, 24-hr

Storm Duration	Total Rainfall Volume (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	✓ 100-yr
24 hrs	0.00	3.44	0.00	0.00	5.22	6.44	0.00	8.66

Incremental Rainfall Distribution, 100-yr

Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.024883	11.43	0.033861	11.80	0.065356	12.17	0.093064	12.53	0.033860		
11.10	0.024883	11.47	0.033860	11.83	0.093066	12.20	0.093066	12.57	0.033861		
11.13	0.027135	11.50	0.033862	11.87	0.093064	12.23	0.065353	12.60	0.033860		
11.17	0.027135	11.53	0.044368	11.90	0.093067	12.27	0.065354	12.63	0.031724		
11.20	0.027135	11.57	0.044367	11.93	0.168301	12.30	0.065354	12.67	0.031725		
11.23	0.029444	11.60	0.044368	11.97	0.168301	12.33	0.046706	12.70	0.031725		
11.27	0.029444	11.63	0.046706	12.00	0.168300	12.37	0.046707	12.73	0.029444		
11.30	0.029444	11.67	0.046707	12.03	0.287311	12.40	0.046707	12.77	0.029443		
11.33	0.031724	11.70	0.046706	12.07	0.287311	12.43	0.044368	12.80	0.029444		
11.37	0.031724	11.73	0.085354	12.10	0.287311	12.47	0.044367	12.83	0.027134		
11.40	0.031724	11.77	0.065354	12.13	0.093066	12.50	0.044368	12.87	0.027134		



**EXISTING & PROPOSED HYDROGRAPHS
1YR WATER QUALITY DESIGN STORM
(HYDROGRAPHS CREATED USING HYDROLOGY STUDIO
2020 COMPUTER SOFTWARE)**

Hydrograph 1-yr Summary

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	0.162	80	373	----		
3	NRCS Runoff	EX DA-2 IMP	2.107	70	3,552	----		
4	NRCS Runoff	EX DA-2 PER	0.190	78	388	----		
5	Junction	EX DA-2 [POI-2]	2.248	72	3,940	3, 4		
7	Junction	EX TOTAL TO POI-2	2.352	72	4,313	1, 5		
9	NRCS Runoff	EX DA-3 IMP	5.162	64	6,443	----		
10	NRCS Runoff	EX DA-3 PER	0.114	68	141	----		
11	Junction	EX DA-3	5.238	64	6,584	9, 10		
13	Junction	EX TOTAL TO POI-3	6.894	66	10,897	7, 11		
15	NRCS Runoff	DA-1 [POI-1]	0.106	80	237	----		
17	NRCS Runoff	DA-2 UNDET IMP	0.987	64	1,232	----		
18	NRCS Runoff	DA-2 UNDET PER	0.014	68	17.7	----		
19	Junction	DA-2 UNDET	0.997	64	1,250	17, 18		
21	NRCS Runoff	DA-2A DET IMP	2.129	70	3,588	----		
22	NRCS Runoff	DA-2A DET PER	0.058	76	115	----		
23	Junction	DA-2A DET (HW 1)	2.169	70	3,704	21, 22		
25	NRCS Runoff	DA-2B DET IMP	0.667	68	1,046	----		
26	NRCS Runoff	DA-2B DET PER	0.137	74	246	----		
27	Junction	DA-2B DET (HW 2)	0.784	70	1,292	25, 26		
29	Junction	TOTAL TO AG BASIN	2.953	70	4,996	23, 27		
30	Pond Route	AG BASIN [POI-2]	0.000	0	0.000	29	461.99	4,996
32	Junction	PROP TOTAL TO POI-2	0.997	64	1,250	19, 30		
34	NRCS Runoff	DA-3 UNDET IMP	5.134	64	6,408	----		
35	NRCS Runoff	DA-3 UNDET PER	0.123	68	153	----		
36	Junction	DA-3 UNDET	5.216	64	6,561	34, 35		

Hydrograph 1-yr Summary

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hvd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PROP TOTAL TO POI-3	6.213	64	7,811	32, 36		

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

AG BASIN [POI-2]

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 1-yr	Time to Peak	= 0 min
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 29 - TOTAL TO AG BASIN	Max. Elevation	= 461.99 ft
Pond Name	= AG BASIN	Max. Storage	= 4,996 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

RIP RAP CALCULATIONS

Conduit Outlet Protection Calculations

Rip Rap Pad # A

Design Parameters:

Design Storm Flow for 25 Year, Q	4.90 cfs
Vertical Dimension of Outlet Pipe, D_o	18 in
Horizontal Dimension of Outlet Pipe, W_o	18 in
Tailwater Depth, TW^1	0.15 ft

Apron Dimension Calculations:

Unit Discharge, $q = Q/D_o = 3.27$ cfs per foot

• Case I: $TW < 1/2 D_o$

$$\text{Apron Length, } L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o = 15.3 \text{ ft}$$

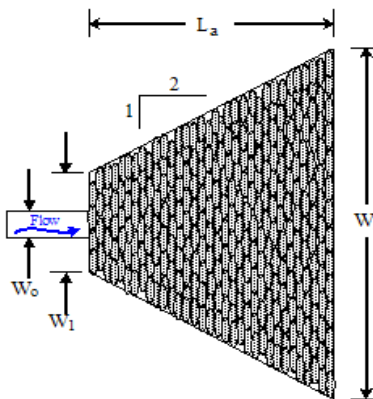
$$\text{Width, } W_1 = 3W_o = 4.5 \text{ ft}$$

$$\text{Width, } W_2 = 3W_o + L_a = 19.8 \text{ ft}$$

or $L_a = 16 \text{ ft}$

or $W_1 = 5 \text{ ft}$

or $W_2 = 20 \text{ ft}$



• Case II: $TW \geq 1/2 D_o$

$$\text{Apron Length, } L_a = \frac{3q}{D_o^{1/2}} =$$

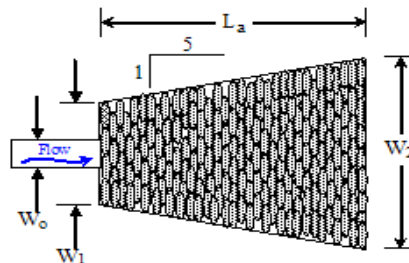
$$\text{Width, } W_1 = 3W_o =$$

$$\text{Width, } W_2 = 3W_o + 0.4L_a =$$

$L_a =$

$W_1 =$

$W_2 =$



Rip Rap Stone Size Calculations:

$$\text{Median Stone, } d_{50} = \frac{0.02q^{1.33}}{TW} = 7.72 \text{ in}$$

$d_{50} = 8 \text{ in}$

Notes:

- Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
- The side slopes shall be 2:1 or flatter.
- The bottom grade shall be 0.0% (level).
- There shall be no overfall at the end of the apron or at the end of the culvert.
- Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50} . The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
- The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
- Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
- No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

- Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
- For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

Conduit Outlet Protection Calculations

Rip Rap Pad # B

Design Parameters:

Design Storm Flow for 25 Year, Q	2.92 cfs
Vertical Dimension of Outlet Pipe, D_o	18 in
Horizontal Dimension of Outlet Pipe, W_o	18 in
Tailwater Depth, TW^1	0.15 ft

Apron Dimension Calculations:

Unit Discharge, $q = Q/D_o = 1.94$ cfs per foot

• Case I: $TW < 1/2 D_o$

$$\text{Apron Length, } L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o = 13.36 \text{ ft}$$

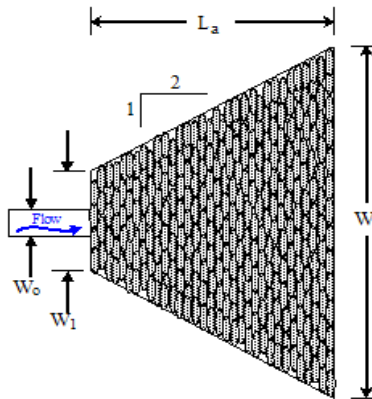
$$\text{or } L_a = 14 \text{ ft}$$

$$\text{Width, } W_1 = 3W_o = 4.5 \text{ ft}$$

$$\text{or } W_1 = 5 \text{ ft}$$

$$\text{Width, } W_2 = 3W_o + L_a = 17.86 \text{ ft}$$

$$\text{or } W_2 = 18 \text{ ft}$$



• Case II: $TW \geq 1/2 D_o$

$$\text{Apron Length, } L_a = \frac{3q}{D_o^{1/2}} =$$

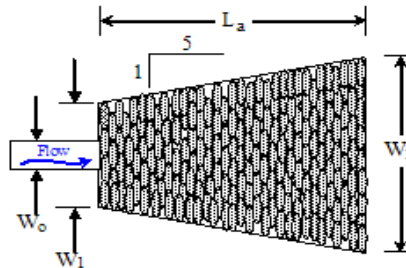
$$L_a =$$

$$\text{Width, } W_1 = 3W_o =$$

$$W_1 =$$

$$\text{Width, } W_2 = 3W_o + 0.4L_a =$$

$$W_2 =$$



Rip Rap Stone Size Calculations:

$$\text{Median Stone, } d_{50} = \frac{0.02q^{1.33}}{TW} = 3.87 \text{ in}$$

$$d_{50} = 6 \text{ in}$$

Notes:

- Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
- The side slopes shall be 2:1 or flatter.
- The bottom grade shall be 0.0% (level).
- There shall be no overfall at the end of the apron or at the end of the culvert.
- Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50} . The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
- The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
- Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
- No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

- Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
- For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

INLET AREA CALCULATIONS AND STORMWATER COLLECTION SYSTEM CALCULATIONS (PIPE SIZING)



Inlet Area Summary and Average Coefficient (C) Calculations

Project: Altera
Job #: 2530-99-006
Location: West Orange, NJ

Computed By: SDP
Checked By: RJC
Date: 6/20/2022

Drainage Area	Impervious Area (sf)	Coefficient (C) Used	Open Space (SF)	Coefficient (C) Used	Average Coefficient (C) Used	Total Area (SF)	Total Area (acres)
Inlet #300	13398	0.95	2429	0.35	0.86	15827	0.36
Inlet #200	5501	0.95	4462	0.35	0.68	9963	0.23
Inlet #103	9507	0.95	13510	0.35	0.60	23017	0.53
Inlet #105	14495	0.95	4187	0.35	0.82	18682	0.43
Inlet #107	0	0.95	964	0.35	0.35	964	0.02
Inlet #108	0	0.95	1794	0.35	0.35	1794	0.04
Inlet #109	15144	0.95	8681	0.35	0.73	23825	0.55
Inlet #110		0.95	19166	0.35	0.35	19166	0.44
Inlet #111	10468	0.95	470	0.35	0.92	10938	0.25



Stormwater Collection System Calculations

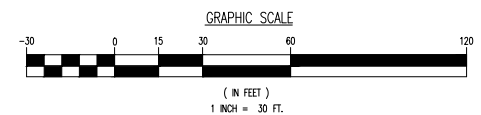
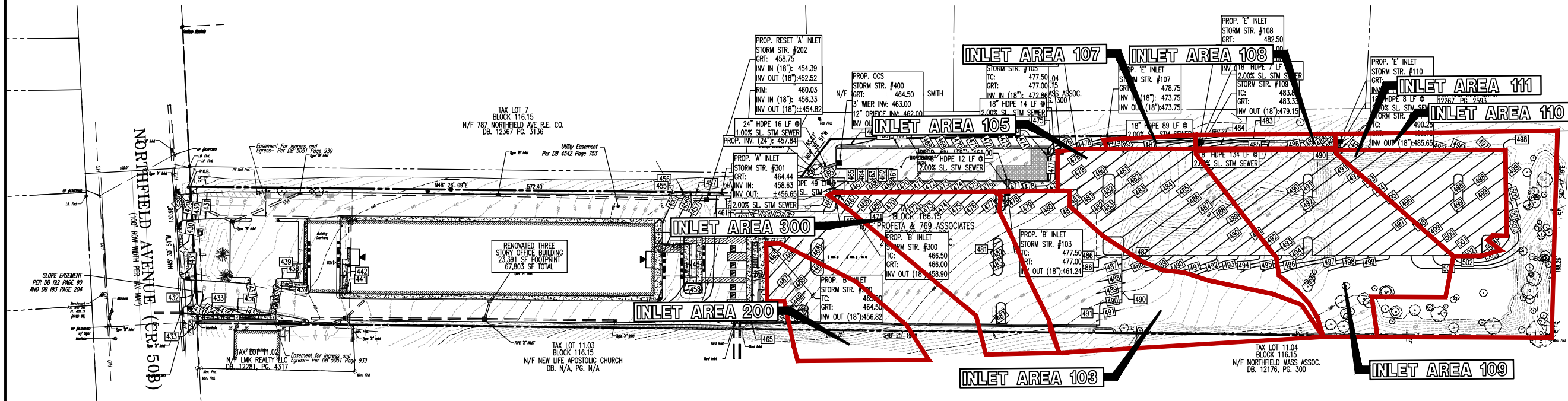
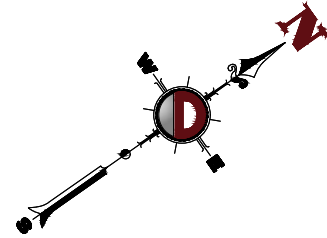
Project: Altera
Job #: 2530-99-006
Location: West Orange, NJ
Design Storm: 25

Computed By: SDP
Checked By: RJC
Date: 6/20/2022

NOTES:

- 1) Design method used is Rational Method, unless otherwise noted.
- 2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Pipe Velocity (fps)
Inlet #300	Inlet #301	0.36	0.86	0.31	0.31	6.00	0.02	6.00	7.70	2.39	2.39	18	13.0	0.012	0.0200	16.09	9.11
Inlet #200	Manhole #201	0.23	0.68	0.16	0.16	6.00	0.13	6.00	7.70	1.23	1.23	18	49.0	0.012	0.0100	11.38	6.44
Inlet #103	AG Basin	0.53	0.60	0.32	0.32	13.30	0.02	13.30	6.08	1.95	1.95	18	12.0	0.012	0.0200	16.09	9.11
Inlet #105	AG Basin	0.43	0.82	0.35	1.15	14.70	0.03	19.38	4.88	1.71	5.61	18	14.0	0.012	0.0200	16.09	9.11
Inlet #107	Inlet #105	0.02	0.35	0.01	0.80	6.00	0.08	19.30	4.88	0.05	3.90	18	44.0	0.012	0.0200	16.09	9.11
Inlet #108	Inlet #107	0.04	0.35	0.01	0.79	6.00	0.25	19.05	4.88	0.05	3.86	18	134.0	0.012	0.0200	16.09	9.11
Inlet #109	Inlet #108	0.55	0.73	0.40	0.40	13.30	0.01	13.30	6.08	2.43	2.43	18	7.0	0.012	0.0200	16.09	9.11
Inlet #110	Inlet #108	0.44	0.35	0.15	0.38	18.80	0.25	18.80	4.97	0.75	1.89	18	134.0	0.012	0.0200	16.09	9.11
Inlet #111	Inlet #110	0.25	0.92	0.23	0.23	6.00	0.01	6.00	7.70	1.77	1.77	18	8.0	0.012	0.0200	16.09	9.11



THIS PLAN SET IS FOR PERMITTING PURPOSES
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ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE:

INLET AREA MAP

SCALE: (H) 1"=30' (V).	DATE: 08/17/2022
PROJECT No: 2530-99-006	

SHEET No: **1** OF 1

BASIN DRAIN TIME

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

AG BASIN [POI-2]

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 1,627 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,017 cuft
Inflow Hydrograph	= 29 - TOTAL TO AG BASIN	Max. Elevation	= 462.69 ft
Pond Name	= AG BASIN	Max. Storage	= 8,532 cuft
Pond Routing by Storage Indication Method			
Center of mass detention time = 2.59 hrs			

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.93	0.028	12.77	1.188	13.60	0.571	14.43	0.350	15.27	0.261
11.97	0.042	12.80	1.147	13.63	0.557	14.47	0.346	15.30	0.258
12.00	0.088	12.83	1.106	13.67	0.543	14.50	0.342	15.33	0.256
12.03	0.145	12.87	1.068	13.70	0.530	14.53	0.338	15.37	0.253
12.07	0.228	12.90	1.031	13.73	0.517	14.57	0.334	15.40	0.250
12.10	0.342	12.93	0.996	13.77	0.505	14.60	0.330	15.43	0.247
12.13	0.510	12.97	0.962	13.80	0.493	14.63	0.326	15.47	0.245
12.17	0.704	13.00	0.932	13.83	0.482	14.67	0.323	15.50	0.242
12.20	0.908	13.03	0.906	13.87	0.471	14.70	0.319	15.53	0.240
12.23	1.118	13.07	0.881	13.90	0.460	14.73	0.315	15.57	0.238
12.27	1.296	13.10	0.856	13.93	0.450	14.77	0.312	15.60	0.235
12.30	1.442	13.13	0.832	13.97	0.441	14.80	0.308	15.63	0.233
12.33	1.543	13.17	0.809	14.00	0.432	14.83	0.305	15.67	0.231
12.37	1.603	13.20	0.786	14.03	0.423	14.87	0.301	15.70	0.229
12.40	1.627	13.23	0.764	14.07	0.415	14.90	0.298	15.73	0.227
12.43	1.622	13.27	0.743	14.10	0.407	14.93	0.294	15.77	0.225
12.47	1.596	13.30	0.722	14.13	0.399	14.97	0.291	15.80	0.223
12.50	1.558	13.33	0.702	14.17	0.392	15.00	0.287	15.83	0.221
12.53	1.514	13.37	0.683	14.20	0.385	15.03	0.284	15.87	0.219
12.57	1.467	13.40	0.664	14.23	0.378	15.07	0.281	15.90	0.217
12.60	1.419	13.43	0.646	14.27	0.372	15.10	0.277	15.93	0.216
12.63	1.370	13.47	0.631	14.30	0.367	15.13	0.274	15.97	0.214
12.67	1.321	13.50	0.615	14.33	0.363	15.17	0.271	16.00	0.212
12.70	1.275	13.53	0.600	14.37	0.359	15.20	0.268	16.03	0.211
12.73	1.231	13.57	0.585	14.40	0.354	15.23	0.265	16.07	0.209

Printed values > 1% of Opeak. rtfh-point print interval = 1

Hydrograph Discharge Table, cont'd

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
16.10	0.208	17.30	0.169	18.50	0.141	19.70	0.124	20.90	0.113						
16.13	0.206	17.33	0.168	18.53	0.140	19.73	0.123	20.93	0.113						
16.17	0.205	17.37	0.167	18.57	0.140	19.77	0.123	20.97	0.113						
16.20	0.203	17.40	0.166	18.60	0.139	19.80	0.123	21.00	0.113						
16.23	0.202	17.43	0.166	18.63	0.139	19.83	0.122	21.03	0.112						
16.27	0.200	17.47	0.165	18.67	0.138	19.87	0.122	21.07	0.112						
16.30	0.199	17.50	0.164	18.70	0.137	19.90	0.122	21.10	0.112						
16.33	0.198	17.53	0.163	18.73	0.137	19.93	0.121	21.13	0.112						
16.37	0.196	17.57	0.163	18.77	0.136	19.97	0.121	21.17	0.111						
16.40	0.195	17.60	0.162	18.80	0.136	20.00	0.121	21.20	0.111						
16.43	0.194	17.63	0.161	18.83	0.135	20.03	0.121	21.23	0.111						
16.47	0.193	17.67	0.160	18.87	0.135	20.07	0.120	21.27	0.111						
16.50	0.191	17.70	0.159	18.90	0.134	20.10	0.120	21.30	0.110						
16.53	0.190	17.73	0.159	18.93	0.134	20.13	0.120	21.33	0.110						
16.57	0.189	17.77	0.158	18.97	0.133	20.17	0.119	21.37	0.110						
16.60	0.188	17.80	0.157	19.00	0.133	20.20	0.119	21.40	0.110						
16.63	0.187	17.83	0.156	19.03	0.132	20.23	0.119	21.43	0.109						
16.67	0.185	17.87	0.156	19.07	0.132	20.27	0.118	21.47	0.109						
16.70	0.184	17.90	0.155	19.10	0.131	20.30	0.118	21.50	0.109						
16.73	0.183	17.93	0.154	19.13	0.131	20.33	0.118	21.53	0.109						
16.77	0.182	17.97	0.153	19.17	0.130	20.37	0.118	21.57	0.108						
16.80	0.181	18.00	0.152	19.20	0.130	20.40	0.117	21.60	0.108						
16.83	0.180	18.03	0.152	19.23	0.129	20.43	0.117	21.63	0.108						
16.87	0.179	18.07	0.151	19.27	0.129	20.47	0.117	21.67	0.108						
16.90	0.178	18.10	0.150	19.30	0.128	20.50	0.116	21.70	0.108						
16.93	0.177	18.13	0.149	19.33	0.128	20.53	0.116	21.73	0.107						
16.97	0.176	18.17	0.148	19.37	0.128	20.57	0.116	21.77	0.107						
17.00	0.175	18.20	0.148	19.40	0.127	20.60	0.116	21.80	0.107						
17.03	0.175	18.23	0.147	19.43	0.127	20.63	0.115	21.83	0.107						
17.07	0.174	18.27	0.146	19.47	0.126	20.67	0.115	21.87	0.106						
17.10	0.173	18.30	0.145	19.50	0.126	20.70	0.115	21.90	0.106						
17.13	0.173	18.33	0.145	19.53	0.126	20.73	0.115	21.93	0.106						
17.17	0.172	18.37	0.144	19.57	0.125	20.77	0.114	21.97	0.106						
17.20	0.171	18.40	0.143	19.60	0.125	20.80	0.114	22.00	0.106						
17.23	0.170	18.43	0.142	19.63	0.125	20.83	0.114	22.03	0.105						
17.27	0.169	18.47	0.142	19.67	0.124	20.87	0.114	22.07	0.105						

Printed values > 1% of Opeak. rtfh-point print interval = 1

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.24

06-22-2022

AG BASIN [POI-2]

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 3,701 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 24,579 cuft
Inflow Hydrograph	= 29 - TOTAL TO AG BASIN	Max. Elevation	= 463.16 ft
Pond Name	= AG BASIN	Max. Storage	= 10,970 cuft
Pond Routing by Storage Indication Method			
Center of mass detention time = 1.89 hrs			

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.80	0.039	11.63	0.543	12.47	3.198	13.30	1.167	14.13	0.617
10.83	0.044	11.67	0.577	12.50	3.034	13.33	1.129	14.17	0.806
10.87	0.058	11.70	0.612	12.53	2.869	13.37	1.092	14.20	0.596
10.90	0.072	11.73	0.650	12.57	2.709	13.40	1.057	14.23	0.587
10.93	0.087	11.77	0.694	12.60	2.617	13.43	1.024	14.27	0.578
10.97	0.101	11.80	0.740	12.63	2.544	13.47	0.992	14.30	0.569
11.00	0.115	11.83	0.791	12.67	2.470	13.50	0.962	14.33	0.560
11.03	0.130	11.87	0.849	12.70	2.390	13.53	0.934	14.37	0.551
11.07	0.144	11.90	0.914	12.73	2.290	13.57	0.910	14.40	0.543
11.10	0.158	11.93	0.998	12.77	2.195	13.60	0.887	14.43	0.535
11.13	0.173	11.97	1.105	12.80	2.104	13.63	0.864	14.47	0.528
11.17	0.192	12.00	1.233	12.83	2.016	13.67	0.842	14.50	0.520
11.20	0.213	12.03	1.397	12.87	1.933	13.70	0.821	14.53	0.513
11.23	0.234	12.07	1.609	12.90	1.855	13.73	0.800	14.57	0.506
11.27	0.256	12.10	1.858	12.93	1.781	13.77	0.780	14.60	0.499
11.30	0.277	12.13	2.140	12.97	1.711	13.80	0.761	14.63	0.492
11.33	0.298	12.17	2.433	13.00	1.642	13.83	0.743	14.67	0.485
11.37	0.320	12.20	2.647	13.03	1.576	13.87	0.726	14.70	0.479
11.40	0.341	12.23	3.016	13.07	1.513	13.90	0.709	14.73	0.473
11.43	0.363	12.27	3.339	13.10	1.454	13.93	0.694	14.77	0.466
11.47	0.389	12.30	3.593	13.13	1.397	13.97	0.679	14.80	0.460
11.50	0.419	12.33	3.701	13.17	1.344	14.00	0.665	14.83	0.454
11.53	0.449	12.37	3.685	13.20	1.294	14.03	0.651	14.87	0.448
11.57	0.479	12.40	3.573	13.23	1.250	14.07	0.639	14.90	0.443
11.60	0.510	12.43	3.395	13.27	1.207	14.10	0.628	14.93	0.437

Printed values > 1% of Qpeak. rtfh-point print interval = 1

Hydrograph Discharge Table, cont'd

AG BASIN [POI-2]

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
22.10	0.105	23.30	0.097	24.50	0.068	25.70	0.035	26.90	0.024
22.13	0.105	23.33	0.097	24.53	0.066	25.73	0.035	26.93	0.024
22.17	0.104	23.37	0.097	24.57	0.064	25.77	0.034	26.97	0.024
22.20	0.104	23.40	0.096	24.60	0.062	25.80	0.034	27.00	0.023
22.23	0.104	23.43	0.096	24.63	0.060	25.83	0.034	27.03	0.023
22.27	0.104	23.47	0.096	24.67	0.058	25.87	0.033	27.07	0.023
22.30	0.104	23.50	0.096	24.70	0.056	25.90	0.033	27.10	0.023
22.33	0.103	23.53	0.096	24.73	0.054	25.93	0.033	27.13	0.022
22.37	0.103	23.57	0.095	24.77	0.053	25.97	0.032	27.17	0.022
22.40	0.103	23.60	0.095	24.80	0.051	26.00	0.032	27.20	0.022
22.43	0.103	23.63	0.095	24.83	0.050	26.03	0.032	27.23	0.022
22.47	0.102	23.67	0.095	24.87	0.048	26.07	0.031	27.27	0.022
22.50	0.102	23.70	0.095	24.90	0.047	26.10	0.031	27.30	0.021
22.53	0.102	23.73	0.094	24.93	0.045	26.13	0.031	27.33	0.021
22.57	0.102	23.77	0.094	24.97	0.044	26.17	0.030	27.37	0.021
22.60	0.102	23.80	0.094	25.00	0.044	26.20	0.030	27.40	0.021
22.63	0.101	23.83	0.094	25.03	0.043	26.23	0.030	27.43	0.020
22.67	0.101	23.87	0.094	25.07	0.043	26.27	0.029	27.47	0.020
22.70	0.101	23.90	0.093	25.10	0.042	26.30	0.029	27.50	0.020
22.73	0.101	23.93	0.093	25.13	0.042	26.33	0.029	27.53	0.020
22.77	0.101	23.97	0.093	25.17	0.041	26.37	0.028	27.57	0.020
22.80	0.100	24.00	0.093	25.20	0.041	26.40	0.028	27.60	0.019
22.83	0.100	24.03	0.092	25.23	0.040	26.43	0.028	27.63	0.019
22.87	0.100	24.07	0.092	25.27	0.040	26.47	0.028	27.67	0.019
22.90	0.100	24.10	0.092	25.30	0.040	26.50	0.027	27.70	0.019
22.93	0.099	24.13	0.091	25.33	0.039	26.53	0.027	27.73	0.019
22.97	0.099	24.17	0.089	25.37	0.039	26.57	0.027	27.77	0.018
23.00	0.099	24.20	0.088	25.40	0.038	26.60	0.027	27.80	0.018
23.03	0.099	24.23	0.086	25.43	0.038	26.63	0.026	27.83	0.018
23.07	0.099	24.27	0.084	25.47	0.038	26.67	0.026	27.87	0.018
23.10	0.098	24.30	0.081	25.50	0.037	26.70	0.026	27.90	0.018
23.13	0.098	24.33	0.079	25.53	0.037	26.73	0.025	27.93	0.018
23.17	0.098	24.37	0.077	25.57	0.037	26.77	0.025	27.97	0.017
23.20	0.098	24.40	0.074	25.60	0.036	26.80	0.025	28.00	0.017
23.23	0.098	24.43	0.072	25.63	0.036	26.83	0.025	28.03	0.017
23.27	0.097	24.47	0.070	25.67	0.035	26.87	0.024	28.07	0.017

Printed values > 1% of Qpeak. rtfh-point print interval = 1

Hydrograph Discharge Table, cont'd

AG BASIN [POL-2]									
Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
14.97	0.431	16.17	0.315	17.37	0.258	18.57	0.211	19.77	0.187
15.00	0.426	16.20	0.313	17.40	0.256	18.60	0.210	19.80	0.187
15.03	0.420	16.23	0.311	17.43	0.255	18.63	0.209	19.83	0.187
15.07	0.415	16.27	0.310	17.47	0.254	18.67	0.208	19.87	0.186
15.10	0.409	16.30	0.308	17.50	0.252	18.70	0.207	19.90	0.186
15.13	0.404	16.33	0.306	17.53	0.251	18.73	0.206	19.93	0.185
15.17	0.399	16.37	0.304	17.57	0.249	18.77	0.205	19.97	0.185
15.20	0.394	16.40	0.303	17.60	0.248	18.80	0.204	20.00	0.184
15.23	0.389	16.43	0.301	17.63	0.247	18.83	0.204	20.03	0.184
15.27	0.384	16.47	0.299	17.67	0.245	18.87	0.203	20.07	0.184
15.30	0.380	16.50	0.297	17.70	0.244	18.90	0.202	20.10	0.183
15.33	0.375	16.53	0.296	17.73	0.242	18.93	0.201	20.13	0.183
15.37	0.371	16.57	0.294	17.77	0.241	18.97	0.201	20.17	0.182
15.40	0.368	16.60	0.293	17.80	0.240	19.00	0.200	20.20	0.182
15.43	0.365	16.63	0.291	17.83	0.238	19.03	0.199	20.23	0.182
15.47	0.362	16.67	0.289	17.87	0.237	19.07	0.199	20.27	0.181
15.50	0.360	16.70	0.288	17.90	0.236	19.10	0.198	20.30	0.181
15.53	0.357	16.73	0.286	17.93	0.234	19.13	0.197	20.33	0.180
15.57	0.354	16.77	0.285	17.97	0.233	19.17	0.197	20.37	0.180
15.60	0.352	16.80	0.283	18.00	0.231	19.20	0.196	20.40	0.180
15.63	0.349	16.83	0.281	18.03	0.230	19.23	0.196	20.43	0.179
15.67	0.347	16.87	0.280	18.07	0.229	19.27	0.195	20.47	0.179
15.70	0.344	16.90	0.278	18.10	0.227	19.30	0.194	20.50	0.179
15.73	0.342	16.93	0.277	18.13	0.226	19.33	0.194	20.53	0.178
15.77	0.340	16.97	0.275	18.17	0.225	19.37	0.193	20.57	0.178
15.80	0.338	17.00	0.274	18.20	0.223	19.40	0.193	20.60	0.178
15.83	0.335	17.03	0.272	18.23	0.222	19.43	0.192	20.63	0.177
15.87	0.333	17.07	0.271	18.27	0.221	19.47	0.192	20.67	0.177
15.90	0.331	17.10	0.269	18.30	0.219	19.50	0.191	20.70	0.177
15.93	0.329	17.13	0.268	18.33	0.218	19.53	0.191	20.73	0.176
15.97	0.327	17.17	0.267	18.37	0.217	19.57	0.190	20.77	0.176
16.00	0.325	17.20	0.265	18.40	0.216	19.60	0.190	20.80	0.176
16.03	0.323	17.23	0.264	18.43	0.215	19.63	0.189	20.83	0.176
16.07	0.321	17.27	0.262	18.47	0.214	19.67	0.189	20.87	0.175
16.10	0.319	17.30	0.261	18.50	0.213	19.70	0.188	20.90	0.175
16.13	0.317	17.33	0.259	18.53	0.212	19.73	0.188	20.93	0.175

Printed values > 1% of Qpeak. rtt=point print interval = 1

Hydrograph Discharge Table, cont'd

AG BASIN [POL-2]									
Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
20.97	0.175	22.17	0.164	23.37	0.152	24.57	0.100	25.77	0.040
21.00	0.174	22.20	0.164	23.40	0.152	24.60	0.097	25.80	0.039
21.03	0.174	22.23	0.163	23.43	0.152	24.63	0.094	25.83	0.039
21.07	0.174	22.27	0.163	23.47	0.151	24.67	0.091	25.87	0.039
21.10	0.173	22.30	0.163	23.50	0.151	24.70	0.088	25.90	0.038
21.13	0.173	22.33	0.162	23.53	0.151	24.73	0.086	25.93	0.038
21.17	0.173	22.37	0.162	23.57	0.150	24.77	0.083	25.97	0.037
21.20	0.173	22.40	0.162	23.60	0.150	24.80	0.081	26.00	0.037
21.23	0.172	22.43	0.161	23.63	0.150	24.83	0.078	26.03	0.037
21.27	0.172	22.47	0.161	23.67	0.149	24.87	0.076	...end	...
21.30	0.172	22.50	0.161	23.70	0.149	24.90	0.073		
21.33	0.171	22.53	0.160	23.73	0.149	24.93	0.071		
21.37	0.171	22.57	0.160	23.77	0.148	24.97	0.069		
21.40	0.171	22.60	0.160	23.80	0.148	25.00	0.067		
21.43	0.171	22.63	0.159	23.83	0.148	25.03	0.065		
21.47	0.170	22.67	0.159	23.87	0.147	25.07	0.063		
21.50	0.170	22.70	0.159	23.90	0.147	25.10	0.061		
21.53	0.170	22.73	0.158	23.93	0.147	25.13	0.059		
21.57	0.169	22.77	0.158	23.97	0.146	25.17	0.057		
21.60	0.169	22.80	0.158	24.00	0.146	25.20	0.055		
21.63	0.169	22.83	0.158	24.03	0.146	25.23	0.054		
21.67	0.168	22.87	0.157	24.07	0.145	25.27	0.052		
21.70	0.168	22.90	0.157	24.10	0.144	25.30	0.050		
21.73	0.168	22.93	0.157	24.13	0.143	25.33	0.049		
21.77	0.168	22.97	0.156	24.17	0.141	25.37	0.047		
21.80	0.167	23.00	0.156	24.20	0.138	25.40	0.046		
21.83	0.167	23.03	0.156	24.23	0.135	25.43	0.044		
21.87	0.167	23.07	0.155	24.27	0.132	25.47	0.044		
21.90	0.166	23.10	0.155	24.30	0.128	25.50	0.043		
21.93	0.166	23.13	0.155	24.33	0.125	25.53	0.043		
21.97	0.166	23.17	0.154	24.37	0.121	25.57	0.042		
22.00	0.165	23.20	0.154	24.40	0.117	25.60	0.042		
22.03	0.165	23.23	0.154	24.43	0.114	25.63	0.042		
22.07	0.165	23.27	0.153	24.47	0.110	25.67	0.041		
22.10	0.164	23.30	0.153	24.50	0.107	25.70	0.041		
22.13	0.164	23.33	0.153	24.53	0.103	25.73	0.040		

Printed values > 1% of Qpeak. rtt=point print interval = 1

Hydrograph Report

Hydrology Studio v 3.0.0.24

Project Name:

06-22-2022

AG BASIN [POI-2]

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 8,450 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Hydrograph Volume	= 47,664 cuft
Inflow Hydrograph	= 29 - TOTAL TO AG BASIN	Max. Elevation	= 463.60 ft
Pond Name	= AG BASIN	Max. Storage	= 13,238 cuft
Pond Routing by Storage Indication Method			
Center of mass detention time = 1.38 hrs			

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
8.47	0.089	9.30	0.309	10.13	0.528	10.97	0.785	11.80	1.876
8.50	0.089	9.33	0.317	10.17	0.537	11.00	0.803	11.83	1.759
8.53	0.108	9.37	0.324	10.20	0.545	11.03	0.820	11.87	1.856
8.57	0.117	9.40	0.332	10.23	0.553	11.07	0.838	11.90	1.969
8.60	0.126	9.43	0.340	10.27	0.562	11.10	0.858	11.93	2.106
8.63	0.135	9.47	0.347	10.30	0.570	11.13	0.877	11.97	2.274
8.67	0.143	9.50	0.355	10.33	0.578	11.17	0.898	12.00	2.464
8.70	0.151	9.53	0.363	10.37	0.586	11.20	0.920	12.03	2.656
8.73	0.159	9.57	0.370	10.40	0.594	11.23	0.943	12.07	3.150
8.77	0.167	9.60	0.380	10.43	0.602	11.27	0.971	12.10	3.966
8.80	0.175	9.63	0.391	10.47	0.610	11.30	1.000	12.13	5.035
8.83	0.185	9.67	0.401	10.50	0.618	11.33	1.031	12.17	6.209
8.87	0.195	9.70	0.411	10.53	0.626	11.37	1.062	12.20	7.279
8.90	0.206	9.73	0.420	10.57	0.634	11.40	1.094	12.23	8.071
8.93	0.216	9.77	0.430	10.60	0.642	11.43	1.126	12.27	8.444
8.97	0.225	9.80	0.440	10.63	0.652	11.47	1.160	12.30	8.450
9.00	0.234	9.83	0.449	10.67	0.662	11.50	1.193	12.33	8.175
9.03	0.243	9.87	0.458	10.70	0.673	11.53	1.229	12.37	7.887
9.07	0.252	9.90	0.467	10.73	0.684	11.57	1.266	12.40	7.077
9.10	0.261	9.93	0.476	10.77	0.697	11.60	1.307	12.43	6.429
9.13	0.269	9.97	0.485	10.80	0.710	11.63	1.356	12.47	5.798
9.17	0.277	10.00	0.494	10.83	0.723	11.67	1.410	12.50	5.230
9.20	0.285	10.03	0.503	10.87	0.738	11.70	1.468	12.53	4.750
9.23	0.293	10.07	0.511	10.90	0.753	11.73	1.531	12.57	4.347
9.27	0.301	10.10	0.520	10.93	0.769	11.77	1.599	12.60	3.998

Printed values > 1% of Opeak. rtfh-point print interval = 1

Hydrograph Discharge Table, cont'd

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
12.63	3.724	13.83	1.174	15.03	0.696	16.23	0.512	17.43	0.420
12.67	3.473	13.87	1.148	15.07	0.687	16.27	0.509	17.47	0.418
12.70	3.243	13.90	1.122	15.10	0.679	16.30	0.506	17.50	0.415
12.73	3.093	13.93	1.099	15.13	0.671	16.33	0.503	17.53	0.413
12.77	2.951	13.97	1.076	15.17	0.663	16.37	0.501	17.57	0.411
12.80	2.817	14.00	1.055	15.20	0.655	16.40	0.498	17.60	0.409
12.83	2.691	14.03	1.035	15.23	0.647	16.43	0.495	17.63	0.406
12.87	2.625	14.07	1.016	15.27	0.640	16.47	0.492	17.67	0.404
12.90	2.570	14.10	0.998	15.30	0.633	16.50	0.489	17.70	0.402
12.93	2.515	14.13	0.980	15.33	0.627	16.53	0.487	17.73	0.399
12.97	2.461	14.17	0.964	15.37	0.620	16.57	0.484	17.77	0.397
13.00	2.405	14.20	0.948	15.40	0.614	16.60	0.482	17.80	0.395
13.03	2.333	14.23	0.935	15.43	0.608	16.63	0.479	17.83	0.392
13.07	2.263	14.27	0.922	15.47	0.603	16.67	0.476	17.87	0.390
13.10	2.195	14.30	0.910	15.50	0.598	16.70	0.474	17.90	0.388
13.13	2.130	14.33	0.898	15.53	0.592	16.73	0.471	17.93	0.385
13.17	2.066	14.37	0.887	15.57	0.587	16.77	0.469	17.97	0.383
13.20	2.005	14.40	0.876	15.60	0.583	16.80	0.466	18.00	0.381
13.23	1.945	14.43	0.865	15.63	0.578	16.83	0.464	18.03	0.378
13.27	1.888	14.47	0.854	15.67	0.573	16.87	0.461	18.07	0.376
13.30	1.833	14.50	0.844	15.70	0.569	16.90	0.459	18.10	0.374
13.33	1.780	14.53	0.833	15.73	0.565	16.93	0.456	18.13	0.372
13.37	1.729	14.57	0.823	15.77	0.561	16.97	0.454	18.17	0.370
13.40	1.680	14.60	0.813	15.80	0.557	17.00	0.451	18.20	0.368
13.43	1.630	14.63	0.803	15.83	0.553	17.03	0.449	18.23	0.367
13.47	1.583	14.67	0.794	15.87	0.549	17.07	0.446	18.27	0.365
13.50	1.537	14.70	0.784	15.90	0.545	17.10	0.444	18.30	0.364
13.53	1.493	14.73	0.775	15.93	0.541	17.13	0.442	18.33	0.362
13.57	1.450	14.77	0.766	15.97	0.538	17.17	0.439	18.37	0.360
13.60	1.409	14.80	0.757	16.00	0.535	17.20	0.437	18.40	0.359
13.63	1.370	14.83	0.748	16.03	0.531	17.23	0.434	18.43	0.358
13.67	1.331	14.87	0.739	16.07	0.528	17.27	0.432	18.47	0.356
13.70	1.295	14.90	0.730	16.10	0.525	17.30	0.430	18.50	0.355
13.73	1.263	14.93	0.721	16.13	0.521	17.33	0.427	18.53	0.353
13.77	1.232	14.97	0.713	16.17	0.518	17.37	0.425	18.57	0.352
13.80	1.202	15.00	0.704	16.20	0.515	17.40	0.422	18.60	0.351

Printed values > 1% of Opeak. rtfh-point print interval = 1

**STORMWATER BASIN AREA INVESTIGATION REPORT
PREPARED BY DYNAMIC EARTH, DATED JANUARY 14,
2022**

STORMWATER BASIN AREA INVESTIGATION REPORT

PROPOSED SITE IMPROVEMENTS

**769 Northfield Avenue
Block 166.15, Lot 9
Township of West Orange, Essex County, New Jersey**

Prepared for:

**ALTERA 769, LLC c/o
ALTERA DEVELOPMENT
5910 N. Central Expressway, Suite 1360
Dallas, Texas 75206**

Prepared by:



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**Peter H. Howell, P.E.
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**Project #2530-99-006E
January 14, 2021**

STORMWATER BASIN AREA INVESTIGATION REPORT

Proposed Site Improvements

769 Northfield Avenue

Block 166.15, Lot 9

Township of West Orange, Essex County, New Jersey

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Test Location Plan

Records of Subsurface Exploration

Laboratory Test Results

Field Infiltration Testing

USDA NRCS Custom Soil Resources Report for Morris County, New Jersey

1.0 LOCATION AND DESCRIPTION

Dynamic Earth, LLC (Dynamic Earth) has completed an exploration and evaluation for the proposed stormwater management facilities located 769 Northfield Avenue in the Township of West Orange, Essex County, New Jersey. The site is further identified as Block 166.15, Lot 9. The site of the proposed construction is shown on the attached *Test Location Plan* within the appendix of this report.

At the time of Dynamic Earth's field investigation, the subject site was developed with an existing three-story office building (occupying a footprint area of approximately 23,391 square feet) with associated pavements, utilities, and landscaped areas. The proposed improvements for the site are anticipated to occur in two phases. The Phase-I improvements consist of upgrading the building façade including the addition of a canopy at the buildings rear (north) entrance, reconfiguration of the existing parking area to provide a drop off lane, and ADA improvements which result in the expansion of parking area in the rear of the site. The Phase-II improvements consist of the further expansion of the rear parking area to provide additional spaces. Additional improvements include construction of utilities, retaining walls and stormwater management facilities within the northwestern portion of the site. The proposed site improvement details were provided on an August 6, 2021 Grading Plan prepared by Dynamic Engineering Consultants, PC (Dynamic).

Dynamic Earth previously completed a preliminary subsurface investigation for the proposed site improvements and the results were provided in a September 23, 2021 *Report of Geotechnical Investigation*. An initial site visit was also performed to review the existing retaining walls on the site and the results were issued in a September 23, 2021 *Existing Retaining Wall Review* letter. The results of the previous investigation are included herein as applicable.

Topographic information was provided on a June 25, 2020 *Boundary Location & Topographic Survey* prepared by Dynamic Survey, LLC. Existing site grades generally slope downward from north to south and range between approximately 510.0 feet within the northern portion of the site and 427.0 feet within the southern portion of the site. The elevations included herein reference the North American Vertical Datum of 1988 (NAVD 1988), unless otherwise noted.

The subject site is bound to the north by a wooded area and a residential neighborhood beyond; to the east by an existing property (The Life Christian Church); to the south by Northfield Avenue; and to the west by an existing commercial property (Stratford Manor Rehabilitation & Care Center).

2.0 SCOPE OF SERVICES

Dynamic Earth's scope of services pertaining to this report included evaluating the subsurface conditions at soil profile pit locations to estimate the apparent seasonal high groundwater level, collecting samples for laboratory permeability testing and performing in-situ basin flood testing.

Four soil profile pits (identified as SPP-1 through SPP-4) were excavated at the site using a track-mounted excavator. Based on results of the initial subsurface investigation, relatively shallow weathered rock and machine refusal on apparent rock was encountered. As such, additional authorized scope of services included in-situ infiltration testing which included basin flood testing. Basin flood testing was performed within locations SPP-1 through SPP-3. Test locations were located within the area of potential stormwater management facilities and were backfilled to the surface with excavated soils at completion. Test locations located within existing pavement areas were backfilled to the surface with excavated soils and restored with asphalt at completion. The test locations are shown on the *Test Location Plan* included within the Appendix of this report. Environmental conditions were not evaluated by Dynamic Earth.

The soils encountered were classified in general conformance with the U.S. Department of Agriculture (USDA) soil classification system. Observations were made for groundwater and/or redoximorphic features indicative of zones of saturation or seasonal high groundwater as indicated in the New Jersey Department of Environmental Protection (N.J.D.E.P) stormwater best management practices (BMP). Soil logs are included in the Appendix of this report.

Undisturbed tube permeameter tests were collected in general accordance with New Jersey Department of Environmental Protection (NJDEP) *Stormwater Best Practices Manual – Chapter 12: Soil Testing Criteria* test methods on representative samples obtained from anticipated stormwater management facility infiltration depths. The results of the permeability testing are included in the Appendix of this report.

Infiltration testing was performed at select soil profile pit locations in general accordance with New Jersey *Stormwater Best Management Practices Manual- Chapter 12* using basin flooding test methods. Detailed results of the in-situ infiltration testing are included in the Appendix of this report.

3.0 UNITES STATES DEPARTMENT FO AGRICULTURE (USDA) SOIL SURVEY

Based on a review of the United States Department of Agriculture – Natural Resources Conservation Services (USDA-NRCS) soil survey the following soil resources are mapped underlying the site within the area of the proposed site improvements and are described below:

Boonton loam, three to eight percent slopes, stony (BogB): This soil series is generally mapped within the northern portion of the site. The parent material is described as coarse-loamy basal till

derived from the underlying basalt. The typical soil profile (as detailed in the survey) consists of slightly decomposed plant material to a depth of three inches; loam to a depth of five inches; silt loam to a depth of 30 inches; sandy loam to a depth of 47 inches; underlain by loamy sand to a depth of 72 inches below the natural ground surface (limit of the report). The depth to the groundwater table is reported to be greater than 72 inches below the natural ground surface (limit of the report).

Boonton-Urban land, Boonton substratum complex, zero to eight percent slopes (BouB):

Boonton-Urban land, Boonton substratum complex, zero to eight percent slopes is mapped within the southern portion of the site (within the area of the proposed stormwater management facilities) and is reported to have a similar soil profile to BogB, as detailed above.

Boonton loam, zero to eight percent slopes, extremely stony (BogBc): Boonton loam with zero to eight percent slopes is mapped within a relatively small area within the western and northeastern portions of the site (within the area of the proposed stormwater management facilities) and is reported to have a similar soil profile to BogB, as detailed above.

Urban land-Boonton substratum, zero to eight percent slopes (URBONB): This soil series is generally mapped within the southern and central portions of the site. The parent material is detailed as surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. The typical soil profile (as detailed in the survey) consists of surficial material to a depth of 12 inches; silt loam to a depth of 47 inches; underlain by loamy sand to a depth of 72 inches below the natural ground surface (limit of the report). The depth to the groundwater table is not reported within the report.

4.0 RESULTS

Detailed descriptions of the subsurface conditions encountered at each location are provided on the *Records of Subsurface Exploration* included herein. A summary of the subsurface conditions encountered within the soil profile pits is included below.

4.1 Subsurface Soil Profile

The soil profile pits were performed within existing undeveloped areas and pavement areas. Test locations performed within existing undeveloped areas encountered approximately 12 inches of topsoil at the surface. Test locations performed within existing asphalt areas encountered approximately six inches of asphalt at the surface. Beneath the surface cover, existing fill material was encountered generally consisting of sandy clay loam, silty clay loam, and sandy loam with various amounts of gravel. The existing fill material was encountered to depths ranging between approximately 2.8 feet and five feet below the ground surface; corresponding to elevations ranging between 476.0 feet and 463.2 feet. Beneath the existing fill material, natural residual soils were

encountered that generally consisted of sandy loam and loamy sand with various amount of gravel. The natural residual soils were encountered to depths ranging between approximately five feet and ten feet below the ground surface; corresponding to elevations ranging between 487.0 feet and 463.2 feet.

The top of weathered rock (basalt) was encountered beneath the residual soils at depths ranging between approximately five feet and ten feet below existing site grades; corresponding to elevations ranging between approximately 487.0 feet and 463.2 feet above the referenced elevation. Each soil profile pit was terminated due to machine refusal on apparent bedrock.

4.2 Seasonal High Groundwater and Permeability

Indicators of seasonal high groundwater (i.e. soil mottling) and groundwater was not encountered within the soil profile pit explorations. Groundwater was not encountered at previous soil boring locations. Groundwater levels are expected to fluctuate seasonally and following significant periods of precipitation.

A summary of the seasonal high groundwater levels and permeability test results is presented in the table below:

SUBSURFACE AND PERMEABILITY SUMMARY							
Location	Surface Elevation (ft)	Estimated Seasonal High Groundwater		Sample Depth (Inches)	Permeability (Inches/Hour)		Comments
		Depth (ft)	Elevation (ft)		Replicate A	Replicate B	
SPP-1	466.0	Not Encountered ¹		26	<0.06	<0.06	Refusal at ± 8.0 ft. (±el. 458.0 ft.)
SPP-2	475.0			30	<0.06	<0.06	Refusal at ± 10.0 ft. (±el. 465.0 ft.)
SPP-3	481.0			40	<0.06	<0.06	Refusal at ± 10.0 ft. (±el. 471.0 ft.)
SPP-4	487.0			36	<0.06	<0.06	Refusal at ± 5.0 ft. (±el. 482.0 ft.)

¹Since indicators of seasonal high groundwater and groundwater were not encountered, the depth to seasonal high groundwater can be estimated to be below the termination/refusal depth of the soil profile pits

Based on the laboratory testing, permeability rates tested at depths 40 inches or less were less than 0.06 inch/hour which is generally consistent with a hydrologic soil group (HSG) D.

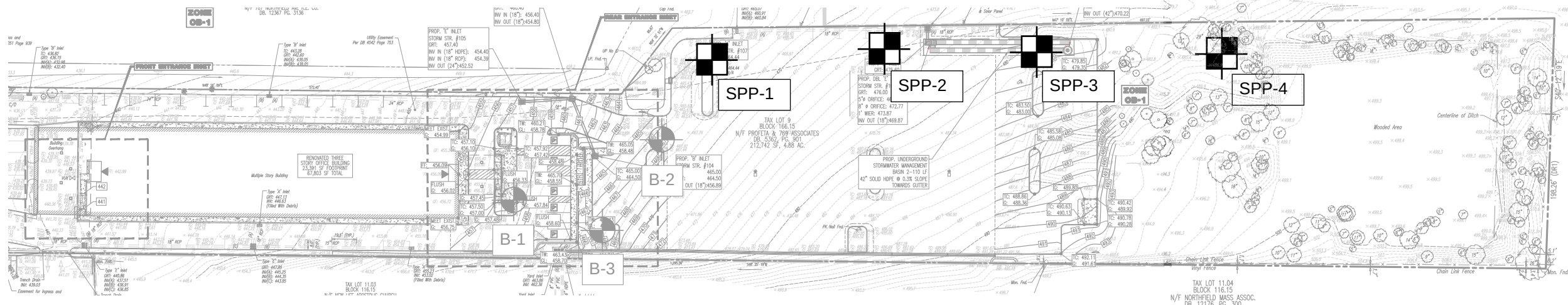
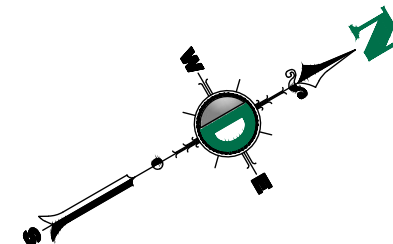
4.3 In-Situ Permeability Testing

A summary of the in-situ permeability test results is presented in the following table:

SUMMARY OF SUPPLEMENTAL PERMEABILITY TESTING						
Location	Approx. Surface Elevation	Groundwater		Test Depth (feet)	In-situ Test Method	Permeability (Inches/hour)
		Depth	Elevation			
SPP-1	± 466.0	Not Encountered		± 8.0	Basin Flood	See below
SPP-2	± 475.0	Not Encountered		± 10.0	Basin Flood	See below
SPP-3	± 481.0	Not Encountered		± 10.0	Basin Flood	See below

The basin flood tests conducted at soil profile pit SPP-2 and SPP-3 did not drain within 24 hours of the initial filling. The basin flood tests conducted at soil profile pit SPP-1 did not drain within 48 hours of the initial filling. Therefore, per the NJ BMP manual, the limiting zone beneath these locations may be considered a massive rock substratum.

Test Pit Location Plan



SCALE: N.T.S.

JOB No:
2530-99-006E

SHEET No:
1
OF 1

DRAWN BY:
JSS
DESIGNED BY:
XX
CHECKED BY:
PG
DATE:
12/27/2021

TITLE:
TEST LOCATION PLAN

PROJECT: **ALTERA 769, LLC c/o
ALTERA DEVELOPMENT
PROPOSED SITE IMPROVEMENTS**
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE, TOWNSHIP OF WEST ORANGE,
ESSEX COUNTY, NEW JERSEY
Rev. # 0 DEC Client Code: 2530

LEGEND:

**SPP-X**
APPROXIMATE
LOCATION OF
SOIL PROFILE PIT

**B-X**
APPROXIMATE
LOCATION OF
PREVIOUS SOIL
BORING

NOTES:

- THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE TEST LOCATIONS ONLY AND MAY NOT REFLECT THE MOST CURRENT REVISION OF THE BASE PLAN.
- BASE PLAN OBTAINED FROM AN AUGUST 6, 2021 GRADING PLAN PREPARED BY DYNAMIC ENGINEERING CONSULTANTS, P.C. AND A JUNE 25, 2020 BOUNDARY LOCATION & TOPOGRAPHIC SURVEY PREPARED BY DYNAMIC SURVEY, LLC.



**DYNAMIC
EARTH, LLC**

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Records of Subsurface Exploration



SOIL PROFILE PIT LOG

Soil Profile Pit: **SPP-1**

Page **1** of **1**

Project: Proposed Site Improvements										Project No.: 2530-99-005E														
Location: 790 Northfield Avenue, West Orange, New Jersey										Client: Alterra Development Company														
Surface Elevation (ft): 466.0		Date Started: 12/14/21		Groundwater Data				Depth (ft):		El. (ft):		Groundwater Comments												
Termination Depth (ft): 8.0		Date Completed: 12/14/21		Soil Type: SWM				Soil Type: NE		El. (ft): -														
Proposed Location: SWM		Logged by: J. Scardigno		Contractor: Neighbors Contracting				Groundwater: NE		El. (ft): -														
Excavation / Test Method: Visual Observation		Rig Type: Bobcat E60		Seasonal High Groundwater:				NE		El. (ft): -														
DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS	MOTTLING			SAMPLING			LAB RESULTS	
			GRAVEL	COBBLES	STONES	BOULDERS	Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography		Quantity	Size	Contrast	Type	Depth (in)	No.		
0-6	ASPHALT		0	0	0	0																		
6-34	Dark Grayish Brown (10YR 4/2)	SANDY CLAY LOAM	0	0	0	0	SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG TUBE	26	S-1 T-1	A < 0.06 iph B < 0.06 iph
34-96	Dark Brown (7.5YR 3/4)	GRAVELLY LOAMY SAND	15	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC			NONE		NONE			BAG TUBE	34 40	S-2 T-2	

Additional Remarks: Asphalt encountered between zero and six inches. Fill encountered between six inches and 34 inches. Soil Profile Pit SPP-1 encountered refusal on apparent weathered rock at approximately eight feet below the ground surface.





SOIL PROFILE PIT LOG

Soil Profile Pit: **SPP-3**

Page 1 of 1

Project: Proposed Site Improvements										Project No.: 2530-99-005E															
Location: 790 Northfield Avenue, West Orange, New Jersey										Client: Alterra Development Company															
Surface Elevation (ft):		481.0		Date Started:		12/14/21		Groundwater Data		Depth (ft)		EL (ft)		Groundwater Comments											
Termination Depth (ft):		10.0		Date Completed:		12/14/21		Sewage		NE		-													
Proposed Location:		SWM		Logged by:		J. Scardigno		Groundwater		NE		-													
Excavation / Test Method:		Visual Observation		Contractor:		Neighbors Contracting		Seasonal High Groundwater		NE		-													
				Rig Type:		Bobcat E60																			
DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS	
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (ft)	No.		
0-12	Dark Yellowish Brown (10YR 3/6)	LOAM	GRAVEL	COBBLES	STONES	BOULDERS	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE							
			0	0	0	0																			
12-60	Dark Grayish Brown (10YR 4/2)	SILTY CLAY LOAM	GRAVEL	COBBLES	STONES	BOULDERS	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG TUBE	50	40	S-1 T-1	A < 0.06 iph B <0.06 iph
			0	0	0	0																			
60-120	Dark Brown (7.5YR 3/4)	GRAVELLY LOAMY SAND	GRAVEL	COBBLES	STONES	BOULDERS	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC			NONE		NONE			BAG TUBE	70		S-2 T-2	
			15	0	0	0																			

Additional Remarks: Topsoil encountered between zero and 12 inches. Fill encountered between 12 and 60 inches. Soil Profile Pit SPP-3 encountered refusal on apparent weathered rock at approximately ten feet below the ground surface.



SOIL PROFILE PIT LOG

Soil Profile Pit: **SPP-4**

Page 1 of 1

Project: Proposed Site Improvements										Project No.: 2530-99-005E														
Location: 790 Northfield Avenue, West Orange, New Jersey										Client: Alterra Development Company														
Surface Elevation (ft): 487.0		Date Started: 12/14/21		Groundwater Data				Depth (ft)		EL (ft)		Groundwater Comments												
Termination Depth (ft): 5.0		Date Completed:		Logged by: J. Scardigno				NE		-														
Proposed Location: SWM				Contractor: Neighbors Contracting				NE		-														
Excavation / Test Method: Visual Observation		Rig Type:		Bobcat E60				NE		-														
DEPTH (ft)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS	MOTTLING			SAMPLING			LAB RESULTS	
			GRAVEL	COBBLES	STONES	BOULDERS	Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography		Quantity	Size	Contrast	Type	Depth (ft)	No.		
0-12	Dark Yellowish Brown (10YR 3/6)	LOAM	0	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	MEDIUM	NONE			BAG	6	S-1	
12-60	Brown (7.5YR 4/3)	GRAVELLY SANDY LOAM	15	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC			NONE		NONE			BAG TUBE	38	S-2 T-1	A < 0.06 iph B < 0.06 iph

Additional Remarks: Soil Profile Pit SPP-4 encountered refusal on apparent weathered rock at approximately five feet below the ground surface.

Laboratory Test Results

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-1 Sample No.: T-1 Depth: 26"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: x Fill Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-1 Sample No.: T-1 Depth: 26"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) B Date Collected 12/14/2021

2. Material Tested: x Fill Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-2 Sample No.: T-1 Depth: 30"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: x Fill Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Job Number: 2530-99-006E

Client: Altera Development

_____ x _____ NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-3 Sample No.: T-1 Depth: 40"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: x Fill Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-3 Sample No.: T-1 Depth: 40"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) B Date Collected 12/14/2021

2. Material Tested: x Fill Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-4 Sample No.: T-1 Depth: 36"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-4 Sample No.: T-1 Depth: 36"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) B Date Collected 12/14/2021

2. Material Tested: Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Tube Permeameter Test Data

Job Number: 2530-99-006E

Project: Proposed Site Redevelopment

Client: Altera Development

Lab Tech: M. Mickley

Sample ID: Boring/Test Pit No.: SPP-4 Sample No.: T-1 Depth: 36"
MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) C Date Collected 12/14/2021

2. Material Tested: Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --

Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R²), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE
Soil/Tube Contact Large Gravel Large Roots
Dry Soil Smearing Compaction
Other - Specify

Field Infiltration Testing



Basin Flood Testing

(Stormwater Basin Area Investigation)

Soil Profile Pit #: **SPP-1**
Date **12/14/2021 - 12/16/2021**

Project	Proposed Site Improvements	Project Number:	2530-99-006E
Location	790 Northfield Avenue, West Orange, New Jersey	Client:	Altera Development Company
Surface Elevation (ft):	466	Weather:	Clear, 55°F
Proposed Location:	SWM	Logged By:	J. Scardigno

MUNICIPALITY : **West Orange** BLOCK: **166.15** LOT(s): **9**

Depth of Test Pit: **8.0** Feet Area of Test Pit: **50.0** Square Feet
Note: 50 square feet minimum

Description of Rock Stratum:

Type of Rock/Fractured Rock: **Basalt**
Name of Formation: **Rahway Till**
Average Fracture Spacing: **0** inches

Type of Fractures:

☐ Open (wide), Clean, Width of Openings, (____ mm)
☐ Open (wide), Infilled with Fines, Width of Openings, (approx. 5 mm)
☒ Tight (Closed)

Orientation of Fractures:

☒ Horizontal (Parallel to Pit Bottom) or Nearly So
☐ Inclined
☐ Vertical (Parallel to Sides of Pit) or Nearly So

Hardness of Rock:

☐ Rippable by Hand Tools
☒ Not Rippable by Hand Tools, Rippable by Machine
☐ Not Rippable by Machine, Explosives Used

Date of First Basin Flooding: **12/14/2021** Time of First Basin Flooding: **4:00 PM**

Result of First Basin Flooding:

☒ Basin Drained within 24 hours by **3:50 PM** on **####**
☐ Basin Did Not Drain within 24 hours (Time) (Date)

Date of Second Flooding: **12/15/2021** 7a. Time of Second Flooding: **4:00 PM**

Result of Second Basin Flooding:

☐ Basin Drained within 24 hours by **_____** on **_____**
☐ (Drained within 12 hrs?) (Time) (Date)
☒ Basin Did Not Drain within 24 hours

Permeability Rate: **0**

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Basin Flood Testing

(Stormwater Basin Area Investigation)

Soil Profile Pit #: **SPP-2**
Date **12/14/2021 - 12/16/2021**

Project	Proposed Site Improvements	Project Number:	2530-99-006E
Location	790 Northfield Avenue, West Orange, New Jersey	Client:	Altera Development Company
Surface Elevation (ft):	475	Weather:	Clear, 55°F
Proposed Location:	SWM	Logged By:	J. Scardigno

MUNICIPALITY : **West Orange** BLOCK: **166.15** LOT(s): **9**

Depth of Test Pit: **10.0** Feet Area of Test Pit: **50.0** Square Feet
Note: 50 square feet minimum

Description of Rock Stratum:

Type of Rock/Fractured Rock: **Basalt**
Name of Formation: **Rahway Till**
Average Fracture Spacing: **0** inches

Type of Fractures:

☐ Open (wide), Clean, Width of Openings, (____ mm)
☐ Open (wide), Infilled with Fines, Width of Openings, (approx. 5 mm)
☒ Tight (Closed)

Orientation of Fractures:

☒ Horizontal (Parallel to Pit Bottom) or Nearly So
☐ Inclined
☐ Vertical (Parallel to Sides of Pit) or Nearly So

Hardness of Rock:

☐ Rippable by Hand Tools
☒ Not Rippable by Hand Tools, Rippable by Machine
☐ Not Rippable by Machine, Explosives Used

Date of First Basin Flooding: **12/14/2021** Time of First Basin Flooding: **4:10 PM**

Result of First Basin Flooding:

☐ Basin Drained within 24 hours by on
☒ Basin Did Not Drain within 24 hours (Time) (Date)

Date of Second Flooding: 7a. Time of Second Flooding:

Result of Second Basin Flooding:

Basin Drained within 24 hours by on
 (Drained within 12 hrs?) (Time) (Date)
 Basin Did Not Drain within 24 hours

Permeability Rate: **0**

New Jersey Stormwater Best Management Practices Manual- Appendix E (2020)



Basin Flood Testing
(Stormwater Basin Area Investigation)

Soil Profile Pit #: **SPP-3**
Date 12/14/2021 - 12/16/2021

Project	Proposed Site Improvements	Project Number:	2530-99-006E
Location	790 Northfield Avenue, West Orange, New Jersey	Client:	Altera Development Company
Surface Elevation (ft):	481	Weather:	Clear, 55°F
Proposed Location:	SWM	Logged By:	J. Scardigno

MUNICIPALITY : West Orange BLOCK: 166.15 LOT(s): 9

Depth of Test Pit: 10.0 Feet Area of Test Pit: 50.0 Square Feet
Note: 50 square feet minimum

Description of Rock Stratum:

Type of Rock/Fractured Rock: Basalt
Name of Formation: Rahway Till
Average Fracture Spacing: 0 inches

Type of Fractures:

☐ Open (wide), Clean, Width of Openings, (____ mm)
☐ Open (wide), Infilled with Fines, Width of Openings, (approx. 5 mm)
☒ Tight (Closed)

Orientation of Fractures:

☒ Horizontal (Parallel to Pit Bottom) or Nearly So
☐ Inclined
☐ Vertical (Parallel to Sides of Pit) or Nearly So

Hardness of Rock:

☐ Rippable by Hand Tools
☒ Not Rippable by Hand Tools, Rippable by Machine
☐ Not Rippable by Machine, Explosives Used

Date of First Basin Flooding: 12/14/2021 Time of First Basin Flooding: 4:30 PM

Result of First Basin Flooding:

☐ Basin Drained within 24 hours by on
☒ Basin Did Not Drain within 24 hours (Time) (Date)

Date of Second Flooding: 12/15/2021 7a. Time of Second Flooding:

Result of Second Basin Flooding:

 Basin Drained within 24 hours by on
 (Drained within 12 hrs?) (Time) (Date)
 Basin Did Not Drain within 24 hours

Permeability Rate: 0

New Jersey Stormwater Best Management Practices Manual- Appendix E (2020)

**USDA-NRCS Custom Soil Resource
Report for Essex County, New Jersey**



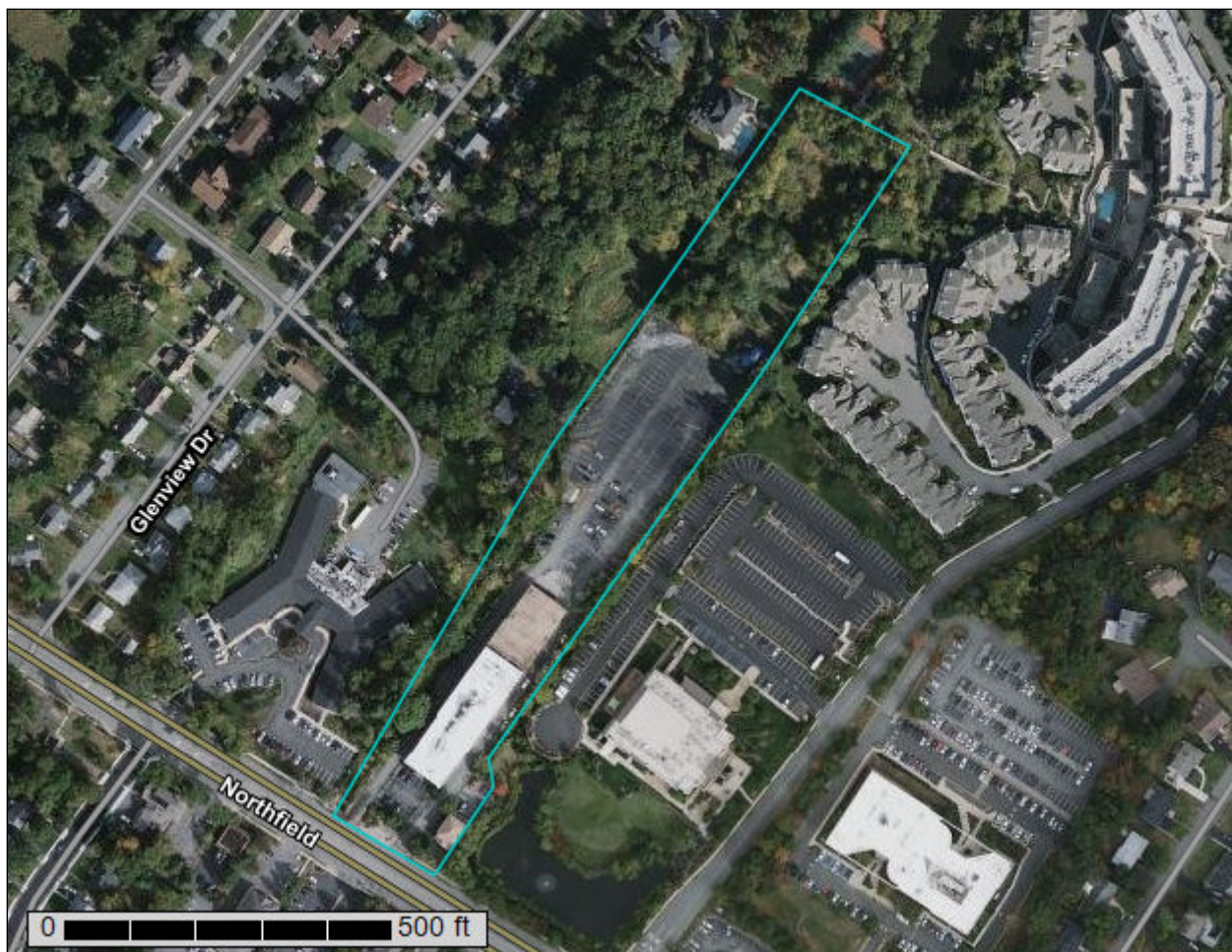
United States
Department of
Agriculture

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 **Essex County, New Jersey**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

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

Custom Soil Resource Report

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



Custom Soil Resource Report

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 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 17, Aug 30, 2021

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

Date(s) aerial images were photographed: May 9, 2020—Oct 15, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BogB	Boonton loam, 3 to 8 percent slopes	1.6	27.8%
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	0.5	8.0%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	0.4	7.1%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	3.3	57.0%
Totals for Area of Interest		5.7	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.

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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.

Essex County, New Jersey

BogB—Boonton loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: b066

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Boonton and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Oa - 1 to 3 inches: highly decomposed plant material

A - 3 to 5 inches: loam

BA - 5 to 8 inches: silt loam

BE - 8 to 17 inches: silt loam

Bt - 17 to 30 inches: silt loam

Btx1 - 30 to 40 inches: gravelly fine sandy loam

Btx2 - 40 to 47 inches: fine sandy loam

CBt1 - 47 to 58 inches: loamy sand

CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 20 to 36 inches to fragipan

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Haledon

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Boonton, moderately well drained

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: b128

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Boonton, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton, Extremely Stony

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Oa - 1 to 3 inches: highly decomposed plant material

A - 3 to 5 inches: loam

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BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Boonton, moderately well drained, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Haledon, extremely stony

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: b12f
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Boonton and similar soils: 50 percent
Urban land, boonton substratum: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy basal till derived from basalt

Typical profile

A - 0 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 47 inches: silt loam
2CBt1 - 47 to 58 inches: loamy sand
2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, boonton substratum

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w9cn
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton substratum: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material

H2 - 12 to 47 inches: silt loam

2CBt1 - 47 to 58 inches: loamy sand

2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Boonton

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Udorthents, boonton substratum

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

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United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

DRAINAGE AREA MAPS

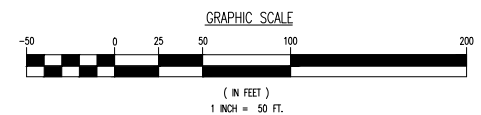
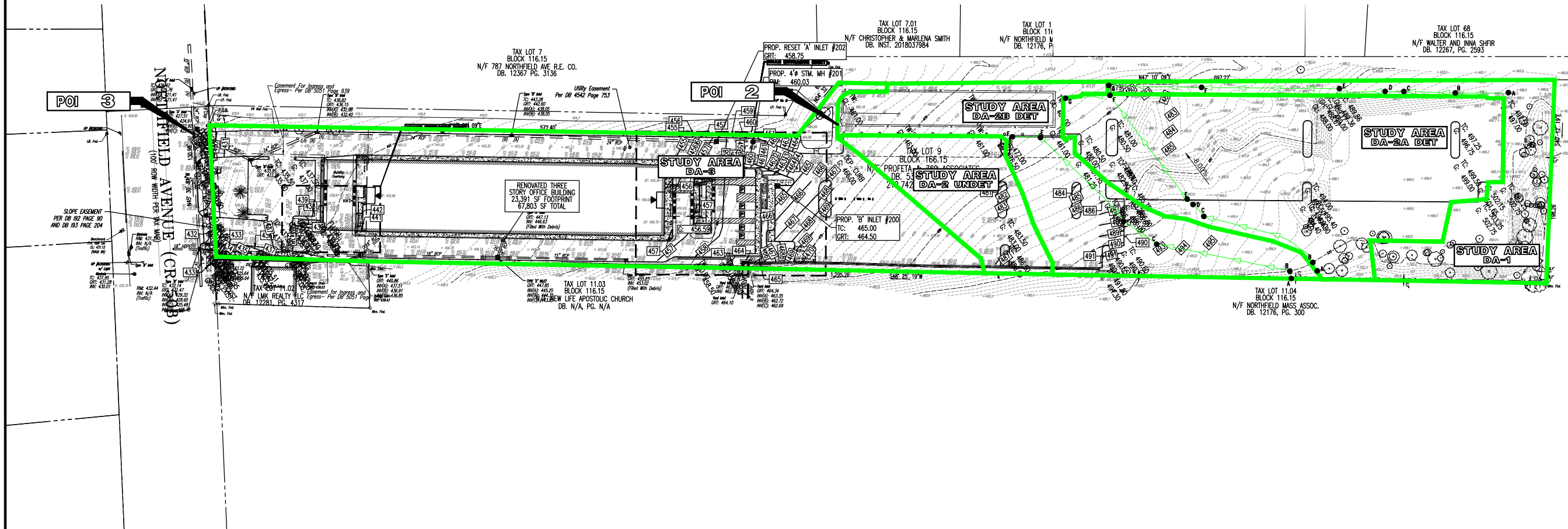
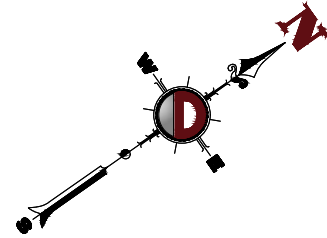
PROJECT: ALTRA 769, LLC ALTRA SITE IMPROVEMENTS BLOCK 166, LOT 9 769 NORTHFIELD AVENUE (CR 508) TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ	
OWNER: SDP	DESIGNER: RJC
DATED: 06/01/17	DATED: 06/01/17
DRAWN BY: JGU	CHECKED BY: JGU

ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

TITLE:
EXISTING CONDITIONS
DRAINAGE AREA MAP



[illegible]

**THIS PLAN SET IS FOR PERMITTING PURPOSES
ONLY AND MAY NOT BE USED FOR CONSTRUCTION**

FORMER: _____	EXCISED R: _____	DELETED R: _____	DELETED R: _____
SDP _____	R/C _____	JCS _____	JGU _____

[illegible]

ROBERT J. COLUCCO III

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE: PROPOSED
CONDITIONS DRAINAGE
AREA MAP

SCALE: (H) 1"=50' (V).	DATE: 08/17/2022
PROJECT No: 2530-99-006	

SHEET No:	2	Rev. #:	0
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STORMWATER MANAGEMENT FACILITIES OPERATION AND MAINTENANCE MANUAL

for

Altera 769, LLC
Proposed Site Improvements

Block 166.15, Lot 9
769 Northfield Avenue (CR 508)
Township of West Orange
Essex County, NJ

Prepared by:



245 Main Street, Suite 110
Chester, NJ 07930

A handwritten signature in dark ink, appearing to read 'RJC', is positioned above a horizontal line.

Robert J. Colucco, PE
NJ Professional Engineer License #55851

January 2022
Revised August 2022
DEC#2530-99-006

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PART I: PROJECT DETAILS

A. Introduction and Description of Facilities:

The project site is comprised of Block 166.15, Lot 9 in the Township of West Orange, Essex County, New Jersey and is located at 769 Northfield Avenue (CR 508). The subject site consists of 4.88 acres and is presently partially developed with a multi-story building and associated parking areas. The proposed improvements consist of the renovation of the existing office building, modifications to the existing parking lot to satisfy current ADA regulations, the expansion of the rear parking area, and other associated site improvements. Proposed stormwater management improvements include a Small-Scale Bioretention Basin and associated stormwater conveyance network.

This manual consists of three parts: Part I includes the introduction, project description and a list of project contacts; Part II provides the operation and maintenance instructions for the facility and equipment. Part III provides information regarding the inspection and maintenance activities. This manual shall run with the property and be recorded as part of the deed.

B. Project Contacts:

The owner is responsible to maintain a detailed log of all preventative and corrective maintenance for the structural stormwater measures incorporated into the design, including record of all inspections and copies of all maintenance-related work orders. The owner is also responsible to evaluate the effectiveness of the maintenance plan at least once per year, and adjust the plan and deed as needed. The owner shall be responsible for the maintenance plan, and shall retain a copy of this report should a public entity request this report or documentation of said maintenance in the future.

Applicant
Altera 769, LLC 5910 N. Central Expressway, Suite 1360 Dallas, TX 75206
Municipal Engineer
CME Associates 849 W. Bay Avenue, Suite 7 Barnegat, NJ 08005 Attn: John J. Hess (732) 410-2650
Property Owners
Block 166.15, Lot 6 Altera 769, LLC 5910 N. Central Expressway, Suite 1360 Dallas, Texas 75206
Design Engineer
Dynamic Engineering Consultants, P.C. 245 Main Street, Suite 110 Chester, NJ 07930 Attn: Robert J. Colucco, PE (908) 879-9229
Party Responsible for Maintaining Stormwater Management Facility
Altera 769, LLC 5910 N. Central Expressway, Suite 1360 Dallas, Texas 75206 Attn: Eddie Tillman (972) 897-4961

C. Proposed Best Management Practices:

Bioretention Basin

Stormwater runoff generated from the proposed parking area, which includes one (1) Small-Scale Biorientation Basin, is located on the north west side of the site. The proposed bioretention basin has been designed to address the applicable aspects of NJAC 7:8. The stormwater runoff generated by the subject site will be directed to the basin through storm water management practices. Smaller runoff events will be infiltrated and collected via under drains and larger runoff events will be discharged at a controlled rate via proposed outlet control structures. Stormwater runoff that is detained below the lowest outlet is infiltrated and shall drain from the basin in under 72 hours via the proposed underdrains. If significant increases or decreases in this drain time are observed, a qualified licensed Professional Engineer shall be contacted to evaluate possible corrective measures that may be required.

PART II: INSPECTION AND MAINTENANCE

A. Routine Inspection and Maintenance of the Stormwater Management Facilities:

The stormwater management basin has been designed to control stormwater and reduce downstream impact. Without proper routine inspection and maintenance, the basin may lose some or all of its capability to function to its full capacity. Lack of adequate maintenance at this facility could lead to system failures.

A consulting Professional Engineer should perform regularly scheduled maintenance inspections of the stormwater facilities at least (4) times each year. The primary purpose of these inspections is to ascertain the operational condition and safety of the facilities, particularly the condition of outlet structures and other safety-related aspects. Inspections will also provide information on the effectiveness of regularly scheduled Preventative Maintenance Procedures, and will help to identify where changes in the extent and scheduling of the procedures are warranted. Finally, the facility inspections should also be used to determine the need for and timing of Corrective Maintenance procedures.

Routine Functional Maintenance is required to insure the safe and effective operation of the storm water management facility and is further broken down into two (2) categories: Preventative and Corrective. It is important to note that a successful Functional Maintenance program will emphasize regularly scheduled Preventative Maintenance over emergency-based Corrective Maintenance. Listed below are the Preventative and Corrective Maintenance Procedures to be performed on a routine basis:

1. Preventative Maintenance Procedures

The purpose of Preventative Maintenance is to assure that the basin remains operational and safe at all times, while minimizing the need for emergency or corrective maintenance. These procedures are as follows:

Bioretention:

a) Grass Cutting

A regularly scheduled program of mowing and trimming of grass at and surrounding the basin during the growing season will help to maintain a tightly knit turf, and will also help to prevent diseases, pests and the intrusion of weeds. The actual mowing requirements of an area should be tailored to the specific site conditions, grass type, and seasonal variations in the climate. In general, lawn areas should be mowed at

least once a month during the growing season and grass should not be allowed to grow more than 1 to 2 inches between cuttings. Allowing the grass to grow more than this amount prior to cutting it may result in damage to the grass' growing points and limit its continued healthy growth.

b) Grass Maintenance

Grassed areas require periodic fertilizing, de-thatching and soil conditioning in order to maintain healthy growth and to provide bank stabilization. Additionally, provisions should be made to re-seed and re-establish grass cover in areas damaged by sediment accumulation, stormwater flow, or other causes. These tasks should be performed, or at least evaluated, on a quarterly basis.

c) Vegetative Cover

Trees, shrubs, and ground cover require periodic maintenance, including fertilizing, pruning, and pest control in order to maintain healthy growth. Vegetated areas must be inspected at least annually for erosion and scour as well as unwanted growth, which should be removed with minimum disruption to the remaining vegetation. The basin should be evaluated regularly to determine whether excessive plant growth is evident. A correction in the application of fertilizers can often solve these problems. Weeds, which have become a problem, can be cleared through harvesting by professional maintenance technicians.

Note: All use of fertilizers, mechanical treatments, pesticides and other means to ensure optimum vegetation health must not compromise the intended purpose of the storm water management facility. All vegetation deficiencies should be addressed without the use of fertilizers and pesticides whenever possible.

d) Removal and Disposal of Trash and Debris

All storm water management components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding one inch of rainfall. Such components may include the basin, stormwater conveyance network (piping and inlet), flared end sections, bottoms, riprap or gabion aprons, trash racks and inflow points.

All components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding 1 inch of rainfall. Such

components may include inlets and diversion structures, fore bays, sand beds, and overflows.

Removal of trash and debris will prevent possible damage to trash racks and outlets, vegetated areas and eliminate potential mosquito breeding habitats. Disposal of debris and trash must comply with all local, county, state, and federal waste flow control regulations. Only suitable disposal and recycling sites should be utilized.

e) Sediment Removal and Disposal

The basin should also be evaluated for excessive deposition of sediment. Accumulated sediment should be removed before it threatens the storage volume of the basin. Before de-sedimentation activities are performed, consideration should be given to evacuating all standing water from the basin. This may be accomplished by clearing any blocked openings of the outlet structure or by mechanical means such as pumping. If stable soil conditions exist on-site, sediment deposition should not be an excessive maintenance issue. Should a recurrent stabilization situation develop, the inspector should identify the upstream sources of sediment and recommend required stabilization measures.

Sediment removal should take place when all runoff has drained from the sand bed and the sand is reasonably dry. In addition, runoff should be drained or pumped from fore bays with permanent pools before removing sediment. Disposal of debris, trash, sediment, and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.

f) Mechanical Components

Mechanical components such as valves, sluice gates, pumps, fence gates, locks, and access hatches, should remain functional at all times. Regularly scheduled maintenance should be performed in accordance with the manufactures' recommendations. Additionally, all mechanical components should be operated at least once every three months to assure their continued performance.

g) Elimination of Potential Mosquito Breeding Habitats

The most effective mosquito control program is one that eliminates potential breeding habitats. Almost any stagnant pool of water can be attractive to mosquitoes, and may become the source of a large mosquito population. A maintenance program dedicated to eliminating potential breeding areas is preferable

to chemical means of controlling mosquitoes. The most important maintenance function is removal of all obstructions to natural flow patterns before stagnant water conditions can develop.

h) Parking Lot Maintenance

This management measure involves employing pavement cleaning practices, such as parking lot sweeping on a regular basis, to minimize pollutant export to the stormwater conveyance system/detention basins and eventually the receiving waters. These cleaning practices are designed to remove sediment, debris, and other pollutants from access drive and parking lot surfaces that are a potential source of pollution impacting urban waterways. Mechanical machines that use vacuum assisted dry sweeping to remove particulate matter shall be utilized as these have the ability to remove finer sediment particles. Parking lots and access drives shall be swept/vacuumed at least once a month. The disposal of the swept material must be properly hauled off the site and transferred to an approved disposal site. Other parking lot maintenance features include the use of on-site trash receptacle. These receptacles should be located in strategic areas where the majority of the pedestrian traffic occurs. These receptacles should be emptied daily. The disposal of the solid waste must be properly hauled off the site and transferred to an approved disposal site.

i) Observation After Rainfall

This management measure involves monitoring the amount of time the detention basin takes to drain to ensure the basin is working properly. The detention basin should drain to the bottom in less than 72 hours. If significant increases or decreases are observed in the drawdown time, a qualified licensed Professional Engineer shall be contacted to evaluate the basin's bottom surface, subsoil and both groundwater and tailwater elevations to determine what corrective measures may need to be implemented.

The management measure involves monitoring the amount of time it would normally take to drain the maximum design storm runoff volume below the top of the filter's sand bed. This normal drain or drawdown time should then be used to evaluate the filter's actual performance. If significant increases or decreases in the normal drain time are observed, a qualified licensed Professional Engineer shall be contacted to evaluate the filter's sand bed, underdrain system, and tailwater levels to determine what corrective measures may need to be implemented to maintain the proper functioning of the filter.

j) Inspection of the Soil Bed

The soil bed should be inspected at least twice annually. The infiltration rate of the soil bed material may also be retested. If the water fails to infiltrate 72 hours after the end of the stormwater quality design storm, corrective measures must be taken.

k) Vegetation Maintenance

All landscaped areas within the aboveground basin shall be periodically inspected a minimum of once per month and every two weeks during growing season or after each mowing session. In general, mowing should occur at least once a month during the growing season. Clippings from the mowing operations shall be removed and disposed of in accordance with all local, state and federal regulations. Reseeding, if required, shall occur within spring or early fall. Summer and fall seeding can be successful with a light mulching of weed-free straw to conserve moisture.

All landscaped areas shall be inspected for invasive plant species. Invasive species should be removed immediately and properly disposed of at an approved disposal site.

l) Inspection and Reporting:

Regularly scheduled inspections of the facility should be performed by a consulting Professional Engineer. The primary purpose of the inspections is to ascertain the operational condition and safety of the facility. Inspections will also provide information on the effectiveness of regularly scheduled Preventative and Aesthetic Maintenance procedures. It should be noted that, in addition to regularly scheduled inspections, an informal inspection should be performed during every visit to stormwater management facilities by maintenance or supervisory personnel.

The recording of all maintenance work and inspections provides valuable data on the condition of the stormwater management facilities. Review of this information will also help to establish more efficient and beneficial maintenance procedures and practices. All recorded information should be directed to the owner of the facility for review and subsequent follow-up on recommendations. Inspection and maintenance checklists and logs are included in the Appendix of this manual.

2. Corrective Maintenance Procedures

Corrective Maintenance is required on an emergency or non-routine basis to correct problems or malfunctions and to restore the intended operation and safe condition of the basin.

Bioretention:

a) Removal of Debris and Sediment

Sediment, debris and trash which threaten the discharge capacity of the basin should be removed immediately and properly disposed. As noted previously, it is recommended that all water be evacuated from the basin with a pump before any significant amount of sediment, settled debris or trash is removed from the basin. The lack of an available disposal site should not delay the removal of trash, debris and sediment. Temporary disposal sites should be utilized if necessary.

b) Structural Repairs

Structural damage to outlet and inlet structures, trash racks, access hatches, roadways and headwalls as a result of vandalism, flood events, settlement or other causes must be repaired promptly. The urgency of the repairs will depend upon the nature of the damage and its effects on the safety and operation of the facility. The analysis of structural damage and the design and performance of structural repairs should only be undertaken by the consulting Professional Engineer.

c) Embankment and Slope Repairs

Damage to embankments, and side slopes must be repaired promptly. This damage can be the result of rain or flood events, vandalism, animals, vehicles or neglect. Typical problems include settlement, scouring, cracking, sloughing, seepage and rutting. The urgency of the repairs will depend upon the nature of the damage and its effect on the safety and operation of the facility. The analysis of the damage and the design and performance of geotechnical repairs should only be undertaken by qualified personnel and under the direction of a consulting Professional Engineer. All basin embankments shall be inspected quarterly and after each significant storm greater than one (1) inch of rainfall. Any damage or indication of erosion shall be immediately inspected by a professional engineer.

d) Dewatering

It may be necessary to remove ponded water from within a malfunctioning basin. This ponding may be the result of a blocked principal outlet or poor bottom drainage.

Portable pumps may be necessary to remove the ponded water temporarily until a permanent solution can be implemented.

e) Weed Harvesting

It may be necessary to remove congested weeds from the basin. Companies with specialized harvesters should be contacted to perform these operations. Note that such work may require the approval of various regulatory agencies.

f) Extermination of Mosquitoes

If neglected, the basin can become an ideal mosquito breeding area. The extermination of mosquitoes will usually require the services of the County Mosquito Commission. If mosquito control in the facility becomes necessary, the preventative maintenance program should be re-evaluated, and more emphasis should be placed on control of mosquito breeding habitats.

g) Erosion Repair

Vegetative cover or other protective measures are necessary to prevent the loss of soil due to the forces of wind and water. Where a re-seeding program has not been effective in maintaining a non-erosive vegetative cover, or other factors have exposed soils to erosion, corrective steps should be initiated to prevent further loss of soil that may result in danger to the stability of the facility. Soil loss can be controlled by a variety of materials and methods, including rip-rap, gabion lining, geotextile fabrics, sod, seeding, concrete lining and re-grading.

h) Elimination of Trees, Brush, Roots and Animal Burrows

The stability of embankments can be impaired by large roots and animal burrows. Additionally, burrows can present a safety hazard for maintenance personnel. Trees and brush with extensive, woody root systems should be completely removed to prevent destabilization and the creation of seepage routes. Roots should also be completely removed to prevent decomposition within the embankment. Root voids and burrows should be filled with material similar to the existing material, and capped just below grade with stone, concrete or other material. If the filling of the burrows does not discourage the animals from returning, further measures should be taken to either move the animal population or to make critical areas of the facility unattractive to them.

i) Snow and Ice Removal

Accumulations of snow and ice can threaten the functioning of the inlets, outlets and emergency spillways. Provision of the equipment, material and personnel to monitor and remove snow and ice from critical areas will assure the function of the facility during the winter months.

j) Basin Drain Time

As mentioned above, two basins are infiltration basins. In accordance with the Drainage Report, the amount of time for the water quality storm volume to drain and reach the bottom elevation is approximately 24 hours.

If the basin fails to drain in the above-mentioned time, the basin should be dewatered down to the soil bed elevation and the soil bed shall be replaced partially or completely depending on field inspection result. This task is to be followed by re-grading and leveling of the soil bed. The thickness of the sand layer should be checked to ensure that a minimum of 18" is maintained throughout the basin bottom area to ensure that the infiltration basin water quality treatment feature operates correctly. The soil bed material to be utilized shall consist of the following, by volume: 85-95% sand, with no more than 25% of the sand as fine or very fine sands; no more than 15% silt and clay with a 2-5% clay content. Pre-mixed soil must be certified to consistent with the requirement above for use in a bioretention basin by either the vendor or a professional engineer. The contact of any soil mixed on-site must be certified by professional engineer who must be present while its being mixed. A maximum permeability rate of 10 inches per hour. Any disturbed vegetated area should be re-vegetated immediately to prevent erosion.

3. Summary of Maintenance Procedures

Preventative Maintenance -Bioretention basin

- a) Grass Cutting
- b) Grass Maintenance
- c) Vegetative Cover
- d) Removal and Disposal of Trash and Debris
- e) Sediment Removal and Disposal
- f) Mechanical Components
- g) Elimination of Mosquito Breeding Habitats
- h) Parking Lot Maintenance
- i) Observation After Rainfall

- j) Inspection of the Soil Bed
- k) Vegetation Maintenance
- l) Inspection and Reporting

Corrective Maintenance – Bioretention basin

- a) Removal of Debris and Sediment
- b) Structural Repairs
- c) Embankment and Slope Repairs
- d) Dewatering
- e) Weed Harvesting
- f) Extermination of Mosquitoes
- g) Erosion Repair
- h) Elimination of Trees, Brush, Roots, and Animal Burrows
- i) Snow and Ice Removal
- j) Basin Drain Time

Aesthetic Maintenance

- a. Grass Trimming/Landscape Maintenance
- b. Control of Weeds

B. Checklists and Logs

The Appendix of this report contains sample checklists and logs regarding various aspects of the basin maintenance and inspection. A brief description of the use of each form is listed below:

1. “Grading, Drainage & Utility Plan” – a plan identifying stormwater management facilities on-site.
2. “Estimated Maintenance Costs” – an estimate of the approximate cost to maintain the proposed stormwater management system on an annual basis.
3. “Maintenance Equipment and Materials” – a comprehensive list of equipment and materials typically required for stormwater management facility maintenance.
4. “Maintenance Work Order and Checklist” – a comprehensive form outlining both required and completed maintenance work.
5. “Maintenance Log” – a summary table for recording of all maintenance work at the site.
6. “Inspection Checklist” – a comprehensive checklist of the items to be inspected.
7. “Inspection Log” – a summary table for recording the results of all inspections.

APPENDIX

GRADING, DRAINAGE & UTILITY PLAN

ESTIMATED MAINTENANCE COSTS

Estimated Maintenance Costs

An estimated total cost of approximately **\$6,200** will be incurred to maintain the proposed stormwater management system on an annual basis. The following is a summary of the required maintenance tasks and associated costs in written and tabular form:

Maintenance Schedule Summary

Task Identification	Task Frequency	Estimated Cost	Annual Cost
Inspection by licensed professional consulting engineer	Once (1) per year	\$1,500.00	\$1,500.00
Inspection by property owner and/or maintenance designee	Once (1) per month (or after a storm event exceeding 1 inch of rainfall)	Minimal Cost	Minimal Cost
Debris removal from conveyance system (inlets, pipes, manholes, and outlet control systems)	Twice (2) per year	\$1,750.00	\$3,500.00
Surface debris removal (garbage & organic matter) including leaves in the Fall and snow in the Winter	Twice (2) per month (or on as-needed basis)	\$50.00	\$1,200.00

- Inspections to be performed by a consulting engineer on an annual basis.
- Inspections to be performed by the property owner and/or a maintenance designee on a monthly basis and/or after a storm event exceeding 1 inch of rainfall
- Stormwater conveyance system and outlet control structure access for debris removal to be performed on an annual basis and/or as inspection routine dictates.
- Surface debris removal including garbage and organic matter to be performed in conjunction with lawn and grounds maintenance, includes removal of leaves in the Fall and removal of excessive amounts of snow (as necessary) in the Winter. These tasks are encouraged as necessary to maintain safe operating conditions (twice a month from Spring through Winter recommended or on as-needed basis)

MAINTENANCE EQUIPMENT AND MATERIALS

Maintenance Equipment and Materials

A. Grass Maintenance Equipment

1. Riding Mowers
2. Hand Mowers
3. Gas Powered Trimmers
4. Gas Powered Edgers
5. Seed Spreaders
6. Fertilizer Spreaders
7. De-Thatching Equipment
8. Pesticide and Herbicide Application Equipment
9. Grass Clipping and Leaf Collection Equipment

B. Vegetative Maintenance Equipment

1. Saws
2. Pruning Shears
3. Hedge Trimmers
4. Wood Chippers

C. Transportation Equipment

1. Trucks for Transportation of Materials
2. Trucks for Transportation of Equipment
3. Vehicles for Transportation of Personnel

D. Debris, Trash and Sediment Removal Equipment

1. Loader
2. Backhoe
3. Grader
4. Dredging Equipment
5. Portable Pump for Dewatering

E. Miscellaneous Equipment

1. Shovels
2. Rakes
3. Picks
4. Wheel Barrows
5. Fence Repair Tools
6. Painting Equipment
7. Gloves
8. Standard Mechanics Tools
9. Tools for Maintenance of Equipment
10. Office Space
11. Office Equipment
12. Telephones
13. Safety Equipment
14. Tools for Concrete Work (Mixers, Form Materials, etc.)
15. Welding Equipment (for Repair of Trash Racks, etc.)

F. Materials

1. Topsoil
2. Fill
3. Seed
4. Soil Amenities (Fertilizer/Lime)
5. Chemicals (Pesticides/Herbicides)
6. Mulch
7. Paint Removers
8. Spare Parts for Equipment
9. Oil and Grease for Equipment and SWMF Components
10. Concrete

G. Parking Lot Maintenance Equipment

1. Sweeping/Vacuuming Equipment
2. Trash Receptacles
3. Snow Plowing Equipment
4. Snow Shovels

MAINTENANCE WORK ORDER AND CHECKLIST

**MAINTENANCE WORK ORDER AND CHECKLIST
FOR STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____ DATE: _____
 LOCATION: _____ WORK STARTED: _____
 WEATHER: _____ WORK COMPLETED: _____
 MAINTENANCE PERFORMED BY: _____

A. PREVENTATIVE MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS		
1. GRASS CUTTING					
A. BOTTOMS					
B. EMBANKMENTS AND SIDE SLOPES					
C. PERIMETER AREAS					
D. ACCESS AREAS AND ROADS					
E. OTHERS					
2. GRASS MAINTENANCE					
A. FERTILIZING					
B. RE-SEEDING					
C. DE-THATCHING					
D. PEST CONTROL					
E. OTHERS					
3. VEGETATIVE COVER					
A. FERTILIZING					
B. PRUNING					
C. PEST CONTROL					
D. POISONOUS PLANTS					
E. OTHERS					
4. TRASH AND DEBRIS REMOVAL					
A. BOTTOMS					
B. EMBANKMENTS AND SIDE SLOPES					
C. PERIMETER AREAS					
D. ACCESS AREAS AND ROADS					
E. INLETS					
F. OUTLETS AND TRASH RACKS					
G. OTHERS					
5. SEDIMENT REMOVAL					
A. INLETS					
B. OUTLETS AND TRASH RACKS					
C. BOTTOMS					
D. OTHERS					
6. PEST CONTROL					
A. GEESE					
B. MOSQUITO BREEDING					
C. RODENTS / RODENT HOLES					
D. OTHERS					
7. STRUCTURAL REPAIRS					
A. PIPES					
B. FLARED END SECTIONS/HEADWALLS					
C. INLETS					
D. MANHOLES					
E. OUTLET CONTROL STRUCTURES					
F. RIP-RAP					
G. EMERGENCY SPILLWAY					
H. ACCESS AREA / ROADS					
I. FENCE					
J. TRASH RACKS					
K. OTHERS					

8. BASIN REPAIR					
A. EROSION					
B. SAND LAYER REPLACEMENT					
C. HARMFUL POLLUTANT REMOVAL					
D. BASIN LAYER					
E. SNOW / ICE REMOVAL					
F. OTHERS					
9. OTHER PREVENTIVE MAINTENANCE					
A. PARKING LOT SWEEPING					
B. EMPTYING TRASH RECEPTACLES					
C. PUMPS AND VALVES					
D. ELECTRICAL PANEL AND WIRING					
E. DEWATERING					
F. GRAFFITI REMOVAL					
G. OTHERS					

B. CORRECTIVE MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. REMOVAL OF DEBRIS AND SEDIMENT			
2. STRUCTURAL REPAIRS			
3. EMBANKMENTS AND SIDE SLOPES			
4. DEWATERING			
5. BASIN MAINTENANCE			
6. CONTROL OF MOSQUITOES			
7. EROSION REPAIR			
8. FENCE REPAIR			
9. SNOW AND ICE REMOVAL			
10. SAND LAYER REPLACEMENT			
11. OTHER			

C. AESTHETIC MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRAFFITI REMOVAL			
2. GRASS TRIMMING			
3. WEEDING			
4. OTHERS			

GENERAL NOTES AND REMARKS:

MAINTENANCE COMPLETED AND BASED ON ALL AREAS VISIBLE AND ACCESSIBLE AT THE TIME OF INSPECTION.

WORK PERFORMED BY: _____

SIGNED: _____ DATE: _____

MAINTENANCE LOG

**MAINTENANCE LOG
FOR STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____
 LOCATION: _____ DATE: _____
 WEATHER: _____ WORK STARTED: _____
 MAINTENANCE PERFORMED BY: _____ WORK COMPLETED: _____

A. PREVENTATIVE MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRASS CUTTING					
A. BOTTOMS					
B. EMBANKMENTS AND SIDE SLOPES					
C. PERIMETER AREAS					
D. ACCESS AREAS AND ROADS					
E. OTHERS					
2. GRASS MAINTENANCE					
A. FERTILIZING					
B. RE-SEEDING					
C. DE-THATCHING					
D. PEST CONTROL					
E. OTHERS					
3. VEGETATIVE COVER					
A. FERTILIZING					
B. PRUNING					
C. PEST CONTROL					
D. POISONOUS PLANTS					
E. OTHERS					
4. TRASH AND DEBRIS REMOVAL					
A. BOTTOMS					
B. EMBANKMENTS AND SIDE SLOPES					
C. PERIMETER AREAS					
D. ACCESS AREAS AND ROADS					
E. INLETS					
F. OUTLETS AND TRASH RACKS					
G. OTHERS					
5. SEDIMENT REMOVAL					
A. INLETS					
B. OUTLETS AND TRASH RACKS					
C. BOTTOMS					
D. OTHERS					
6. PEST CONTROL					
A. GEESE					
B. MOSQUITO BREEDING					
C. RODENTS / RODENT HOLES					
D. OTHERS					
7. STRUCTURAL REPAIRS					
A. PIPES					
B. FLARED END SECTIONS/HEADWALLS					
C. INLETS					
D. MANHOLES					
E. OUTLET CONTROL STRUCTURES					
F. RIP-RAP					
G. EMERGENCY SPILLWAY					
H. ACCESS AREA / ROADS					
I. FENCE					
J. TRASH RACKS					
K. OTHERS					

8. BASIN REPAIR					
A. EROSION					
B. SAND LAYER REPLACEMENT					
C. HARMFUL POLLUTANT REMOVAL					
D. BASIN LAYER					
E. SNOW / ICE REMOVAL					
F. OTHERS					
9. OTHER PREVENTIVE MAINTENANCE					
A. PARKING LOT SWEEPING					
B. EMPTYING TRASH RECEPTACLES					
C. PUMPS AND VALVES					
D. ELECTRICAL PANEL AND WIRING					
E. DEWATERING					
F. GRAFFITI REMOVAL					
G. OTHERS					

B. CORRECTIVE MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. REMOVAL OF DEBRIS AND SEDIMENT					
2. STRUCTURAL REPAIRS					
3. EMBANKMENTS AND SIDE SLOPES					
4. DEWATERING					
5. BASIN MAINTENANCE					
6. CONTROL OF MOSQUITOES					
7. EROSION REPAIR					
8. FENCE REPAIR					
9. SNOW AND ICE REMOVAL					
10. SAND LAYER REPLACEMENT					
11. OTHER					

C. AESTHETIC MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRAFFITI REMOVAL					
2. GRASS TRIMMING					
3. WEEDING					
4. OTHERS					

GENERAL NOTES AND REMARKS:

MAINTENANCE COMPLETED AND BASED ON ALL AREAS VISIBLE AND ACCESSIBLE AT THE TIME OF INSPECTION.

WORK PERFORMED BY: _____

SIGNED: _____ DATE: _____

INSPECTION CHECKLIST

**INSPECTION CHECKLIST
FOR
STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____
 LOCATION: _____
 WEATHER: _____ DATE: _____

FACILITY ITEM	O.K. ¹	ROUTINE ²	URGENT ³	COMMENTS
1. EMBANKMENTS AND SIDE SLOPES				
A. VEGETATION				
B. LININGS				
C. EROSION				
D. SETTLEMENT				
E. SLOUGHING				
F. TRASH AND DEBRIS				
G. SEEPAGE				
H. AESTHETICS				
I. OTHER:				
2. BOTTOMS (DETENTION AND INFILTRATION)				
A. VEGETATION				
B. EROSION				
C. STANDING WATER				
D. SETTLEMENT				
E. TRASH AND DEBRIS				
F. SEDIMENT				
G. AESTHETICS				
H. OTHER:				
3. INLET STRUCTURE				
A. CONDITION OF STRUCTURE				
B. EROSION				
C. TRASH AND DEBRIS				
D. SEDIMENT				
E. AESTHETICS				
F. OTHER:				
4. OUTLET STRUCTURE				
A. CONDITION OF STRUCTURE				
B. EROSION				
C. TRASH AND DEBRIS				
D. SEDIMENT				
E. MECHANICAL COMPONENTS				
F. AESTHETICS				
G. OTHER:				

INSPECTION LOG

**INSPECTION LOG
FOR STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____
 LOCATION: _____ DATE: _____
 WEATHER: _____
 INSPECTION PERFORMED BY: _____

A. PREVENTATIVE MAINTENANCE				
FACILITY ITEM	OK (1)	ROUTINE (2)	URGENT (3)	COMMENTS (4)
1. GRASS CUTTING				
A. BOTTOMS				
B. EMBANKMENTS AND SIDE SLOPES				
C. PERIMETER AREAS				
D. ACCESS AREAS AND ROADS				
E. OTHERS				
2. GRASS MAINTENANCE				
A. FERTILIZING				
B. RE-SEEDING				
C. DE-THATCHING				
D. PEST CONTROL				
E. OTHERS				
3. VEGETATIVE COVER				
A. FERTILIZING				
B. PRUNING				
C. PEST CONTROL				
D. POISONOUS PLANTS				
E. OTHERS				
4. TRASH AND DEBRIS REMOVAL				
A. BOTTOMS				
B. EMBANKMENTS AND SIDE SLOPES				
C. PERIMETER AREAS				
D. ACCESS AREAS AND ROADS				
E. INLETS				
F. OUTLETS AND TRASH RACKS				
G. OTHERS				
5. SEDIMENT REMOVAL				
A. INLETS				
B. OUTLETS AND TRASH RACKS				
C. BOTTOMS				
D. OTHERS				
6. PEST CONTROL				
A. GEESE				
B. MOSQUITO BREEDING				
C. RODENTS / RODENT HOLES				
D. OTHERS				
7. STRUCTURAL REPAIRS				
A. PIPES				
B. FLARED END SECTIONS/HEADWALLS				
C. INLETS				
D. MANHOLES				
E. OUTLET CONTROL STRUCTURES				
F. RIP-RAP				
G. EMERGENCY SPILLWAY				
H. ACCESS AREA / ROADS				
I. FENCE				
J. TRASH RACKS				
K. OTHERS				
8. BASIN REPAIR				
A. EROSION				
B. SAND LAYER REPLACEMENT				
C. HARMFUL POLLUTANT REMOVAL				
D. BASIN LAYER				
E. SNOW / ICE REMOVAL				
F. OTHERS				

9. UNDERGROUND BASIN MAINTENANCE				
A. BOTTOMS				
B. OUTLETS AND TRASH RACKS				
C. ACCESS HATCHES				
D. OTHERS				
10. INFILTRATION BASIN MAINTENANCE				
A. TILING BOTTOM				
11. POND MAINTENANCE				
A. AERATION EQUIPMENT				
B. DEBRIS AND TRASH REMOVAL				
C. WEED REMOVAL				
D. PERMANENT POOL LEVEL				
E. OTHERS				
11. OTHER PREVENTIVE MAINTENANCE				
A. PARKING LOT SWEEPING				
B. EMPTYING TRASH RECEPTACLES				
C. PUMPS AND VALVES				
D. ELECTRICAL PANEL AND WIRING				
E. DEWATERING				
F. GRAFFITI REMOVAL				
E. OTHERS				

B. CORRECTIVE MAINTENANCE				
FACILITY ITEM	OK (1)	ROUTINE (2)	URGENT (3)	COMMENTS (4)
1. REMOVAL OF DEBRIS AND SEDIMENT				
2. STRUCTURAL REPAIRS				
3. EMBANKMENTS AND SIDE SLOPES				
4. DEWATERING				
5. BASIN MAINTENANCE				
6. CONTROL OF MOSQUITOES				
7. EROSION REPAIR				
8. FENCE REPAIR				
9. SNOW AND ICE REMOVAL				
10. SAND LAYER REPLACEMENT				
11. OTHER				

C. AESTHETIC MAINTENANCE				
FACILITY ITEM	OK (1)	ROUTINE (2)	URGENT (3)	COMMENTS (4)
1. GRAFFITI REMOVAL				
2. GRASS TRIMMING				
3. WEEDING				
4. OTHERS				

REMARKS

- (1) ITEM CHECKED IS IN GOOD CONDITION, AND THE MAINTENANCE PROGRAM IS ADEQUATE.
- (2) ITEM CHECKED REQUIRES ATTENTION, BUT DOES NOT PRESENT AN IMMEDIATE THREAT TO THE FACILITY FUNCTION OR OTHER FACILITY COMPONENTS.
- (3) THE ITEM CHECKED REQUIRES IMMEDIATE ATTENTION TO KEEP THE FACILITY OPERATIONAL OR TO PREVENT DAMAGE TO OTHER FACILITY COMPONENTS.
- (4) PROVIDE EXPLANATION AND DETAILS IF COLUMNS 2 OR 3 ARE CHECKED.

GENERAL NOTES AND REMARKS:

INSPECTION COMPLETED AND BASED ON ALL AREAS VISIBLE AND ACCESSIBLE AT THE TIME OF INSPECTION.

WORK PERFORMED BY: _____

SIGNED: _____ DATE: _____