Quarry Ridge Associates, LLC
139, 141, & 201 Turkey Roost Road
& 30 Cobblers Hill Court

Town of Monroe
Inland Wetlands and
Watercourses Application

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TOWN OF MONROE
APPLICATION FOR PERMIT
INLAND WETLANDS COMMISSION
7 Fan Hill Road, Monroe, CT 06468
Tel. (203)452-2809

FOR OFFICE USE ONLY:
Application Number _____
File Number: _____
Submittal Date: _____
Application Fee Collected _____
Public Hearing Fee Collected _____
Date of Receipt: _____
Extensions (cumulative ≤ 65 days) _____
_____
Public Hearing Start: _____ End _____
Hearing: Start: _____ End _____
Deliberation: Start: _____ End _____
Approval Date: _____ Denial Date: _____
270 Days Up: _____
Permit Expiration: _____

As the applicant, it is your responsibility to provide the information the Commission needs in order to process your application and make a fair determination of the issues. If you fail to supply the information it may result in delay, a denial of your application or both. We recommend that you read the Inland Wetlands and Watercourses Regulations and that you request a meeting with the Land Use Department prior to submitting your application. There is no charge to the applicant for this meeting.

SECTION A: Information about the property

1. **Location of the Property**:
   Street Address: 139, 141, & 201 Turkey Roost Road and 30 Cobblers Hill Court
   Assessor's Map Number: 107
   Parcel Number: 003, 004, 008/1, & 008/2
2. **Where is the property deed found in the Monroe Land Records?**
   Volume: 1156/1435/2213/1156 Page: 191/72/0296/0191
3. **Is the property located within a public water supply watershed?**
   ☒ No
   ☐ Yes (***If " Yes, " the Applicant must send a copy of this application BY CERTIFIED MAIL ON OR BEFORE THE DATE OF THE APPLICATION to the Aquarion Water Company of Connecticut, 714 Black Rock Road, Easton, CT 06612, and the Commissioner of Public Health, 410 Capitol Avenue, Hartford, CT 06106; See Regulations Section 8.3).***
4. **Is the property located within 500 feet of a town boundary?**
   ☒ No
   ☐ Yes ***(If" Yes ", the applicant must notify the Inland Wetland Agency of the adjacent municipality by certified mail and submit the receipt with this application).***
5. **Is the property subject to an existing conservation easement?**
   ☒ No
   ☐ Yes ***(If" Yes ", the applicant must notify the party holding such restriction by certified mail no later than sixty days prior to the filing of this permit application, or submit a letter from the party holding the restriction verifying that the application is in compliance with the terms of the restriction; see Regulations Section 7.9c & 7.9d).***
6. **Is there a flood plain located on the property?**
   ☐ No
   ☒ Yes ***(If" Yes ", indicate elevation and location of flood plain on the submission plan).***
7. **Please attach a list of the names and mailing addresses of all landowners within 100 feet of the property.**

SECTION B: Information about the applicant

8. **Applicant's name and contact information:**
   Name: Quarry Ridge Associates, LLC c/o David Bienashski-Member
   Address: 43 Fox Street, Fairfield, CT 06824
   Telephone: 203-556-1976 Fax: _____ Email: bienashski@gmail.com
9. **What is the Applicant's interest in the property?**
   ☒ Owner
   ☒ Option to purchase (139 Turkey Roost Road)
   ☐ Other _____

Application No. _____ File No._____

Applicant's representative's name and contact information:

Name: Attorney Christopher B. Russo

Business Name: Russo & Rizio, LLC

Business Address: 10 Sasco Hill Road, Fairfield, CT 06824

Telephone: 203-528-0590 Fax: _____ Email: Chris@russorizio.com

10. Engineer's name and contact information:

Name: Larry Edwards, PE

Business Name: J. Edwards Associates, LLC

Business Address: 227 Stepney Road, Easton, CT. 06612

Telephone: 203-268-4205 Fax: _____ Email: larry@jedwardsassoc.com

11. Owner's name and contact information:

Name: See attachment.

Address: _____

Telephone: _____ Fax: _____ Email: _____

Owner's signature_____ (granting permission for submission of application by the applicant)

Please note the following:

If the applicant is not the current owner, this application must include the owner's signature or a written, witnessed consent to submit this application, signed and dated by the owner. Only the applicant and the agent listed on this application will receive copies of official action and correspondence.

SECTION C: Information about the proposed activity

(Please attach additional sheets if necessary)

12. Select one or more of the following types of Application requested:

- [X] Regulated Activity
- [ ] Including Site Remediation
- [ ] Subdivision Report/Referral
- [ ] Map Amendment
- [ ] Renewal/Extension of Issued Permit Number _____
- [ ] Regulation Amendment

13. Describe the proposed activity covered by this application:

Construction of 99 single family detached dwellings served by 5,570 linear feet of new roadway.

14. List all activities which take place in regulated areas, including the upland review areas:

See attachment.

15. List the total acreage of the following:

Overall project site: 153.65 ac.

Wetlands on the property: 15.72 ac.

Upland review areas on the property: 28.65 ac.

16. List the total area of the regulated areas to be altered:

Wetlands: 0 acres; 0 sq. ft.

Upland review areas (within 100 feet of a wetland or 150 feet of a watercourse): 1.71 acres; 74,800 sq. ft.

Total Regulated area to be altered (a + b above) for determination of fee: 1.71 acres; 74,800 sq. ft.

17. What alternatives to the proposed regulated activity did you consider? Why did you choose the activity proposed in this application as opposed to the alternatives considered? (See Regulations *Section 7.5f)*

There are two site plan alternates included in the plan set. The proposed activity chosen in this application is the version most similar to that which recieved inland wetlands approval in 2010.

18. List all measures of Low Impact Design/Development that have been incorporated into this application in order to minimize impact to wetlands.

Construction of water quality/retention basins.

SECTION D: Determination of Application Fee

(See Regulations Section 19)

19. Select type of Application Fee (choose one):

□ Residential Use = $300.00	$ 300
□ Commercial Use = $500.00	
□ Regulation Amendment = $500.00	
□ Map Amendment = $150.00	
□ Permit Modification = $100.00	
□ Renewal/Extension of Issue Permit = $100.00	

20. Select the following additional fees that apply for regulated areas proposed to be disturbed:

Square Feet of Disturbed Area:

□ Less than 1,000 square feet = $50.00	
□ 1,000 to 5,000 square feet = $100.00	
□ More than 5,000 square feet = $100.00 (base amount)	$ 100.00
*(Plus $5.00 for every **additional** 5,000 square feet rounded up)*	
Disturbed Area (Line 17c) (-) 5,000 sq.ft. (÷) 5,000 sq.ft. (x) $5.00 per sq.ft. rounded up...	$ 70.00
21. Department of Environmental Protection State Surcharge	$60.00
22. TOTAL APPLICATION FEE:	$ 530.00

****** Please note the Application Fees/State Fee must be payable to the Town of Monroe. Applicants paying with a personal check must include their driver's license number and telephone number on the check.***

SECTION E: Required support documents

(See Regulations Section 7)

Please indicate (check box) that the following documents have been included with the application:

23. Submit ten (10) copies of the following:

- ☑ Completed Inland Wetlands Application.
- ☑ A description of all filling and/or excavation activities within regulated areas (include estimates of quantity).
- ☑ A Soils Report by a Soil Scientist (include a sketch of flagged wetland areas within said report).
- ☑ A minimum of two alternative plans/sketches that were considered prior to choosing the proposed plans.
- □ A report from the Monroe Health Department.
- ☑ A Wetlands Assessment Report.
- ☑ An area plan showing all abutting properties and applicable downstream drainage systems.

24. Submit seven **(7)** reduced copies of the following (all plans must be folded):

- ☑ Reduced copies, **18' x 24'**, of the site plan showing existing and proposed conditions in relation to the wetlands, watercourses and upland review areas. Please include a location map, delineate the 100-foot wetland setback (upland review area) and/or the l50-foot watercourse setback (upland review area) in red, and incorporate an area plan showing all abutting properties and applicable downstream drainage systems. All plans must have a bar scale.

Application No._____ File No._____

25. Submit three (3) copies of the following (all plans must be folded):

☑ Full size copies of the site plan, 24' x 36', showing existing and proposed conditions in relation to the wetlands, watercourses and upland review areas. Please include a location map, delineate the 100-foot wetland setback (upland review area) and/or the l50-foot watercourse setback (upland review area) in red, and incorporate an area plan showing all abutting properties and applicable downstream drainage systems. All plans must have a bar scale.

26. Submit two (2) copies of the following:

☑ Drainage calculations, if applicable.

27. Submit one (1) copy of the following:

☑ A list of the names and mailing addresses of all abutting property owners.

☑ A completed D.E.E.P report form (available at the Inland Wetlands Office or on the Town Website at www.monroect.org/Town Hall Departments/Inland Wetlands/Applications & Forms).

☑ Verification in writing that all wetlands have been flagged and the property address/location is adequately delineated and/or marked at the property.

☑ A completed bond form listing all wetlands related work and protective measures for same (available at the Inland Wetlands Office or on the Town Website at www.monroect.org/Town Hall Departments/Inland Wetlands/Applications & Forms).

PLEASE INCLUDE TEN (10) COPIES OF ANY FUTURE SUPPORTING DOCUMENTATION SUBMITTED TO THE COMMISSION (Plans: 3 Full Size copies - 24' x 36', and 7 Reduced Size copies - 18' x 24'). Plans prepared by engineers, surveyors and architects must be signed and sealed. The Commission may request additional copies of the application or supporting documents at any time.

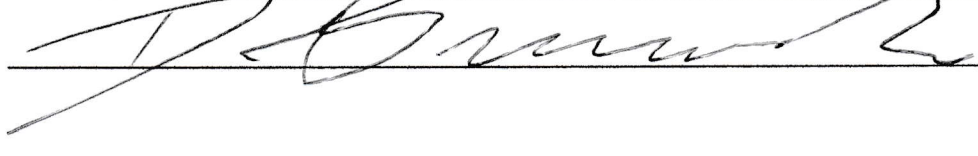
Title of original submission plan (include author and date) Site Plan, 139,141, & 201 Turkey Roost Road, and 30 Cobblers Hill Cour Monroe, CT Prepared For Quarry Ridge Associates, LLC dated 5-1-23 by J.Edwards & Associates, LLC

The undersigned applicant hereby consents for the owner, in the case where the applicant is not the owner, to necessary and proper access to the above mentioned property by the Inland Wetlands Commissioners, the Inland Wetlands Agent and other appropriate Town staff and/or authorized Town Consultants, at reasonable times, both before and after any permit has been granted or denied by the Commission, for the purpose of evaluating the application, monitoring compliance or correcting any violation of the Inland Wetlands and Watercourses Regulations brought about through actions or inactions of the applicant of permittee.

The undersigned warrants the truth of all statements contained herein and in all supporting documents according to the best of the applicant's knowledge and belief.

The undersigned applicant understands and agrees that the Commission may request additional information and it is the applicant's responsibility to provide this information in a timely fashion and to the Commission's satisfaction. If the information provided is incomplete or inaccurate, in the opinion of the Commission, the Commission may deny the application or request an extension to be granted by the Applicant in order to act within the legal time limits.

Type or Print the Name of the Applicant: Quarry Ridge Associates, LLC c/o David Bienashski-Member

Signature of Applicant: 

Connecticut Department of
ENERGY & ENVIRONMENTAL PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

GIS CODE #: ___ ___ ___ ___ ___ ___ ___ ___ ___
For DEEP Use Only

Statewide Inland Wetlands & Watercourses Activity Reporting Form

Please complete and mail this form in accordance with the instructions on pages 2 and 3 to:
DEEP Land & Water Resources Division, Inland Wetlands Management Program, 79 Elm Street, 3rd Floor, Hartford, CT 06106
Incomplete or incomprehensible forms will be mailed back to the inland wetlands agency.

PART I: Must Be Completed By The Inland Wetlands Agency

1. DATE ACTION WAS TAKEN: year: _____ month: _____
2. ACTION TAKEN (see instructions, only use one code): _____
3. WAS A PUBLIC HEARING HELD (check one)? yes ☐ no ☐
4. NAME OF AGENCY OFFICIAL VERIFYING AND COMPLETING THIS FORM:
   (print name) _____ (signature) _____

PART II: To Be Completed By The Inland Wetlands Agency Or The Applicant

5. TOWN IN WHICH THE ACTION IS OCCURRING (print name): Monroe
   does this project cross municipal boundaries (check one)? yes ☐ no ☑
   if yes, list the other town(s) in which the action is occurring (print name(s)): _____, _____
6. LOCATION (see instructions for information): USGS quad name: Long Hill or number: 93
   subregional drainage basin number: 6022
7. NAME OF APPLICANT, VIOLATOR OR PETITIONER (print name): Quarry Ridge Associates LLC
8. NAME & ADDRESS / LOCATION OF PROJECT SITE (print information): 139 & 141 & 201 Turkey Roost Road and 30 Cobblers Hill Court
   briefly describe the action/project/activity (check and print information): temporary ☐ permanent ☑ description:
   Construction of 90 detached single family dwellings
9. ACTIVITY *PURPOSE* CODE (see instructions, only use one code): B
10. ACTIVITY *TYPE* CODE(S) (see instructions for codes): 1, 2, 9, 12
11. WETLAND / WATERCOURSE AREA ALTERED (must provide acres or linear feet):
    wetlands: 0 acres open water body: 0 acres stream: 0 linear feet
12. UPLAND AREA ALTERED (must provide acres): 1.72 acres
13. AREA OF WETLANDS / WATERCOURSES RESTORED, ENHANCED OR CREATED (must provide acres): 0 acres

DATE RECEIVED:

PART III: To Be Completed By The DEEP

DATE RETURNED TO DEEP:

FORM COMPLETED: YES NO

FORM CORRECTED / COMPLETED: YES NO

APPLICATION ATTACHMENTS

Section B #11: Owner's name and contact information.

#141 and #201 Turkey Roost Road, AND 30 Cobblers Hill Court
Quarry Ridge Associates, LLC. David Bienashski-member
43 Fox Street
Fairfield, CT. 06824

#139 Turkey Roost Road
Thea R. Smith
121 Turkey Roost Road
Monroe, CT. 06468

(Authorization letter in favor of Quarry Ridge Associates LLC is attached to this application)

Section C #14: List all activities which take place in regulated areas.

Activities include construction of 24 foot wide roadway with associated grading, storm drainage system, underground utilities, water main, sewage force main, water quality basin, portions of paved driveways, portion of a riprap swale, footing drain outlets, removal of an existing dwelling, and tree removal along town highway.

Section E #23: Description of all filling and/or excavation activities within regulated areas

Activities listed above under C-14 results in approximately net 2590 cubic yards of fill.

QUARRY RIDGE ASSOCIATES, LLC
131, 141, 201 TURKEY ROOST ROAD
& 30 COBBLERS HILL COURT
MONROE, CT
100' ADJOINERS
5/9/23

MAP/BLOCK/LOT	STREET ADDRESS	OWNER/MAILING ADDRESS
TURKEY ROOST RD.		
97/23	71	Mary A. & Robert G. Dunbar 71 Turkey Roost Rd. Monroe, CT 06468
107/49/4	136	William E. Sr. & Mary K. Terry 136 Turkey Roost Rd. Monroe, CT 06468
107/3	139	Thea R. Smith 121 Turkey Roost Rd. Monroe, CT 06468
107/48/3	142	Harold Horell & Barbara Daly Horell 142 Turkey Roost Rd. Monroe, CT 06468
107/47/2	150	Nikoll & Vera Gjorka 150 Turkey Roost Rd. Monroe, CT 06468

107/5/3	177	Guy H. & Doris A. Dubail 177 Turkey Roost Rd. Monroe, CT 06468
107/6/2	185	Antreas Skourides & Beatriz Samya 185 Turkey Roost Rd. Monroe, CT 06468
107/7/1	193	Rodney E. Perkins 193 Turkey Roost Rd. Monroe, CT 06468
107/14/2	196	Wayne & Robin Hoffman 196 Turkey Roost Rd. Monroe, CT 06468
107/13/3	202	Gene L. & Ellen L. Marini 202 Turkey Roost Rd. Monroe, CT 06468
107/9	207	Robert H., Loraine M. & Daniel R. Carlson P.O. Box 164 Monroe, CT 06468
107/12/4	208	Jorge L. & Jovanny Perez 208 Turkey Roost Rd. Monroe, CT 06468

107/11/15	218	Abel B. & Elaine DaSilva 218 Turkey Roost Rd. Monroe, CT 06468
117/1/1	225	Ryan & Melissa Carter 225 Turkey Roost Rd. Monroe, CT 06468
117/001/3	265	Patricia A. & Daniel J. Flynn 265 Turkey Roost Rd. Monroe, CT 06468
117/001/99	297	Town of Monroe Open Space 7 Fan Hill Rd. Monroe, CT 06468
HAMMERTOWN RD.		
124/8	291	David H. Ambrose 265 Hammertown Rd. Monroe, CT 06468
MORGAN LANE		
123/8/10	20	Ronald & Marina Sadownick 20 Morgan Lane Monroe, CT 06468

MUSTANG DRIVE

115/6	19	Harry Riebe et al 15101 Robles Grandes Drive Rancho Murieta, CA 95683
115/7/6	76	Juliet Gallicano 76 Mustang Drive Monroe, CT 06468
115/7/5	84	James Hall 84 Mustang Drive Monroe, CT 06468

PINTO LANE

115/7/7	11	11 Pinto Lane LLC Shaun Cain-Mgr. 195 East Avenue Norwalk, CT 06855
115/7/13	39	Autumn Sheppard 39 Pinto Ln. Monroe, CT 06468
115/7/14	69	Joseph C. & Alyssa Z. Campbell 69 Pinto Lane Monroe, CT 06468

J. EDWARDS & ASSOCIATES LLC

March 22, 2023

Cheryl Vallerie
Wetlands Enforcement officer
7 Fan Hill Road
Monroe, CT 06468

Re: Quarry Ridge, Turkey Roost Road

Dear Cheryl:

As required in the application form for this Commission, we are verifying in writing that, to the best of our knowledge and belief, the wetlands were flagged in June 2020 by Davison Environmental and survey located by Shevlin Land Surveying LLC. The property address/location is adequately delineated and/or marked at the site.

Very truly yours,
J. Edwards and Associates, LLC.

Nicholas D. Clark, P.E

227 Stepney Road • Easton, CT • 06612 • Phone:203.268.4205 • Fax: 203.268.5604
www.jedwardsassoc.com • www.leassoc.com
Engineering • Surveying • Site Planning

TOWN OF MONROE

Issued: 10-9-07

BOND ESTIMATE FORM (Private Site Development)

☐ PLANNING & ZONING COMMISSION
MEETING DATE _____

APPLICANT: Quarry Ridge Associates, LLc
ENGINEER: J. Edwards & Associates, LLC
TEL.: 203-268-4205

*APPLICATION NO: _____
*FILE NO: _____
DATE: _____

PROJECT NAME: Quarry Ridge

PROJECT LOCATION: 139, 141, & 201 Turkey Roost Road

*BOND RECOMMENDATION

(IWWC BOND)

NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST	Comments by Town Engr. Unit Price*	Comments by Town Engr. Cost*
1.	Sedimentation and Erosion Control Measures (temp. sed traps)	L.S.	2000 cy	16/cy	32,000		
2.	Silt Fence & Hay Bales	L.F.	9740 lf	4.2/lf	40,908		
3.	Topsoil, Seed, Fertilizing, and Mulching (entire disturbed area)	S.F.	74,800	0.65/sf	48,620		
4.	Landscaping (extent to provide for restoration and aesthetic considerations)	L.S. (seed)	215 lb	8/lb	1,720		
5.	Grading (for site restoration that will provide safe and stable conditions)	L.S.			N/A		
6.	Other (anti-track pad)			1,225 ea.	1,225		
					124, 473		
	(+) 10% for Contingencies				12,447		
	* To be filled in by the Town			Total Cost =	137,000	*	

Submitted by: _____

Approved by: _____

Total costs as determined by the Town Engineer represent adjusted values assuming a Municipal bid arrangement with inflation, noting that the terms of the bond may be in effect for up to 10 or more years (statutory time allowance for performance of requirements).

J. EDWARDS & ASSOCIATES, LLC

May 10, 2023

Amy Lehaney MPH, RS
Director of Health
Town of Monroe
7 Fan Hill Road
Monroe, CT 06468

Re: Quarry Ridge – 139, 141, 201 Turkey Roost Road & 30 Cobblers Hill Court

Dear Ms. Lehaney;

Please find the attached site development plans for your review and file. The Monroe Inland Wetlands department requires that your office be supplied with this information along with submittal of an Inland Wetland application.

The development will produce more than 7,500 gallons per day and therefore is under the jurisdiction of the Connecticut Department of Energy and Environmental Protection. Furthermore, the site will be serviced by Aquarion Water and no wells are proposed.

It would be helpful if you could please provide a response letter concurring with my assessment of the jurisdiction.

If you have any questions or need any additional information, please contact my office.

Sincerely,

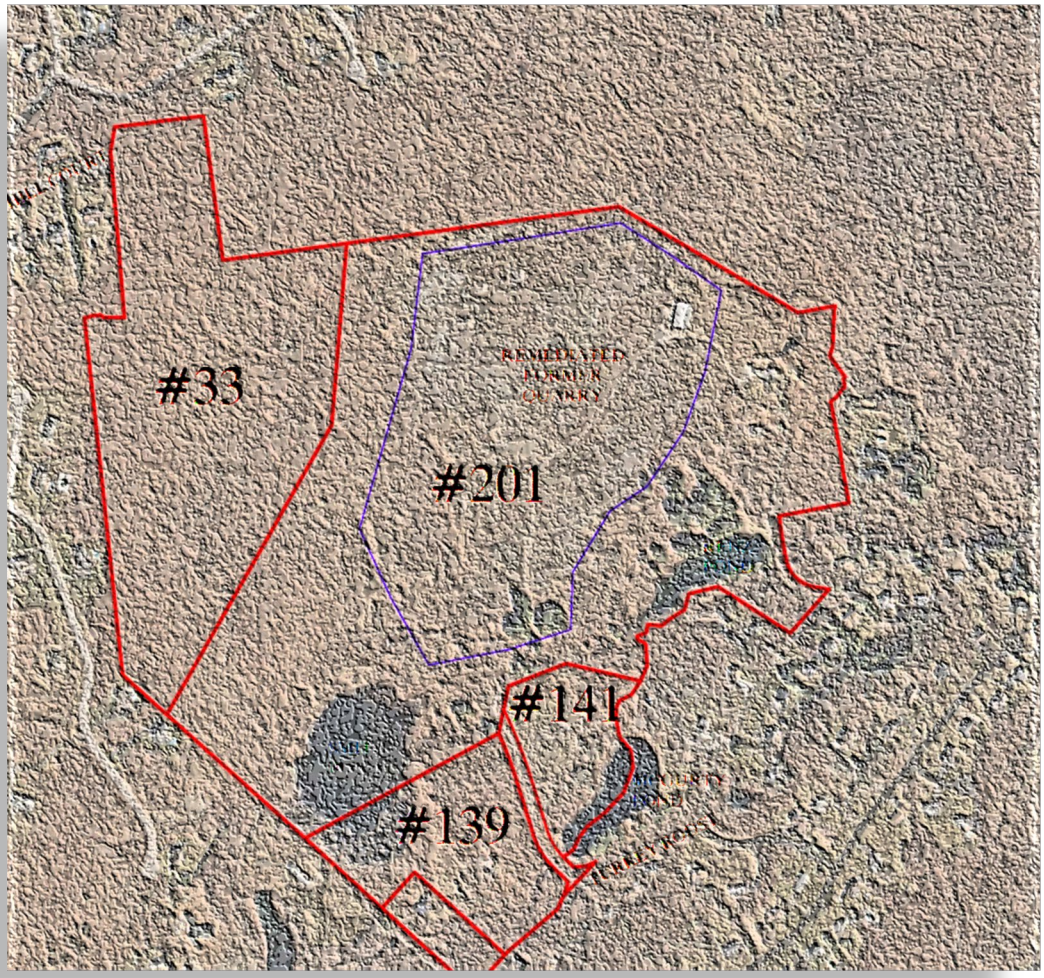
Jason Edwards

J. EDWARDS & ASSOCIATES, LLC
SPATH-BJORKLUND & ASSOCIATES, LLC
227 Stepney Road • Easton, CT • 06612 Phone:203.268.4205
info@jedwardsassoc.com
Engineering • Surveying • Site Planning

Quarry Ridge
Project Narrative

Quarry Ridge Associates, LLC
139, 141, & 201 Turkey Roost Road
& 30 Cobblers Hill Court

May 1, 2023



J. EDWARDS & ASSOCIATES, LLC
SPATH-BJORKLUND & ASSOCIATES, LLC
227 Stepney Road • Easton, CT • 06612 Phone:203.268.4205
info@jedwardsassoc.com
Engineering • Surveying • Site Planning

Executive Summary

201 Turkey Roost Road is zoned as Multi Family Residential. It is proposed to construct 99 single family homes within this parcel. The development will be serviced by public water and a community wastewater treatment system. Included in this system is an on-site wastewater treatment plant. The treatment system design is within the jurisdiction of the CT DEEP and all permitting for this system is strictly regulated by that agency.

The potential development site is comprised of 5 individual parcels

1. 139 Turkey Roost Road: 11.0 Acres
2. 141 Turkey Roost Road: 6.3 Acres
3. 201 Turkey Roost Road (2 parcels): 99.98 acres
4. 30 Cobblers Court : 36.4 Acres

   Total area: 154 acres

The remaining parcels are zoned RF-2. Portions of these parcels will be utilized as part of the septic leaching areas. The property lines are to be revised to separate the existing house at 139 Turkey Roost Road onto a conforming parcel. 30 Cobblers court will be reduced to a 4 acre parcel. The remaining land will be combined into a single parcel, any of the land outside of the development footprint will be remain as open space.

Water service will be provided by Aquarian. A new water main will be run from Fan Hill Road to the site. Current flow tests have been conducted and a will serve letter has been provided with this submission.

Site History

The proposed development is on the site of a former illegal quarry operation. In the 1940's, this site started as a small sand and gravel operation. In the 1960's and into the 1980's, the operation expanded into to a large commercial quarry operation.

In 2003 the current owner purchased the property and began plans to remediate and develop. The remediation was completed and unfortunately the economic crash of 2008 happened before the new development could be constructed. Since then, a great deal of work has been completed in order to provide the design plans presented with this application.

As part of the remediation, blasting for the proposed infrastructure and house foundations was completed, therefore minimal blasting will be required for the currently proposed development. A plan depicting these blasted areas is included in the submitted plan set. See sheet L-3

As part of the quarry operation, two driveways were constructed for access to Turkey Roost Road. These driveways cross smith brook via existing culverts. Those culverts will be utilized in the current proposal, so no new crossing is proposed. A pond was also created near the southeast driveway which also includes a culvert. This pond and the associated berm have now been registered with the CT DEEP as class “AA” dam.

The definition of a class AA dam is as follows:

A) A Class AA dam is a negligible hazard potential dam which, if it were to fail, would result in the following:

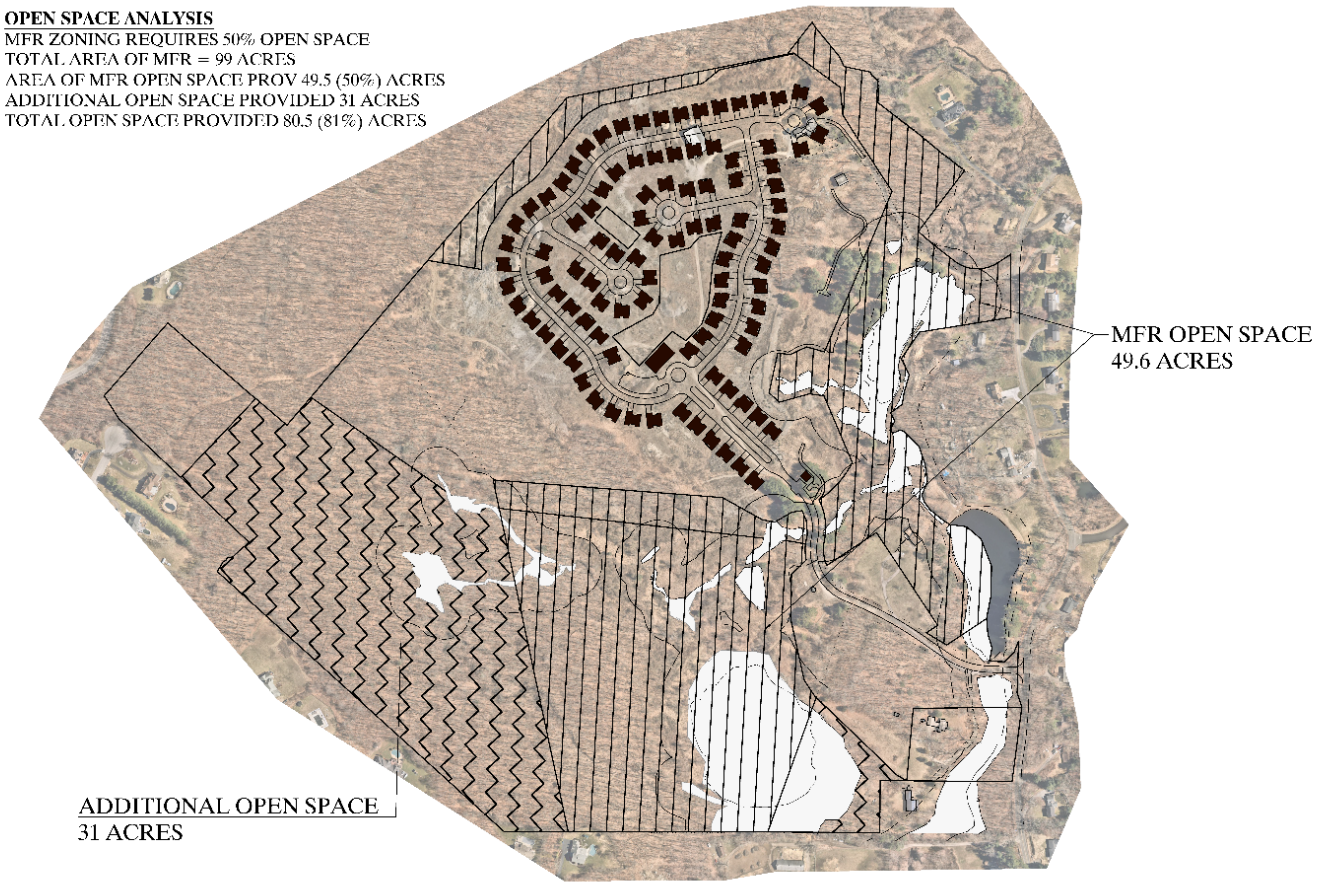
(i) no measurable damage to roadways;

(ii) no measurable damage to land and structures; and

(iii) negligible economic loss.

Open Space and Wetland Impact

The revised development parcel will contain an area of 147 acres. The portion of the site in the MFR zone is 99 acres. The zoning regulations required that 50% of the MFR zone be open space. The proposed plan includes 49.6 acres (50%) of open space within the MFR zone. Additionally, 31 acres of open space are proposed outside of the MFR zone. A total of 81 acres of open space will be provided. This represents roughly 55% of the site and 82% of the MFR area, which exceeds any standards. The open space will be owned and maintained by the development homeowner's association.



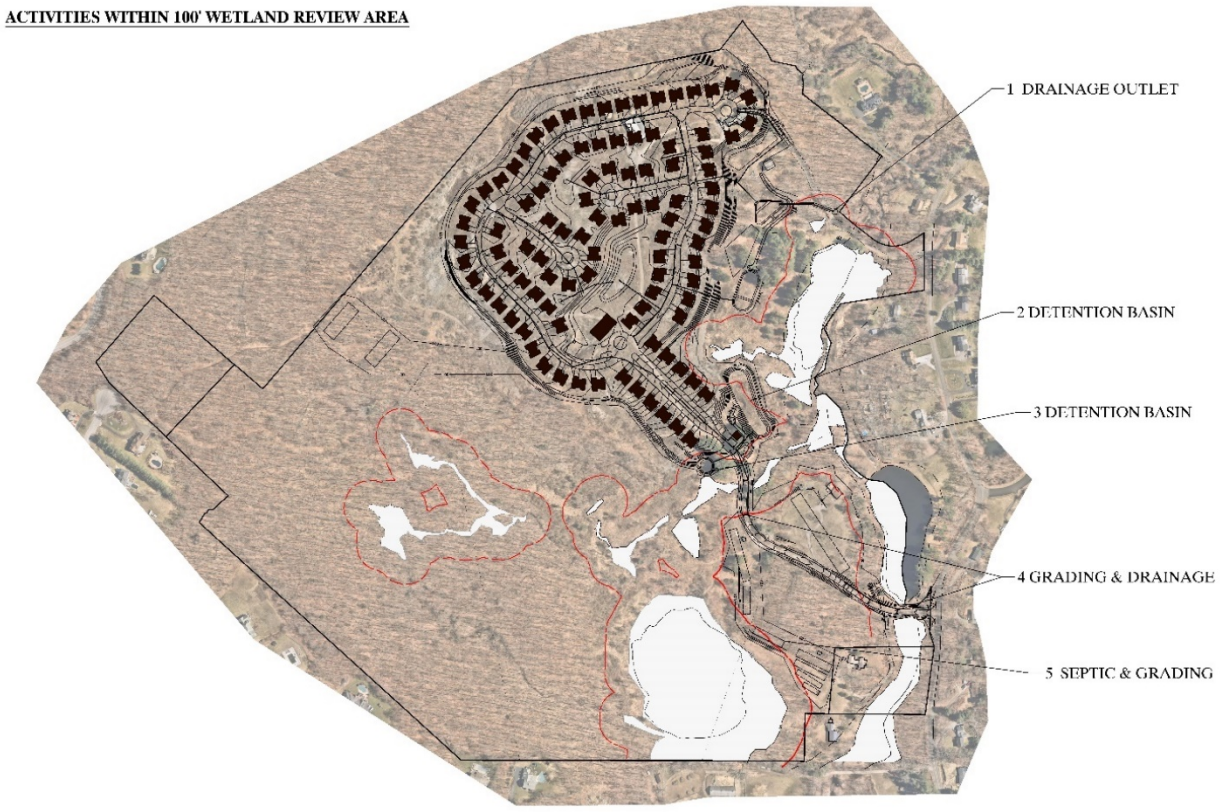
The preservation of open space is considered one of the most effective practices for long term protection of inland wetlands. The below is quoted from the Center of Land Use Education and Research

https://nemo.uconn.edu/watershed-protect 1

Permanent protection as dedicated open space is the ultimate way to ensure that riparian corridors and other critical areas throughout a watershed continue to perform their important functions. Open space acquisition by municipalities and nonprofits like land trusts continues to be the foundation for land protection in Connecticut. Below are links to some statewide organizations that can provide assistance.

NEMO

The proposal includes no direct wetland disturbance, and the regulated area disturbance is approximately 1.71 acres or 74,800sf. This represents 1.1% of the parcel.



Wetlands flags have been freshened on the site to provide clarity if a site walk is required. A wetland report has been included with the submission.

Sanitary Wastewater Treatment Design

The proposed development anticipated an average daily flow of approximately 40,000gpd. Per Sec. 19-13-B104 of the CT health code designs in excess of 7500gpd shall be directed to the Commissioner of Environmental Protection. This is more commonly referred to as CT DEEP.

The design of this wastewater treatment system has been ongoing since 2006. Currently the property has an active approval from DEEP for a treatment system design with an average daily flow of 20,050gpd.

Furthermore, extensive testing and analysis has been completed in additional leaching areas. A report from WSP has been provided with the submission. The results of this analysis indicate that there is capacity for an additional 18,000gpd of average daily flow.

More recently, another leaching area was identified and preliminary analysis indicates capacity for approximately 10,000gpd of average daily flow. The results of this analysis have been included in the submission.

All of the leaching system areas are identified on the plans and reports including calculations and soil data for each are also provided.

The proposal includes a Zenon on-site wastewater treatment plant which will provide treatment in excess of the minimum CT DEEP requirement. The table below indicates the post treatment effluent water quality.

1.3 Effluent Quality

The following performance parameters are expected upon equipment startup and once the biological system has stabilized based on the data listed in section 1.1 and 1.2.

BOD_5	<5	mg/L
TSS	<5	mg/L
TN [1]	<10	mg/L
NH_3-N	<1	mg/L
TP	<1	mg/L
Turbidity	< 1	NTU

Note 1: TN less than 10mg/L corresponds to minimum design temperatures of 10°C and <1.5 mg/L non-biodegradable TKN in the system influent

The CT DEEP wastewater treatment design standards require groundwater studies to verify that distributed wastewater will be fully treated prior to reaching wetlands or reaching the ground surface (21 day travel time). In this case, the design incorporates an onsite wastewater treatment plant. DEEP approval requires that this plant remove pollutants to the levels allowed for direct distribution to surface waters. However, they also require that the design allow for 21 day ground water travel time to fully treat the effluent after it has been fully treated by the plant. To summarize, the waste water from this site will be fully treated for pollutant removal to provide 200% of the standard water quality tolerances.

In November 2006, the Connecticut DEP prepared a Zenon Performance Appraisal. This study was updated in March 2008. At that time there were 12 Zenon plants operating in the State that discharge to subsurface disposal facilities. The conclusion of the 5-year study by the DEP is "Groundwater monitoring located within the zone of influence of the permitted systems has continued to consistently show levels of total nitrogen, total phosphorus and fecal coli form technology are suitable for drinking water and other domestic uses without further treatment, and do not appear to be cause for concern"

The pollutant removal provided by DEEP greatly exceed those of the standard State Health Code approval. Other recently approved projects in Monroe have utilized State Health Code standards to introduce more than 30,000gpd into the ground with no treatment plant and no analysis of ground water travel time. Not to say that this design was not compliant, the health code does not require those calculations. Additionally, portions of the septic system design on the other designs extend to within approximately 10' of the wetlands. The intent of this statement is not to criticize other projects, it is intended to provide perspective on the wetland impact of the current proposal and to demonstrate that the CT DEEP goes to great lengths to provide protection to the wetlands and environment in general.

The discharge from the treatment plant to the leaching beds will be fully treated to DEEP standards, which means that the effluent put into the ground will pose no risk to the wetlands. This is reinforced by the fact that 99% of the proposed leaching areas are more than 100 feet from a wetland. And 100% are more than 80' from a wetland. The proposed design also includes extensive calculations to demonstrate that all of the discharged effluent will exceed the required 21 day travel time to wetlands, as required by DEEP.

PERMIT PROCESS

As stated above, CT DEEP has approved the Zenon wastewater treatment plant and the leaching system on this project for a design flow of 20,250gpd. This permit was issued based on the wetlands and zoning approval received in 2006. Without those approvals DEEP would not have issued a permit, accepted an application, or reviewed the plans for permit approval.

Included with this application is “attachment Q” of the 2006 DEEP “application for wastewater discharge”. This attachment provides copies of local approvals which were required by CT DEEP.

The typical sequence for projects requiring a CT DEEP wastewater discharger permit is as follows:

1. Preliminary site investigation to determine treatment area feasibility
2. Site design and calculation of preliminary discharge estimates
3. Prepare detailed soil and groundwater study. Prepare groundwater mounding model. This study provides the available design flow capacity.
4. Prepare engineered site plans.
5. Submit local permit applications
6. Obtain local permits.
7. Submit DEEP permit applications
8. Prepare final DEEP design drawings
9. Obtain DEEP permit to construct
10. Obtain local building permit and begin construction

This development is unique because a portion of it is already DEEP permitted, but the local zoning and inland wetland permits have expired. Additional evidence of this permitting sequence are apparent in the Monroe zoning regulations.

The Monroe zoning regulations make the following statements in regard to wastewater and the MFR zone

§3.4.2

B. In an MFR District, the property shall be suitable for the long-term disposal of sanitary waste effluent without danger to public health by an environmentally suitable and legally acceptable method.

§3.4.10

B. Sewerage System

(1) All buildings shall be served by an environmentally suitable sanitary waste treatment and disposal system that conforms to all applicable requirements of local, State and Federal law and shall be certified by a Connecticut licensed professional engineer. The sanitary waste treatment and disposal system must be approved for construction by all relevant Federal, State and local authorities prior to the issuance of the written zoning certification needed for a building permit. ***All necessary permits for the discharge of wastewater shall be obtained and presented to the Commission or its authorized agent prior to the issuance of a final Zoning Certificate of Compliance or Certificate of Occupancy.***

(4) In the case where there is a community septic system serving more than one building, the community septic system must meet all the requirements of State of Connecticut General Statutes, §7-245 through §7-273u, as amended, and the regulations and requirements of the Monroe Water Pollution Control Authority. An agreement for use of the community septic system shall be executed and recorded in the Monroe Land Records ***prior to the issuance of a Certificate of Zoning Compliance for Building Permits.***

These statements make it clear that approval from the planning and zoning commission will be conditional on receiving approval of the septic design by the governing agency. In this case that is CT DEEP. Meaning that the DEEP application, plan review, and permit must follow the zoning approval.

The zoning regulations also prohibit the planning and zoning commission to render a decision until the inland wetland commission has ruled.

§8.1.3 Application Requirements

B. For a Special Exception Permit application involving an activity regulated pursuant to Connecticut General Statutes §22a-36 to §22a-45, inclusive, the applicant shall submit an application for a permit to the Inland Wetlands Commission no later than the day such application is filed with the Commission. The applicant shall provide documentation of said filing. ***The Commission shall not render a decision on the application until the Inland Wetlands Commission has submitted to it a report in accordance with the standards of the Connecticut General Statutes, as amended, which report shall be given due consideration by the Commission in making its decision.***

To summarize, submitting an application for plan review and permit is not possible without first obtaining an inland wetland approval and planning and zoning approval from the local municipality

The permitting sequence protects the town from environmental risk. The purpose of the Department of Environmental Protection, is to protect the environment. By conditioning town approvals on DEEP review, it passes the resource burden and liability to the state of Connecticut. It also allows the developer to obtain local permits prior to undertaking the large of expense of a complete treatment system design. It is the developer who takes the risk of a potential DEEP denial or forced reduction of flow.

Stormwater

The stormwater treatment system meets or exceeds all standards of the 2004 Connecticut Stormwater Quality Manual. A detailed report including hydrologic and hydraulic calculations have been included along with results of all soil testing completed within the proposed stormwater basins. Current NOAA atlas rainfall depths and intensities were used in the calculations. The tables below indicate the reduction in peak flows and runoff volumes that are a result of the design.

Pre and Post Development Peak Flow Summary

Design Point	Design Storm	Existing Peak Flow (cfs)	Proposed Peak Flow (cfs)	Change in Peak Flow (cfs)
DP 1 (East of Project Area)	2	35.89	28.53	-7.36
	5	61.89	55.9	-5.99
	10	87.17	80.06	-7.11
	25	121.41	113.53	-7.88
	50	146.57	143.8	-2.77
	100	173.62	173.54	-0.08

Pre and Post Development Runoff Volume Summary

Design Point	Design Storm	Existing Runoff Vol. (ac-ft)	Proposed Runoff Vol. (ac-ft)	Change in Peak Flow (ac-ft)
DP 1 (East of Project Area)	2	11.203	10.497	-0.706
	5	18.748	18.222	-0.526
	10	25.583	25.189	-0.394
	25	35.621	35.387	-0.234
	50	43.407	43.277	-0.13
	100	52.025	51.994	-0.031

The plans also meet or exceed all standards of the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. Details can be found within the plan set and report.

Alternatives

In the past 22 years many different alternative layout have been prepared. Most recently in November of 2022 a plan similar to the current proposal was submitted to the commission and later withdrawn. That plan proposed 90 single family homes in roughly the same footprint as the current proposal.

With this application we have submitted 2 additional alternatives:

1. Alternative 1: This plan includes development of the same currently proposed 99 unit layout but in addition a 196 unit apartment complex would be constructed on the parcel know as 33 Cobbler Court. This complex is similar in design and concept to the recently approved projects in other parts of town. The exception being that all septic areas will be outside for the 100' regulated area. The complex would be served by onsite septic systems that would be sized to be less than 7500gpd and would therefore be permitted by the state health department rather than DEEP. As noted above, these requirements allow more discharge with less verification of impact.

2. Alternative 2: This plan includes the above-mentioned 196-unit complex along with a large apartment complex in place of the proposed single-family homes. The complex would be served by onsite septic systems that would be sized to be less than 7500gpd and would therefore be permitted by the state health department rather than DEEP. As noted above, these requirements allow more discharge with less verification of impact.

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Both alternatives are less desirable to the developer and more impactful to the environment. Open space areas would be significantly reduced from the current proposal and both projects would introduce more untreated wastewater into the ground.

Conclusion

At the time the owner purchased the property there was an illegal quarry operation on the site that needed to be addressed. In collaboration with the Town of Monroe, the owner completed a restoration at his own expense and in doing so the Town of Monroe saw it fit to approve a residential development on the site. Due to economic conditions beyond any of our control, the project was not viable to build at that time. Over the past 20 years the owner has paid in excess of $2,000,000 in property taxes and has been provided no services in return. He has spent thousands more in design costs and legal fees to prepare a design that presents no impact to the wetlands, provides enormous amounts of open space and, if approved, will provide an estimated $1,188,000 - $1,485,000 in annual tax revenue to the town.

At this point the owner must somehow recoup at least a portion of this huge investment. What is proposed would be in harmony with the singe family housing character that Monroe offers. The alternatives would require an approval path that limits the input and control the town and its residents would have over the development.

Some key points of the current proposal:

1. There is no proposed direct wetland impact
2. 98% of the proposed site disturbance is outside of the 100' regulated area
3. Septic system design is regulated by DEEP and will provide the greatest levels of environmental protection
4. 81 acres of permanent open space will be provide
5. A water main will be extended which will provide additional public water service to town residents
6. The proposed design is fully compliant with Town of Monroe zoning regulations
7. An extensive stormwater treatment system is provided. The design exceeds CT DEEP standards

In summary, it is our professional opinion the proposed development, including the on-site wastewater disposal system will:

(a) not result in an adverse impact to a wetlands or watercourse;
(b) satisfy the factors for consideration provided by Section 22a-41 of the Connecticut General Statutes;
(c) satisfy the criteria provided by the Commission's Regulations. The housing proposal is not reasonably likely to result in the unreasonable pollution, impairment or destruction of the public trust in the air, water or other natural resource of the State of Connecticut.

ATTACHMENT Q
2006 DEEP APPLICATION

FITZPATRICK, FRAY & BOLOGNA LLC

ATTORNEYS AT LAW

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JOHN T. FITZPATRICK
(1925-1989)
JOHN P. FRAY
OF COUNSEL

June 16, 2006

Antoanela Daha
Engineer Intern
State of Connecticut
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

RE: Quarry Ridge, Monroe

Dear Antoanela Daha:

I write in response to your concerns regarding restrictions on the use of the units in the above-referenced development to an aged population.

First, I enclose a copy of Monroe Planning and Zoning Final Decision dated September 18, 2003 which was apparently inadvertently omitted from my last letter. I call your attention to paragraph 21 of that document, which was quoted at length in my May 3, 2005 letter.

Second, I enclose for your review the following documentation per your request:

1. Deed form for each unit, containing age restriction, to be recorded on the Land Records of the Town of Monroe.

2. Affidavit to be signed by each Buyer/Owner acknowledging permanent deeded use restriction.

3. Article to be contained in Declaration of Common Interest Community, to be recorded on the Land Records of the Town of Monroe.

4. Declaration of Age Restricted Unit Occupancy to be separately and additionally recorded on the Land Records of the Town of Monroe.

5. Plan of Compliance to be included in Declaration of Common Interest Community.

I believe these five items meet your stated concerns. If we can be of further assistance, please contact me.

Sincerely yours,

William J. Fitzpatrick, III

WFJ:sa
Enc(s) 6
cc: William Carboni, Spath-Bjorklund, Judy Wren, Trumbull-Monroe Health Department, David Bienashski, Quarry Ridge Associates LLC

Town of Monroe

PLANNING AND ZONING DEPARTMENT

- Planning and Zoning Commission
- Zoning Board of Appeals
- Zoning Enforcement Officer

COPY

September 25, 2003

David Bienashski
Quarry Ridge Associates, LLC
201 Turkey Roost Road
Monroe, CT 06468

Re: Zone Change / Special Exception Permit
201 Turkey Roost Road -- Design Residence District Site Plan

Dear Mr. Bienashski:

Please be advised that the Town Planning and Zoning Commission, at its regular meeting of September 18, 2003, voted to approve your application for a change of zone from Residential and Farming District D (RD) to Design Residence District (DR) for land consisting of 100 acres, more or less. Also, approved was the companion special exception permit for site plan of development (conceptual) for construction of residential occupancy units, accessory structures and appurtenances, and other associated site improvements under a DR District site plan.

You should further be advised that the application was approved subject to specific conditions as detailed in the action on the application.

Enclosed you will find a copy of the record of the action. This document will detail the findings for the decision and will include the conditions attached to, and made part of the approval. It should be considered as part of this formal notice of action. Please review the document carefully to be aware of the specific details and obligations under the approval.

Also, enclosed please find a copy of the office draft of the legal notice of decision.

Should you have any specific questions, or, for other more detailed information concerning the Commission's action, please feel free to contact me at your convenience.

Very truly yours,

Daniel A. Tuba
Town Planner
Clerk of the Commission

Enclosures (2)

cc: Attorney William J. Fitzpatrick, III (w/enc.)
David S. Bjorklund, Jr., PE (w/enc.)
Jarett Crooks, AIA (w/enc.)
Sherwood Lovejoy, Director of Public Works (w/enc.)
Richard Jacobson, Inland Wetlands Administrator (w/enc.)
John Brandt, Zoning Enforcement Officer (w/enc.)
John Salvatore, Chief of Police (w/enc.)
Elizabeth Duffy, Assessor (w/enc.)

CERTIFIED MAIL #7099 3220 0008 3393 6923 RRR

PLANNING & ZONING COMMISSION
FINAL DECISION

SEPTEMBER 18, 2003

APPLICATION OF
QUARRY RIDGE ASSOCIATES, LLC
201 TURKEY ROOST ROAD

A motion by Robert Martin, seconded by Wm. Mark Michaels, that upon due and deliberate consideration of the application, supporting materials and documents, the record in general, and all relevant testimony, the Planning and Zoning Commission ("Commission") votes to approve the application of Quarry Ridge Associates, LLC, based upon the following reasons and findings of fact:

1. The Commission finds that the proposal is consistent with the "Monroe 2000 Plan of Conservation & Development" in that

    a) it furthers the community structure strategies by providing flexibility in residential development patterns and housing opportunities;

    b) it furthers the housing and residential area strategies by presenting opportunity for the development of more diverse types of housing;

    c) it addresses an identified local housing need by providing housing dedicated to senior adults;

    d) it promotes the protection and physical character of the community by restoring and redeveloping a site devastated by a formerly unbridled nonconforming excavation activity that would remain a scar and negative quality long into the future, while remaining an environmental problem for future generations to resolve;

    e) it promotes the natural resource conservation strategies of the plan through its design, restoration and redevelopment plan features;

    f) it furthers infrastructure strategies by the expansion of public water service to provide for water supply and fire protection.

2. The Commission finds the density of the proposal to be consistent with similar residential development and regulations of the town, particularly that of the Design Residential District, and further, the proposed design of buildings will be adequate to preserve the appearance and character of the neighborhood and community in general.

3. The Commission finds the proposal to be consistent with, and designed in accordance with the applicable zoning regulations for such, particularly those of the Design Residential District.

4. The Commission finds that the use, building, structures and improvements will not be detrimental to the health safety, and welfare of the neighborhood and will be in harmony with, and will not negatively impact the appropriate orderly development of the town; and further, upon completion of improvements the proposal will have no significant detrimental impact upon the environment.

5. The Commission finds that the proposal can be supported by existing and projected infrastructure, specifically

    a) evaluation of road conditions and existing and projected vehicle trips by the traffic analysis demonstrates there to be adequate capacity to accept the additional contribution from the proposal without creating any major impact

    b) the site can and will be served by public water supply

    c) existing and proposed stormwater structures can adequately accommodate any increase in runoff.

6. The Commission finds that by the results of the testing of the characteristics of the soils, and subsequent documentation of the civil sanitary engineer, the site will be suitable for the long-term disposal of sanitary waste effluent without danger to public health or the general welfare of the community.

7. The Commission finds that the proposal can be served by present or projected community facilities without undue cost to the town.

8. The Commission finds that the lot is of sufficient size and adequate dimension to permit construction of the proposal in such a manner as will not be detrimental to the neighborhood and community in general.

9. The Commission finds that no factual evidence, testimony or other documentation has been introduced to contradict the aforesaid findings.

10. The Commission makes no finding regarding inland wetland impacts.

FURTHER, based upon the aforesaid reasons and findings the change of zone element of the proposal is approved effective October 1, 2003;

FURTHER, the approval of the special exception permit is given subject to the following specific conditions:

1. The following titled plans including revisions and additions hereafter specified by the Commission shall be the approved plans of record and the basis for all final construction plans --

   - "Granite Ridge Active Adult Community in Monroe, Connecticut Prepared For Quarry Ridge Associates, LLC," dated 6/27/03, prepared by Spath-Bjorklund Associates, Inc. Consulting Engineers and Surveyors, Monroe, Connecticut, David S. Bjorklund, Jr., P.E.

     Said plans containing in all three (3) pages incorporate survey compilation and conceptual engineering site improvement details.

   - Additionally, display exhibits providing greater detail and scale, submitted at the public hearing, are incorporated as basis for final design.

   - Additionally included are five (5) pages of landscape designs and details prepared (pages LP-1 thru LP-5) by Environmental Land Solutions, LLC, which shall be the basis of the landscape site design.

   - Additionally included are four (4) pages of conceptual clubhouse and dwelling designs and architectural details prepared by Jarrett Crooks, AIA which shall be the basis of the dwelling construction plans.

2. For the purpose of this permit the words "applicant," "owner," "developer" or "permittee" may be used interchangeably and shall refer to the applicant of record Quarry Ridge Associates, LLC, its heirs, assigns and successors;

   the term "Commission" shall mean the Monroe Town Planning and Zoning Commission;

   the term "DEP" shall mean State of Connecticut Department of Environmental Protection;

   the words "site," "property" or "premises" may be used interchangeably and shall refer to all of the land subject to the application and approval;

   the words "project," "work" or "improvements" may be used interchangeably and shall refer to the development of the site as authorized under the approval of this application.

3. The "Conditions Of Restoration By Quarry Ridge Associates LLC, Renz Site, Turkey Roost Road, As Approved By The Planning & Zoning Commission May 1, 2003," as they appear in a document bearing that title, are incorporated by reference and shall be the basis of both site preparation and final project construction plans.

4. Before commencement of the project, or each project section (if applicable), the permittee shall prepare and submit final construction plans to the Town's engineers for their approval and recommendation to the Commission. Upon completion of review of recommendations, and incorporating such modifications as may be deemed necessary, the Commission will issue a formal construction authorization. This requirement shall not preclude work required to be performed under the aforesaid conditions of restoration (condition no. 3).

5. This approval is for a special exception permit of a site plan of development, or concept plan, under §117-1010B of the zoning regulations. All final construction plans shall be completed based on this concept unless otherwise modified by the terms of this approval.

6. Recognizing that the concept plan is in fact a preliminary design plan, adjustments may be made and are expected in final construction design as continued engineering investigation and design refines the proposal and its details.

7. In the final construction plans final disposition of all existing structures shall be determined. subject to approval by the Commission.

8. There shall not be allowed radical departure from the plan in terms of area to be disturbed. Changes creating less disturbance will be acceptable; changes creating greater disturbance shall be submitted for further decision by the Commission.

9. The following elements shall be modified from the original concept and incorporated into the final design:

   a) The two parallel internal driveway loops at the west side of the project along with the adjacent dwellings shall be reconfigured into a single loop to reduce congestion and density and provide for more adequate common space.

   b) The overall maximum project density shall not exceed 90 dwelling units, all of which shall be detached.

   c) The proposed central pond shall be subject to more detailed engineering investigation to assure adequate flow and avoid stagnation, and if warranted, shall be reconfigured to achieve such conditions.

fish and shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization, wetland wildlife habitat, recreational value, educational/scientific value, uniqueness, visual/aesthetic quality and threatened and endangered species habitat.

The degree to which a wetland provides each of these functions is determined by one or more of the following factors: landscape position, substrate, hydrology, vegetation, history of disturbance, and size. Each wetland may provide one or more of the listed functions at significant levels. The determining factors that affect the level of function provided by a wetland can often be broken into two categories. The effectiveness of a wetland to provide a specified function is generally dependent on factors within the wetland whereas the opportunity to provide a function is often influenced by the wetland's position in the landscape as well as adjacent land uses. For example, a depressed wetland with a restricted outlet may be considered highly effective in trapping sediment due to the long residence time of runoff water passing through the system. If this wetland is located in gently sloping woodland, however, there is no significant source of sediment in the runoff therefore the wetland is considered to have a small opportunity of providing this function.

Table 1: Summary of Wetland Functions and Values

Wetland Functions and Values	Groundwater Recharge/Discharge	Sediment/Shoreline Stabilization	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/Toxicant/ Pathogen Retention	Nutrient Removal/Attenuation	Production Export	Wildlife Habitat	Recreation	Educational/Scientific Value	Uniqueness/Heritage	Visual Quality/Aesthetics	Listed Species Habitat
Wetland 1	S	N/A	N/A	N/A	S	S	S	S	U	U	U	U	U
Wetland 2	P	S	P	S	P	P	S	S	U	U	U	U	U

Suitability

P = principal function

S = secondary function

U = function unlikely to be provided at a significant level

N/A = not applicable

10. No commencement of work shall be permitted until such time as a valid inland wetland permit is effective, based upon formal construction plan proposal.

11. All underground fuel (or similar) storage tanks and appurtenances, should they exist, shall be removed from the site and certification provided to the Commission of such removal and disposition.

12. As specified by the applicant the project shall be served by public water supply. The site may similarly be supplied by other diverse public utilities which may be required to be installed under and within the travelway of Turkey Roost Road and other town streets. The permittee shall, upon the completion of all such service installations restore and repave (overlay) applicable portions of town streets, including Turkey Roost Road for its entire width for a length beginning from the initial excavation point of extension to a point one hundred feet beyond the end of such extension. Such overlay repaving shall meet the standards of the Public Works Department.

13. Should the development of this site be contemplated in sections or phases the developer shall convey this information to the P&Z Department prior to the initiation of work in the form of a plan clearly delineating the section lines. Sections used for sales and marketing shall coincide with those filed with the town; no arbitrary deviation will be permitted.

14. Activities occurring within the public right-of-way (i.e. water main or utility extension, sight line improvement, etc.) may proceed without formal Commission authorization, but subject to authorization and under the supervision of the Director of Public Works.

15. All road or sight line approvals as determined by the Director of Public Works shall be completed before the issue of any Certificate of Occupancy. Internal roads or driveways leading to the town street shall be paved to a driveway point of access to a dwelling unit before such unit is issued a Certificate of Occupancy.

16. No topsoil shall be removed from the site until completion of either the section or the project. Excess materials may be authorized for removal by the Director of Public Works but only after determining that the material is excess and not needed for completion of the work.

17. Every effort shall be made to protect the woodland aspect of the property.

18. Reasonable field changes may be required on site by town staff as the situation may require. These changes are permitted so long as they do not significantly alter the intent or design of the concept or construction plans.

19. As the dwelling units in this approval are of a "Design Residence" nature, once completed and delivered by the developer no change, addition or other exterior alteration may be made. The restriction of this condition shall apply similarly to other structures (i.e. outbuildings, pools, landscape appurtenances, and similar). This limitation shall be placed prominently in the seller's offering and closing documentation.

20. The seller shall clearly state the method of ownership of the project specifically stating that this is not subdivided land and that there are no lots. This limitation shall be placed prominently in the seller's offering and closing documentation. The term "Lot," by itself or associated with any other word or term, shall not be used in conjunction with marketing and sales.

21. In accordance with the provisions of the federal *Fair Housing Act*, no less than eighty (80%) per cent of the dwelling units shall occupied by at least one person of fifty-five (55) years of age or older, provided however, that in no case shall there be occupancy by persons under the age of eighteen (18) for a period not to exceed 120 days in any calendar year.

    This restriction shall be placed prominently in the seller's offering and closing documentation. It shall also be included in the declaration of the housing community association as a non-amendable provision, except as may be required by the federal *Fair Housing Act* or other applicable laws. The community association shall be responsible at all times of new occupancy for age verification of the prospective occupants.

    Failure to comply with the restrictions and provisions of this condition shall be deemed to be a violation of the permit and as such a violation Zoning Regulations jointly by the community association and the offending occupants.

    Additionally, the community association shall provide annually, on or about the first day of April, an age and occupancy profile of all residents. Such profile shall at a minimum list all of the unit addresses and numbers, the number of occupants, and their ages. Similarly, failure to comply with this requirement shall be deemed to be a violation of the permit and as such a violation Zoning Regulations by the community association.

22. Upon completion of the construction plans, but prior to commencement of improvements the permittee shall accomplish conveyance of the proposed area of Open Space amounting to approximately seven (7) acres as depicted on the exhibit "Display Map." Additionally, the permittee shall conference with the Commission to determine what additional portion of the Dedicated Open Space

depicted on that map will be included in the conveyance and what portion will be permanently protected by conservation easement.

23. A map shall be prepared for recording in the land records documenting the final lines establishing the areas of Open Space to be conveyed to the town and those to be Dedicated under an irrevocable conservation easement, the language for which will be provided by the Commission. The maps and documents shall be filed in the land records upon resolution of the boundaries of these areas. No activity shall be conducted in these areas except as provided in §117-1008C of the zoning regulations.

24. Provide and file at no cost to the town all requisite deeds, easements, covenants, and other similar related documents to be recorded concurrently in the Monroe Land Records with the approved modified conceptual site plan.

25. The naming of all streets and drives shall be approved by the Town Planner before the inclusion in any plan or sales document.

26. It shall be the responsibility of the developer and the successors in title to keep and maintain the entire property clean, free of garbage, junk and other debris. Failure to do so shall constitute a violation of the terms of this permit and a violation of the zoning regulations enforceable as prescribed by applicable state and local laws.

27. No structural (dwelling) building permit shall be issued until sewage disposal approvals and/or permits required to commence such construction have been issued by the agency having such jurisdiction and in a manor set forth in the regulations of such agency.

28. Final construction plans shall bear an endorsement block stating:

"These plans are the final construction plans and have been reviewed by the Director of Public Works and Town Planner.

_____
Town Planner

_____
Director of Public Works"

Said block shall appear in the lower right hand corner of each plan and/or profile page.

29. No signs of any nature, other than normal temporary construction signs are approved by this application. The installation of signs, if needed, shall be approved only through the normal permit procedure of the Commission.

30. Provide and maintain current insurance certificates indemnifying all operations and parties or persons related to the work, with the Town of Monroe named as additional insured, prior to commencement of any work on the site.

31. The developer shall submit all bonds and insurances as required by local and state laws and by the Commission at such times as may be necessary during the term of the overall construction of the project until such time as the improvements or work covered by the applicable bond or insurances is deemed to be acceptably complete by the requesting authority.

32. No structure shall be certified for occupancy and access is continuously paved from the public street to a point beyond the structure; and also until all site improvements are complete or until incomplete site improvements are bonded to the Commission.

33. No structure shall be certified for occupancy until connected to public water supply for domestic use.

34. The term of the site plan approval shall be eight years from the effective date of approval, which date may be subject to extension upon written request to the Commission.

35. All improvements, including drainage construction, are to be installed based upon final plan design and in accordance with best engineering practice. Inspection of said improvements are to be performed by the design engineer who shall be a professional engineer licensed to practice in the state of Connecticut who shall provide reports of such inspections as may be requested by town agents.

36. A pre-construction conference is to be held with the developer and/or general contractor, engineer and architect, and representatives of the town's Development Services Group prior to work on the premises. Additional job meetings may be called as deemed necessary throughout the construction phase of the project.

37. The construction of all improvements subject to local jurisdiction shall be conducted under inspection supervision by members of the Development Services Group or their authorized representatives.

38. Provision of copies of plans, details and/or specifications, as may be required by town or state agencies from time to time.

39. Upon completion of the project and all of its improvements, plans of "As-built" improvements shall be provided in a form and quantity acceptable to the Director of Public Works and Town Planner. Said As-built plans shall include the locations of all physical and man-made improvements both above and below ground, channel and wetland lines, easement areas, pipe and spot elevations, and specific contour elevations (only where and if deemed necessary).

40. Any issue not specifically addressed by this permit be governed by applicable local, state or federal regulations, as the case may be.

41. Should this action be the subject of an appeal to the courts, no time limit specified herein shall begin to run until all potential elements of such litigation are fully concluded (date of final court action).

42. Failure to meet any specified condition of this approval or maintain compliance with applicable local, state or federal ordinance, regulation or laws may result in the ordered suspension of construction authorizations until such time as such failure or noncompliance has been satisfactorily resolved.

43. Should any changes in site plan be contemplated, they shall be submitted to the Commission for review. Should any changes be considered as major or beyond the scope of the concept plan they shall be applied for under a special exception permit application to modify the approved plan. Minor changes are considered by the Commission as those which do not change the substance, impact or general locations involved in the proposal and may be authorized by the Commission after appropriate review.

44. It is the responsibility of the owner/developer/permittee to notify the Planning and Zoning Department of any change in the status of ownership and/or contractor(s) and/or professional design or inspection consultants involved in the proposal. Additionally, it is the responsibility of the owner/developer to notify any new owner and/or contractor(s) and/or consultants of all construction requirements including all job meeting notes and inspection notes produced up to the date of any such change in project related personnel.

45. This permit and all conditions specified herein shall be binding in perpetuity upon the applicant and property owner and his (their) heirs, assigns and successors unless otherwise amended by a subsequent act of the Commission.

46. This permit and all conditions specified herein shall be binding in perpetuity upon the parcels and premises unless otherwise amended or invalidated under the terms of this approval or a subsequent act of the Commission.

47. The permittee shall be responsible for recording the special exception permit document (which will be provided by the Planning & Zoning Department) in the Monroe Land Records. Failure to record said document within ninety (90) days of the date of approval shall render this approval null and void.

48. The effective date of the special exception permit and site plan shall be concurrent with the zone change.

The motion is approved by a vote of 4 - 1

(VOTING RECORD FOLLOWS)

MOTION NO. 4 VOTING RECORD —	
IN FAVOR OF THE MOTION (4)	IN OPPOSITION TO THE MOTION (1)
ABATE, ANDREW MARTIN, ROBERT MICHAELS, WM. MARK PAVIA, DONALD (ALT)	MOORE, CHARLES (ALT)
OTHERS PRESENT – NOT VOTING: SCHOLLER, SUSAN, POTHIER, DEBORAH (ALT)	
ABSENT: NONE	

Wetland Assessment and Impact Evaluation

Quarry Ridge Residential Development
Turkey Roost Road, Monroe

Submitted To:
Jason Edwards
J. Edwards and Associates, LLC
225 Stepney Road
Easton, CT 06612

Prepared By:

Davison Environmental, LLC
Eric Davison,
Wildlife Biologist
Registered Soil Scientist
Certified Professional Wetland Scientist

March 20, 2023

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1.0 INTRODUCTION

Davison Environmental, LLC has prepared this wetland assessment and impact evaluation in conjunction with an Inland Wetlands and Watercourses Commission application to the Town of Monroe for a proposed development ("Project") on a 117-acre property located north of Turkey Roost Road in Monroe (the "Site" hereinafter). The Site is accessed from Turkey Roost Road to the south, and roughly borders Pinto Lane to the west and Morgan Lane to the north. See Appendix B - Figures 1 and 2 illustrating the Site location.

2.0 EXISTING ENVIRONMENT

2.1 General Site Description

Site photographs are provided in Appendix A. The Site is currently undeveloped and consists of a former gravel mine that has been left fallow for a number of years. The former mining areas were allowed to revegetate naturally, and now consist of "old field"[1] habitat dominated by invasive non-native species along with native pioneer species. Mining activity is visible on historical aerial photography as early as 1952 (source: Connecticut State Library). Mining activity was largely focused on the southern portions of the Site, where sand and gravel surficial material was present. The eastern half of the site consists of mixed hardwood forest and forested wetlands.

2.2 Surficial Geology and Watershed

The surficial materials at the site have been modified by the historic mining activity which stripped the upper layers of material from the Site. The Site's surficial geology is comprised of sand and gravel along the southern portions of the Site, with thin till dominated the northern portion of the Site. Most of the Site consists of thin glacial till. Tills are ice-laid deposits were derived directly from the ice and consist of non-sorted, generally non-stratified mixtures of grain-sizes ranging from clay to large boulders. The matrix of most tills is predominantly sand and silt and boulders can be sparse to abundant. Some tills contain lenses of sorted sand and gravel and occasionally masses of laminated fine-grained sediment.

Sand and gravel surficial materials are glacial meltwater deposits that were laid down in glacial streams, lakes and ponds which occupied the valleys and lowlands of Connecticut as the last ice sheet melted away to the north. They are composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. They are often composed of

[1] Old Field habitat refers to habitats that contain an interspersion of shrubs and small trees (typically less than 30% total cover) interspersed with herbaceous vegetation consisting of grasses and forbs.

layers of well-to-poorly sorted sands, gravels, silts and clays with few to no boulders, and owing to their water-related depositional origins they have many characteristics that are favorable for development.

The Site is located within the Halfway River watershed. Along the southern portions of the Site is Smith Pond Brook which drains in a northeasterly direction into Copper Mill Brook which flows along the eastern side of the Site. Smith Pond Brook drains north into the Halfway River north of Hammertown Road. See Figure 1 – *Location Map* which illustrates these waterway locations.

2.3 Wetland Delineation and Soil Types

Wetlands and watercourses are regulated in the State of Connecticut General Statutes, Chapter 440, sections 22a-28 to 22a-45. Inland Wetlands "means land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the National Resources Conservation Service (NRCS) of the United States Department of Agriculture" section 22a-38(15).

Davison Environmental, LLC Registered Soil Scientists Michael Klein and Eric Davison delineated Site wetlands in June of 2020. Wetlands were delineated by walking across the Site and examining the soil profile using a hand auger to a minimum depth of 20 inches in order to determine soil drainage class.

Digitally available updated soil survey information was obtained from the Natural Resources Conservation Service and generally confirmed during the field investigation, with the exception of historic material extraction areas which presented as a modified condition of the relevant native soil. Soil classifications present on the property are as follows:

Wetland Soils

Wetland soils on the site consist of the Ridgebury, Leicester and Whitman complex, Aquents, the Saco series and the Rippowam series. The Ridgebury, Leicester and Whitman complex is an undifferentiated mapping unit consisting of two poorly drained (Ridgebury and Leicester) and one very poorly drained (Whitman) soil developed on glacial till in depressions and drainageways in uplands and valleys. Their use interpretations are very similar, and they typically are so intermingled on the landscape that separation is not practical. The Ridgebury and Leicester series have a seasonal high water table at or near the surface (0-6") from fall through spring. They differ in that the Leicester soil has a more friable compact layer or hardpan, while the Ridgebury soils have a dense to very dense compact layer. The Whitman soil has a high water table for much of the year and may frequently be ponded.

The Aquents map unit is a miscellaneous land type used to denote man-made or man-disturbed areas that are wet. This soil condition dominates the former mining areas of the Site. These soils have an aquic soil moisture regime and can be expected to support hydrophytic vegetation. Typically, these soils occur in places where less than 2 feet of earthen material have been placed over poorly or very poorly drained soils; areas where the natural soils have been mixed so that the natural soil layers are not identifiable; or where the soil materials have been excavated to the watertable.

The Rippowam series consists of very deep, poorly drained loamy soils formed in alluvial sediments. They are nearly level soils on flood plains subject to frequent flooding. Permeability is moderate or moderately rapid in the loamy layers and rapid or very rapid in the underlying sandy materials.

The Saco series consists of very deep, very poorly drained soils formed in silty alluvial deposits. They are nearly level soils on flood plains, subject to frequent flooding. Depth to the coarse-textured substratum layers is more than 40 inches. The surface soil is very dark gray to black silt loam, underlain directly by a mottled, gray to grayish brown substratum. Some pedons have a mucky surface up to 5 inches thick. The soils formed in depressions in recent silty alluvium. In places water is ponded on the surface from late fall through early spring. These soils flood in the spring and after periods of heavy rainfall.

Non-Wetland Soils

The non-wetland soils were not examined in detail, except as was necessary to determine the wetland boundary. Non-wetland soils consist primarily of Udorthents associated with the historic site disturbance. Native soil types present in whole or modified from mining activity include the Canton and Charlton complex and the Charlton-Chatfield complex.

The Canton series consists of very deep, well drained soils formed in a loamy mantle underlain by sandy glacial till. They are on nearly level to very steep glaciated plains, hills, and ridges. Permeability is moderately rapid in the solum and rapid in the substratum. The soils developed in a fine sandy loam mantle over acid sandy glacial till of Wisconsin age derived mainly from granite and gneiss and some fine-grained sandstone.

The Charlton series is a very deep, well drained loamy soil formed in friable till. They are nearly level to very steep soils on till plains and hills. Depth to bedrock and the seasonal high water table is commonly more than 6 feet.

The Chatfield series consists of moderately deep, well drained, and somewhat excessively drained soils formed in till. They are nearly level to very steep soils on glaciated plains, hills, and ridges. Crystalline bedrock is at depths of 20 to 40 inches. The soils formed in a moderately thick mantle of glacial till overlying granite, gneiss, or schist bedrock. Rock outcrops are rare to common and are limited to the more resistant bedrock.

2.4 Wetland Description

Wetlands consist of: (1) a single small, isolated wetland (Wetland 1) located in the northeast corner of the Site; and (2) a large, interconnected wetland system that runs along the southern and eastern portions of the Site (Wetland 2). The physical, hydrologic and vegetative conditions of these two wetland areas are described in detail in the following sections:

Wetland 1

Wetland 1 is demarcated by flags 1X-16X shown on Sheet S6. It is a small, isolate forested wetland with a temporarily flooded hydrology. The wetland appears to be entirely anthropogenic in origin, with the topography showing evidence of creation by heavy equipment. It has two inlets, one on the south side and one on the west side, and the internal flows discharges from the wetland into a culvert on the north side. The outlet culvert is partially buried in sediment.

The vegetation consists of upland tree cover of black birch (*Betula lenta*) on the banks of the wetland along with the invasive non-native autumn olive, with the interior being dominated by multiflora rose (*Rosa mutliflora*), along with goldenrods (*Solidago sp.*).

Wetland 2

Wetland 2 is a large, interconnected wetland system that flows east, draining into Smith Pond Brook. The entirety of the wetland has been altered by the former mining activities, with areas of wetland having been excavated, channelized, and culverts installed to accommodate road crossing. The wetland is described in five segments as noted below:

Wetland 2A: Wetland Area 2A is demarcated by flags 120-175 as shown in Sheet S2/S6. The wetland is a hillside groundwater slope wetland that extends up the slope towards the proposed development area. It terminates just east of proposed Lots 43-45. This wetland area was completely disturbed from the mining activities, and possibly, the wetland was entirely created as a result of the mining which lowered the ground surface elevation resulting in the interception of groundwater and the creation of a hydric soil conditions due to regular groundwater discharge.

Groundwater discharges into the wetland at the two upper slope “fingers” (at the westernmost end) which originate at the base of a steep embankment. Flow travels downslope to the east,

draining into the large northeast pond. Flow is concentrated into a defined channel which is averages approximately 3 feet wide and 1.5 feet in depth. The vegetation consists of young "pioneer" species consistent with a wetland that was recently created. The cover type is scrub-shrub but includes scattered small trees. The dominant canopy species is willow (*Salix sp.*), with the shrub layer being dominated by autumn olive and multiflora rose, the herb layer is dominated by Japanese stiltgrass (*Microstegium vimineum*) along with sedges (*Carex sp.*) and rushes (*Juncus sp.*). The immediately adjacent uplands consist of a dense growth of the invasive non-native mugwort (*Artemesia vulgaris*). The eastern portion of the wetland becomes more steeply sloped which results in the wetland narrowing in width, and the flow becoming higher velocity flow confined to a narrow well-defined channel.

Wetland 2B: Wetland Area 2B is the northeast pond demarcated by flags 96-120, and 175-196 shown on Sheets S2/S6. This is the receiving pond for Wetland 2A. This is a large man-made pond with a well-defined shoreline, with little bordering wetlands. The shoreline is well-vegetated with emergent marsh vegetation. The pond is separated from Smith Pond Brook by a narrow earthen berm along the southeast side of the pond. The pond eventually discharges to Smith Pond Brook near its confluence with Copper Mill Brook. Details of the ponds physical or water quality conditions are not known. The vegetation includes a dense cover of the floating aquatic duckweed (*Lemna minor*), and a shoreline that is densely vegetated with marsh species including the invasive non-native common reed (*Phragmites australis*), along with cattail (*Typha latifolia*), pickerelweed (*Pontederia cordata*), arrow tearthumb (*Persicaria sagittata*) and alder (*Alnus rugosa*).

Wetland 2C: Wetland Area 2C refers to the southwestern portion of the wetland (west of the main access road), demarcated by flags 1X-37X as shown on Sheet S2. Wetland hydrology ranges from semi-permanently flooded along the perimeter of the wetland, and permanently flooded within the interior of the wetland. It is presumed that the wetland's shape and topography resulted from alterations that occurred from the mining operation. It was likely used historically as a settling basin. Water drains out of this wetland slowly (due to the gently sloping topography) to the east where it drains into the culvert and discharges on the east side of the access road.

The vegetation within the interior low elevation portions of the wetland consists of a dense growth of American bur-reed (*Sparganium Americanum*), a grass-like aquatic plant. The dominant plant along the wetland edges is a dense growth of Japanese stiltgrass. The shoreline includes some willow trees, along with gray birch and black birch, but generally has an open canopy.

Wetland 2D: Wetland 2D is demarcated by wetland flags 44-59 and is located on the east side of the interior access road as shown on Sheet S2. It is fed by the culvert outlet from Wetland Area 2C, and discharges to a culvert on the east side of the wetland where there is another culvert crossing. The culvert is in poor condition and is partially buried in sediment. The wetland hydrology is perennial flow, with shallow gentle flow to the east. There is a low central channel bordered by steeply sided banks.

Wetland vegetation is dictated by the deep shade provided by the white pine (*Pinus strobus*) tree canopy bordering the southern side of the wetland. There is little interior wetland vegetation present except for a few small patches of American bur-reed and scattered poison ivy (*Toxicodendron radicans*). The banks of the wetland consist of a dense monoculture of Japanese barberry along with scattered autumn olive along with black birch and red maple (*Acer rubrum*).

Wetland 2E: Wetland Area 2E is located at the downstream side of the culvert discharge from Wetland Area 2D. This wetland area is a high-gradient perennial watercourse with a meandering channel alignment and a stony (gravel-to-cobble sized) stream bottom. The banks are steeply sloping with no bordering wetlands. This stream segment drains east into Smith Pond Brook.

The shoreline vegetation consists of hardwood tree species including black birch, red maple, sugar maple and hickories (*Carya sp.*). The shrub cover is dominated by autumn olive, and the groundcover consists of poison ivy, Christmas fern (*Polystichum acrostichoides*) and Asiatic bittersweet.

2.5 Rare Species Habitat

Field surveys to inventory Site wildlife were not conducted as a part of our work. Based on a review of the most recently updated (June 2021) Connecticut Department of Energy and Environmental Protection Natural Diversity Database (NDDB) mapping, NDDB records overlap the Site. Additionally, a single adult male eastern box turtle (*Terrapene c. carolina*), a State-listed species of special concern, was observed during the wetland delineation work in June, west of Sheet S2 in the 32.68 acre proposed open space parcel. The turtle was found basking at the edge of the mixed hardwood forest, near the forest/old field interface near the edge of a wetland.

3.0 WETLAND FUNCTIONS AND VALUES

3.1 Wetland Functions and Values

The functions and values of the wetland and watercourse which would be subject to filling or enhancement are summarized in Table 1. The *Highway Methodology* recognizes 13 separate wetland functions and values, including: groundwater recharge/discharge, floodwater storage,

Wetland functions and values are heavily influenced by the site history. The wetlands throughout the site have been heavily disturbed, including large scale grading, filling, channelization and flow diversions. The wetlands are in essence "young wetlands" with soils, hydrology and vegetation still in the development stages. A brief description of the wetland's principal functions and values is provided below.

Wetland 1

Wetland 1 is a small historically disturbed wetland that provides few functions and values. It does not have a hydrology suitable for aquatic species, or species that require seasonal flooding (e.g., vernal pool species). The small size of the wetland is the primary limiting factor with respect to its ability to provide functions and values. The wetland's principal function is to convey flow to the downstream wetland system via the existing culvert system. The vegetation is dominated by invasive non-native species and therefore has relatively low plant species diversity.

Wetland 2

Wetland 2 is far more significant with respect to the functions and values it provides. This is largely the result of its large size, longer hydroperiod, and its surface water connection to Smith Pond Brook which makes its ability to provide water quality renovation functions important to protect downstream resources. Its principal functions include groundwater recharge/discharge, floodflow alteration, sediment/toxicant/pathogen retention, and nutrient removal/attenuation.

4.0 REGULATED ACTIVITIES

No activities are proposed within Site wetlands (i.e., there are no direct wetland impacts). Due to the needs of the proposed Project and the location and proximity of surrounding wetlands, activities are proposed within the Town of Monroe's 100-foot upland review area (URA). A total of 74,800 square feet of work is proposed within the URA. The majority of this work is related to the construction of the stormwater management basins. The closest activity to wetlands will occur at the entrance road which will require improvement on either side of the existing culvert crossing. Overall, most construction activity will occur a significant distance from wetlands. Estimating the distance of the activity from wetlands (using twelve of the closest activity locations), an average setback of ±60 feet from wetlands is proposed. Upon completion of construction, the closest proposed home to wetlands will be 102 feet.

5.0 WETLAND IMPACT ASSESSMENT AND RECOMMENDATIONS

5.1 Potential Short-term Impacts

Potential short-term Project impacts to wetlands and watercourses are primarily related to discharges during construction. In order to minimize the potential for these impacts, erosion and sediment ("E&S") control measures have been designed in accordance with the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control", CT DEEP Bulletin No. 34, and all amendments and addenda thereto as published by the Connecticut Department of Energy and Environmental Protection. Sediment and erosion control measures proposed for this project include:

- Temporary sediment traps
- Anti-tracking pad
- Silt-sacks at catch basins
- Wood chip berms
- Geotextile silt fencing (including double rows)

At critical locations (e.g., upslope of Wetland 2) barrier controls consist of a wood chip berm as the interior control, backed by a double row of silt fencing. These measures in combination will be highly effective at slowing the flow of runoff and trapping sediment generated during construction.

Most wetland sedimentation impacts during construction occur because of contractor's not properly installing and maintaining the control measures as designed. Therefore, it is imperative that the contractor properly install and maintain these measures throughout the duration of construction. This should include daily inspection by the contractor of all Site controls, but in particular the outer barrier control measures closest to wetlands just prior to, and after, a significant rainfall event.

5.2 Potential Long-term Impacts

Potential long-term Project impacts to wetlands and watercourses are most often related to the loss of wetland functions and values resulting from filling and water quality degradation resulting from stormwater discharges.

Proposed upland review area activities would primarily occur within portions of the Site which were previously occupied by the sand and gravel mine and have thus been disturbed. These areas no longer have native plant communities or soil. The topsoil and subsoil have been stripped and processed, and the topography radically altered. Therefore, wetland and hydrologic impacts

resulting from such activities (carbon loss, soil compaction, habitat loss and alteration, alteration of groundwater infiltration patterns) have already occurred. In other words, the impacts to the wetland buffer (a.k.a. the upland review area) that result from development have already occurred at this Site.

Potential long-term impacts to water resources are primarily related to the loss of functions and values and/or water quality degradation resulting from wetland filling and stormwater discharges. In the case of the proposed development no wetland filling is proposed. With respect to degradation of water quality, the development incorporates *primary treatment* practices as described in CTDEP's 2004 Stormwater Quality Manual. This includes three stormwater treatment ponds and a settling basin fed by a rip-rap swale with stone check dams. Therefore, converting the former mining lands to residential development is unlikely to adversely affect principal wetland functions and values. This is because the proposed treatment system are designed to maximize the removal of stormwater pollutants including nutrients, sediment and hydrocarbons from stormwater runoff.

5.3 Recommendations

1. Invasive non-native species dominate the proposed development area. It is recommended that an Invasive Species Control Plan be developed by a qualified herbicide applicator with experience in eradicating invasive species, particularly mugwort, autumn olive and multiflora rose. Efforts should focus on the limits of disturbance, particularly in areas that will include landscaping and stormwater wetlands along the margins of the development where invasive plants could most easily reestablish after construction is completed.

2. During construction, the disposal of invasive plant material should comply with CT Invasive Plants Working Group guidelines (source: https://cipwg.uconn.edu/).

3. The limits of disturbance coincide with the areas of the former quarry that are either sparsely vegetated, or not vegetated at all as they consist of sorted gravel and cobble piles. It is recommended that these areas be restored with topsoil and vegetated with a native meadow or no-mow seed mix.

4. To protect the eastern box turtle during construction, it is recommended that the *Eastern Box Turtle Protection Plan* (see Appendix C) be implemented during construction if construction is proposed to occur during the turtle's active period (which typically occurs between April 1st and October 30th). Note that this plan is not intended to mitigate for the loss of habitat that will result from the proposed development project. Rather, it is intended to prevent incidental

mortality of turtles during construction (e.g., being crushed by equipment). This protection plan is a necessary measure as the proposed development areas represent suitable basking, foraging and nesting habitat for box turtle likely to be used during the late spring and early summer. Should the work occur during the turtle's dormancy period (roughly from October 1st through April 1st) this plan is not deemed necessary, as the development areas do not represent suitable overwintering habitat for box turtle due to the lack of tree cover, topsoil (and duff) and subsoil, along with the low vegetation density.

5. To maximize the pollutant uptake function of the stormwater basin the goal is to establish well-vegetated stormwater basins. The following construction sequence is recommended:

    a. Compaction of the wetland basins shall be minimized to the maximum extent feasible by using temporary construction matting, grading from outside of the creation area, using light equipment with turf tires, or wide track equipment. The contractor shall ensure that proper soil compaction levels (loose to friable) are maintained.

    b. If compaction does occur, the compacted zone shall be tilled to refracture at least 12" of underlying natural soil.

    c. Wetland topsoil consisting of a 1:1 mixture (or equal volumes) of organic and mineral materials that contains at least 12 percent organic carbon content by weight will be placed over the bottom of the creation area at a minimum depth of 6". Clean leaf compost or commercially available compost (well to partially decomposed) is the preferred amendment to achieve this standard, though other materials may be used if approved by the supervising wetland scientist. Soil amendments should be uncontaminated and void of any woodchips or invasive species. Woody debris, comprised of native materials collected from the surrounding property, will be placed on the bottom of the creation area to enhance habitat value under the direction of the supervising wetland scientist.

    d. The qualified wetland scientist may determine that dewatering is needed during the grading and planting. If necessary, excess water will be discharged into a temporary sediment trap. The need for dewatering and any specific method for dewatering is site specific and may be modified by the Contractor to accommodate field conditions. The Contractor shall provide the means and methods of

dewatering consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

e. Basin plantings will take place once the above listed tasks have been completed. Seed non-ponded emergent areas with WetMix (product of New England Wetland Plants source: https://newp.com/catalog/seed-mixes/#wetland) or equivalent per the manufacturers specifications. Seed the side slopes with New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites (source: https://newp.com/catalog/seed-mixes/#erosionMoist) or equivalent.

f. All plantings to be spaced to provide a dense planting bed. Final plant locations shall be reviewed in the field and approved by a qualified wetland scientist. Live plugs are species contained within these seed mixes if field conditions or construction schedule do not favor seed mix establishment.

g. The contractor hired to construct the creation area shall be responsible for the careful installation, maintenance (including watering if necessary), and establishment of the plant material in the basin area. All plants shall be guaranteed by the contractor to remain alive and healthy for a full twenty four (24) month period.

6.0 REFERENCES

Connecticut Environmental Conditions Online (CTECO) (http://www.cteco.uconn.edu/)

Dowhan, J. and R. J. Craig. 1976. Rare and Endangered Species of Connecticut and Their Habitats. State Geological and Natural History Survey of Connecticut.

Mitsch, W.J. and Gosselink, J.G. 2007. Wetlands, fourth edition. John Wiley and Sons, Inc.

U.S. Army Corp of Engineers. 1995. The Highway Methodology Workbook – Wetland Functions and Values: A Descriptive Approach.

Appendix A: Site Photographs

TOWN OF MONROE

Issued: 10-9-07

BOND ESTIMATE FORM (Private Site Development)

☐ PLANNING & ZONING COMMISSION
MEETING DATE _____

APPLICANT: Quarry Ridge Associates, LLc
ENGINEER: J. Edwards & Associates, LLC
TEL.: 203-268-4205

*APPLICATION NO: _____
*FILE NO: _____
DATE: _____

PROJECT NAME: Quarry Ridge

PROJECT LOCATION: 139, 141, & 201 Turkey Roost Road

*BOND RECOMMENDATION

(IWWC BOND)

NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST	Comments by Town Engr. Unit Price*	Comments by Town Engr. Cost*
1.	Sedimentation and Erosion Control Measures (temp. sed traps)	L.S.	2000 cy	16/cy	32,000		
2.	Silt Fence & Hay Bales	L.F.	9740 lf	4.2/lf	40,908		
3.	Topsoil, Seed, Fertilizing, and Mulching (entire disturbed area)	S.F.	74,800	0.65/sf	48,620		
4.	Landscaping (extent to provide for restoration and aesthetic considerations)	L.S. (seed)	215 lb	8/lb	1,720		
5.	Grading (for site restoration that will provide safe and stable conditions)	L.S.			N/A		
6.	Other (anti-track pad)			1,225 ea.	1,225		
					124, 473		
	(+) 10% for Contingencies				12,447		
	* To be filled in by the Town			Total Cost =	137,000	*	

Submitted by: _____

Approved by: _____

Total costs as determined by the Town Engineer represent adjusted values assuming a Municipal bid arrangement with inflation, noting that the terms of the bond may be in effect for up to 10 or more years (statutory time allowance for performance of requirements).



Photo 1: Wetland 1, overall view



Photo 2: Wetland 1 showing the southern 4” PVC discharge pipe.



Photo 3: upper reaches of Wetland 2A, immediately downslope of the former gravel mining limits.



Photo 4: lower reaches of Wetland 2A where the channelized flow drains into the lower pond.



Photo 5: Wetland 2C, historically created/ disturbed from mining activity. Note flooded central portions of wetland bordered by slopes dominated by a dense cover of the invasive Japanese stiltgrass.



Photo 6: Wetland 2D just downstream of road crossing, looking east.



Photo 7: outlet discharge to Wetland 2D, on the east side of the easternmost crossing.



Photo 8: easterly portion of Wetland 2D where perennial stream flow drains to Smith Pond Brook.



Photo 9: unvegetated slopes above Wetland 2A, at the limit of the historic mining area.



Photo 9: uplands within the proposed development area.

Appendix B: Figures



FIGURE 1
Location Map
Turkey Roost Rd
Monroe, CT

Legend

Site Boundary (approx)

Map Description: USGS topographic map (source USGS) showing approximate site boundary. This map is intended for general planning purposes only.

SCALE
0 450 900 Feet

N

DAVISON ENVIRONMENTAL
Davison Environmental, LLC
10 Maple Street
Chester, CT
www.davisonenvironmental.com



FIGURE 2
Aerial Site Map
Turkey Roost Rd
Monroe, CT

Legend

Site Boundary (approx)

Map Description: 2019 aerial photograph (source CT ECO) showing approximate site boundary. This map is intended for general planning purposes only.

SCALE
0 237.5 475
Feet

N

DAVISON ENVIRONMENTAL

Davison Environmental, LLC
10 Maple Street
Chester, CT
www.davisonenvironmental.com

Appendix C: Eastern Box Turtle Protection Plan

Eastern Box Turtle Protection Plan

Quarry Ridge Residential Development
Turkey Roost Road, Monroe

Eastern Box Turtle Protection Plan

Eastern Box Turtle, a State Special Concern species afforded protection under the Connecticut Endangered Species Act and listed as a Greatest Conservation Need species in Connecticut's Comprehensive Wildlife Conservation Strategy (CT DEEP 2005), is known to occur on the site. The following protective measures are recommended to satisfy requirements from the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division and follow protocols developed from previous rare species consultations and state-approved protection plans. This plan is focused on preventing incidental mortality to eastern box turtle but will also serve to limit mortality to other herpetofauna located within the construction, including hognose snake, should they be present.

This plan is intended to be implemented during the box turtle's active period which typically occurs between April 1st and October 30th.

Davison Environmental, LLC will serve as the Environmental Monitor for this project to ensure that Eastern Box Turtle protection measures are implemented properly.

The Contractor shall contact Eric Davison at least 5 business days prior to the pre-construction meeting. Mr. Davison can be reached by phone at (860) 803-0938 or via email at eric@davisonenvironmental.com.

The recommended Eastern Box Turtle protection program consists of the following components:

1. Isolation of the project perimeter
2. Targeted searches of the project area prior to construction
3. Periodic inspection and maintenance of isolation structures throughout construction period
4. Education of all contractors and sub-contractors prior to initiation of work on the site
5. Documentation and reporting submitted to the NDDB Program

1. Isolation Barrier (Erosion and Sedimentation Controls)

a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. These products or reinforced silt fence should not be used on the project. Temporary erosion control products, either erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) and/or netting composed of planar woven natural biodegradable fiber should be used to avoid/minimize wildlife entanglement.

b. Installation of erosion and sedimentation controls (i.e., silt fencing), required for erosion control compliance and creation of a barrier to migrating/dispersing herpetofauna, should be

installed by the Contractor prior to clearing activities or any earthwork. This fencing will need to be nearly continuous, as directed in the field by Davison Environmental.

c. The fencing will consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. The Contractor is responsible for daily inspections of the fencing for tears or breeches in the fabric and accumulation levels of sediment, particularly following storm events of 0.25 inch or greater. Davison Environmental will provide periodic inspections of the fencing throughout the duration of construction activities, generally on a biweekly frequency or more frequently if site conditions warrant.

d. All openings in the isolation barrier, used during the work day for accessibility, should be closed with hay bales at the completion of each day. This should be done under the direction of Davison Environmental, with the understanding that during certain seasonal periods and construction phases, this may not be necessary at all work area entrances.

e. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Targeted Searches – Pre-Construction

a. Upon completion of the barrier fence installation, the project limits will be searched for eastern box turtle. The purpose of this work is to locate and remove all box turtles from within the construction zone.

b. All turtles observed will removed from the project area just beyond the limits of work.

c. The time of day, frequency and intensity of the pre-construction searches should be determined by the Environmental Monitor based on weather conditions and success of relocation progression. It is anticipated that searches will be conducted once per week at a minimum, with more intensive and frequent searches conducted during periods of high activity which would increase the likelihood of captures.

3. Contractor Education

a. Prior to the start of construction, the Contractor shall attend an educational session at the pre-construction meeting with Davison Environmental. This orientation and educational session will consist of an introductory meeting with Davison Environmental providing photos of herpetofauna that may be encountered during construction activities, including eastern box turtles, emphasizing the non-aggressive nature of these species, the absence of need to destroy wildlife that might be encountered and the need to follow the prescribed protection measures.

b. The Contractor will be provided with cell phone and email contacts for Davison Environmental to immediately report encounters with any turtles or other herpetofauna. Educational poster

materials will be provided by Davison Environmental and displayed on the job site to maintain worker awareness as the project progresses.

4. Turtle Protective Measures – During Construction

a. Prior to the start of construction each day, the Contractor shall search the entire work area for turtles. The Environmental Monitor will also conduct periodic inspections of the work area depending upon weather conditions, observed turtle activity, or other factors.

b. If a turtle is found, it shall be immediately moved by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier closest to where it was encountered. The Environmental Monitor should be notified of any observed eastern box turtle.

c. Special care shall be taken by the Contractor during early morning hours and on overcast rainy days so that possible basking or foraging turtles are not harmed by construction activities.

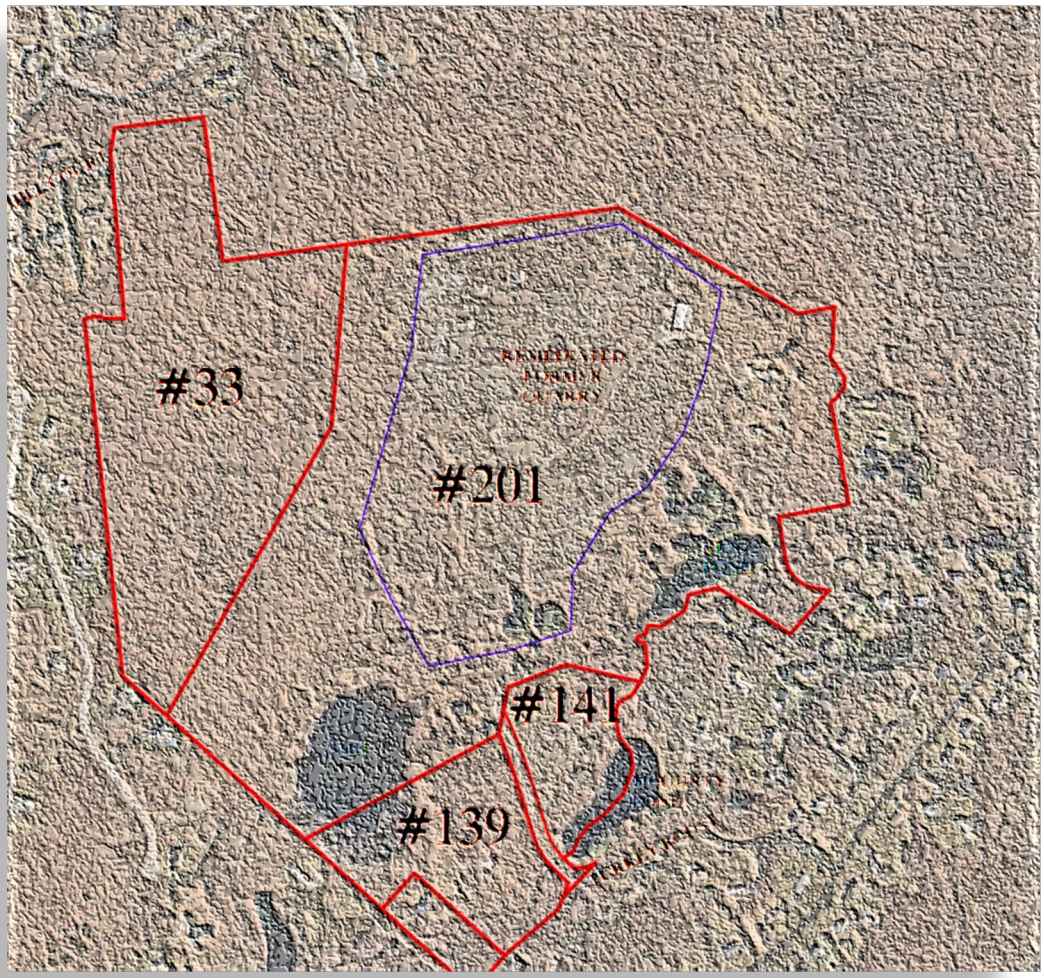
5. Reporting

a. Following completion of the construction project, Davison Environmental will provide a summary of observations of eastern box turtle (or other state listed species) including a submission of a *Special Animal Survey Form* to the CTDEEP with photo-documentation and with specific information on the location and disposition of the animals observed.

Quarry Ridge Estates

Project Narrative

May 1, 2023



Executive Summary

201 Turkey Roost Road is zoned as Multi Family Residential. It is proposed to construct 99 single family homes within this parcel. The development will be serviced by public water and a community wastewater treatment system. Included in this system is an on-site wastewater treatment plant. The treatment system design is within the jurisdiction of the CT DEEP and all permitting for this system is strictly regulated by that agency.

The potential development site (the "Site") is comprised of 5 individual parcels

1. 139 Turkey Roost Road: 11.0 Acres
2. 141 Turkey Roost Road: 6.3 Acres
3. 201 Turkey Roost Road (2 parcels): 99.98 acres
4. 33 Cobblers Court : 36.4 Acres

Total area: 154 acres

The remaining parcels, besides 201 Turkey Roost Road, are zoned RF-2. Portions of these parcels will be utilized as part of the septic leaching areas. The property lines are to be revised to separate the existing house at 139 Turkey Roost Road onto a conforming parcel. The remaining parcel area currently contains vacant and buildable land. 33 Cobblers Court will be reduced to a 4 acre parcel. The remaining land will be combined into a single parcel; any of the land outside of the development footprint will be remain as open space.

Water service will be provided by Aquarion Water Company. A new water main will be run from Fan Hill Road to the Site. Current flow tests have been conducted and a will serve letter has been provided with this submission.

Site History

The proposed development is on the site of a former illegal quarry operation, which was the subject of numerous enforcement actions by the Town of Monroe. In the 1940's, this Site started as a small sand and gravel operation. In the 1960's and into the 1980's, the operation expanded into to a large commercial quarry operation.

In 2003, the current owner purchased the property and began plans to remediate and develop. The remediation was completed and unfortunately the economic crash of 2008 happened before the new development could be constructed. Since then, a great deal of work has been completed in order to provide the design plans presented with this application.

As part of the remediation, blasting for the proposed infrastructure and house foundations was completed. Therefore, minimal blasting will be required for the currently proposed development. A plan depicting these blasted areas is included in the submitted plan set. See sheet L-3.

As part of the quarry operation, two driveways were constructed for access to Turkey Roost Road. These driveways cross Smith Brook via existing culverts. Those culverts will be utilized in the current proposal, so no new crossing is proposed. A pond was also created near the southeast driveway, which also includes a culvert. This pond and the associated berm have now been registered with the CT DEEP as class “AA” dam.

The definition of a class AA dam is as follows:

A) A Class AA dam is a negligible hazard potential dam which, if it were to fail, would result in the following:

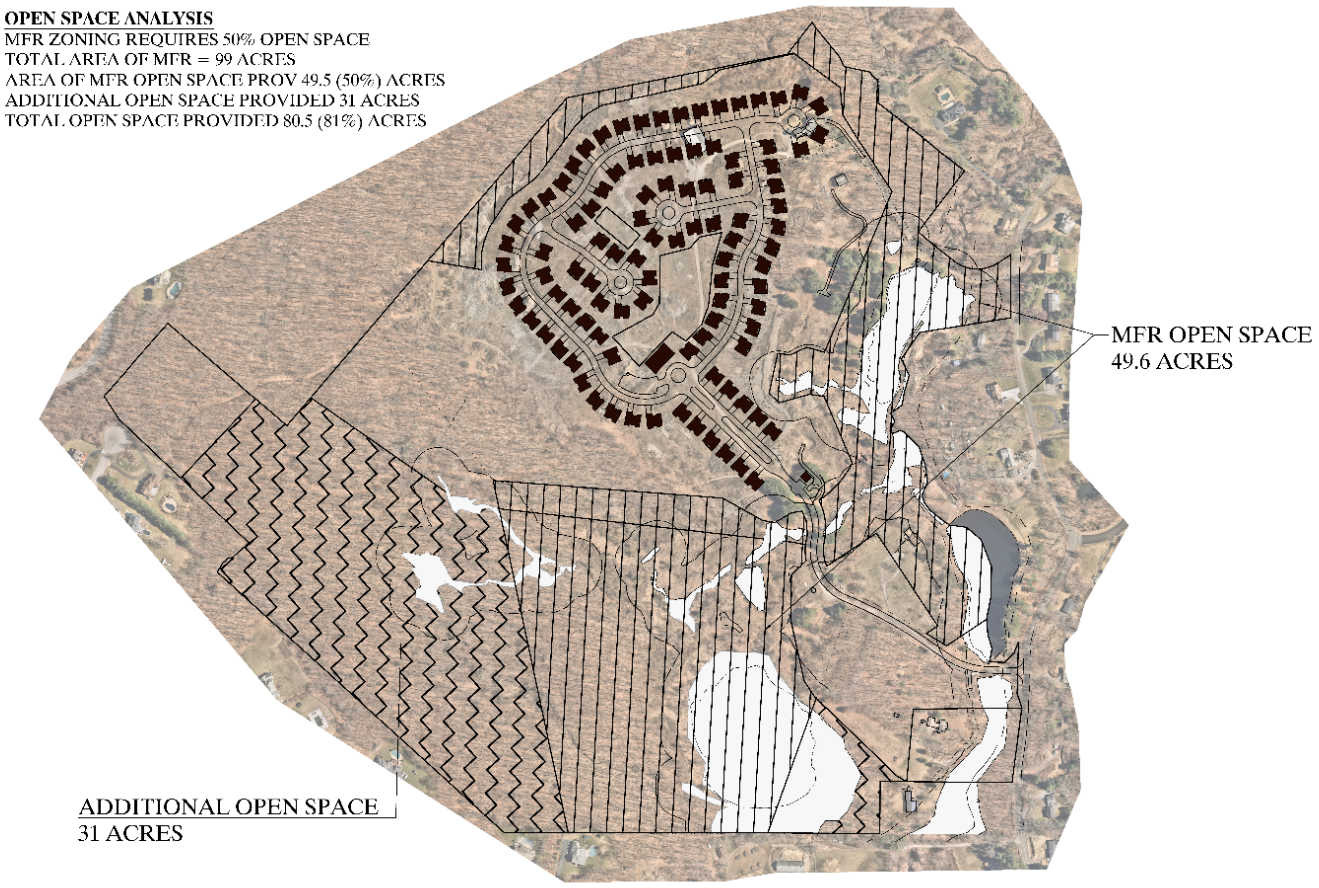
(i) no measurable damage to roadways;

(ii) no measurable damage to land and structures; and

(iii) negligible economic loss.

Open Space and Wetland Impact

The revised development parcel will contain an area of 147 acres. The portion of the site in the MFR zone is 99 acres. The zoning regulations required that 50% of the MFR zone be open space. The proposed plan includes 49.6 acres (50%) of open space within the MFR zone. Additionally, 31 acres of land, which contains significant buildable area, are proposed to be declared as open space outside of the MFR zone. A total of 81 acres of open space will be provided. This represents roughly 55% of the site and 82% of the MFR area, which exceeds any standards under the Monroe Zoning Regulations (the "Regulations"). The open space will be owned and maintained by the development homeowner's association.



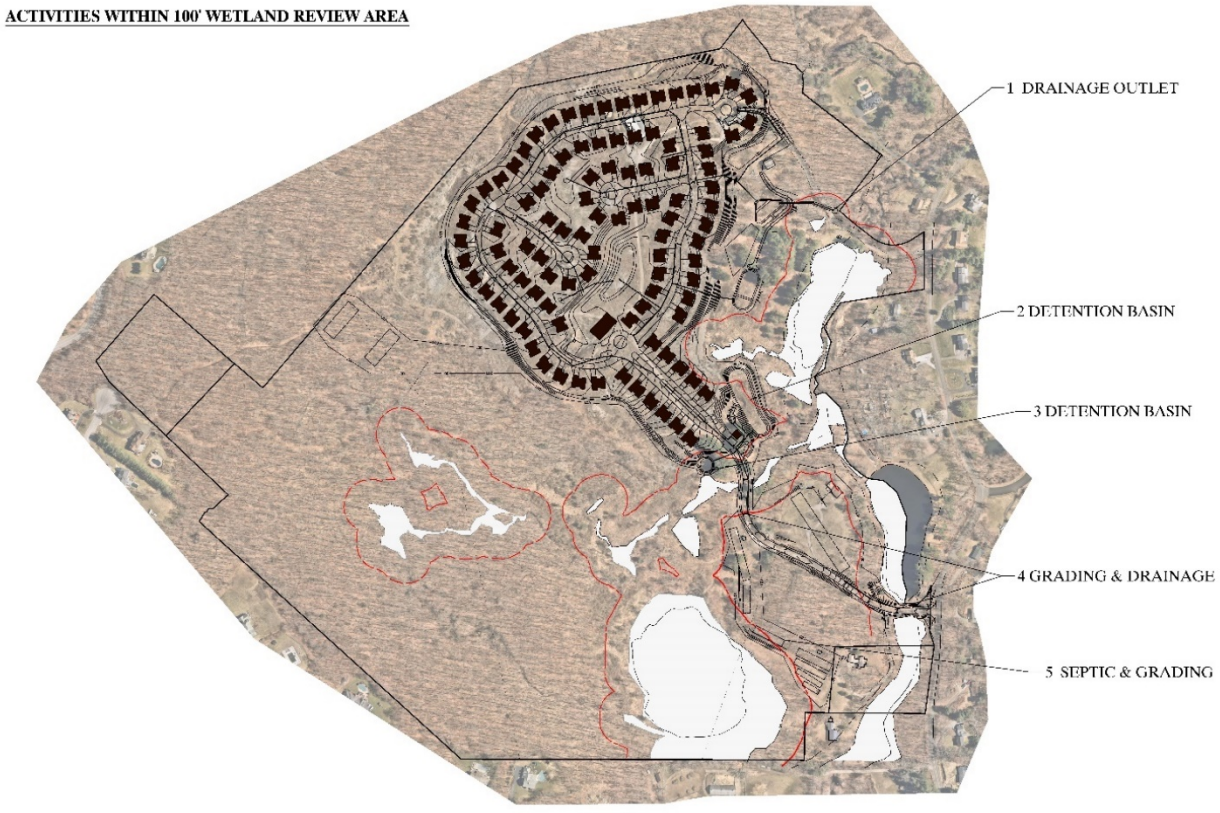
The preservation of open space is considered one of the most effective practices for long term protection of inland wetlands. The below is quoted from the Center of Land Use Education and Research

https://nemo.uconn.edu/watershed-protect 1

Permanent protection as dedicated open space is the ultimate way to ensure that riparian corridors and other critical areas throughout a watershed continue to perform their important functions. Open space acquisition by municipalities and nonprofits like land trusts continues to be the foundation for land protection in Connecticut. Below are links to some statewide organizations that can provide assistance.

NEMO

The proposal includes no direct wetland disturbance, and the regulated area disturbance is approximately 1.71 acres or 74,800sf. This represents 1.1% of the parcel. The open space provides separation of .1 miles to the nearest home on Turkey Roost Road and 0.3 miles to the nearest homes on Pinto Lane.



Wetlands flags have been freshened on the site to provide clarity if a site walk is required. A wetland report has been included with the submission.

Sanitary design

The proposed development anticipates an average daily flow of approximately 40,000 gpd. Per Sec. 19-13-B104 of the CT Health Code, designs in excess of 7500 gpd shall be directed to the Commissioner of Environmental Protection. This is more commonly referred to as CT DEEP.

The design of this wastewater treatment system has been ongoing since 2006. Currently the property has an active approval from DEEP for a treatment system design with an average daily flow of 20,050gpd.

Furthermore, extensive testing and analysis has been completed in additional leaching areas. A report from WSP has been provided with the submission. The results of this analysis indicate that there is capacity for an additional 18,000gpd of average daily flow.

More recently, another leaching area was identified and preliminary analysis indicates capacity for approximately 10,000gpd of average daily flow. The results of this analysis have been included in the submission.

All of the leaching system areas are identified on the plans and reports including calculations and soil data for each are also provided.

The proposal includes a Zenon on-site wastewater treatment plant which will provide treatment in excess of the minimum CT DEEP requirement. The table below indicates the post treatment effluent water quality.

1.3 Effluent Quality

The following performance parameters are expected upon equipment startup and once the biological system has stabilized based on the data listed in section 1.1 and 1.2.

BOD_5	<5	mg/L
TSS	<5	mg/L
TN [1]	<10	mg/L
NH_3-N	<1	mg/L
TP	<1	mg/L
Turbidity	< 1	NTU

Note 1: TN less than 10mg/L corresponds to minimum design temperatures of 10°C and <1.5 mg/L non-biodegradable TKN in the system influent

The CT DEEP design standards require groundwater studies to verify that distributed wastewater will be fully treated prior to reaching wetlands or reaching the ground surface (21-day travel time). In this case, the design incorporates an onsite wastewater

treatment plant. DEEP approval requires that this plant remove pollutants to the levels allowed for direct distribution to surface waters. However, they also require that the design allow for 21 day ground water travel time to fully treat the effluent after it has been fully treated by the plant. To summarize, the waste water from this site will be fully treated for pollutant removal to provide 200% of the standard water quality tolerances.

In November 2006, the Connecticut DEEP prepared a Zenon Performance Appraisal. This study was updated in March 2008. At that time, there were 12 Zenon plants operating in the State that discharge to subsurface disposal facilities. The conclusion of the 5-year study by the DEP is "Groundwater monitoring located within the zone of influence of the permitted systems has continued to consistently show levels of total nitrogen, total phosphorus and fecal coli form technology are suitable for drinking water and other domestic uses without further treatment, and do not appear to be cause for concern"

The pollutant removal provided by DEEP greatly exceed those of the standard State Health Code approval. Other recently approved projects in Monroe have utilized State Health Code standards to introduce more than 30,000gpd into the ground with no treatment plant and no analysis of ground water travel time. Not to say that this design was not compliant, the State Health Code does not require those calculations. Additionally, portions of the septic system design on the other designs extend to within approximately 10' of the wetlands. The intent of this statement is not to criticize other projects, it is intended to provide perspective on the wetland impact of the current proposal and to demonstrate that the CT DEEP goes to great lengths to provide protection to the wetlands and environment in general.

The discharge from the treatment plant to the leaching beds will be fully treated to DEEP standards, which means that the effluent put into the ground will pose no risk to the wetlands. This is reinforced by the fact that 99% of the proposed leaching areas are more than 100 feet from a wetland. 100% of the proposed leaching areas are more than 80' from a wetland. The proposed design also includes extensive calculations to demonstrate that all of the discharged effluent will exceed the required 21-day travel time to wetlands, as required by DEEP.

PERMIT PROCESS

As stated above, CT DEEP has approved the Zenon wastewater treatment plant and the leaching system on this project for a design flow of 20,250 gpd. This permit was issued based on the wetlands and zoning approvals received in 2006. Without those

approvals, DEEP would not have issued a permit, accepted an application, or reviewed the plans for permit approval.

Included with this application is “attachment Q” of the 2006 DEEP “application for wastewater discharge”. This attachment provides copies of local approvals which were required by CT DEEP.

The typical sequence for projects requiring a CT DEEP wastewater discharger permit is as follows:

1. Preliminary site investigation to determine treatment area feasibility
2. Site design and calculation of preliminary discharge estimates
3. Prepare detailed soil and groundwater study. Prepare groundwater mounding model. This study provides the available design flow capacity.
4. Prepare engineered site plans.
5. Submit local permit applications
6. Obtain local permits.
7. Submit DEEP permit applications
8. Prepare final DEEP design drawings
9. Obtain DEEP permit to construct
10. Obtain local building permit and begin construction

This development is unique because a portion of it is already DEEP permitted but the local zoning and inland wetland permits have expired. Additional evidence of this permitting sequence is apparent in the Regulations.

The Regulations make the following statements in regard to wastewater and the MFR zone:

§3.4.2

B. In an MFR District, the property shall be suitable for the long-term disposal of sanitary waste effluent without danger to public health by an environmentally suitable and legally acceptable method.

§3.4.10

B. Sewerage System

(1) All buildings shall be served by an environmentally suitable sanitary waste treatment and disposal system that conforms to all applicable requirements of local, State and Federal law and shall be certified by a Connecticut licensed professional engineer. The sanitary waste treatment and disposal system must be approved for construction by all relevant Federal, State and local

authorities prior to the issuance of the written zoning certification needed for a building permit. ***All necessary permits for the discharge of wastewater shall be obtained and presented to the Commission or its authorized agent prior to the issuance of a final Zoning Certificate of Compliance or Certificate of Occupancy.***

(4) In the case where there is a community septic system serving more than one building, the community septic system must meet all the requirements of State of Connecticut General Statutes, §7-245 through §7-273u, as amended, and the regulations and requirements of the Monroe Water Pollution Control Authority. An agreement for use of the community septic system shall be executed and recorded in the Monroe Land Records ***prior to the issuance of a Certificate of Zoning Compliance for Building Permits.***

These statements make it clear that approval from the Monroe Planning and Zoning Commission will be conditional on receiving approval of the septic design by the governing agency. In this case, that is CT DEEP. This means that the DEEP application, plan review, and permit must follow IWC and P&Z approvals.

The Regulations also prohibit the Monroe Planning and Zoning Commission from rendering a decision until the Monroe Inland Wetland and Watercourses Commission has ruled.

§8.1.3 Application Requirements

B. For a Special Exception Permit application involving an activity regulated pursuant to Connecticut General Statutes §22a-36 to §22a-45, inclusive, the applicant shall submit an application for a permit to the Inland Wetlands Commission no later than the day such application is filed with the Commission. The applicant shall provide documentation of said filing. ***The Commission shall not render a decision on the application until the Inland Wetlands Commission has submitted to it a report in accordance with the standards of the Connecticut General Statutes, as amended, which report shall be given due consideration by the Commission in making its decision.***

To summarize, submitting an application to DEEP for plan review and permit is not possible without first obtaining an approval from the Monroe Inland Wetlands and Watercourses Commission and the Monroe Planning and Zoning Commission.

The permitting sequence protects the town from environmental risk. The purpose of the Department of Environmental Protection is to protect the environment. By conditioning town approvals on DEEP review, it passes the burden of the protection of resources and liability to the State of Connecticut. It also allows the developer to obtain local permits prior to undertaking the large of expense of a complete treatment system design. It is the developer who takes the risk of a potential DEEP denial or forced reduction of flow.

Stormwater

The stormwater treatment system meets or exceeds all standards of the 2004 Connecticut Stormwater Quality Manual. A detailed report including hydrologic and hydraulic calculations has been included along with results of all soil testing completed within the proposed stormwater basins. Current NOAA atlas rainfall depths and intensities were used in the calculations. The tables below indicate the reduction in peak flows and runoff volumes that are a result of the design.

Pre and Post Development Peak Flow Summary

Design Point	Design Storm	Existing Peak Flow (cfs)	Proposed Peak Flow (cfs)	Change in Peak Flow (cfs)
DP 1 (East of Project Area)	2	35.89	28.53	-7.36
	5	61.89	55.9	-5.99
	10	87.17	80.06	-7.11
	25	121.41	113.53	-7.88
	50	146.57	143.8	-2.77
	100	173.62	173.54	-0.08

Pre and Post Development Runoff Volume Summary

Design Point	Design Storm	Existing Runoff Vol. (ac-ft)	Proposed Runoff Vol. (ac-ft)	Change in Peak Flow (ac-ft)
DP 1 (East of Project Area)	2	11.203	10.497	-0.706
	5	18.748	18.222	-0.526
	10	25.583	25.189	-0.394
	25	35.621	35.387	-0.234
	50	43.407	43.277	-0.13
	100	52.025	51.994	-0.031

The plans also meet or exceed all standards of the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. Details can be found within the plan set and report.

Alternatives

In the past 22 years, many different alternative layouts have been prepared for the Site. Most recently, in November of 2022, a plan similar to the current proposal was submitted to the commission and later withdrawn. That plan proposed 90 single family homes in roughly the same footprint as the current proposal.

With this application we have submitted 2 additional alternatives:

1. Alternative 1: This plan includes development of the same currently proposed 99 unit layout but in addition a 196 unit apartment complex would be constructed on the parcel known as 33 Cobbler Court. This complex is similar in design and concept to the recently approved projects in other parts of town. The exception is that all septic areas will be outside the 100' regulated area. The complex would be served by onsite septic systems that would be sized to be less than 7500gpd and would therefore be permitted by the State Health Department rather than DEEP. As noted above, these requirements allow more discharge with less verification of impact. . This alternative would result in a significant reduction of open space from the current proposal.

2. Alternative 2: This plan includes the above-mentioned 196-unit complex along with a large apartment complex in place of the proposed single-family homes. The complex would be served by onsite septic systems that would be sized to be less than 7500 gpd and would therefore be permitted by the State Health Department rather than DEEP. As noted above, these requirements allow more discharge with less verification of impact. This alternative would result in a significant reduction of open space from the current proposal.

Both alternatives are less desirable to the developer and more impactful to the environment. Open space areas would be significantly reduced from the current proposal and both projects would introduce more wastewater.

Conclusion

At the time the owner purchased the property, there was an illegal quarry operation on the site that needed to be addressed. This Site had been the subject of multiple enforcement actions by the Town of Monroe, particularly with respect to illegal blasting. As a result, the Site was a virtual moonscape. In collaboration with the Town of Monroe, the owner completed a restoration at his own expense and, in doing so, the Town of Monroe saw it fit to approve a residential development on the Site. Due to economic conditions beyond any of our control, the project was not viable to build at that time. Over the past 20 years, the owner has paid in excess of $2,000,000 in property taxes and has been provided no services in return. He has spent thousands more in design costs and legal fees to prepare a design that presents no impact to the wetlands, provides enormous amounts of open space and, if approved, will provide an estimated $1,188,000 - $1,485,000 in annual tax revenue to the town.

At this point, the owner is entitled to recoup at least a portion of this huge investment. This proposal is would be in harmony with the singe family housing character that Monroe offers and it is completely conforming with the Regulations. For the entire Site, it yields slightly over 1.5 acres per dwelling unit. The other enormous benefit of this proposal will be the preservation of 81 acres of land, of which a significant portion is buildable, as open space in perpetuity. In addition, an overwhelming majority of the proposed development will occur in an area that was previously disturbed by the prior illegal quarry operation while the proposed open space is almost entirely undisturbed. The alternatives would require an approval path that limits the input and control the town and its residents would have over the development with a significant decrease in open space.

Some key points of the current proposal:

1. There is no proposed direct wetland impact;
2. 98% of the proposed site disturbance is outside of the 100’ regulated area;
3. Septic system design is regulated by DEEP and will provide the greatest levels of environmental protection;
4. 81 acres of permanent open space will be provided;
5. A water main will be extended which will provide additional public water service to town residents;
6. The proposed design is fully compliant with the Regulations; and
7. An extensive stormwater treatment system is provided. The design exceeds CT DEEP standards.

In summary, it is our professional opinion the proposed development, including the on-site wastewater disposal system will:

(a) Not result in an adverse impact to a wetlands or watercourse;
(b) Satisfy the factors for consideration provided by Section 22a-41 of the Connecticut General Statutes;
(c) Satisfy the criteria provided by the Commission's Inland Wetlands & Watercourses Regulations. The housing proposal is not reasonably likely to result in the unreasonable pollution, impairment or destruction of the public trust in the air, water or other natural resource of the State of Connecticut.

QUARRY RIDGE

IN

MONROE, CONNECTICUT

PREPARED FOR

QUARRY RIDGE ASSOCIATES, LLC



VICINITY MAP

1"=1000'

LIST OF DRAWINGS:

1/1	EXISTING CONDITIONS PLAN (BY OTHERS)
A-1	AREA PLAN
L-1 & L-2	LAYOUT PLAN
L-3	TEST HOLE LOCATION PLAN
S-1 TO S-7	SITE PLAN
S-1A & S1-B	SITE PLAN ALTERNATES
OS-1	OPEN SPACE PLAN
E-1 TO E-6	EROSION CONTROL PLAN
WL-1	WETLANDS PLAN
LP-1 TO LP-4	LANDSCAPE PLAN (BY OTHERS)
SP-1	SIGHTLINE PLAN AND PROFILE
P-1 TO P-6	PLAN AND PROFILE
D-1 TO D-5	DETAILS

J. EDWARDS & ASSOCIATES LLC

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STATE OF CONNECTICUT — JASON EDWARDS — LICENSED LAND SURVEYOR

139, 141, & 201 TURKEY ROOST ROAD
& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR

QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

#	DATE	DESCRIPTION

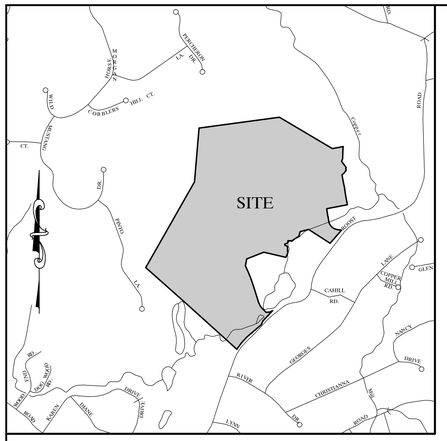
DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE:

TITLE

TITLE SHEET

SHEET NUMBER

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\TITLE.DWG


SITE
PINTO LN.
CABHILL RD.
CHRISTIANA DRIVE
RIVER ROAD
TURN ROAD
CHERRY HILL ROAD
CHERRY HILL CT.
CHERRY HILL DRIVE
CHERRY HILL ROAD
CHERRY HILL LANE
CHERRY HILL CIRCLE
CHERRY HILL DRIVE
CHERRY HILL ROAD
CHERRY HILL ROAD
CHERRY HILL ROAD

LEGEND:

DIRECTION OF FLOW

NOTE:

1984 TOWN OF MONROE TOPOGRAPHIC MAPPING USED TO SHOW OFFSITE FLOW PATTERNS THE ONSITE TOPOGRAPHY HAS BEEN SIGNIFICANTLY MODIFIED BY THE QUARRY OPERATION. SEE DATA ACCUMULATION MAP FOR CURRENT TOPOGRAPHIC CONDITIONS.



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139, 141, & 201 TURKEY ROOST ROAD
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QUARRY RIDGE ASSOCIATES, LLC

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#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: SCALE:1"=200

TITLE

AREA PLAN

SHEET NUMBER

A–1

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\A–1.DWG



LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- 520.2 EXISTING SPOT ELEVATION
- 520.2 PROPOSED SPOT ELEVATION
- EXISTING DRAINAGE
- PROPOSED DRAINAGE
- EXISTING SANITARY
- PROPOSED SANITARY
- FL 100 YEAR FLOOD PLAIN
- L SANITARY LATERALS
- FM FORCE MAIN
- FD FOOTING DRAIN
- RD ROOF DRAIN
- W WATER SERVICE
- G GAS LINE
- COTG CLEAN OUT TO GRADE
- FF FINISHED FLOOR
- GF GARAGE FLOOR
- BS BASEMENT SLAB
- TST TEMPORARY SEDIMENT TRAP
- INLAND WETLANDS WITH FLAG #
- XXX OBSERVATION HOLE
- PERCOLATION TEST
- GTD GRADE TO DRAIN
- SF SYNTHETIC FILTER BARRIER
- WATER BREAK
- LOD LIMIT OF DISTURBANCE
- BUILDING SETBACK LINE
- UPLAND REVIEW LIMIT
- WATERCOURSE OFFSET
- AV AIRVALVE
- BV BLOW OFF VALVE
- GATE VALVE
- HYDRANT

200 0 200 400

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#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: SCALE:1"=200'

TITLE

ON–SITE
LAYOUT PLAN

SHEET NUMBER

L–1

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\L–1.DWG


PROJECT SITE
POND
FAN HOLLOW SCHOOL
Fan Hollow Cemetery
Jockey Hollow Middle School
Check Mill Middle School
FAN HOLLOW ROAD
CABELL ROAD
HOOKER HILL DRIVE
CHUCK HILL ROAD
HILLTOP ROAD
LAKE ROAD
LONGVIEW DRIVE
MEADOW LANE
WOODLAND DRIVE
LAUREL ROAD
TURKEY ROOST ROAD
COBBLERS HILL COURT
P/O 115-7
P/O 107-9
P/O 107-36
P/O 107-35
P/O 107-34
P/O 97-25
P/O 97-22
P/O 96-42.12
P/O 97-23
P/O 97-24
P/O 97-26
P/O 97-37
P/O 97-38
P/O 97-39
P/O 97-40
P/O 97-41
P/O 97-42
P/O 97-43
P/O 97-44
P/O 97-45
P/O 97-46
P/O 97-47
P/O 97-48
P/O 97-49
P/O 97-50
P/O 97-51
P/O 97-52
P/O 97-53
P/O 97-54
P/O 97-55
P/O 97-56
P/O



DEPTHS OF POST BLASTING HOLES

Hole	Depth to Ledge
A1	115"
A2	160"
A3	96"
A4	98"
A5	89"
A6	104"
A7	125"
B1	140"
B2	130"
B3	97"
B4	120"
B5	106"
B6	120"
B7	112"
B8	72"
B9	32"
B10	65"
B11	68"
C1	115"
C2	150"
C3	120"
C4	108"
C5	130"
C6	117"
C7	106"
C8	57"
C9	31"
C10	12"
C11	41"
D1	64"
D2	67"
D3	108"
D4	66"
D5	70"
D6	81"
D7	48"
D8	85"
D9	100"
D10	12"
D11	106"
D12	96"
D13	125"
E1	66"
E2	49"
E3	56"
E4	25"
E5	120"
E6	112"
E7	96"
E8	36"
E9	102"
E10	130"
E11	98"
E12	69"
E13	89"
F1	129"
F2	120"
F3	150"
F4	60"
F5	98"
F6	132"
F7	72"
F8	156"
F9	120"
F10	60"
G1	96"
G2	72"
G3	?"
G4	96"
G5	132"
G6	60"
G7	96"
G8	120"
G9	96"
H1	120"
H2	40"
H3	108"
H4	150"
H5	108"
H6	96"
H7	108"
H8	132"
I1	96"
I2	72"
I3	72"
I4	120"
I5	120"
I6	60"
I7	120"
I8	120"
I9	48"
I10	96"
I11	150"
J1	60"
J2	56"
J3	132"
J4	72"
J5	82"
J6	112"
J7	126"
J8	160"
K1	144"
K2	168"
K3	120"
K4	120"
K5	162"
K6	150"
K7	155"
K8	136"
L1	168"
L2	60"
L3	84"
L4	210"
L5	176"
L6	165"
M1	48"
M2	120"
M3	145"
M4	160"
N1	86"
N2	120"
N3	120"
N4	148"
N5	144"
O1	120"
O2	120"

60 0 60 120

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REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: SCALE:1"=150'

TITLE

TEST HOLE LOCATION PLAN

SHEET NUMBER

L–3

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\L–3.DWG

SEE DWG S-2

DRIVEWAY TO BE REMOVED

BAFFLE D-BOX

SUBSURFACE WASTEWATER ABSORPTION SYSTEM

DWELLING TO BE REMOVED

PHASE LINE (TYP)

POLE TO BE REMOVED

TROUT POND ROAD

6" UNDERDRAIN

POLE TO BE REMOVED

SMITH POND

4" 40 LF DRAIN PIPE W/ ELBOW

6' x 9' RIPRAP SPILLWAY EL 373.6

RIPRAP BERM

STORMWATER TREATMENT POND 1
TOP 374.5
BOTT 371.2

4' X 4' RIPRAP PAD EL 372.0

RIPRAP APRON

N/F
SMITH IRREVOCABLE TRUST

N/F
DUBAIL

RECONSTRUCT DRIVEWAY

BLOCK RETAINING WALL DETAILED DRAWINGS TO BE PROVIDED PRIOR TO CONSTRUCTION

APPARENT WETLANDS

POLE TO BE REMOVED

GUARDRAIL (TYP)

DRIVEWAY TO BE REMOVED, LOAMED, AND SEEDED

PROPOSED PROPERTY LINE

BLOCK RETAINING WALL

STOP SIGN

RIPRAP

PAVEMENT STRIPING

12" WHITE STOP BAR

DRIVEWAY TO BE REMOVED, LOAMED, AND SEEDED

PAVED LEAK-OFF

PAVEMENT STRIPING

TURKEY ROOST ROAD

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- EXISTING DRAINAGE
- PROPOSED DRAINAGE
- EXISTING SANITARY
- PROPOSED SANITARY
- FL 100 YEAR FLOOD PLAIN
- L SANITARY LATERALS
- FM FORCE MAIN
- FD FOOTING DRAIN
- RD ROOF DRAIN
- W WATER SERVICE
- G GAS LINE
- COTG CLEAN OUT TO GRADE
- FF FINISHED FLOOR
- GF GARAGE FLOOR
- BS BASEMENT SLAB
- TST TEMPORARY SEDIMENT TRAP
- INLAND WETLANDS WITH FLAG #
- XXX OBSERVATION HOLE
- PERCOLATION TEST
- GTD GRADE TO DRAIN
- SF SYNTHETIC FILTER BARRIER
- WATER BREAK
- LOD LIMIT OF DISTURBANCE
- BUILDING SETBACK LINE
- UPLAND REVIEW LIMIT
- WATERCOURSE OFFSET
- AV AIRVALVE
- BV BLOW OFF VALVE
- GATE VALVE
- HYDRANT

40 0 40 80

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DATE: MAY 1, 2023
PROJECT #: 3302
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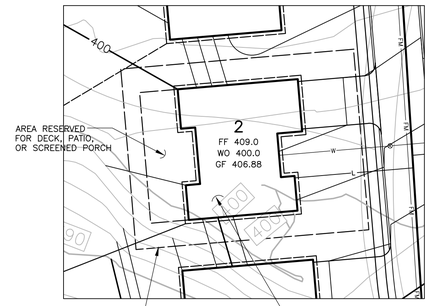
TITLE

SITE PLAN

SHEET NUMBER

S-1

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TYPICAL UNIT DETAIL
SCALE: 1"=30'

SEE DWG S-3

SEE DWG S-1

TROUT ROOST ROAD

FOOTING DRAIN AND ROOF DRAIN TO BE SEPARATE PIPES (TYP)

NO PARKING SIGN (TYP 4 PLACES)

4' x 4' RIPRAP PAD (TYP)

40' WIDE MODIFIED RIPRAP LEVEL SPREADER EL 373.0

10 LF 4" PERF PVC @ 0.0% — INV 372.3

4" 40LF DRAIN PIPE W/ELBOW

30'X14' RIPRAP SPILLWAY EL 377.5

STORMWATER TREATMENT POND 2 TOP 378.5 BOTT 373.5

KEEP RIGHT SIGN

CROSSWALK SIGN

PAVED ACCESSWAY

HYDRANT (TYP)

HANDICAP RAMP (TYP)

RIPRAP BERM

MAILBOXES

WASTEWATER PRETREATMENT FACILITY

LOADING AREA SIGN

STONE CHECK DAM (TYP)

RIPRAP SWALE

SETTLING BASIN BOT EL 378.0 SPILLWAY EL. 380.0

STONE LANDSCAPE WALL (TYP)

CROSSWALK BRICK PAVERS (TYP)

6" FORCE MAIN SLEEVE

GUARDRAIL (TYP)

CROSS COUNTRY RUN 5

CROSSWALK SIGN

EXISTING WELL TO BE ABANDONED BY A CONNECTICUT LICENSED WELL DRILLER

N/F DUBAIL

	FF	WO	GF
1	404.4	395.4	402.25
2	409.0	400.0	406.88
3	413.0	404.0	410.83
4	416.5	407.5	414.33
53	417.1		414.92
54	413.35		411.18
55	409.4		407.27

40 0 40 80

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\S-2.DWG

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REVISIONS

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PROJECT #: 3302
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SCALE: SCALE:1"=40'

TITLE

SITE PLAN

SHEET NUMBER

S-2

SEE DWG S-4

4' SIDEWALK (TYP)

11
FF 439.0
GF 436.88

56
FF 440.65
GF 438.48

10
FF 437.0
GF 434.89

9
FF 434.8
GF 432.65

8
FF 432.3
GF 430.18

7
FF 429.8
GF 427.65

6
FF 424.3
GF 422.1

5
FF 420.6
GF 418.4

CLUBHOUSE
FF 428.0

99
FF 424.6
GF 422.46

98
FF 425.6
GF 423.46

97
FF 426.6
GF 424.45

96
FF 427.6
GF 425.45

95
FF 428.5
GF 426.35

94
FF 429.1
GF 426.93

95
FF 429.8
GF 427.6

45
FF 430.1
WO 421.1
GF 427.94

46
FF 429.3
WO 420.3
GF 427.18

47
FF 428.2
WO 419.2
GF 426.04

48
FF 427.5
WO 418.5
GF 425.36

49
FF 426.9
WO 417.9
GF 424.7

50
FF 426.2
WO 417.2
GF 424.04

51
FF 424.5
GF 422.39

52
FF 420.8
GF 418.65

STORMWATER TREATMENT POND 5
BOT EL 422.0

POSSIBLE DUMPSTER LOCATION W/ENCLOSURE

6' WIDE BIT WALK

CROSSWALK SIGN

12" WHITE STOP BAR (TYP)

NO PARKING SIGN

HANDICAP RAMP (TYP)

STOP SIGNS

KEEP RIGHT SIGN

CROSSWALK BRICK PAVERS (TYP)

WIND SWEPT CIRCLE

HYDRANT (TYP)

STOP SIGN

FOOTING DRAIN AND ROOF DRAIN TO BE SEPARATE PIPES (TYP)

CROSS COUNTRY RUN 1

CROSS COUNTRY RUN 2

INSTALL SPLIT RAIL FENCE

4' x 4' MODIFIED RIPRAP PAD (TYP)

RIPRAP SWALE

NO PARKING SIGNS

STONE CHECK DAM (TYP)

TROUT POND ROAD

X425.0

X425.5

SEE DWG S-2

SEE DWG S-6

40 0 40 80

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\S-3.DWG

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REVISIONS

#	DATE	DESCRIPTION

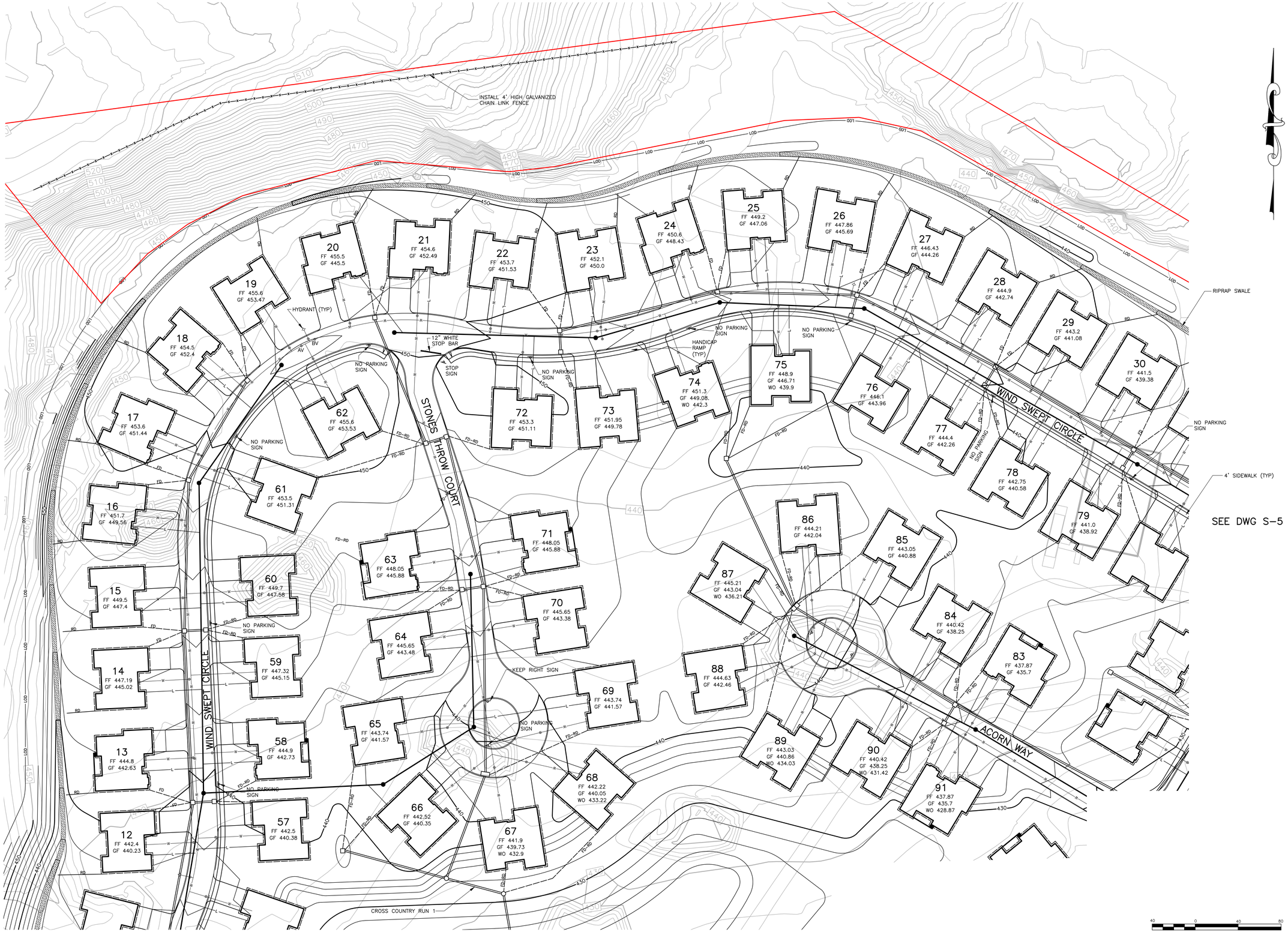
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TITLE

SITE PLAN

SHEET NUMBER

S-3



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TITLE

SITE PLAN

SHEET NUMBER

S-4

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SEE DWG S-4

SEE DWG S-3

SEE DWG S-6

WIND SWEPT CIRCLE

ACORN WAY

NO PARKING SIGN

BUILDING TO BE REMOVED

RIPRAP SWALE

HYDRANT (TYP)

REMOVABLE BOLLARD W/EMERGENCY ACCESS ONLY SIGN

GUARDRAIL (TYP)

4' SIDEWALK (TYP)

INSTALL SPLIT RAIL FENCE

CROSS COUNTRY RUN 3

CROSS COUNTRY RUN 4

PAVED EMERGENCY ACCESS DRIVE

BUILDING TO REMAIN FOR STORAGE USE. NO SANITARY FACILITIES

31	FF 439.9	GF 437.74
32	FF 438.3	GF 436.14
33	FF 436.8	GF 434.63
34	FF 435.3	GF 433.17
35	FF 433.8	WO 424.8 GF 431.66
36	FF 433.0	WO 424.0 GF 430.85
37	FF 432.5	WO 423.5 GF 430.35
38	FF 432.0	WO 423.0 GF 429.78
39	FF 432.1	WO 423.1 GF 430.0
40	FF 434.8	GF 432.61
41	FF 433.6	GF 431.42
42	FF 432.4	WO 423.4 GF 430.26
43	FF 431.5	WO 422.5 GF 429.28
44	FF 430.8	WO 421.8 GF 428.6
80	FF 439.5	GF 437.29
81	FF 434.4	GF 432.2
82	FF 433.2	GF 431.04
83	FF 432.0	GF 429.88
92	FF 430.9	GF 428.68

40 0 40 80

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PROJECT #: 3302
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SCALE: SCALE:1"=40'

TITLE

SITE PLAN

SHEET NUMBER

S-5

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\S-5.DWG

SEE DWG S-5

SEE DWG S-3

RIPRAP BERM

OUTLET CONTROL STRUCTURE

8'X20' RIPRAP PAD
EL 392.0

STORMWATER
TREATMENT POND 4
TOP 381.5
BOTT 377.0

30 LF
4" DRAIN PIPE
W/ELBOW

140 LF TWIN 24" CPP @ 13.57%

5 LF 4" PERF
PVC @ 0.0%
INV 376.0

STORM MH
TF 361.78
INV IN (TWIN 24" PIPES) 357.0
INV OUT (SINGLE 30") 354.0

ACCESS DRIVE
CROSSING
SEE DETAIL

RIGID LIP
(TYP 3 PLACES)

90 LF 30" CPP @ 1.64%

MON. WELL 2

5' x 13' RIPRAP SPILLWAY EL 379.6

PREFORMED SCOUR HOLE

GRAVEL MAINTENANCE DRIVE

CROSS COUNTRY
RUN 2

40' WIDE MODIFIED
RIPRAP LEVEL SPREADER
1.25' THICK

STORMWATER
TREATMENT POND 3
TOP 377.0
BOTT 373.0

30 LF
4" DRAIN PIPE
W/ELBOW

10 LF 4" PERF
PVC @ 0.0%
INV 371.3

40' x 13' RIPRAP SPILLWAY EL 376.0

40' WIDE MODIFIED
RIPRAP LEVEL SPREADER
1.25' THICK

INV 347.0

102 LF 18" CPP @2.4%

INV 344.55

EMERGENCY ACCESS DRIVE

EXISTING GATE.
EMERGENCY LOCK BOX
TO BE INSTALLED

SMITH POND BROOK

N/F
CARLSON

N/F
PERKINS

TURKEY ROOST ROAD

WIND SWEPT CIRCLE

NO PARKING
SIGN

40 0 40 80

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REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
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SCALE: SCALE:1"=40'

TITLE

SITE PLAN

SHEET NUMBER

S-6



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DATE: MAY 1, 2023
PROJECT #: 3302
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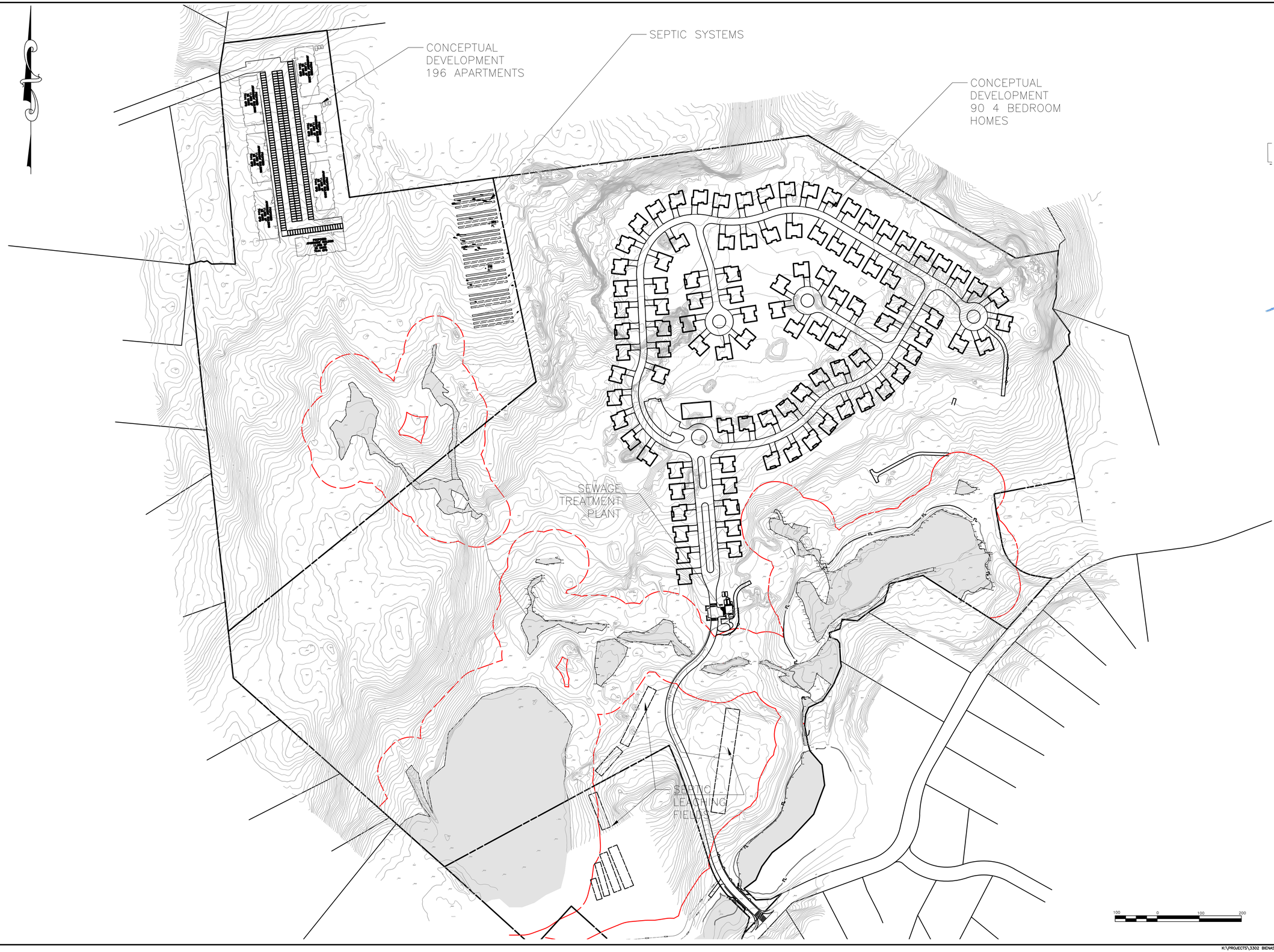
TITLE

SITE PLAN

SHEET NUMBER

S-7

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\S-7.DWG



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SCALE: 1"= 100'

TITLE

SITE PLAN
ALTERNATE

SHEET NUMBER

S–1A

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\S–1A ALTERNATE.DWG

CONCEPTUAL
DEVELOPMENT
196 APARTMENTS

SEPTIC SYSTEMS

REVISED
PROPERTY LINE

CONCEPTUAL
DEVELOPMENT
10 50 BEDROOM
APARTMENT BUILDINGS

SEPTIC
LEACHING
FIELDS

100 0 100 200

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\S-1B ALTERNATE.DWG

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No.
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REVISIONS

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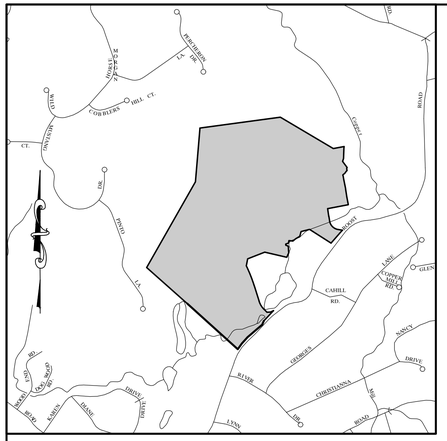
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PROJECT #: 3302
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SCALE: 1"= 100'

TITLE

SITE PLAN ALTERNATE

SHEET NUMBER

S-1B



LOCATION MAP
SCALE: 1"=1000'

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DELTA ANGLE
C1	1323.14'	110.00'	109.97'	S 08°12'18" E	4°45'48"
C2	142.00'	174.23'	163.50'	S 45°44'12" E	70°18'01"
C3	450.00'	21.66'	21.65'	S 42°47'03" W	2°45'26"
C4	270.00'	4.55'	4.55'	S 45°30'19" E	0°57'53"
C5	270.00'	130.32'	129.06'	S 31°11'44" E	27°39'17"
C6	330.00'	164.84'	163.13'	S 31°40'41" E	28°37'10"
C7	2030.00'	304.49'	304.21'	N 21°39'55" W	8°35'39"

OPEN SPACE ANALYSIS
MFR ZONING REQUIRES 50% OPEN SPACE
TOTAL AREA OF MFR = 99 ACRES
AREA OF MFR OPEN SPACE PROV 49.5 (50%) ACRES
ADDITIONAL OPEN SPACE PROVIDED 31 ACRES
TOTAL OPEN SPACE PROVIDED 80.5 (81%) ACRES

LINE	BEARING	DISTANCE
L1	S 09°17'00" W	23.10'
L2	S 02°24'02" W	143.67'
L3	S 16°26'53" W	42.53'
L4	S 36°18'04" E	106.16'
L5	S 39°00'27" W	9.31'
L6	S 07°13'34" E	11.43'
L7	S 06°34'41" E	25.25'
L8	S 57°09'34" W	10.47'
L9	S 35°04'37" W	37.86'
L10	S 49°54'46" W	35.70'
L11	S 13°42'56" E	20.12'
L12	S 10°03'47" E	39.32'
L13	S 10°49'10" E	134.73'
L14	S 10°49'54" E	15.96'
L15	S 08°18'23" E	99.07'
L16	S 12°43'28" E	18.63'
L17	S 10°20'06" E	95.63'
L18	S 10°35'12" E	70.00'
L19	S 80°53'13" E	55.00'
L20	S 15°28'28" W	68.37'
L21	S 57°58'32" W	67.38'
L22	S 51°31'14" W	49.44'
L23	N 84°10'44" W	54.92'
L24	S 13°18'15" W	35.30'
L25	S 70°21'34" W	40.23'
L26	S 08°58'44" E	16.32'
L27	S 70°39'36" E	27.48'
L28	S 35°17'13" E	14.46'
L29	S 03°03'17" E	63.84'
L30	S 09°07'01" E	18.79'
L31	S 23°10'10" W	72.13'
L32	S 33°48'04" W	68.49'
L33	S 64°28'59" W	55.32'
L34	S 23°02'24" W	27.20'
L35	S 05°26'49" W	37.95'
L36	S 09°34'16" E	67.12'
L37	S 17°04'26" E	28.07'
L38	S 40°44'46" E	64.41'
L39	S 07°30'36" E	73.34'
L40	S 20°33'29" W	110.39'
L41	S 52°50'44" W	85.49'
L42	S 36°36'44" W	61.72'
L43	S 24°18'59" W	52.80'
L44	S 53°18'34" W	51.87'
L45	S 43°13'14" W	195.90'
L46	N 63°59'40" E	44.45'
L47	N 87°00'30" E	52.01'
L48	N 45°59'16" W	53.31'
L49	N 45°59'16" W	79.97'
L50	N 14°06'17" E	25.80'
L51	N 21°28'14" E	32.78'
L52	N 23°35'29" E	61.52'

N/F
David Ambrose
291 Hammertown Road
(124/8)

N/F
Daniel Flynn
265 Turkey Roost Road
(117/1/3)

N/F
Ryan Carter
225 Turkey Roost Road
(117/1/1)

N/F
Robert Carlson
207 Turkey Roost Road
(107/9)

N/F
Rodney Perkins
193 Turkey Roost Road
(107/7)

N/F
Antreas Skourides
185 Turkey Roost Road
(107/6)

N/F
Guy Dubail
177 Turkey Roost Road
(107/5)

N/F
Quarry Ridge Assoc. LLC
141 Turkey Roost Road
(107/4)
274,109 SF± - 6.293 AC±

N/F
Carl Smith
139 Turkey Roost Road
(107/3)
EX AREA 477,217 SF± - 10.955 AC±
REV. AREA 115,344 2.64 AC

N/F
Carl Smith
121 Turkey Roost Road
(107/2)

N/F
Robert Dunbar
71 Turkey Roost Road
(97/23)

N/F
Joseph Campbell
69 Pinto Lane
(115/7/14)

N/F
Julie Rodrigue
81 Pinto Lane
(115/7/15)

N/F
Ioana Badara
95 Pinto Lane
(115/7/16)

N/F
David Ambrose
291 Hammertown Road
(124/8)

N/F
Quarry Ridge Assoc. LLC
201 Turkey Roost Road
(107/8/1)
EX. AREA 4,354,772 SF± - 99.972 AC±
REV. AREA 6,402,907SF± 147.00 AC±

N/F
Quarry Ridge Assoc. LLC
30 Cobblers Hill Court
EX. AREA 1,587,203 SF 36.43 AC.
REV. AREA 175,111 4.019 AC.
(107/8/2)

MFR OPEN SPACE

REVISED PROPERTY LINE

ZONE LINE
(FORMER PROPERTY LINE)

FORMER PROPERTY LINE

ADDITIONAL OPEN SPACE

N 87°18'55" E 516.22'
S 04°43'09" W 753.94'
S 07°41'05" E 600.54'
N 83°28'04" E 176.20'
N 83°12'57" E 74.80'
S 09°05'37" E 118.57'
S 09°05'37" E 103.51'
S 04°44'41" E 328.10'
N 85°15'19" E 416.78'
156.87'
N 04°44'41" W 698.41'
N 73°23'23" E 12.75'
S 74°28'59" E 11.13'
S 88°01'42" E 44.89'
N 88°12'13" E 39.85'
S 53°56'38" E 19.51'
S 71°58'26" E 20.50'
N 73°39'05" E 23.36'
S 29°40'58" W 375.05'
N 66°06'35" W 1482.27'
N 48°11'47" W 244.85'
N 48°11'47" W 534.90'
N 48°11'58" W 67.50'
S 48°14'45" W 162.41'
S 47°47'31" E 429.19'
S 47°47'31" E 946.58'
S 79°43'57" E 35.00'
S 59°23'42" E 860.00'
N 82°18'55" E 1357.56'
S 77°04'12" E 97.46'
S 17°22'06" W 227.26'
N 17°22'06" E 227.26'
N 17°44'20" E 166.26'
N 68°20'05" E 215.98'
N 48°55'25" W 416.23'
N 46°57'17" E 278.27'
N 47°45'10" W 504.99'
N 49°38'54" E 272.51'
N 41°51'14" E 15.60'
N 41°51'14" E 99.98'
N 35°33'14" E 100.52'
S 42°14'54" W 199.67'
S 57°28'29" W 355.47'
S 77°04'12" E 220.40'
N 48°43'31" E 116.77'
S 43°11'06" E 141.43'
S 44°47'48" E 47.48'
S 44°47'48" E 47.48'
(50' DIA)

N

NOTES:

1. This survey and map has been prepared in accordance with the Sections 20–300b–1 through 20–300b–20 of the Regulations of Connecticut State Agencies – "Minimum Standards for Survey and Maps in the State of Connecticut" as endorsed by the Connecticut Association of Land Surveyors, Inc. It is an "Existing Conditions Plan" based on a Resurvey and conforms to Horizontal Accuracy Class A–2 and Topographical Classes T–2 and T–3.
2. Reference is made to the following maps:
   A. RM 580
   B. RM 891
   C. RM 919
   D. RM 1088
   E. RM 1094
   F. RM 1435
   G. RM 1554
   H. RM 1573
   I. RM 1695
   J. RM 1787
   K. RM 1803
   L. RM 2174
   M. RM 2646
   N. RM 2731
   O. RM 2873
   P. RM 2921
3. The underground utilities shown, if any, have been located from visible field survey information. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area either in service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated although the surveyor does hereby declare that they are located as accurately as possible from information available. The surveyor has not physically located the underground utilities.
4. Property is Located in Zones X and AE per Flood Insurance Rate Map #09001C0276F and #09001C0277F (Panels 276 and 277 of 626) Effective Date: June 18, 2010.
5. Unauthorized alterations or additions to this survey, which bears the surveyor's embossed seal, renders any declaration shown hereon null and void.
6. All monumentation, found or set, is depicted hereon.

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STATE OF CONNECTICUT — JOHN EDWARDS — LICENSED LAND SURVEYOR

139, 141, & 201 TURKEY ROOST ROAD
& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR
QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: SCALE:1"=150'

TITLE

OPEN SPACE PLAN

SHEET NUMBER

OS–1

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\OS–1.DWG



TEMPORARY SEDIMENT TRAP SIZING

TRAP #	TRIBUTARY AREA (AC)	VOLUME REQUIRED (CY)
1	1.40	187
2	0.87	116
3	1.93	258
4	1.80	241
5	3.95	529
6	4.19	561
7	2.75	368
8	4.33	580
9	3.84	514
10	4.3	576
11	2.21	296
12	5.57	746
13	4.6	616
14	2.55	341
15	2.03	272
16	3.22	431
17	2.34	313

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JASON EDWARDS
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LAND SURVEYOR

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& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR
QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: SCALE:1"=40'

TITLE

EROSION CONTROL PLAN

SHEET NUMBER

E-1

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\E-1.DWG

SEE DWG E-3

HAYBALE BARRIER (TYP)

TROUT POND ROAD

STOCKPILE AREA

TEMPORARY SEDIMENT TRAP 5 – 529CY

STORMWATER TREATMENT POND 2

PUMPING SETTLING BASIN (IF REQUIRED)

2' HIGH WOOD CHIP BERM (TYP)

TEMPORARY SEDIMENT TRAP 4 – 241CY

SILTSACK TO BE INSTALLED AT EACH CATCH BASIN

TEMPORARY SEDIMENT ROUTING (TYP)

DOUBLE ROW SILT FENCE (TYP)

TEMPORARY SEDIMENT TRAP 3 – 258CY

SEE DWG E-1

40 0 40 80

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TITLE

EROSION CONTROL PLAN

SHEET NUMBER

E-2

K:\PROJECTS_3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\E-2.DWG

SEE DWG E-4

TEMPORARY SEDIMENT TRAP 10 – 576CY

TEMPORARY SEDIMENT TRAP 15 – 272CY

CONCRETE WASHOUT BASIN

REFUELING STATION

STOCKPILE AREA

SILTSACK TO BE INSTALLED AT EACH CATCH BASIN

TEMPORARY SEDIMENT TRAP 7 – 368CY

TEMPORARY SEDIMENT TRAP 6 – 561CY

WIND SWEPT CIRCLE

TROUT POND ROAD

SEE DWG E-6

SEE DWG E-2

40 0 40 80

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DRAWN BY: NDC
SCALE: SCALE:1"=40'

TITLE

EROSION CONTROL PLAN

SHEET NUMBER

E-3

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\E-3.DWG

TEMPORARY SEDIMENT TRAP 12 – 746CY

TEMPORARY SEDIMENT TRAP 10 – 576CY

STONES THROW COURT

WIND SWEPT CIRCLE

STOCKPILE AREA

TEMPORARY SEDIMENT TRAP 11 – 296CY

STOCKPILE AREA

TEMPORARY SEDIMENT ROUTING (TYP)

TEMPORARY SEDIMENT TRAP 9 – 514CY

TEMPORARY SEDIMENT TRAP 14 – 341CY

TEMPORARY SEDIMENT TRAP 10 – 576CY

SEE DWG E–3

SEE DWG E–5

40 0 40 80

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REVISIONS

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PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: SCALE:1"=40'

TITLE

EROSION CONTROL PLAN

SHEET NUMBER

E–4

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\E–4.DWG



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REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: SCALE:1"=40'

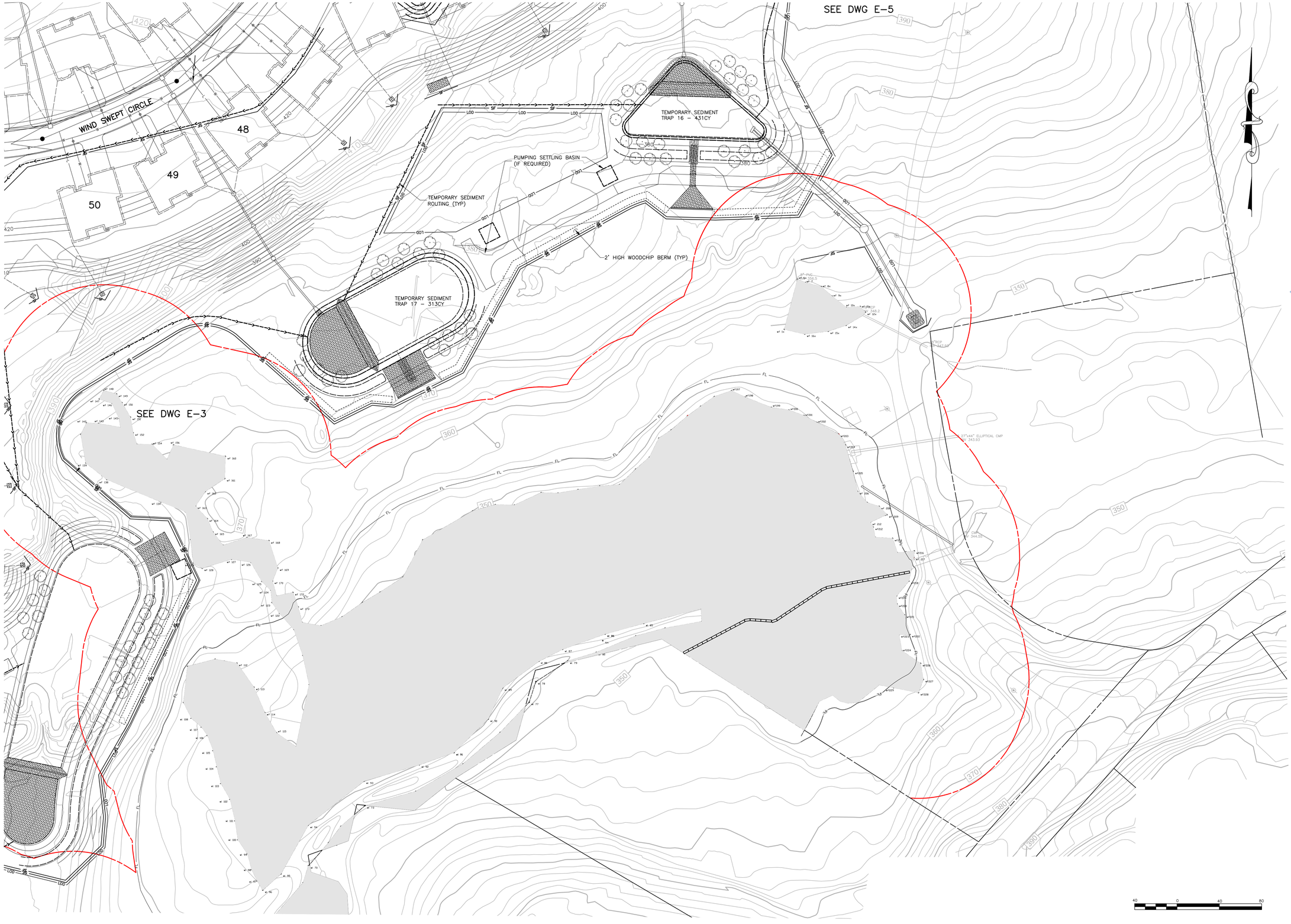
TITLE

EROSION CONTROL PLAN

SHEET NUMBER

E-5

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\E-5.DWG



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REVISIONS

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PROJECT #: 3302
DRAWING FILE:
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SCALE: SCALE:1"=40'

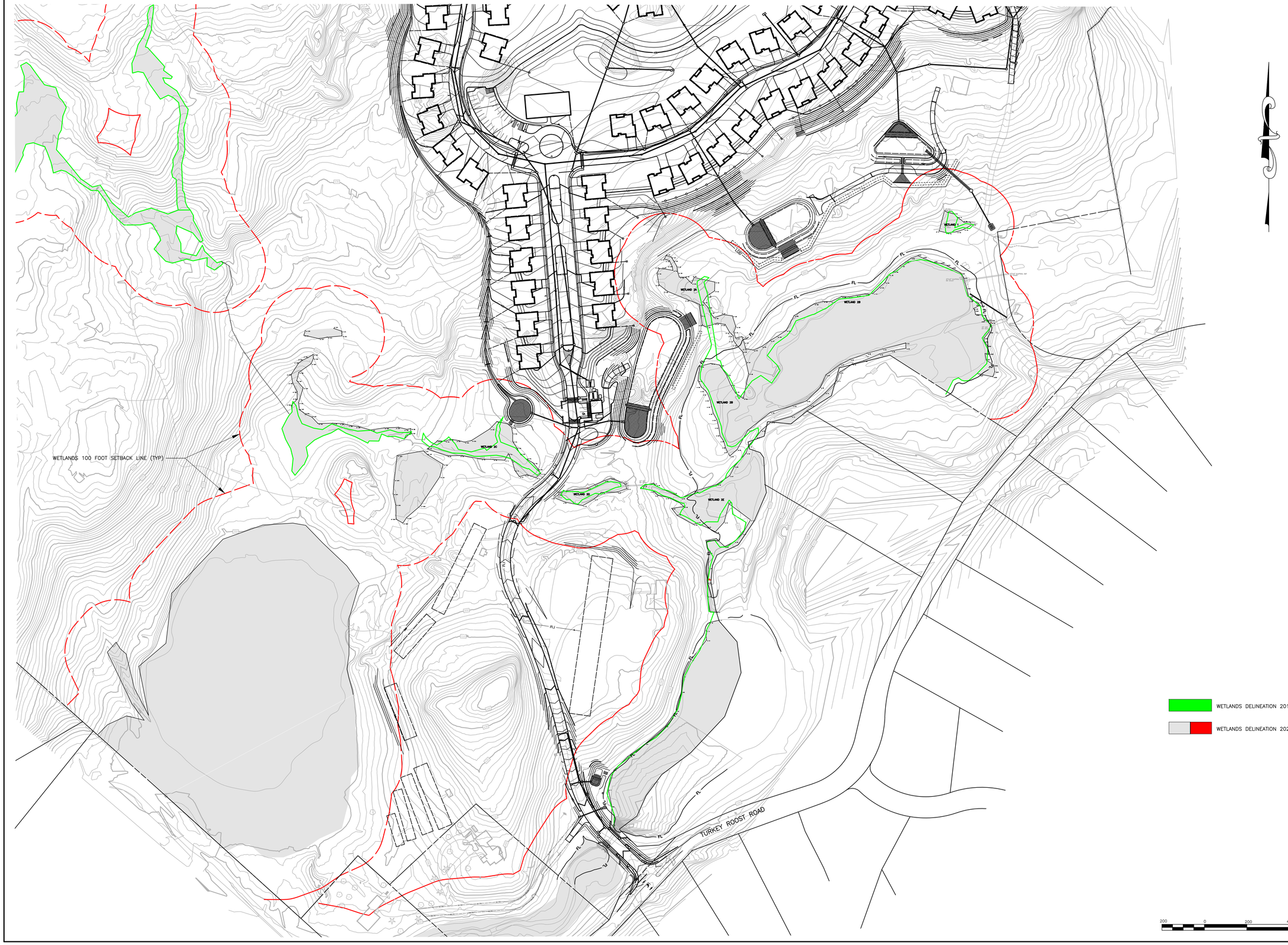
TITLE

EROSION CONTROL PLAN

SHEET NUMBER

E-6

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MONROE, CONNECTICUT

PREPARED FOR

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REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
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SCALE: SCALE:1"=200'

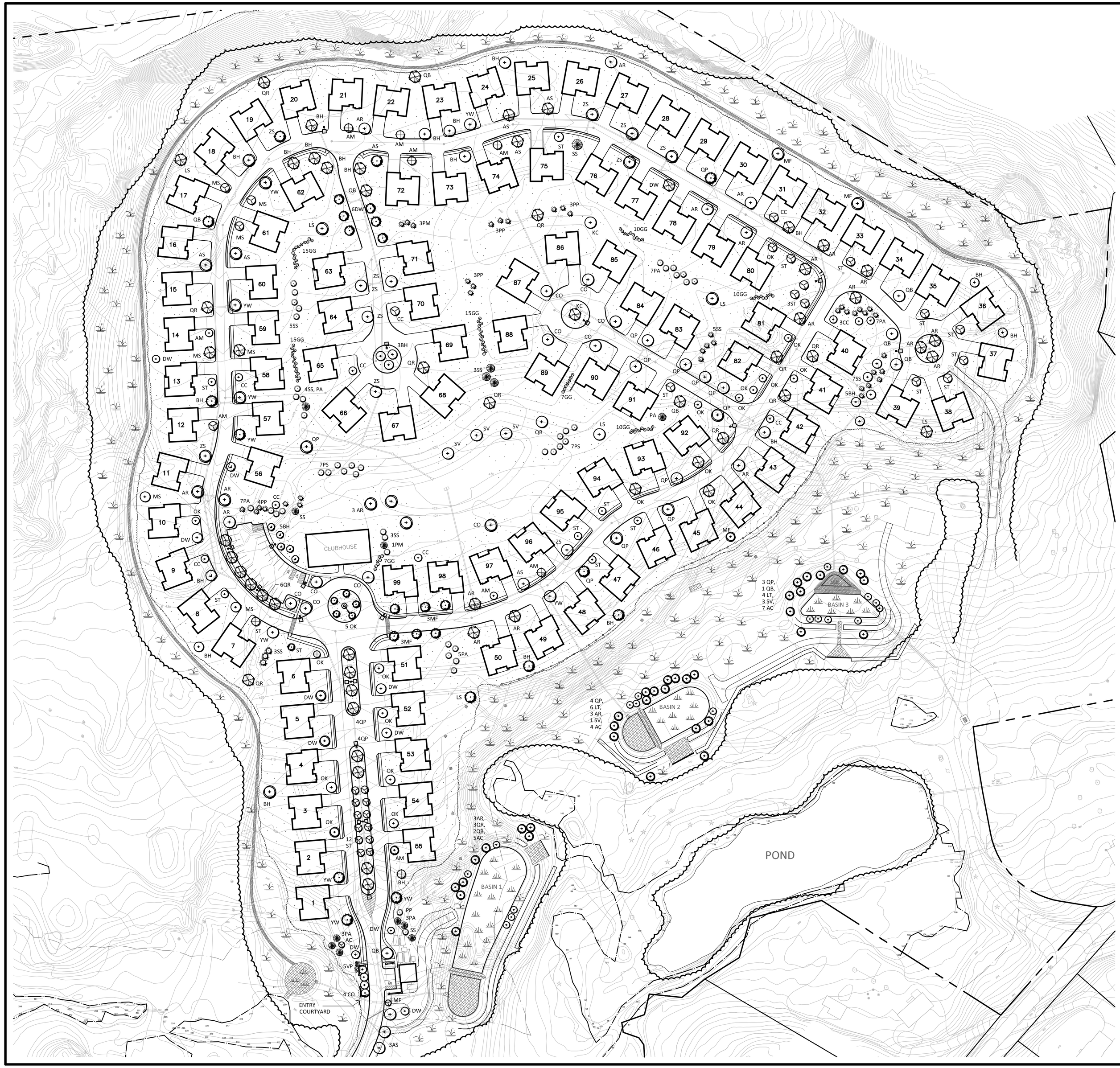
TITLE

WETLANDS PLAN

SHEET NUMBER

WL–1

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\WL–1.DWG



SEEDING NOTES:

1. FOR ALL SEEDING AREAS, APPLY SEED MIX AT THE METHODS AND 125 % THE RATE RECOMMENDED BY THE MANUFACTURER. SEED MIX SUBSTITUTIONS SHALL BE APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE. APPLY SOIL AMENDMENTS AS NEEDED TO ESTABLISH PROPER SEED GERMINATION AND GROWTH.
2. BASIN BOTTOM: SEED THIS AREA WITH "NEW ENGLAND EROSION CONTROL / RESTORATION MIX FOR DETENTION BASINS AND MOIST SITES" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000).
3. BASIN SIDE SLOPES: SEED THIS AREA WITH "NEW ENGLAND CONSERVATION / WILDLIFE MIX" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000).
4. UPLAND MEADOW: SEED DISTURBED MEADOW AREAS WITH "NEW ENGLAND CONSERVATION / WILDLIFE MIX" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000).
5. LAWN : SEED NEW LAWN AREAS WITH A HIGH QUALITY TURF TYPE SEED MIXTURE CONSISTING OF BLUEGRASS, FESCUE AND PERENNIAL RYEGRASS. APPLY SEED MIX AT THE METHODS AND 125% THE RATE RECOMMENDED BY THE MANUFACTURER. SEED MIX SUBSTITUTIONS SHALL BE APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE. APPLY SOIL AMENDMENTS AS NEEDED TO ESTABLISH PROPER SEED GERMINATION AND GROWTH.

LEGEND

- NEW BOLLARD LIGHT
- NEW FLAG POLE
- NEW SINGLE / DOUBLE FIXTURE LIGHT POLE
- TREE LINE (APPROX.)
- NEW / EX. LAWN AREA
- BASIN BOTTOM SEED AREA
- BASIN BOTTOM SIDE SLOPES AND UPLAND MEADOW SEED AREA

PLANT LIST (TYPICAL)

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
28	AR	ACER RUBRUM	RED MAPLE	2 1/2-3" CAL.	B&B	
10	AS	ACER 'GREEN MOUNTAIN'	SUGAR MAPLE	2-2 1/2" CAL.	B&B	
7	SV	ACER SACCHARINUM	SILVER MAPLE	2-2 1/2" CAL.	B&B	
14	CO	CELTIS OCCIDENTALIS	HACKBERRY	2-2 1/2" CAL.	B&B	
2	KC	GYMNOCLADUS DIOCIA	KENTUCKY COFFEETREE	2-2 1/2" CAL.	B&B	
6	LS	LIQUIDAMBAR STYRACIFLUA	SWEET GUM	2-2 1/2" CAL.	B&B	
10	LT	LIRIODENDRON TULIPIFERA	TULIPTREE	1 1/2-2" CAL.	B&B	
11	QB	QUERCUS BICOLOR	SWAMP WHITE OAK	2 1/2-3" CAL.	B&B	
31	QP	QUERCUS PALUSTRIS	PIN OAK	2 1/2-3" CAL.	B&B	
23	QR	QUERCUS RUBRA	RED OAK	2-2 1/2" CAL.	B&B	FULL
11	ZS	ZELKOVA SERRATA	ZELKOVA	2 1/2-3" CAL.	B&B	
17	AC	AMELANCHIER CANADENSIS	SHADBLOW	4-5' HT.	B&B	MULTISTEM
9	AM	AMELANCHIER 'AUTUMN BRILLIANCE'	SHAD (TREE FORM)	8-9' HT.	B&B	SINGLE STEM
28	BH	BETULA NIGRA 'DURA HEAT'	DURA HEAT BIRCH	9-10' HT.	B&B	
0	JM	BETULA JACQUEMONTI	JACQUEMONTI BIRCH	8-9' HT.	B&B	3 STEMS
11	CC	CERCIS CANADENSIS	RED BUD	8-9' HT.	B&B	SINGLE STEM
10	YW	CLADRASTIS LUTEA	YELLOWWOOD	2 1/2-3" CAL.	B&B	
5	VP	VIBURNUM PLICATUM 'PINK SENSATION'	PINK SENSATION VIBURNUM	3-4' HT.	B&B	
7	MS	MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA	2-2 1/2" CAL.	B&B	
17	DW	MALUS 'SNOWDRIFT'	SNOWDRIFT CRABAPPLE	2-2 1/2" CAL.	B&B	FULL
29	ST	MALUS 'SUGAR TYME'	SUGAR TYME CRAB	2-2 1/2" CAL.	B&B	MATCHING
10	MF	MALUS FLORIBUNDA	JAPANESE FLOWERING CRAB	2-2 1/2" CAL.	B&B	
24	OK	PRUNUS 'OKAME'	OKAME CHERRY	2 1/2-3" CAL.	B&B	
34	PA	PICEA ABIES	NORWAY SPRUCE	8-10' HT.	B&B	
23	SS	PICEA OMORIKA	SERBIAN SPRUCE	8-10' HT.	B&B	
14	PP	PICEA PUNGENS	BLUE SPRUCE	7-8' HT.	B&B	
14	PS	PINUS STROBUS	WHITE PINE	8-10' HT.	B&B	
4	PM	PSEUDOTSUGA MENZIESII	DOUGLASFIR	8-10' HT.	B&B	
89	GG	THUJA 'GREEN GIANT'	GREEN GIANT ARBORVITAE	5-6' HT.	B&B	

BASIN PLANT LIST (TYP.)

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
75	-----	CLETHRA ALNIFOLIA	CLETHRA	3-4' HT.	CONT.	TOE OF SLOPE
75	-----	ILEX VERTICILLATA	WINTERBERRY	3-4' HT.	CONT.	TOE OF SLOPE
900	-----	ASCLEPIAS INCARNATA	SWAMP MILKWEED		PP/1 QT.	BASIN BOTTOM
600	-----	EUPATORIUM PERFOLIATUM	BONESET		PP/1 QT.	BASIN BOTTOM
300	-----	IRIS VERSICOLOR	BLUE FLAG IRIS		PP/1 QT.	BASIN BOTTOM
300	-----	VERBENA HASTATA	BLUE VERVAIN		PP/1 QT.	BASIN BOTTOM
300	-----	VERNONIA NOVEBORACENSIS	NEW YORK IRONWEED		PP/1 QT.	BASIN BOTTOM

NOTE: PLANT BASIN PLANTS EVENLY BETWEEN THE THREE BASINS. HERBACEOUS PLANTS TO BE PLANTED WITHIN THE BASIN BOTTOM IN N GROUPINGS OF TEN.

GENERAL NOTES:

1. SURVEY AND PROPOSED SITE INFORMATION TAKEN FROM A DIGITAL AUTOCADD SITE PLAN SUPPLIED BY J. EDWARDS & ASSOCIATES, LLC.
2. EXACT LOCATION OF PLANTINGS, SPECIES TYPES AND QUANTITIES MAY VARY FROM THIS PLAN BASED ON SITE PLAN REVISIONS AND/OR ACTUAL FIELD CONDITIONS.
3. SPRAY NEW PLANTINGS WITH A WHITE-TAILED DEER REPELLENT IMMEDIATELY AFTER PLANTING AND AS NEEDED TO MAINTAIN NEW PLANTINGS FREE OF SIGNIFICANT DEER BROWSING.
4. THIS PLAN FOR PLANTING PURPOSES ONLY. SEE PLANS BY OTHERS FOR ADDITIONAL INFORMATION.
5. PLANT SPECIES SUBSTITUTIONS MAY BE MADE WITH THE APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT PRIOR TO PLANTING. S
6. ALL PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
7. IN THE EVENT OF A DISCREPANCY BETWEEN THE QUANTITIES OF PLANTS IN THE "PLANT LIST" AND THE ACTUAL QUANTITIES SHOWN ON THE PLAN, THE PLAN SHALL GOVERN.
8. ALL LIGHTING INFORMATION AND PLANS PREPARED BY ENVIRONMENTAL LAND SOLUTIONS, LLC ARE DESIGNED FOR AESTHETIC PURPOSES ONLY AND SHALL BE USED ONLY FOR SUCH PURPOSES. LIGHTING INFORMATION SHOWN ON THIS PLAN SHALL NOT BE USED FOR SECURITY OR SAFETY LIGHTING PURPOSES.
9. SEE SHEET LP-2 FOR ADDITIONAL INFORMATION.

REVISIONS:		
7	5/1/23	99 UNIT PLAN
6	3/13/23	REV. SITE PLAN
5	1/25/22	83 UNIT PLAN
4	12/17/21	SEEDING INFO ADDED
3	6/22/21	PER REVISED SITE PLAN
2	8/6/10	CHANGE PROJECT NAME
1	5/15/10	PER REVISED SITE PLAN

ENVIRONMENTAL LAND SOLUTIONS, LLC
LANDSCAPE ARCHITECTURE AND ENVIRONMENTAL PLANNING
8 Knight Street, Suite 203
Norwalk, Connecticut 06851
Tel: (203) 855-7879 Fax: (203) 855-7836
email: landscape@snet.net

DRAWING TITLE: SITE LANDSCAPE PLAN

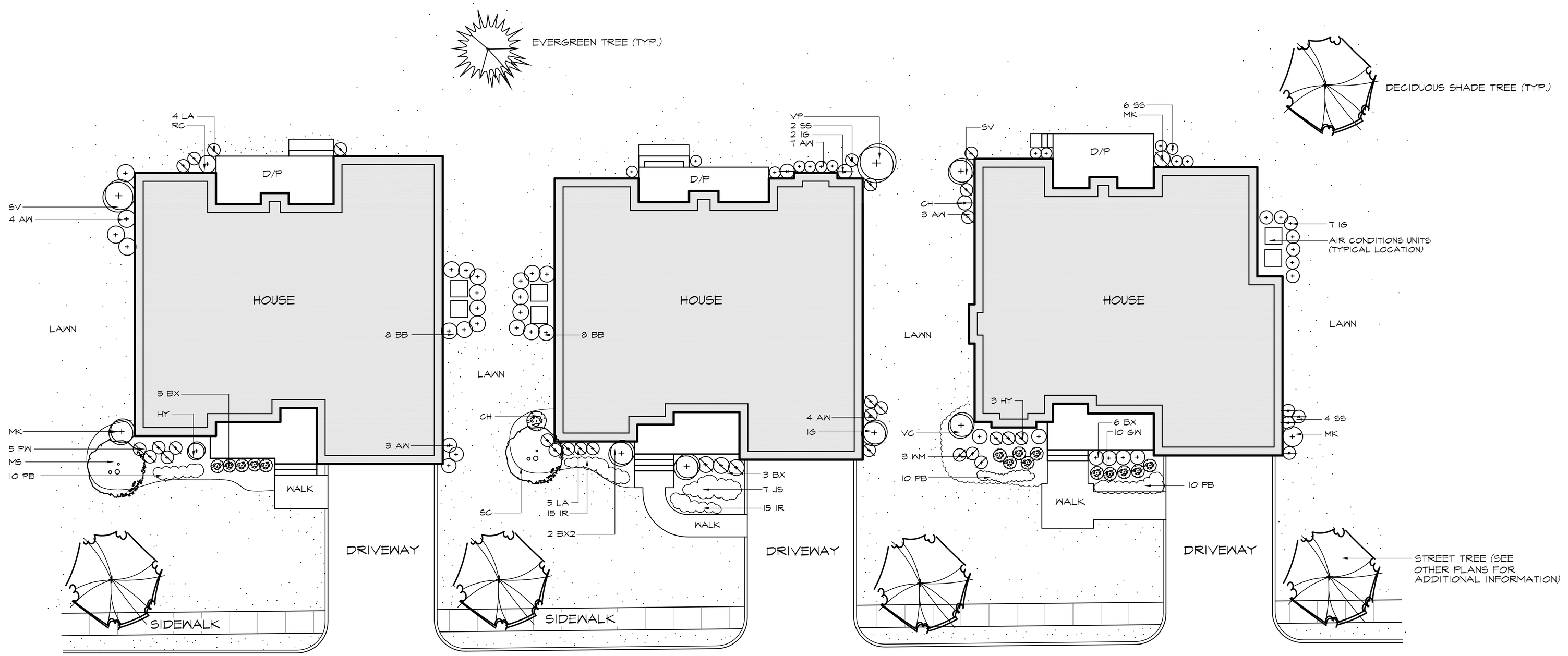
PROJECT: QUARRY RIDGE, MONROE, CONNECTICUT

PREPARED FOR: QUARRY RIDGE ASSOCIATES, LLC

DATE: APRIL 2007

SCALE: 1"=80'

DRAWING NO.: LP-1



PLANT LIST (TYP.)

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
0	AC	AMELANCHIER CANADENSIS	SHADBLOW	6-7' HT.	B&B	MULTISTEM
0	FD	CORNUS FLORIDA	FLOWERING DOGWOOD	7-8' HT.	B&B	
0	CK	CORNUS KOUSA 'MILKY WAY'	KOUSA DOGWOOD	7-8' HT.	B&B	SPECIMEN
1	MS	MAGNOLIA STELLATA 'CENTENNIAL'	CENTENNIAL MAGNOLIA	5-6' HT.	B&B	SPECIMEN
1	SC	MALUS SARGENTI	SARGENT CRAB	6-7' HT.	B&B	
10	GW	AZALEA 'GUMPO WHITE'	GUMPO WHITE AZALEA	15-18" HT.	CONT.	
5	PW	AZALEA 'PLEASANT WHITE' (3'X3')	PLEASANT WHITE AZALEA	2-3' HT.	CONT.	
0	PD	BUDDLEIA 'PINK DELIGHT'	PINK DELIGHT	2-3' HT.	CONT.	
14	BX	BUXUS SEMP. 'VARDEN VALLEY'	BOXWOOD	18-24" HT.	CONT.	
2	BX2	BUXUS SEMP. 'VARDEN VALLEY'	BOXWOOD	30-36" HT.	CONT.	
2	CH	CLETHRA ALNIFOLIA 'HUMMINGBIRD'	HUMMINGBIRD CLETHRA	2-3' HT.	CONT.	
4	HY	HYDRANGEA MAC. 'NIKKO BLUE'	NIKKO BLUE HYDRANGEA	15-18" HT.	2 GAL.	
0	IC	ILEX CRENATA 'CHESAPEAKE'-7' HT	CHESAPEAKE HOLLY	3-4' HT.	CONT.	
0	ST	ILEX CRENATA 'SOFT TOUCH' 2'X3'	SOFT TOUCH HOLLY	15-18" HT.	CONT.	
7	IG	ILEX GLABRA 'SHAMROCK'	INKBERRY	2-3' HT.	CONT.	
7	JS	JUNIPERUS 'SARGENT'	SARGENT JUNIPER	18-24" SPR.	2 GAL.	
9	LA	LEUCOTHOE AXILLARIS	LEUCOTHOE	18-24" HT.	CONT.	
0	MP	MYRICA PENSYLVANICA	BAYBERRY	2-3' HT.	CONT.	
16	BB	PIERIS 'BROUNER'S BEAUTY'	BROUNER'S BEAUTY PIERIS	36-42" HT.	B&B	
1	RC	RHODODENDRON 'CHIONOIDES'	CHIONOIDES RHODODENDRON	36-42" HT.	B&B	
3	WM	ROSA 'WHITE MEIDILAND'	WHITE MEIDILAND ROSE	2-3' SPR.	CONT.	
21	AW	SPIRAEA 'ANTHONY WATERER'	ANTHONY WATERER SPIREA	2-3' SPR.	CONT.	
13	SS	SPIRAEA 'SHIROBANA'	SHIROBANA SPIREA	18-24" HT.	CONT.	
3	MK	SYRINGA PATULA 'MISS KIM'	MISS KIM LILAC	30-36" HT.	CONT.	
2	SV	SYRINGA 'POCAHONTAS'	POCAHONTAS LILAC	3-4' HT.	B&B	
0	TO	THUJA 'NIGRA'	ARBORVITAE	3-4' HT.	B&B	
1	VC	VIBURNUM CARLESII	MAYFLOWER VIBURNUM	3-4' HT.	B&B	
1	VP	VIBURNUM PL. TOMENTOSA 'SHASTA'	SHASTA VIBURNUM	4-5' HT.	B&B	
30	PB	ASTILBE 'PEACH BLOSSOM'	ASTILBE		1 GAL.	
0	GN	LYSIMACHIA CLETHROIDES	GOOSENECK LOOSESTRIFE		2 GAL.	
30	IR	IRIS 'BUTTER AND EGGS'	WHITE IRIS		2 GAL.	
0	EG	MISCANTHUS SIN. 'PURPURESCENS'	EULALIA GRASS		2 GAL.	
0	PH	PENNISETUM ALOP. 'HAMELN'	HAMELN FOUNTAIN GRASS		2 GAL.	
0	CF	POLYSTICHUM ACROSTICHOIDES	CHRISTMAS FERN		2 GAL.	
0	VM	VINCA MINOR	VINCA		BR	

NOTE: THIS PLAN ILLUSTRATES A TYPICAL FOUNDATION PLANTING DESIGN FOR INDIVIDUAL HOUSE SITES. PLANT SPECIES LISTED ABOVE WITH A QTY OF "0" MAY ALSO BE USED AS FOUNDATION PLANTS.

NOTES:

1. THIS PLAN REPRESENTS A GRAPHIC ILLUSTRATION OF TYPICAL LANDSCAPED UNITS. THE LOCATION OF LANDSCAPE ELEMENTS (I.E.; WALKS, DRIVEWAY, LIGHTING, AND PLANTING LOCATIONS, SPECIES AND QUANTITIES) MAY VARY FROM THIS PLAN BASED ON ACTUAL FIELD CONDITIONS AND THE OWNERS PREFERENCES.
2. SURVEY AND PROPOSED SITE INFORMATION TAKEN FROM A DIGITAL AUTOCADD SITE PLAN PREPARED BY SPATH-BJORKLUND ASSOCIATES, INC.
3. THE LANDSCAPE CONTRACTOR SHALL VERIFY WITH THE PROJECT ENGINEER THAT THE PROPOSED PLANTINGS DO NOT INTERFERE WITH EXISTING AND/OR PROPOSED UTILITIES, SIGHT LINES, AND/OR STRUCTURES.
4. SEED NEW LAWN AREAS WITH A HIGH QUALITY TURF TYPE SEED MIXTURE CONSISTING OF BLUEGRASS, FESCUE AND PERENNIAL RYEGRASS SUCH AS "TRI-PLEX SHADE" MIX AVAILABLE FROM LOFTS SEED, INC. APPLY SOIL AMENDMENTS AS NEEDED TO ESTABLISH PROPER SEED GERMINATION AND GROWTH. LAWN AREAS SHALL HAVE A MINIMUM 4-6" LAYER OF TOPSOIL.
5. SPRAY NEW PLANTINGS WITH A WHITE-TAILED DEER REPELLENT IMMEDIATELY AFTER PLANTING AND AS NEEDED TO MAINTAIN NEW PLANTINGS FREE OF SIGNIFICANT DEER BROWSING.
6. THIS PLAN FOR PLANTING PURPOSES ONLY. SEE PLANS BY OTHERS FOR ADDITIONAL INFORMATION.
7. PLANT SPECIES SUBSTITUTIONS MAY BE MADE WITH THE APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT PRIOR TO PLANTING. SUBSTITUTED PLANTS SHALL BE AT AN EQUAL OR GREATER SIZE AS NOTED USING A SIMILAR TYPE PLANT.
8. THE LANDSCAPE CONTRACTOR SHALL TEST THE SOIL IN AREAS TO BE LANDSCAPED FOR DETERMINING THE NEED OF ADDING SOIL AMENDMENTS TO SUPPORT PROPER PLANT GROWTH. SUCH AMENDMENTS SHALL BE PROVIDED BY THE LANDSCAPE CONTRACTOR IF NEEDED.
9. ALL PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
10. IN THE EVENT OF A DISCREPANCY BETWEEN THE QUANTITIES OF PLANTS IN THE "PLANT LIST" AND THE ACTUAL QUANTITIES SHOWN ON THE PLAN, THE PLAN SHALL GOVERN.
11. IF REQUESTED BY THE OWNER/CLIENT, THE LANDSCAPE CONTRACTOR SHALL PROVIDE AN IRRIGATION PLAN FOR ALL LANDSCAPED AREAS. THE CONTRACTOR SHALL INCLUDE A PRICE FOR PREPARATION OF AN IRRIGATION PLAN AND INSTALLATION OF SYSTEM TO THE OWNER/CLIENT.
12. MULCH PLANTING BEDS AND TREES WITH A 2.5" THICK LAYER OF SHREDDED BARK MULCH. MAINTAIN 4" AREA SURROUNDING TREE TRUNKS FREE OF MULCH.
13. ALL LIGHTING INFORMATION AND PLANS PREPARED BY ENVIRONMENTAL LAND SOLUTIONS, LLC ARE DESIGNED FOR AESTHETIC PURPOSES ONLY AND SHALL BE USED ONLY FOR SUCH PURPOSES. LIGHTING INFORMATION SHOWN ON THIS PLAN SHALL NOT BE USED FOR SECURITY OR SAFETY LIGHTING PURPOSES.
14. HOUSE DIMENSIONS ARE APPROXIMATE, ADJUST PLANTINGS AS REQUIRED TO MEET INTENT OF PLAN.
15. DECK/PATIO (D/P) SHAPES ARE TYPICAL AND MAY VARY FROM THAT SHOWN.
16. EACH UNIT MAY HAVE WALL MOUNTED AND/OR POLE LIGHT FIXTURES.

REVISIONS:		
3	6/22/21	PER REVISED SITE PLAN
2	8/6/10	CHANGE PROJECT NAME
1	5/15/10	PER REVISED SITE PLAN

ENVIRONMENTAL LAND SOLUTIONS, LLC
LANDSCAPE ARCHITECTURE AND ENVIRONMENTAL PLANNING
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Norwalk, Connecticut 06851
Tel: (203) 855-7879 Fax: (203) 855-7836
email: landscape@snet.net

DRAWING TITLE: TYPICAL UNIT LANDSCAPING

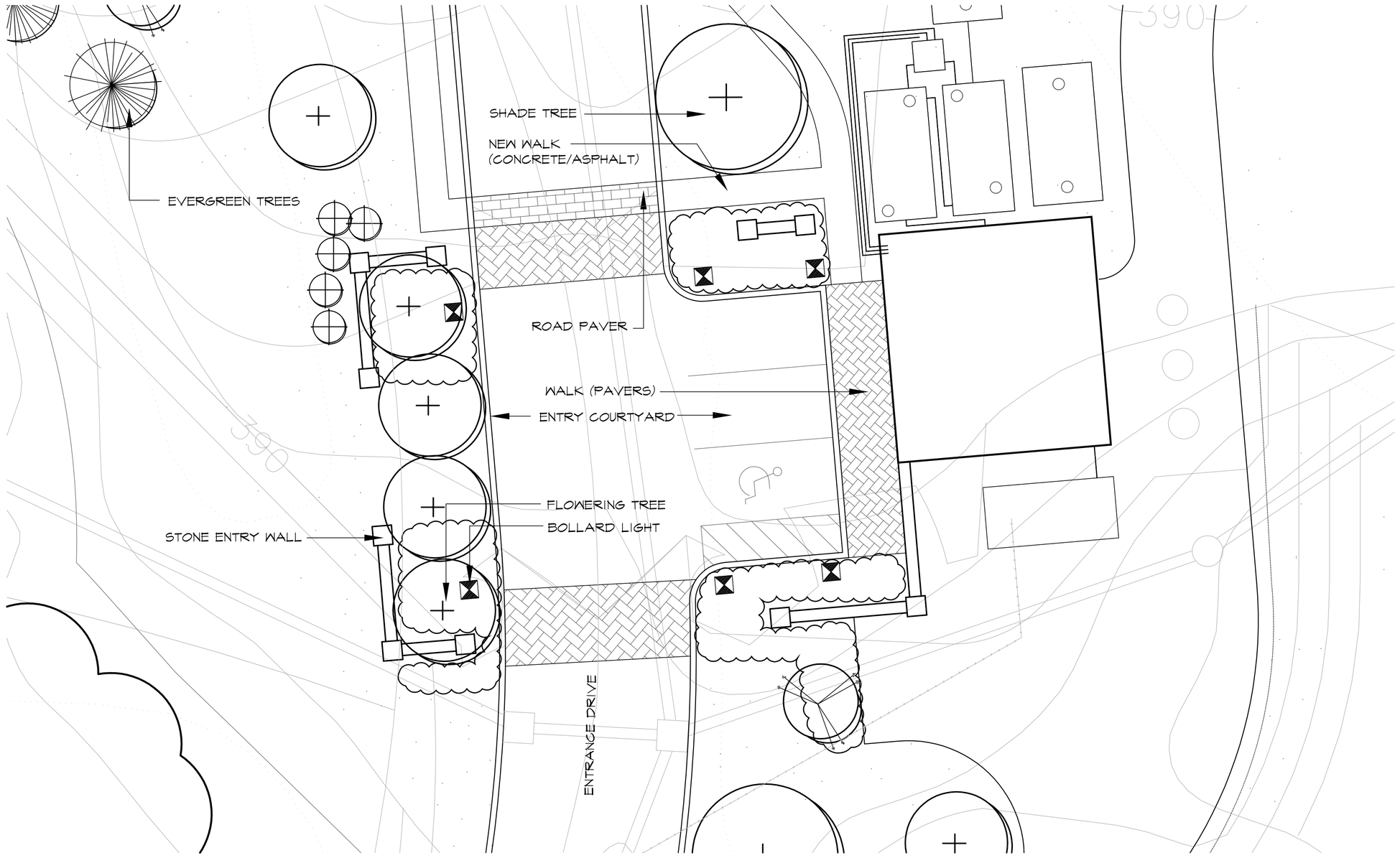
PROJECT: QUARRY RIDGE
MONROE, CONNECTICUT

PREPARED FOR: QUARRY RIDGE ASSOCIATES, LLC

DATE: APRIL 2007

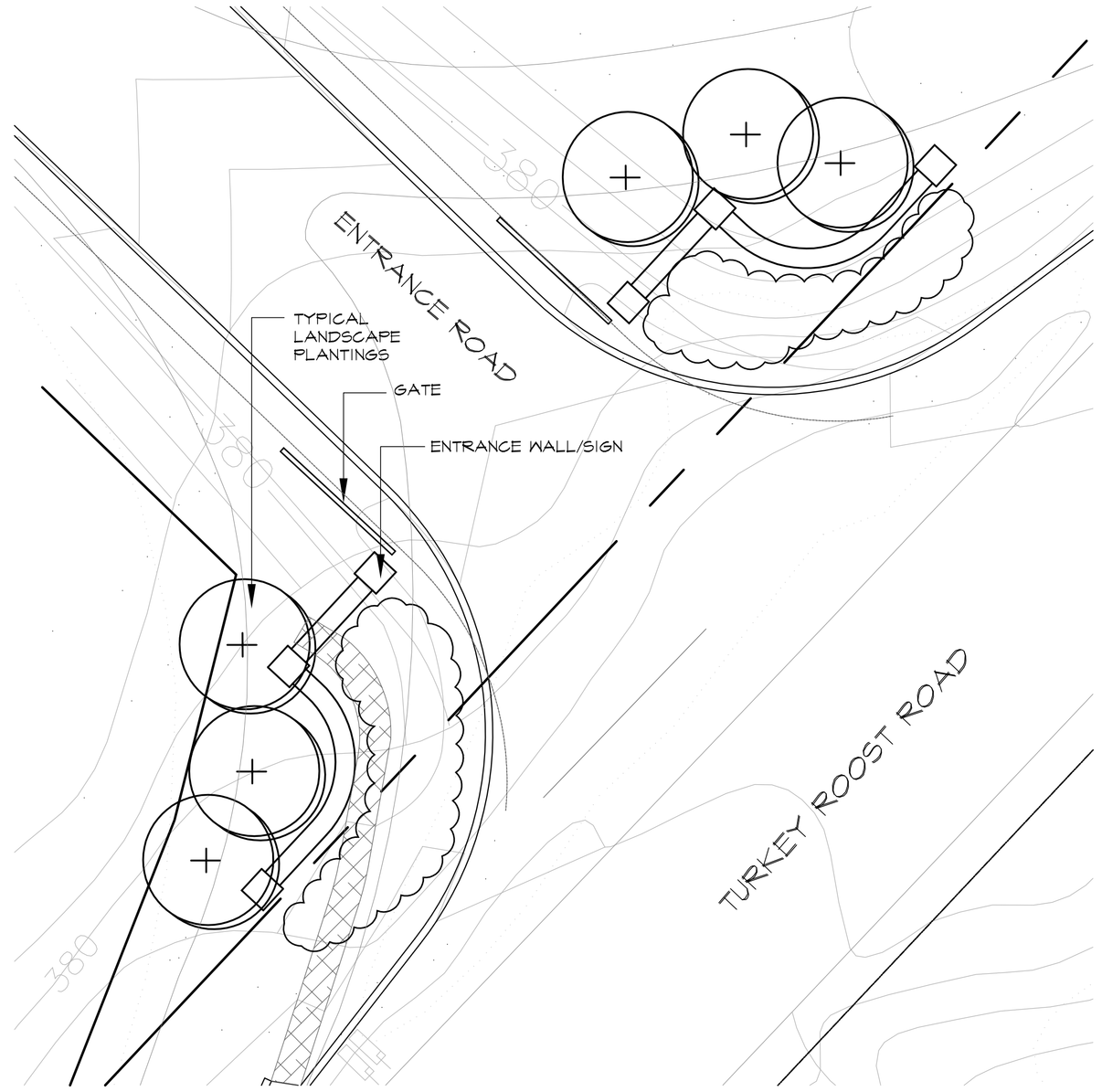
SCALE: 1"=20'

DRAWING NO.: LP-2



ENTRY COURTYARD - PLAN ELEVATION

SCALE: 1"=10'

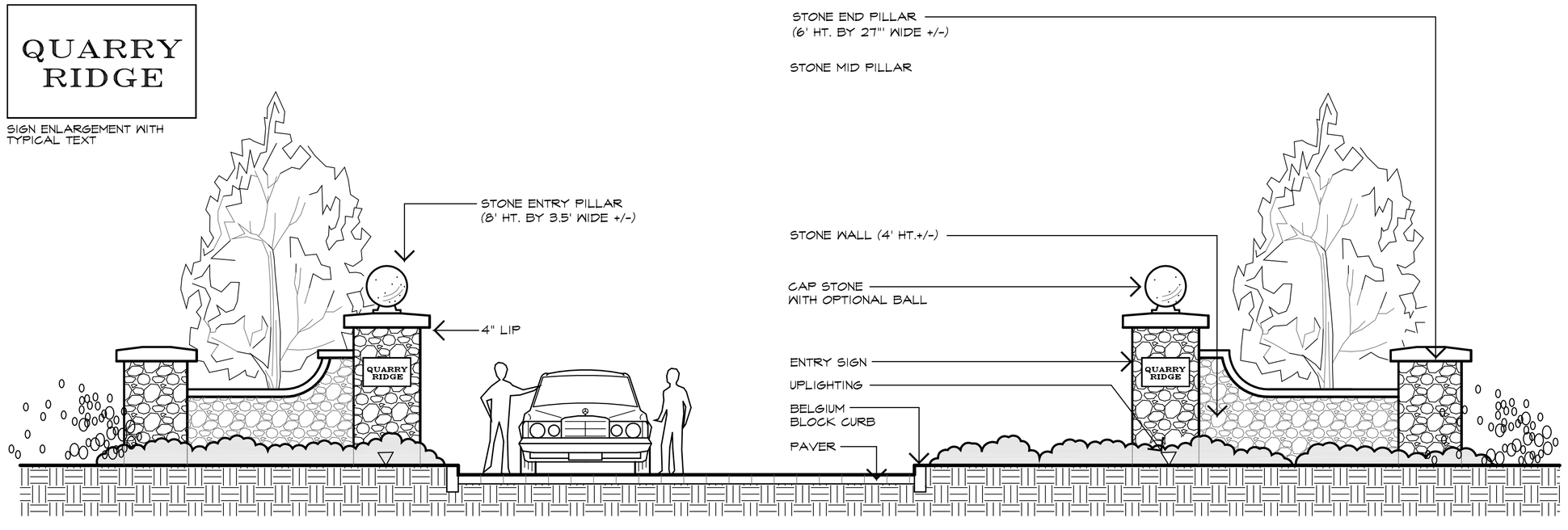


ENTRY SIGNAGE

SCALE: 1"=10'

QUARRY
RIDGE

SIGN ENLARGEMENT WITH
TYPICAL TEXT



ENTRY COURTYARD - TYPICAL ELEVATION

SCALE: NOT TO SCALE

NOTE: THIS ELEVATION IS A CONCEPTUAL VIEW OF THE ENTRANCE TO THE COURTYARD. ENTRANCE WALL, CAP, AND PILLAR HEIGHT AND SHAPE MAY VARY FROM THAT SHOWN.

REVISIONS:		
3	6/22/21	PER REVISED SITE PLAN
2	8/6/10	CHANGE PROJECT NAME
1	5/15/10	PER REVISED SITE PLAN

LANDSCAPE ARCHITECTURE ENVIRONMENTAL PLANNING
ELS
ENVIRONMENTAL LAND SOLUTIONS, LLC
LANDSCAPE ARCHITECTURE AND ENVIRONMENTAL PLANNING
8 Knight Street, Suite 203
Norwalk, Connecticut 06851
Tel: (203) 855-7879 Fax: (203) 855-7836
email: landscape@snet.net

DRAWING TITLE: LANDSCAPE ENLARGEMENTS

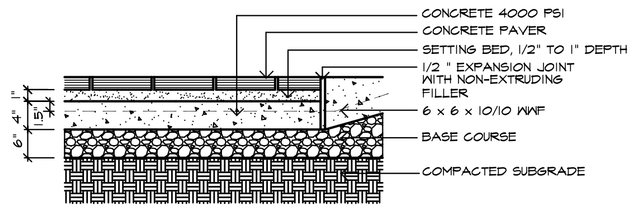
PROJECT: QUARRY RIDGE
MONROE, CONNECTICUT

PREPARED FOR: QUARRY RIDGE ASSOCIATES, LLC

DATE: APRIL 2007

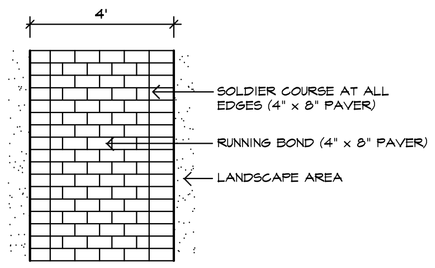
SCALE: AS SHOWN

DRAWING NO.: LP-3



NOTES:
1. PAVER SHALL HAVE A MIN. 8,000 PSI COMPRESSIVE STRENGTH, SHALL MEET ASTM C936-82 PAVING BRICK STANDARDS, AND SHALL HAVE 5% WATER ABSORPTION RATE. PAVER COLOR SHALL BE TAN/SAND.
2. PITCH ALL RAMPS & WALKS AT 1/8" PER 1' FROM SIDE TO SIDE.
3. PAVERS TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

SECTION

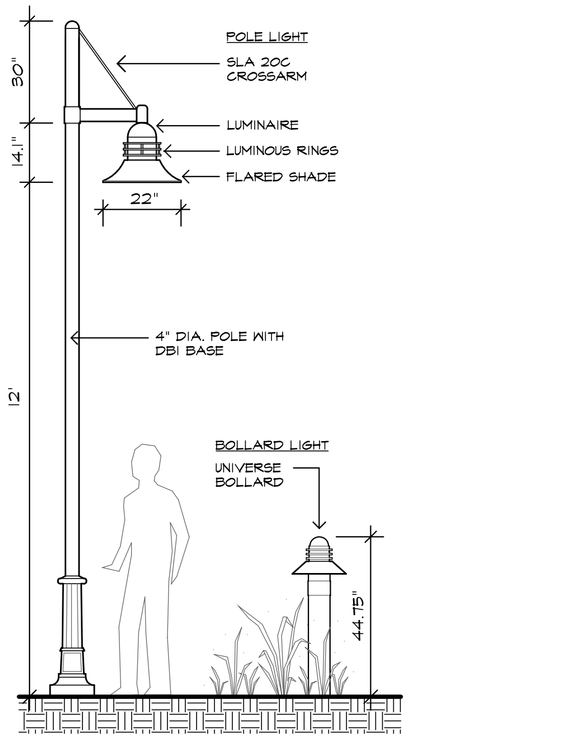


PLAN

PATTERN IS TYPICAL.

PRECAST CONCRETE WALK PAVEMENT

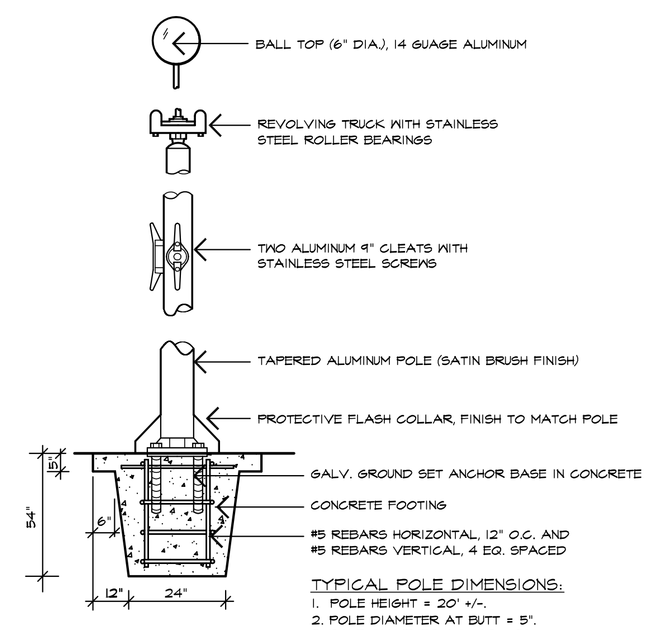
SCALE: NOT TO SCALE



NOTES:
1. LIGHTING BY ARCHITECTURAL AREA LIGHTING, UNIVERSE COLLECTION.
2. POLE, BOLLARDCOLOR AND FIXTURES SHALL BE DARK GREEN IN COLOR.
3. SINGLE FIXTURE POLE IS SHOWN ABOVE. DOUBLE FIXTRE POLE HAS TWO LUMINARES.

POLE & BOLLARD LIGHT

SCALE: NOT TO SCALE

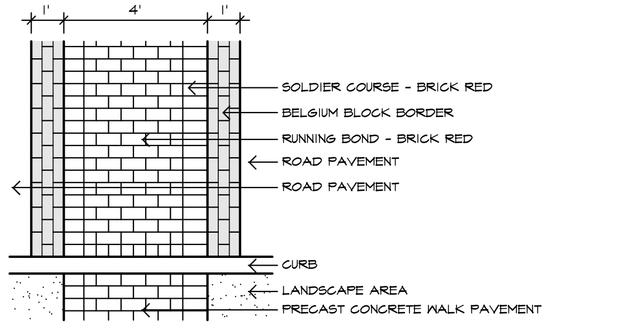


TYPICAL POLE DIMENSIONS:
1. POLE HEIGHT = 20' +/-.
2. POLE DIAMETER AT BUTT = 5".
3. POLE DIAMETER AT TOP = 3".
4. POLE THICKNESS = .188".

NOTE: INSTALL POLE PER MANUFACTURER'S RECOMMENDATIONS.

FLAG POLE (TYPICAL)

SCALE: NOT TO SCALE



NOTES:
1. PAVER SHALL HAVE A MIN. 8,000 PSI COMPRESSIVE STRENGTH.
2. PITCH ALL AREAS TO DRAIN.
3. PAVERS TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

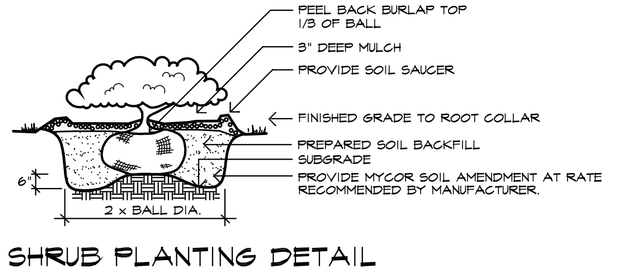
SECTION

PLAN

PATTERN IS TYPICAL.

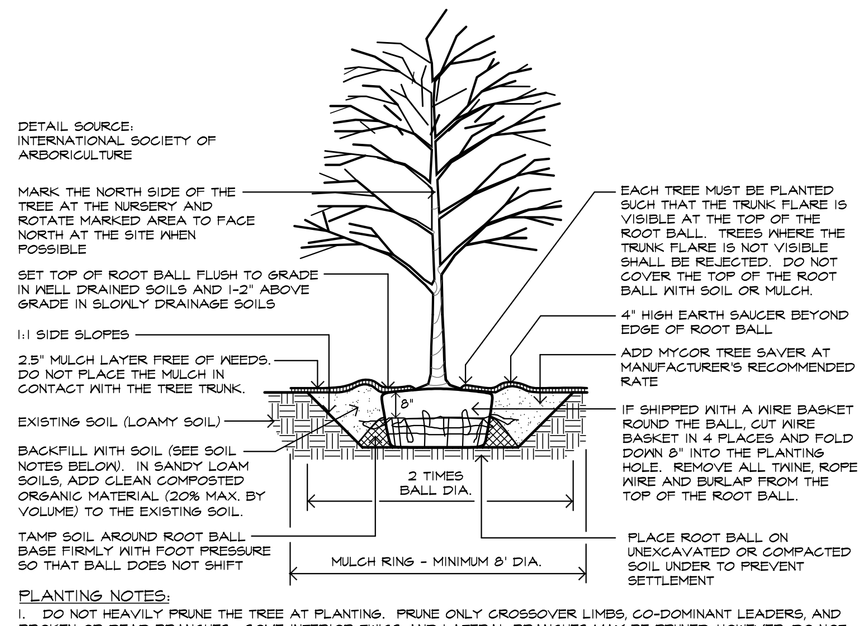
PRECAST CONCRETE CROSSWALK PAVEMENT

SCALE: NOT TO SCALE



SHRUB PLANTING DETAIL

SCALE: NOT TO SCALE



PLANTING NOTES:
1. DO NOT HEAVILY PRUNE THE TREE AT PLANTING. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED; HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN.
2. STAKE TREE BASED ON CRITERIA BELOW OR AS REQUESTED BY THE LANDSCAPE ARCHITECT.
3. WRAP TREE TRUNKS ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT.

SOIL NOTES:
1. CLEAN FILL MATERIAL SHALL BE A LOAMY SOIL. LOAMY SOILS INCLUDE THE FOLLOWING USDA TEXTURAL CLASSIFICATIONS AND HAVE A CLAY CONTENT BETWEEN 7% TO 27%: LOAM, SANDY LOAM AND SILT LOAM. NOTE THAT SOILS AT THE OUTER LIMITS OF THE LOAM CLASSIFICATION MAY PRESENT SPECIAL PLANTINGS PROBLEMS NOT ANTICIPATED BY THE DETAIL.
2. LOAMY SOILS ARE DEFINED AS A GRANULAR OR BLOCKY FRIABLE SOILS, A MIXTURE OF SAND, SILT AND CLAY PARTICLES WITH A WITH A MINIMUM OF 1.5% BY DRY WEIGHT OF ORGANIC MATTER. THE SOIL MUST NOT BE SO COMPACTED AS TO IMPEDED ROOT GROWTH OR DRAINAGE. THE SOIL STRUCTURE SHALL NOT BE PLATY OR MASSIVE.

STAKING NOTES:
1. STAKE TREES ONLY IF IT IS EXPECTED THAT THE TREE WILL NOT BE ABLE TO SUPPORT ITSELF AND REMAIN STRAIGHT. STAKE TREES FOR THE FOLLOWING REASONS:
   A. THE TREE IS INSTALLED WITHIN VERY SANDY SOIL OR VERY WET CLAY SOIL.
   B. THE TREE IS LOCATED IN A PLACE OF EXTREMELY WINDY CONDITIONS.
2. CONTACT THE PROJECT LANDSCAPE ARCHITECT FOR STAKING DETAIL IF NEEDED.

TREE PLANTING DETAIL (IN ALL SOIL TYPES)

SCALE: NOT TO SCALE

REVISIONS:

3	6/22/21	PER REVISED SITE PLAN
2	8/6/10	CHANGE PROJECT NAME
1	5/15/10	PER REVISED SITE PLAN

ENVIRONMENTAL LAND SOLUTIONS, LLC
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8 Knight Street, Suite 203
Norwalk, Connecticut 06851
Tel: (203) 855-7879 Fax: (203) 855-7836
email: landscape@snet.net

DRAWING TITLE: LANDSCAPE DETAILS

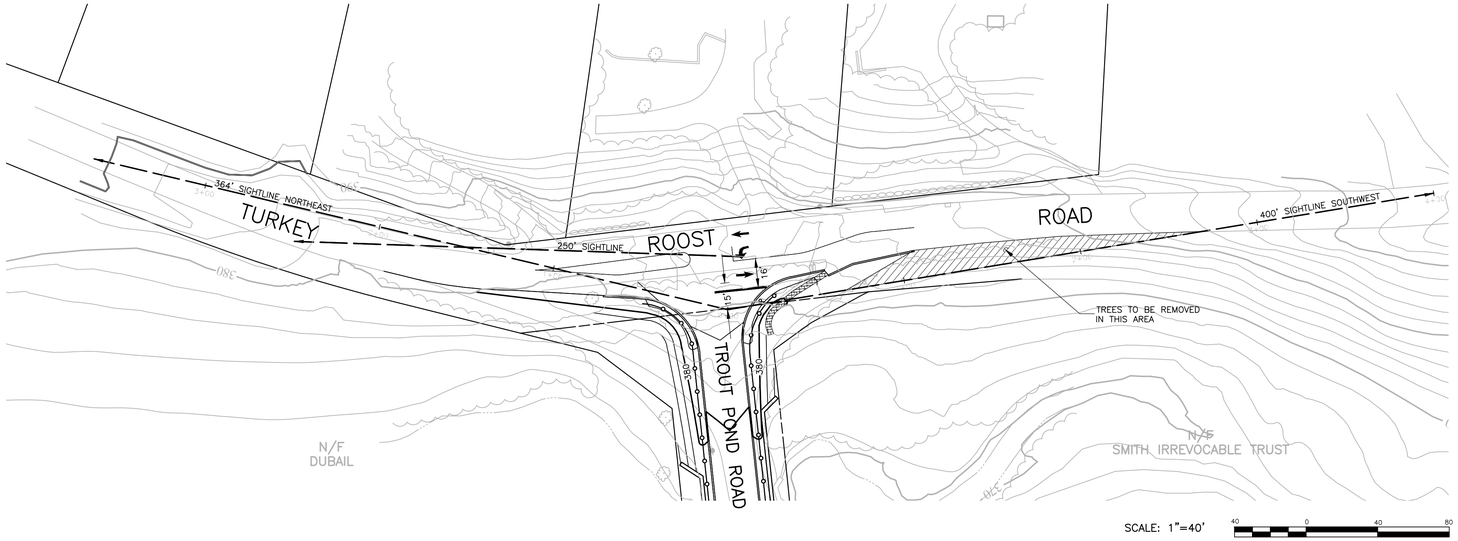
PROJECT: QUARRY RIDGE, MONROE, CONNECTICUT

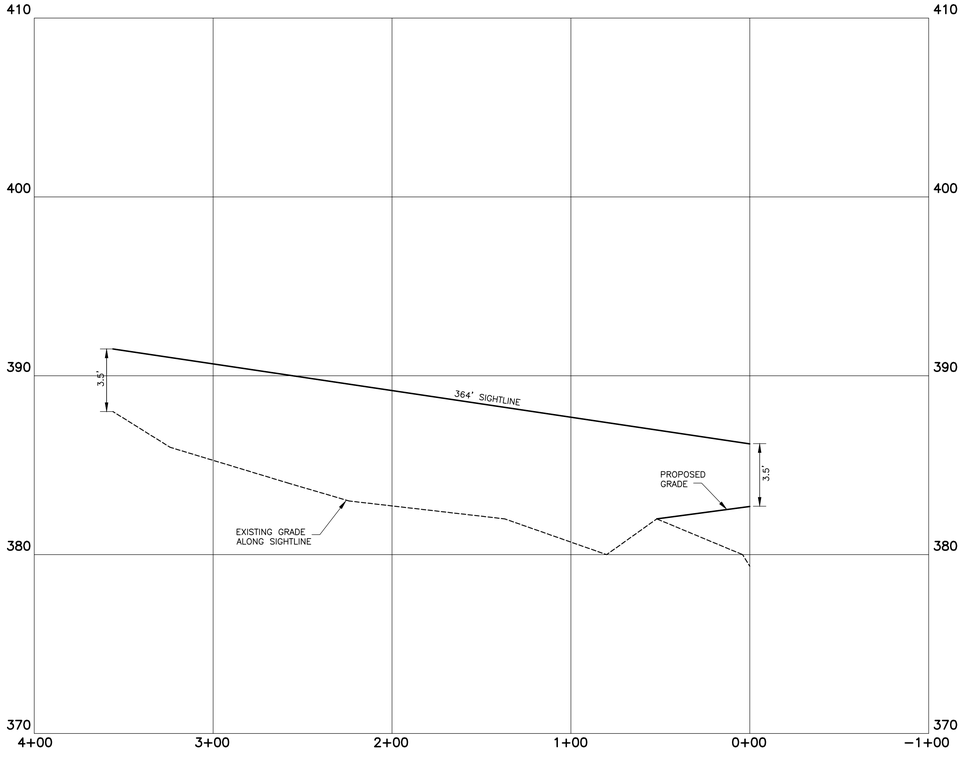
PREPARED FOR: QUARRY RIDGE ASSOCIATES, LLC

DATE: APRIL 2007

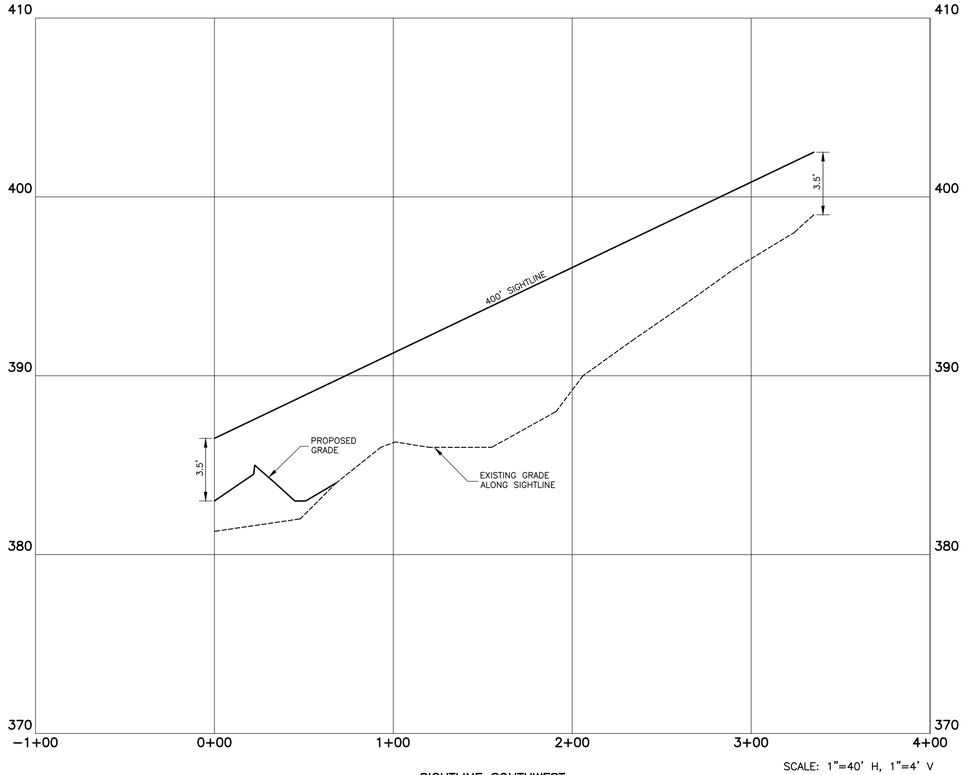
SCALE: AS SHOWN

DRAWING NO.: LP-4





SIGHTLINE NORTHEAST



SIGHTLINE SOUTHWEST

SCALE: 1"=40' H, 1"=4' V

J. EDWARDS & ASSOCIATES LLC
ENGINEERING • SURVEYING • SITE PLANNING

227 Stepney Road Easton, CT 06612
Phone:203.268.4205 Fax: 203.268.5604
www.jedwardsassoc.com

STATE OF CONNECTICUT
KENNETH R. EDWARDS
No. 10907
LICENSED
PROFESSIONAL ENGINEER

STATE OF CONNECTICUT
JASON EDWARDS
LICENSED
LAND SURVEYOR

139, 141, & 201 TURKEY ROOST ROAD
& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR
QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE: AS NOTED

TITLE

SIGHTLINE PLAN AND PROFILE

SHEET NUMBER

SP–1

K:\PROJECTS\3302 BIENASHSKI\DRAWINGS\ALTERNATE 5\SP–1 RE

GENERAL NOTES

1. These plans are for regulatory approval only and are not to be used for construction.

2. The proposed improvements indicated on these plans are shown as one of many possible layouts. Any variation from these plans is to be approved by a professional engineer.

3. Topographic data and property lines based upon "Existing Conditions Plan, Prepared For Quarry Ridge Associates, LLC, #121,139, 141, and 201 Turkey Roost Road, Monroe, Connecticut, Scale:1"=150' dated 8-17-21 certified Horizontal Accuracy Class A-2 and Topographical Classes T-2 and T-3. by Shevlin Land Surveying, LLC.

4. Owner/Applicant: Quarry Ridge Associates, LLC
C/o David Bienashski, mbr
454 Fox Street
Fairfield, CT 06824

5. Total area of site is 153.65 acres.

6. Total area of on-site wetlands is 15.72 acres.

7. The site is located in zone RF2/MFR,

8. Inland wetlands were delineated in the field by Eric Davison, Registered Soil Scientist, of Davison Environmental. Wetland flags were located by Shevlin Land Surveying LLC.

9. The site will be served with public water and a private underground sewage disposal system.

10. The location of underground utilities, if any, is unknown. Call Before You Dig 1-800-922-4455.

11. Retaining walls are to be designed by a structural engineer.

12. It is the contractor's responsibility to verify all on-site and off-site field conditions and establish that no changes have occurred since the issuance of this plan. The design engineer is to be notified of any field conditions which conflict with this plan.

13. Proposed utilities, catv, gas and electric are to be underground.

14. Utility transformer locations to be approved by the Town of Monroe prior to installation.

15. Water main and hydrant location subject to the local water company and Fire Marshall requirements and approvals.

16. Prior to commencement of construction, a preconstruction conference is to be held with the design engineer, the owner, the contractor, the Town Engineer and representatives from the Planning and Zoning and Conservation Administrations to review construction and time tables.

17. Construction will begin shortly after necessary approvals are obtained. Construction is anticipated to be completed within five years from the time of commencement.

18. The site drains to Smiths Pond Brook

STORMWATER POLLUTION CONTROL PLAN

1. The proposal will create ninety nine dwelling units with a club house. The dwellings will be accessed by 5530 linear feet of new roadway. The development will be serviced by public water and a private subsurface sewage disposal system falling under the jurisdiction of the Connecticut Department of Environmental Protection. An extensive portion of the site has been previously cleared and brought to grade under a restoration plan approved by the Monroe Planning and Zoning Commission on May 1, 2003.

2. All erosion and sediment control measures will be constructed in accordance with the standards and specifications of the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control."

3. The Stormwater Pollution Control Plan shall include all erosion and sedimentation control shown on the approved maps and detail sheets. These controls are assumed to be the minimum required, and the contractor may be required to install additional measures as site conditions and weather warrant.

4. All erosion and sediment control devices will be installed prior to the start of clearing and grubbing operations and excavation work. All the devices will be maintained as specified in this document until the disturbed earth has been paved or vegetated, at which time the devices will be removed.

5. All construction methods, materials and system installations are to conform to all applicable local and state regulations.

6. Grading to be according to all applicable regulations and normal standards of good practice.

7. Land disturbance will be kept to a minimum; re-stabilization will be scheduled as soon as practicable.

8. Stockpiles of topsoil and common fill shall be surrounded with silt fence and temporarily stabilized by seeding with a 50-50 mix of annual and perennial rye grass at the rate of one pound per 1,000 square feet of surface area shall be employed between March 15 and June 15 or August 1 and October 1. Mulch with straw or hay at the rate of 70 to 90 pounds per 1,000 square feet until stabilized.

9. All control measures will be maintained in effective condition throughout the construction period until the area is stabilized.

10. Maintenance of the erosion controls shall consist of inspection at the start of each work day with special attention afforded following storm events. Noted deficiencies shall be corrected immediately. Accumulated sediment shall be removed from the erosion control device and dispersed temporarily on the upland portion of the disturbed area. Additional seeding or mulching shall be employed as required.

11. Where riprap is specified on the plan, it shall be modified riprap conforming to the guidelines unless otherwise noted.

12. The contractor is to inspect the site daily during construction to insure the integrity of the erosion controls.

13. The contractor is to have available at all times extra silt fence, hay bale mulch, grass seed and riprap to implement additional erosion control measures not foreseen in this plan.

14. Prior to closing the site down for winter, if required, the contractor shall schedule a meeting with the project engineer to review site conditions and make recommendations to minimize erosion during the winter. The meeting is to be held no later than October 1,of any given year.

15. Accumulated sediment is to be disposed of in an area approved by the design engineer.

16. This plan and report may be modified by the engineer based upon field conditions.

17. Catch basins shall be protected with silt sacks, haybales, and/or silt fence during construction until all disturbed areas are stabilized.

18. The design engineer will inspect the entire site at additional cost to the developer/owner every 30-days during the construction. He shall recommend repairs and additional measures, if necessary.

19. Water breaks, silt fence, haybales and other measures are to be maintained until drainage is complete and site is stabilized with vegetable cover.

20. Plunge pools and/or riprap aprons are to be constructed at the outlets of all major drainage systems.

21. Stabilization practices may include silt fences, temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation and other vegetative and non-structural measures as identified in the Guidelines. Where construction activities have permanently ceased or have temporarily been suspended for more than seven days or when final grades are reached in any portion of the site, stabilization practices shall be implemented within three days. Areas which remain disturbed but inactive for at least thirty days shall receive temporary seeding and/or mulching in accordance with the Guidelines. Areas that will remain disturbed beyond the planting season, shall receive long-term, non-vegetative stabilization sufficient to protect the site through the winter. Areas to be graded with slopes steeper than 3:1 (horizontal:vertical) and higher than fifteen feet shall be graded with appropriate slope benches in accordance with the Guidelines.

22. Structural practices include but are not limited to earth dikes (diversions), drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, outlet protection, reinforced soil retained systems, gabions, and temporary or permanent sediment basins and chambers. Unless specifically approved in writing, structural measures shall be installed in upland soils.

23. De-watering waste waters might be generated during the construction of the underground utilities and the excavation for basements. Contractors shall arrange for the pumping of water in excavations to occur in temporary sediment traps or pumping settling basins.

24. All contractors and subcontractors working on site will ensure that no litter, debris, building material or similar material is discharged to the waters of the State.

25. Contractors will implement techniques to control the generation of dust.

26. All post construction storm water structures will be cleaned of construction sediment and any remaining silt fence shall be removed prior to filing the termination notice pursuant to Section 5 of the General Permit.

27. Stabilization practices are listed in the construction sequencing for the construction of the roadways and drainage systems for the site. House sites will have their anti-tracking pads installed at all points where construction traffic exits the lot to paved surfaces and silt fence installed as shown on the plans or as required downhill of areas of disturbed earth. Refer to the detail drawings for specifics on proposed measures.

POST CONSTRUCTION STORM WATER MANAGEMENT PLAN:

1. The roads/parking lot shall be cleaned annually using a mechanical sweeper.

2. The catch basins and stormwater treatment ponds shall be inspected annually by a qualified individual. Sediment shall be removed when one-half the capacity of the sediment basin has been reached.

3. The storm drainage pipe outlets shall be inspected for erosion at least annually and after major storm events.

4. The dates and results of the inspections and cleanings shall be kept on file and on-site at the building and will be made available for inspection upon request by the Town.

5. Upon completion of construction for sites authorized by the General Permit for the Discharge of Stormwater Associated with Commercial Activity or the General Permit for the Discharge of Stormwater Associated with Industrial Activity, the plan shall be kept as an appendix to the Stormwater Pollution Control Plan or Stormwater Pollution Prevention Plan (as applicable) for a period of at least three years from the date of completion of construction.

INSPECTION

Qualified personnel (provided by the permittee) shall inspect disturbed areas of the construction activity that have not been finally stabilized, structural control measures and locations where vehicles enter or exit the site at least once every seven calendar days and within 24 hours of the end of a storm that is 0.1 inches or greater. Where sites have been temporarily or finally stabilized, such inspection shall be conducted at least once every month for three months.

Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of or the potential for pollutants entering the drainage system. Erosion and sediment control measures shall be observed to ensure they are operating correctly. Where discharge locations or points are accessable they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.

Based on the results of the inspection, the description of potential sources and pollution prevention measures identified in the plan shall be revised as appropriate as soon as practicable after such inspection. Such modifications shall provide for timely implementation of any changes to the site within 24 hours and any changes to the plan within 3 calendar days following the inspection. The plan shall be revised and the site controls updated in accordance with sound engineering practices, the Guidelines.

A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the plan and actions taken will be made and retained as part of the plan for at least three years after the date of the observation. The report will be signed by the Permittee or his authorized representative.

Reporting and record keeping requirements

The Permittee shall retain copies of the plan and all reports required by the General Permit, and records of all data used to complete the registration to be authorized by the General Permit, for a period of at least three years from the date that construction at the site is completed unless the Commissioner specifies another time period in writing.

The Permittee shall retain an updated copy of the plan required by the General Permit at the construction site from the date construction is initiated at the site until the date construction at the site is completed.

Contractors:

The plan shall clearly identify each Contractor and Subcontractor that will perform actions on the site which may reasonably be expected to cause or have the potential to cause pollution of the waters of the state and shall include a copy of the certification statement shown below signed by each Contractor and Subcontractor. All certifications will be included in the plan.

Responsibility:

David Bienashski, phone#(203)556-1976, is assigned the responsibility for implementing this Stormwater Pollution Control Plan during the construction of the road and storm water control facilities. This responsibility includes the installation and maintenance of control measures, informing all parties engaged on the construction site of the requirements and objectives of the plan.

_____ _____
Registrant date

CERTIFICATION STATEMENT:

"I certify under penalty of law that I have read and understand the Terms and Conditions of the General Permit for the Discharge of Storm Water and Dewatering Waste Waters from Construction Activities. I understand that as a contractor or subcontractor at the site, I am authorized by this General Permit and must comply with the Terms and Conditions of this General Permit, including but not limited to the requirements of the Stormwater Pollution Control Plan prepared for the site."

The certification will include the name and title of the person providing the signature; the name, address and telephone number of the contracting firm; the address (or other identifying description)of the site and the date the Certification is made.

_____ _____ _____
Contractor date

_____ _____ _____
Contractor date

_____ _____ _____
Contractor date

ON-SITE CONSTRUCTION SEQUENCE

The following sequence is a suggested procedure for the construction of a full built-out of the Quarry Ridge project. Deviations may apply from the sequence outlined below dependant upon the quantity and timing of actual unit construction.

Sequence may occur simultaneously with the water main extension from Fan Hill Road to the project site.

1. Install anti-tracking apron as shown where construction traffic enters the public right-of-way.

2. Install silt fencing, wood chip berm, and temporary sediment trap (TST) numbers 1-4, 6-15 as indicated on the erosion control plans. Construct temporary sediment routing measures.

3. Install TST numbers 5, 16 and 17 in conjunction with the driveway that services them. These designated sediment trap numbers coincide with permanent stormwater treatment pond locations.

4. Construct swale that commences behind unit 18 and traverses the perimeter of the western portion of the site terminating at TST 4 in proximity of unit 1. Install stone dams every 100 feet behind units 1-5 to retard flow velocities.

5. Construct swale that commences behind unit 20 and traverses the perimeter of the eastern portion of the site terminating at TST 13 in proximity of unit 36.

6. Clear and stump remainder of site not previously prepared. Care should be taken as to not adversely impact soils in the areas of the subsurface wastewater absorption systems.

7. Stumps are to be disposed of in accordance with current state law. No stumps are to be buried within 50' of a wetland or 100' from a watercourse.

8. Scrape and stockpile loam, if required, in construction areas.

9. Surround loam stockpile with silt fence, seed piles for dust control or treat with calcium chloride.

10. Storm water runoff from the construction areas is to be directed with swales and diversion berms as necessary to flow into the temporary sediment traps.

11. Construct retaining walls adjacent to entrance roadway from station 1+0-2+0.

12. Rough grade Trout Pond Road.

13. Rough grade Windswept Circle and Stones Throw Court.

14. Demolish and remove existing dwelling and driveway.

15. Rough grade underground wastewater absorption system sites, and wastewater pretreatment facility.

16. Construct wastewater pretreatment facility and wastewater absorption systems.

17. Rough grade dwelling building pads with the exception of unit numbers 8,14,15,17,36,45,46,51,52, & 92 since these locations are occupied by temporary sediment traps.

18. Install sanitary piping, structures, and laterals beginning at the wastewater pretreatment facility and proceeding upstream,

19. Install drainage pipes and structures beginning at the outlets Install other underground utilities.

20. Place silt sacks in new catch basins.

21. Commence building construction.

22. Fine grade proposed paved areas and remove water breaks.

23. Install binder course in paved areas, curb roadway and shape shoulders.

24. Install sidewalks.

25. Loam, seed, and mulch disturbed earth in areas that will not be paved.

26. Place wearing surface.

27. Loam, seed and mulch shoulders and adjoining disturbed earth and plant trees/shrubs.

28. Remove remaining temporary sediment traps. The temporary sediment traps located within the proposed stormwater treatment ponds will have the accumulated sediment removed and the final grading and berms constructed along with outfall structures and protection. If de-watering practices are required for final construction/planting of the treatment ponds, utilize pumping settling basins as shown on erosion control plans.

29. Apply final grading for the stormwater ponds and install associated plantings.

30. Remove erosion controls when uphill areas are stabilized.

31. Clean catch basins of accumulated sediment.

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139, 141, & 201 TURKEY ROOST ROAD
& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR
QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE:

TITLE

DETAILS

SHEET NUMBER

D-1

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STORMWATER TREATMENT POND CONSTRUCTION

Materials

Earthen berms shall be used for stormwater treatment ponds. They shall be constructed on stable soils and shall be free of topsoil, organic matter and debris. The fill material for the embankment shall be taken from approved borrow areas. It shall be clean mineral soil, free of roots, woody vegetation, stumps, sod, oversized stones, rocks or other organic or unsuitable material. The material selected shall have enough strength for the embankment to remain stable and be tight enough, when properly compacted, to prevent excessive seepage of water through the dam. The embankment materials for this work shall conform to the following gradation.

Sieve size	Percent passing
6"	0–20
3/4"	60–85
#4	45–75
#40	30–60
#200	15–50

No stones larger than 6 inches shall be allowed within the compacted embankment. Within 2 feet of any structure, the maximum size shall be 3 inches.

The soil intended for the embankment shall be laboratory tested with a written report by a professional engineer licensed to practice in Connecticut, experienced in the field of soil mechanics. The report shall carry the Engineer's findings and suggested design parameters if at variance with those proposed in the design.

Construction methods

The top width of the berm is to be a minimum of 8 feet. The downstream (outer) slope of the berm shall be at a slope of two horizontal to one vertical. The upstream (inner) slope of the berm shall be at a slope of three horizontal to one vertical with a planted vegetative cover. This slope can be increased to 2:1 if protected by stone riprap.

The area beneath the berm shall be known as the subgrade. All soft and yielding material and other portions of the subgrade which will not compact readily when rolled, vibrated or tamped shall be removed and replaced with suitable material.

Construction shall not take place during cold periods where temperatures are consistently lower than 40 degrees Fahrenheit. All topsoil, organic matter and debris shall be removed from the area of the berm.

The surface of the subgrade shall be compacted uniformly by rolling with an approved power roller having a minimum compression of three hundred pounds per inch of width of tread on the rear wheel or wheels and weighing not less than ten tons, or with an equivalent vibratory roller or compactor. The contractor shall protect the subgrade from damage by exercising such precautions as are necessary. At all times the subgrade surface shall be kept in such condition that it will drain readily and correctly. The subgrade shall be checked by the Engineer before any berm material is placed thereon. Should the subgrade become churned up and mixed with the berm material at any time, the contractor shall remove the mixture and replace it with new subgrade material. Such replaced
subgrade material shall be thoroughly compacted.

The subgrade shall be excavated to a depth to allow the berm material to be notched into the subgrade a minimum of eighteen inches. The subgrade shall be covered with woven geotextile before the placement of the berm material.

Compaction

The fill material shall contain the proper amount of moisture to ensure that 90%–95% standard proctor compaction will be achieved. Special care shall be taken in compacting around the anti–seep collars, conduits and structures to avoid damage and achieve desired compaction.

The berm material shall be placed in layers of not over six inches in depth. The surface shall be compacted uniformly by rolling with an approved power roller having a minimum compression of three hundred pounds per inch of width of tread on the rear wheel or wheels and weighing not less than ten tons or with an equivalent vibratory roller or compactor.

The dry density after compaction shall not be less than 95 percent of the dry density for that berm material when tested in accordance with AASHTO T–180, Method D.

Planted vegetation cover

Prior to placing any topsoil all surfaces shall be scarified by raking, discing or other approved means to a minimum depth of 2 inches. On sloped areas the raking or discing shall be done parallel to the contours to minimize erosion. Topsoil shall be placed at a depth of six inches over all disturbed areas except the bottom of the basin.

The following materials shall then be applied:

Lime shall be standard commercial ground dolomitic limestone; fertilizer shall be a standard 10–6–4 mixture; in maintained area organic fertilizer shall be used and have a quality and mixture equal to spurzon, milorganite or turf builder. All fertilizer shall be delivered to the job in its original sealed containers.

Grass seed shall be from a new crop, fresh and clean. The seed is to be delivered to the site in its original containers which shall bear the dealer's guaranteed analysis indicating the proportions of each seed, the purity, and the germination. The following indicates the type of seed required and the minimum percentages of each:

Kind of grass	by weight	purity	germination
Chewings fescue	30%	97%	90%
Kentucky 31 fescue	30%	98%	90%
Kentucky bluegrass	20%	85%	80%
Domestic ryegrass	20%	98%	90%

Note: weeds and inert material shall not exceed 2%.

Areas seeded shall be mulched unless otherwise ordered by the Engineer. Wood–chip mulch shall not be used on seeded areas.

Hay (where used) shall be uniformly applied by an approved method to a placed depth of two inches (at a rate of two tons per acre).

EASTERN BOX TURTLE PROTECTION PLAN

Eastern Box Turtle, a State Special Concern species afforded protection under the Connecticut Endangered Species Act and listed as a Greatest Conservation Need species in Connecticut's Comprehensive Wildlife Conservation Strategy (CT DEEP 2005), is known to occur on the site. The following protective measures are recommended to satisfy requirements from the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division and follow protocols developed from previous rare species consultations and state–approved protection plans. This plan is focused on preventing incidental mortality to eastern box turtle but will also serve to limit mortality to other herpetofauna located within the construction, including hognose snake, should they be present.

This plan is intended to be implemented during the box turtle's active period which typically occurs between April 1st and October 30th.

Davison Environmental, LLC will serve as the Environmental Monitor for this project to ensure that Eastern Box Turtle protection measures are implemented properly.

The Contractor shall contact Eric Davison at least 5 business days prior to the pre–construction meeting. Mr. Davison can be reached by phone at (860) 803–0938 or via email at eric@davisonenvironmental.com.

The recommended Eastern Box Turtle protection program consists of the following components:

1. Isolation of the project perimeter
2. Targeted searches of the project area prior to construction
3. Periodic inspection and maintenance of isolation structures throughout construction period
4. Education of all contractors and sub–contractors prior to initiation of work on the site
5. Documentation and reporting submitted to the NDDB Program

1. Isolation Barrier (Erosion and Sedimentation Controls)

a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. These products or reinforced silt fence should not be used on the project. Temporary erosion control products, either erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) and/or netting composed of planar woven natural biodegradable fiber should be used to avoid/minimize wildlife entanglement.

b. Installation of erosion and sedimentation controls (i.e., silt fencing), required for erosion control compliance and creation of a barrier to migrating/dispersing herpetofauna, should be installed by the Contractor prior to clearing activities or any earthwork. This fencing will need to be nearly continuous, as directed in the field by Davison Environmental.

c. The fencing will consist of non–reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten–foot intervals using four–foot oak stakes or approved equivalent. The Contractor is responsible for daily inspections of the fencing for tears or breeches in the fabric and accumulation levels of sediment, particularly following storm events of 0.25 inch or greater. Davison Environmental will provide periodic inspections of the fencing throughout the duration of construction activities, generally on a biweekly frequency or more frequently if site conditions warrant.

d. All openings in the isolation barrier, used during the work day for accessibility, should be closed with hay bales at the completion of each day. This should be done under the direction of Davison Environmental, with the understanding that during certain seasonal periods and construction phases, this may not be necessary at all work area entrances.

e. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Targeted Searches – Pre–Construction

a. Upon completion of the barrier fence installation, the project limits will be searched for eastern box turtle. The purpose of this work is to locate and remove all box turtles from within the construction zone.

b. All turtles observed will be removed from the project area just beyond the limits of work.

c. The time of day, frequency and intensity of the pre–construction searches should be determined by the Environmental Monitor based on weather conditions and success of relocation progression. It is anticipated that searches will be conducted once per week at a minimum, with more intensive and frequent searches conducted during periods of high activity which would increase the likelihood of captures.

3. Contractor Education

a. Prior to the start of construction, the Contractor shall attend an educational session at the pre–construction meeting with Davison Environmental. This orientation and educational session will consist of an introductory meeting with Davison Environmental providing photos of herpetofauna that may be encountered during construction activities, including eastern box turtles, emphasizing the non–aggressive nature of these species, the absence of need to destroy wildlife that might be encountered and the need to follow the prescribed protection measures.

b. The Contractor will be provided with cell phone and email contacts for Davison Environmental to immediately report encounters with any turtles or other herpetofauna. Educational poster materials will be provided by Davison Environmental and displayed on the job site to maintain worker awareness as the project progresses.

4. Turtle Protective Measures – During Construction

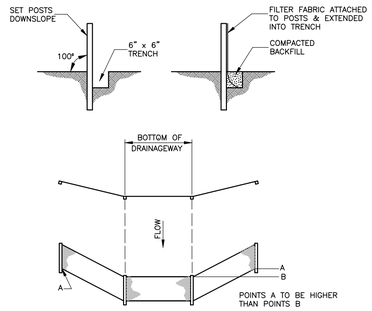
a. Prior to the start of construction each day, the Contractor shall search the entire work area for turtles. The Environmental Monitor will also conduct periodic inspections of the work area depending upon weather conditions, observed turtle activity, or other factors.

b. If a turtle is found, it shall be immediately moved by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier closest to where it was encountered. The Environmental Monitor should be notified of any observed eastern box turtle.

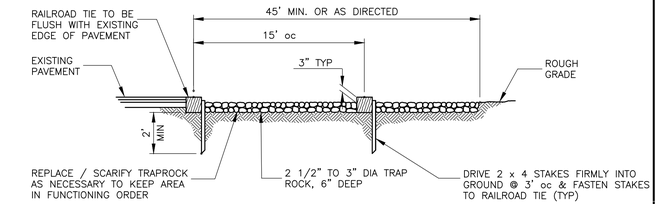
c. Special care shall be taken by the Contractor during early morning hours and on overcast rainy days so that possible basking or foraging turtles are not harmed by construction activities.

5. Reporting

a. Following completion of the construction project, Davison Environmental will provide a summary of observations of eastern box turtle (or other state listed species) including a submission of a Special Animal Survey Form to the CTDEEP with photo–documentation and with specific information on the location and disposition of the animals observed.

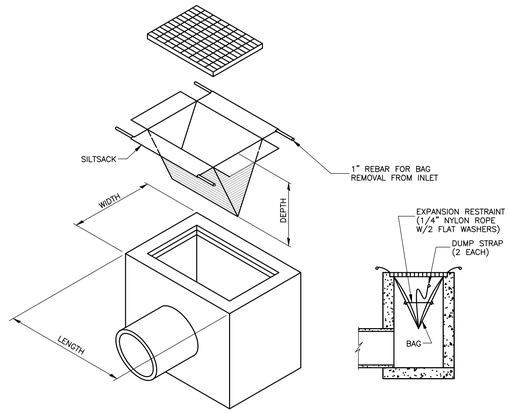


SYNTHETIC FILTER BARRIER

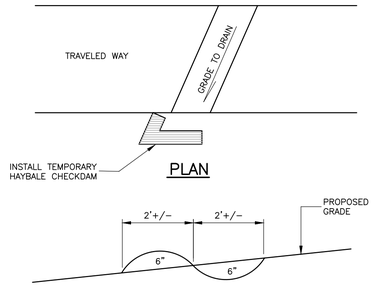


NOTE:
MINIMUM WIDTH OF PAD TO BE 15' OR AS DIRECTED BY THE ENGINEER.

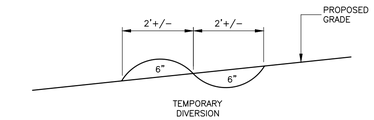
ANTI–TRACKING PAD



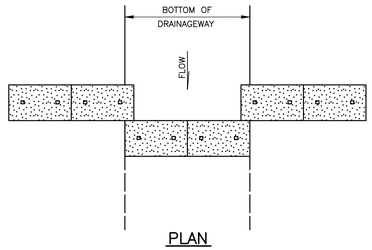
SEDIMENT CONTROL AT INLET



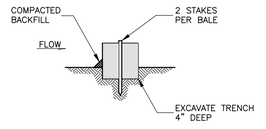
PLAN



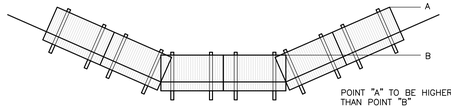
TEMPORARY WATER BREAK



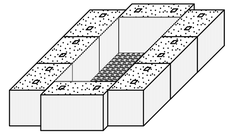
PLAN



SECTION



ELEVATION



AT CATCH BASIN

HAYBALE BARRIER

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& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR

QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

#	DATE	DESCRIPTION

DATE: MAY 1, 2023
PROJECT #: 3302
DRAWING FILE:
DRAWN BY: NDC
SCALE:

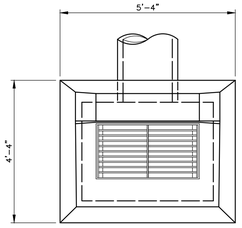
TITLE

DETAILS

SHEET NUMBER

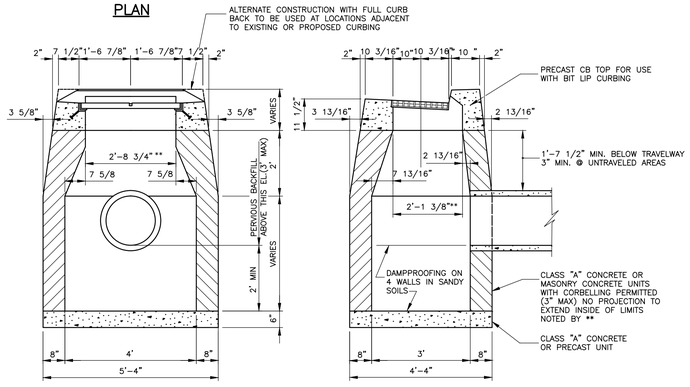
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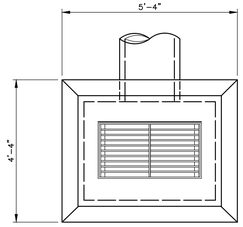


PLAN

NOTE:
WHERE PRECAST CONCRETE UNITS ARE USED FOR THE SUMP, THE TOP OF THE UNIT SHALL BE AT LEAST 6" BELOW THE BOTTOM OF THE PIPE OUTLETTING FROM THE CATCH BASIN

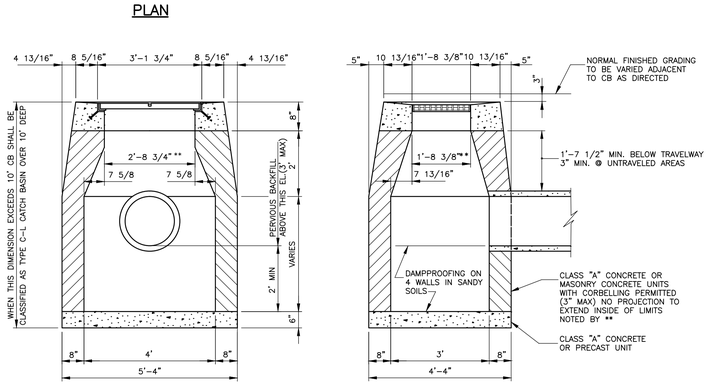


TYPE "C" CATCH BASIN

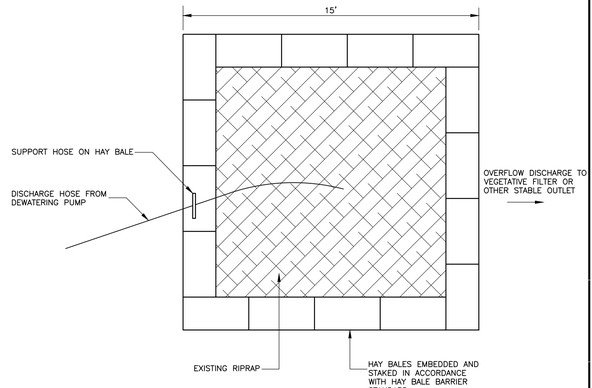


PLAN

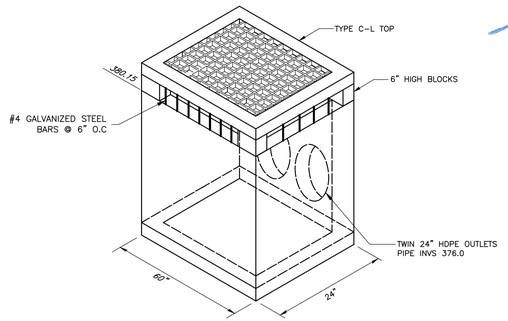
NOTE:
WHERE PRECAST CONCRETE UNITS ARE USED FOR THE SUMP, THE TOP OF THE UNIT SHALL BE AT LEAST 6" BELOW THE BOTTOM OF THE PIPE OUTLETTING FROM THE CATCH BASIN



TYPE "C-L" CATCH BASIN

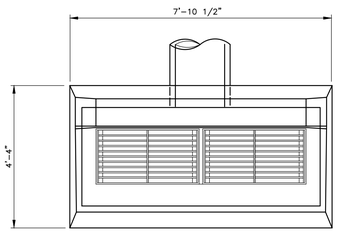


PUMPING SETTLING BASIN



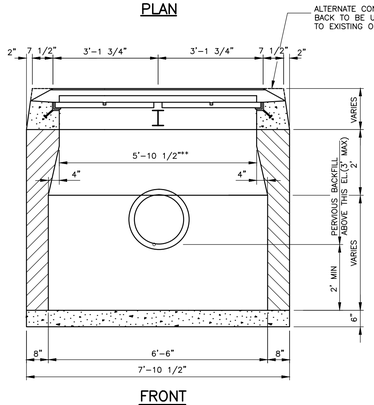
OUTLET CONTROL STRUCTURE– POND #4

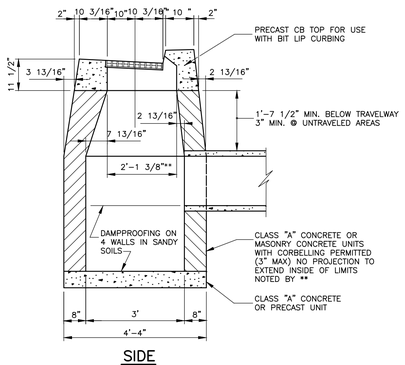
6" SUMP (MIN)



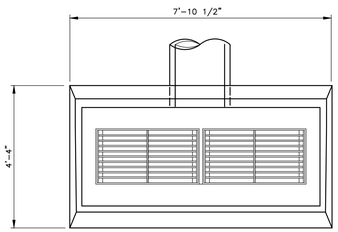
PLAN

NOTE:
WHERE PRECAST CONCRETE UNITS ARE USED FOR THE SUMP, THE TOP OF THE UNIT SHALL BE AT LEAST 6" BELOW THE BOTTOM OF THE PIPE OUTLETTING FROM THE CATCH BASIN



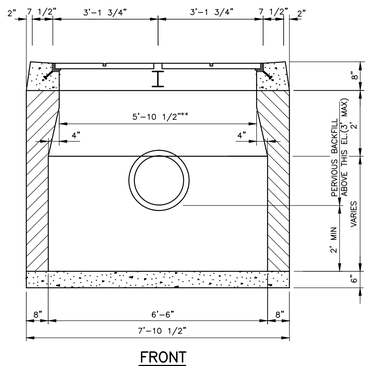


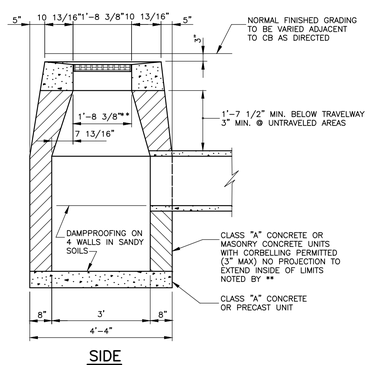
TYPE "C" CATCH BASIN – DOUBLE GRATE



PLAN

NOTE:
WHERE PRECAST CONCRETE UNITS ARE USED FOR THE SUMP, THE TOP OF THE UNIT SHALL BE AT LEAST 6" BELOW THE BOTTOM OF THE PIPE OUTLETTING FROM THE CATCH BASIN





TYPE "C-L" CATCH BASIN – DOUBLE GRATE

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STATE OF CONNECTICUT — JOSEPH R. EDWARDS — No. 10907 — LICENSED PROFESSIONAL ENGINEER

STATE OF CONNECTICUT — JOSEPH R. EDWARDS — No. 10907 — LICENSED LAND SURVEYOR

139, 141, & 201 TURKEY ROOST ROAD
& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR

QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

#	DATE	DESCRIPTION

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DRAWN BY: NDC
SCALE:

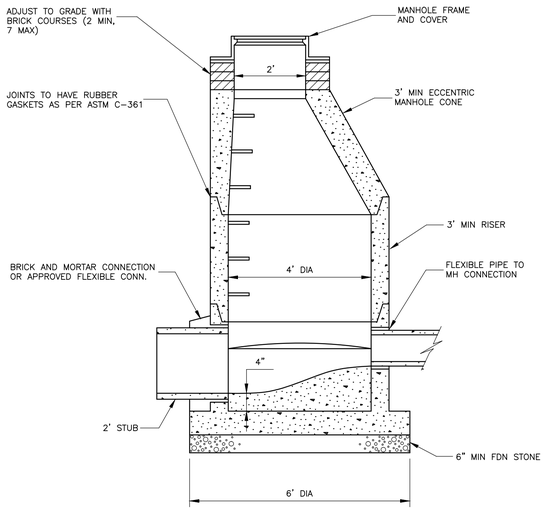
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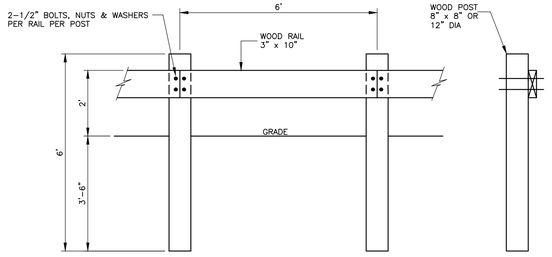
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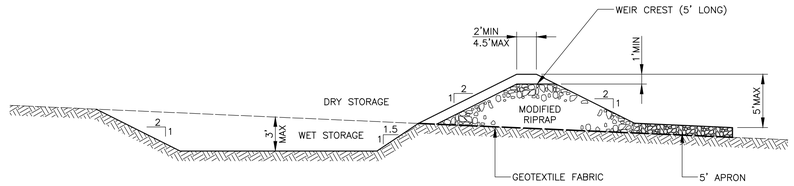


48" PRECAST CONCRETE MANHOLE

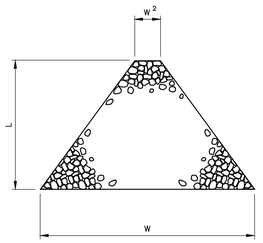


ELEVATION SECTION

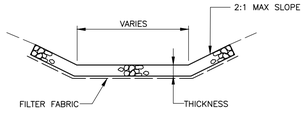
WOOD GUARD RAIL



TEMPORARY SEDIMENT TRAP



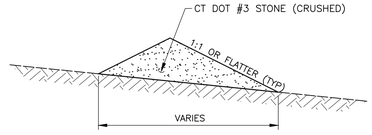
PLAN



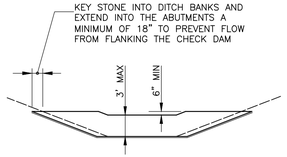
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LOCATION	L	W	W2	ELEV	SLOPE	THICKNESS
TROUT POND ROAD 2+14 RT	10	10	3	372.0	0	1.25

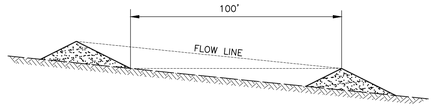
RIPRAP APRON



SECTION

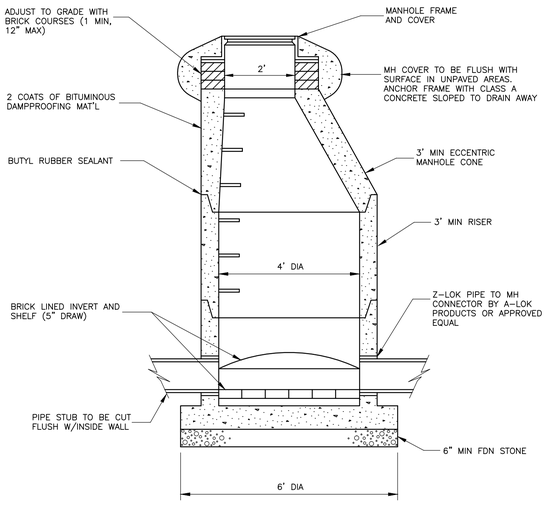


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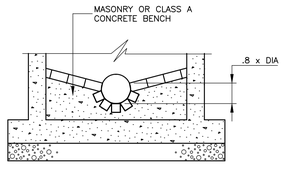


DAM SPACING

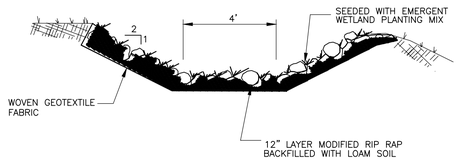
STONE CHECK DAM



SANITARY MANHOLE



SECTION



WATER QUALITY SWALE

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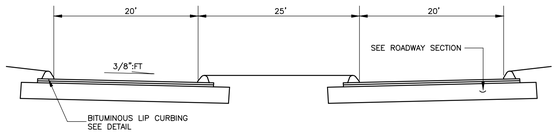
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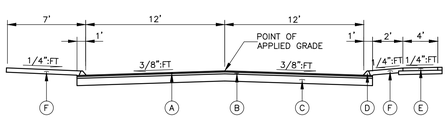
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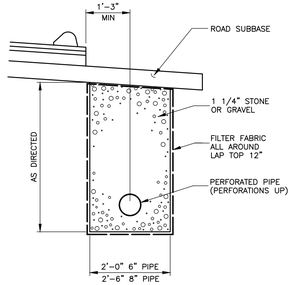


ROADWAY SECTION AT BOULEVARD

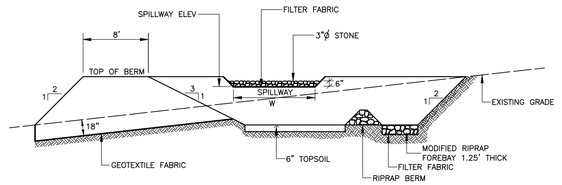


ROADWAY SECTION

(A) 1.5" BITUMINOUS CONCRETE – CLASS 2
(B) 2.5" BITUMINOUS CONCRETE – CLASS 1
(C) PROCESSED AGGREGATE BASE 10" MIN AND 16" MAX
(D) 6" BITUMINOUS CONCRETE LIP CURBING
(E) BITUMINOUS CONCRETE SIDEWALK AS REQUIRED
(F) 6" TOPSOIL, FERTILIZE AND SEED

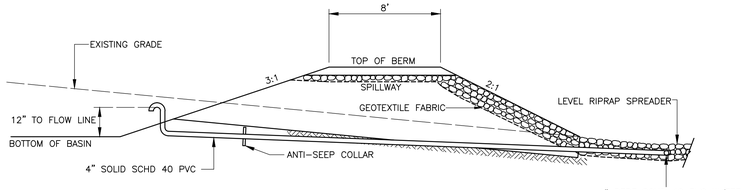


UNDERDRAIN

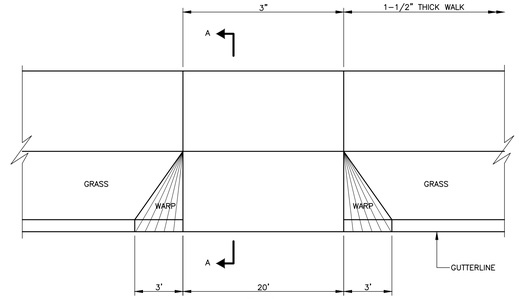


STORMWATER TREATMENT POND SECTION

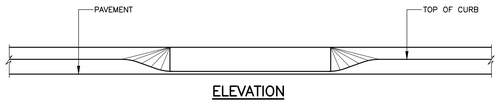
POND LOCATION	BOT L	BOT W	SPILLWAY ELEVATION	W
#1	35	13	373.6	6
#2	153	75	377.5	30
#3	156	64	376.0	40
#4	69	130	379.6	5
#5	245	55	424.0	



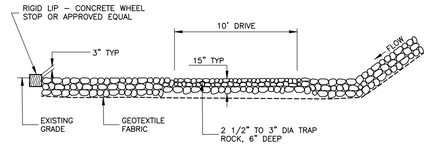
STORMWATER POND OUTLET SECTION



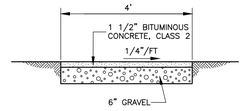
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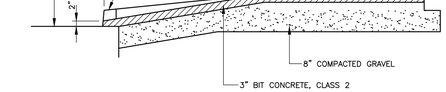
ELEVATION



ACCESS DRIVE ACROSS POND #4 OUTLET

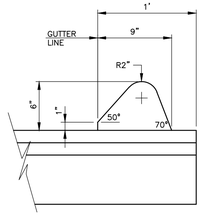


BITUMINOUS SIDEWALK

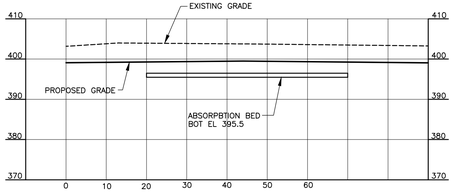


SECTION A–A

DRIVEWAY

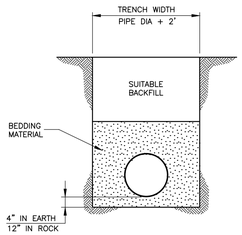


BITUMINOUS LIP CURBING



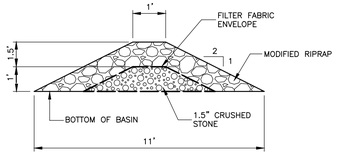
SECTION A–A

N.T.S.

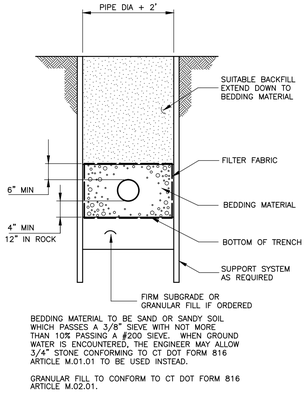


BEDDING MATERIAL TO BE SAND OR SANDY SOIL WHICH PASSES A 3/8" SIEVE WITH NOT MORE THAN 10% PASSING A #200 SIEVE. WHEN GROUND WATER IS ENCOUNTERED, THE ENGINEER MAY ALLOW 3/4" STONE CONFORMING TO CT DOT FORM 814A ARTICLE M.01.01 TO BE USED INSTEAD.

DRAINAGE PIPE TRENCH



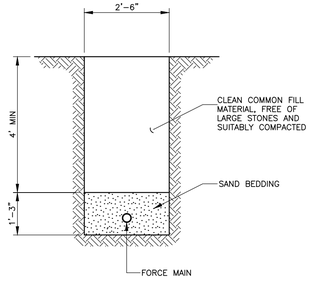
RIPRAP BERM



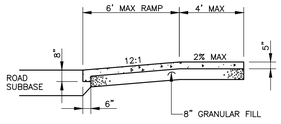
BEDDING MATERIAL TO BE SAND OR SANDY SOIL WHICH PASSES A 3/8" SIEVE WITH NOT MORE THAN 10% PASSING A #200 SIEVE. WHEN GROUND WATER IS ENCOUNTERED, THE ENGINEER MAY ALLOW 3/4" STONE CONFORMING TO CT DOT FORM 816 ARTICLE M.01.01 TO BE USED INSTEAD.

GRANULAR FILL TO CONFORM TO CT DOT FORM 816 ARTICLE M.02.01.

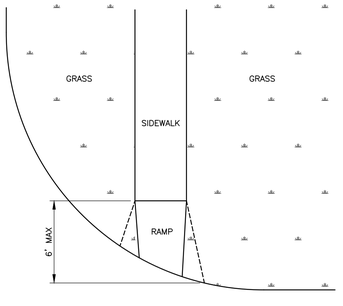
SEWER TRENCH



FORCE MAIN TRENCH

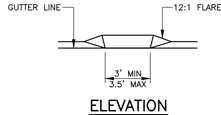


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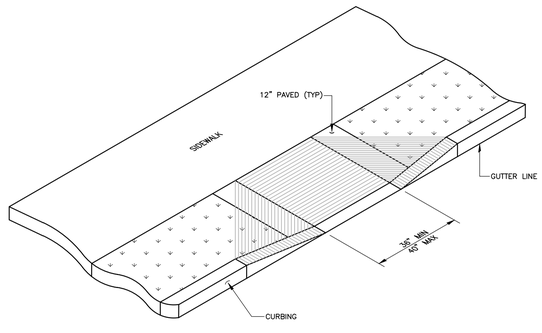
PLACE EXPANSION JOINT AT INTERSECTION OF RAMP AND CURB LINE

PLAN

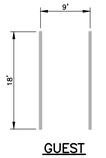


ELEVATION

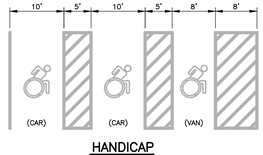
SIDEWALK RAMP TYPE V



SIDEWALK FLARED CURB RAMP TYPE II



GUEST



HANDICAP

PARKING SPACES

NOTE:
HANDICAP PARKING SPACES SHALL NOT EXCEED 2% SLOPE IN ANY DIRECTION

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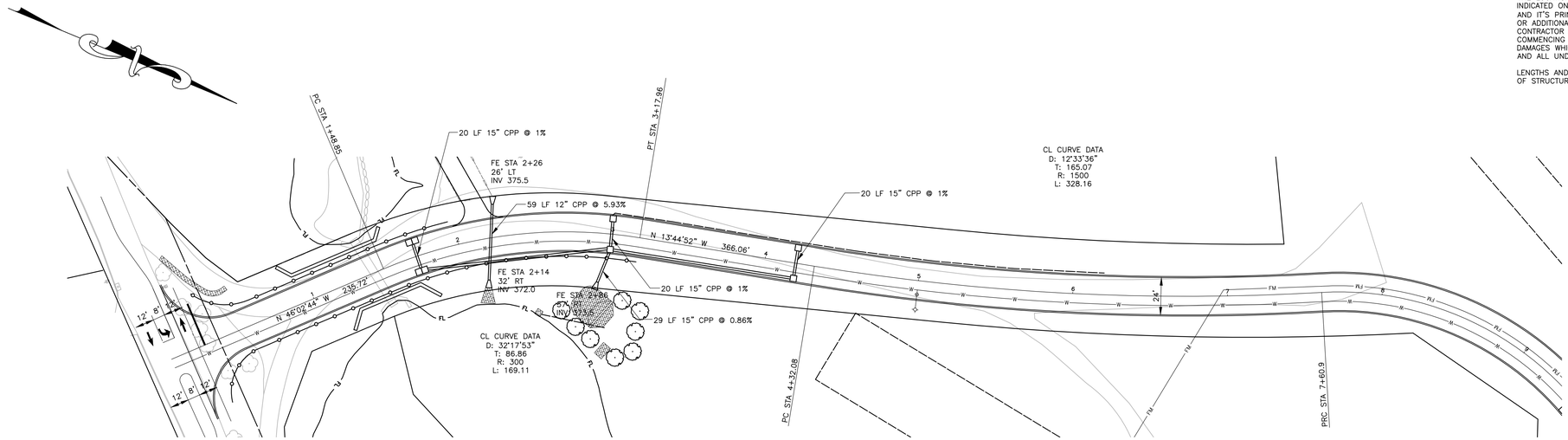
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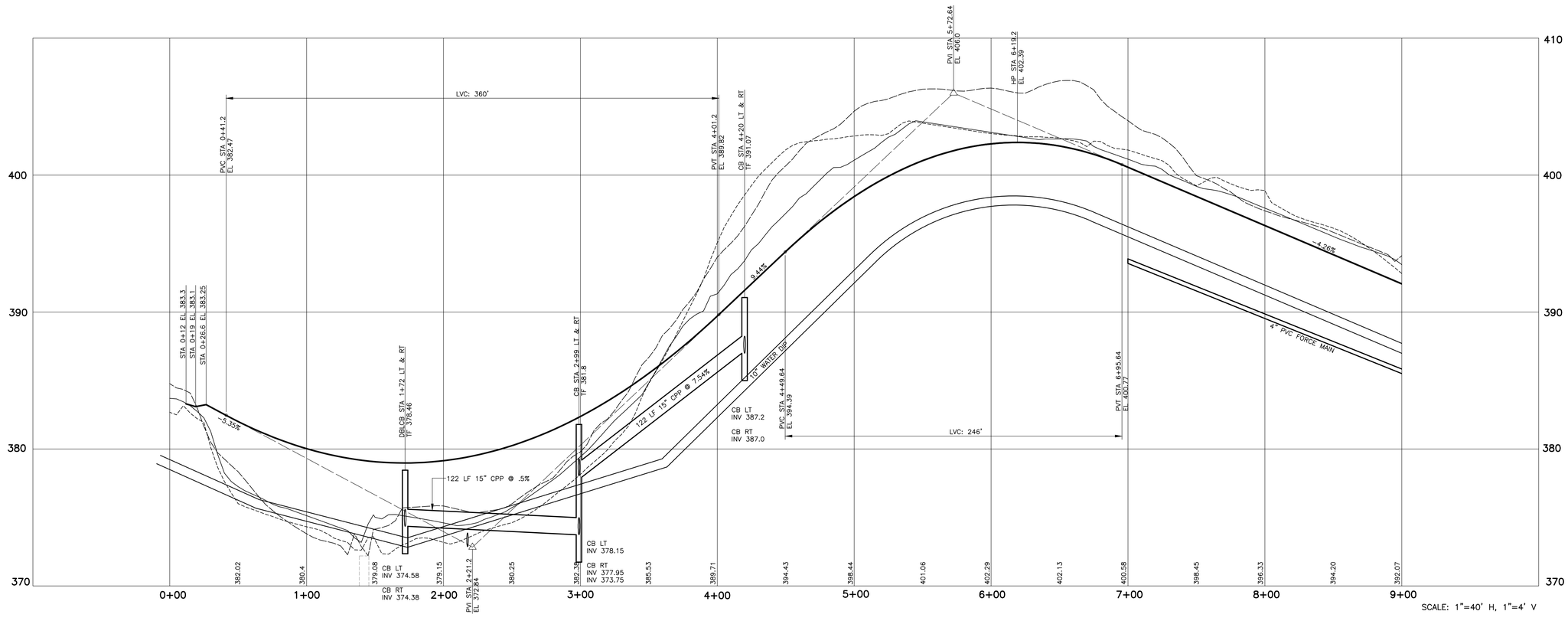
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SCALE: 1"=40'



SCALE: 1"=40' H, 1"=4' V

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& 30 COBBLERS HILL COURT
MONROE, CONNECTICUT

PREPARED FOR

QUARRY RIDGE ASSOCIATES, LLC

REVISIONS

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DRAWN BY: NDC
SCALE: AS NOTED

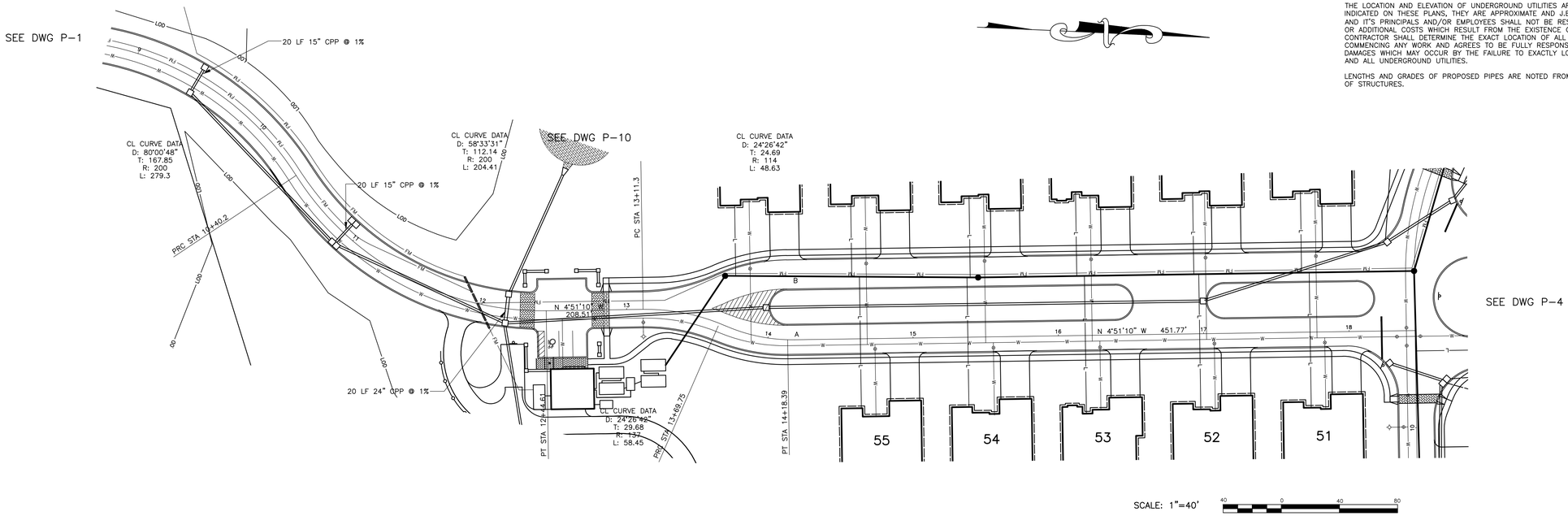
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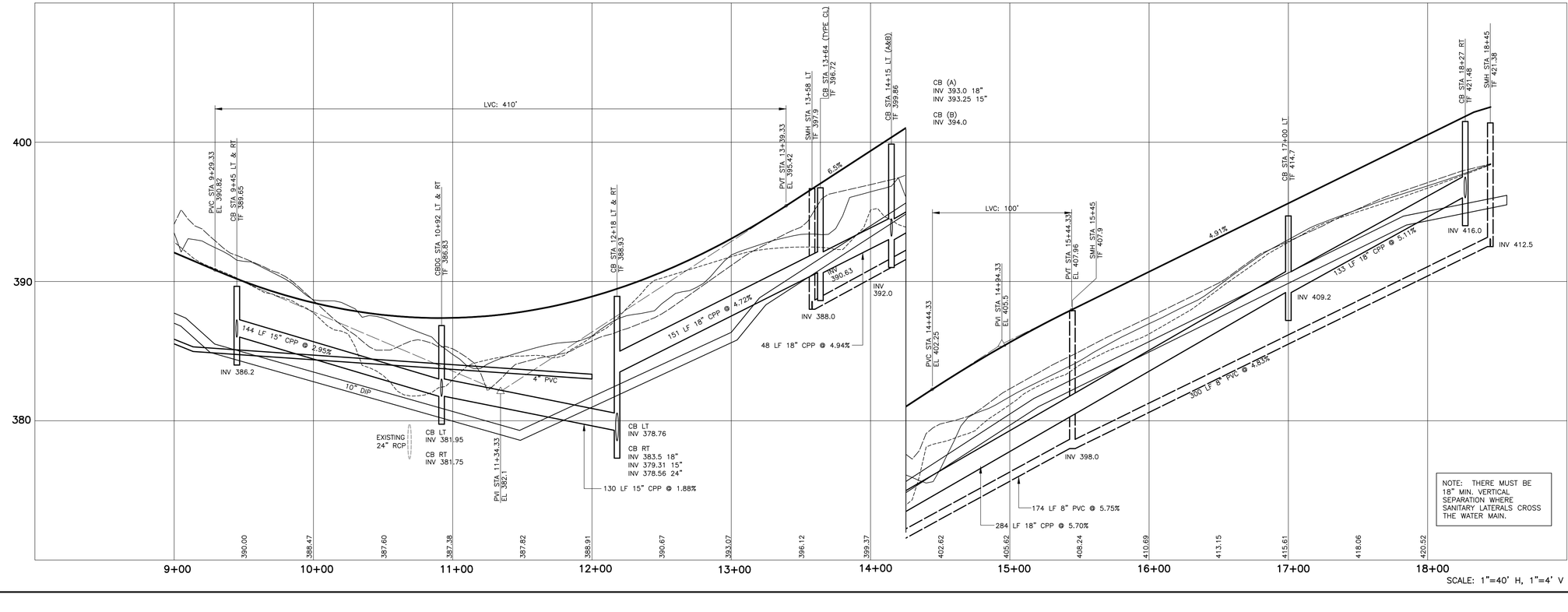
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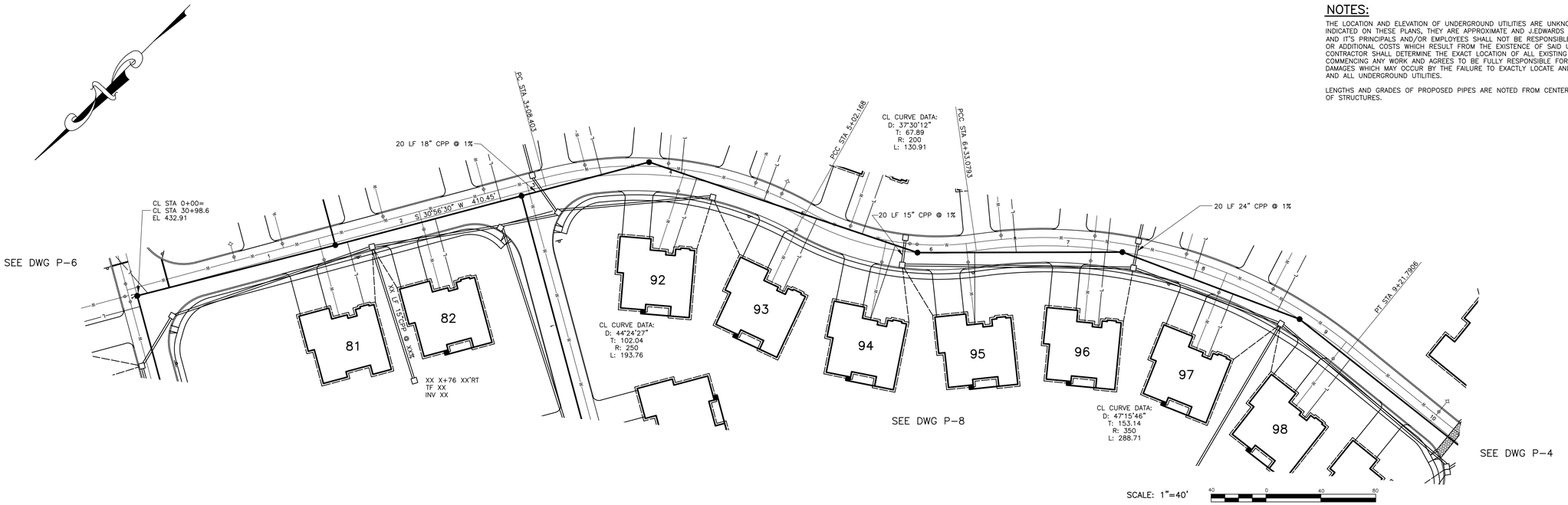
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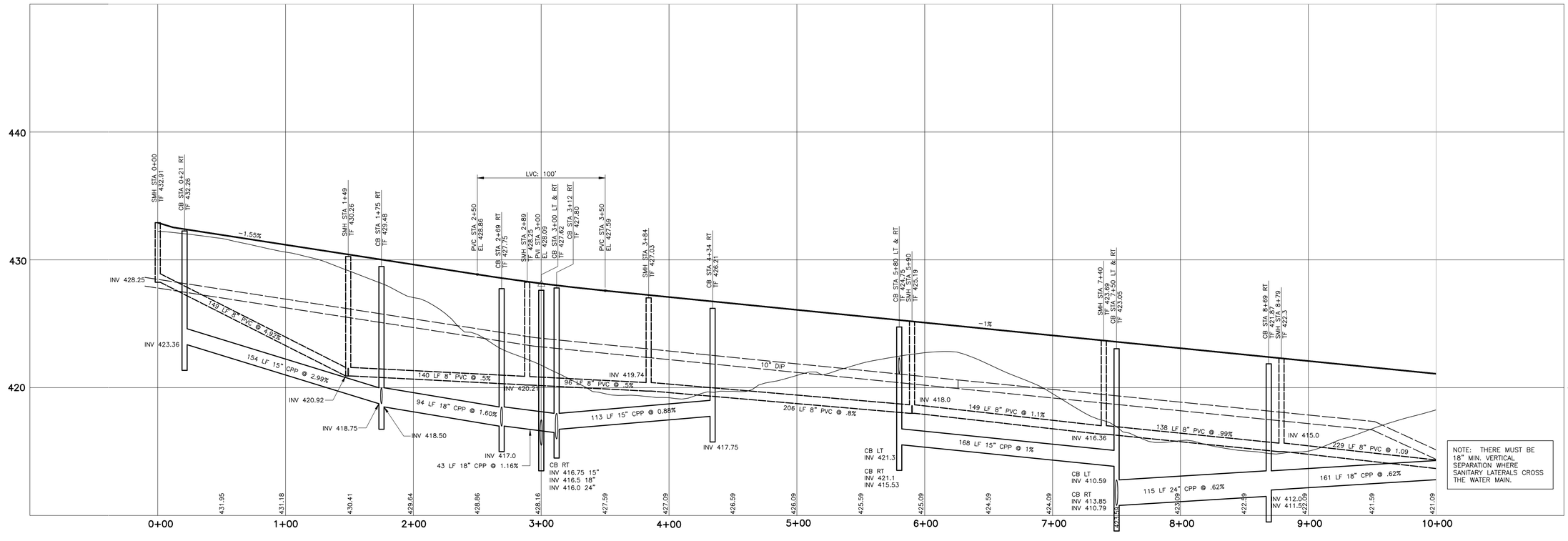
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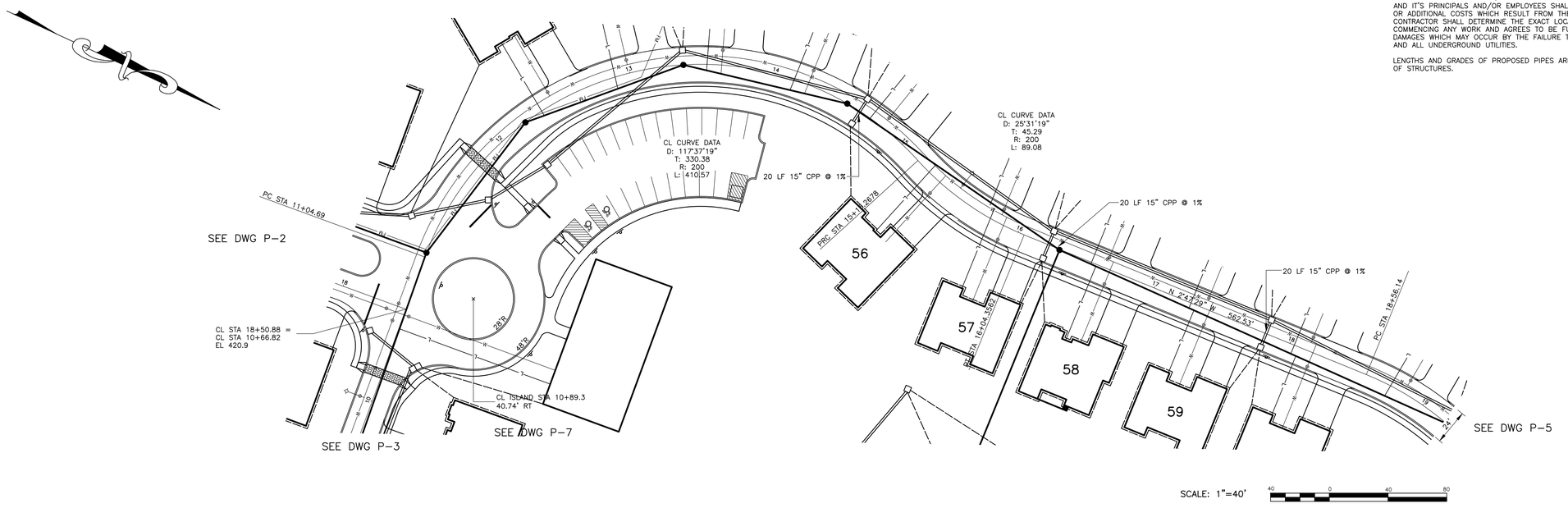
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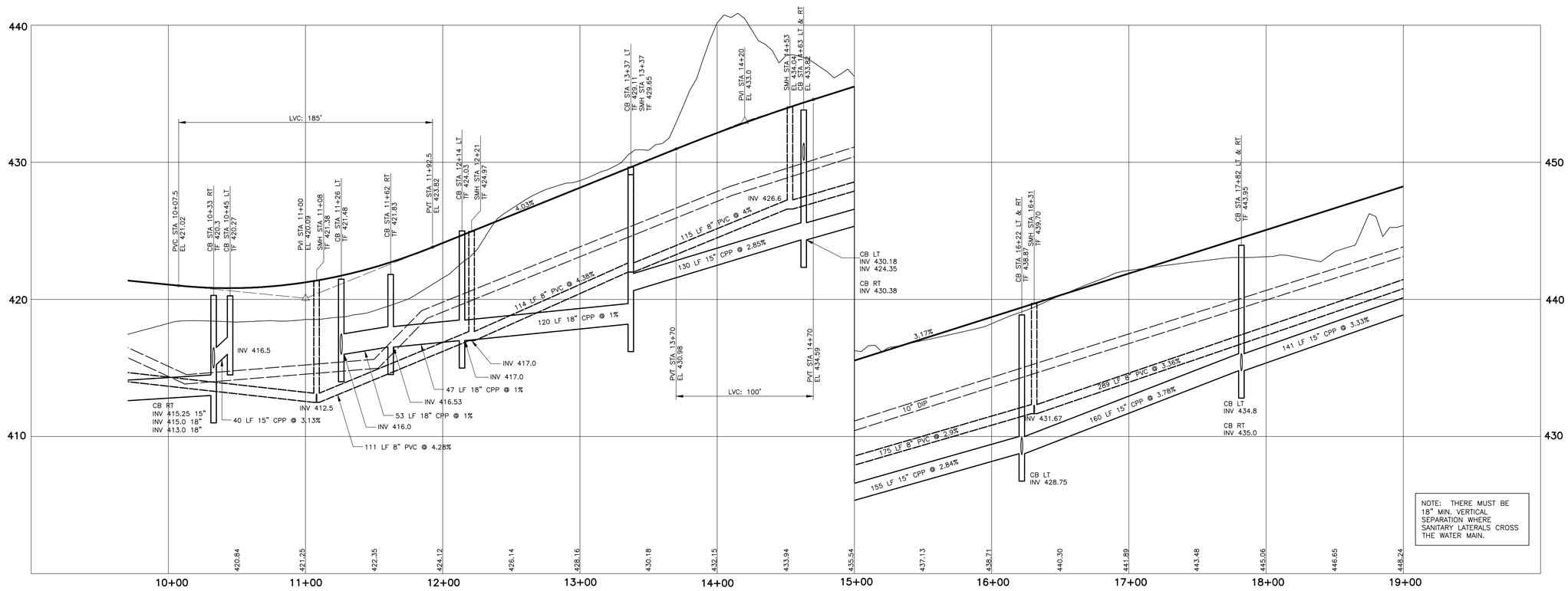
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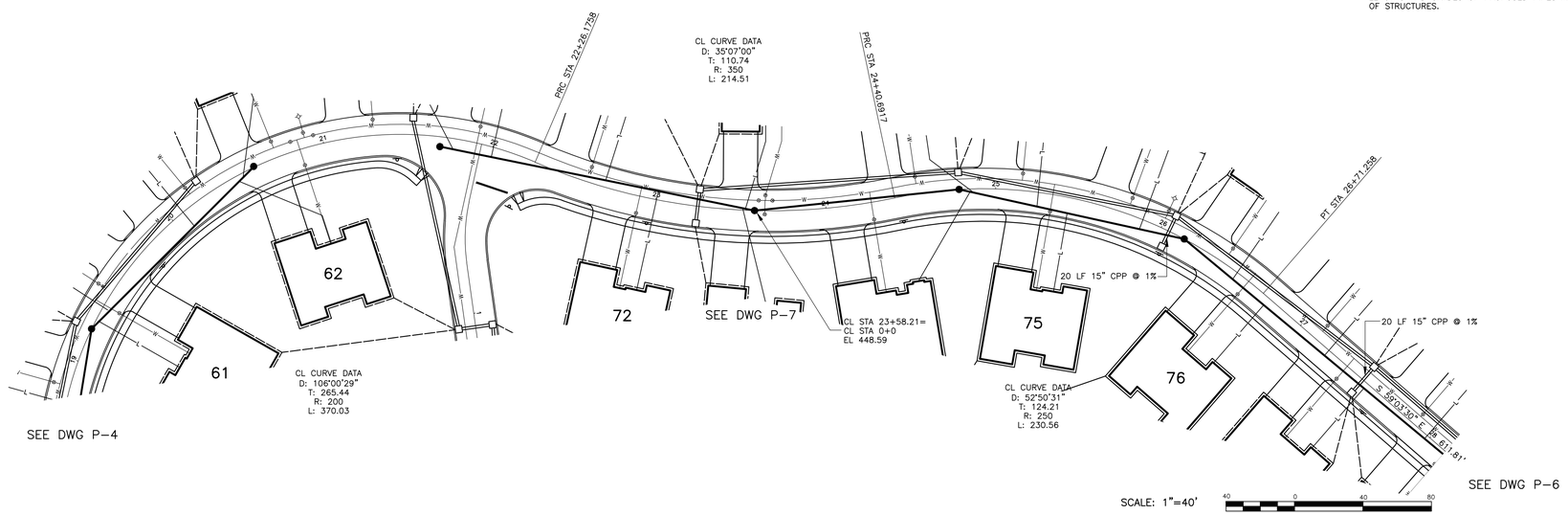
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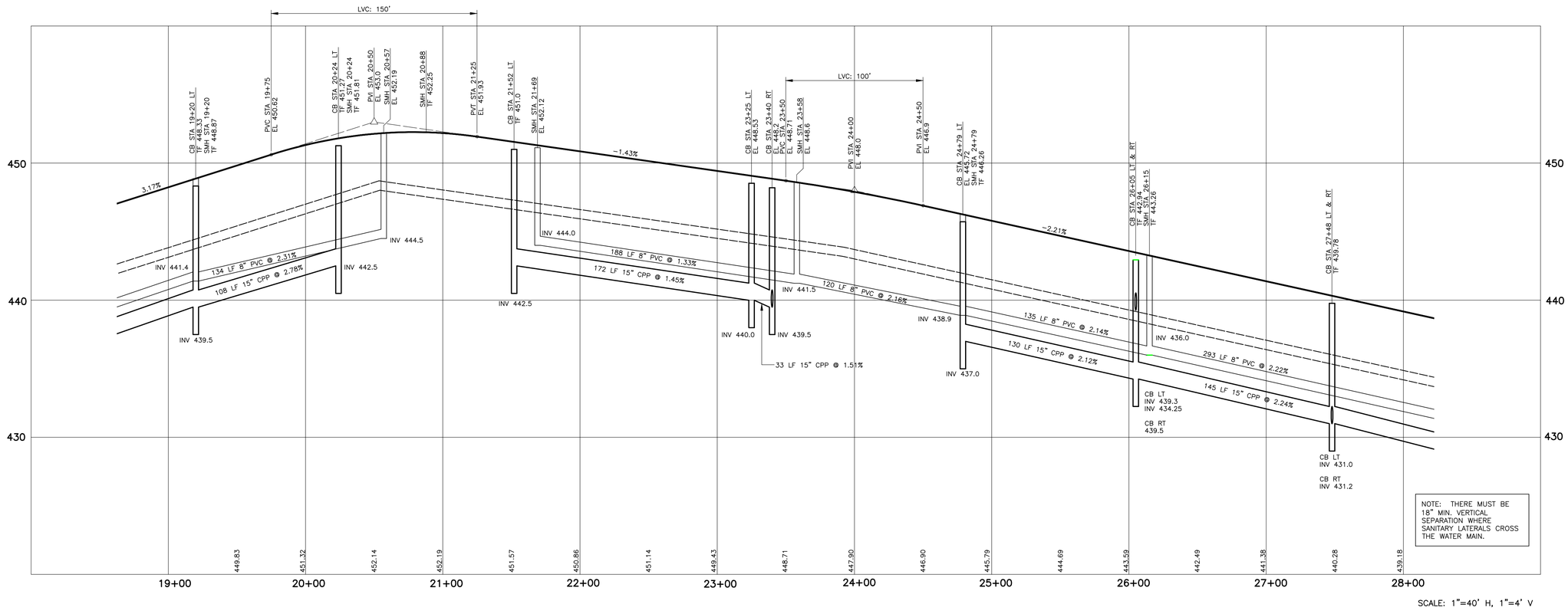
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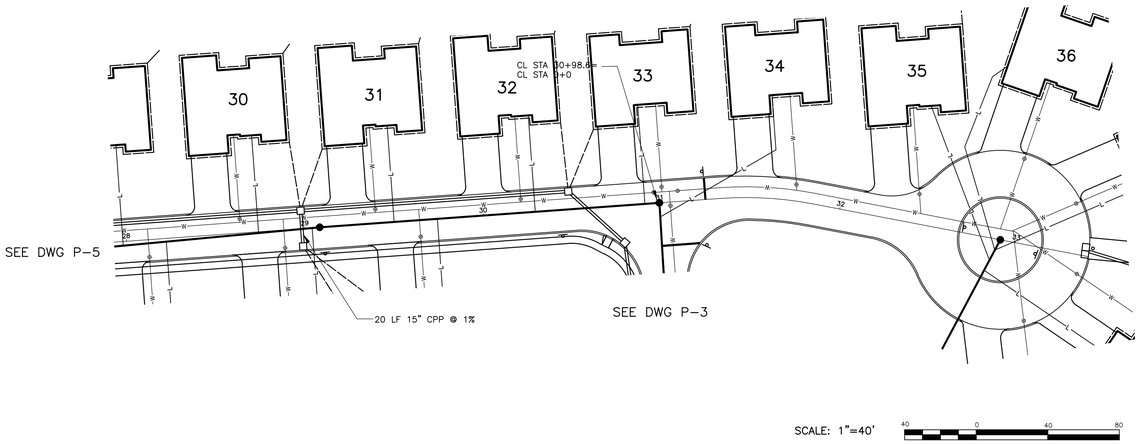
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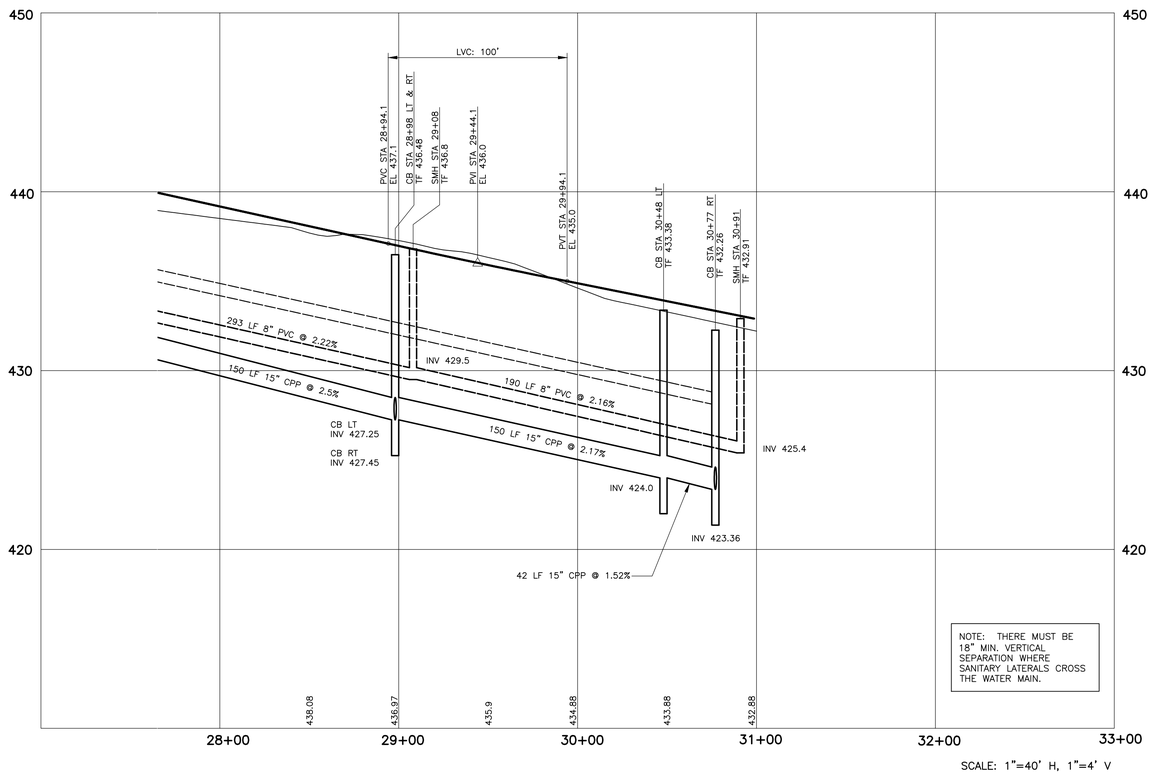
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SCALE: 1"=40'



NOTE: THERE MUST BE 18" MIN. VERTICAL SEPARATION WHERE SANITARY LATERALS CROSS THE WATER MAIN.

SCALE: 1"=40' H, 1"=4' V

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PLAN–PROFILE

SHEET NUMBER

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STORMWATER MANAGEMENT REPORT

FOR THE PROPOSED DEVELOPMENT OF

QUARRY RIDGE

RESIDENTIAL DEVELOPMENT

LOCATED AT

TURKEY ROOST ROAD
MONROE, CT

PREPARED ON: May 10, 2023

PREPARED BY:

J. EDWARDS & ASSOCIATES, LLC
227 STEPNEY ROAD, EASTON CT, 06612



Larry Edwards, P.E.

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SECTION 1. PROJECT NARRATIVE AND DRAINAGE REPORT

APPENDIX A: NRCS MAP AND NOAA RAINFALL TABLES

APPENDIX B: PRE DEVELOPMENT HYDROLOGICAL ANALYSIS

APPENDIX C: POST DEVELOPMENT HYDROLOGICAL ANALYSIS

INTRODUCTION:

J. Edwards & Associates has prepared this report to demonstrate compliance with local and state engineering guidelines. These guidelines include drainage design, sediment and erosion control and site grading.

PROJECT OVERVIEW:

This site is a former quarry that discontinued operation prior to 2009. Since that time, the quarry has been left unmaintained. The property supports several residential structures, one remaining commercial building, and gravel driveways. The present owner of the property is proposing to develop it as a 99-unit Residential Community. In 2009, Spath-Bjorklund Associates completed an analysis of the property. This report has been prepared to bring the design into conformance with the current stormwater management standards. Refer to the accompanying plans that include the design and layout of the proposed development and its associated improvements.

DRAINAGE ANALYSIS:

A Hydrologic analysis was completed using HydroCAD software which implements SCS-T20 methodology to compute runoff volumes. A Hydraulic analysis of the proposed piping was completed using Hydraflow Storm Sewer software. Rainfall intensities and depths were generated from the NOAA web site.

NOAA RAINFALL DEPTHS

EVENT	24 HR. DEPTH
2 YEAR	3.60
5 YEAR	4.69
10 YEAR	5.59
25 YEAR	6.83
50 YEAR	7.75
100 YEAR	8.74

The project area is completely with the approximately 126.154 acres of the property that is tributary to this analysis. The project area flows south toward Turkey Roost Road and either enters Smith Pond Brook or the pond located adjacent to the east driveway, identified as “East Pond”. East pond discharges under the driveway through an elliptical pipe. Along with an additional area to the east, these areas all combine as Smith Pond Brook as it flows onto the adjacent property to the east. The NRCS soil survey indicates areas of Hydraulic Soil Group (HSG) A, B, C, and D soils on the property. Existing conditions on the parcel include the abandoned quarry which has been stripped of all soil and is modeled as “Newly graded area, HSG D”.

The proposed development consists of single-family dwellings, roadways, driveways, community buildings, hardscapes, and landscaping. The development will result in an increase in impervious surfaces on the site by approximately 10.1 acres. A storm drainage network is proposed to collect, route, store,

and infiltrate runoff from impervious surfaces. Five stormwater basins are proposed to detain and store runoff from the proposed impervious surfaces. These basins also provide treatment for the water quality volume. The table below includes calculated peak flows at 2, 5, 10, 25, 50 & 100-year storm events. Peak flow from the site is decreased or maintained for all storm events.

Pre and Post Development Peak Flow Summary

Design Point	Design Storm	Existing Peak Flow (cfs)	Proposed Peak Flow (cfs)	Change in Peak Flow (cfs)
DP 1 (East of Project Area)	2	35.89	28.53	-7.36
	5	61.89	55.9	-5.99
	10	87.17	80.06	-7.11
	25	121.41	113.53	-7.88
	50	146.57	143.8	-2.77
	100	173.62	173.54	-0.08

Pre and Post Development Runoff Volume Summary

Design Point	Design Storm	Existing Runoff Vol. (ac-ft)	Proposed Runoff Vol. (ac-ft)	Change in Peak Flow (ac-ft)
DP 1 (East of Project Area)	2	11.203	10.497	-0.706
	5	18.748	18.222	-0.526
	10	25.583	25.189	-0.394
	25	35.621	35.387	-0.234
	50	43.407	43.277	-0.13
	100	52.025	51.994	-0.031

WATER QUALITY:

The state of Connecticut DEEP stormwater guidelines require that the first 1" of runoff be retained on site to provide an improvement in water quality. Below are calculations using the DEEP calculation worksheet.

TOTAL SITE AREA (A) = 126.154 acres

DRAINAGE AREAS

Drainage Area	Impervious Area
Subcatchment-1	13.34
Subcatchment-2	
Subcatchment-3	
Total Impervious	13.34

0.106%

WATER QUALITY VOLUME (WQV) CALCULATION

Design Precipitation (P) =	1	inch
% Impervious Cover (I) =	0.106	
Volumetric Runoff Coefficient (R) =	0.051	
WQV =	0.536	ac-ft
	23,348	cu-ft

WQ Basin	Provided Storage Volume (cf)
1	259
2	8,975
3	31,983
4	8,191
5	9,344
Total	58,752

Ground Water Recharge Volume

This requirement is intended to maintain pre-development annual groundwater recharge volume by capturing and infiltrating the storm water runoff.

Ground water recharge will be provided through the water quality basins. The basins' outlets are set above the basin bottoms which allows for retention of 58,752cf.

GWV = DxAxI/12

Soil recharge depth calculation:

Soil group B: D_B =0.35

Site	Area	% Imperv.	GWV Required (cf)	GWV Proposed (cf)
1	126.154Ac	10.6	16,990	58,752

Outlet Protection

The water quality basin outlets and all other stormwater discharges will be protected with rip rap pads sized in accordance with the state of Connecticut Department of transportation drainage design manual.

Conveyance Protection

All project drainage improvements have been designed to handle a minimum 25 year storm event with outlet overflow from the basin designed to handle a 100 year storm. Reference is made to complete drainage report for supporting documentation.

Peak Runoff Attenuation

The storm management system for this project will control post development peak runoff for the 2, 10, 25, 50, and 100-year storm events to levels less than or equal to the pre development rates.

Emergency Outlet Protection

The emergency outlet control have been designed to handle a 100 year storm event. See Drainage Summary Addendum attached to this report as well as the complete Drainage Report for supporting documentation.

Downstream Analysis

The drainage study for this project has also looked at the overall project impact to downstream off site water courses. Peak runoff from the total site will not exceed pre development levels. See Drainage Summary Addendum attached to this report as well as the complete Drainage Report for supporting documentation.

Pollutant Reduction

The State of CT DEEP requires 80% removal of Total Suspended Solids. The proposed BMPs exceed this standard.

TSS Removal Calculation Worksheet

Location: CB -> Basin

A	B	C	D	E
BMP[1]	TSS Removal Rate[1]	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump	0.25	1	0.25	0.75
Infil. Basin	0.8	0.75	0.6	0.15
		0.15	0	0.15
		0.15	0	0.15
		0.15	0	0.15
		Total TSS Removal =	85%	

TSS Removal Calculation Worksheet

Location: Grass Swale -> Basin

A	B	C	D	E
BMP[1]	TSS Removal Rate[1]	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Grass Swale	0.7	1	0.7	0.3
Infil. Basin	0.8	0.3	0.24	0.06
		0.06	0	0.06
		0.06	0	0.06
		0.06	0	0.06
		Total TSS Removal =	94%	

4. CONCLUSION

The proposed development will increase the amount of impervious area on the site, resulting in higher peak runoff rates. However, with the installation of the proposed water quality basin systems, the original flow patterns will be maintained and there will be no increase in peak runoff for the 2, 5, 10, 25, 50 & 100-year storm events. In addition to controlling stormwater peak runoff, the proposed design incorporates stormwater treatment to control pollution and provide groundwater recharge capacity. The implementation of these techniques and the overall site design layout will result in a finished project that will minimize sediment and erosion impacts during construction and will have no adverse impacts to adjoining properties upon completion.

APPENDIX A:

NOAA Atlas 14 Precipitation Data

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NOAA Atlas 14, Volume 10, Version 3
Location name: Monroe, Connecticut, USA*
Latitude: 41.3568°, Longitude: -73.2162°
Elevation: 437.05 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.365 (0.277-0.469)	0.427 (0.324-0.549)	0.529 (0.401-0.682)	0.614 (0.462-0.793)	0.730 (0.535-0.978)	0.817 (0.589-1.11)	0.909 (0.638-1.28)	1.01 (0.677-1.44)	1.16 (0.749-1.70)	1.28 (0.810-1.91)
10-min	0.517 (0.393-0.664)	0.605 (0.460-0.778)	0.749 (0.566-0.965)	0.869 (0.655-1.13)	1.03 (0.758-1.39)	1.16 (0.834-1.58)	1.29 (0.904-1.81)	1.43 (0.959-2.04)	1.64 (1.06-2.41)	1.81 (1.15-2.70)
15-min	0.609 (0.462-0.782)	0.712 (0.541-0.916)	0.881 (0.667-1.14)	1.02 (0.769-1.32)	1.22 (0.891-1.63)	1.36 (0.980-1.86)	1.52 (1.06-2.13)	1.69 (1.13-2.40)	1.93 (1.25-2.83)	2.13 (1.35-3.18)
30-min	0.843 (0.641-1.08)	0.987 (0.749-1.27)	1.22 (0.924-1.58)	1.42 (1.07-1.83)	1.68 (1.23-2.25)	1.89 (1.36-2.56)	2.10 (1.46-2.92)	2.32 (1.55-3.31)	2.63 (1.70-3.85)	2.87 (1.82-4.28)
60-min	1.08 (0.819-1.39)	1.26 (0.957-1.62)	1.56 (1.18-2.01)	1.81 (1.36-2.34)	2.15 (1.57-2.87)	2.41 (1.73-3.27)	2.68 (1.86-3.72)	2.95 (1.98-4.20)	3.32 (2.15-4.87)	3.61 (2.29-5.38)
2-hr	1.40 (1.07-1.79)	1.64 (1.25-2.10)	2.04 (1.55-2.61)	2.36 (1.79-3.04)	2.81 (2.07-3.75)	3.15 (2.28-4.27)	3.51 (2.47-4.89)	3.91 (2.62-5.54)	4.48 (2.91-6.52)	4.95 (3.14-7.32)
3-hr	1.61 (1.24-2.05)	1.90 (1.46-2.42)	2.37 (1.81-3.02)	2.76 (2.10-3.53)	3.29 (2.43-4.37)	3.69 (2.68-4.99)	4.11 (2.92-5.74)	4.61 (3.10-6.50)	5.33 (3.46-7.73)	5.93 (3.77-8.74)
6-hr	2.03 (1.57-2.56)	2.41 (1.86-3.05)	3.04 (2.34-3.86)	3.57 (2.73-4.54)	4.29 (3.19-5.66)	4.82 (3.53-6.49)	5.40 (3.86-7.51)	6.08 (4.10-8.52)	7.09 (4.62-10.2)	7.96 (5.08-11.7)
12-hr	2.49 (1.94-3.13)	3.01 (2.33-3.78)	3.85 (2.98-4.85)	4.55 (3.50-5.75)	5.52 (4.13-7.25)	6.23 (4.59-8.34)	7.00 (5.03-9.69)	7.92 (5.36-11.0)	9.29 (6.07-13.3)	10.5 (6.69-15.2)
24-hr	2.93 (2.29-3.65)	3.60 (2.81-4.49)	4.69 (3.65-5.86)	5.59 (4.33-7.02)	6.84 (5.15-8.94)	7.76 (5.75-10.3)	8.76 (6.35-12.1)	9.97 (6.78-13.8)	11.8 (7.75-16.8)	13.4 (8.61-19.4)
2-day	3.33 (2.62-4.12)	4.15 (3.26-5.14)	5.49 (4.30-6.81)	6.60 (5.14-8.23)	8.12 (6.17-10.6)	9.24 (6.91-12.3)	10.5 (7.68-14.5)	12.0 (8.21-16.6)	14.5 (9.53-20.5)	16.7 (10.7-23.9)
3-day	3.63 (2.87-4.48)	4.53 (3.57-5.59)	6.00 (4.71-7.42)	7.21 (5.64-8.96)	8.89 (6.77-11.5)	10.1 (7.59-13.4)	11.5 (8.44-15.8)	13.2 (9.02-18.1)	15.9 (10.5-22.4)	18.3 (11.8-26.2)
4-day	3.91 (3.09-4.81)	4.86 (3.84-5.98)	6.41 (5.05-7.91)	7.70 (6.03-9.53)	9.47 (7.23-12.3)	10.8 (8.09-14.2)	12.2 (8.98-16.8)	14.0 (9.60-19.2)	16.9 (11.2-23.7)	19.4 (12.5-27.7)
7-day	4.69 (3.73-5.74)	5.74 (4.56-7.02)	7.45 (5.90-9.13)	8.86 (6.98-10.9)	10.8 (8.28-13.9)	12.2 (9.22-16.0)	13.8 (10.2-18.8)	15.8 (10.8-21.4)	18.8 (12.4-26.2)	21.3 (13.8-30.3)
10-day	5.46 (4.36-6.65)	6.56 (5.23-8.00)	8.36 (6.65-10.2)	9.86 (7.79-12.1)	11.9 (9.14-15.2)	13.4 (10.1-17.5)	15.1 (11.1-20.3)	17.1 (11.8-23.1)	20.0 (13.3-27.8)	22.6 (14.6-31.9)
20-day	7.81 (6.27-9.44)	9.01 (7.23-10.9)	11.0 (8.78-13.3)	12.6 (10.0-15.4)	14.9 (11.4-18.7)	16.6 (12.5-21.2)	18.3 (13.4-24.2)	20.3 (14.1-27.2)	23.0 (15.4-31.8)	25.3 (16.4-35.4)
30-day	9.74 (7.86-11.7)	11.0 (8.87-13.3)	13.1 (10.5-15.8)	14.8 (11.8-18.0)	17.2 (13.2-21.5)	19.0 (14.3-24.1)	20.8 (15.2-27.1)	22.7 (15.8-30.3)	25.3 (16.9-34.7)	27.3 (17.8-38.1)
45-day	12.1 (9.81-14.5)	13.5 (10.9-16.1)	15.6 (12.6-18.8)	17.5 (14.0-21.1)	19.9 (15.4-24.8)	21.9 (16.5-27.6)	23.8 (17.3-30.7)	25.7 (17.9-34.1)	28.1 (18.8-38.4)	29.9 (19.5-41.5)
60-day	14.1 (11.4-16.8)	15.5 (12.5-18.5)	17.7 (14.3-21.3)	19.6 (15.8-23.7)	22.2 (17.2-27.5)	24.3 (18.3-30.4)	26.2 (19.1-33.6)	28.1 (19.7-37.2)	30.4 (20.5-41.5)	32.1 (21.0-44.5)

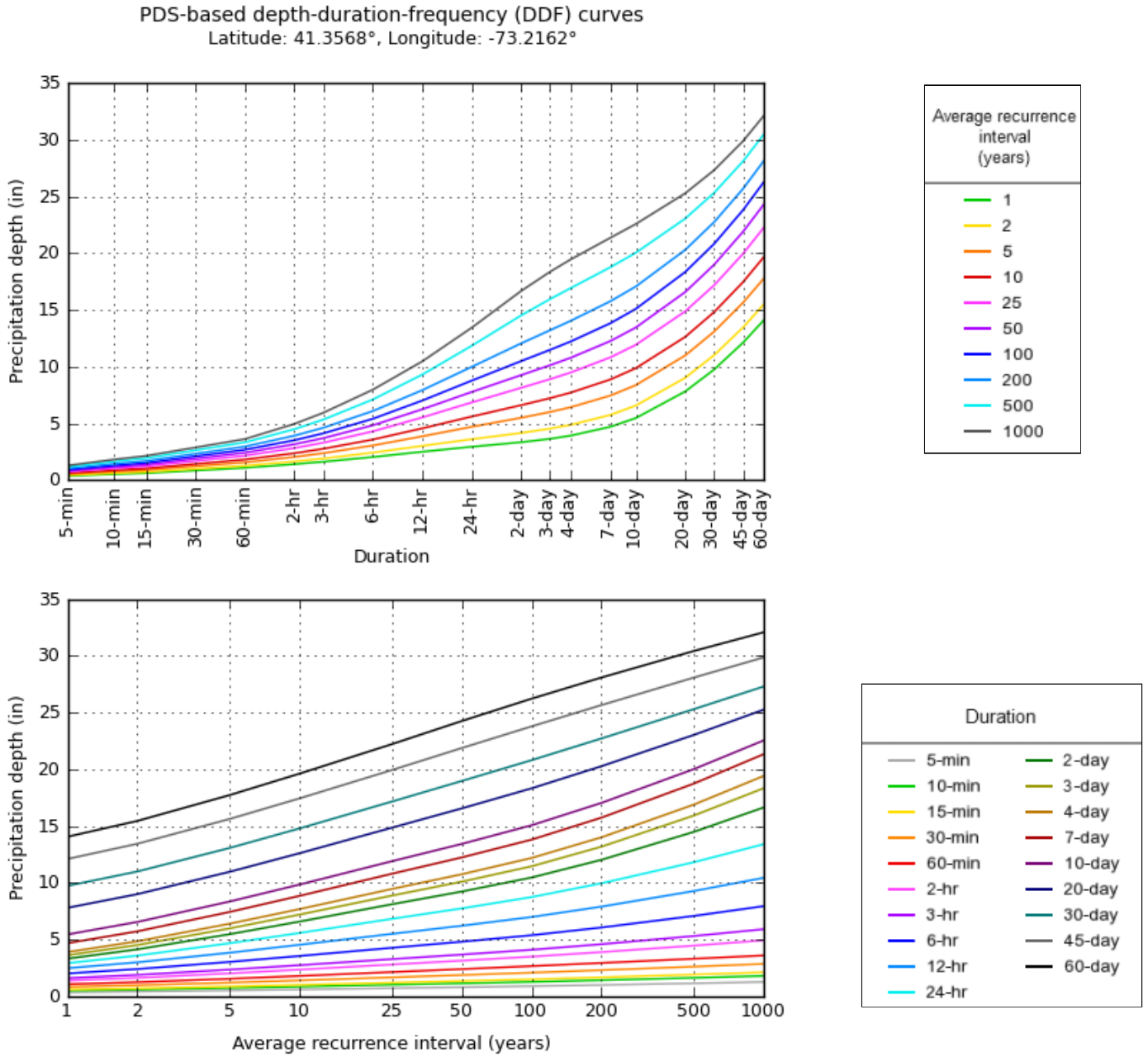
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



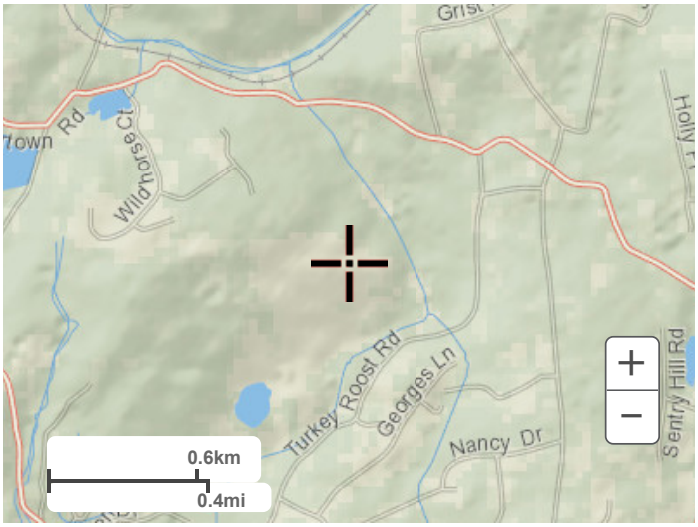
NOAA Atlas 14, Volume 10, Version 3

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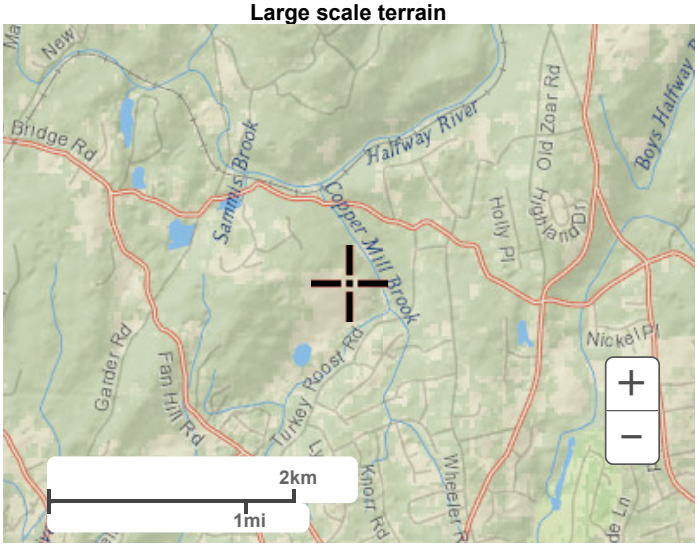
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Maps & aerials

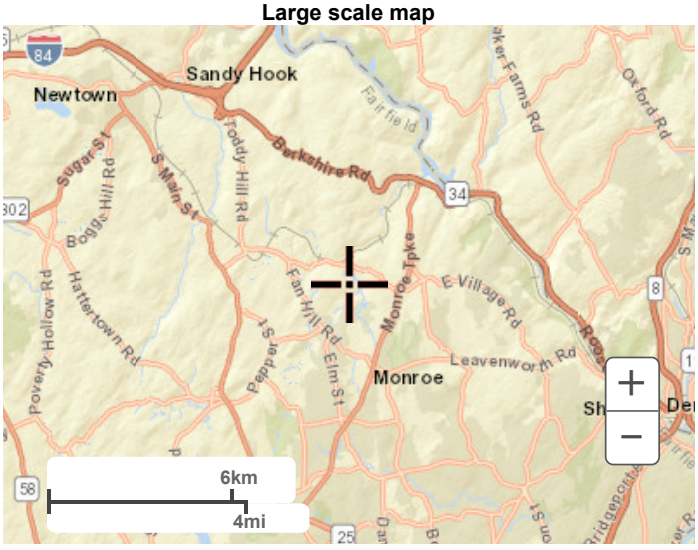
Small scale terrain



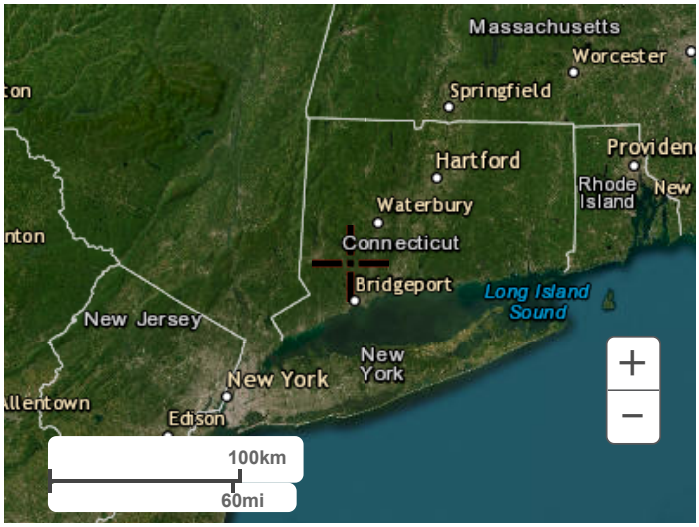
Large scale terrain



Large scale map



Large scale aerial



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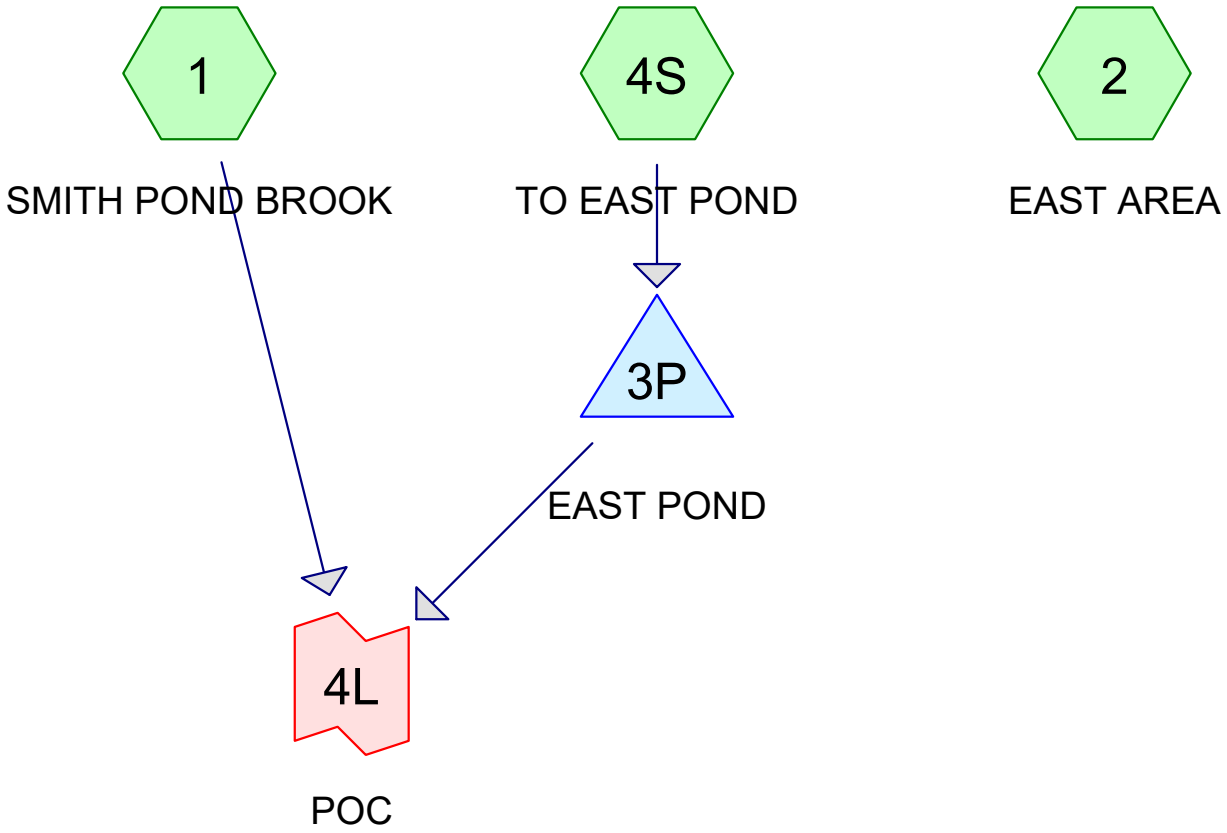
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National Oceanic and Atmospheric Administration
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National Water Center
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Disclaimer

APPENDIX B & C:

Pre and Post Development HydroCAD Analysis

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www.jedwardsassoc.com • www.leassoc.com
Engineering • Surveying • Site Planning



Subcat Reach Pond Link

Routing Diagram for EXISTING CONDITIONS_112322
Prepared by J. Edwards & Associates, LLC, Printed 1/12/2023
HydroCAD® 10.10-7c s/n 04982 © 2022 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.162	90	GRAVEL DRIVEWAY (1, 4S)
26.046	94	Newly graded area, HSG D (4S)
0.398	98	Paved parking (4S)
0.272	98	Roofs, HSG B (1, 4S)
1.537	98	Water Surface (4S)
8.428	36	Woods, Fair, HSG A (1, 2, 4S)
49.049	60	Woods, Fair, HSG B (1, 2, 4S)
25.617	73	Woods, Fair, HSG C (1, 4S)
13.645	79	Woods, Fair, HSG D (1, 2)

Summary for Subcatchment 1: SMITH POND BROOK

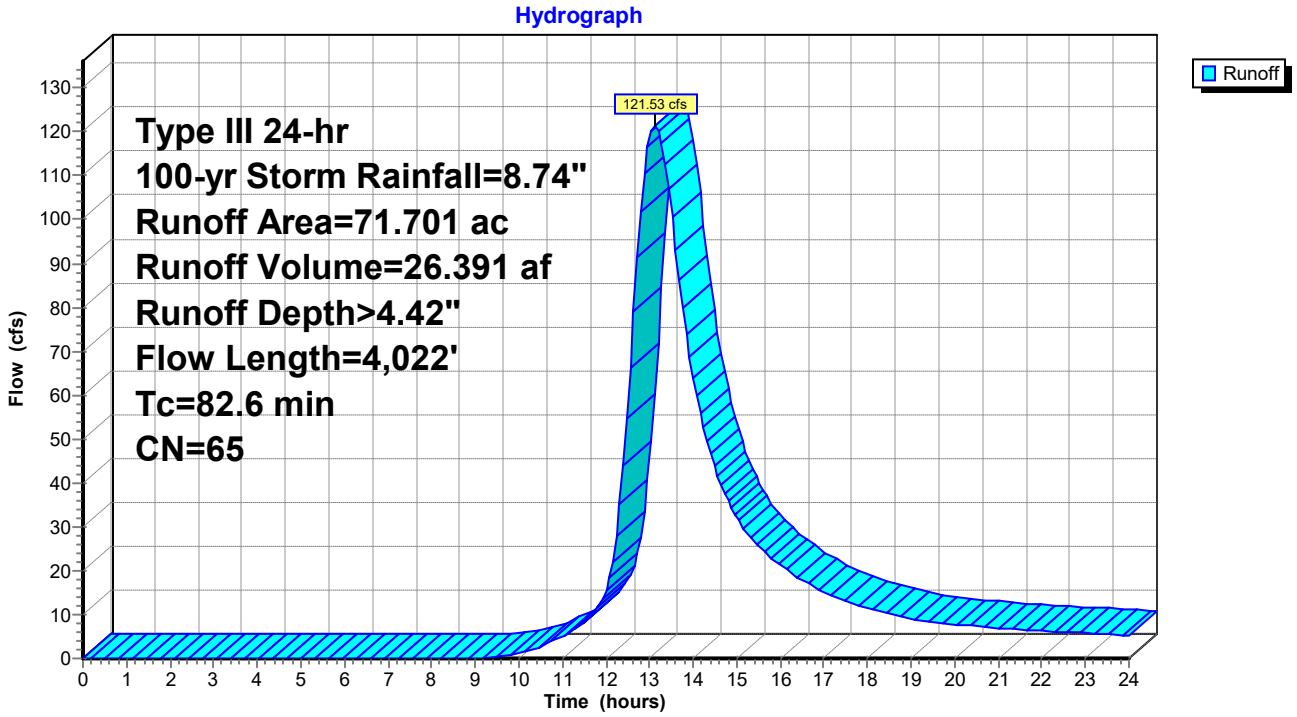
Runoff = 121.53 cfs @ 13.12 hrs, Volume= 26.391 af, Depth> 4.42"
Routed to Link 4L : POC

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.08 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	0.000	80	>75% Grass cover, Good, HSG D
	4.658	36	Woods, Fair, HSG A
	38.714	60	Woods, Fair, HSG B
	14.735	73	Woods, Fair, HSG C
	12.905	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	0.000	98	Paved parking
*	0.638	90	GRAVEL DRIVEWAY
	0.051	98	Roofs, HSG B
	0.000	98	Water Surface
	71.701	65	Weighted Average
	71.650		99.93% Pervious Area
	0.051		0.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.0	190	0.0130	0.08		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
12.6	110	0.0880	0.15		**Sheet Flow, BC** Woods: Light underbrush n= 0.400 P2= 3.30"
21.6	1,880	0.0840	1.45		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
6.4	1,842	0.0180	4.77	66.84	**Trap/Vee/Rect Channel Flow, DE** Bot.W=10.00' D=1.00' Z= 4.0 '/' Top.W=18.00' n= 0.035
82.6	4,022	Total			

Subcatchment 1: SMITH POND BROOK



Summary for Subcatchment 2: EAST AREA

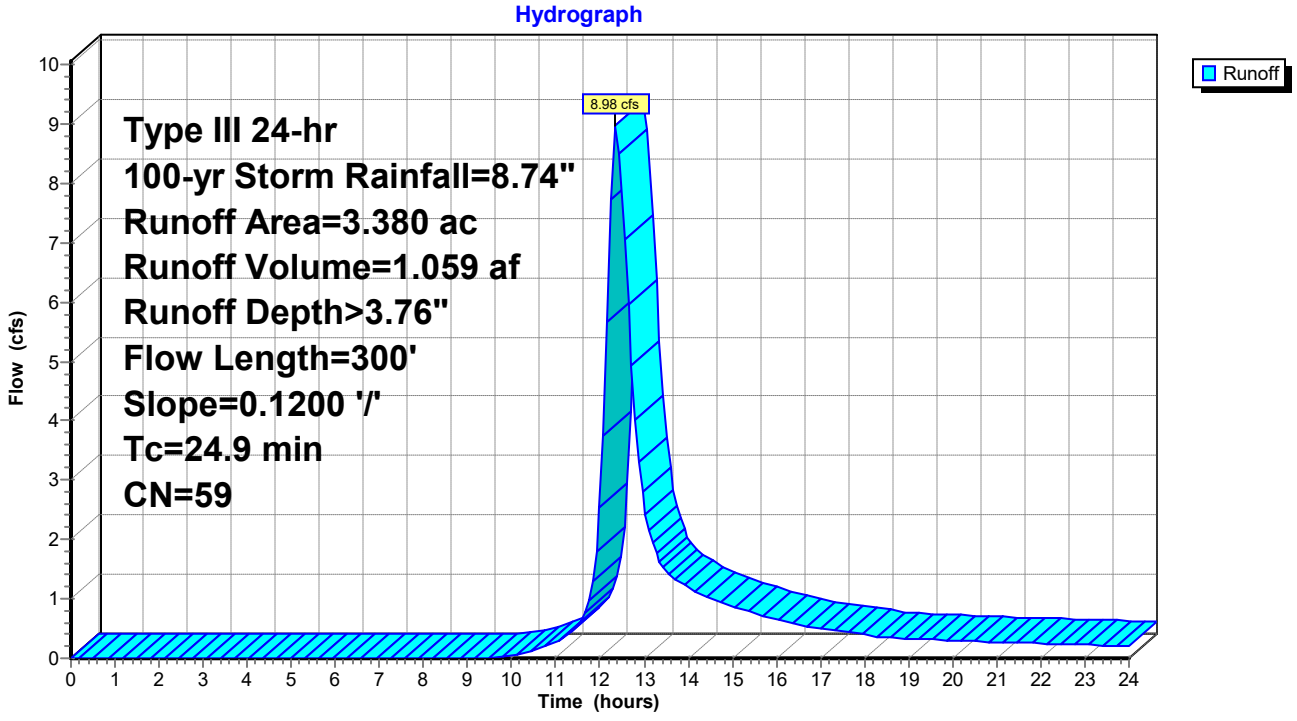
Runoff = 8.98 cfs @ 12.36 hrs, Volume= 1.059 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.08 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

Area (ac)	CN	Description
0.660	36	Woods, Fair, HSG A
1.980	60	Woods, Fair, HSG B
0.740	79	Woods, Fair, HSG D
3.380	59	Weighted Average
3.380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	300	0.1200	0.20		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"

Subcatchment 2: EAST AREA



Summary for Subcatchment 4S: TO EAST POND

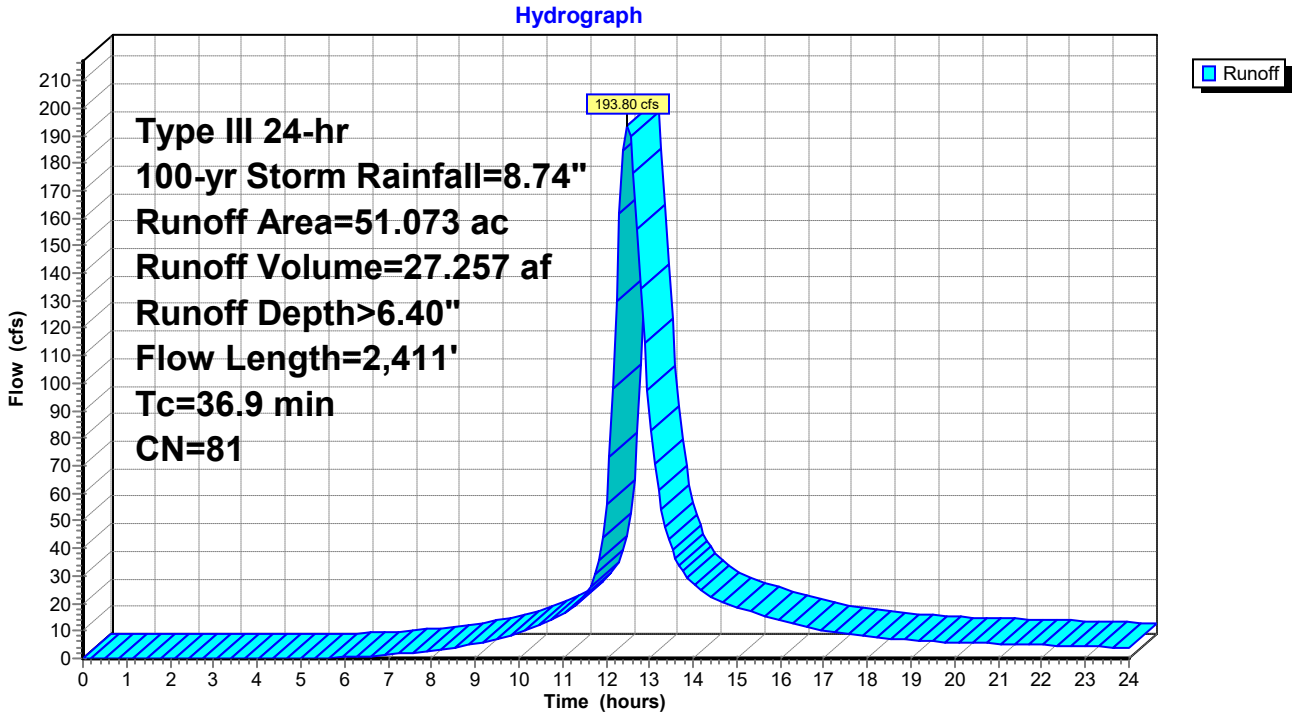
Runoff = 193.80 cfs @ 12.50 hrs, Volume= 27.257 af, Depth> 6.40"
Routed to Pond 3P : EAST POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.08 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	0.000	80	>75% Grass cover, Good, HSG D
	3.110	36	Woods, Fair, HSG A
	8.355	60	Woods, Fair, HSG B
	10.882	73	Woods, Fair, HSG C
	0.000	79	Woods, Fair, HSG D
	26.046	94	Newly graded area, HSG D
*	0.398	98	Paved parking
*	0.524	90	GRAVEL DRIVEWAY
	0.221	98	Roofs, HSG B
	1.537	98	Water Surface
	51.073	81	Weighted Average
	48.917		95.78% Pervious Area
	2.156		4.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	26	0.4600	0.21		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
14.1	74	0.0300	0.09		**Sheet Flow, BC-SHEET** Woods: Light underbrush n= 0.400 P2= 3.30"
2.5	131	0.0300	0.87		**Shallow Concentrated Flow, BC_SHALLOW** Woodland Kv= 5.0 fps
2.1	318	0.2500	2.50		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
11.7	1,407	0.0400	2.00		**Shallow Concentrated Flow, DE** Nearly Bare & Untilled Kv= 10.0 fps
4.4	455	0.1200	1.73		**Shallow Concentrated Flow, EF** Woodland Kv= 5.0 fps
36.9	2,411	Total			

Subcatchment 4S: TO EAST POND



Summary for Pond 3P: EAST POND

Inflow Area = 51.073 ac, 4.22% Impervious, Inflow Depth > 6.40" for 100-yr Storm event
Inflow = 193.80 cfs @ 12.50 hrs, Volume= 27.257 af
Outflow = 52.38 cfs @ 13.30 hrs, Volume= 25.634 af, Atten= 73%, Lag= 48.3 min
Primary = 52.38 cfs @ 13.30 hrs, Volume= 25.634 af
Routed to Link 4L : POC

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.08 hrs
Peak Elev= 350.60' @ 13.30 hrs Surf.Area= 108,286 sf Storage= 520,903 cf

Plug-Flow detention time= 147.2 min calculated for 25.634 af (94% of inflow)
Center-of-Mass det. time= 116.3 min (938.4 - 822.1)

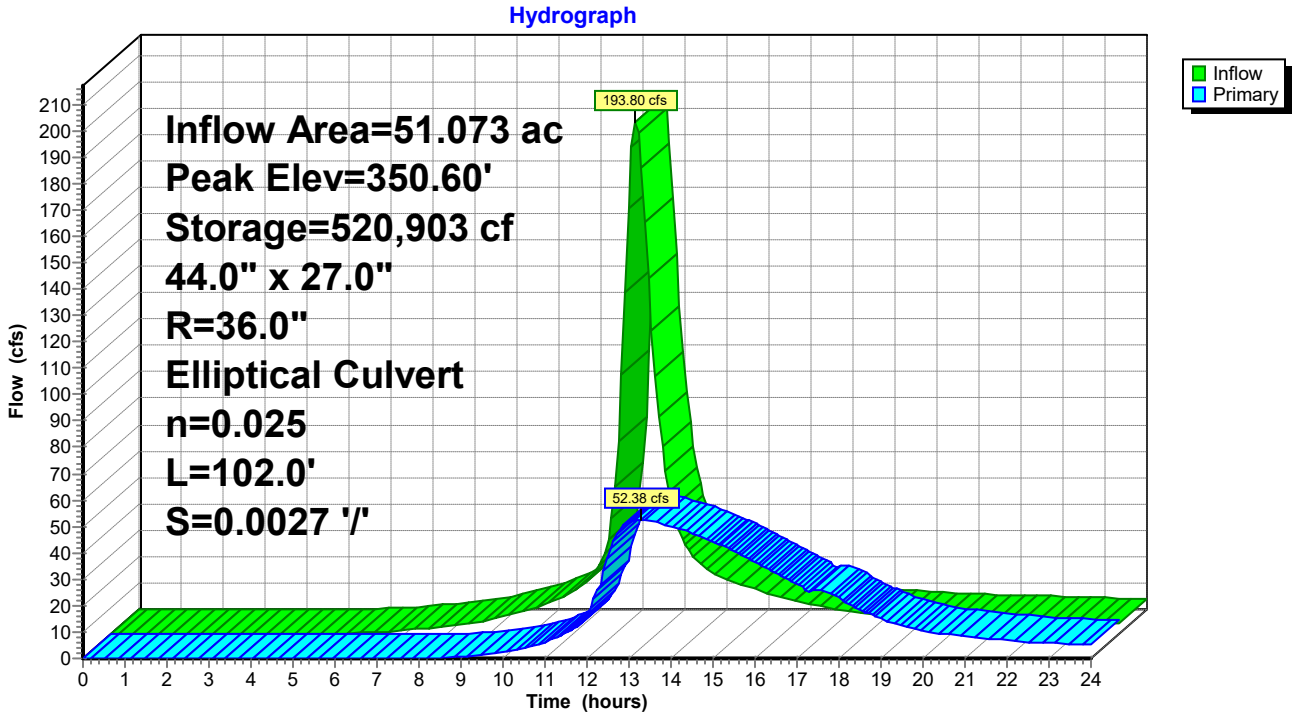
Volume	Invert	Avail.Storage	Storage Description
#1	344.20'	587,805 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
344.20	64,107	0	0	64,107
346.00	70,422	121,032	121,032	70,635
348.00	81,904	152,182	273,213	82,282
350.00	103,093	184,591	457,804	103,580
351.20	113,660	130,000	587,805	114,240

Device	Routing	Invert	Outlet Devices
#1	Primary	344.21'	**44.0" W x 27.0" H, R=36.0" Elliptical Culvert** L= 102.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 344.21' / 343.93' S= 0.0027 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 6.62 sf

Primary OutFlow Max=52.37 cfs @ 13.30 hrs HW=350.60' TW=0.00' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 52.37 cfs @ 7.91 fps)

Pond 3P: EAST POND



Stage-Area-Storage for Pond 3P: EAST POND

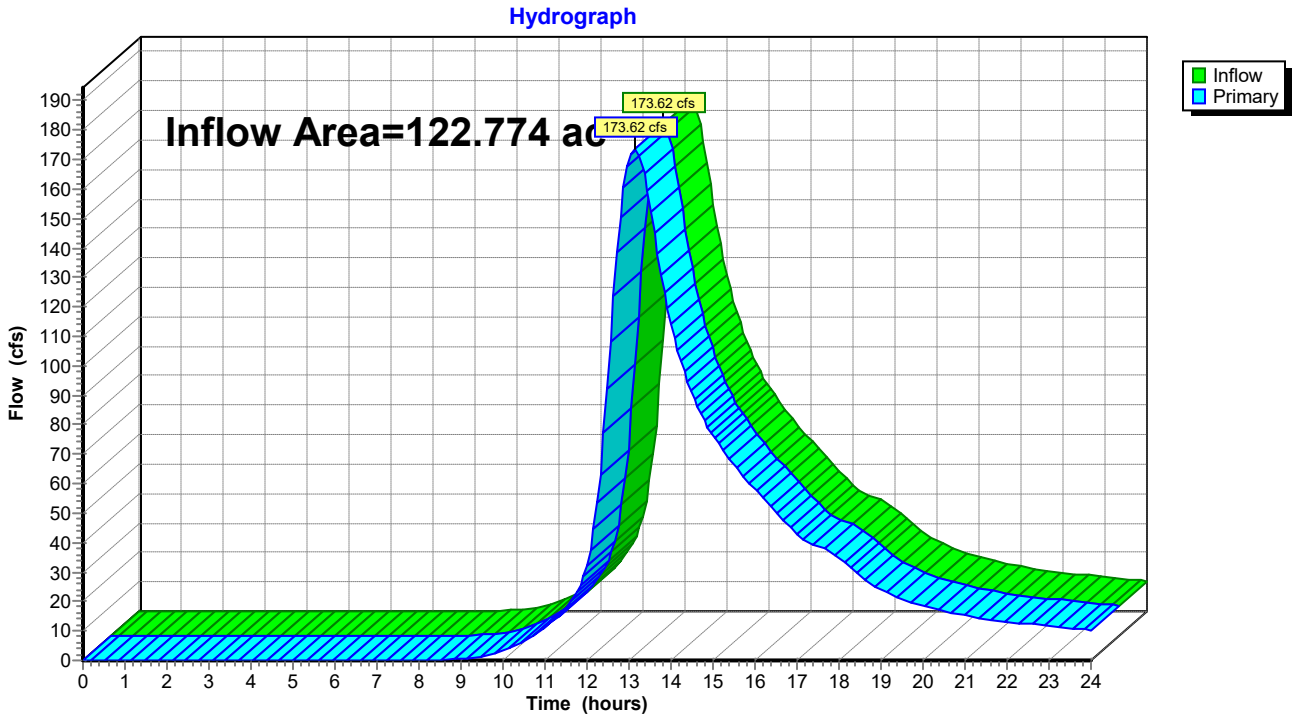
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
344.20	64,107	0
344.30	64,450	6,428
344.40	64,794	12,890
344.50	65,139	19,387
344.60	65,485	25,918
344.70	65,831	32,484
344.80	66,179	39,084
344.90	66,528	45,719
345.00	66,877	52,390
345.10	67,227	59,095
345.20	67,579	65,835
345.30	67,931	72,611
345.40	68,284	79,421
345.50	68,638	86,268
345.60	68,993	93,149
345.70	69,349	100,066
345.80	69,706	107,019
345.90	70,063	114,007
346.00	70,422	121,032
346.10	70,976	128,101
346.20	71,531	135,227
346.30	72,089	142,408
346.40	72,649	149,645
346.50	73,211	156,938
346.60	73,776	164,287
346.70	74,342	171,693
346.80	74,911	179,155
346.90	75,482	186,675
347.00	76,055	194,252
347.10	76,630	201,886
347.20	77,207	209,578
347.30	77,787	217,328
347.40	78,368	225,135
347.50	78,952	233,001
347.60	79,538	240,926
347.70	80,126	248,909
347.80	80,717	256,951
347.90	81,309	265,053
348.00	81,904	273,213
348.10	82,906	281,454
348.20	83,913	289,794
348.30	84,927	298,236
348.40	85,947	306,780
348.50	86,973	315,426
348.60	88,005	324,175
348.70	89,043	333,027
348.80	90,087	341,984
348.90	91,138	351,045
349.00	92,194	360,211
349.10	93,257	369,484
349.20	94,325	378,863
349.30	95,400	388,349
349.40	96,481	397,943
349.50	97,567	407,646
349.60	98,660	417,457
349.70	99,759	427,378
349.80	100,865	437,409
349.90	101,976	447,551
350.00	103,093	457,804
350.10	103,954	468,157
350.20	104,818	478,595
350.30	105,686	489,120
350.40	106,558	499,733
350.50	107,433	510,432
350.60	108,312	521,219
350.70	109,194	532,095
350.80	110,080	543,058
350.90	110,970	554,111
351.00	111,863	565,253
351.10	112,760	576,484
351.20	**113,660**	**587,805**

Summary for Link 4L: POC

Inflow Area = 122.774 ac, 1.80% Impervious, Inflow Depth > 5.08" for 100-yr Storm event
Inflow = 173.62 cfs @ 13.13 hrs, Volume= 52.025 af
Primary = 173.62 cfs @ 13.13 hrs, Volume= 52.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.08 hrs

Link 4L: POC



Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr Storm	Type III 24-hr		Default	24.00	1	3.60	2
2	5-yr Storm	Type III 24-hr		Default	24.00	1	4.69	2
3	10-yr Storm	Type III 24-hr		Default	24.00	1	5.59	2
4	25-yr Storm	Type III 24-hr		Default	24.00	1	6.83	2
5	50-yr Storm	Type III 24-hr		Default	24.00	1	7.75	2
6	100-yr Storm	Type III 24-hr		Default	24.00	1	8.74	2

Time span=0.00-24.00 hrs, dt=0.08 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=71.701 ac 0.07% Impervious Runoff Depth>0.78"
Flow Length=4,022' Tc=82.6 min CN=65 Runoff=18.32 cfs 4.677 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=0.90 cfs 0.149 af

Subcatchment 4S: TO EAST POND Runoff Area=51.073 ac 4.22% Impervious Runoff Depth>1.78"
Flow Length=2,411' Tc=36.9 min CN=81 Runoff=54.54 cfs 7.559 af

Pond 3P: EAST POND Peak Elev=346.26' Storage=139,647 cf Inflow=54.54 cfs 7.559 af
44.0" x 27.0", R=36.0" Elliptical Culvert n=0.025 L=102.0' S=0.0027 '/' Outflow=17.57 cfs 6.525 af

Link 4L: POC Inflow=35.89 cfs 11.203 af
Primary=35.89 cfs 11.203 af

Total Runoff Area = 126.154 ac Runoff Volume = 12.385 af Average Runoff Depth = 1.18"
98.25% Pervious = 123.947 ac 1.75% Impervious = 2.207 ac

Time span=0.00-24.00 hrs, dt=0.08 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=71.701 ac 0.07% Impervious Runoff Depth>1.42"
Flow Length=4,022' Tc=82.6 min CN=65 Runoff=36.25 cfs 8.462 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>1.05"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=2.20 cfs 0.297 af

Subcatchment 4S: TO EAST POND Runoff Area=51.073 ac 4.22% Impervious Runoff Depth>2.69"
Flow Length=2,411' Tc=36.9 min CN=81 Runoff=83.11 cfs 11.465 af

Pond 3P: EAST POND Peak Elev=347.22' Storage=210,756 cf Inflow=83.11 cfs 11.465 af
44.0" x 27.0", R=36.0" Elliptical Culvert n=0.025 L=102.0' S=0.0027 '/' Outflow=26.30 cfs 10.286 af

Link 4L: POC Inflow=61.98 cfs 18.748 af
Primary=61.98 cfs 18.748 af

Total Runoff Area = 126.154 ac Runoff Volume = 20.224 af Average Runoff Depth = 1.92"
98.25% Pervious = 123.947 ac 1.75% Impervious = 2.207 ac

Time span=0.00-24.00 hrs, dt=0.08 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=71.701 ac 0.07% Impervious Runoff Depth>2.01"
Flow Length=4,022' Tc=82.6 min CN=65 Runoff=53.37 cfs 12.024 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>1.57"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=3.50 cfs 0.443 af

Subcatchment 4S: TO EAST POND Runoff Area=51.073 ac 4.22% Impervious Runoff Depth>3.49"
Flow Length=2,411' Tc=36.9 min CN=81 Runoff=107.37 cfs 14.847 af

Pond 3P: EAST POND Peak Elev=348.03' Storage=275,970 cf Inflow=107.37 cfs 14.847 af
44.0" x 27.0", R=36.0" Elliptical Culvert n=0.025 L=102.0' S=0.0027 '/' Outflow=33.93 cfs 13.559 af

Link 4L: POC Inflow=87.17 cfs 25.583 af
Primary=87.17 cfs 25.583 af

Total Runoff Area = 126.154 ac Runoff Volume = 27.314 af Average Runoff Depth = 2.60"
98.25% Pervious = 123.947 ac 1.75% Impervious = 2.207 ac

Time span=0.00-24.00 hrs, dt=0.08 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=71.701 ac 0.07% Impervious Runoff Depth>2.91"
Flow Length=4,022' Tc=82.6 min CN=65 Runoff=79.01 cfs 17.395 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>2.37"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=5.52 cfs 0.669 af

Subcatchment 4S: TO EAST POND Runoff Area=51.073 ac 4.22% Impervious Runoff Depth>4.62"
Flow Length=2,411' Tc=36.9 min CN=81 Runoff=141.26 cfs 19.652 af

Pond 3P: EAST POND Peak Elev=349.09' Storage=368,480 cf Inflow=141.26 cfs 19.652 af
44.0" x 27.0", R=36.0" Elliptical Culvert n=0.025 L=102.0' S=0.0027 '/' Outflow=42.51 cfs 18.226 af

Link 4L: POC Inflow=121.41 cfs 35.621 af
Primary=121.41 cfs 35.621 af

Total Runoff Area = 126.154 ac Runoff Volume = 37.716 af Average Runoff Depth = 3.59"
98.25% Pervious = 123.947 ac 1.75% Impervious = 2.207 ac

Time span=0.00-24.00 hrs, dt=0.08 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=71.701 ac 0.07% Impervious Runoff Depth>3.62"
Flow Length=4,022' Tc=82.6 min CN=65 Runoff=99.13 cfs 21.638 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>3.02"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=7.15 cfs 0.851 af

Subcatchment 4S: TO EAST POND Runoff Area=51.073 ac 4.22% Impervious Runoff Depth>5.47"
Flow Length=2,411' Tc=36.9 min CN=81 Runoff=166.55 cfs 23.291 af

Pond 3P: EAST POND Peak Elev=349.83' Storage=440,637 cf Inflow=166.55 cfs 23.291 af
44.0" x 27.0", R=36.0" Elliptical Culvert n=0.025 L=102.0' S=0.0027 '/' Outflow=47.63 cfs 21.769 af

Link 4L: POC Inflow=146.57 cfs 43.407 af
Primary=146.57 cfs 43.407 af

Total Runoff Area = 126.154 ac Runoff Volume = 45.781 af Average Runoff Depth = 4.35"
98.25% Pervious = 123.947 ac 1.75% Impervious = 2.207 ac

Time span=0.00-24.00 hrs, dt=0.08 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=71.701 ac 0.07% Impervious Runoff Depth>4.42"
Flow Length=4,022' Tc=82.6 min CN=65 Runoff=121.53 cfs 26.391 af

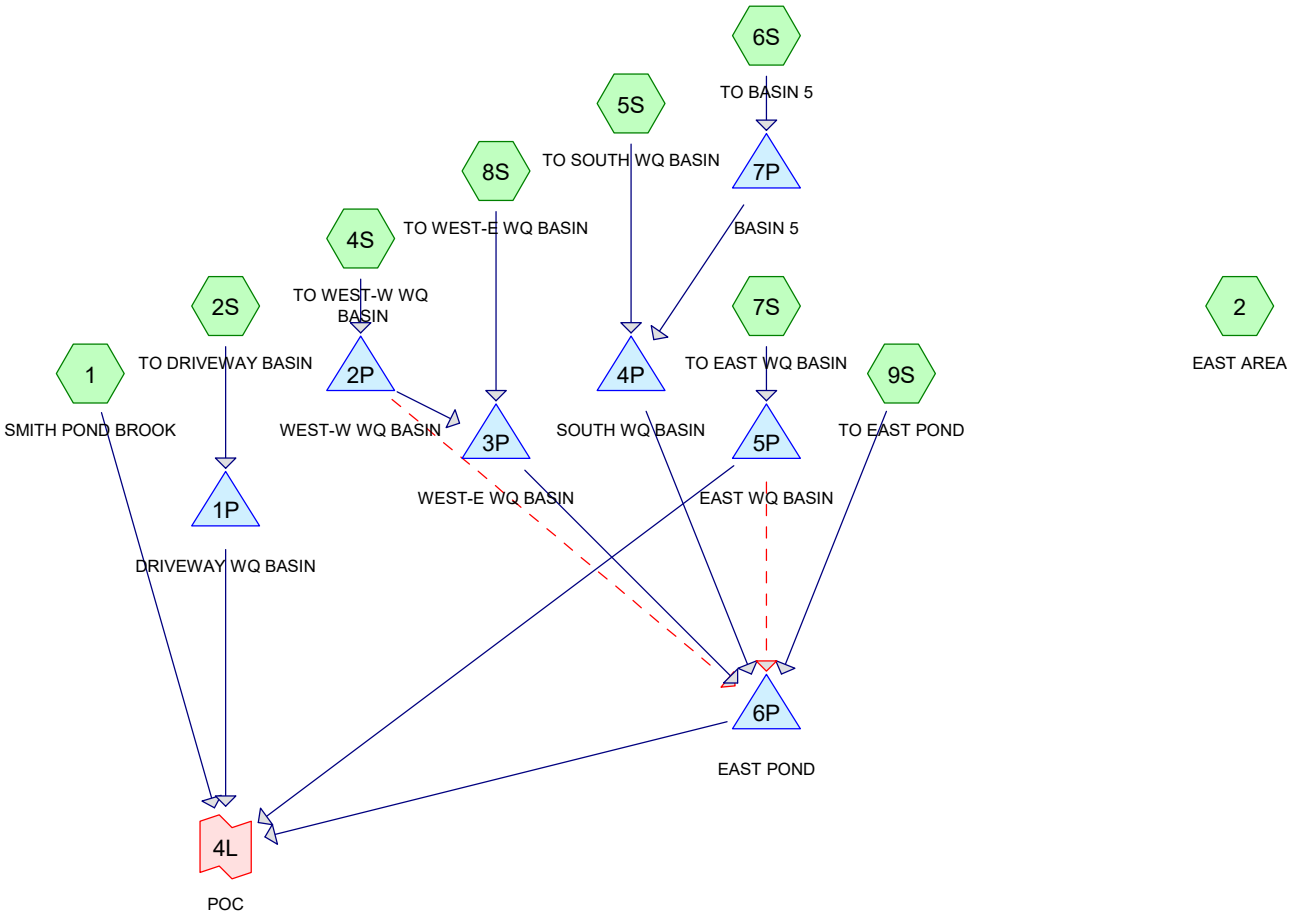
Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>3.76"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=8.98 cfs 1.059 af

Subcatchment 4S: TO EAST POND Runoff Area=51.073 ac 4.22% Impervious Runoff Depth>6.40"
Flow Length=2,411' Tc=36.9 min CN=81 Runoff=193.80 cfs 27.257 af

Pond 3P: EAST POND Peak Elev=350.60' Storage=520,903 cf Inflow=193.80 cfs 27.257 af
44.0" x 27.0", R=36.0" Elliptical Culvert n=0.025 L=102.0' S=0.0027 '/' Outflow=52.38 cfs 25.634 af

Link 4L: POC Inflow=173.62 cfs 52.025 af
Primary=173.62 cfs 52.025 af

Total Runoff Area = 126.154 ac Runoff Volume = 54.707 af Average Runoff Depth = 5.20"
98.25% Pervious = 123.947 ac 1.75% Impervious = 2.207 ac



Subcat Reach Pond Link

Routing Diagram for PROPOSED CONDITIONS_050423
Prepared by J. Edwards & Associates, LLC, Printed 5/10/2023
HydroCAD® 10.10-7c s/n 04982 © 2022 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.963	61	>75% Grass cover, Good, HSG B (4S, 7S, 8S)
20.179	74	>75% Grass cover, Good, HSG C (1, 4S, 5S, 6S, 7S, 8S, 9S)
17.439	80	>75% Grass cover, Good, HSG D (4S, 5S, 6S, 7S, 8S)
0.130	90	GRAVEL DRIVEWAY (7S, 8S)
5.706	98	Paved parking (5S, 6S, 7S, 8S, 9S)
0.350	98	Paved parking, HSG B (2S)
5.565	98	Roofs, HSG B (4S, 5S, 6S, 7S, 8S, 9S)
0.185	98	Unconnected pavement, HSG B (5S, 6S, 7S, 8S)
1.537	98	Water Surface (9S)
0.660	36	Woods, Fair, HSG A (2)
37.614	60	Woods, Fair, HSG B (1, 2)
16.590	73	Woods, Fair, HSG C (1, 4S, 9S)
13.236	79	Woods, Fair, HSG D (1, 2)

Summary for Subcatchment 1: SMITH POND BROOK

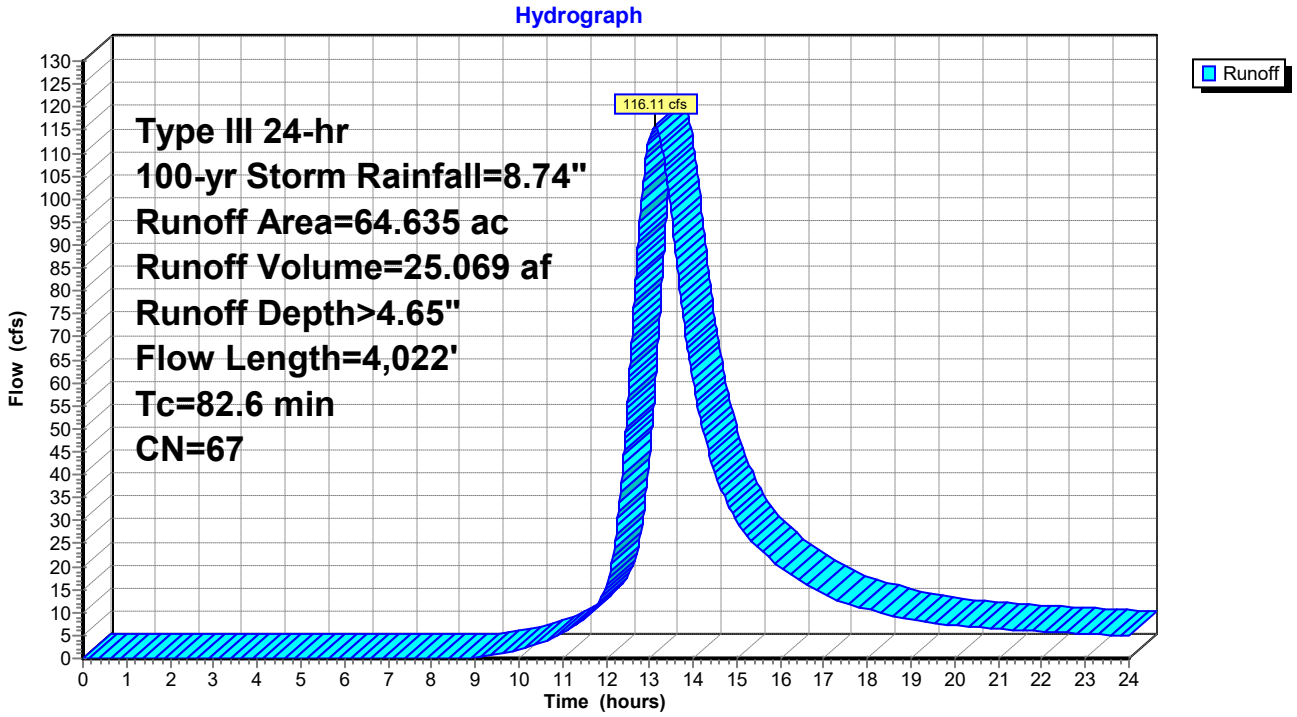
Runoff = 116.11 cfs @ 13.12 hrs, Volume= 25.069 af, Depth> 4.65"
Routed to Link 4L : POC

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	9.200	74	>75% Grass cover, Good, HSG C
	0.000	80	>75% Grass cover, Good, HSG D
	0.000	36	Woods, Fair, HSG A
	35.634	60	Woods, Fair, HSG B
	7.305	73	Woods, Fair, HSG C
	12.496	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	0.000	98	Paved parking
*	0.000	90	GRAVEL DRIVEWAY
	0.000	98	Roofs, HSG B
	0.000	98	Water Surface
	64.635	67	Weighted Average
	64.635		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.0	190	0.0130	0.08		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
12.6	110	0.0880	0.15		**Sheet Flow, BC** Woods: Light underbrush n= 0.400 P2= 3.30"
21.6	1,880	0.0840	1.45		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
6.4	1,842	0.0180	4.77	66.84	**Trap/Vee/Rect Channel Flow, DE** Bot.W=10.00' D=1.00' Z= 4.0 '/' Top.W=18.00' n= 0.035
82.6	4,022	Total			

Subcatchment 1: SMITH POND BROOK



Summary for Subcatchment 2: EAST AREA

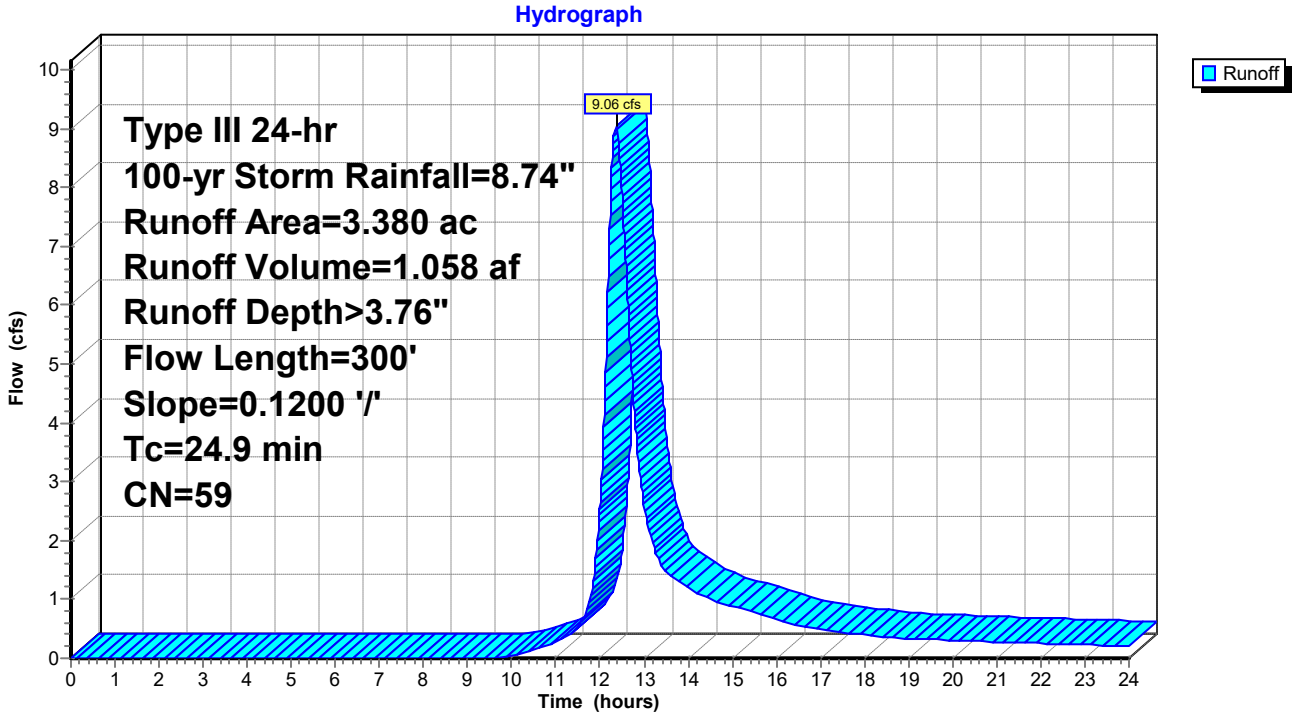
Runoff = 9.06 cfs @ 12.36 hrs, Volume= 1.058 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

Area (ac)	CN	Description
0.660	36	Woods, Fair, HSG A
1.980	60	Woods, Fair, HSG B
0.740	79	Woods, Fair, HSG D
3.380	59	Weighted Average
3.380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	300	0.1200	0.20		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"

Subcatchment 2: EAST AREA



Summary for Subcatchment 2S: TO DRIVEWAY BASIN

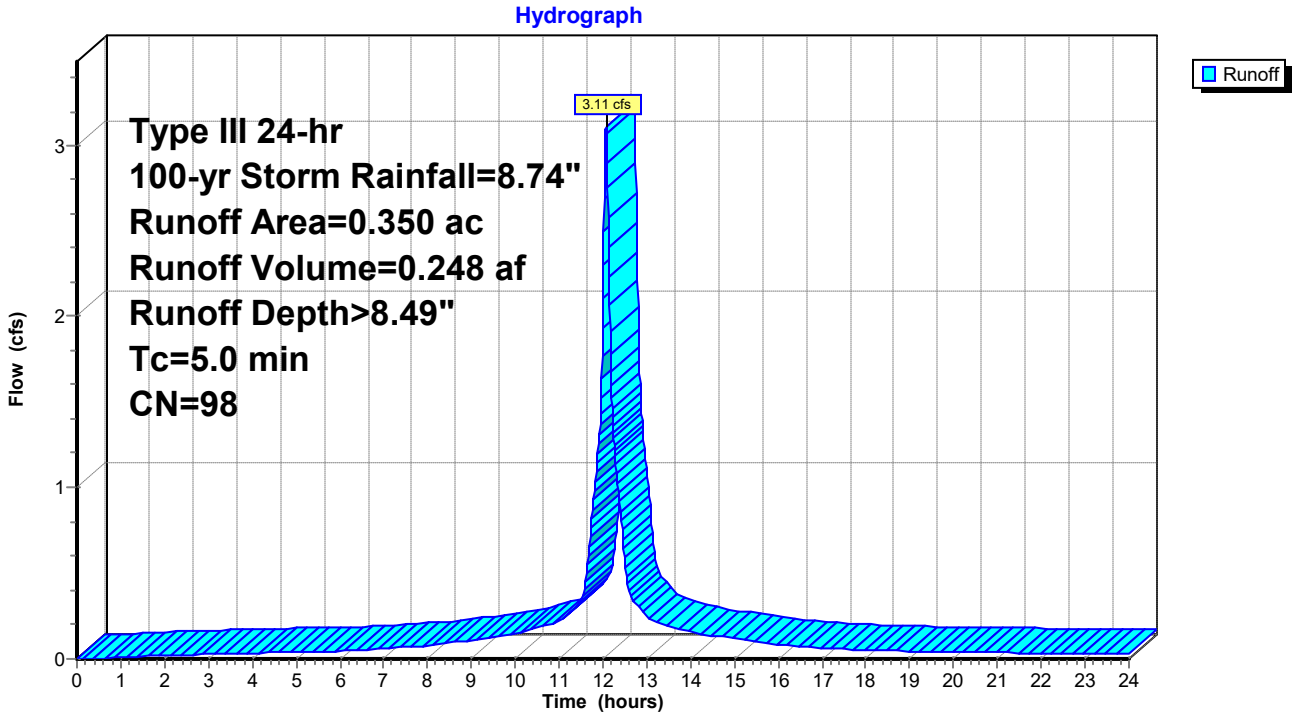
Runoff = 3.11 cfs @ 12.07 hrs, Volume= 0.248 af, Depth> 8.49"
Routed to Pond 1P : DRIVEWAY WQ BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG B
0.350		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, DIRECT**

Subcatchment 2S: TO DRIVEWAY BASIN



Summary for Subcatchment 4S: TO WEST-W WQ BASIN

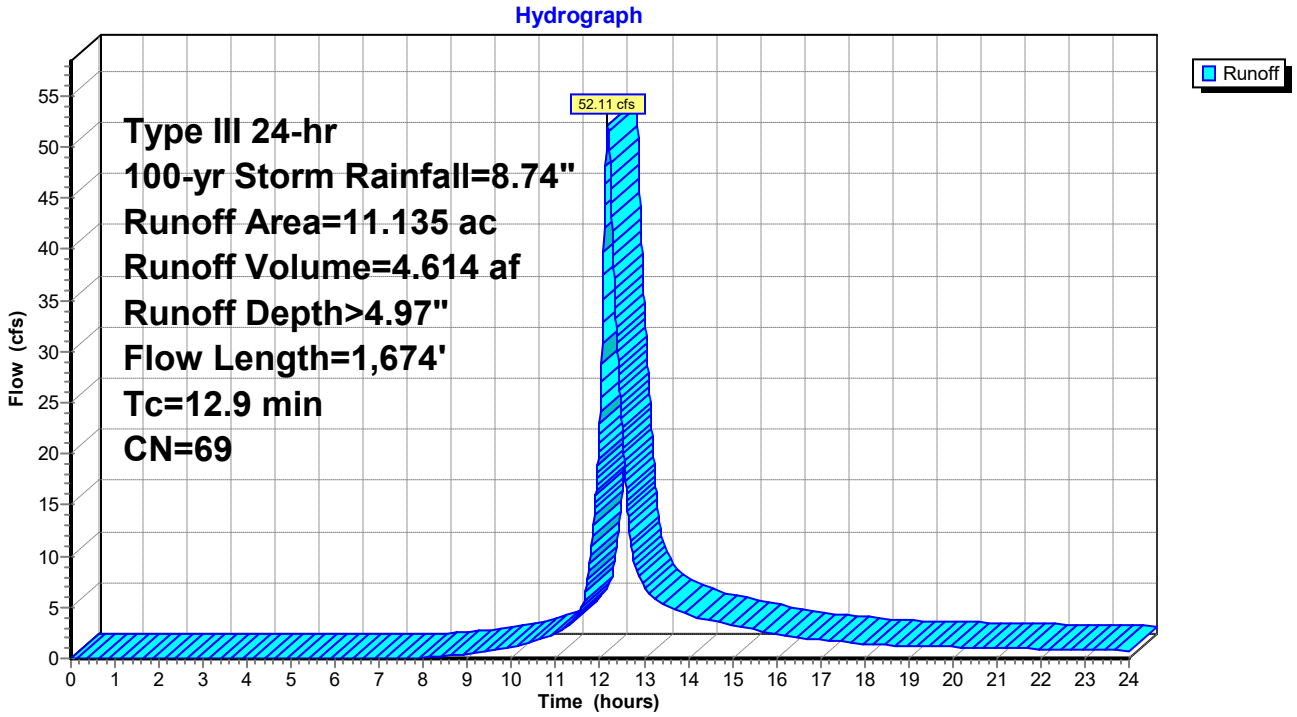
Runoff = 52.11 cfs @ 12.18 hrs, Volume= 4.614 af, Depth> 4.97"
Routed to Pond 2P : WEST-W WQ BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	5.373	61	>75% Grass cover, Good, HSG B
	1.010	74	>75% Grass cover, Good, HSG C
	0.804	80	>75% Grass cover, Good, HSG D
	0.000	36	Woods, Fair, HSG A
	0.000	60	Woods, Fair, HSG B
	3.265	73	Woods, Fair, HSG C
	0.000	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	0.000	98	Paved parking
*	0.000	90	GRAVEL DRIVEWAY
	0.683	98	Roofs, HSG B
	0.000	98	Unconnected pavement, HSG B
	0.000	98	Water Surface
	11.135	69	Weighted Average
	10.452		93.87% Pervious Area
	0.683		6.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	100	0.5000	0.29		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	200	0.5000	10.61		**Shallow Concentrated Flow, BC** Grassed Waterway Kv= 15.0 fps
6.8	1,374	0.0500	3.35		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
12.9	1,674	Total			

Subcatchment 4S: TO WEST-W WQ BASIN



Summary for Subcatchment 5S: TO SOUTH WQ BASIN

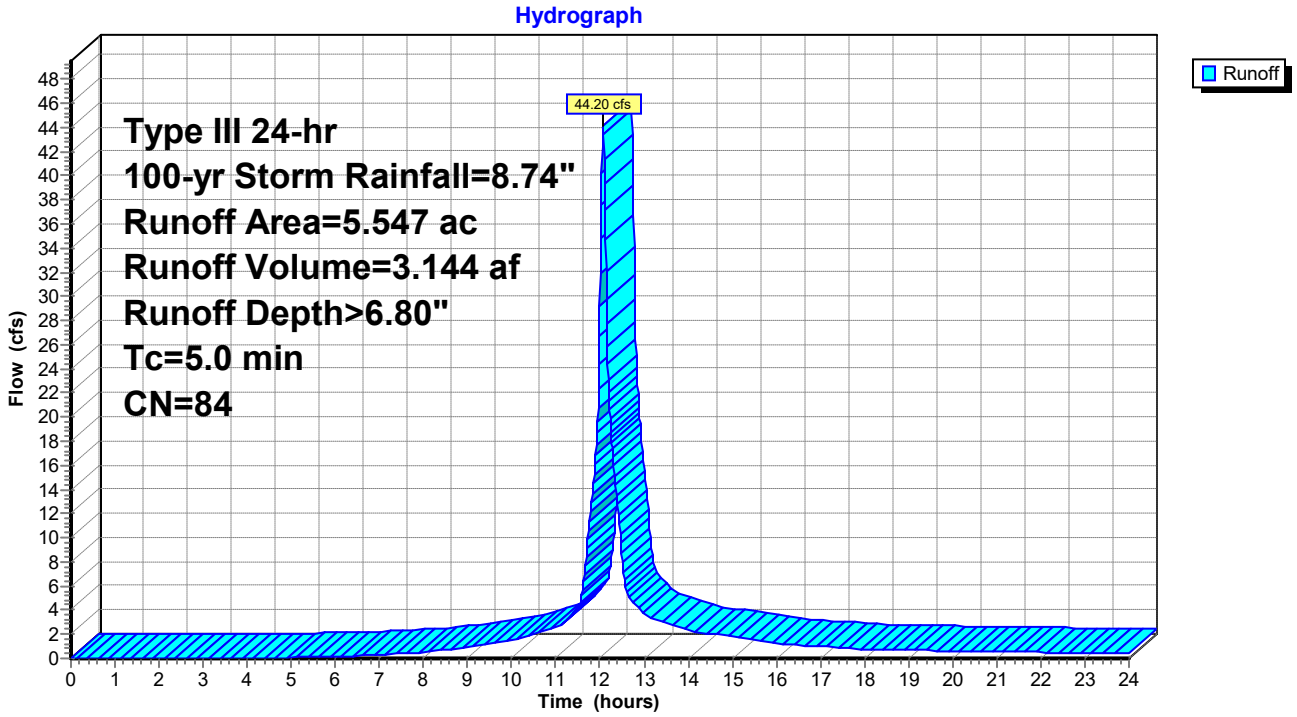
Runoff = 44.20 cfs @ 12.07 hrs, Volume= 3.144 af, Depth> 6.80"
Routed to Pond 4P : SOUTH WQ BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	0.487	74	>75% Grass cover, Good, HSG C
	3.703	80	>75% Grass cover, Good, HSG D
	0.000	36	Woods, Fair, HSG A
	0.000	60	Woods, Fair, HSG B
	0.000	73	Woods, Fair, HSG C
	0.000	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	0.645	98	Paved parking
*	0.000	90	GRAVEL DRIVEWAY
	0.657	98	Roofs, HSG B
	0.055	98	Unconnected pavement, HSG B
	0.000	98	Water Surface
	5.547	84	Weighted Average
	4.190		75.54% Pervious Area
	1.357		24.46% Impervious Area
	0.055		4.05% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, DIRECT**

Subcatchment 5S: TO SOUTH WQ BASIN



Summary for Subcatchment 6S: TO BASIN 5

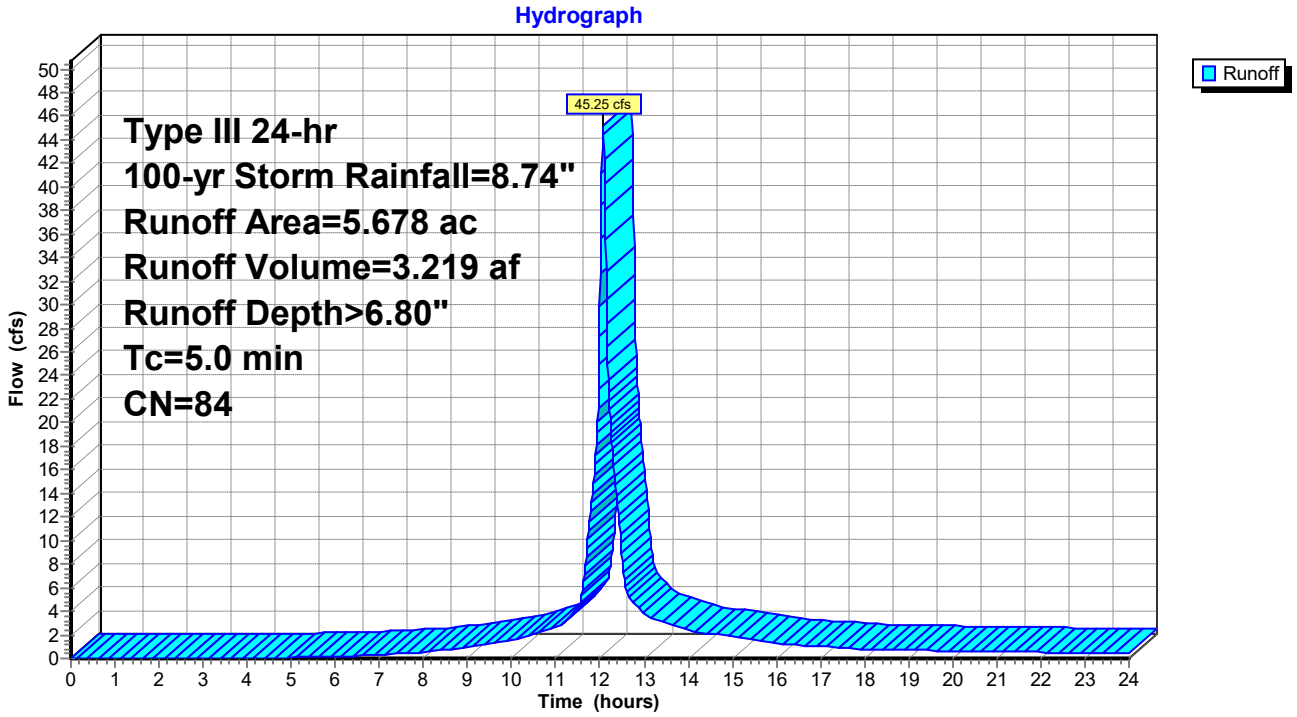
Runoff = 45.25 cfs @ 12.07 hrs, Volume= 3.219 af, Depth> 6.80"
Routed to Pond 7P : BASIN 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	0.487	74	>75% Grass cover, Good, HSG C
	3.703	80	>75% Grass cover, Good, HSG D
	0.000	36	Woods, Fair, HSG A
	0.000	60	Woods, Fair, HSG B
	0.000	73	Woods, Fair, HSG C
	0.000	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	0.750	98	Paved parking
*	0.000	90	GRAVEL DRIVEWAY
	0.717	98	Roofs, HSG B
	0.021	98	Unconnected pavement, HSG B
	0.000	98	Water Surface
	5.678	84	Weighted Average
	4.190		73.79% Pervious Area
	1.488		26.21% Impervious Area
	0.021		1.41% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, DIRECT**

Subcatchment 6S: TO BASIN 5



Summary for Subcatchment 7S: TO EAST WQ BASIN

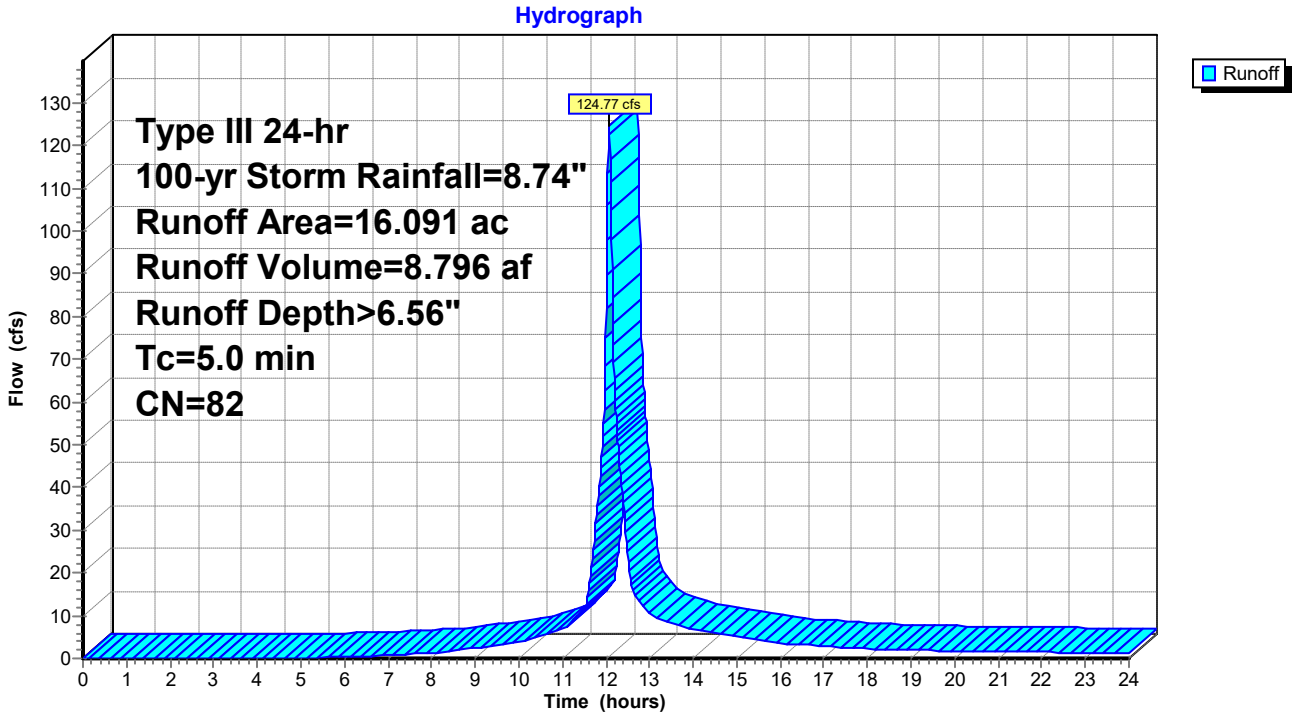
Runoff = 124.77 cfs @ 12.07 hrs, Volume= 8.796 af, Depth> 6.56"
Routed to Pond 5P : EAST WQ BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	1.217	61	>75% Grass cover, Good, HSG B
	3.188	74	>75% Grass cover, Good, HSG C
	7.243	80	>75% Grass cover, Good, HSG D
	0.000	36	Woods, Fair, HSG A
	0.000	60	Woods, Fair, HSG B
	0.000	73	Woods, Fair, HSG C
	0.000	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	1.790	98	Paved parking
*	0.098	90	GRAVEL DRIVEWAY
	2.478	98	Roofs, HSG B
	0.077	98	Unconnected pavement, HSG B
	0.000	98	Water Surface
	16.091	82	Weighted Average
	11.746		73.00% Pervious Area
	4.345		27.00% Impervious Area
	0.077		1.77% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 7S: TO EAST WQ BASIN



Summary for Subcatchment 8S: TO WEST-E WQ BASIN

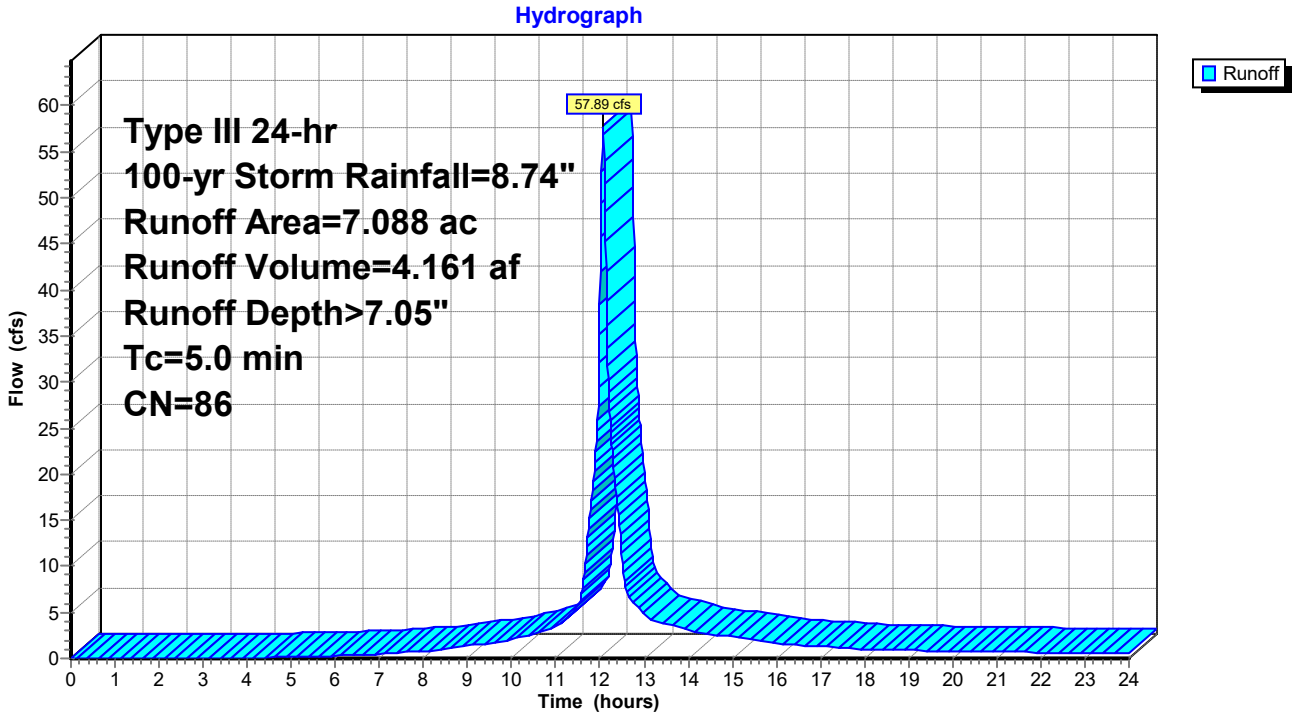
Runoff = 57.89 cfs @ 12.07 hrs, Volume= 4.161 af, Depth> 7.05"
Routed to Pond 3P : WEST-E WQ BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	0.373	61	>75% Grass cover, Good, HSG B
	1.597	74	>75% Grass cover, Good, HSG C
	1.986	80	>75% Grass cover, Good, HSG D
	0.000	36	Woods, Fair, HSG A
	0.000	60	Woods, Fair, HSG B
	0.000	73	Woods, Fair, HSG C
	0.000	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	2.452	98	Paved parking
*	0.032	90	GRAVEL DRIVEWAY
	0.616	98	Roofs, HSG B
	0.032	98	Unconnected pavement, HSG B
	0.000	98	Water Surface
	7.088	86	Weighted Average
	3.988		56.26% Pervious Area
	3.100		43.74% Impervious Area
	0.032		1.03% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 8S: TO WEST-E WQ BASIN



Summary for Subcatchment 9S: TO EAST POND

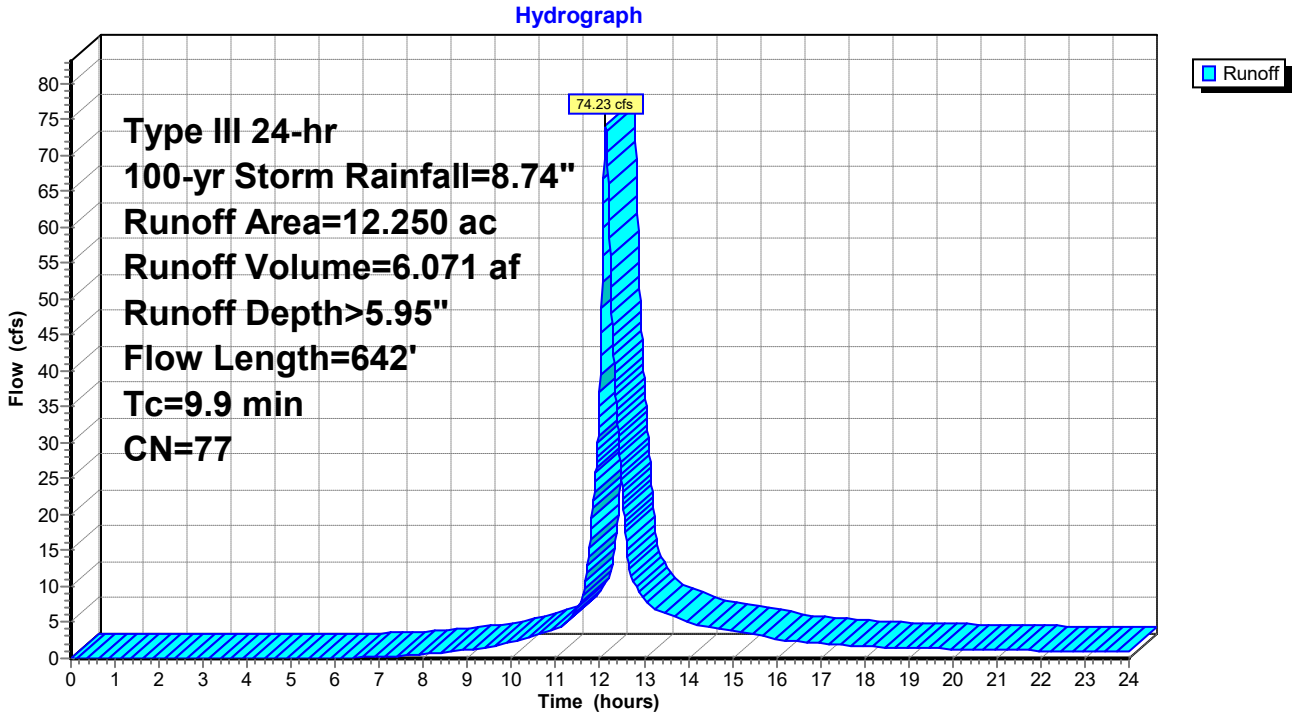
Runoff = 74.23 cfs @ 12.14 hrs, Volume= 6.071 af, Depth> 5.95"
Routed to Pond 6P : EAST POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Storm Rainfall=8.74"

	Area (ac)	CN	Description
	0.000	39	>75% Grass cover, Good, HSG A
	4.210	74	>75% Grass cover, Good, HSG C
	0.000	36	Woods, Fair, HSG A
	0.000	60	Woods, Fair, HSG B
	6.020	73	Woods, Fair, HSG C
	0.000	79	Woods, Fair, HSG D
	0.000	94	Newly graded area, HSG D
*	0.069	98	Paved parking
*	0.000	90	GRAVEL DRIVEWAY
	0.414	98	Roofs, HSG B
	1.537	98	Water Surface
	12.250	77	Weighted Average
	10.230		83.51% Pervious Area
	2.020		16.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1100	0.23		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.30"
0.2	67	0.1100	4.97		**Shallow Concentrated Flow, BC** Grassed Waterway Kv= 15.0 fps
0.1	59	0.4100	9.60		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
2.5	416	0.0800	2.83		**Shallow Concentrated Flow, DE** Nearly Bare & Untilled Kv= 10.0 fps
9.9	642	Total			

Subcatchment 9S: TO EAST POND



Summary for Pond 1P: DRIVEWAY WQ BASIN

Inflow Area = 0.350 ac,100.00% Impervious, Inflow Depth > 8.49" for 100-yr Storm event
Inflow = 3.11 cfs @ 12.07 hrs, Volume= 0.248 af
Outflow = 3.04 cfs @ 12.09 hrs, Volume= 0.240 af, Atten= 2%, Lag= 1.0 min
Primary = 3.04 cfs @ 12.09 hrs, Volume= 0.240 af
Routed to Link 4L : POC

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 373.87' @ 12.09 hrs Surf.Area= 886 sf Storage= 1,521 cf

Plug-Flow detention time= 59.3 min calculated for 0.239 af (97% of inflow)
Center-of-Mass det. time= 38.7 min (777.5 - 738.8)

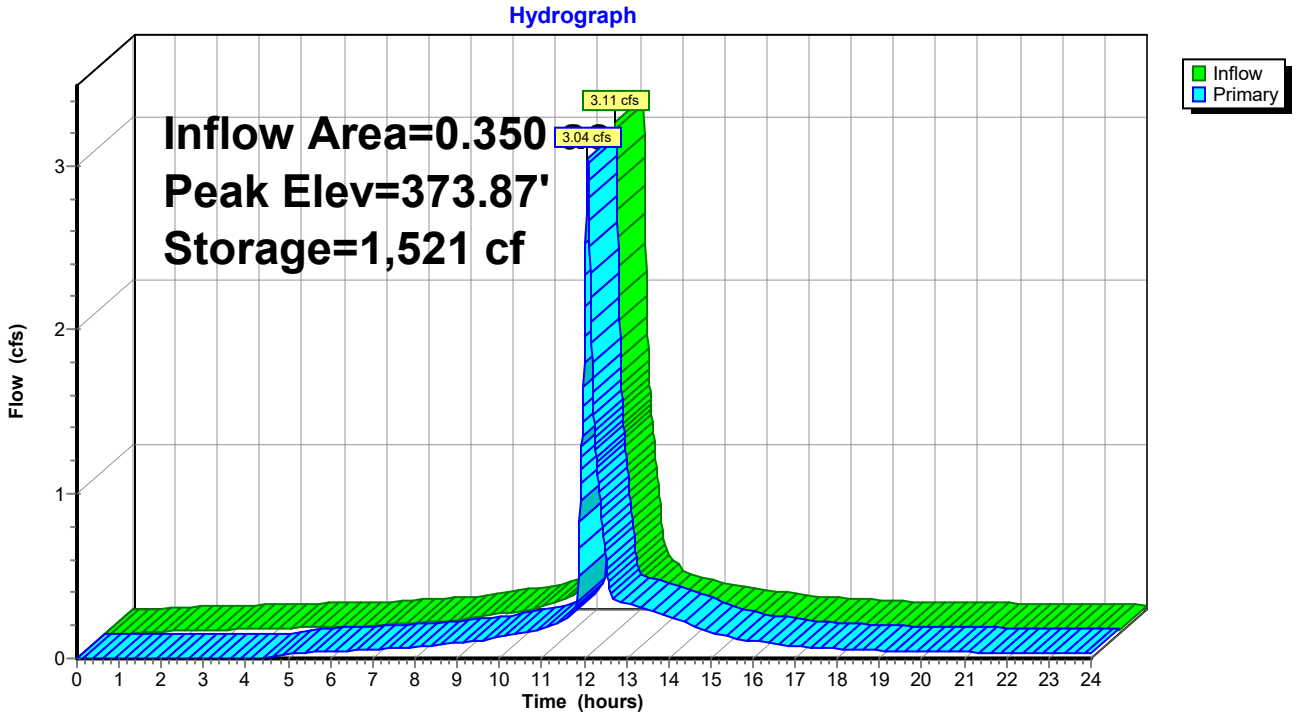
Volume	Invert	Avail.Storage	Storage Description
#1	371.20'	2,128 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
371.20	189	0	0	189
372.00	482	259	259	486
374.50	1,049	1,868	2,128	1,102

Device	Routing	Invert	Outlet Devices
#1	Primary	372.00'	**4.0" Round Culvert** L= 42.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 372.00' / 372.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Device 1	371.20'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	373.60'	**6.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59

Primary OutFlow Max=3.03 cfs @ 12.09 hrs HW=373.87' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 0.39 cfs @ 4.42 fps)
  - **2=Orifice/Grate** (Passes 0.39 cfs of 0.57 cfs potential flow)
- **3=Broad-Crested Rectangular Weir** (Weir Controls 2.65 cfs @ 1.63 fps)

Pond 1P: DRIVEWAY WQ BASIN



Stage-Area-Storage for Pond 1P: DRIVEWAY WQ BASIN

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
371.20	189	0
371.25	203	10
371.30	218	20
371.35	234	32
371.40	250	44
371.45	266	57
371.50	283	70
371.55	301	85
371.60	319	100
371.65	337	117
371.70	356	134
371.75	376	152
371.80	396	172
371.85	417	192
371.90	438	213
371.95	460	236
372.00	482	259
372.05	491	284
372.10	500	309
372.15	510	334
372.20	519	360
372.25	529	386
372.30	539	412
372.35	548	440
372.40	558	467
372.45	568	495
372.50	578	524
372.55	588	553
372.60	598	583
372.65	608	613
372.70	619	644
372.75	629	675
372.80	640	707
372.85	650	739
372.90	661	772
372.95	672	805
373.00	683	839
373.05	694	873
373.10	705	908
373.15	716	944
373.20	727	980
373.25	738	1,016
373.30	750	1,054
373.35	761	1,091
373.40	773	1,130
373.45	784	1,169
373.50	796	1,208
373.55	808	1,248
373.60	820	1,289
373.65	832	1,330
373.70	844	1,372
373.75	856	1,415
373.80	868	1,458
373.85	881	1,501
373.90	893	1,546
373.95	906	1,591
374.00	918	1,636
374.05	931	1,683
374.10	944	1,729
374.15	957	1,777
374.20	969	1,825
374.25	983	1,874
374.30	996	1,923
374.35	1,009	1,973
374.40	1,022	2,024
374.45	1,036	2,076
374.50	**1,049**	**2,128**

Summary for Pond 2P: WEST-W WQ BASIN

Inflow Area = 11.135 ac, 6.13% Impervious, Inflow Depth > 4.97" for 100-yr Storm event
Inflow = 52.11 cfs @ 12.18 hrs, Volume= 4.614 af
Outflow = 51.99 cfs @ 12.19 hrs, Volume= 4.596 af, Atten= 0%, Lag= 0.6 min
Primary = 12.69 cfs @ 12.19 hrs, Volume= 3.366 af
Routed to Pond 3P : WEST-E WQ BASIN
Secondary = 39.30 cfs @ 12.19 hrs, Volume= 1.230 af
Routed to Pond 6P : EAST POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 380.97' @ 12.19 hrs Surf.Area= 2,149 sf Storage= 6,168 cf

Plug-Flow detention time= 7.0 min calculated for 4.594 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (832.5 - 827.8)

Volume	Invert	Avail.Storage	Storage Description
#1	378.00'	6,224 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

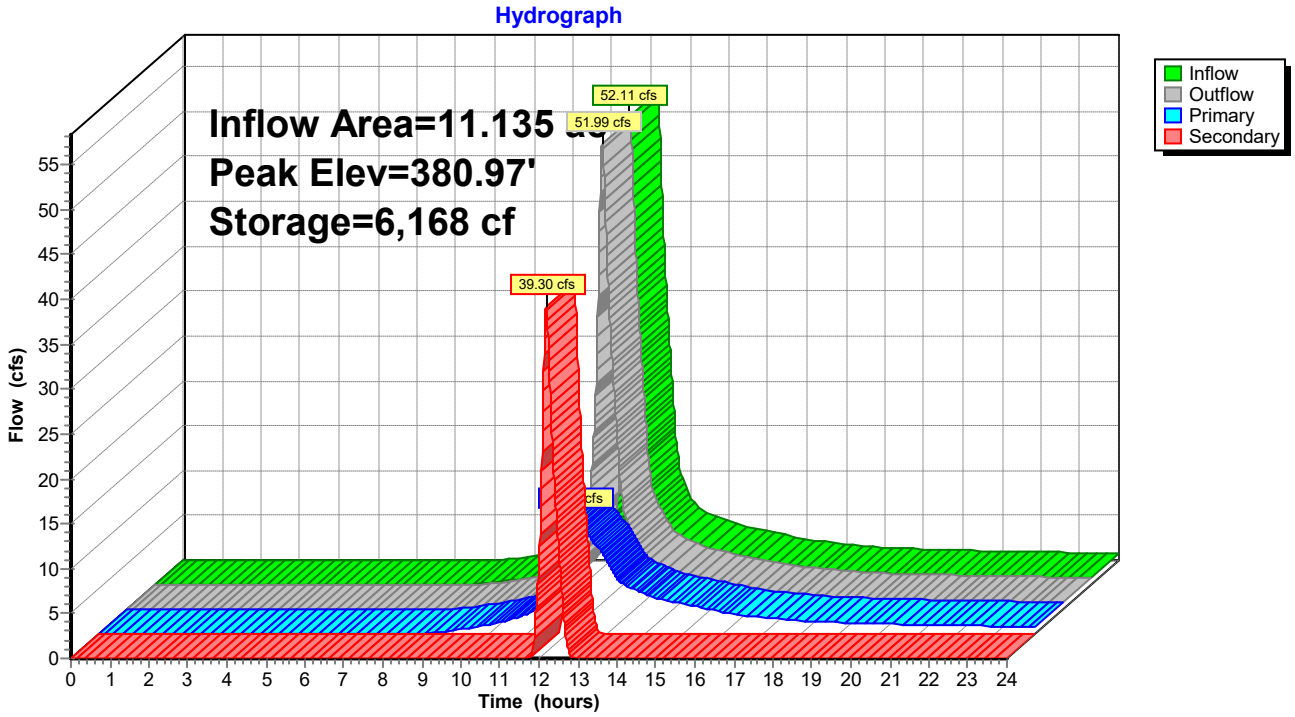
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
378.00	2,000	0	0	2,000
381.00	2,150	6,224	6,224	2,507

Device	Routing	Invert	Outlet Devices
#1	Primary	378.00'	**18.0" Round Culvert** L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 378.00' / 377.00' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	380.00'	**12.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59

Primary OutFlow Max=12.69 cfs @ 12.19 hrs HW=380.97' TW=377.83' (Dynamic Tailwater)
1=Culvert (Inlet Controls 12.69 cfs @ 7.18 fps)

Secondary OutFlow Max=39.27 cfs @ 12.19 hrs HW=380.97' TW=348.17' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 39.27 cfs @ 3.36 fps)

Pond 2P: WEST-W WQ BASIN



Stage-Area-Storage for Pond 2P: WEST-W WQ BASIN

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
378.00	2,000	0
378.05	2,002	100
378.10	2,005	200
378.15	2,007	301
378.20	2,010	401
378.25	2,012	502
378.30	2,015	602
378.35	2,017	703
378.40	2,020	804
378.45	2,022	905
378.50	2,025	1,006
378.55	2,027	1,107
378.60	2,030	1,209
378.65	2,032	1,310
378.70	2,035	1,412
378.75	2,037	1,514
378.80	2,039	1,616
378.85	2,042	1,718
378.90	2,044	1,820
378.95	2,047	1,922
379.00	2,049	2,025
379.05	2,052	2,127
379.10	2,054	2,230
379.15	2,057	2,333
379.20	2,059	2,436
379.25	2,062	2,539
379.30	2,064	2,642
379.35	2,067	2,745
379.40	2,069	2,848
379.45	2,072	2,952
379.50	2,074	3,056
379.55	2,077	3,159
379.60	2,079	3,263
379.65	2,082	3,367
379.70	2,084	3,471
379.75	2,087	3,576
379.80	2,089	3,680
379.85	2,092	3,785
379.90	2,094	3,889
379.95	2,097	3,994
380.00	2,099	4,099
380.05	2,102	4,204
380.10	2,104	4,309
380.15	2,107	4,414
380.20	2,109	4,520
380.25	2,112	4,625
380.30	2,115	4,731
380.35	2,117	4,837
380.40	2,120	4,943
380.45	2,122	5,049
380.50	2,125	5,155
380.55	2,127	5,261
380.60	2,130	5,368
380.65	2,132	5,474
380.70	2,135	5,581
380.75	2,137	5,688
380.80	2,140	5,795
380.85	2,142	5,902
380.90	2,145	6,009
380.95	2,147	6,116
381.00	**2,150**	**6,224**

Summary for Pond 3P: WEST-E WQ BASIN

Inflow Area = 18.223 ac, 20.76% Impervious, Inflow Depth > 4.96" for 100-yr Storm event
Inflow = 69.68 cfs @ 12.07 hrs, Volume= 7.528 af
Outflow = 46.76 cfs @ 12.17 hrs, Volume= 7.052 af, Atten= 33%, Lag= 5.8 min
Primary = 46.76 cfs @ 12.17 hrs, Volume= 7.052 af
Routed to Pond 6P : EAST POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 377.84' @ 12.17 hrs Surf.Area= 21,577 sf Storage= 85,771 cf

Plug-Flow detention time= 112.9 min calculated for 7.049 af (94% of inflow)
Center-of-Mass det. time= 79.2 min (900.4 - 821.2)

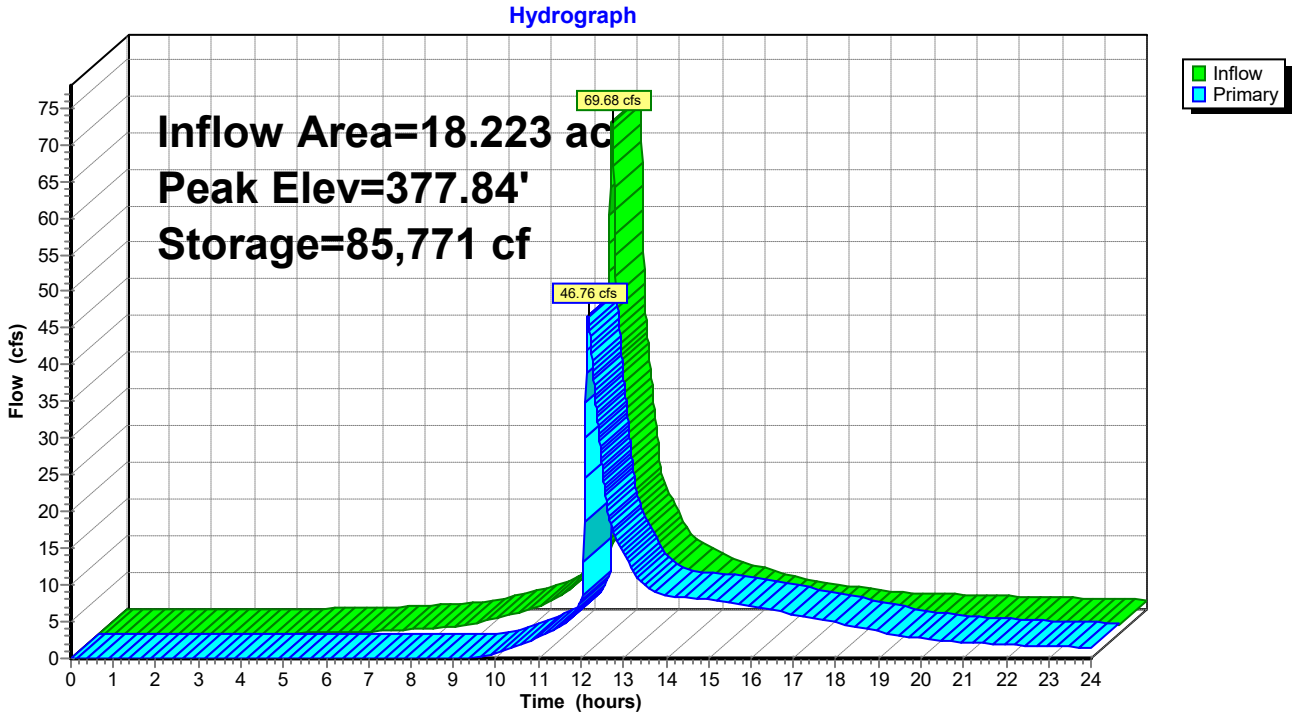
Volume	Invert	Avail.Storage	Storage Description
#1	373.50'	100,298 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
373.50	17,700	0	0	17,700
374.00	18,200	8,975	8,975	18,254
376.00	20,200	38,383	47,357	20,482
378.00	21,700	41,891	89,248	22,299
378.50	22,500	11,049	100,298	23,141

Device	Routing	Invert	Outlet Devices
#1	Primary	374.00'	**15.0" Round Culvert** L= 40.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 374.00' / 372.30' S= 0.0425 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Primary	377.30'	**30.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59

Primary OutFlow Max=46.75 cfs @ 12.17 hrs HW=377.84' TW=348.02' (Dynamic Tailwater)
1=Culvert (Inlet Controls 9.35 cfs @ 7.62 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 37.40 cfs @ 2.31 fps)

Pond 3P: WEST-E WQ BASIN



Stage-Area-Storage for Pond 3P: WEST-E WQ BASIN

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
373.50	17,700	0
373.55	17,750	886
373.60	17,799	1,775
373.65	17,849	2,666
373.70	17,899	3,560
373.75	17,949	4,456
373.80	17,999	5,355
373.85	18,049	6,256
373.90	18,099	7,160
373.95	18,150	8,066
374.00	18,200	8,975
374.05	18,249	9,886
374.10	18,298	10,800
374.15	18,346	11,716
374.20	18,395	12,634
374.25	18,444	13,555
374.30	18,493	14,479
374.35	18,542	15,405
374.40	18,592	16,333
374.45	18,641	17,264
374.50	18,690	18,197
374.55	18,740	19,133
374.60	18,789	20,071
374.65	18,839	21,012
374.70	18,888	21,955
374.75	18,938	22,900
374.80	18,987	23,849
374.85	19,037	24,799
374.90	19,087	25,752
374.95	19,137	26,708
375.00	19,187	27,666
375.05	19,237	28,627
375.10	19,287	29,590
375.15	19,337	30,555
375.20	19,387	31,523
375.25	19,438	32,494
375.30	19,488	33,467
375.35	19,539	34,443
375.40	19,589	35,421
375.45	19,640	36,402
375.50	19,690	37,385
375.55	19,741	38,371
375.60	19,792	39,359
375.65	19,842	40,350
375.70	19,893	41,343
375.75	19,944	42,339
375.80	19,995	43,338
375.85	20,046	44,339
375.90	20,098	45,342
375.95	20,149	46,349
376.00	20,200	47,357
376.05	20,237	48,368
376.10	20,274	49,381
376.15	20,311	50,396
376.20	20,348	51,412
376.25	20,385	52,430
376.30	20,422	53,451
376.35	20,459	54,473
376.40	20,496	55,496
376.45	20,533	56,522
376.50	20,570	57,550
376.55	20,607	58,579
376.60	20,644	59,610
376.65	20,682	60,644
376.70	20,719	61,679
376.75	20,756	62,715
376.80	20,794	63,754
376.85	20,831	64,795
376.90	20,868	65,837
376.95	20,906	66,882
377.00	20,943	67,928
377.05	20,981	68,976
377.10	21,018	70,026
377.15	21,056	71,078
377.20	21,094	72,132
377.25	21,131	73,187
377.30	21,169	74,245
377.35	21,207	75,304
377.40	21,244	76,365
377.45	21,282	77,428
377.50	21,320	78,494
377.55	21,358	79,560
377.60	21,396	80,629
377.65	21,434	81,700
377.70	21,472	82,773
377.75	21,510	83,847
377.80	21,548	84,924
377.85	21,586	86,002
377.90	21,624	87,082
377.95	21,662	88,164
378.00	21,700	89,248
378.05	21,779	90,335
378.10	21,859	91,426
378.15	21,938	92,521
378.20	22,018	93,620
378.25	22,098	94,723
378.30	22,178	95,830
378.35	22,258	96,941
378.40	22,339	98,056
378.45	22,419	99,175
378.50	**22,500**	**100,298**

Summary for Pond 4P: SOUTH WQ BASIN

Inflow Area = 11.225 ac, 25.35% Impervious, Inflow Depth > 6.56" for 100-yr Storm event
Inflow = 76.34 cfs @ 12.08 hrs, Volume= 6.140 af
Outflow = 74.69 cfs @ 12.10 hrs, Volume= 5.396 af, Atten= 2%, Lag= 1.3 min
Primary = 74.69 cfs @ 12.10 hrs, Volume= 5.396 af
Routed to Pond 6P : EAST POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 376.84' @ 12.10 hrs Surf.Area= 12,280 sf Storage= 40,309 cf

Plug-Flow detention time= 83.9 min calculated for 5.396 af (88% of inflow)
Center-of-Mass det. time= 29.3 min (830.5 - 801.2)

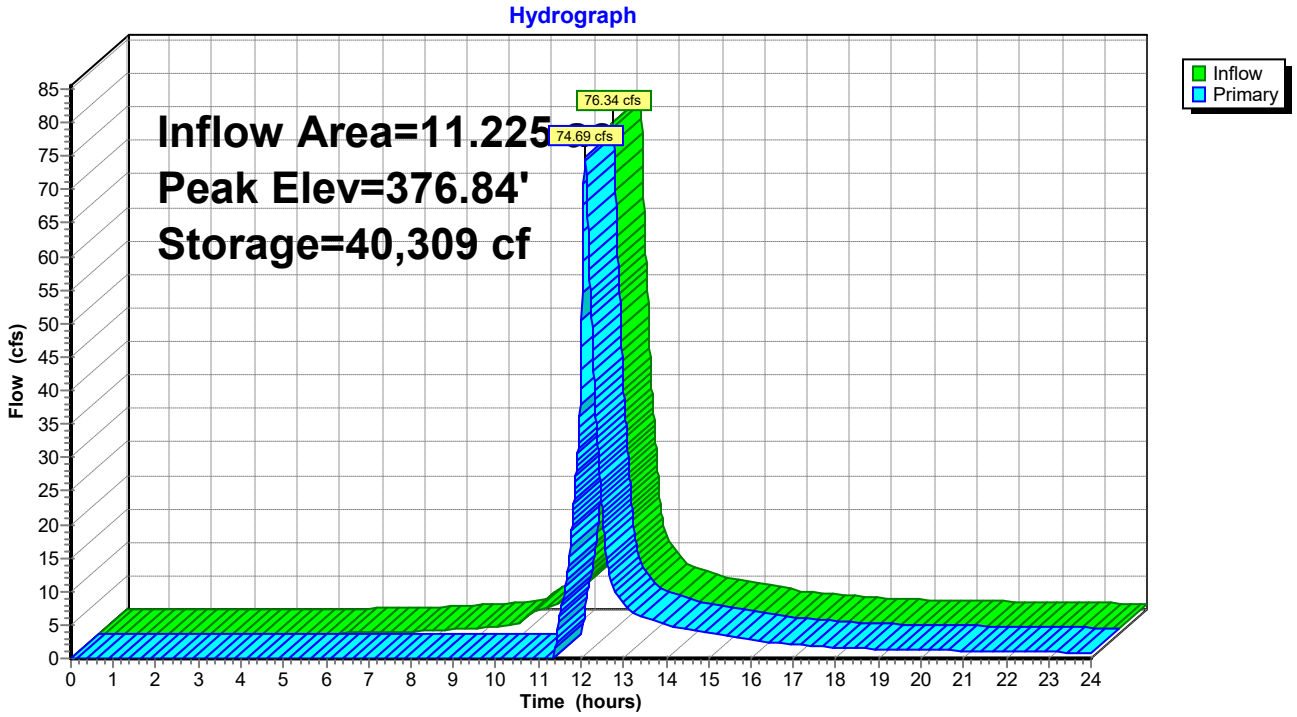
Volume	Invert	Avail.Storage	Storage Description
#1	373.00'	42,251 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
373.00	8,432	0	0	8,432
374.00	9,596	9,008	9,008	9,644
376.00	11,656	21,219	30,226	11,829
377.00	12,398	12,025	42,251	12,667

Device	Routing	Invert	Outlet Devices
#1	Primary	376.15'	**40.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59

Primary OutFlow Max=74.65 cfs @ 12.10 hrs HW=376.84' TW=347.30' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 74.65 cfs @ 2.70 fps)

Pond 4P: SOUTH WQ BASIN



Stage-Area-Storage for Pond 4P: SOUTH WQ BASIN

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
373.00	8,432	0
373.05	8,488	423
373.10	8,545	849
373.15	8,602	1,278
373.20	8,659	1,709
373.25	8,716	2,143
373.30	8,773	2,581
373.35	8,831	3,021
373.40	8,889	3,464
373.45	8,946	3,910
373.50	9,005	4,358
373.55	9,063	4,810
373.60	9,121	5,265
373.65	9,180	5,722
373.70	9,239	6,183
373.75	9,298	6,646
373.80	9,357	7,112
373.85	9,417	7,582
373.90	9,476	8,054
373.95	9,536	8,529
374.00	9,596	9,008
374.05	9,645	9,489
374.10	9,694	9,972
374.15	9,744	10,458
374.20	9,793	10,947
374.25	9,843	11,437
374.30	9,892	11,931
374.35	9,942	12,427
374.40	9,992	12,925
374.45	10,042	13,426
374.50	10,092	13,929
374.55	10,143	14,435
374.60	10,193	14,944
374.65	10,244	15,454
374.70	10,294	15,968
374.75	10,345	16,484
374.80	10,396	17,002
374.85	10,447	17,523
374.90	10,498	18,047
374.95	10,550	18,573
375.00	10,601	19,102
375.05	10,653	19,633
375.10	10,704	20,167
375.15	10,756	20,704
375.20	10,808	21,243
375.25	10,860	21,785
375.30	10,912	22,329
375.35	10,965	22,876
375.40	11,017	23,425
375.45	11,070	23,978
375.50	11,122	24,532
375.55	11,175	25,090
375.60	11,228	25,650
375.65	11,281	26,213
375.70	11,334	26,778
375.75	11,388	27,346
375.80	11,441	27,917
375.85	11,495	28,490
375.90	11,548	29,066
375.95	11,602	29,645
376.00	11,656	30,226
376.05	11,693	30,810
376.10	11,729	31,396
376.15	11,766	31,983
376.20	11,803	32,572
376.25	11,839	33,163
376.30	11,876	33,756
376.35	11,913	34,351
376.40	11,950	34,947
376.45	11,987	35,546
376.50	12,024	36,146
376.55	12,061	36,748
376.60	12,098	37,352
376.65	12,136	37,958
376.70	12,173	38,566
376.75	12,210	39,175
376.80	12,248	39,787
376.85	12,285	40,400
376.90	12,323	41,015
376.95	12,360	41,633
377.00	**12,398**	**42,251**

Summary for Pond 5P: EAST WQ BASIN

Inflow Area = 16.091 ac, 27.00% Impervious, Inflow Depth > 6.56" for 100-yr Storm event
Inflow = 124.77 cfs @ 12.07 hrs, Volume= 8.796 af
Outflow = 114.42 cfs @ 12.10 hrs, Volume= 8.514 af, Atten= 8%, Lag= 2.0 min
Primary = 64.02 cfs @ 12.10 hrs, Volume= 2.167 af
Routed to Link 4L : POC
Secondary = 50.40 cfs @ 12.10 hrs, Volume= 6.347 af
Routed to Pond 6P : EAST POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 381.48' @ 12.10 hrs Surf.Area= 7,985 sf Storage= 29,022 cf

Plug-Flow detention time= 38.9 min calculated for 8.514 af (97% of inflow)
Center-of-Mass det. time= 20.1 min (813.7 - 793.5)

Volume	Invert	Avail.Storage	Storage Description
#1	377.00'	29,196 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

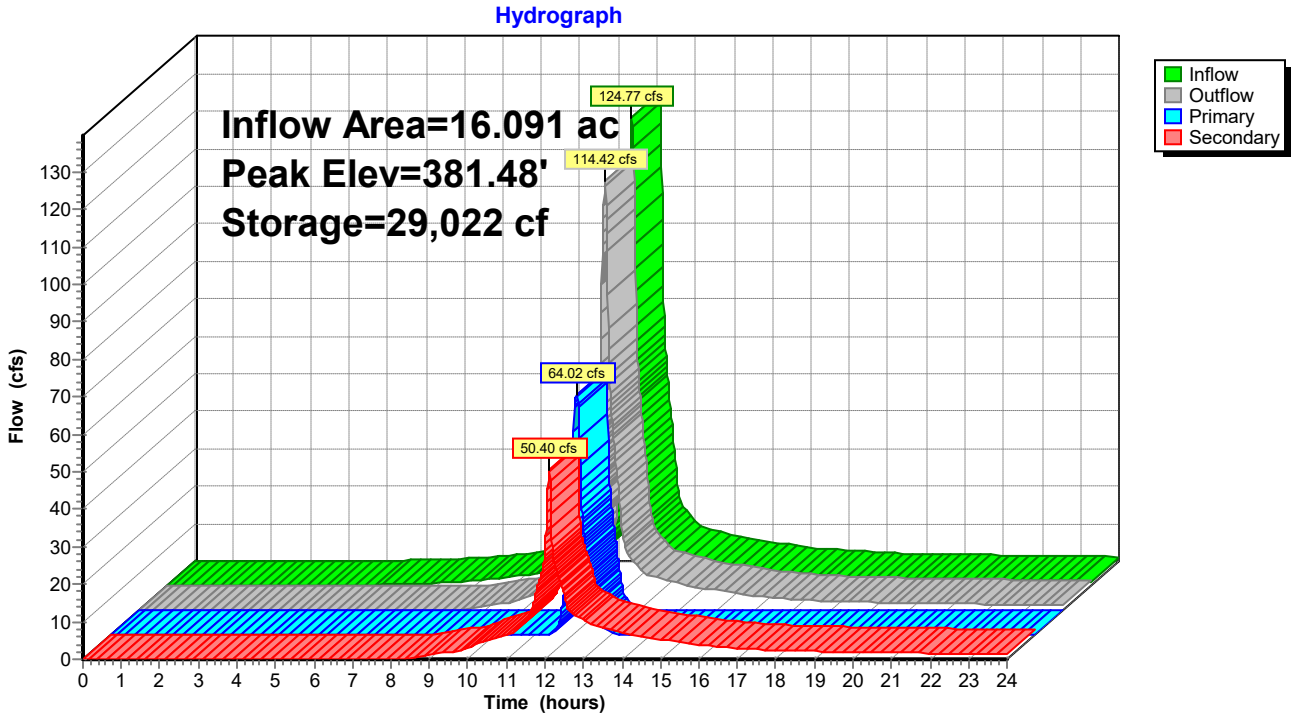
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
377.00	4,750	0	0	4,750
378.00	5,750	5,242	5,242	5,782
381.50	8,000	23,954	29,196	8,255

Device	Routing	Invert	Outlet Devices
#1	Primary	362.70'	**30.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 362.70' / 354.00' S= 0.0870 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	376.00'	**24.0" Round Culvert X 2.00** L= 140.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 376.00' / 362.70' S= 0.0950 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	380.15'	**16.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 2	380.50'	**2.5" x 2.5" Horiz. Orifice/Grate X 21.00 columns** X 7 rows C= 0.600 in 60.0" x 24.0" Grate (64% open area) Limited to weir flow at low heads
#5	Secondary	379.60'	**5.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59
#6	Secondary	378.50'	**10.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 378.50' / 376.00' S= 0.1250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=64.00 cfs @ 12.10 hrs HW=381.48' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 64.00 cfs of 98.94 cfs potential flow)
└─**2=Culvert** (Inlet Controls 64.00 cfs @ 10.19 fps)
└─**3=Sharp-Crested Rectangular Weir** (Passes < 78.48 cfs potential flow)
└─**4=Orifice/Grate** (Passes < 30.33 cfs potential flow)

Secondary OutFlow Max=50.29 cfs @ 12.10 hrs HW=381.48' TW=347.34' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 46.09 cfs @ 4.92 fps)
└─**6=Culvert** (Inlet Controls 4.20 cfs @ 7.70 fps)

Pond 5P: EAST WQ BASIN



Stage-Area-Storage for Pond 5P: EAST WQ BASIN

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
377.00	4,750	0
377.05	4,798	239
377.10	4,846	480
377.15	4,894	723
377.20	4,942	969
377.25	4,991	1,218
377.30	5,040	1,468
377.35	5,089	1,722
377.40	5,139	1,977
377.45	5,188	2,235
377.50	5,238	2,496
377.55	5,288	2,759
377.60	5,339	3,025
377.65	5,389	3,293
377.70	5,440	3,564
377.75	5,491	3,837
377.80	5,542	4,113
377.85	5,594	4,391
377.90	5,646	4,672
377.95	5,698	4,956
378.00	5,750	5,242
378.05	5,780	5,530
378.10	5,809	5,820
378.15	5,839	6,111
378.20	5,869	6,404
378.25	5,898	6,698
378.30	5,928	6,994
378.35	5,958	7,291
378.40	5,988	7,590
378.45	6,019	7,890
378.50	6,049	8,191
378.55	6,079	8,495
378.60	6,109	8,799
378.65	6,140	9,106
378.70	6,170	9,413
378.75	6,201	9,723
378.80	6,232	10,033
378.85	6,262	10,346
378.90	6,293	10,660
378.95	6,324	10,975
379.00	6,355	11,292
379.05	6,386	11,611
379.10	6,417	11,931
379.15	6,448	12,252
379.20	6,480	12,575
379.25	6,511	12,900
379.30	6,542	13,227
379.35	6,574	13,555
379.40	6,606	13,884
379.45	6,637	14,215
379.50	6,669	14,548
379.55	6,701	14,882
379.60	6,733	15,218
379.65	6,765	15,555
379.70	6,797	15,894
379.75	6,829	16,235
379.80	6,861	16,577
379.85	6,893	16,921
379.90	6,925	17,266
379.95	6,958	17,613
380.00	6,990	17,962
380.05	7,023	18,313
380.10	7,056	18,664
380.15	7,088	19,018
380.20	7,121	19,373
380.25	7,154	19,730
380.30	7,187	20,089
380.35	7,220	20,449
380.40	7,253	20,811
380.45	7,286	21,174
380.50	7,319	21,539
380.55	7,353	21,906
380.60	7,386	22,275
380.65	7,419	22,645
380.70	7,453	23,017
380.75	7,487	23,390
380.80	7,520	23,765
380.85	7,554	24,142
380.90	7,588	24,521
380.95	7,622	24,901
381.00	7,656	25,283
381.05	7,690	25,666
381.10	7,724	26,052
381.15	7,758	26,439
381.20	7,793	26,828
381.25	7,827	27,218
381.30	7,861	27,610
381.35	7,896	28,004
381.40	7,931	28,400
381.45	7,965	28,797
381.50	**8,000**	**29,196**

Summary for Pond 6P: EAST POND

Inflow Area = 41.698 ac, 20.74% Impervious, Inflow Depth > 7.51" for 100-yr Storm event
Inflow = 270.05 cfs @ 12.13 hrs, Volume= 26.097 af
Outflow = 59.13 cfs @ 12.68 hrs, Volume= 24.518 af, Atten= 78%, Lag= 32.5 min
Primary = 59.13 cfs @ 12.68 hrs, Volume= 24.518 af
Routed to Link 4L : POC

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 349.68' @ 12.68 hrs Surf.Area= 99,529 sf Storage= 424,623 cf

Plug-Flow detention time= 124.1 min calculated for 24.518 af (94% of inflow)
Center-of-Mass det. time= 92.8 min (935.7 - 842.9)

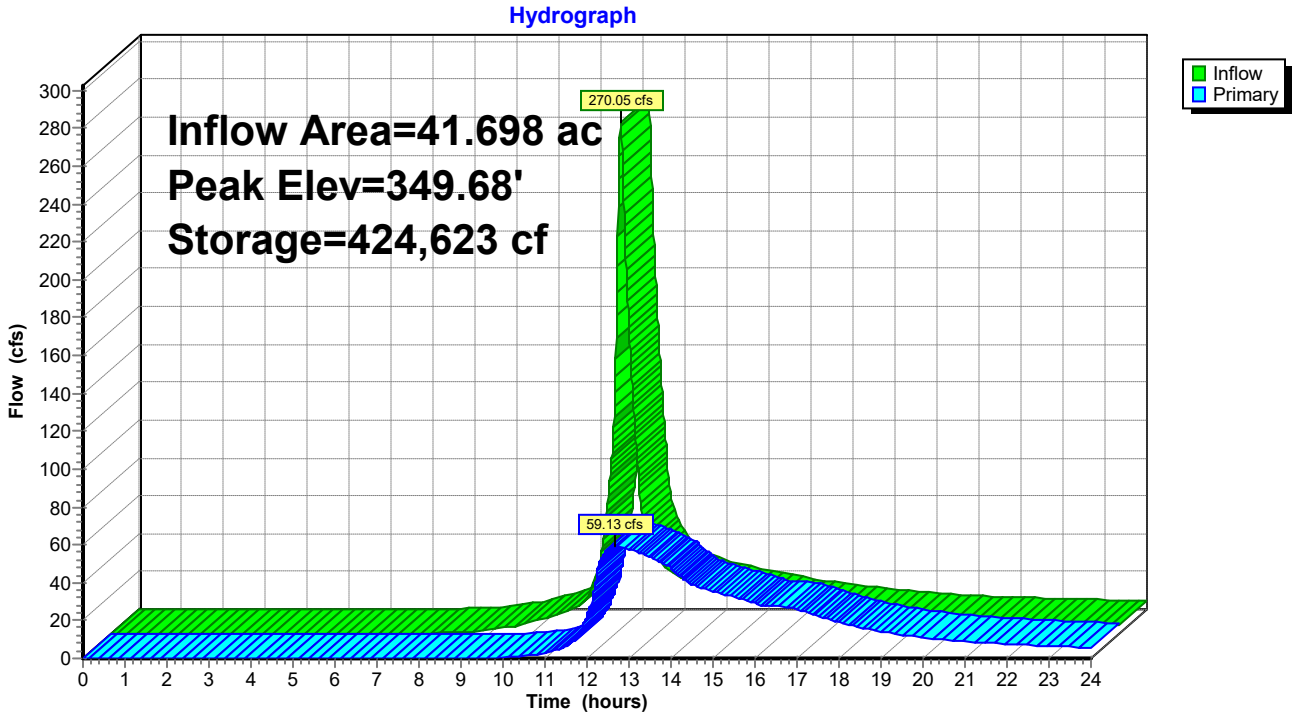
Volume	Invert	Avail.Storage	Storage Description
#1	344.21'	587,132 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
344.21	64,107	0	0	64,107
346.00	70,422	120,359	120,359	70,633
348.00	81,904	152,182	272,541	82,280
350.00	103,093	184,591	457,132	103,578
351.20	113,660	130,000	587,132	114,237

Device	Routing	Invert	Outlet Devices
#1	Primary	344.21'	**44.0" W x 27.0" H, R=36.0" Elliptical Culvert** L= 102.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 344.21' / 343.93' S= 0.0027 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 6.62 sf
#2	Primary	343.00'	**18.0" Round Culvert** L= 102.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 343.00' / 342.50' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	344.21'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	348.20'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=59.13 cfs @ 12.68 hrs HW=349.68' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 46.62 cfs @ 7.05 fps)
- **2=Culvert** (Passes 12.51 cfs of 17.90 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 2.16 cfs @ 11.00 fps)
  - **4=Orifice/Grate** (Orifice Controls 10.35 cfs @ 5.86 fps)

Pond 6P: EAST POND



Stage-Area-Storage for Pond 6P: EAST POND

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
344.21	64,107	0
344.31	64,452	6,428
344.41	64,798	12,890
344.51	65,145	19,388
344.61	65,492	25,919
344.71	65,841	32,486
344.81	66,191	39,088
344.91	66,541	45,724
345.01	66,893	52,396
345.11	67,245	59,103
345.21	67,598	65,845
345.31	67,953	72,623
345.41	68,308	79,436
345.51	68,664	86,284
345.61	69,021	93,168
345.71	69,379	100,088
345.81	69,738	107,044
345.91	70,097	114,036
346.01	70,477	121,064
346.11	71,031	128,139
346.21	71,587	135,270
346.31	72,145	142,457
346.41	72,705	149,699
346.51	73,268	156,998
346.61	73,832	164,353
346.71	74,399	171,764
346.81	74,968	179,232
346.91	75,539	186,758
347.01	76,112	194,340
347.11	76,687	201,980
347.21	77,265	209,678
347.31	77,845	217,433
347.41	78,427	225,247
347.51	79,011	233,119
347.61	79,597	241,049
347.71	80,185	249,038
347.81	80,776	257,086
347.91	81,369	265,194
348.01	82,004	273,360
348.11	83,006	281,611
348.21	84,014	289,962
348.31	85,029	298,414
348.41	86,049	306,968
348.51	87,076	315,624
348.61	88,109	324,383
348.71	89,147	333,246
348.81	90,192	342,213
348.91	91,243	351,284
349.01	92,300	360,462
349.11	93,363	369,745
349.21	94,432	379,134
349.31	95,508	388,631
349.41	96,589	398,236
349.51	97,676	407,949
349.61	98,770	417,772
349.71	99,870	427,704
349.81	100,975	437,746
349.91	102,087	447,899
350.01	103,179	458,163
350.11	104,040	468,524
350.21	104,905	478,971
350.31	105,773	489,505
350.41	106,645	500,126
350.51	107,521	510,835
350.61	108,400	521,631
350.71	109,283	532,515
350.81	110,169	543,487
350.91	111,059	554,549
351.01	111,953	565,699
351.11	**112,850**	**576,939**

Summary for Pond 7P: BASIN 5

Inflow Area = 5.678 ac, 26.21% Impervious, Inflow Depth > 6.80" for 100-yr Storm event
Inflow = 45.25 cfs @ 12.07 hrs, Volume= 3.219 af
Outflow = 34.14 cfs @ 12.14 hrs, Volume= 2.996 af, Atten= 25%, Lag= 3.8 min
Primary = 34.14 cfs @ 12.14 hrs, Volume= 2.996 af
Routed to Pond 4P : SOUTH WQ BASIN

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 424.39' @ 12.14 hrs Surf.Area= 16,040 sf Storage= 19,923 cf

Plug-Flow detention time= 62.3 min calculated for 2.994 af (93% of inflow)
Center-of-Mass det. time= 25.9 min (814.5 - 788.6)

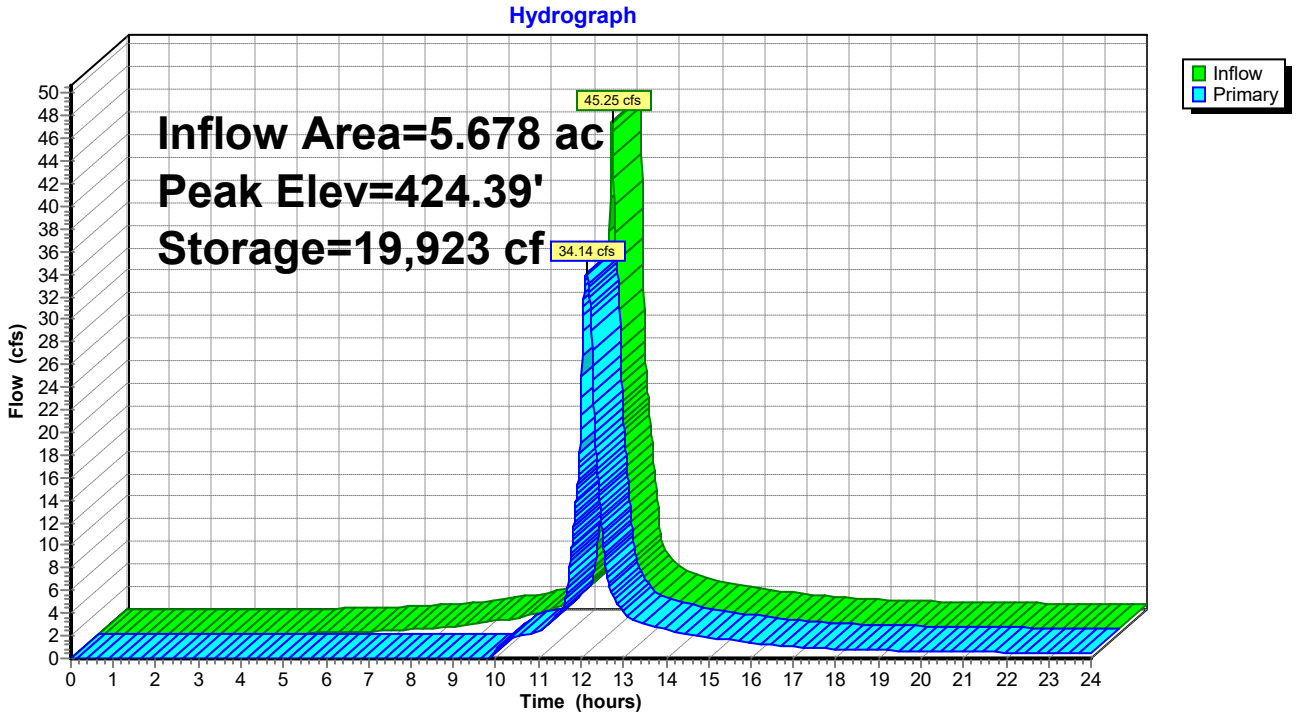
Volume	Invert	Avail.Storage	Storage Description
#1	422.00'	60,921 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
422.00	3,129	0	0
424.00	11,396	14,525	14,525
426.00	35,000	46,396	60,921

Device	Routing	Invert	Outlet Devices
#1	Primary	423.50'	**1.5" x 3.0" Horiz. Orifice/Grate X 12.00 columns** X 20 rows C= 0.600 in 24.0" x 72.0" Grate (63% open area) Limited to weir flow at low heads
#2	Primary	425.00'	**30.0' long (Profile 26) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.06 3.13 3.13

Primary OutFlow Max=34.12 cfs @ 12.14 hrs HW=424.39' TW=376.82' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 34.12 cfs @ 4.55 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: BASIN 5



Stage-Area-Storage for Pond 7P: BASIN 5

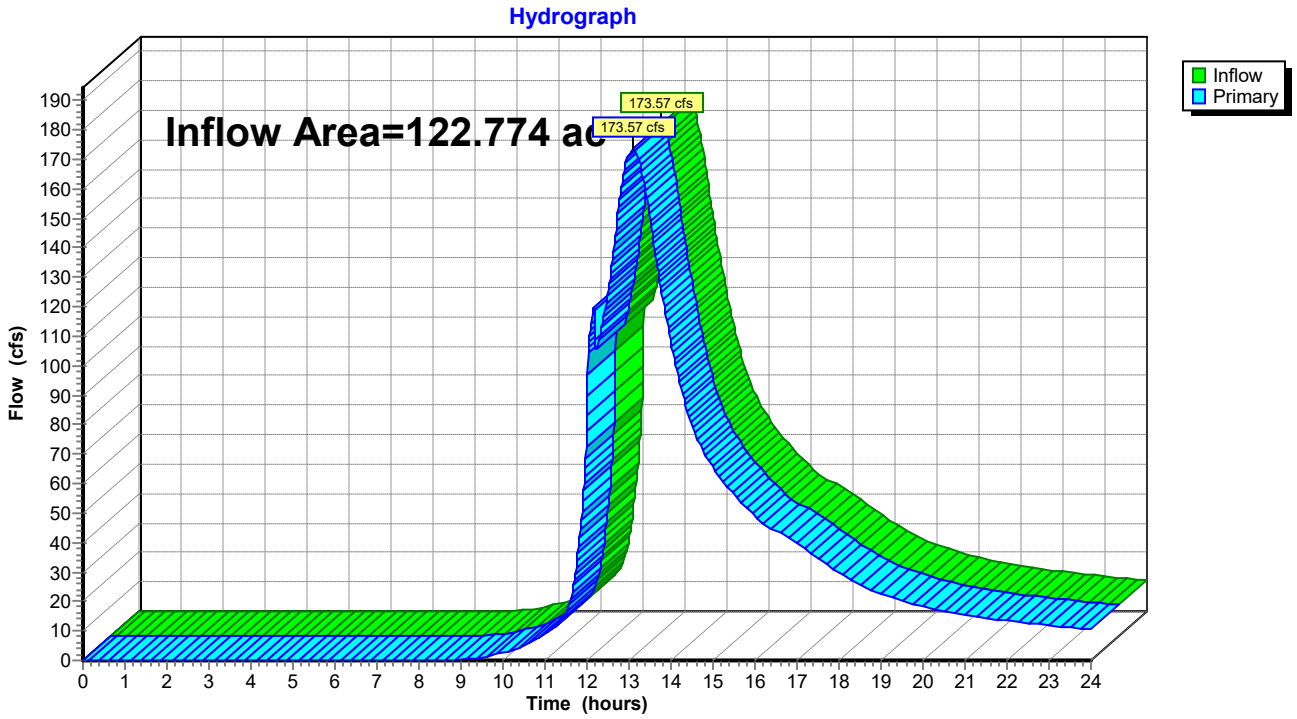
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
422.00	3,129	0
422.05	3,336	162
422.10	3,542	334
422.15	3,749	516
422.20	3,956	708
422.25	4,162	911
422.30	4,369	1,125
422.35	4,576	1,348
422.40	4,782	1,582
422.45	4,989	1,827
422.50	5,196	2,081
422.55	5,402	2,346
422.60	5,609	2,621
422.65	5,816	2,907
422.70	6,022	3,203
422.75	6,229	3,509
422.80	6,436	3,826
422.85	6,642	4,153
422.90	6,849	4,490
422.95	7,056	4,838
423.00	7,263	5,196
423.05	7,469	5,564
423.10	7,676	5,943
423.15	7,883	6,332
423.20	8,089	6,731
423.25	8,296	7,141
423.30	8,503	7,561
423.35	8,709	7,991
423.40	8,916	8,431
423.45	9,123	8,882
423.50	9,329	9,344
423.55	9,536	9,815
423.60	9,743	10,297
423.65	9,949	10,790
423.70	10,156	11,292
423.75	10,363	11,805
423.80	10,569	12,328
423.85	10,776	12,862
423.90	10,983	13,406
423.95	11,189	13,960
424.00	11,396	14,525
424.05	11,986	15,110
424.10	12,576	15,724
424.15	13,166	16,367
424.20	13,756	17,040
424.25	14,347	17,743
424.30	14,937	18,475
424.35	15,527	19,236
424.40	16,117	20,028
424.45	16,707	20,848
424.50	17,297	21,698
424.55	17,887	22,578
424.60	18,477	23,487
424.65	19,067	24,426
424.70	19,657	25,394
424.75	20,248	26,391
424.80	20,838	27,418
424.85	21,428	28,475
424.90	22,018	29,561
424.95	22,608	30,677
425.00	23,198	31,822
425.05	23,788	32,997
425.10	24,378	34,201
425.15	24,968	35,434
425.20	25,558	36,698
425.25	26,149	37,990
425.30	26,739	39,312
425.35	27,329	40,664
425.40	27,919	42,045
425.45	28,509	43,456
425.50	29,099	44,896
425.55	29,689	46,366
425.60	30,279	47,865
425.65	30,869	49,394
425.70	31,459	50,952
425.75	32,050	52,540
425.80	32,640	54,157
425.85	33,230	55,804
425.90	33,820	57,480
425.95	34,410	59,186
426.00	**35,000**	**60,921**

Summary for Link 4L: POC

Inflow Area = 122.774 ac, 10.87% Impervious, Inflow Depth > 5.08" for 100-yr Storm event
Inflow = 173.57 cfs @ 13.12 hrs, Volume= 51.994 af
Primary = 173.57 cfs @ 13.12 hrs, Volume= 51.994 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 4L: POC



Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr Storm	Type III 24-hr		Default	24.00	1	3.60	2
2	5-yr Storm	Type III 24-hr		Default	24.00	1	4.69	2
3	10-yr Storm	Type III 24-hr		Default	24.00	1	5.59	2
4	25-yr Storm	Type III 24-hr		Default	24.00	1	6.83	2
5	50-yr Storm	Type III 24-hr		Default	24.00	1	7.75	2
6	100-yr Storm	Type III 24-hr		Default	24.00	1	8.74	2

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=64.635 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=4,022' Tc=82.6 min CN=67 Runoff=19.34 cfs 4.753 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=0.91 cfs 0.149 af

Subcatchment 2S: TO DRIVEWAY BASIN Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>3.36"
Tc=5.0 min CN=98 Runoff=1.27 cfs 0.098 af

Subcatchment 4S: TO WEST-W WQ BASIN Runoff Area=11.135 ac 6.13% Impervious Runoff Depth>1.01"
Flow Length=1,674' Tc=12.9 min CN=69 Runoff=9.63 cfs 0.938 af

Subcatchment 5S: TO SOUTH WQ BASIN Runoff Area=5.547 ac 24.46% Impervious Runoff Depth>2.02"
Tc=5.0 min CN=84 Runoff=13.64 cfs 0.934 af

Subcatchment 6S: TO BASIN 5 Runoff Area=5.678 ac 26.21% Impervious Runoff Depth>2.02"
Tc=5.0 min CN=84 Runoff=13.96 cfs 0.956 af

Subcatchment 7S: TO EAST WQ BASIN Runoff Area=16.091 ac 27.00% Impervious Runoff Depth>1.86"
Tc=5.0 min CN=82 Runoff=36.47 cfs 2.499 af

Subcatchment 8S: TO WEST-E WQ BASIN Runoff Area=7.088 ac 43.74% Impervious Runoff Depth>2.19"
Tc=5.0 min CN=86 Runoff=18.81 cfs 1.291 af

Subcatchment 9S: TO EAST POND Runoff Area=12.250 ac 16.49% Impervious Runoff Depth>1.50"
Flow Length=642' Tc=9.9 min CN=77 Runoff=18.61 cfs 1.533 af

Pond 1P: DRIVEWAY WQ BASIN Peak Elev=373.65' Storage=1,327 cf Inflow=1.27 cfs 0.098 af
Outflow=0.54 cfs 0.091 af

Pond 2P: WEST-W WQ BASIN Peak Elev=379.66' Storage=3,390 cf Inflow=9.63 cfs 0.938 af
Primary=8.12 cfs 0.928 af Secondary=0.00 cfs 0.000 af Outflow=8.12 cfs 0.928 af

Pond 3P: WEST-E WQ BASIN Peak Elev=375.62' Storage=39,806 cf Inflow=22.05 cfs 2.219 af
Outflow=5.21 cfs 1.863 af

Pond 4P: SOUTH WQ BASIN Peak Elev=376.28' Storage=33,472 cf Inflow=21.59 cfs 1.671 af
Outflow=5.59 cfs 0.932 af

Pond 5P: EAST WQ BASIN Peak Elev=380.57' Storage=22,046 cf Inflow=36.47 cfs 2.499 af
Primary=14.94 cfs 0.233 af Secondary=19.61 cfs 2.028 af Outflow=34.55 cfs 2.260 af

Pond 6P: EAST POND Peak Elev=345.61' Storage=92,985 cf Inflow=39.46 cfs 6.355 af
Outflow=9.83 cfs 5.421 af

Pond 7P: BASIN 5 Peak Elev=423.83' Storage=12,681 cf Inflow=13.96 cfs 0.956 af
Outflow=10.06 cfs 0.737 af

Link 4L: POC

Inflow=28.53 cfs 10.497 af
Primary=28.53 cfs 10.497 af

Total Runoff Area = 126.154 ac Runoff Volume = 13.150 af Average Runoff Depth = 1.25"
89.42% Pervious = 112.811 ac 10.58% Impervious = 13.343 ac

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=64.635 ac 0.00% Impervious Runoff Depth>1.55"
Flow Length=4,022' Tc=82.6 min CN=67 Runoff=36.63 cfs 8.364 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>1.05"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=2.21 cfs 0.297 af

Subcatchment 2S: TO DRIVEWAY BASIN Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>4.45"
Tc=5.0 min CN=98 Runoff=1.66 cfs 0.130 af

Subcatchment 4S: TO WEST-W WQ BASIN Runoff Area=11.135 ac 6.13% Impervious Runoff Depth>1.73"
Flow Length=1,674' Tc=12.9 min CN=69 Runoff=17.48 cfs 1.605 af

Subcatchment 5S: TO SOUTH WQ BASIN Runoff Area=5.547 ac 24.46% Impervious Runoff Depth>2.99"
Tc=5.0 min CN=84 Runoff=20.05 cfs 1.380 af

Subcatchment 6S: TO BASIN 5 Runoff Area=5.678 ac 26.21% Impervious Runoff Depth>2.99"
Tc=5.0 min CN=84 Runoff=20.52 cfs 1.413 af

Subcatchment 7S: TO EAST WQ BASIN Runoff Area=16.091 ac 27.00% Impervious Runoff Depth>2.80"
Tc=5.0 min CN=82 Runoff=54.77 cfs 3.756 af

Subcatchment 8S: TO WEST-E WQ BASIN Runoff Area=7.088 ac 43.74% Impervious Runoff Depth>3.18"
Tc=5.0 min CN=86 Runoff=27.08 cfs 1.876 af

Subcatchment 9S: TO EAST POND Runoff Area=12.250 ac 16.49% Impervious Runoff Depth>2.36"
Flow Length=642' Tc=9.9 min CN=77 Runoff=29.70 cfs 2.410 af

Pond 1P: DRIVEWAY WQ BASIN Peak Elev=373.74' Storage=1,405 cf Inflow=1.66 cfs 0.130 af
Outflow=1.34 cfs 0.122 af

Pond 2P: WEST-W WQ BASIN Peak Elev=380.31' Storage=4,757 cf Inflow=17.48 cfs 1.605 af
Primary=10.64 cfs 1.495 af Secondary=6.54 cfs 0.098 af Outflow=17.17 cfs 1.593 af

Pond 3P: WEST-E WQ BASIN Peak Elev=376.66' Storage=60,922 cf Inflow=34.17 cfs 3.371 af
Outflow=7.44 cfs 2.985 af

Pond 4P: SOUTH WQ BASIN Peak Elev=376.49' Storage=35,983 cf Inflow=36.16 cfs 2.573 af
Outflow=24.35 cfs 1.832 af

Pond 5P: EAST WQ BASIN Peak Elev=380.74' Storage=23,304 cf Inflow=54.77 cfs 3.756 af
Primary=28.78 cfs 0.578 af Secondary=24.60 cfs 2.929 af Outflow=53.38 cfs 3.507 af

Pond 6P: EAST POND Peak Elev=346.27' Storage=139,697 cf Inflow=82.38 cfs 10.255 af
Outflow=18.98 cfs 9.158 af

Pond 7P: BASIN 5 Peak Elev=423.98' Storage=14,312 cf Inflow=20.52 cfs 1.413 af
Outflow=17.47 cfs 1.193 af

Link 4L: POC

Inflow=55.90 cfs 18.222 af
Primary=55.90 cfs 18.222 af

Total Runoff Area = 126.154 ac Runoff Volume = 21.231 af Average Runoff Depth = 2.02"
89.42% Pervious = 112.811 ac 10.58% Impervious = 13.343 ac

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=64.635 ac 0.00% Impervious Runoff Depth>2.18"
Flow Length=4,022' Tc=82.6 min CN=67 Runoff=52.81 cfs 11.722 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>1.57"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=3.52 cfs 0.442 af

Subcatchment 2S: TO DRIVEWAY BASIN Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>5.35"
Tc=5.0 min CN=98 Runoff=1.99 cfs 0.156 af

Subcatchment 4S: TO WEST-W WQ BASIN Runoff Area=11.135 ac 6.13% Impervious Runoff Depth>2.39"
Flow Length=1,674' Tc=12.9 min CN=69 Runoff=24.63 cfs 2.217 af

Subcatchment 5S: TO SOUTH WQ BASIN Runoff Area=5.547 ac 24.46% Impervious Runoff Depth>3.81"
Tc=5.0 min CN=84 Runoff=25.41 cfs 1.762 af

Subcatchment 6S: TO BASIN 5 Runoff Area=5.678 ac 26.21% Impervious Runoff Depth>3.81"
Tc=5.0 min CN=84 Runoff=26.01 cfs 1.803 af

Subcatchment 7S: TO EAST WQ BASIN Runoff Area=16.091 ac 27.00% Impervious Runoff Depth>3.61"
Tc=5.0 min CN=82 Runoff=70.21 cfs 4.839 af

Subcatchment 8S: TO WEST-E WQ BASIN Runoff Area=7.088 ac 43.74% Impervious Runoff Depth>4.02"
Tc=5.0 min CN=86 Runoff=33.96 cfs 2.373 af

Subcatchment 9S: TO EAST POND Runoff Area=12.250 ac 16.49% Impervious Runoff Depth>3.12"
Flow Length=642' Tc=9.9 min CN=77 Runoff=39.31 cfs 3.183 af

Pond 1P: DRIVEWAY WQ BASIN Peak Elev=373.78' Storage=1,444 cf Inflow=1.99 cfs 0.156 af
Outflow=1.85 cfs 0.148 af

Pond 2P: WEST-W WQ BASIN Peak Elev=380.50' Storage=5,154 cf Inflow=24.63 cfs 2.217 af
Primary=11.25 cfs 1.920 af Secondary=13.24 cfs 0.284 af Outflow=24.50 cfs 2.204 af

Pond 3P: WEST-E WQ BASIN Peak Elev=377.37' Storage=75,788 cf Inflow=43.51 cfs 4.293 af
Outflow=10.48 cfs 3.884 af

Pond 4P: SOUTH WQ BASIN Peak Elev=376.64' Storage=37,869 cf Inflow=46.26 cfs 3.344 af
Outflow=43.17 cfs 2.603 af

Pond 5P: EAST WQ BASIN Peak Elev=380.86' Storage=24,184 cf Inflow=70.21 cfs 4.839 af
Primary=40.44 cfs 0.903 af Secondary=28.34 cfs 3.680 af Outflow=68.78 cfs 4.583 af

Pond 6P: EAST POND Peak Elev=346.93' Storage=188,549 cf Inflow=124.68 cfs 13.634 af
Outflow=27.08 cfs 12.416 af

Pond 7P: BASIN 5 Peak Elev=424.07' Storage=15,330 cf Inflow=26.01 cfs 1.803 af
Outflow=22.41 cfs 1.582 af

Link 4L: POC

Inflow=80.06 cfs 25.189 af
Primary=80.06 cfs 25.189 af

Total Runoff Area = 126.154 ac Runoff Volume = 28.497 af Average Runoff Depth = 2.71"
89.42% Pervious = 112.811 ac 10.58% Impervious = 13.343 ac

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=64.635 ac 0.00% Impervious Runoff Depth>3.11"
Flow Length=4,022' Tc=82.6 min CN=67 Runoff=76.79 cfs 16.739 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>2.37"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=5.57 cfs 0.668 af

Subcatchment 2S: TO DRIVEWAY BASIN Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>6.59"
Tc=5.0 min CN=98 Runoff=2.43 cfs 0.192 af

Subcatchment 4S: TO WEST-W WQ BASIN Runoff Area=11.135 ac 6.13% Impervious Runoff Depth>3.37"
Flow Length=1,674' Tc=12.9 min CN=69 Runoff=35.12 cfs 3.123 af

Subcatchment 5S: TO SOUTH WQ BASIN Runoff Area=5.547 ac 24.46% Impervious Runoff Depth>4.97"
Tc=5.0 min CN=84 Runoff=32.82 cfs 2.300 af

Subcatchment 6S: TO BASIN 5 Runoff Area=5.678 ac 26.21% Impervious Runoff Depth>4.97"
Tc=5.0 min CN=84 Runoff=33.60 cfs 2.354 af

Subcatchment 7S: TO EAST WQ BASIN Runoff Area=16.091 ac 27.00% Impervious Runoff Depth>4.75"
Tc=5.0 min CN=82 Runoff=91.67 cfs 6.374 af

Subcatchment 8S: TO WEST-E WQ BASIN Runoff Area=7.088 ac 43.74% Impervious Runoff Depth>5.20"
Tc=5.0 min CN=86 Runoff=43.41 cfs 3.070 af

Subcatchment 9S: TO EAST POND Runoff Area=12.250 ac 16.49% Impervious Runoff Depth>4.21"
Flow Length=642' Tc=9.9 min CN=77 Runoff=52.92 cfs 4.293 af

Pond 1P: DRIVEWAY WQ BASIN Peak Elev=373.82' Storage=1,478 cf Inflow=2.43 cfs 0.192 af
Outflow=2.36 cfs 0.184 af

Pond 2P: WEST-W WQ BASIN Peak Elev=380.71' Storage=5,593 cf Inflow=35.12 cfs 3.123 af
Primary=11.90 cfs 2.495 af Secondary=23.10 cfs 0.613 af Outflow=35.00 cfs 3.108 af

Pond 3P: WEST-E WQ BASIN Peak Elev=377.59' Storage=80,457 cf Inflow=54.40 cfs 5.565 af
Outflow=23.75 cfs 5.129 af

Pond 4P: SOUTH WQ BASIN Peak Elev=376.74' Storage=39,098 cf Inflow=59.93 cfs 4.432 af
Outflow=58.21 cfs 3.689 af

Pond 5P: EAST WQ BASIN Peak Elev=381.00' Storage=25,287 cf Inflow=91.67 cfs 6.374 af
Primary=56.82 cfs 1.397 af Secondary=33.31 cfs 4.710 af Outflow=90.12 cfs 6.107 af

Pond 6P: EAST POND Peak Elev=348.15' Storage=285,144 cf Inflow=167.38 cfs 18.435 af
Outflow=36.82 cfs 17.067 af

Pond 7P: BASIN 5 Peak Elev=424.18' Storage=16,705 cf Inflow=33.60 cfs 2.354 af
Outflow=29.04 cfs 2.132 af

Link 4L: POC

Inflow=113.53 cfs 35.387 af
Primary=113.53 cfs 35.387 af

Total Runoff Area = 126.154 ac Runoff Volume = 39.113 af Average Runoff Depth = 3.72"
89.42% Pervious = 112.811 ac 10.58% Impervious = 13.343 ac

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=64.635 ac 0.00% Impervious Runoff Depth>3.84"
Flow Length=4,022' Tc=82.6 min CN=67 Runoff=95.46 cfs 20.677 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>3.02"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=7.21 cfs 0.851 af

Subcatchment 2S: TO DRIVEWAY BASIN Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>7.51"
Tc=5.0 min CN=98 Runoff=2.76 cfs 0.219 af

Subcatchment 4S: TO WEST-W WQ BASIN Runoff Area=11.135 ac 6.13% Impervious Runoff Depth>4.13"
Flow Length=1,674' Tc=12.9 min CN=69 Runoff=43.21 cfs 3.830 af

Subcatchment 5S: TO SOUTH WQ BASIN Runoff Area=5.547 ac 24.46% Impervious Runoff Depth>5.85"
Tc=5.0 min CN=84 Runoff=38.31 cfs 2.705 af

Subcatchment 6S: TO BASIN 5 Runoff Area=5.678 ac 26.21% Impervious Runoff Depth>5.85"
Tc=5.0 min CN=84 Runoff=39.22 cfs 2.768 af

Subcatchment 7S: TO EAST WQ BASIN Runoff Area=16.091 ac 27.00% Impervious Runoff Depth>5.62"
Tc=5.0 min CN=82 Runoff=107.62 cfs 7.534 af

Subcatchment 8S: TO WEST-E WQ BASIN Runoff Area=7.088 ac 43.74% Impervious Runoff Depth>6.08"
Tc=5.0 min CN=86 Runoff=50.40 cfs 3.594 af

Subcatchment 9S: TO EAST POND Runoff Area=12.250 ac 16.49% Impervious Runoff Depth>5.04"
Flow Length=642' Tc=9.9 min CN=77 Runoff=63.15 cfs 5.141 af

Pond 1P: DRIVEWAY WQ BASIN Peak Elev=373.85' Storage=1,499 cf Inflow=2.76 cfs 0.219 af
Outflow=2.69 cfs 0.211 af

Pond 2P: WEST-W WQ BASIN Peak Elev=380.84' Storage=5,882 cf Inflow=43.21 cfs 3.830 af
Primary=12.30 cfs 2.917 af Secondary=30.79 cfs 0.896 af Outflow=43.09 cfs 3.813 af

Pond 3P: WEST-E WQ BASIN Peak Elev=377.70' Storage=82,770 cf Inflow=61.81 cfs 6.511 af
Outflow=32.81 cfs 6.055 af

Pond 4P: SOUTH WQ BASIN Peak Elev=376.80' Storage=39,740 cf Inflow=68.66 cfs 5.251 af
Outflow=66.75 cfs 4.507 af

Pond 5P: EAST WQ BASIN Peak Elev=381.18' Storage=26,677 cf Inflow=107.62 cfs 7.534 af
Primary=61.86 cfs 1.777 af Secondary=39.62 cfs 5.482 af Outflow=101.48 cfs 7.260 af

Pond 6P: EAST POND Peak Elev=348.89' Storage=349,851 cf Inflow=204.65 cfs 22.083 af
Outflow=50.14 cfs 20.611 af

Pond 7P: BASIN 5 Peak Elev=424.27' Storage=18,039 cf Inflow=39.22 cfs 2.768 af
Outflow=31.70 cfs 2.546 af

Link 4L: POC Inflow=143.82 cfs 43.277 af
Primary=143.82 cfs 43.277 af

Total Runoff Area = 126.154 ac Runoff Volume = 47.318 af Average Runoff Depth = 4.50"
89.42% Pervious = 112.811 ac 10.58% Impervious = 13.343 ac

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: SMITH POND BROOK Runoff Area=64.635 ac 0.00% Impervious Runoff Depth>4.65"
Flow Length=4,022' Tc=82.6 min CN=67 Runoff=116.11 cfs 25.069 af

Subcatchment 2: EAST AREA Runoff Area=3.380 ac 0.00% Impervious Runoff Depth>3.76"
Flow Length=300' Slope=0.1200 '/' Tc=24.9 min CN=59 Runoff=9.06 cfs 1.058 af

Subcatchment 2S: TO DRIVEWAY BASIN Runoff Area=0.350 ac 100.00% Impervious Runoff Depth>8.49"
Tc=5.0 min CN=98 Runoff=3.11 cfs 0.248 af

Subcatchment 4S: TO WEST-W WQ BASIN Runoff Area=11.135 ac 6.13% Impervious Runoff Depth>4.97"
Flow Length=1,674' Tc=12.9 min CN=69 Runoff=52.11 cfs 4.614 af

Subcatchment 5S: TO SOUTH WQ BASIN Runoff Area=5.547 ac 24.46% Impervious Runoff Depth>6.80"
Tc=5.0 min CN=84 Runoff=44.20 cfs 3.144 af

Subcatchment 6S: TO BASIN 5 Runoff Area=5.678 ac 26.21% Impervious Runoff Depth>6.80"
Tc=5.0 min CN=84 Runoff=45.25 cfs 3.219 af

Subcatchment 7S: TO EAST WQ BASIN Runoff Area=16.091 ac 27.00% Impervious Runoff Depth>6.56"
Tc=5.0 min CN=82 Runoff=124.77 cfs 8.796 af

Subcatchment 8S: TO WEST-E WQ BASIN Runoff Area=7.088 ac 43.74% Impervious Runoff Depth>7.05"
Tc=5.0 min CN=86 Runoff=57.89 cfs 4.161 af

Subcatchment 9S: TO EAST POND Runoff Area=12.250 ac 16.49% Impervious Runoff Depth>5.95"
Flow Length=642' Tc=9.9 min CN=77 Runoff=74.23 cfs 6.071 af

Pond 1P: DRIVEWAY WQ BASIN Peak Elev=373.87' Storage=1,521 cf Inflow=3.11 cfs 0.248 af
Outflow=3.04 cfs 0.240 af

Pond 2P: WEST-W WQ BASIN Peak Elev=380.97' Storage=6,168 cf Inflow=52.11 cfs 4.614 af
Primary=12.69 cfs 3.366 af Secondary=39.30 cfs 1.230 af Outflow=51.99 cfs 4.596 af

Pond 3P: WEST-E WQ BASIN Peak Elev=377.84' Storage=85,771 cf Inflow=69.68 cfs 7.528 af
Outflow=46.76 cfs 7.052 af

Pond 4P: SOUTH WQ BASIN Peak Elev=376.84' Storage=40,309 cf Inflow=76.34 cfs 6.140 af
Outflow=74.69 cfs 5.396 af

Pond 5P: EAST WQ BASIN Peak Elev=381.48' Storage=29,022 cf Inflow=124.77 cfs 8.796 af
Primary=64.02 cfs 2.167 af Secondary=50.40 cfs 6.347 af Outflow=114.42 cfs 8.514 af

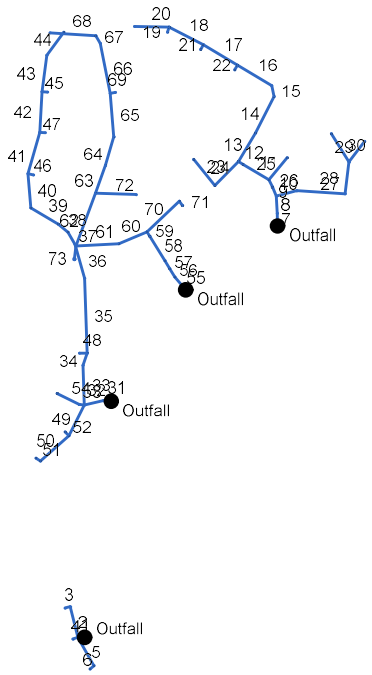
Pond 6P: EAST POND Peak Elev=349.68' Storage=424,623 cf Inflow=270.05 cfs 26.097 af
Outflow=59.13 cfs 24.518 af

Pond 7P: BASIN 5 Peak Elev=424.39' Storage=19,923 cf Inflow=45.25 cfs 3.219 af
Outflow=34.14 cfs 2.996 af

Link 4L: POC Inflow=173.57 cfs 51.994 af
Primary=173.57 cfs 51.994 af

Total Runoff Area = 126.154 ac Runoff Volume = 56.381 af Average Runoff Depth = 5.36"
89.42% Pervious = 112.811 ac 10.58% Impervious = 13.343 ac

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: 3302-KWF.stm	Number of lines: 73	Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	25.195	178.669	Grate	0.61	0.00	0.00	5.0	373.50	0.99	373.75	15	Cir	0.012	1.50	381.80	Pipe - (32)
2	1	119.778	77.404	Grate	1.17	0.00	0.00	5.0	373.75	11.06	387.00	15	Cir	0.012	1.50	391.07	Pipe - (31)
3	2	20.216	-89.493	Grate	3.23	0.00	0.00	5.0	387.00	0.99	387.20	15	Cir	0.012	1.00	391.07	Pipe - (30)
4	1	20.027	-15.103	Grate	0.61	0.00	0.00	5.0	377.95	1.00	378.15	15	Cir	0.012	1.00	381.80	Pipe - (33)
5	1	122.337	-118.049	Grate	0.52	0.00	0.00	5.0	373.75	0.51	374.38	15	Cir	0.012	1.47	378.46	Pipe - (35)
6	5	20.035	77.965	Grate	0.52	0.00	0.00	5.0	374.38	1.00	374.58	15	Cir	0.012	1.00	378.46	Pipe - (34)
7	End	48.007	-92.256	Grate	0.00	0.00	0.00	5.0	379.00	1.04	379.50	30	Cir	0.012	0.50	394.00	Pipe - (43)
8	7	65.929	-0.056	Grate	5.72	0.00	0.00	5.0	387.50	3.79	390.00	30	Cir	0.012	1.47	398.00	Pipe - (42)
9	8	37.291	-22.364	Grate	0.00	0.00	0.00	5.0	393.50	9.92	397.20	24	Cir	0.012	0.50	410.00	Pipe - (41)
10	9	29.905	-0.219	Grate	0.00	0.00	0.00	5.0	402.90	18.73	408.50	24	Cir	0.012	1.37	422.00	Pipe - (40)
11	10	114.159	-34.174	Grate	1.59	0.00	0.00	5.0	408.86	4.94	414.50	24	Cir	0.012	0.50	427.62	Pipe - (39)
12	11	20.331	0.010	Grate	1.03	0.00	0.00	5.0	414.30	8.36	416.00	24	Cir	0.012	2.20	427.62	Pipe - (38)
13	12	126.011	89.964	Grate	1.83	0.00	0.00	5.0	416.50	1.59	418.50	18	Cir	0.012	0.50	429.48	Pipe - (37)
14	13	154.272	-4.096	Grate	0.00	0.00	0.00	5.0	418.75	2.99	423.36	15	Cir	0.012	1.01	432.26	Pipe - (36)
15	14	42.372	-38.754	Grate	1.41	0.00	0.00	5.0	423.36	1.51	424.00	15	Cir	0.012	1.16	433.38	Pipe - (56)
16	15	150.146	-47.123	Grate	1.45	0.00	0.00	5.0	424.00	2.16	427.25	15	Cir	0.012	1.50	436.48	Pipe - (55)
17	16	150.143	0.038	Grate	1.50	0.00	0.00	5.0	427.25	2.50	431.00	15	Cir	0.012	1.50	439.78	Pipe - (54)
18	17	145.164	-3.588	Grate	1.45	0.00	0.00	5.0	431.00	2.24	434.25	15	Cir	0.012	1.67	442.94	Pipe - (53)
19	18	20.331	-101.174	Grate	1.45	0.00	0.00	5.0	439.30	0.98	439.50	15	Cir	0.012	1.00	442.94	Pipe - (57)
20	18	130.074	-26.117	Grate	1.41	0.00	0.00	5.0	434.25	2.11	437.00	15	Cir	0.012	1.00	445.72	Pipe - (52)
21	17	20.184	-90.562	Grate	1.41	0.00	0.00	5.0	431.00	0.99	431.20	15	Cir	0.012	1.00	439.78	Pipe - (58)
22	16	19.955	-90.012	Grate	1.45	0.00	0.00	5.0	427.25	1.00	427.45	15	Cir	0.012	1.00	436.48	Pipe - (59)
23	12	126.506	-76.540	Grate	1.31	0.00	0.00	5.0	416.50	1.63	418.56	18	Cir	0.012	1.50	426.21	Pipe - (45)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	23	127.017	96.384	Grate	13.45	0.00	0.00	5.0	419.40	2.83	423.00	15	Cir	0.012	1.00	427.00	Pipe - (44)
25	10	108.029	64.013	Grate	1.64	0.00	0.00	5.0	415.41	3.79	419.50	15	Cir	0.012	1.00	423.00	Pipe - (46)
26	8	79.019	78.015	Grate	0.14	0.00	0.00	5.0	390.10	1.01	390.90	24	Cir	0.012	0.54	395.00	Pipe - (50)
27	26	181.944	17.880	Grate	0.80	0.00	0.00	5.0	390.90	0.49	391.80	24	Cir	0.012	1.50	397.00	Pipe - (49)
28	27	121.251	-86.188	Grate	0.75	0.00	0.00	5.0	391.80	9.98	403.90	24	Cir	0.012	1.02	414.30	Pipe - (48)
29	28	97.602	29.580	Grate	22.14	0.00	0.00	5.0	408.25	9.99	418.00	15	Cir	0.012	1.00	419.86	Pipe - (47)
30	28	126.206	-39.286	Grate	4.41	0.00	0.00	5.0	408.00	9.51	420.00	15	Cir	0.012	1.00	427.50	Pipe - (51)
31	End	30.000	-176.000	Grate	0.00	0.00	0.00	5.0	377.50	2.30	378.19	36	Cir	0.012	0.51	389.50	Pipe - (83)
32	31	73.386	-17.000	Grate	0.56	0.00	0.00	5.0	378.19	0.50	378.56	36	Cir	0.012	2.15	415.05	Pipe - (82)
33	32	150.569	100.995	Grate	0.00	0.00	0.00	5.0	383.50	4.74	390.63	18	Cir	0.012	0.61	415.80	Pipe - (74)
34	33	47.994	20.707	Grate	4.16	0.00	0.00	5.0	390.63	4.94	393.00	18	Cir	0.012	1.50	416.05	Pipe - (73)
35	34	284.334	-20.554	Grate	1.78	0.00	0.00	5.0	393.00	5.70	409.20	18	Cir	0.012	0.50	417.47	Pipe - (72)
36	35	133.139	-13.986	Grate	1.78	0.00	0.00	5.0	409.20	5.11	416.00	18	Cir	0.012	0.50	421.48	Pipe - (71)
37	36	53.198	-14.690	Grate	1.92	0.00	0.00	5.0	416.00	1.00	416.53	18	Cir	0.012	0.58	421.83	Pipe - (67)
38	37	47.067	-19.423	Grate	1.27	0.00	0.00	5.0	416.53	1.00	417.00	18	Cir	0.012	0.50	424.03	Pipe - (66)
39	38	120.653	-9.419	Grate	1.41	0.00	0.00	5.0	417.00	0.99	418.20	18	Cir	0.012	1.27	429.11	Pipe - (65)
40	39	130.403	54.984	Grate	1.22	0.00	0.00	5.0	420.65	2.84	424.35	15	Cir	0.012	1.50	433.82	Pipe - (64)
41	40	161.656	20.177	Grate	1.50	0.00	0.00	5.0	424.35	3.34	429.75	15	Cir	0.012	1.47	439.06	Pipe - (63)
42	41	154.069	-12.665	Grate	1.45	0.00	0.00	5.0	429.75	3.28	434.80	15	Cir	0.012	1.50	443.95	Pipe - (62)
43	42	140.369	4.401	Grate	1.27	0.00	0.00	5.0	434.80	3.35	439.50	15	Cir	0.012	0.81	448.33	Pipe - (61)
44	43	107.999	28.774	Grate	0.89	0.00	0.00	5.0	439.50	2.78	442.50	15	Cir	0.012	1.00	451.27	Pipe - (60)
45	42	20.089	90.444	Grate	1.92	0.00	0.00	5.0	434.80	1.00	435.00	15	Cir	0.012	1.00	443.95	Pipe - (70)
46	40	20.249	107.575	Grate	1.31	0.00	0.00	5.0	430.18	0.99	430.38	15	Cir	0.012	1.00	433.82	Pipe - (69)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
47	41	19.915	77.472	Grate	1.45	0.00	0.00	5.0	429.75	1.00	429.95	15	Cir	0.012	1.00	439.06	Pipe - (68)
48	34	28.928	-107.619	Grate	0.28	0.00	0.00	5.0	393.25	2.59	394.00	15	Cir	0.012	1.00	399.86	Pipe - (75)
49	32	129.835	-50.282	Grate	0.28	0.00	0.00	5.0	379.31	1.88	381.75	15	Cir	0.012	1.50	386.83	Pipe - (78)
50	49	143.637	21.543	Grate	0.00	0.00	0.00	5.0	381.75	3.10	386.20	15	Cir	0.012	1.46	389.65	Pipe - (77)
51	50	20.226	74.652	Grate	0.23	0.00	0.00	5.0	386.20	0.99	386.40	15	Cir	0.012	1.00	389.65	Pipe - (76)
52	49	20.197	108.231	Grate	0.23	0.00	0.00	5.0	381.75	0.99	381.95	15	Cir	0.012	1.00	386.83	Pipe - (79)
53	32	19.805	21.738	Grate	1.13	0.00	0.00	5.0	378.56	1.01	378.76	24	Cir	0.012	0.53	388.93	Pipe - (81)
54	53	92.886	17.579	Grate	11.90	0.00	0.00	5.0	378.76	-0.01	378.75	36	Cir	0.012	1.00	382.40	Pipe - (80)
55	End	64.098	-130.308	Grate	0.00	0.00	0.00	5.0	378.00	1.01	378.65	24	Cir	0.012	0.50	422.29	Pipe - (25)
56	55	36.295	8.835	Grate	0.00	0.00	0.00	5.0	382.80	9.92	386.40	24	Cir	0.012	0.50	422.47	Pipe - (24)
57	56	35.254	0.102	Grate	0.00	0.00	0.00	5.0	397.40	10.21	401.00	24	Cir	0.012	0.50	422.64	Pipe - (23)
58	57	108.716	-0.157	Grate	1.08	0.00	0.00	5.0	409.50	1.00	410.59	24	Cir	0.012	0.50	423.19	Pipe - (22)
59	58	20.237	-0.808	Grate	1.27	0.00	0.00	5.0	410.59	0.99	410.79	24	Cir	0.012	2.22	423.29	Pipe - (21)
60	59	115.221	-80.955	Grate	1.27	0.00	0.00	5.0	410.79	0.62	411.50	24	Cir	0.012	0.60	423.86	Pipe - (20)
61	60	161.486	20.347	Grate	3.96	0.00	0.00	5.0	411.50	0.62	412.50	24	Cir	0.012	1.50	424.67	Pipe - (19)
62	61	213.210	112.988	Grate	0.00	0.00	0.00	5.0	412.50	1.99	416.75	24	Cir	0.012	1.44	425.74	Pipe - (18)
63	62	111.216	-0.103	Grate	0.00	0.00	0.00	5.0	417.50	5.39	423.50	15	Cir	0.012	0.50	434.50	Pipe - (17)
64	63	112.817	-3.650	Grate	4.22	0.00	0.00	5.0	423.50	1.33	425.00	15	Cir	0.012	0.62	433.32	Pipe - (16)
65	64	165.213	-21.253	Grate	1.78	0.00	0.00	5.0	425.00	1.82	428.00	18	Cir	0.012	1.50	438.09	Pipe - (13)
66	65	192.294	-6.191	Grate	1.55	0.00	0.00	5.0	428.00	5.98	439.50	15	Cir	0.012	0.58	448.20	Pipe - (12)
67	66	33.674	-19.615	Grate	1.69	0.00	0.00	5.0	439.50	1.48	440.00	15	Cir	0.012	1.28	448.53	Pipe - (14)
68	67	172.625	-55.300	Grate	1.03	0.00	0.00	5.0	440.00	1.45	442.50	15	Cir	0.012	1.00	451.00	Pipe - (10)
69	65	20.277	85.629	Grate	1.50	0.00	0.00	5.0	428.00	0.99	428.20	15	Cir	0.012	1.00	438.09	Pipe - (15)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
70	59	168.359	79.156	Grate	1.45	0.00	0.00	5.0	413.85	1.00	415.53	15	Cir	0.012	1.50	424.75	Pipe - (29)
71	70	19.738	96.881	Grate	1.78	0.00	0.00	5.0	421.10	1.01	421.30	15	Cir	0.012	1.00	424.75	Pipe - (28)
72	62	153.378	71.930	Grate	3.56	0.00	0.00	5.0	417.50	0.98	419.00	15	Cir	0.012	1.00	423.00	Pipe - (26)
73	61	50.000	-80.000	Curb	2.34	0.00	0.00	0.0	413.00	2.00	414.00	15	Cir	0.012	1.00	421.00	

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	2+99RT	Grate	381.80	Rect	4.00	4.50	15	Cir	373.75	15 15 15	Cir Cir Cir	373.75 377.95 373.75
2	4+20RT	Grate	391.07	Rect	4.00	4.50	15	Cir	387.00	15	Cir	387.00
3	4+20LT	Grate	391.07	Rect	4.00	4.50	15	Cir	387.20			
4	2+99LT	Grate	381.80	Rect	4.00	4.50	15	Cir	378.15			
5	1+67RT	Grate	378.46	Rect	4.00	4.50	15	Cir	374.38	15	Cir	374.38
6	1+67LT	Grate	378.46	Rect	4.00	4.50	15	Cir	374.58			
7	Structure - (52)	Grate	394.00	Rect	4.00	4.50	30	Cir	379.50	30	Cir	387.50
8	CC CB7	Grate	398.00	Rect	4.00	4.50	30	Cir	390.00	24 24	Cir Cir	393.50 390.10
9	CC MH3	Grate	410.00	Rect	4.00	4.50	24	Cir	397.20	24	Cir	402.90
10	CC MH2	Grate	422.00	Rect	4.00	4.50	24	Cir	408.50	24 15	Cir Cir	408.86 415.41
11	3+0 LT	Grate	427.62	Rect	4.00	4.50	24	Cir	414.50	24	Cir	414.30
12	3+0 RT	Grate	427.62	Rect	4.00	4.50	24	Cir	416.00	18 18	Cir Cir	416.50 416.50
13	1+75 RT	Grate	429.48	Rect	4.00	4.50	18	Cir	418.50	15	Cir	418.75
14	30+78RT	Grate	432.26	Rect	4.00	4.50	15	Cir	423.36	15	Cir	423.36
15	30+48LT	Grate	433.38	Rect	4.00	4.50	15	Cir	424.00	15	Cir	424.00
16	28+98LT	Grate	436.48	Rect	4.00	4.50	15	Cir	427.25	15 15	Cir Cir	427.25 427.25
17	27+48LT	Grate	439.78	Rect	4.00	4.50	15	Cir	431.00	15 15	Cir Cir	431.00 431.00
18	26+05LT	Grate	442.94	Rect	4.00	4.50	15	Cir	434.25	15 15	Cir Cir	439.30 434.25
19	26_05RT	Grate	442.94	Rect	4.00	4.50	15	Cir	439.50			

Project File: 3302-KWF.stm | Number of Structures: 73 | Run Date: 5/17/2023

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
20	24+79LT	Grate	445.72	Rect	4.00	4.50	15	Cir	437.00			
21	27+48RT	Grate	439.78	Rect	4.00	4.50	15	Cir	431.20			
22	28+98RT	Grate	436.48	Rect	4.00	4.50	15	Cir	427.45			
23	4+34 RT	Grate	426.21	Rect	4.00	4.50	18	Cir	418.56	15	Cir	419.40
24	CC CB 1	Grate	427.00	Rect	4.00	4.50	15	Cir	423.00			
25	CC CB6	Grate	423.00	Rect	4.00	4.50	15	Cir	419.50			
26	CC CB5A	Grate	395.00	Rect	4.00	4.50	24	Cir	390.90	24	Cir	390.90
27	CC CB 5	Grate	397.00	Rect	4.00	4.50	24	Cir	391.80	24	Cir	391.80
28	CC CB4	Grate	414.30	Rect	4.00	4.50	24	Cir	403.90	15 15	Cir Cir	408.25 408.00
29	FE	Grate	419.86	Rect	4.00	4.50	15	Cir	418.00			
30	33+47	Grate	427.50	Rect	4.00	4.50	15	Cir	420.00			
31	XC5	Grate	389.50	Rect	4.00	4.50	36	Cir	378.19	36	Cir	378.19
32	12+18RT	Grate	415.05	Rect	4.00	4.50	36	Cir	378.56	18 15 24	Cir Cir Cir	383.50 379.31 378.56
33	13+95	Grate	415.80	Rect	4.00	4.50	18	Cir	390.63	18	Cir	390.63
34	14+XRT	Grate	416.05	Rect	4.00	4.50	18	Cir	393.00	18 15	Cir Cir	393.00 393.25
35	17+0	Grate	417.47	Rect	4.00	4.50	18	Cir	409.20	18	Cir	409.20
36	11+26LT	Grate	421.48	Rect	4.00	4.50	18	Cir	416.00	18	Cir	416.00
37	11+62RT	Grate	421.83	Rect	4.00	4.50	18	Cir	416.53	18	Cir	416.53
38	12+14RT	Grate	424.03	Rect	4.00	4.50	18	Cir	417.00	18	Cir	417.00
39	13+37LT	Grate	429.11	Rect	4.00	4.50	18	Cir	418.20	15	Cir	420.65
40	14+63LT	Grate	433.82	Rect	4.00	4.50	15	Cir	424.35	15 15	Cir Cir	424.35 430.18

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
41	16+28lt	Grate	439.06	Rect	4.00	4.50	15	Cir	429.75	15 15	Cir Cir	429.75 429.75
42	17+28LT	Grate	443.95	Rect	4.00	4.50	15	Cir	434.80	15 15	Cir Cir	434.80 434.80
43	19+20	Grate	448.33	Rect	4.00	4.50	15	Cir	439.50	15	Cir	439.50
44	20+24	Grate	451.27	Rect	4.00	4.50	15	Cir	442.50			
45	17+28RT	Grate	443.95	Rect	4.00	4.50	15	Cir	435.00			
46	14+63RT	Grate	433.82	Rect	4.00	4.50	15	Cir	430.38			
47	16+28RT	Grate	439.06	Rect	4.00	4.50	15	Cir	429.95			
48	14+XLT	Grate	399.86	Rect	4.00	4.50	15	Cir	394.00			
49	10+92RT	Grate	386.83	Rect	4.00	4.50	15	Cir	381.75	15 15	Cir Cir	381.75 381.75
50	9+45RT	Grate	389.65	Rect	4.00	4.50	15	Cir	386.20	15	Cir	386.20
51	9+45LT	Grate	389.65	Rect	4.00	4.50	15	Cir	386.40			
52	10+92LT	Grate	386.83	Rect	4.00	4.50	15	Cir	381.95			
53	12+18LT	Grate	388.93	Rect	4.00	4.50	24	Cir	378.76	36	Cir	378.76
54	FE-IN	Grate	382.40	Rect	4.00	4.50	36	Cir	378.75			
55	Structure - (32)	Grate	422.29	Rect	4.00	4.50	24	Cir	378.65	24	Cir	382.80
56	Structure - (31)	Grate	422.47	Rect	4.00	4.50	24	Cir	386.40	24	Cir	397.40
57	Structure - (30)	Grate	422.64	Rect	4.00	4.50	24	Cir	401.00	24	Cir	409.50
58	7+50LT	Grate	423.19	Rect	4.00	4.50	24	Cir	410.59	24	Cir	410.59
59	7+50RT	Grate	423.29	Rect	4.00	4.50	24	Cir	410.79	24 15	Cir Cir	410.79 413.85
60	8+69RT	Grate	423.86	Rect	4.00	4.50	24	Cir	411.50	24	Cir	411.50
61	10+33RT	Grate	424.67	Rect	4.00	4.50	24	Cir	412.50	24 15	Cir Cir	412.50 413.00

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
62	CC 3	Grate	425.74	Rect	4.00	4.50	24	Cir	416.75	15 15	Cir Cir	417.50 417.50
63	CC MH1	Grate	434.50	Rect	4.00	4.50	15	Cir	423.50	15	Cir	423.50
64	3+76RT	Grate	433.32	Rect	4.00	4.50	15	Cir	425.00	18	Cir	425.00
65	2+11rt	Grate	438.09	Rect	4.00	4.50	18	Cir	428.00	15 15	Cir Cir	428.00 428.00
66	23+25RT	Grate	448.20	Rect	4.00	4.50	15	Cir	439.50	15	Cir	439.50
67	23+25LT	Grate	448.53	Rect	4.00	4.50	15	Cir	440.00	15	Cir	440.00
68	21+52	Grate	451.00	Rect	4.00	4.50	15	Cir	442.50			
69	2+11LT	Grate	438.09	Rect	4.00	4.50	15	Cir	428.20			
70	5+80RT	Grate	424.75	Rect	4.00	4.50	15	Cir	415.53	15	Cir	421.10
71	5+80LT	Grate	424.75	Rect	4.00	4.50	15	Cir	421.30			
72	CC 2	Grate	423.00	Rect	4.00	4.50	15	Cir	419.00			
73		Curb-	421.00	Cir	4.00	4.00	15	Cir	414.00			

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (32)	6.66	15	Cir	25.195	373.50	373.75	0.992	374.71	374.79	n/a	374.79	End	Grate
2	Pipe - (31)	4.40	15	Cir	119.778	373.75	387.00	11.062	374.79	387.85	n/a	387.85 j	1	Grate
3	Pipe - (30)	3.23	15	Cir	20.216	387.00	387.20	0.989	387.85	387.92	n/a	387.92	2	Grate
4	Pipe - (33)	0.61	15	Cir	20.027	377.95	378.15	0.999	378.20	378.45	n/a	378.45	1	Grate
5	Pipe - (35)	1.04	15	Cir	122.337	373.75	374.38	0.515	374.79	374.78	n/a	374.78	1	Grate
6	Pipe - (34)	0.52	15	Cir	20.035	374.38	374.58	0.998	374.78	374.86	n/a	374.86	5	Grate
7	Pipe - (43)	66.34	30	Cir	48.007	379.00	379.50	1.042	381.50*	382.57*	n/a	383.99	End	Grate
8	Pipe - (42)	66.34	30	Cir	65.929	387.50	390.00	3.792	389.14	392.43	n/a	392.43	7	Grate
9	Pipe - (41)	32.38	24	Cir	37.291	393.50	397.20	9.922	394.40	399.09	n/a	399.09	8	Grate
10	Pipe - (40)	32.38	24	Cir	29.905	402.90	408.50	18.726	403.66	410.39	n/a	410.39	9	Grate
11	Pipe - (39)	30.74	24	Cir	114.159	408.86	414.50	4.940	410.39	416.37	n/a	416.37	10	Grate
12	Pipe - (38)	29.15	24	Cir	20.331	414.30	416.00	8.362	416.37	417.85	n/a	417.85	11	Grate
13	Pipe - (37)	13.36	18	Cir	126.011	416.50	418.50	1.587	417.85	419.86	n/a	419.86	12	Grate
14	Pipe - (36)	11.53	15	Cir	154.272	418.75	423.36	2.988	419.86	424.57	n/a	424.57	13	Grate
15	Pipe - (56)	11.53	15	Cir	42.372	423.36	424.00	1.510	424.61*	425.76*	n/a	427.35	14	Grate
16	Pipe - (55)	10.12	15	Cir	150.146	424.00	427.25	2.165	427.35*	430.50*	n/a	432.08	15	Grate
17	Pipe - (54)	7.22	15	Cir	150.143	427.25	431.00	2.498	432.08*	433.68*	n/a	434.49	16	Grate
18	Pipe - (53)	4.31	15	Cir	145.164	431.00	434.25	2.239	434.49	435.09	n/a	435.09	17	Grate
19	Pipe - (57)	1.45	15	Cir	20.331	439.30	439.50	0.984	439.69	439.98	n/a	439.98	18	Grate
20	Pipe - (52)	1.41	15	Cir	130.074	434.25	437.00	2.114	435.09	437.47	n/a	437.47	18	Grate
21	Pipe - (58)	1.41	15	Cir	20.184	431.00	431.20	0.991	434.49*	434.50*	n/a	434.52	17	Grate
22	Pipe - (59)	1.45	15	Cir	19.955	427.25	427.45	1.002	432.08*	432.09*	n/a	432.11	16	Grate
23	Pipe - (45)	14.76	18	Cir	126.506	416.50	418.56	1.628	417.85	419.96	n/a	419.96	12	Grate
24	Pipe - (44)	13.45	15	Cir	127.017	419.40	423.00	2.834	420.65*	425.35*	n/a	427.21	23	Grate

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	Pipe - (46)	1.64	15	Cir	108.029	415.41	419.50	3.786	415.70	420.01	n/a	420.01	10	Grate
26	Pipe - (50)	28.24	24	Cir	79.019	390.10	390.90	1.012	392.43*	393.48*	n/a	394.16	8	Grate
27	Pipe - (49)	28.10	24	Cir	181.944	390.90	391.80	0.495	394.16*	396.55*	n/a	398.41	26	Grate
28	Pipe - (48)	27.30	24	Cir	121.251	391.80	403.90	9.979	398.41	405.71	n/a	405.71	27	Grate
29	Pipe - (47)	22.14	15	Cir	97.602	408.25	418.00	9.990	409.28	419.25	n/a	419.25	28	Grate
30	Pipe - (51)	4.41	15	Cir	126.206	408.00	420.00	9.508	408.38	420.85	n/a	420.85	28	Grate
31	Pipe - (83)	37.94	36	Cir	30.000	377.50	378.19	2.300	379.80	380.19	n/a	380.19	End	Grate
32	Pipe - (82)	37.94	36	Cir	73.386	378.19	378.56	0.504	380.19	380.56	n/a	380.56	31	Grate
33	Pipe - (74)	23.61	18	Cir	150.569	383.50	390.63	4.735	384.67	392.11	n/a	392.11	32	Grate
34	Pipe - (73)	23.61	18	Cir	47.994	390.63	393.00	4.938	392.11	394.48	n/a	394.48	33	Grate
35	Pipe - (72)	19.17	18	Cir	284.334	393.00	409.20	5.698	394.48	410.66	n/a	410.66	34	Grate
36	Pipe - (71)	17.39	18	Cir	133.139	409.20	416.00	5.107	410.66	417.44	n/a	417.44	35	Grate
37	Pipe - (67)	15.61	18	Cir	53.198	416.00	416.53	0.996	417.50*	418.50*	n/a	419.21	36	Grate
38	Pipe - (66)	13.69	18	Cir	47.067	416.53	417.00	0.999	419.21*	419.89*	n/a	420.35	37	Grate
39	Pipe - (65)	12.42	18	Cir	120.653	417.00	418.20	0.995	420.35*	421.79*	n/a	422.77	38	Grate
40	Pipe - (64)	11.01	15	Cir	130.403	420.65	424.35	2.837	422.77*	426.00*	n/a	427.88	39	Grate
41	Pipe - (63)	8.48	15	Cir	161.656	424.35	429.75	3.340	427.88	430.89	n/a	430.89	40	Grate
42	Pipe - (62)	5.53	15	Cir	154.069	429.75	434.80	3.278	430.89	435.75	n/a	435.75	41	Grate
43	Pipe - (61)	2.16	15	Cir	140.369	434.80	439.50	3.348	435.75	440.09	n/a	440.09	42	Grate
44	Pipe - (60)	0.89	15	Cir	107.999	439.50	442.50	2.778	440.09	442.87	n/a	442.87	43	Grate
45	Pipe - (70)	1.92	15	Cir	20.089	434.80	435.00	0.996	435.75	435.55	n/a	435.55	42	Grate
46	Pipe - (69)	1.31	15	Cir	20.249	430.18	430.38	0.988	430.55	430.83	n/a	430.83	40	Grate
47	Pipe - (68)	1.45	15	Cir	19.915	429.75	429.95	1.004	430.89	430.43	n/a	430.43	41	Grate
48	Pipe - (75)	0.28	15	Cir	28.928	393.25	394.00	2.593	394.48	394.20	n/a	394.20	34	Grate

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
49	Pipe - (78)	0.74	15	Cir	129.835	379.31	381.75	1.879	380.56	382.09	n/a	382.09	32	Grate
50	Pipe - (77)	0.23	15	Cir	143.637	381.75	386.20	3.098	382.09	386.39	n/a	386.39	49	Grate
51	Pipe - (76)	0.23	15	Cir	20.226	386.20	386.40	0.989	386.39	386.59	n/a	386.59	50	Grate
52	Pipe - (79)	0.23	15	Cir	20.197	381.75	381.95	0.990	382.09	382.14	n/a	382.14	49	Grate
53	Pipe - (81)	13.03	24	Cir	19.805	378.56	378.76	1.010	380.56	380.59	n/a	380.75	32	Grate
54	Pipe - (80)	11.90	36	Cir	92.886	378.76	378.75	-0.011	380.75	380.79	n/a	380.88	53	Grate
55	Pipe - (25)	28.48	24	Cir	64.098	378.00	378.65	1.014	379.84*	380.75*	n/a	381.39	End	Grate
56	Pipe - (24)	28.48	24	Cir	36.295	382.80	386.40	9.919	383.64	388.24	n/a	388.24	55	Grate
57	Pipe - (23)	28.48	24	Cir	35.254	397.40	401.00	10.212	398.23	402.84	n/a	402.84	56	Grate
58	Pipe - (22)	28.48	24	Cir	108.716	409.50	410.59	1.003	411.50*	412.97*	n/a	413.61	57	Grate
59	Pipe - (21)	27.40	24	Cir	20.237	410.59	410.79	0.988	413.61*	413.86*	n/a	416.49	58	Grate
60	Pipe - (20)	22.90	24	Cir	115.221	410.79	411.50	0.616	416.49*	417.49*	n/a	417.99	59	Grate
61	Pipe - (19)	21.63	24	Cir	161.486	411.50	412.50	0.619	417.99*	419.25*	n/a	420.35	60	Grate
62	Pipe - (18)	15.33	24	Cir	213.210	412.50	416.75	1.993	420.35*	421.19*	n/a	421.72	61	Grate
63	Pipe - (17)	11.77	15	Cir	111.216	417.50	423.50	5.395	421.72	424.74	n/a	425.45	62	Grate
64	Pipe - (16)	11.77	15	Cir	112.817	423.50	425.00	1.330	425.45*	428.65*	n/a	429.54	63	Grate
65	Pipe - (13)	7.55	18	Cir	165.213	425.00	428.00	1.816	429.54*	430.26*	n/a	430.69	64	Grate
66	Pipe - (12)	4.27	15	Cir	192.294	428.00	439.50	5.980	430.69	440.34	n/a	440.34	65	Grate
67	Pipe - (14)	2.72	15	Cir	33.674	439.50	440.00	1.485	440.34	440.66	n/a	440.66	66	Grate
68	Pipe - (10)	1.03	15	Cir	172.625	440.00	442.50	1.448	440.66	442.90	n/a	442.90	67	Grate
69	Pipe - (15)	1.50	15	Cir	20.277	428.00	428.20	0.986	430.69*	430.70*	n/a	430.72	65	Grate
70	Pipe - (29)	3.23	15	Cir	168.359	413.85	415.53	0.998	416.49*	416.85*	n/a	417.01	59	Grate
71	Pipe - (28)	1.78	15	Cir	19.738	421.10	421.30	1.013	421.53	421.83	n/a	421.83	70	Grate
72	Pipe - (26)	3.56	15	Cir	153.378	417.50	419.00	0.978	421.72*	422.12*	n/a	422.25	62	Grate

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
73		2.34	15	Cir	50.000	413.00	414.00	2.000	420.35*	420.41*	n/a	420.47	61	Curb-

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	25.195	0.00	0.00	0.00	0.00	0.00	5.0	8.2	0.0	6.66	6.97	5.80	15	0.99	373.50	373.75	374.71	374.79	375.36	381.80	Pipe - (32)
2	1	119.778	0.00	0.00	0.00	0.00	0.00	5.0	5.1	0.0	4.40	23.27	4.50	15	11.06	373.75	387.00	374.79	387.85	381.80	391.07	Pipe - (31)
3	2	20.216	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	3.23	0.00	4.01	15	0.99	387.00	387.20	387.85	387.92	391.07	391.07	Pipe - (30)
4	1	20.027	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.61	0.00	3.07	15	1.00	377.95	378.15	378.20	378.45	381.80	381.80	Pipe - (33)
5	1	122.337	0.00	0.00	0.00	0.00	0.00	5.0	5.8	0.0	1.04	0.00	2.01	15	0.51	373.75	374.38	374.79	374.78	381.80	378.46	Pipe - (35)
6	5	20.035	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.52	0.00	2.03	15	1.00	374.38	374.58	374.78	374.86	378.46	378.46	Pipe - (34)
7	End	48.007	0.00	0.00	0.00	0.00	0.00	5.0	9.4	0.0	66.34	0.00	13.52	30	1.04	379.00	379.50	381.50	382.57	382.13	394.00	Pipe - (43)
8	7	65.929	0.00	0.00	0.00	0.00	0.00	5.0	9.3	0.0	66.34	0.00	16.53	30	3.79	387.50	390.00	389.14	392.43	394.00	398.00	Pipe - (42)
9	8	37.291	0.00	0.00	0.00	0.00	0.00	5.0	9.2	0.0	32.38	0.00	17.00	24	9.92	393.50	397.20	394.40	399.09	398.00	410.00	Pipe - (41)
10	9	29.905	0.00	0.00	0.00	0.00	0.00	5.0	9.2	0.0	32.38	0.00	20.08	24	18.73	402.90	408.50	403.66	410.39	410.00	422.00	Pipe - (40)
11	10	114.159	0.00	0.00	0.00	0.00	0.00	5.0	9.0	0.0	30.74	0.00	10.97	24	4.94	408.86	414.50	410.39	416.37	422.00	427.62	Pipe - (39)
12	11	20.331	0.00	0.00	0.00	0.00	0.00	5.0	8.9	0.0	29.15	0.00	9.45	24	8.36	414.30	416.00	416.37	417.85	427.62	427.62	Pipe - (38)
13	12	126.011	0.00	0.00	0.00	0.00	0.00	5.0	8.7	0.0	13.36	0.00	7.95	18	1.59	416.50	418.50	417.85	419.86	427.62	429.48	Pipe - (37)
14	13	154.272	0.00	0.00	0.00	0.00	0.00	5.0	8.4	0.0	11.53	0.00	9.74	15	2.99	418.75	423.36	419.86	424.57	429.48	432.26	Pipe - (36)
15	14	42.372	0.00	0.00	0.00	0.00	0.00	5.0	8.3	0.0	11.53	0.00	9.40	15	1.51	423.36	424.00	424.61	425.76	432.26	433.38	Pipe - (56)
16	15	150.146	0.00	0.00	0.00	0.00	0.00	5.0	8.0	0.0	10.12	0.00	8.25	15	2.16	424.00	427.25	427.35	430.50	433.38	436.48	Pipe - (55)
17	16	150.143	0.00	0.00	0.00	0.00	0.00	5.0	7.6	0.0	7.22	0.00	5.88	15	2.50	427.25	431.00	432.08	433.68	436.48	439.78	Pipe - (54)
18	17	145.164	0.00	0.00	0.00	0.00	0.00	5.0	6.9	0.0	4.31	0.00	4.21	15	2.24	431.00	434.25	434.49	435.09	439.78	442.94	Pipe - (53)
19	18	20.331	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.45	0.00	3.92	15	0.98	439.30	439.50	439.69	439.98	442.94	442.94	Pipe - (57)
20	18	130.074	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.41	0.00	2.48	15	2.11	434.25	437.00	435.09	437.47	442.94	445.72	Pipe - (52)
21	17	20.184	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.41	0.00	1.15	15	0.99	431.00	431.20	434.49	434.50	439.78	439.78	Pipe - (58)
22	16	19.955	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.45	0.00	1.18	15	1.00	427.25	427.45	432.08	432.09	436.48	436.48	Pipe - (59)

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	12	126.506	0.00	0.00	0.00	0.00	0.00	5.0	5.2	0.0	14.76	0.00	8.71	18	1.63	416.50	418.56	417.85	419.96	427.62	426.21	Pipe - (45)
24	23	127.017	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	13.45	0.00	10.96	15	2.83	419.40	423.00	420.65	425.35	426.21	427.00	Pipe - (44)
25	10	108.029	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.64	0.00	5.49	15	3.79	415.41	419.50	415.70	420.01	422.00	423.00	Pipe - (46)
26	8	79.019	0.00	0.00	0.00	0.00	0.00	5.0	6.2	0.0	28.24	0.00	8.99	24	1.01	390.10	390.90	392.43	393.48	398.00	395.00	Pipe - (50)
27	26	181.944	0.00	0.00	0.00	0.00	0.00	5.0	5.8	0.0	28.10	0.00	8.95	24	0.49	390.90	391.80	394.16	396.55	395.00	397.00	Pipe - (49)
28	27	121.251	0.00	0.00	0.00	0.00	0.00	5.0	5.6	0.0	27.30	0.00	8.90	24	9.98	391.80	403.90	398.41	405.71	397.00	414.30	Pipe - (48)
29	28	97.602	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	22.14	0.00	19.29	15	9.99	408.25	418.00	409.28	419.25	414.30	419.86	Pipe - (47)
30	28	126.206	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	4.41	0.00	9.38	15	9.51	408.00	420.00	408.38	420.85	414.30	427.50	Pipe - (51)
31	End	30.000	0.00	0.00	0.00	0.00	0.00	5.0	23.4	0.0	37.94	0.00	7.05	36	2.30	377.50	378.19	379.80	380.19	383.00	389.50	Pipe - (83)
32	31	73.386	0.00	0.00	0.00	0.00	0.00	5.0	23.2	0.0	37.94	0.00	7.57	36	0.50	378.19	378.56	380.19	380.56	389.50	415.05	Pipe - (82)
33	32	150.569	0.00	0.00	0.00	0.00	0.00	5.0	11.2	0.0	23.61	0.00	14.67	18	4.74	383.50	390.63	384.67	392.11	415.05	415.80	Pipe - (74)
34	33	47.994	0.00	0.00	0.00	0.00	0.00	5.0	11.2	0.0	23.61	0.00	13.39	18	4.94	390.63	393.00	392.11	394.48	415.80	416.05	Pipe - (73)
35	34	284.334	0.00	0.00	0.00	0.00	0.00	5.0	10.7	0.0	19.17	0.00	10.90	18	5.70	393.00	409.20	394.48	410.66	416.05	417.47	Pipe - (72)
36	35	133.139	0.00	0.00	0.00	0.00	0.00	5.0	10.5	0.0	17.39	0.00	9.94	18	5.11	409.20	416.00	410.66	417.44	417.47	421.48	Pipe - (71)
37	36	53.198	0.00	0.00	0.00	0.00	0.00	5.0	10.4	0.0	15.61	0.00	8.83	18	1.00	416.00	416.53	417.50	418.50	421.48	421.83	Pipe - (67)
38	37	47.067	0.00	0.00	0.00	0.00	0.00	5.0	10.3	0.0	13.69	0.00	7.75	18	1.00	416.53	417.00	419.21	419.89	421.83	424.03	Pipe - (66)
39	38	120.653	0.00	0.00	0.00	0.00	0.00	5.0	10.0	0.0	12.42	0.00	7.03	18	0.99	417.00	418.20	420.35	421.79	424.03	429.11	Pipe - (65)
40	39	130.403	0.00	0.00	0.00	0.00	0.00	5.0	9.8	0.0	11.01	0.00	8.97	15	2.84	420.65	424.35	422.77	426.00	429.11	433.82	Pipe - (64)
41	40	161.656	0.00	0.00	0.00	0.00	0.00	5.0	9.4	0.0	8.48	0.00	7.08	15	3.34	424.35	429.75	427.88	430.89	433.82	439.06	Pipe - (63)
42	41	154.069	0.00	0.00	0.00	0.00	0.00	5.0	8.8	0.0	5.53	0.00	5.12	15	3.28	429.75	434.80	430.89	435.75	439.06	443.95	Pipe - (62)
43	42	140.369	0.00	0.00	0.00	0.00	0.00	5.0	7.5	0.0	2.16	0.00	2.99	15	3.35	434.80	439.50	435.75	440.09	443.95	448.33	Pipe - (61)
44	43	107.999	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.89	0.00	2.25	15	2.78	439.50	442.50	440.09	442.87	448.33	451.27	Pipe - (60)

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	42	20.089	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.92	0.00	2.80	15	1.00	434.80	435.00	435.75	435.55	443.95	443.95	Pipe - (70)
46	40	20.249	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.31	0.00	3.81	15	0.99	430.18	430.38	430.55	430.83	433.82	433.82	Pipe - (69)
47	41	19.915	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.45	0.00	2.31	15	1.00	429.75	429.95	430.89	430.43	439.06	439.06	Pipe - (68)
48	34	28.928	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.28	0.00	1.18	15	2.59	393.25	394.00	394.48	394.20	416.05	399.86	Pipe - (75)
49	32	129.835	0.00	0.00	0.00	0.00	0.00	5.0	19.6	0.0	0.74	0.00	1.69	15	1.88	379.31	381.75	380.56	382.09	415.05	386.83	Pipe - (78)
50	49	143.637	0.00	0.00	0.00	0.00	0.00	5.0	6.8	0.0	0.23	0.00	1.45	15	3.10	381.75	386.20	382.09	386.39	386.83	389.65	Pipe - (77)
51	50	20.226	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.23	0.00	2.03	15	0.99	386.20	386.40	386.39	386.59	389.65	389.65	Pipe - (76)
52	49	20.197	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.23	0.00	1.45	15	0.99	381.75	381.95	382.09	382.14	386.83	386.83	Pipe - (79)
53	32	19.805	0.00	0.00	0.00	0.00	0.00	5.0	5.9	0.0	13.03	0.00	4.24	24	1.01	378.56	378.76	380.56	380.59	415.05	388.93	Pipe - (81)
54	53	92.886	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	11.90	0.00	2.36	36	-0.01	378.76	378.75	380.75	380.79	388.93	382.40	Pipe - (80)
55	End	64.098	0.00	0.00	0.00	0.00	0.00	5.0	12.4	0.0	28.48	0.00	9.24	24	1.01	378.00	378.65	379.84	380.75	421.97	422.29	Pipe - (25)
56	55	36.295	0.00	0.00	0.00	0.00	0.00	5.0	12.3	0.0	28.48	0.00	16.06	24	9.92	382.80	386.40	383.64	388.24	422.29	422.47	Pipe - (24)
57	56	35.254	0.00	0.00	0.00	0.00	0.00	5.0	12.3	0.0	28.48	0.00	16.19	24	10.21	397.40	401.00	398.23	402.84	422.47	422.64	Pipe - (23)
58	57	108.716	0.00	0.00	0.00	0.00	0.00	5.0	12.1	0.0	28.48	0.00	9.07	24	1.00	409.50	410.59	411.50	412.97	422.64	423.19	Pipe - (22)
59	58	20.237	0.00	0.00	0.00	0.00	0.00	5.0	12.0	0.0	27.40	0.00	8.72	24	0.99	410.59	410.79	413.61	413.86	423.19	423.29	Pipe - (21)
60	59	115.221	0.00	0.00	0.00	0.00	0.00	5.0	11.8	0.0	22.90	0.00	7.29	24	0.62	410.79	411.50	416.49	417.49	423.29	423.86	Pipe - (20)
61	60	161.486	0.00	0.00	0.00	0.00	0.00	5.0	11.4	0.0	21.63	0.00	6.89	24	0.62	411.50	412.50	417.99	419.25	423.86	424.67	Pipe - (19)
62	61	213.210	0.00	0.00	0.00	0.00	0.00	5.0	10.6	0.0	15.33	0.00	4.88	24	1.99	412.50	416.75	420.35	421.19	424.67	425.74	Pipe - (18)
63	62	111.216	0.00	0.00	0.00	0.00	0.00	5.0	10.4	0.0	11.77	0.00	9.60	15	5.39	417.50	423.50	421.72	424.74	425.74	434.50	Pipe - (17)
64	63	112.817	0.00	0.00	0.00	0.00	0.00	5.0	10.2	0.0	11.77	0.00	9.59	15	1.33	423.50	425.00	425.45	428.65	434.50	433.32	Pipe - (16)
65	64	165.213	0.00	0.00	0.00	0.00	0.00	5.0	9.6	0.0	7.55	0.00	4.27	18	1.82	425.00	428.00	429.54	430.26	433.32	438.09	Pipe - (13)
66	65	192.294	0.00	0.00	0.00	0.00	0.00	5.0	8.7	0.0	4.27	0.00	4.19	15	5.98	428.00	439.50	430.69	440.34	438.09	448.20	Pipe - (12)

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
67	66	33.674	0.00	0.00	0.00	0.00	0.00	5.0	8.4	0.0	2.72	0.00	3.62	15	1.48	439.50	440.00	440.34	440.66	448.20	448.53	Pipe - (14)
68	67	172.625	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.03	0.00	2.31	15	1.45	440.00	442.50	440.66	442.90	448.53	451.00	Pipe - (10)
69	65	20.277	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.50	0.00	1.22	15	0.99	428.00	428.20	430.69	430.70	438.09	438.09	Pipe - (15)
70	59	168.359	0.00	0.00	0.00	0.00	0.00	5.0	5.2	0.0	3.23	0.00	2.63	15	1.00	413.85	415.53	416.49	416.85	423.29	424.75	Pipe - (29)
71	70	19.738	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.78	0.00	4.19	15	1.01	421.10	421.30	421.53	421.83	424.75	424.75	Pipe - (28)
72	62	153.378	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	3.56	0.00	2.90	15	0.98	417.50	419.00	421.72	422.12	425.74	423.00	Pipe - (26)
73	61	50.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.34	0.00	1.91	15	2.00	413.00	414.00	420.35	420.41	424.67	421.00	

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
1	1.09	1.09	Offsite	0.20	0.50	0.90	6.97	1.04	0.050	0.020	....	178.669	1.21	1.04**	Outfall	0.00	871428.86	375.29	375.37	0.000
2	0.89	0.89	Offsite	0.20	0.50	0.90	23.27	0.85	0.050	0.020	....	77.404	1.04	0.85**	1	0.00	871400.03	375.17	388.23	0.000
3	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-89.493	0.00	0.00**	2	0.00	871380.37	388.15	387.92	0.000
4	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-15.103	0.00	0.00**	1	0.00	871409.65	378.31	378.45	0.000
5	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-118.049	0.00	0.00**	1	0.00	871488.88	374.93	374.78	0.000
6	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	77.965	0.00	0.00**	5	0.00	871473.85	374.88	374.86	0.000
7	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-92.256	0.00	0.00**	Outfall	0.00	872179.53	384.34	382.57	0.000
8	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.056	0.00	0.00**	7	0.00	872176.87	392.03	392.43	0.000
9	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-22.364	0.00	0.00**	8	0.00	872161.30	396.13	399.09	0.000
10	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.219	0.00	0.00**	9	0.00	872148.72	405.38	410.39	0.000
11	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-34.174	0.00	0.00**	10	0.00	872050.79	411.97	416.37	0.000
12	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	0.010	0.00	0.00**	11	0.00	872033.35	417.71	417.85	0.000
13	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	89.964	0.00	0.00**	12	0.00	872098.07	418.82	419.86	0.000
14	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-4.096	0.00	0.00**	13	0.00	872167.65	421.26	424.57	0.000
15	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-38.754	0.00	0.00**	14	0.00	872158.88	425.98	425.76	0.000
16	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-47.123	0.00	0.00**	15	0.00	872030.09	428.41	430.50	0.000
17	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	0.038	0.00	0.00**	16	0.00	871901.35	432.62	433.68	0.000
18	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-3.588	0.00	0.00**	17	0.00	871772.45	434.68	435.09	0.000
19	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-101.174	0.00	0.00**	18	0.00	871766.78	439.87	439.98	0.000
20	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-26.117	0.00	0.00**	18	0.00	871642.41	435.26	437.47	0.000
21	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-90.562	0.00	0.00**	17	0.00	871891.14	434.51	434.50	0.000
22	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-90.012	0.00	0.00**	16	0.00	872019.84	432.10	432.09	0.000
23	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-76.540	0.00	0.00**	12	0.00	871944.84	419.00	419.96	0.000

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
24	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	96.384	0.00	0.00**	23	0.00	871864.54	422.52	425.35	0.000
25	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	64.013	0.00	0.00**	10	0.00	872216.87	415.89	420.01	0.000
26	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	78.015	0.00	0.00**	8	0.00	872253.44	393.68	393.48	0.000
27	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	17.880	0.00	0.00**	26	0.00	872435.03	395.40	396.55	0.000
28	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-86.188	0.00	0.00**	27	0.00	872450.64	399.59	405.71	0.000
29	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	29.580	0.00	0.00**	28	0.00	872509.34	414.34	419.25	0.000
30	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-39.286	0.00	0.00**	28	0.00	872383.96	408.77	420.85	0.000
31	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-176.000	0.00	0.00**	Outfall	0.00	871524.51	380.69	380.19	0.000
32	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-17.000	0.00	0.00**	31	0.00	871453.01	381.08	380.56	0.000
33	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	100.995	0.00	0.00**	32	0.00	871447.74	387.46	392.11	0.000
34	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	20.707	0.00	0.00**	33	0.00	871463.13	394.90	394.48	0.000
35	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-20.554	0.00	0.00**	34	0.00	871453.94	396.34	410.66	0.000
36	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-13.986	0.00	0.00**	35	0.00	871417.60	412.20	417.44	0.000
37	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-14.690	0.00	0.00**	36	0.00	871390.58	418.71	418.50	0.000
38	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-19.423	0.00	0.00**	37	0.00	871354.55	420.14	419.89	0.000
39	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-9.419	0.00	0.00**	38	0.00	871250.73	421.12	421.79	0.000
40	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	54.984	0.00	0.00**	39	0.00	871240.76	424.02	426.00	0.000
41	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	20.177	0.00	0.00**	40	0.00	871284.75	428.62	430.89	0.000
42	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-12.665	0.00	0.00**	41	0.00	871293.15	431.36	435.75	0.000
43	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	4.401	0.00	0.00**	42	0.00	871311.54	435.98	440.09	0.000
44	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	28.774	0.00	0.00**	43	0.00	871375.48	440.22	442.87	0.000
45	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	90.444	0.00	0.00**	42	0.00	871313.20	435.96	435.55	0.000
46	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	107.575	0.00	0.00**	40	0.00	871260.47	430.71	430.83	0.000

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
47	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	77.472	0.00	0.00**	41	0.00	871304.63	431.06	430.43	0.000
48	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-107.619	0.00	0.00**	34	0.00	871434.20	394.55	394.20	0.000
49	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-50.282	0.00	0.00**	32	0.00	871394.63	380.57	382.09	0.000
50	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	21.543	0.00	0.00**	49	0.00	871287.45	382.15	386.39	0.000
51	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	74.652	0.00	0.00**	50	0.00	871270.47	386.45	386.59	0.000
52	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	108.231	0.00	0.00**	49	0.00	871380.34	382.15	382.14	0.000
53	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	21.738	0.00	0.00**	32	0.00	871433.43	380.83	380.59	0.000
54	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	17.579	0.00	0.00**	53	0.00	871350.17	380.83	380.79	0.000
55	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-130.308	0.00	0.00**	Outfall	0.00	871793.56	381.22	380.75	0.000
56	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	8.835	0.00	0.00**	55	0.00	871774.61	385.02	388.24	0.000
57	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	0.102	0.00	0.00**	56	0.00	871756.25	399.62	402.84	0.000
58	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.157	0.00	0.00**	57	0.00	871699.41	412.78	412.97	0.000
59	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.808	0.00	0.00**	58	0.00	871688.58	414.79	413.86	0.000
60	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-80.955	0.00	0.00**	59	0.00	871582.75	417.31	417.49	0.000
61	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	20.347	0.00	0.00**	60	0.00	871421.48	418.73	419.25	0.000
62	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	112.988	0.00	0.00**	61	0.00	871494.55	420.73	421.19	0.000
63	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.103	0.00	0.00**	62	0.00	871532.48	423.15	424.74	0.000
64	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-3.650	0.00	0.00**	63	0.00	871564.13	426.88	428.65	0.000
65	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-21.253	0.00	0.00**	64	0.00	871549.84	429.82	430.26	0.000
66	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-6.191	0.00	0.00**	65	0.00	871512.64	430.88	440.34	0.000
67	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-19.615	0.00	0.00**	66	0.00	871495.42	440.60	440.66	0.000
68	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-55.300	0.00	0.00**	67	0.00	871323.20	440.81	442.90	0.000
69	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	85.629	0.00	0.00**	65	0.00	871569.85	430.71	430.70	0.000

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
70	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	79.156	0.00	0.00**	59	0.00	871811.35	416.60	416.85	0.000
71	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	96.881	0.00	0.00**	70	0.00	871823.03	421.73	421.83	0.000
72	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	71.930	0.00	0.00**	62	0.00	871647.84	421.85	422.12	0.000
73	0.00	0.00	Sag	0.20	0.50	0.90	0.00	0.00	0.050	0.020	4.05	-80.000	0.00	0.00**	61	0.00	871415.33	420.41	420.41	0.000

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
6.66	0.000	0.000	....	2.00	2.00	375.36	381.80	0.15	0.010	4.58	2.00	374.71	374.79	374.79	....	....	0.00	0.61	0.15	89
4.40	0.000	0.000	....	2.00	2.00	381.80	391.07	0.19	0.010	6.34	2.00	374.79	387.85 j	387.85	375.92	376.01	0.00	1.17	0.19	76
3.23	0.000	0.000	....	2.00	2.00	391.07	391.07	0.26	0.010	9.86	2.00	387.85	387.92	387.92	....	....	0.00	3.23	0.26	56
0.61	0.000	0.000	....	2.00	2.00	381.80	381.80	0.15	0.010	4.58	2.00	378.20	378.45	378.45	....	....	0.00	0.61	0.15	89
1.04	0.000	0.000	....	2.00	2.00	381.80	378.46	0.14	0.010	4.20	2.00	374.79	374.78	374.78	....	....	0.00	0.52	0.14	92
0.52	0.000	0.000	....	2.00	2.00	378.46	378.46	0.14	0.010	4.20	2.00	374.78	374.86	374.86	....	....	0.00	0.52	0.14	92
66.34	0.000	0.000	....	2.00	2.00	382.13	394.00	0.00	0.010	0.00	2.00	381.50	382.57	383.99	....	....	0.00	0.00	0.00	0
66.34	0.000	0.000	....	2.00	2.00	394.00	398.00	0.31	0.010	12.43	2.00	389.14	392.43	392.43	....	....	0.00	5.72	0.31	46
32.38	0.000	0.000	....	2.00	2.00	398.00	410.00	0.00	0.010	0.00	2.00	394.40	399.09	399.09	....	....	0.00	0.00	0.00	0
32.38	0.000	0.000	....	2.00	2.00	410.00	422.00	0.00	0.010	0.00	2.00	403.66	410.39	410.39	....	....	0.00	0.00	0.00	0
30.74	0.000	0.000	....	2.00	2.00	422.00	427.62	0.21	0.010	7.28	2.00	410.39	416.37	416.37	....	....	0.00	1.59	0.21	70
29.15	0.000	0.000	....	2.00	2.00	427.62	427.62	0.18	0.010	5.97	2.00	416.37	417.85	417.85	....	....	0.00	1.03	0.18	79
13.36	0.000	0.000	....	2.00	2.00	427.62	429.48	0.21	0.010	7.75	2.00	417.85	419.86	419.86	....	....	0.00	1.83	0.21	67
11.53	0.000	0.000	....	2.00	2.00	429.48	432.26	0.00	0.010	0.00	2.00	419.86	424.57	424.57	....	....	0.00	0.00	0.00	0
11.53	0.000	0.000	....	2.00	2.00	432.26	433.38	0.20	0.010	6.90	2.00	424.61	425.76	427.35	....	....	0.00	1.41	0.20	72
10.12	0.000	0.000	....	2.00	2.00	433.38	436.48	0.20	0.010	6.99	2.00	427.35	430.50	432.08	....	....	0.00	1.45	0.20	72
7.22	0.000	0.000	....	2.00	2.00	436.48	439.78	0.20	0.010	7.10	2.00	432.08	433.68	434.49	....	....	0.00	1.50	0.20	71
4.31	0.000	0.000	....	2.00	2.00	439.78	442.94	0.20	0.010	6.99	2.00	434.49	435.09	435.09	....	....	0.00	1.45	0.20	72
1.45	0.000	0.000	....	2.00	2.00	442.94	442.94	0.20	0.010	6.99	2.00	439.69	439.98	439.98	....	....	0.00	1.45	0.20	72
1.41	0.000	0.000	....	2.00	2.00	442.94	445.72	0.20	0.010	6.90	2.00	435.09	437.47	437.47	....	....	0.00	1.41	0.20	72
1.41	0.000	0.000	....	2.00	2.00	439.78	439.78	0.20	0.010	6.90	2.00	434.49	434.50	434.52	....	....	0.00	1.41	0.20	72
1.45	0.000	0.000	....	2.00	2.00	436.48	436.48	0.20	0.010	6.99	2.00	432.08	432.09	432.11	....	....	0.00	1.45	0.20	72
14.76	0.000	0.000	....	2.00	2.00	427.62	426.21	0.19	0.010	6.68	2.00	417.85	419.96	419.96	....	....	0.00	1.31	0.19	74

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
13.45	0.000	0.000	....	2.00	2.00	426.21	427.00	0.41	0.010	17.39	2.00	420.65	425.35	427.21	....	....	0.00	13.45	0.41	34
1.64	0.000	0.000	....	2.00	2.00	422.00	423.00	0.21	0.010	7.38	2.00	415.70	420.01	420.01	....	....	0.00	1.64	0.21	69
28.24	0.000	0.000	....	2.00	2.00	398.00	395.00	0.09	0.010	1.80	2.00	392.43	393.48	394.16	....	....	0.00	0.14	0.09	100
28.10	0.000	0.000	....	2.00	2.00	395.00	397.00	0.17	0.010	5.28	2.00	394.16	396.55	398.41	....	....	0.00	0.80	0.17	84
27.30	0.000	0.000	....	2.00	2.00	397.00	414.30	0.16	0.010	5.11	2.00	398.41	405.71	405.71	....	....	0.00	0.75	0.16	85
22.14	0.000	0.000	....	2.00	2.00	414.30	419.86	0.48	0.010	21.07	2.00	409.28	419.25	419.25	....	....	0.00	22.14	0.48	28
4.41	0.000	0.000	....	2.00	2.00	414.30	427.50	0.28	0.010	11.19	2.00	408.38	420.85	420.85	....	....	0.00	4.41	0.28	50
37.94	0.000	0.000	....	2.00	2.00	383.00	389.50	0.00	0.010	0.00	2.00	379.80	380.19	380.19	....	....	0.00	0.00	0.00	0
37.94	0.000	0.000	....	2.00	2.00	389.50	415.05	0.15	0.010	4.37	2.00	380.19	380.56	380.56	....	....	0.00	0.56	0.15	90
23.61	0.000	0.000	....	2.00	2.00	415.05	415.80	0.00	0.010	0.00	2.00	384.67	392.11	392.11	....	....	0.00	0.00	0.00	0
23.61	0.000	0.000	....	2.00	2.00	415.80	416.05	0.28	0.010	10.93	2.00	392.11	394.48	394.48	....	....	0.00	4.16	0.28	51
19.17	0.000	0.000	....	2.00	2.00	416.05	417.47	0.21	0.010	7.66	2.00	394.48	410.66	410.66	....	....	0.00	1.78	0.21	67
17.39	0.000	0.000	....	2.00	2.00	417.47	421.48	0.21	0.010	7.66	2.00	410.66	417.44	417.44	....	....	0.00	1.78	0.21	67
15.61	0.000	0.000	....	2.00	2.00	421.48	421.83	0.22	0.010	7.91	2.00	417.50	418.50	419.21	....	....	0.00	1.92	0.22	66
13.69	0.000	0.000	....	2.00	2.00	421.83	424.03	0.19	0.010	6.58	2.00	419.21	419.89	420.35	....	....	0.00	1.27	0.19	74
12.42	0.000	0.000	....	2.00	2.00	424.03	429.11	0.20	0.010	6.90	2.00	420.35	421.79	422.77	....	....	0.00	1.41	0.20	72
11.01	0.000	0.000	....	2.00	2.00	429.11	433.82	0.19	0.010	6.46	2.00	422.77	426.00	427.88	....	....	0.00	1.22	0.19	75
8.48	0.000	0.000	....	2.00	2.00	433.82	439.06	0.20	0.010	7.10	2.00	427.88	430.89	430.89	....	....	0.00	1.50	0.20	71
5.53	0.000	0.000	....	2.00	2.00	439.06	443.95	0.20	0.010	6.99	2.00	430.89	435.75	435.75	....	....	0.00	1.45	0.20	72
2.16	0.000	0.000	....	2.00	2.00	443.95	448.33	0.19	0.010	6.58	2.00	435.75	440.09	440.09	....	....	0.00	1.27	0.19	74
0.89	0.000	0.000	....	2.00	2.00	448.33	451.27	0.17	0.010	5.56	2.00	440.09	442.87	442.87	....	....	0.00	0.89	0.17	82
1.92	0.000	0.000	....	2.00	2.00	443.95	443.95	0.22	0.010	7.91	2.00	435.75	435.55	435.55	....	....	0.00	1.92	0.22	66
1.31	0.000	0.000	....	2.00	2.00	433.82	433.82	0.19	0.010	6.68	2.00	430.55	430.83	430.83	....	....	0.00	1.31	0.19	74

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
1.45	0.000	0.000	....	2.00	2.00	439.06	439.06	0.20	0.010	6.99	2.00	430.89	430.43	430.43	....	....	0.00	1.45	0.20	72
0.28	0.000	0.000	....	2.00	2.00	416.05	399.86	0.12	0.010	2.82	2.00	394.48	394.20	394.20	....	....	0.00	0.28	0.12	99
0.74	0.000	0.000	....	2.00	2.00	415.05	386.83	0.12	0.010	2.82	2.00	380.56	382.09	382.09	....	....	0.00	0.28	0.12	99
0.23	0.000	0.000	....	2.00	2.00	386.83	389.65	0.00	0.010	0.00	2.00	382.09	386.39	386.39	....	....	0.00	0.00	0.00	0
0.23	0.000	0.000	....	2.00	2.00	389.65	389.65	0.11	0.010	2.42	2.00	386.39	386.59	386.59	....	....	0.00	0.23	0.11	100
0.23	0.000	0.000	....	2.00	2.00	386.83	386.83	0.11	0.010	2.42	2.00	382.09	382.14	382.14	....	....	0.00	0.23	0.11	100
13.03	0.000	0.000	....	2.00	2.00	415.05	388.93	0.18	0.010	6.23	2.00	380.56	380.59	380.75	....	....	0.00	1.13	0.18	77
11.90	0.000	0.000	....	2.00	2.00	388.93	382.40	0.39	0.010	16.58	2.00	380.75	380.79	380.88	....	....	0.00	11.90	0.39	36
28.48	0.000	0.000	....	2.00	2.00	421.97	422.29	0.00	0.010	0.00	2.00	379.84	380.75	381.39	....	....	0.00	0.00	0.00	0
28.48	0.000	0.000	....	2.00	2.00	422.29	422.47	0.00	0.010	0.00	2.00	383.64	388.24	388.24	....	....	0.00	0.00	0.00	0
28.48	0.000	0.000	....	2.00	2.00	422.47	422.64	0.00	0.010	0.00	2.00	398.23	402.84	402.84	....	....	0.00	0.00	0.00	0
28.48	0.000	0.000	....	2.00	2.00	422.64	423.19	0.18	0.010	6.10	2.00	411.50	412.97	413.61	....	....	0.00	1.08	0.18	78
27.40	0.000	0.000	....	2.00	2.00	423.19	423.29	0.19	0.010	6.58	2.00	413.61	413.86	416.49	....	....	0.00	1.27	0.19	74
22.90	0.000	0.000	....	2.00	2.00	423.29	423.86	0.19	0.010	6.58	2.00	416.49	417.49	417.99	....	....	0.00	1.27	0.19	74
21.63	0.000	0.000	....	2.00	2.00	423.86	424.67	0.27	0.010	10.72	2.00	417.99	419.25	420.35	....	....	0.00	3.96	0.27	52
15.33	0.000	0.000	....	2.00	2.00	424.67	425.74	0.00	0.010	0.00	2.00	420.35	421.19	421.72	....	....	0.00	0.00	0.00	0
11.77	0.000	0.000	....	2.00	2.00	425.74	434.50	0.00	0.010	0.00	2.00	421.72	424.74	425.45	....	....	0.00	0.00	0.00	0
11.77	0.000	0.000	....	2.00	2.00	434.50	433.32	0.28	0.010	10.99	2.00	425.45	428.65	429.54	....	....	0.00	4.22	0.28	51
7.55	0.000	0.000	....	2.00	2.00	433.32	438.09	0.21	0.010	7.66	2.00	429.54	430.26	430.69	....	....	0.00	1.78	0.21	67
4.27	0.000	0.000	....	2.00	2.00	438.09	448.20	0.20	0.010	7.20	2.00	430.69	440.34	440.34	....	....	0.00	1.55	0.20	70
2.72	0.000	0.000	....	2.00	2.00	448.20	448.53	0.21	0.010	7.48	2.00	440.34	440.66	440.66	....	....	0.00	1.69	0.21	68
1.03	0.000	0.000	....	2.00	2.00	448.53	451.00	0.18	0.010	5.97	2.00	440.66	442.90	442.90	....	....	0.00	1.03	0.18	79
1.50	0.000	0.000	....	2.00	2.00	438.09	438.09	0.20	0.010	7.10	2.00	430.69	430.70	430.72	....	....	0.00	1.50	0.20	71

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
3.23	0.000	0.000	....	2.00	2.00	423.29	424.75	0.20	0.010	6.99	2.00	416.49	416.85	417.01	....	....	0.00	1.45	0.20	72
1.78	0.000	0.000	....	2.00	2.00	424.75	424.75	0.21	0.010	7.66	2.00	421.53	421.83	421.83	....	....	0.00	1.78	0.21	67
3.56	0.000	0.000	....	2.00	2.00	425.74	423.00	0.27	0.010	10.26	2.00	421.72	422.12	422.25	....	....	0.00	3.56	0.27	54
2.34	0.000	0.000	....	....	....	424.67	421.00	0.32	Sag	13.02	2.00	420.35	420.41	420.47	....	....	0.00	2.34	0.32	100

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
2+99RT	On Grade		5.0	0.00	0.00	373.50	373.75	....	....	0.00	0.00	1.50 z	Grate	0.61	1,018	916	865	Pipe - (32)
4+20RT	On Grade		5.0	0.00	0.00	373.75	387.00	11.98	4.25	0.38	1.78	1.50 z	Grate	1.17	4,618	4,156	3,925	Pipe - (31)
4+20LT	On Grade		5.0	0.00	0.00	387.00	387.20	....	....	0.00	0.00	1.00	Grate	3.23	735	662	625	Pipe - (30)
2+99LT	On Grade		5.0	0.00	0.00	377.95	378.15	....	....	0.00	0.00	1.00	Grate	0.61	700	630	595	Pipe - (33)
1+67RT	On Grade		5.0	0.00	0.00	373.75	374.38	....	....	0.00	0.00	1.47	Grate	0.52	4,713	4,241	4,006	Pipe - (35)
1+67LT	On Grade		5.0	0.00	0.00	374.38	374.58	....	....	0.00	0.00	1.00	Grate	0.52	740	666	629	Pipe - (34)
Structure - (52)	On Grade		5.0	0.00	0.00	379.00	379.50	....	....	0.00	0.00	0.50	Grate	0.00	3,207	2,886	2,726	Pipe - (43)
CC CB7	On Grade		5.0	0.00	0.00	387.50	390.00	....	....	0.00	0.00	1.47	Grate	5.72	3,798	3,418	3,228	Pipe - (42)
CC MH3	On Grade		5.0	0.00	0.00	393.50	397.20	....	....	0.00	0.00	0.50	Grate	0.00	2,284	2,056	1,941	Pipe - (41)
CC MH2	On Grade		5.0	0.00	0.00	402.90	408.50	....	....	0.00	0.00	1.37	Grate	0.00	2,013	1,812	1,711	Pipe - (40)
3+0 LT	On Grade		5.0	0.00	0.00	408.86	414.50	....	....	0.00	0.00	0.50	Grate	1.59	8,140	7,326	6,919	Pipe - (39)
3+0 RT	On Grade		5.0	0.00	0.00	414.30	416.00	....	....	0.00	0.00	2.20	Grate	1.03	1,528	1,375	1,298	Pipe - (38)
1+75 RT	On Grade		5.0	0.00	0.00	416.50	418.50	....	....	0.00	0.00	0.50	Grate	1.83	7,080	6,372	6,018	Pipe - (37)
30+78RT	On Grade		5.0	0.00	0.00	418.75	423.36	....	....	0.00	0.00	1.01	Grate	0.00	7,378	6,640	6,271	Pipe - (36)
30+48LT	On Grade		5.0	0.00	0.00	423.36	424.00	....	....	0.00	0.00	1.16	Grate	1.41	2,030	1,827	1,726	Pipe - (56)
28+98LT	On Grade		5.0	0.00	0.00	424.00	427.25	....	....	0.00	0.00	1.50	Grate	1.45	6,890	6,201	5,857	Pipe - (55)
27+48LT	On Grade		5.0	0.00	0.00	427.25	431.00	....	....	0.00	0.00	1.50	Grate	1.50	6,890	6,201	5,857	Pipe - (54)
26+05LT	On Grade		5.0	0.00	0.00	431.00	434.25	....	....	0.00	0.00	1.67	Grate	1.45	6,665	5,999	5,665	Pipe - (53)
26_05RT	On Grade		5.0	0.00	0.00	439.30	439.50	....	....	0.00	0.00	1.00	Grate	1.45	700	630	595	Pipe - (57)
24+79LT	On Grade		5.0	0.00	0.00	434.25	437.00	....	....	0.00	0.00	1.00	Grate	1.41	5,990	5,391	5,092	Pipe - (52)
27+48RT	On Grade		5.0	0.00	0.00	431.00	431.20	....	....	0.00	0.00	1.00	Grate	1.41	1,040	936	884	Pipe - (58)
28+98RT	On Grade		5.0	0.00	0.00	427.25	427.45	....	....	0.00	0.00	1.00	Grate	1.45	1,018	916	865	Pipe - (59)
4+34 RT	On Grade		5.0	0.00	0.00	416.50	418.56	....	....	0.00	0.00	1.50	Grate	1.31	6,593	5,933	5,604	Pipe - (45)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82 -- Return period = 25 Yrs. ; ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
CC CB 1	On Grade		5.0	0.00	0.00	419.40	423.00	....	....	0.00	0.00	1.00	Grate	13.45	4,728	4,255	4,018	Pipe - (44)
CC CB6	On Grade		5.0	0.00	0.00	415.41	419.50	....	....	0.00	0.00	1.00	Grate	1.64	3,895	3,506	3,311	Pipe - (46)
CC CB5A	On Grade		5.0	0.00	0.00	390.10	390.90	....	....	0.00	0.00	0.54	Grate	0.14	3,912	3,521	3,325	Pipe - (50)
CC CB 5	On Grade		5.0	0.00	0.00	390.90	391.80	....	....	0.00	0.00	1.50	Grate	0.80	8,106	7,295	6,890	Pipe - (49)
CC CB4	On Grade		5.0	0.00	0.00	391.80	403.90	....	....	0.00	0.00	1.02	Grate	0.75	6,790	6,111	5,771	Pipe - (48)
FE	On Grade		5.0	0.00	0.00	408.25	418.00	....	....	0.00	0.00	1.00	Grate	22.14	3,268	2,941	2,777	Pipe - (47)
33+47	On Grade		5.0	0.00	0.00	408.00	420.00	....	....	0.00	0.00	1.00	Grate	4.41	5,170	4,653	4,395	Pipe - (51)
XC5	On Grade		5.0	0.00	0.00	377.50	378.19	....	....	0.00	0.00	0.51	Grate	0.00	2,126	1,913	1,807	Pipe - (83)
12+18RT	On Grade		5.0	0.00	0.00	378.19	378.56	....	....	0.00	0.00	2.15	Grate	0.56	7,370	6,633	6,264	Pipe - (82)
13+95	On Grade		5.0	0.00	0.00	383.50	390.63	....	....	0.00	0.00	0.61	Grate	0.00	11,288	10,159	9,594	Pipe - (74)
14+XRT	On Grade		5.0	0.00	0.00	390.63	393.00	....	....	0.00	0.00	1.50	Grate	4.16	3,563	3,206	3,028	Pipe - (73)
17+0	On Grade		5.0	0.00	0.00	393.00	409.20	....	....	0.00	0.00	0.50	Grate	1.78	18,690	16,821	15,887	Pipe - (72)
11+26LT	On Grade		5.0	0.00	0.00	409.20	416.00	....	....	0.00	0.00	0.50	Grate	1.78	6,043	5,438	5,136	Pipe - (71)
11+62RT	On Grade		5.0	0.00	0.00	416.00	416.53	....	....	0.00	0.00	0.58	Grate	1.92	2,240	2,016	1,904	Pipe - (67)
12+14RT	On Grade		5.0	0.00	0.00	416.53	417.00	....	....	0.00	0.00	0.50	Grate	1.27	2,150	1,935	1,828	Pipe - (66)
13+37LT	On Grade		5.0	0.00	0.00	417.00	418.20	....	....	0.00	0.00	1.27	Grate	1.41	6,168	5,551	5,242	Pipe - (65)
14+63LT	On Grade		5.0	0.00	0.00	420.65	424.35	....	....	0.00	0.00	1.50	Grate	1.22	5,990	5,391	5,092	Pipe - (64)
16+28lt	On Grade		5.0	0.00	0.00	424.35	429.75	....	....	0.00	0.00	1.47	Grate	1.50	7,408	6,667	6,296	Pipe - (63)
17+28LT	On Grade		5.0	0.00	0.00	429.75	434.80	....	....	0.00	0.00	1.50	Grate	1.45	7,070	6,363	6,010	Pipe - (62)
19+20	On Grade		5.0	0.00	0.00	434.80	439.50	....	....	0.00	0.00	0.81	Grate	1.27	6,440	5,796	5,474	Pipe - (61)
20+24	On Grade		5.0	0.00	0.00	439.50	442.50	....	....	0.00	0.00	1.00	Grate	0.89	4,978	4,480	4,231	Pipe - (60)
17+28RT	On Grade		5.0	0.00	0.00	434.80	435.00	....	....	0.00	0.00	1.00	Grate	1.92	1,040	936	884	Pipe - (70)
14+63RT	On Grade		5.0	0.00	0.00	430.18	430.38	....	....	0.00	0.00	1.00	Grate	1.31	700	630	595	Pipe - (69)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82 -- Return period = 25 Yrs. ; ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
16+28RT	On Grade		5.0	0.00	0.00	429.75	429.95	....	....	0.00	0.00	1.00	Grate	1.45	1,018	916	865	Pipe - (68)
14+XLT	On Grade		5.0	0.00	0.00	393.25	394.00	....	....	0.00	0.00	1.00	Grate	0.28	1,755	1,580	1,492	Pipe - (75)
10+92RT	On Grade		5.0	0.00	0.00	379.31	381.75	....	....	0.00	0.00	1.50	Grate	0.28	8,165	7,349	6,940	Pipe - (78)
9+45RT	On Grade		5.0	0.00	0.00	381.75	386.20	....	....	0.00	0.00	1.46	Grate	0.00	4,880	4,392	4,148	Pipe - (77)
9+45LT	On Grade		5.0	0.00	0.00	386.20	386.40	....	....	0.00	0.00	1.00	Grate	0.23	700	630	595	Pipe - (76)
10+92LT	On Grade		5.0	0.00	0.00	381.75	381.95	....	....	0.00	0.00	1.00	Grate	0.23	820	738	697	Pipe - (79)
12+18LT	On Grade		5.0	0.00	0.00	378.56	378.76	....	....	0.00	0.00	0.53	Grate	1.13	1,733	1,559	1,473	Pipe - (81)
FE-IN	On Grade		5.0	0.00	0.00	378.76	378.75	....	....	0.00	0.00	1.00	Grate	11.90	5,602	5,042	4,762	Pipe - (80)
Structure - (32)	On Grade		5.0	0.00	0.00	378.00	378.65	....	....	0.00	0.00	0.50	Grate	0.00	5,440	4,896	4,624	Pipe - (25)
Structure - (31)	On Grade		5.0	0.00	0.00	382.80	386.40	....	....	0.00	0.00	0.50	Grate	0.00	3,060	2,754	2,601	Pipe - (24)
Structure - (30)	On Grade		5.0	0.00	0.00	397.40	401.00	....	....	0.00	0.00	0.50	Grate	0.00	2,975	2,678	2,529	Pipe - (23)
7+50LT	On Grade		5.0	0.00	0.00	409.50	410.59	....	....	0.00	0.00	0.50	Grate	1.08	7,755	6,980	6,592	Pipe - (22)
7+50RT	On Grade		5.0	0.00	0.00	410.59	410.79	....	....	0.00	0.00	2.22	Grate	1.27	1,560	1,404	1,326	Pipe - (21)
8+69RT	On Grade		5.0	0.00	0.00	410.79	411.50	....	....	0.00	0.00	0.60	Grate	1.27	8,210	7,389	6,979	Pipe - (20)
10+33RT	On Grade		5.0	0.00	0.00	411.50	412.50	....	....	0.00	0.00	1.50	Grate	3.96	11,430	10,287	9,716	Pipe - (19)
CC 3	On Grade		5.0	0.00	0.00	412.50	416.75	....	....	0.00	0.00	1.44	Grate	0.00	13,700	12,330	11,645	Pipe - (18)
CC MH1	On Grade		5.0	0.00	0.00	417.50	423.50	....	....	0.00	0.00	0.50	Grate	0.00	5,348	4,813	4,545	Pipe - (17)
3+76RT	On Grade		5.0	0.00	0.00	423.50	425.00	....	....	0.00	0.00	0.62	Grate	4.22	5,413	4,871	4,601	Pipe - (16)
2+11rt	On Grade		5.0	0.00	0.00	425.00	428.00	....	....	0.00	0.00	1.50	Grate	1.78	8,443	7,598	7,176	Pipe - (13)
23+25RT	On Grade		5.0	0.00	0.00	428.00	439.50	....	....	0.00	0.00	0.58	Grate	1.55	8,840	7,956	7,514	Pipe - (12)
23+25LT	On Grade		5.0	0.00	0.00	439.50	440.00	....	....	0.00	0.00	1.28	Grate	1.69	1,648	1,483	1,400	Pipe - (14)
21+52	On Grade		5.0	0.00	0.00	440.00	442.50	....	....	0.00	0.00	1.00	Grate	1.03	7,903	7,112	6,717	Pipe - (10)
2+11LT	On Grade		5.0	0.00	0.00	428.00	428.20	....	....	0.00	0.00	1.00	Grate	1.50	1,085	977	922	Pipe - (15)

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NOTES: Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82 -- Return period = 25 Yrs. ; ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
5+80RT	On Grade		5.0	0.00	0.00	413.85	415.53	....	....	0.00	0.00	1.50	Grate	1.45	7,700	6,930	6,545	Pipe - (29)
5+80LT	On Grade		5.0	0.00	0.00	421.10	421.30	....	....	0.00	0.00	1.00	Grate	1.78	685	617	582	Pipe - (28)
CC 2	On Grade		5.0	0.00	0.00	417.50	419.00	....	....	0.00	0.00	1.00	Grate	3.56	5,903	5,312	5,017	Pipe - (26)
	Sag		0.0	0.00	0.00	413.00	414.00	....	....	0.00	0.00	1.00	Curb	2.34	2,413	2,171	2,051	

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MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
25.195	15	0.99	Cir	0.0	0.013	0.012	n/a	688949.93	0.08	0.07	0.54	0.00	15	0.00	15	0.00	0.00	0.00	8.2	....
119.778	15	11.06	Cir	0.0	0.013	0.012	n/a	689066.18	0.56	0.28	0.89	0.00	15	0.00	15	0.00	0.00	0.00	5.1	....
20.216	15	0.99	Cir	0.0	0.013	0.012	n/a	689061.49	0.13	1.43	1.80	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.027	15	1.00	Cir	0.0	0.013	0.012	n/a	688944.26	0.67	0.07	0.54	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
122.337	15	0.51	Cir	0.0	0.013	0.012	n/a	688843.32	2.41	0.04	0.48	0.00	15	0.00	15	0.00	0.00	0.00	5.8	....
20.035	15	1.00	Cir	0.0	0.013	0.012	n/a	688830.07	0.79	0.04	0.48	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
48.007	30	1.04	Cir	0.0	0.013	0.012	n/a	690555.33	0.06	-nan(ind).00	-nan(ind).00	0.00	30	0.00	30	0.00	0.00	0.00	9.4	....
65.929	30	3.79	Cir	0.0	0.013	0.012	n/a	690621.21	0.08	3.09	2.63	0.00	30	0.00	30	0.00	0.00	0.00	9.3	....
37.291	24	9.92	Cir	0.0	0.013	0.012	n/a	690655.09	0.06	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	9.2	....
29.905	24	18.73	Cir	0.0	0.013	0.012	n/a	690682.22	0.05	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	9.2	....
114.159	24	4.94	Cir	0.0	0.013	0.012	n/a	690740.90	0.19	0.48	1.11	0.00	24	0.00	24	0.00	0.00	0.00	9.0	....
20.331	24	8.36	Cir	0.0	0.013	0.012	n/a	690751.35	0.04	0.22	0.81	0.00	24	0.00	24	0.00	0.00	0.00	8.9	....
126.011	18	1.59	Cir	0.0	0.013	0.012	n/a	690859.47	0.28	0.61	1.22	0.00	18	0.00	18	0.00	0.00	0.00	8.7	....
154.272	15	2.99	Cir	0.0	0.013	0.012	n/a	690997.16	0.27	-nan(ind).00	-nan(ind).00	0.00	15	0.00	15	0.00	0.00	0.00	8.4	....
42.372	15	1.51	Cir	0.0	0.013	0.012	n/a	691038.62	0.08	0.39	1.02	0.00	15	0.00	15	0.00	0.00	0.00	8.3	....
150.146	15	2.16	Cir	0.0	0.013	0.012	n/a	691115.80	0.30	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	8.0	....
150.143	15	2.50	Cir	0.0	0.013	0.012	n/a	691193.06	0.43	0.44	1.06	0.00	15	0.00	15	0.00	0.00	0.00	7.6	....
145.164	15	2.24	Cir	0.0	0.013	0.012	n/a	691259.82	0.69	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	6.9	....
20.331	15	0.98	Cir	0.0	0.013	0.012	n/a	691240.30	0.29	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
130.074	15	2.11	Cir	0.0	0.013	0.012	n/a	691262.69	1.89	0.39	1.02	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.184	15	0.99	Cir	0.0	0.013	0.012	n/a	691175.65	0.29	0.39	1.02	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
19.955	15	1.00	Cir	0.0	0.013	0.012	n/a	691098.68	0.28	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
126.506	18	1.63	Cir	0.0	0.013	0.012	n/a	690660.97	0.25	0.35	0.96	0.00	18	0.00	18	0.00	0.00	0.00	5.2	....

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
127.017	15	2.83	Cir	0.0	0.013	0.012	n/a	690759.38	0.19	8.88	4.57	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
108.029	15	3.79	Cir	0.0	0.013	0.012	n/a	690766.04	1.35	0.51	1.13	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
79.019	24	1.01	Cir	0.0	0.013	0.012	n/a	690640.72	0.15	0.00	0.14	0.00	24	0.00	24	0.00	0.00	0.00	6.2	....
181.944	24	0.49	Cir	0.0	0.013	0.012	n/a	690629.35	0.34	0.13	0.67	0.00	24	0.00	24	0.00	0.00	0.00	5.8	....
121.251	24	9.98	Cir	0.0	0.013	0.012	n/a	690749.59	0.23	0.11	0.64	0.00	24	0.00	24	0.00	0.00	0.00	5.6	....
97.602	15	9.99	Cir	0.0	0.013	0.012	n/a	690827.57	0.09	15.88	6.26	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
126.206	15	9.51	Cir	0.0	0.013	0.012	n/a	690856.75	0.59	2.19	2.22	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
30.000	36	2.30	Cir	0.0	0.013	0.012	n/a	689846.16	0.09	-nan(ind).00	-nan(ind).00	0.00	36	0.00	36	0.00	0.00	0.00	23.4	....
73.386	36	0.50	Cir	0.0	0.013	0.012	n/a	689829.65	0.23	0.05	0.51	0.00	36	0.00	36	0.00	0.00	0.00	23.2	....
150.569	18	4.74	Cir	0.0	0.013	0.012	n/a	689980.12	0.19	-nan(ind).00	-nan(ind).00	0.00	18	0.00	18	0.00	0.00	0.00	11.2	....
47.994	18	4.94	Cir	0.0	0.013	0.012	n/a	690025.58	0.06	2.02	2.14	0.00	18	0.00	18	0.00	0.00	0.00	11.2	....
284.334	18	5.70	Cir	0.0	0.013	0.012	n/a	690309.77	0.44	0.58	1.20	0.00	18	0.00	18	0.00	0.00	0.00	10.7	....
133.139	18	5.11	Cir	0.0	0.013	0.012	n/a	690437.85	0.23	0.58	1.20	0.00	18	0.00	18	0.00	0.00	0.00	10.5	....
53.198	18	1.00	Cir	0.0	0.013	0.012	n/a	690483.68	0.10	0.66	1.26	0.00	18	0.00	18	0.00	0.00	0.00	10.4	....
47.067	18	1.00	Cir	0.0	0.013	0.012	n/a	690513.96	0.10	0.33	0.94	0.00	18	0.00	18	0.00	0.00	0.00	10.3	....
120.653	18	0.99	Cir	0.0	0.013	0.012	n/a	690575.43	0.29	0.39	1.02	0.00	18	0.00	18	0.00	0.00	0.00	10.0	....
130.403	15	2.84	Cir	0.0	0.013	0.012	n/a	690705.46	0.24	0.30	0.92	0.00	15	0.00	15	0.00	0.00	0.00	9.8	....
161.656	15	3.34	Cir	0.0	0.013	0.012	n/a	690861.01	0.39	0.44	1.06	0.00	15	0.00	15	0.00	0.00	0.00	9.4	....
154.069	15	3.28	Cir	0.0	0.013	0.012	n/a	691014.85	0.57	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	8.8	....
140.369	15	3.35	Cir	0.0	0.013	0.012	n/a	691154.01	1.33	0.33	0.94	0.00	15	0.00	15	0.00	0.00	0.00	7.5	....
107.999	15	2.78	Cir	0.0	0.013	0.012	n/a	691241.05	2.48	0.16	0.73	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.089	15	1.00	Cir	0.0	0.013	0.012	n/a	691013.60	0.21	0.66	1.26	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.249	15	0.99	Cir	0.0	0.013	0.012	n/a	690700.84	0.32	0.35	0.96	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
19.915	15	1.00	Cir	0.0	0.013	0.012	n/a	690859.88	0.28	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
28.928	15	2.59	Cir	0.0	0.013	0.012	n/a	690026.13	2.11	0.00	0.28	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
129.835	15	1.88	Cir	0.0	0.013	0.012	n/a	689713.67	3.59	0.00	0.28	0.00	15	0.00	15	0.00	0.00	0.00	19.6	....
143.637	15	3.10	Cir	0.0	0.013	0.012	n/a	689618.05	12.77	-nan(ind).00	-nan(ind).00	0.00	15	0.00	15	0.00	0.00	0.00	6.8	....
20.226	15	0.99	Cir	0.0	0.013	0.012	n/a	689629.04	1.80	0.00	0.23	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.197	15	0.99	Cir	0.0	0.013	0.012	n/a	689727.94	1.80	0.00	0.23	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
19.805	24	1.01	Cir	0.0	0.013	0.012	n/a	689832.66	0.08	0.26	0.87	0.00	24	0.00	24	0.00	0.00	0.00	5.9	....
92.886	36	-0.01	Cir	0.0	0.013	0.012	n/a	689873.84	0.92	7.68	4.22	0.00	36	0.00	36	0.00	0.00	0.00	5.0	....
64.098	24	1.01	Cir	0.0	0.013	0.012	n/a	690314.64	0.12	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	12.4	....
36.295	24	9.92	Cir	0.0	0.013	0.012	n/a	690345.59	0.07	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	12.3	....
35.254	24	10.21	Cir	0.0	0.013	0.012	n/a	690375.69	0.06	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	12.3	....
108.716	24	1.00	Cir	0.0	0.013	0.012	n/a	690468.36	0.20	0.24	0.84	0.00	24	0.00	24	0.00	0.00	0.00	12.1	....
20.237	24	0.99	Cir	0.0	0.013	0.012	n/a	690485.46	0.04	0.33	0.94	0.00	24	0.00	24	0.00	0.00	0.00	12.0	....
115.221	24	0.62	Cir	0.0	0.013	0.012	n/a	690439.90	0.26	0.33	0.94	0.00	24	0.00	24	0.00	0.00	0.00	11.8	....
161.486	24	0.62	Cir	0.0	0.013	0.012	n/a	690431.61	0.39	1.89	2.07	0.00	24	0.00	24	0.00	0.00	0.00	11.4	....
213.210	24	1.99	Cir	0.0	0.013	0.012	n/a	690631.90	0.73	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	10.6	....
111.216	15	5.39	Cir	0.0	0.013	0.012	n/a	690736.45	0.19	-nan(ind).00	-nan(ind).00	0.00	15	0.00	15	0.00	0.00	0.00	10.4	....
112.817	15	1.33	Cir	0.0	0.013	0.012	n/a	690844.74	0.20	2.06	2.16	0.00	15	0.00	15	0.00	0.00	0.00	10.2	....
165.213	18	1.82	Cir	0.0	0.013	0.012	n/a	691009.33	0.64	0.58	1.20	0.00	18	0.00	18	0.00	0.00	0.00	9.6	....
192.294	15	5.98	Cir	0.0	0.013	0.012	n/a	691197.99	0.92	0.46	1.09	0.00	15	0.00	15	0.00	0.00	0.00	8.7	....
33.674	15	1.48	Cir	0.0	0.013	0.012	n/a	691226.93	0.25	0.53	1.16	0.00	15	0.00	15	0.00	0.00	0.00	8.4	....
172.625	15	1.45	Cir	0.0	0.013	0.012	n/a	691238.76	3.43	0.22	0.81	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.277	15	0.99	Cir	0.0	0.013	0.012	n/a	691012.62	0.28	0.44	1.06	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
168.359	15	1.00	Cir	0.0	0.013	0.012	n/a	690600.67	1.07	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.2	....
19.738	15	1.01	Cir	0.0	0.013	0.012	n/a	690584.76	0.23	0.58	1.20	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
153.378	15	0.98	Cir	0.0	0.013	0.012	n/a	690626.62	0.88	1.63	1.93	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
50.000	15	2.00	Cir	0.0	....	0.012	n/a	690381.98	0.44	0.00	2.34	0.00	15	0.00	15	0.00	0.00	0.00	0.0	4.0

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)	
0.00	0.00	0.00	5.80	5.48	0.58	0.58	6.12	0.61	6.80	29.20	
0.00	0.00	0.00	4.50	4.04	0.38	0.38	4.96	6.80	2.82	118.76	
0.00	0.00	0.00	4.01	3.64	0.00	0.00	4.39	2.82	2.62	0.00	
0.00	0.00	0.00	3.07	3.50	0.00	0.00	2.64	2.60	2.40	0.00	
0.00	0.00	0.00	2.01	0.96	0.00	0.00	3.06	6.80	2.83	0.00	
0.00	0.00	0.00	2.03	1.53	0.00	0.00	2.53	2.83	2.63	0.00	
0.00	0.00	0.00	13.52	13.52	0.00	0.00	13.51	0.63	12.00	0.00	
0.00	0.00	0.00	16.53	19.42	0.00	0.00	13.63	4.00	5.50	0.00	
0.00	0.00	0.00	17.00	23.48	0.00	0.00	10.52	2.50	10.80	0.00	
0.00	0.00	0.00	20.08	29.63	0.00	0.00	10.52	5.10	11.50	0.00	
0.00	0.00	0.00	10.97	11.89	0.00	0.00	10.05	11.14	11.12	0.00	
0.00	0.00	0.00	9.45	9.28	0.00	0.00	9.61	11.32	9.62	0.00	
0.00	0.00	0.00	7.95	7.98	0.00	0.00	7.92	9.62	9.48	0.00	
0.00	0.00	0.00	9.74	10.00	0.00	0.00	9.48	9.48	7.65	0.00	
0.00	0.00	0.00	9.40	9.40	0.00	0.00	9.40	7.65	8.13	0.00	
0.00	0.00	0.00	8.25	8.25	0.00	0.00	8.25	8.13	7.98	0.00	
0.00	0.00	0.00	5.88	5.88	0.00	0.00	5.88	7.98	7.53	0.00	
0.00	0.00	0.00	4.21	3.51	0.00	0.00	4.91	7.53	7.44	0.00	
0.00	0.00	0.00	3.92	4.47	0.00	0.00	3.38	2.39	2.19	0.00	
0.00	0.00	0.00	2.48	1.61	0.00	0.00	3.35	7.44	7.47	0.00	
0.00	0.00	0.00	1.15	1.15	0.00	0.00	1.15	7.53	7.33	0.00	
0.00	0.00	0.00	1.18	1.18	0.00	0.00	1.18	7.98	7.78	0.00	
0.00	0.00	0.00	8.71	8.82	0.00	0.00	8.60	9.62	6.15	0.00	

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.00	0.00	0.00	10.96	10.96	0.00	0.00	10.96	5.56	2.75	0.00
0.00	0.00	0.00	5.49	7.48	0.00	0.00	3.51	5.34	2.25	0.00
0.00	0.00	0.00	8.99	8.99	0.00	0.00	8.99	5.90	2.10	0.00
0.00	0.00	0.00	8.95	8.95	0.00	0.00	8.94	2.10	3.20	0.00
0.00	0.00	0.00	8.90	8.69	0.00	0.00	9.12	3.20	8.40	0.00
0.00	0.00	0.00	19.29	20.53	0.00	0.00	18.04	4.80	0.61	0.00
0.00	0.00	0.00	9.38	13.79	0.00	0.00	4.96	5.05	6.25	0.00
0.00	0.00	0.00	7.05	6.52	0.00	0.00	7.57	2.50	8.31	0.00
0.00	0.00	0.00	7.57	7.57	0.00	0.00	7.57	8.31	33.49	0.00
0.00	0.00	0.00	14.67	15.95	0.00	0.00	13.39	30.05	23.67	0.00
0.00	0.00	0.00	13.39	13.39	0.00	0.00	13.39	23.67	21.55	0.00
0.00	0.00	0.00	10.90	10.87	0.00	0.00	10.92	21.55	6.77	0.00
0.00	0.00	0.00	9.94	9.91	0.00	0.00	9.96	6.77	3.98	0.00
0.00	0.00	0.00	8.83	8.84	0.00	0.00	8.83	3.98	3.80	0.00
0.00	0.00	0.00	7.75	7.75	0.00	0.00	7.75	3.80	5.53	0.00
0.00	0.00	0.00	7.03	7.03	0.00	0.00	7.03	5.53	9.41	0.00
0.00	0.00	0.00	8.97	8.97	0.00	0.00	8.97	7.21	8.22	0.00
0.00	0.00	0.00	7.08	6.91	0.00	0.00	7.24	8.22	8.06	0.00
0.00	0.00	0.00	5.12	4.72	0.00	0.00	5.51	8.06	7.90	0.00
0.00	0.00	0.00	2.99	2.15	0.00	0.00	3.82	7.90	7.58	0.00
0.00	0.00	0.00	2.25	1.58	0.00	0.00	2.93	7.58	7.52	0.00
0.00	0.00	0.00	2.80	1.91	0.00	0.00	3.68	7.90	7.70	0.00
0.00	0.00	0.00	3.81	4.35	0.00	0.00	3.28	2.39	2.19	0.00

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NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.00	0.00	0.00	2.31	1.24	0.00	0.00	3.38	8.06	7.86	0.00
0.00	0.00	0.00	1.18	0.23	0.00	0.00	2.14	21.55	4.61	0.00
0.00	0.00	0.00	1.69	0.60	0.00	0.00	2.78	34.49	3.83	0.00
0.00	0.00	0.00	1.45	0.86	0.00	0.00	2.03	3.83	2.20	0.00
0.00	0.00	0.00	2.03	2.03	0.00	0.00	2.03	2.20	2.00	0.00
0.00	0.00	0.00	1.45	0.86	0.00	0.00	2.03	3.83	3.63	0.00
0.00	0.00	0.00	4.24	4.15	0.00	0.00	4.32	34.49	8.17	0.00
0.00	0.00	0.00	2.36	2.40	0.00	0.00	2.32	7.17	0.65	0.00
0.00	0.00	0.00	9.24	9.42	0.00	0.00	9.07	41.97	41.64	0.00
0.00	0.00	0.00	16.06	22.70	0.00	0.00	9.43	37.49	34.07	0.00
0.00	0.00	0.00	16.19	22.94	0.00	0.00	9.43	23.07	19.64	0.00
0.00	0.00	0.00	9.07	9.07	0.00	0.00	9.07	11.14	10.60	0.00
0.00	0.00	0.00	8.72	8.72	0.00	0.00	8.72	10.60	10.50	0.00
0.00	0.00	0.00	7.29	7.29	0.00	0.00	7.29	10.50	10.36	0.00
0.00	0.00	0.00	6.89	6.89	0.00	0.00	6.89	10.36	10.17	0.00
0.00	0.00	0.00	4.88	4.88	0.00	0.00	4.88	10.17	6.99	0.00
0.00	0.00	0.00	9.60	9.59	0.00	0.00	9.61	6.99	9.75	0.00
0.00	0.00	0.00	9.59	9.59	0.00	0.00	9.59	9.75	7.07	0.00
0.00	0.00	0.00	4.27	4.27	0.00	0.00	4.27	6.82	8.59	0.00
0.00	0.00	0.00	4.19	3.48	0.00	0.00	4.89	8.84	7.45	0.00
0.00	0.00	0.00	3.62	3.12	0.00	0.00	4.13	7.45	7.28	0.00
0.00	0.00	0.00	2.31	1.56	0.00	0.00	3.05	7.28	7.25	0.00
0.00	0.00	0.00	1.22	1.22	0.00	0.00	1.22	8.84	8.64	0.00

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.00	0.00	0.00	2.63	2.63	0.00	0.00	2.63	8.19	7.97	0.00
0.00	0.00	0.00	4.19	4.78	0.00	0.00	3.60	2.40	2.20	0.00
0.00	0.00	0.00	2.90	2.90	0.00	0.00	2.90	6.99	2.75	0.00
0.00	0.00	0.00	1.91	1.91	0.00	0.00	1.91	10.42	5.75	0.00

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
1	Pipe - (32)	User																		5.00
2	Pipe - (31)	User																		5.00
3	Pipe - (30)	User																		5.00
4	Pipe - (33)	User																		5.00
5	Pipe - (35)	User																		5.00
6	Pipe - (34)	User																		5.00
7	Pipe - (43)	User																		5.00
8	Pipe - (42)	User																		5.00
9	Pipe - (41)	User																		5.00
10	Pipe - (40)	User																		5.00
11	Pipe - (39)	User																		5.00
12	Pipe - (38)	User																		5.00
13	Pipe - (37)	User																		5.00
14	Pipe - (36)	User																		5.00
15	Pipe - (56)	User																		5.00
16	Pipe - (55)	User																		5.00
17	Pipe - (54)	User																		5.00
18	Pipe - (53)	User																		5.00
19	Pipe - (57)	User																		5.00
20	Pipe - (52)	User																		5.00
21	Pipe - (58)	User																		5.00
22	Pipe - (59)	User																		5.00
23	Pipe - (45)	User																		5.00
24	Pipe - (44)	User																		5.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
25	Pipe - (46)	User																		5.00
26	Pipe - (50)	User																		5.00
27	Pipe - (49)	User																		5.00
28	Pipe - (48)	User																		5.00
29	Pipe - (47)	User																		5.00
30	Pipe - (51)	User																		5.00
31	Pipe - (83)	User																		5.00
32	Pipe - (82)	User																		5.00
33	Pipe - (74)	User																		5.00
34	Pipe - (73)	User																		5.00
35	Pipe - (72)	User																		5.00
36	Pipe - (71)	User																		5.00
37	Pipe - (67)	User																		5.00
38	Pipe - (66)	User																		5.00
39	Pipe - (65)	User																		5.00
40	Pipe - (64)	User																		5.00
41	Pipe - (63)	User																		5.00
42	Pipe - (62)	User																		5.00
43	Pipe - (61)	User																		5.00
44	Pipe - (60)	User																		5.00
45	Pipe - (70)	User																		5.00
46	Pipe - (69)	User																		5.00
47	Pipe - (68)	User																		5.00
48	Pipe - (75)	User																		5.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
49	Pipe - (78)	User																		5.00
50	Pipe - (77)	User																		5.00
51	Pipe - (76)	User																		5.00
52	Pipe - (79)	User																		5.00
53	Pipe - (81)	User																		5.00
54	Pipe - (80)	User																		5.00
55	Pipe - (25)	User																		5.00
56	Pipe - (24)	User																		5.00
57	Pipe - (23)	User																		5.00
58	Pipe - (22)	User																		5.00
59	Pipe - (21)	User																		5.00
60	Pipe - (20)	User																		5.00
61	Pipe - (19)	User																		5.00
62	Pipe - (18)	User																		5.00
63	Pipe - (17)	User																		5.00
64	Pipe - (16)	User																		5.00
65	Pipe - (13)	User																		5.00
66	Pipe - (12)	User																		5.00
67	Pipe - (14)	User																		5.00
68	Pipe - (10)	User																		5.00
69	Pipe - (15)	User																		5.00
70	Pipe - (29)	User																		5.00
71	Pipe - (28)	User																		5.00
72	Pipe - (26)	User																		5.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
73		User																		0.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	6.66	373.50	374.71	1.21	1.09	5.48	0.58	375.29	0.000	25.195	373.75	374.79	1.04**	1.09	6.12	0.58	375.37	0.000	0.000	n/a	1.50	n/a
2	15	4.40	373.75	374.79	1.04	0.89	4.04	0.38	375.17	0.000	119.778	387.00	387.85 j	0.85**	0.89	4.96	0.38	388.23	0.000	0.000	n/a	1.50	0.57
3	15	3.23	387.00	387.85	0.00	0.00	3.64	0.00	387.85	0.000	20.216	387.20	387.92	0.00**	0.00	4.39	0.00	387.92	0.000	0.000	0.000	1.00	n/a
4	15	0.61	377.95	378.20	0.00	0.00	3.50	0.00	378.20	0.000	20.027	378.15	378.45	0.00**	0.00	2.64	0.00	378.45	0.000	0.000	0.000	1.00	n/a
5	15	1.04	373.75	374.79	0.00	0.00	0.96	0.00	374.79	0.000	122.337	374.38	374.78	0.00**	0.00	3.06	0.00	374.78	0.000	0.000	0.000	1.47	n/a
6	15	0.52	374.38	374.78	0.00	0.00	1.53	0.00	374.78	0.000	20.035	374.58	374.86	0.00**	0.00	2.53	0.00	374.86	0.000	0.000	0.000	1.00	n/a
7	30	66.34	379.00	381.50	0.00*	0.00	13.52	0.00	381.50	0.000	48.007	379.50	382.57	0.00**	0.00	13.51	0.00	382.57	0.000	0.000	0.000	0.50	n/a
8	30	66.34	387.50	389.14	0.00	0.00	19.42	0.00	389.14	0.000	65.929	390.00	392.43	0.00**	0.00	13.63	0.00	392.43	0.000	0.000	0.000	1.47	n/a
9	24	32.38	393.50	394.40	0.00	0.00	23.48	0.00	394.40	0.000	37.291	397.20	399.09	0.00**	0.00	10.52	0.00	399.09	0.000	0.000	0.000	0.50	n/a
10	24	32.38	402.90	403.66	0.00	0.00	29.63	0.00	403.66	0.000	29.905	408.50	410.39	0.00**	0.00	10.52	0.00	410.39	0.000	0.000	0.000	1.37	n/a
11	24	30.74	408.86	410.39	0.00	0.00	11.89	0.00	410.39	0.000	114.159	414.50	416.37	0.00**	0.00	10.05	0.00	416.37	0.000	0.000	0.000	0.50	n/a
12	24	29.15	414.30	416.37	0.00	0.00	9.28	0.00	416.37	0.000	20.331	416.00	417.85	0.00**	0.00	9.61	0.00	417.85	0.000	0.000	0.000	2.20	n/a
13	18	13.36	416.50	417.85	0.00	0.00	7.98	0.00	417.85	0.000	126.011	418.50	419.86	0.00**	0.00	7.92	0.00	419.86	0.000	0.000	0.000	0.50	n/a
14	15	11.53	418.75	419.86	0.00	0.00	10.00	0.00	419.86	0.000	154.272	423.36	424.57	0.00**	0.00	9.48	0.00	424.57	0.000	0.000	0.000	1.01	n/a
15	15	11.53	423.36	424.61	0.00*	0.00	9.40	0.00	424.61	0.000	42.372	424.00	425.76	0.00**	0.00	9.40	0.00	425.76	0.000	0.000	0.000	1.16	n/a
16	15	10.12	424.00	427.35	0.00	0.00	8.25	0.00	427.35	0.000	150.146	427.25	430.50	0.00**	0.00	8.25	0.00	430.50	0.000	0.000	0.000	1.50	n/a
17	15	7.22	427.25	432.08	0.00	0.00	5.88	0.00	432.08	0.000	150.143	431.00	433.68	0.00**	0.00	5.88	0.00	433.68	0.000	0.000	0.000	1.50	n/a
18	15	4.31	431.00	434.49	0.00	0.00	3.51	0.00	434.49	0.000	145.164	434.25	435.09	0.00**	0.00	4.91	0.00	435.09	0.000	0.000	0.000	1.67	n/a
19	15	1.45	439.30	439.69	0.00	0.00	4.47	0.00	439.69	0.000	20.331	439.50	439.98	0.00**	0.00	3.38	0.00	439.98	0.000	0.000	0.000	1.00	n/a
20	15	1.41	434.25	435.09	0.00	0.00	1.61	0.00	435.09	0.000	130.074	437.00	437.47	0.00**	0.00	3.35	0.00	437.47	0.000	0.000	0.000	1.00	n/a
21	15	1.41	431.00	434.49	0.00	0.00	1.15	0.00	434.49	0.000	20.184	431.20	434.50	0.00**	0.00	1.15	0.00	434.50	0.000	0.000	0.000	1.00	n/a
22	15	1.45	427.25	432.08	0.00	0.00	1.18	0.00	432.08	0.000	19.955	427.45	432.09	0.00**	0.00	1.18	0.00	432.09	0.000	0.000	0.000	1.00	n/a

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
23	18	14.76	416.50	417.85	0.00	0.00	8.82	0.00	417.85	0.000	126.506	418.56	419.96	0.00**	0.00	8.60	0.00	419.96	0.000	0.000	0.000	1.50	n/a
24	15	13.45	419.40	420.65	0.00*	0.00	10.96	0.00	420.65	0.000	127.017	423.00	425.35	0.00**	0.00	10.96	0.00	425.35	0.000	0.000	0.000	1.00	n/a
25	15	1.64	415.41	415.70	0.00	0.00	7.48	0.00	415.70	0.000	108.029	419.50	420.01	0.00**	0.00	3.51	0.00	420.01	0.000	0.000	0.000	1.00	n/a
26	24	28.24	390.10	392.43	0.00	0.00	8.99	0.00	392.43	0.000	79.019	390.90	393.48	0.00**	0.00	8.99	0.00	393.48	0.000	0.000	0.000	0.54	n/a
27	24	28.10	390.90	394.16	0.00	0.00	8.95	0.00	394.16	0.000	181.944	391.80	396.55	0.00**	0.00	8.94	0.00	396.55	0.000	0.000	0.000	1.50	n/a
28	24	27.30	391.80	398.41	0.00	0.00	8.69	0.00	398.41	0.000	121.251	403.90	405.71	0.00**	0.00	9.12	0.00	405.71	0.000	0.000	0.000	1.02	n/a
29	15	22.14	408.25	409.28	0.00	0.00	20.53	0.00	409.28	0.000	97.602	418.00	419.25	0.00**	0.00	18.04	0.00	419.25	0.000	0.000	0.000	1.00	n/a
30	15	4.41	408.00	408.38	0.00	0.00	13.79	0.00	408.38	0.000	126.206	420.00	420.85	0.00**	0.00	4.96	0.00	420.85	0.000	0.000	0.000	1.00	n/a
31	36	37.94	377.50	379.80	0.00	0.00	6.52	0.00	379.80	0.000	30.000	378.19	380.19	0.00**	0.00	7.57	0.00	380.19	0.000	0.000	0.000	0.51	n/a
32	36	37.94	378.19	380.19	0.00	0.00	7.57	0.00	380.19	0.000	73.386	378.56	380.56	0.00**	0.00	7.57	0.00	380.56	0.000	0.000	0.000	2.15	n/a
33	18	23.61	383.50	384.67	0.00	0.00	15.95	0.00	384.67	0.000	150.569	390.63	392.11	0.00**	0.00	13.39	0.00	392.11	0.000	0.000	0.000	0.61	n/a
34	18	23.61	390.63	392.11	0.00	0.00	13.39	0.00	392.11	0.000	47.994	393.00	394.48	0.00**	0.00	13.39	0.00	394.48	0.000	0.000	0.000	1.50	n/a
35	18	19.17	393.00	394.48	0.00	0.00	10.87	0.00	394.48	0.000	284.334	409.20	410.66	0.00**	0.00	10.92	0.00	410.66	0.000	0.000	0.000	0.50	n/a
36	18	17.39	409.20	410.66	0.00	0.00	9.91	0.00	410.66	0.000	133.139	416.00	417.44	0.00**	0.00	9.96	0.00	417.44	0.000	0.000	0.000	0.50	n/a
37	18	15.61	416.00	417.50	0.00*	0.00	8.84	0.00	417.50	0.000	53.198	416.53	418.50	0.00**	0.00	8.83	0.00	418.50	0.000	0.000	0.000	0.58	n/a
38	18	13.69	416.53	419.21	0.00	0.00	7.75	0.00	419.21	0.000	47.067	417.00	419.89	0.00**	0.00	7.75	0.00	419.89	0.000	0.000	0.000	0.50	n/a
39	18	12.42	417.00	420.35	0.00	0.00	7.03	0.00	420.35	0.000	120.653	418.20	421.79	0.00**	0.00	7.03	0.00	421.79	0.000	0.000	0.000	1.27	n/a
40	15	11.01	420.65	422.77	0.00	0.00	8.97	0.00	422.77	0.000	130.403	424.35	426.00	0.00**	0.00	8.97	0.00	426.00	0.000	0.000	0.000	1.50	n/a
41	15	8.48	424.35	427.88	0.00	0.00	6.91	0.00	427.88	0.000	161.656	429.75	430.89	0.00**	0.00	7.24	0.00	430.89	0.000	0.000	0.000	1.47	n/a
42	15	5.53	429.75	430.89	0.00	0.00	4.72	0.00	430.89	0.000	154.069	434.80	435.75	0.00**	0.00	5.51	0.00	435.75	0.000	0.000	0.000	1.50	n/a
43	15	2.16	434.80	435.75	0.00	0.00	2.15	0.00	435.75	0.000	140.369	439.50	440.09	0.00**	0.00	3.82	0.00	440.09	0.000	0.000	0.000	0.81	n/a
44	15	0.89	439.50	440.09	0.00	0.00	1.58	0.00	440.09	0.000	107.999	442.50	442.87	0.00**	0.00	2.93	0.00	442.87	0.000	0.000	0.000	1.00	n/a

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
45	15	1.92	434.80	435.75	0.00	0.00	1.91	0.00	435.75	0.000	20.089	435.00	435.55	0.00**	0.00	3.68	0.00	435.55	0.000	0.000	0.000	1.00	n/a
46	15	1.31	430.18	430.55	0.00	0.00	4.35	0.00	430.55	0.000	20.249	430.38	430.83	0.00**	0.00	3.28	0.00	430.83	0.000	0.000	0.000	1.00	n/a
47	15	1.45	429.75	430.89	0.00	0.00	1.24	0.00	430.89	0.000	19.915	429.95	430.43	0.00**	0.00	3.38	0.00	430.43	0.000	0.000	0.000	1.00	n/a
48	15	0.28	393.25	394.48	0.00	0.00	0.23	0.00	394.48	0.000	28.928	394.00	394.20	0.00**	0.00	2.14	0.00	394.20	0.000	0.000	0.000	1.00	n/a
49	15	0.74	379.31	380.56	0.00	0.00	0.60	0.00	380.56	0.000	129.835	381.75	382.09	0.00**	0.00	2.78	0.00	382.09	0.000	0.000	0.000	1.50	n/a
50	15	0.23	381.75	382.09	0.00	0.00	0.86	0.00	382.09	0.000	143.637	386.20	386.39	0.00**	0.00	2.03	0.00	386.39	0.000	0.000	0.000	1.46	n/a
51	15	0.23	386.20	386.39	0.00	0.00	2.03	0.00	386.39	0.000	20.226	386.40	386.59	0.00**	0.00	2.03	0.00	386.59	0.000	0.000	0.000	1.00	n/a
52	15	0.23	381.75	382.09	0.00	0.00	0.86	0.00	382.09	0.000	20.197	381.95	382.14	0.00**	0.00	2.03	0.00	382.14	0.000	0.000	0.000	1.00	n/a
53	24	13.03	378.56	380.56	0.00	0.00	4.15	0.00	380.56	0.000	19.805	378.76	380.59	0.00**	0.00	4.32	0.00	380.59	0.000	0.000	0.000	0.53	n/a
54	36	11.90	378.76	380.75	0.00	0.00	2.40	0.00	380.75	0.000	92.886	378.75	380.79	0.00**	0.00	2.32	0.00	380.79	0.000	0.000	0.000	1.00	n/a
55	24	28.48	378.00	379.84	0.00	0.00	9.42	0.00	379.84	0.000	64.098	378.65	380.75	0.00**	0.00	9.07	0.00	380.75	0.000	0.000	0.000	0.50	n/a
56	24	28.48	382.80	383.64	0.00	0.00	22.70	0.00	383.64	0.000	36.295	386.40	388.24	0.00**	0.00	9.43	0.00	388.24	0.000	0.000	0.000	0.50	n/a
57	24	28.48	397.40	398.23	0.00	0.00	22.94	0.00	398.23	0.000	35.254	401.00	402.84	0.00**	0.00	9.43	0.00	402.84	0.000	0.000	0.000	0.50	n/a
58	24	28.48	409.50	411.50	0.00*	0.00	9.07	0.00	411.50	0.000	108.716	410.59	412.97	0.00**	0.00	9.07	0.00	412.97	0.000	0.000	0.000	0.50	n/a
59	24	27.40	410.59	413.61	0.00	0.00	8.72	0.00	413.61	0.000	20.237	410.79	413.86	0.00**	0.00	8.72	0.00	413.86	0.000	0.000	0.000	2.22	n/a
60	24	22.90	410.79	416.49	0.00	0.00	7.29	0.00	416.49	0.000	115.221	411.50	417.49	0.00**	0.00	7.29	0.00	417.49	0.000	0.000	0.000	0.60	n/a
61	24	21.63	411.50	417.99	0.00	0.00	6.89	0.00	417.99	0.000	161.486	412.50	419.25	0.00**	0.00	6.89	0.00	419.25	0.000	0.000	0.000	1.50	n/a
62	24	15.33	412.50	420.35	0.00	0.00	4.88	0.00	420.35	0.000	213.210	416.75	421.19	0.00**	0.00	4.88	0.00	421.19	0.000	0.000	0.000	1.44	n/a
63	15	11.77	417.50	421.72	0.00	0.00	9.59	0.00	421.72	0.000	111.216	423.50	424.74	0.00**	0.00	9.61	0.00	424.74	0.000	0.000	0.000	0.50	n/a
64	15	11.77	423.50	425.45	0.00	0.00	9.59	0.00	425.45	0.000	112.817	425.00	428.65	0.00**	0.00	9.59	0.00	428.65	0.000	0.000	0.000	0.62	n/a
65	18	7.55	425.00	429.54	0.00	0.00	4.27	0.00	429.54	0.000	165.213	428.00	430.26	0.00**	0.00	4.27	0.00	430.26	0.000	0.000	0.000	1.50	n/a
66	15	4.27	428.00	430.69	0.00	0.00	3.48	0.00	430.69	0.000	192.294	439.50	440.34	0.00**	0.00	4.89	0.00	440.34	0.000	0.000	0.000	0.58	n/a

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

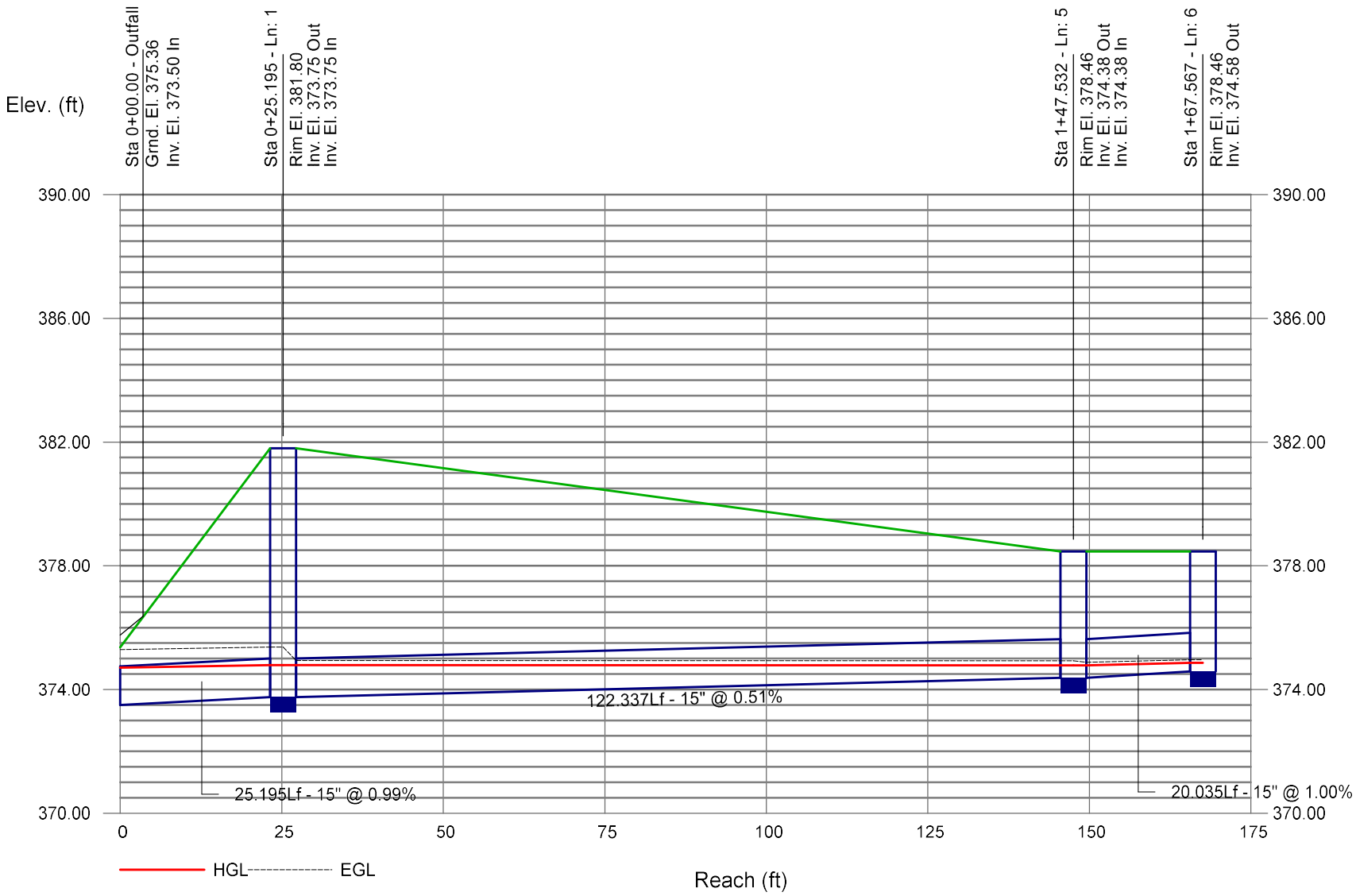
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
67	15	2.72	439.50	440.34	0.00	0.00	3.12	0.00	440.34	0.000	33.674	440.00	440.66	0.00**	0.00	4.13	0.00	440.66	0.000	0.000	0.000	1.28	n/a
68	15	1.03	440.00	440.66	0.00	0.00	1.56	0.00	440.66	0.000	172.625	442.50	442.90	0.00**	0.00	3.05	0.00	442.90	0.000	0.000	0.000	1.00	n/a
69	15	1.50	428.00	430.69	0.00	0.00	1.22	0.00	430.69	0.000	20.277	428.20	430.70	0.00**	0.00	1.22	0.00	430.70	0.000	0.000	0.000	1.00	n/a
70	15	3.23	413.85	416.49	0.00	0.00	2.63	0.00	416.49	0.000	168.359	415.53	416.85	0.00**	0.00	2.63	0.00	416.85	0.000	0.000	0.000	1.50	n/a
71	15	1.78	421.10	421.53	0.00	0.00	4.78	0.00	421.53	0.000	19.738	421.30	421.83	0.00**	0.00	3.60	0.00	421.83	0.000	0.000	0.000	1.00	n/a
72	15	3.56	417.50	421.72	0.00	0.00	2.90	0.00	421.72	0.000	153.378	419.00	422.12	0.00**	0.00	2.90	0.00	422.12	0.000	0.000	0.000	1.00	n/a
73	15	2.34	413.00	420.35	0.00	0.00	1.91	0.00	420.35	0.000	50.000	414.00	420.41	0.00**	0.00	1.91	0.00	420.41	0.000	0.000	0.000	1.00	n/a

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

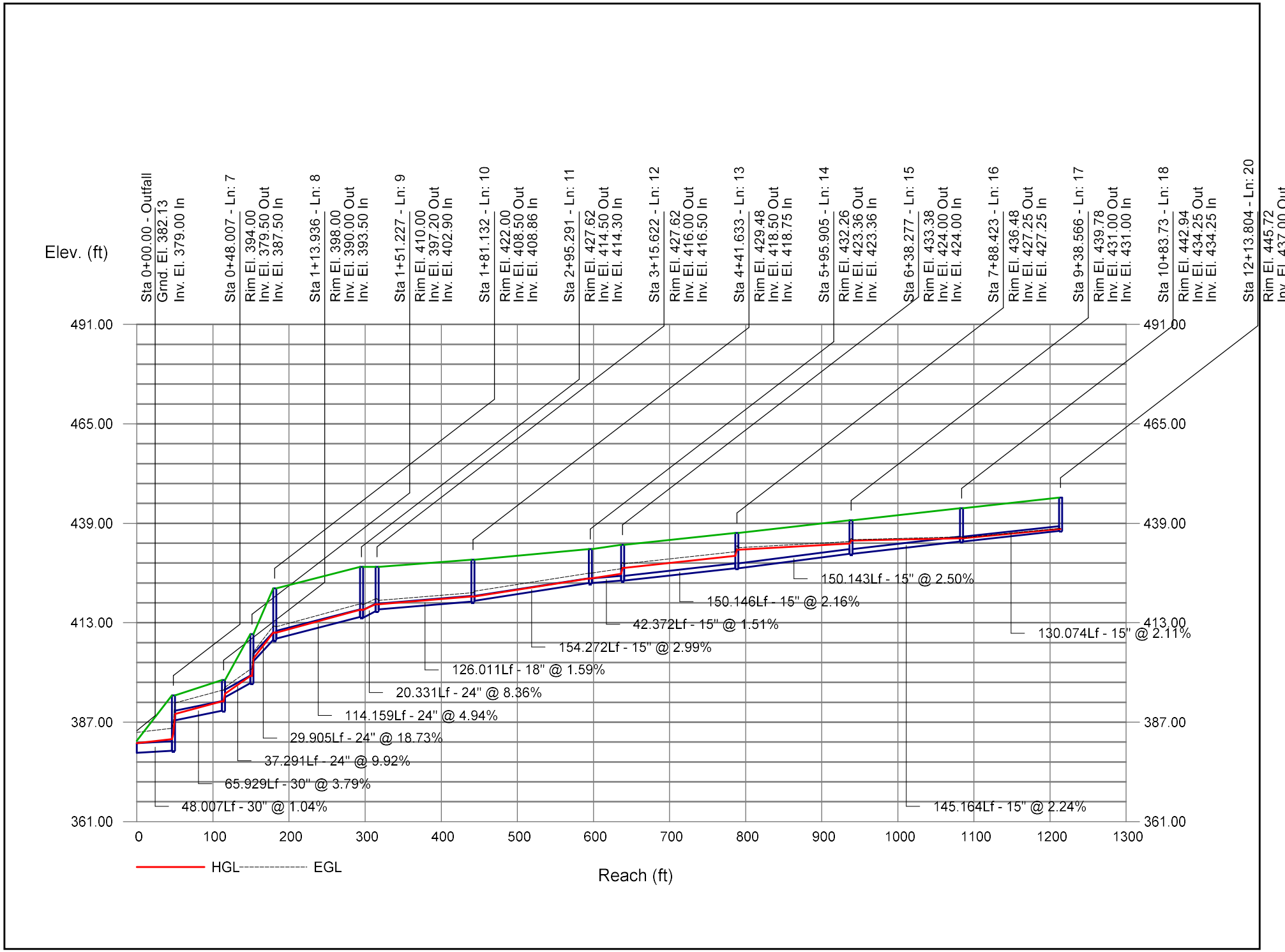
Storm Sewer Profile

Proj. file: 3302-KWF.stm



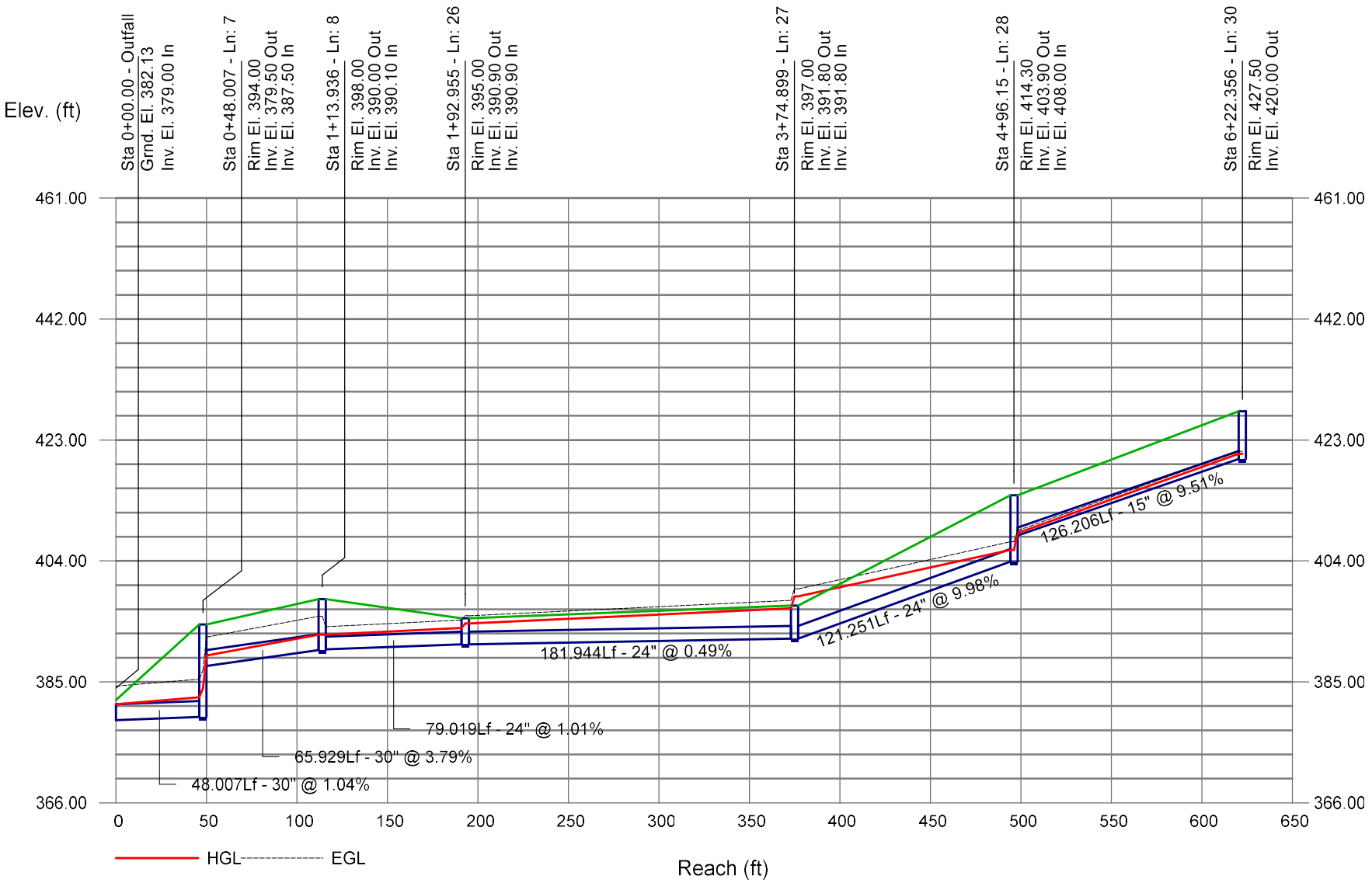
Storm Sewer Profile

Proj. file: 3302-KWF.stm



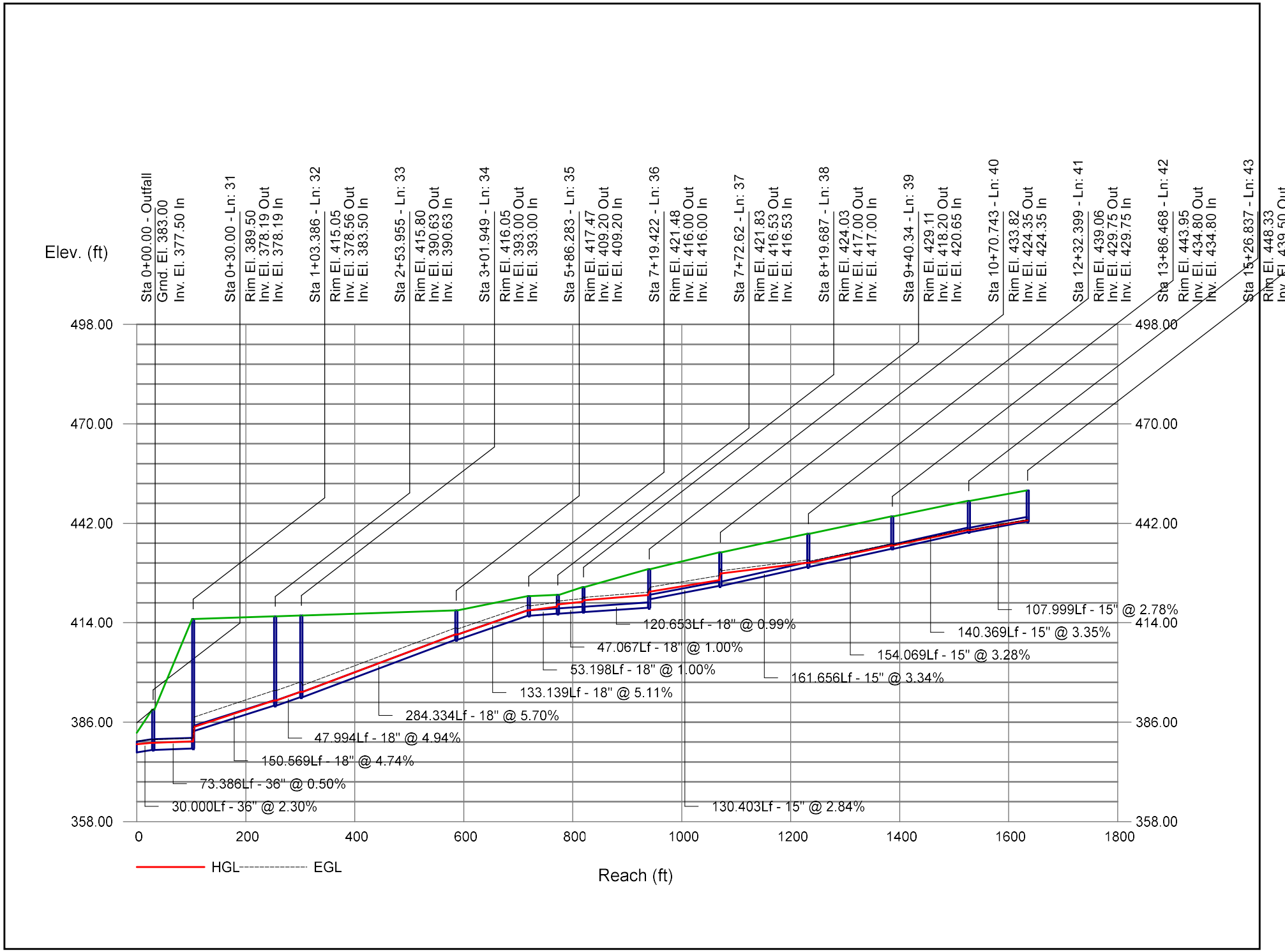
Storm Sewer Profile

Proj. file: 3302-KWF.stm



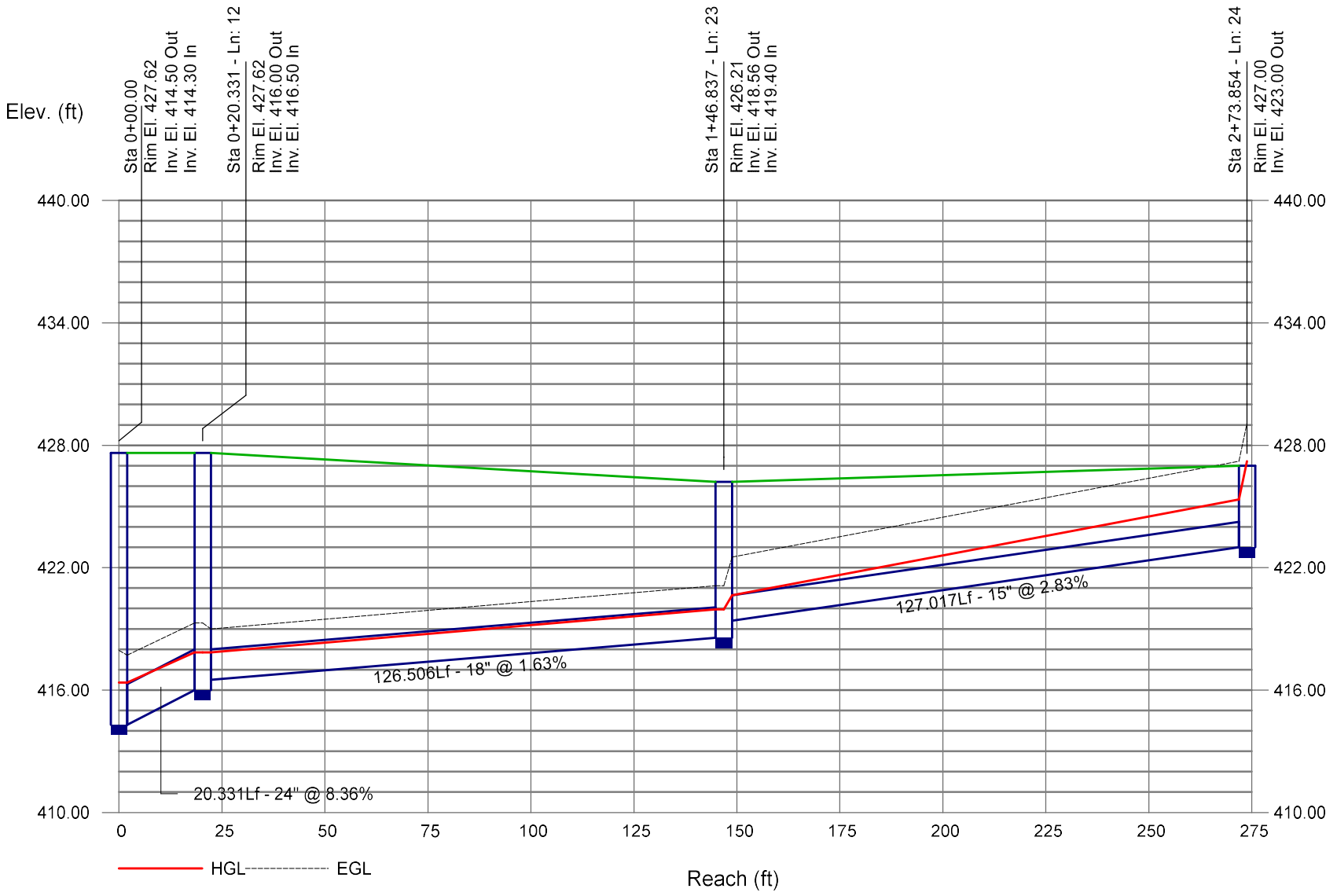
Storm Sewer Profile

Proj. file: 3302-KWF.stm



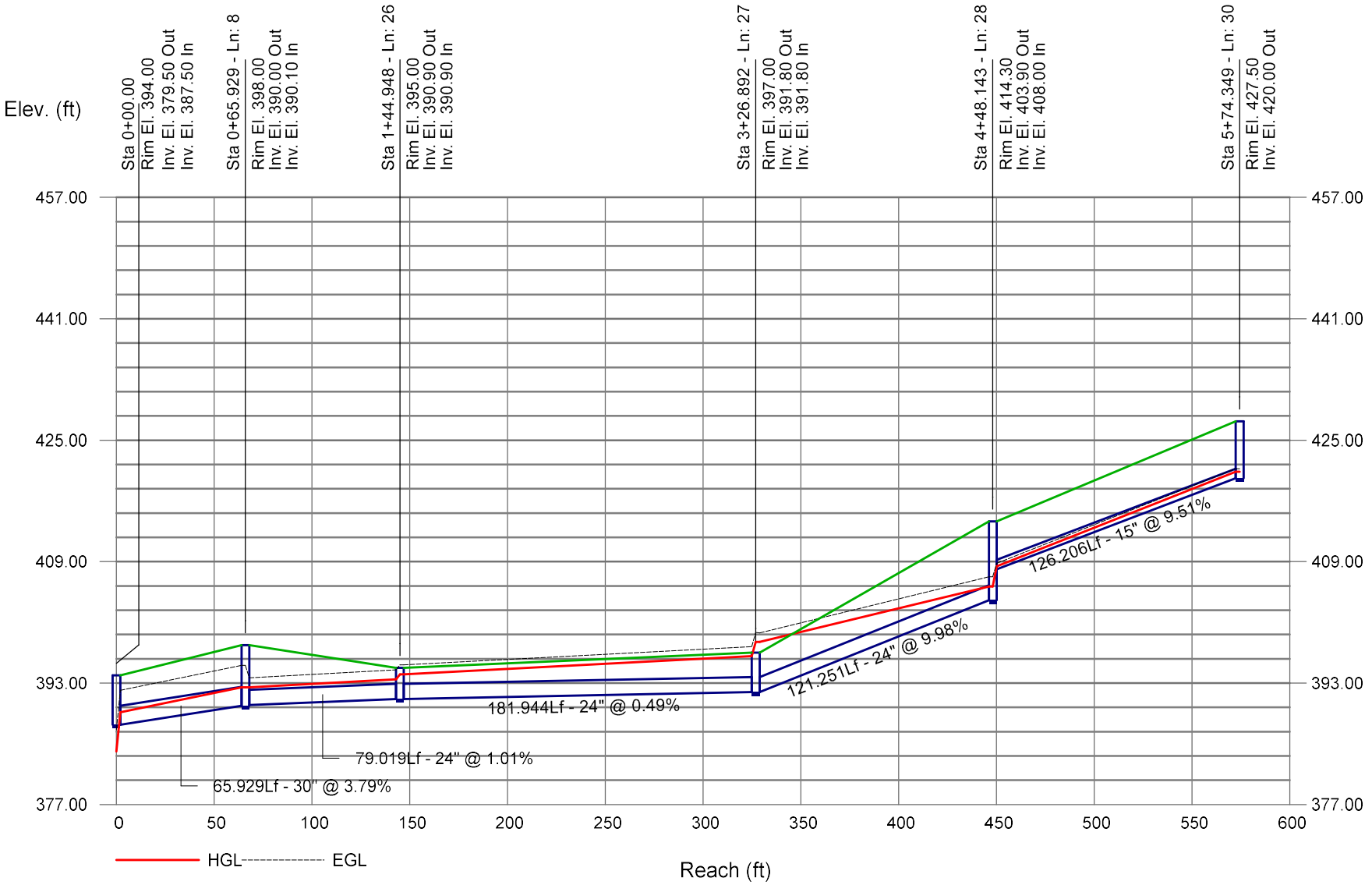
Storm Sewer Profile

Proj. file: 3302-KWF.stm



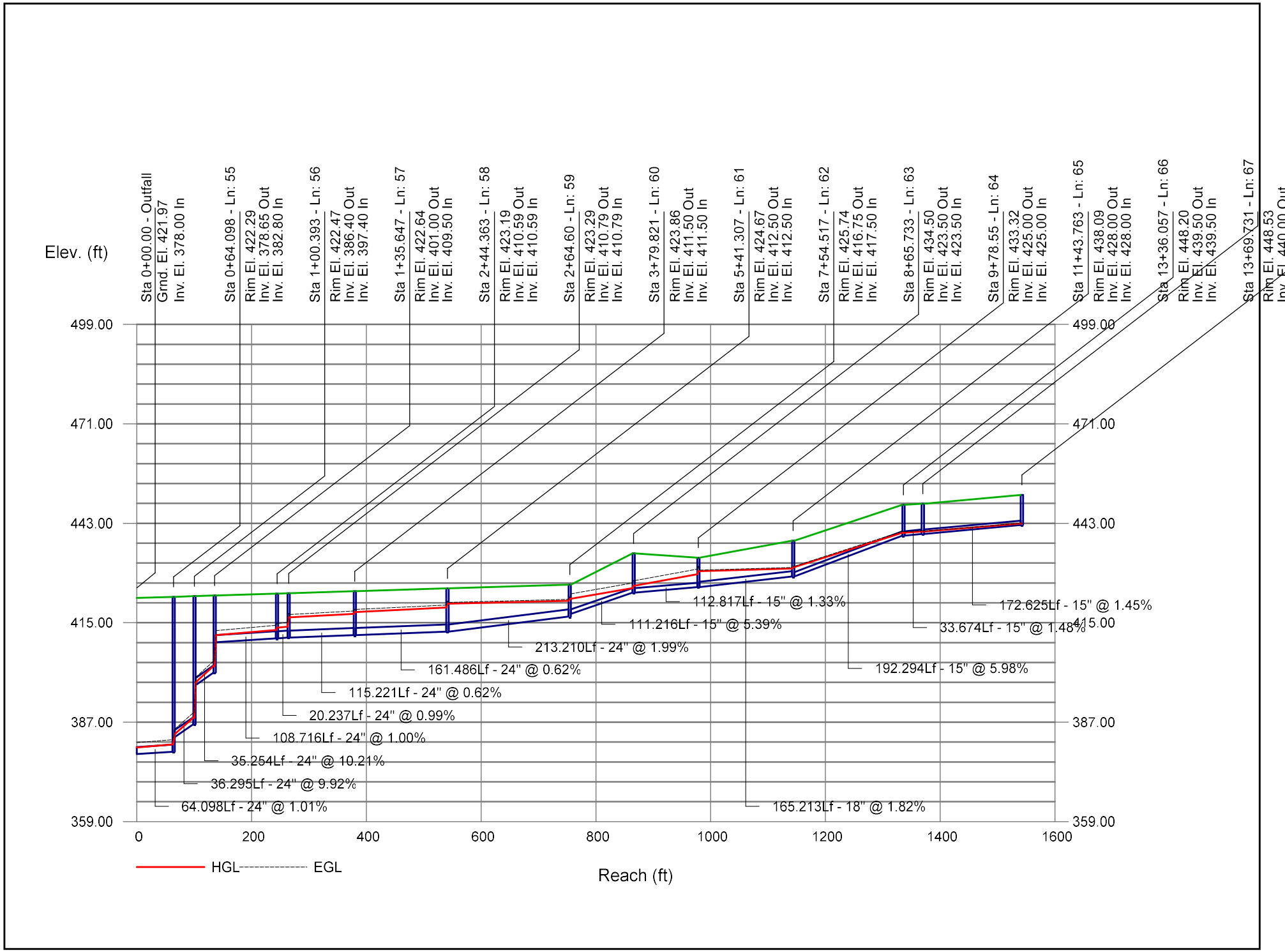
Storm Sewer Profile

Proj. file: 3302-KWF.stm



Storm Sewer Profile

Proj. file: 3302-KWF.stm



Quarry Ridge

Soil Test Data

COBBLERS HILL COURT
MONROE

DEEP TEST RESULTS

TESTING PERFORMED: 3/30/06

#501 Roots to 40”

0	-	11”	Top Soil
11”	-	40”	Orange Brown Fine Silty Sand
40”	-	99”	Olive Brown Fine to Medium Sand with Gravel, Some Silt and Boulders

No Ledge No Water No Mottling

#502 Roots to 41”

0	-	13”	Top Soil
13”	-	41”	Orange Brown Fine Silty Sand
41”	-	93”	Olive Brown Fine to Medium Sand with Gravel, Some Silt and Large Boulders (36”+)

No Ledge No Water No Mottling

#503 Roots to 38”

0	-	10”	Top Soil
10”	-	36”	Orange Brown Fine Silty Sand
36”	-	88”	Olive Brown Fine to Medium Sand with Gravel, Some Silt and Large Boulders (36”+)

No Ledge No Water No Mottling

#504 Roots to 38”

0	-	8”	Top Soil
8”	-	38”	Orange Brown Fine Silty Sand
38”	-	98”	Olive Brown Fine to Medium Sand with Gravel, Some Silt and Boulders

No Ledge No Water No Mottling

#505 Roots to 32”

0	-	9”	Top Soil
9”	-	21”	Orange Brown Fine Silty Sand
21”	-	88”	Olive Brown Fine to Medium Sand with Gravel, Some Silt and Boulders

No Ledge No Water No Mottling

#506 Roots to 30”

0	-	8”	Top Soil
8”	-	32”	Orange Brown Fine Silty Sand
32”	-	96”	Olive Brown Fine to Medium Sand with Gravel, Some Silt and Boulders

No Ledge No Water No Mottling

#507 Roots to 30”

0	-	12”	Top Soil
12”	-	28”	Orange Brown Fine Silty Sand

28” - 118” Brown Fine Silty Sand with Few Rocks
No Ledge No Water No Mottling

#508
0 - 12” Top Soil
12” - 32” Orange Brown Fine Silty Sand
32” - 90” Brown Fine Silty Sand with Few Rocks
No Ledge No Water Mottling at 36"

#509 Roots to 36”
0 - 8” Top Soil
8” - 29” Orange Brown Fine Silty Sand
29” - 66” Olive Tan Medium Silty Sand with Gravel
66” - 86” Tan Gray Very Fine Silt
No Ledge No Water Mottling at 66”

#510
0 - 8” Top Soil
8” - 36” Orange Brown Fine Silty Sand with Many Large Boulders
36” - 87” Olive Tan Medium Silty Sand with Many Large Boulders
No Ledge No Water Mottling at 48”

#511 Roots to 37”
0 - 8” Top Soil
8” - 34” Orange Brown Fine Silty Sand
34” - 95” Brown Fine to Medium Silty Sand with Gravel
No Ledge No Water Mottling at 37”

#512 Roots to 30”
0 - 12” Top Soil
12” - 26” Orange Brown Fine Silty Sand
26” - 95” Brown Fine to Medium Silty Sand with Gravel
No Ledge No Water Mottling at 43”

#513 Roots to 37”
0 - 12” Top Soil
12” - 57” Orange Brown Fine Silty Sand
57” - 112” Olive Brown Medium Silty Sand and Gravel
No Ledge No Water Mottling at 46”

#514 Roots to 30”
0 - 6” Top Soil
6” - 42” Orange Tan Fine Silty Sand
42” - 94” Brown Fine to Medium Silty Sand with Some Gravel
No Ledge No Water Mottling at 42”

#515 Roots to 23”
0 - 7” Top Soil
7” - 42” Orange Brown Fine Silty Sand
42” - 91“ Brown Fine to Medium Silty Sand with Some Gravel

No Ledge No Water Mottling at 46”

#516 Roots to 36”
0 - 6” Top Soil
6” - 36” Orange Brown Fine Silty Sand
36” - 96” Olive Brown Medium, with Some Fine, Sand and Gravel
No Ledge No Water Mottling at 36”

#517 Roots to 32”
0 - 7” Top Soil
7” - 52” Orange Brown Fine Silty Sand
52” - 102” Tan Fine Sand
No Ledge No Water Mottling at 32”

#518 Roots to 28”
0 - 8” Top Soil
8” - 28” Orange Brown Fine Silty Sand
28” - 91” Olive Brown Medium, with Some Fine, Sand and Gravel
No Ledge No Water Mottling at 28”

#519 Roots to 25”
0 - 7” Top Soil
7” - 25” Orange Brown Fine Silty Sand
25” - 99” Olive Tan Fine Sand with Some Gravel
No Ledge No Water No Mottling

#520 Roots to 38”
0 - 12” Top Soil
12” - 39” Orange Brown Fine Silty Sand
39” - 65” Olive Tan Very Fine Silt
Ledge at 65” No Water Mottling at 39”

#521
0 - 5” Top Soil
5” - 27” Orange Brown Fine Silty Sand
27” - 57” Olive Tan Fine Sand
Ledge at 57” No Water Mottling at 34”

#522
0 - 6” Top Soil
6” - 23” Orange Brown Fine Silty Sand
23” - 42” Orange Brown Medium Sand, Gravel and Pebbles
42” - 92” Olive Tan Fine Sand with Some Gravel
Ledge at 92” No Water No Mottling

#523
0 - 5” Top Soil
5” - 16” Orange Brown Fine Silty Sand
16” - 30” Orange Brown Medium Sand, Gravel and Pebbles

	30” - 62”	Olive Tan Fine Sand with Some Gravel	
Ledge at 62”		No Water	Mottling at 44”

#524

	0 - 3”	Top Soil	
	3” - 13”	Orange Brown Fine Silty Sand	
	13” - 37”	Orange Brown Medium Sand, Gravel and Pebbles	
Ledge at 37”		No Water	No Mottling

#525

	0 - 5”	Top Soil	
	5” - 42”	Orange Dark Brown Fine Silty Sand with Gravel and Rocks	
Ledge at 42”		No Water	No Mottling

#526

	0 - 10”	Top Soil	
	10” - 34”	Orange Brown Fine Silty Sand	
	34” - 58”	Tan Fine Sand with Lots of Angular 4” Rock	
Ledge at 58”		No Water	No Mottling

#527 Roots to 32”

	0 - 8”	Top Soil	
	8” - 30”	Orange Brown Fine Silty Sand with 3”-36” Rock	
	30” - 48”	Orange Tan Fine Silty Sand and Gravel with 3”-36” Rock	
Ledge at 48”		No Water	No Mottling

#528 Roots to 35”

	0 - 10”	Top Soil	
	10” - 32”	Orange Brown Fine Silty Sand with 3”-36” Rock	
	32” - 53”	Orange Tan Fine Silty Sand and Gravel with 3”-36” Rock	
Ledge at 53”		No Water	No Mottling

#529 Roots to 40”

	0 - 6”	Top Soil	
	6” - 40”	Orange Brown Fine Silty Sand with 3”-24” rock	
	40” - 67”	Olive Brown Sand and Gravel	
Ledge at 67”		Water at 65”	Mottling at 40”

#530 Roots to 42”

	0 - 7”	Top Soil	
	7” - 42”	Orange Brown Fine Silty Sand with 3”-24” Rock	
	42” - 74”	Olive Brown Sand and Gravel	
Ledge at 74”		No Water	Mottling at 42”

#531 Roots to 39

0	- 7”	Top Soil	
7”	- 39”	Orange Brown Fine Silty Sand with 3”-24” Rock	
39”	- 48”	Olive Brown Sand and Gravel	
Ledge at 48”		No Water	No Mottling

#532 Roots to 27”

0	- 6”	Top Soil	
6”	- 30”	Orange Brown Fine Silty Sand	
Ledge at 30”		No Water	No Mottling

TESTING PERFORMED: 3/31/06

#533 Roots to 31”

0	- 9”	Top Soil	
9”	- 31”	Orange Brown Fine to Medium Silty Sand with Lots of 3” Rocks	
31”	- 63"	Tan and Black Medium Sand and Gravel with 3” Rocks	
Ledge at 63”		No Water	Mottling at 32”

#534 Roots to 44”

0	- 6”	Top Soil	
6”	- 38”	Orange Brown Fine Silty Sand with Lots of 3”-6” Rocks	
38”	- 67”	Orange Brown Medium Sand and Pebbles with Rocks	
67”	- 77”	Tan and Black Medium Sand and Gravel with Rocks	
Ledge at 77”		No Water	Mottling at 42”

#535 Roots to 30”

0	- 6”	Top Soil	
6”	- 27”	Orange Brown Fine Silty Sand with Rocks and cobbles	
27”	- 52”	Gray Fine Silt	
52”	- 84”	Brown Medium Sand and Gravel	
Ledge at 84”		Water at 41”	Mottling at 30”

#536 Roots to 31”

0	- 7”	Top Soil	
7”	- 32”	Orange Brown Fine Silty Sand with 3”-6” Rocks	
32”	- 44”	Orange Brown Medium Sand and Pebbles	
Ledge at 44”		No Water	Mottling at 32”

#537 Roots to 19”

0	- 7”	Top Soil	
7”	- 19”	Brown Fine to Medium Silty Sand	
19”	- 39”	Olive Tan Fine Silt	
39”	- 60”	Brown Medium Sand, Gravel and Rocks	
Ledge at 60”		Water at 19”	Mottling at 19”

#538 Roots to 31”
0 - 4” Top Soil
4” - 37” Orange Brown Fine Silty Sand
37” - 88” Olive Tan Medium Sand and Gravel with Cobbles
No Ledge No Water No Mottling

#539 Roots to 23”
0 - 4” Top Soil
4” - 23” Orange Brown Fine Silty Sand
23” - 83” Olive Tan Medium Sand and Gravel with Cobbles
No Ledge No Water No Mottling

#540 Roots to 27”
0 - 4” Top Soil
4” - 27” Orange Brown Fine Silty Sand
27” - 84” Olive Tan Medium Sand and Gravel with Cobbles
No Ledge No Water No Mottling

#541 Roots to 30”
0 - 5” Top Soil
5” - 31” Orange Brown Fine Silty Sand
31” - 77” Olive Tan Medium Sand and Gravel with Cobbles
No Ledge No Water No Mottling
Boulder at 39”

#542 Roots to 31”
0 - 5” Top Soil
5” - 31” Orange Brown Fine Silty Sand
31” - 61” Orange Brown Fine Very Silty Sand
61” - 78” Tan Fine Sand
No Ledge Water at 50” No Mottling

#543 Roots to 40”
0 - 4” Top Soil
4” - 38” Orange Brown Fine Silty Sand
38” - 94” Tan and Black Medium Sand, Gravel and Rocks
No Ledge No Water No Mottling

TESTING PERFORMED: 4/03/06

#544 Roots to 27”
0 - 6” Top Soil
6” - 27” Orange Brown Fine Silty Sand
27” - 82” Tan and Black Medium Sand, Gravel and Rocks
No Ledge No Water No Mottling

TESTING PERFORMED: 3/31/06

#545 Roots to 29”

0	- 9”	Top Soil	
9”	- 34”	Orange Brown Fine Silty Sand	
34”	- 51”	Gray Fine Silt	
Ledge at 51”		No Water	Mottling at 41”

#546 Roots to 28”

0	- 4”	Top Soil	
4”	- 33”	Orange Brown Fine Silty Sand	
33”	- 41”	Brown Medium Sand and Gravel	
Ledge at 41”		No Water	No Mottling

TESTING PERFORMED: 4/03/06

#547 Roots to 27”

0	- 5”	Top Soil	
5”	- 27”	Orange Brown Fine Silty Sand	
27”	- 87”	Tan Medium Sand, Gravel and Rock	
Ledge at 87”		No Water	No Mottling

TESTING PERFORMED: 3/14/07

#550 Roots to 33”

0	- 8”	Top Soil	
8”	- 33”	Red Brown Fine Silty Sand	
33”	- 65”	Brown Coarse Sand and Gravel	
Ledge at 65”		Water at 59”	No Redoximorphic Features

#551 Roots to 33”

0	- 10”	Top Soil	
10”	- 33”	Red Brown Fine Silty Sand	
33”	- 84”	Brown Coarse Sand and Gravel	
Ledge at 84”		Water at 51”	No Redoximorphic Features

#552 Roots to 40”

0	- 8”	Top Soil	
8”	- 40”	Red Brown Fine Silty Sand	
40”	- 99”	Brown Coarse Sand and Gravel	
No Ledge		Water at 98”	No Redoximorphic Features

#553 Roots to 32”

0	- 10”	Top Soil	
10”	- 50”	Red Brown Fine Silty Sand	
50”	- 99”	Brown Coarse Sand and Gravel	
No Ledge		Water at 79”	No Redoximorphic Features

COBBLERS HILL COURT

MONROE

PERCOLATION TEST RESULTS

TESTING PERFORMED: 3/31/06

P-601	
DIAMETER:	7”
DEPTH:	18”
PRESOAK:	11:45
1:21	7-1/4"
1:31	10"
1:41	11-3/4"
1:51	13-1/4"
2:01	14-1/2"
2:11	15-3/8"
2:21	16-3/8"
RATE:	1"/10 MINUTES

P-602	
DIAMETER:	7”
DEPTH:	19”
PRESOAK:	12:00
1:18	7-1/2"
1:28	12-1/4"
1:38	14-1/4"
1:48	15-1/2"
1:58	16-5/8"
2:08	17-3/4"
2:18	DRY
RATE:	1"/9 MINUTES

P-603	
DIAMETER:	7”
DEPTH:	20”
PRESOAK:	12:35
2:05	4”
2:15	8-1/2”
2:25	10-3/4”
2:35	13”
2:45	14-3/4”
2:55	16-1/4”
3:05	DRY
RATE:	1”/7 MINUTES

P-604	
DIAMETER:	8”
DEPTH:	20”
PRESOAK:	12:40
2:07	3”
2:17	7-3/4”
2:27	10-1/4”
2:37	12-1/4”
2:47	13-5/8”
2:57	15”
3:07	DRY
RATE:	1”/8 MINUTES

TESTING PERFORMED: 4/05/06

P-605	
DIAMETER:	9”
DEPTH:	19”
PRESOAK:	10:45 (4/04/06)
12:56	6-1/4”
1:06	8-3/4”
1:16	10”
1:26	11-1/8”
1:36	12-1/8”
1:46	13-1/8”
1:56	13-7/8”
RATE:	1”/14 MINUTES

P-606	
DIAMETER:	9”
DEPTH:	20”
PRESOAK:	10:50 (4/04/06)
12:57	7-3/4”
1:07	11-1/2”
1:17	14-1/4”
1:27	15-3/4”
1:37	17-1/8”
1:47	18-1/2”
1:57	DRY
RATE:	1”/8 MINUTES

P-607

DIAMETER:	8”
DEPTH:	23”
PRESOAK:	10:33 (4/04/06)
12:14	6-1/4”
12:24	9-3/4”
12:34	11-1/2”
12:44	12-3/4”
12:54	14”
1:04	15”
1:14	16”
RATE:	1”/10 MINUTES

P-608

DIAMETER:	8”
DEPTH:	21”
PRESOAK:	10:36 (4/04/06)
12:13	6-1/2”
12:23	16”
12:33	18-1/4”
12:43	DRY
RATE:	1”/5 MINUTES

P-609

DIAMETER:	7”
DEPTH:	24”
PRESOAK:	10:25 (4/04/06)
12:16	6”
12:26	19”
12:36	DRY
RATE:	1”/<1 MINUTE

P-610

DIAMETER:	9”
DEPTH:	23”
PRESOAK:	10:30 (4/04/06)
12:18	6-1/2”
12:28	14”
12:38	16-1/2”
12:48	17-1/2”
12:58	DRY
RATE:	1”/10 MINUTES

P-611

DIAMETER:	8”
DEPTH:	23”
PRESOAK:	10:15 (4/04/06)
9:19	4-1/2”
9:29	5-3/4”
9:39	6-1/2”
9:49	7”
9:59	7-1/2”
10:09	8”
10:19	8-1/2”
RATE:	1”/20 MINUTES

P-612

DIAMETER:	9”
DEPTH:	22”
PRESOAK:	10:17 (4/04/06)
9:20	6”
9:30	7-1/4”
9:40	8-1/4”
9:50	9”
10:00	9-5/8"
10:10	10-3/8”
10:20	11-1/8”
RATE:	1”/14 MINUTES

P-613

DIAMETER:	8”
DEPTH:	24”
PRESOAK:	11:15 (4/04/06)
9:21	6”
9:31	10-1/4”
9:41	12-1/2”
9:51	14-1/2”
10:01	16”
10:11	17-1/4”
10:21	18-1/2”
RATE:	1”/8 MINUTES

P-614

DIAMETER:	10”
DEPTH:	26”
PRESOAK:	11:12 (4/04/06)
9:23	10-1/2”
9:33	14-1/4”
9:43	15-1/4”
9:53	16-1/8”
10:03	16-3/4”
10:13	17-1/4”
10:23	17-3/4”
RATE:	1”/20 MINUTES

P-615

DIAMETER:	7”
DEPTH:	25”
PRESOAK:	11:11 (4/04/06)
9:24	8”
9:34	12”
9:44	14”
9:54	15-3/4”
10:04	17”
10:14	18”
10:24	19”
RATE:	1”/10 MINUTES

P-616

DIAMETER:	7”
DEPTH:	24”
PRESOAK:	11:10 (4/04/06)
9:25	6-1/2”
9:35	11”
9:45	13”
9:55	14-3/4”
10:05	16”
10:15	17-1/4”
10:25	18”
RATE:	1”/14 MINUTES

P-617

DIAMETER:	8”
DEPTH:	20”
PRESOAK:	11:00 (4/04/06)
10:51	4-1/2”
11:00	6-1/2”
11:10	7-1/2”
11:20	8-1/2”
11:30	9-1/2”
11:40	10-3/8”
11:50	11-1/8”
RATE:	1”/14 MINUTES

P-618

DIAMETER:	9”
DEPTH:	20”
PRESOAK:	11:05 (4/04/06)
10:48	6”
10:58	8-1/4”
11:08	9-3/4”
11:18	11”
11:28	12”
11:38	13”
11:48	14”
RATE:	1”/10 MINUTES

P-619

DIAMETER:	8”
DEPTH:	22”
PRESOAK:	10:12 (4/04/06)
8:59	9-1/4”
9:09	12-3/4”
9:19	14-3/4”
9:29	16”
9:39	16-3/4”
9:49	17-3/8”
9:59	18”
RATE:	1”/16 MINUTES

P-620

DIAMETER:	8”
DEPTH:	25”
PRESOAK:	10:10 (4/04/06)
8:57	9-1/4”
9:07	16-1/2”
9:17	19”
9:27	21”
9:37	22-1/4”
9:47	23-3/8”
9:57	DRY
RATE:	1”/9 MINUTES

P-621

DIAMETER:	8”
DEPTH:	24”
PRESOAK:	10:06 (4/04/06)
9:01	10”
9:11	17-3/4”
9:21	20-3/4”
9:31	DRY
RATE:	1”/4 MINUTES

P-622

DIAMETER:	8”
DEPTH:	25”
PRESOAK:	10:02 (4/04/06)
9:03	8”
9:13	13”
9:23	15-5/8”
9:33	17-3/8”
9:43	18-5/8”
9:53	19-3/8”
10:03	20-1/8"

RATE: 1”/14 MINUTES

P-623

DIAMETER:	8”
DEPTH:	20”
PRESOAK:	10:37
1:00	7-3/4”
1:10	10-1/2”
1:20	12-1/4”
1:30	13-3/4”
1:40	15”
1:50	15-3/4”
2:00	16-1/2”
RATE:	1”/14 MINUTES

P-624

DIAMETER:	8”
DEPTH:	19”
PRESOAK:	10:35
1:01	4-1/4”
1:11	13”
1:21	15-1/2”
1:31	15-7/8”
1:41	16-1/2”
1:51	16-3/4”
2:01	DRY
RATE:	1”/40 MINUTES

TESTING PERFORMED: 3/14/07

P-625

DIAMETER:	7”
DEPTH:	18”
PRESOAK:	1:33
4:15	3-1/2”
4:25	8”
4:35	11”
4:45	12-1/4"
4:55	13-1/4"
5:05	14"
5:15	14-1/4"
RATE:	1”/40 MINUTES

P-626

DIAMETER:	7”
DEPTH:	21”
PRESOAK:	1:35
4:16	7-3/4”
4:26	12”
4:36	14-1/4”
4:46	15-1/2”
4:56	16-1/2”
5:06	17-1/4”
5:16	18"
RATE:	1”/14 MINUTES

P-627

DIAMETER:	7”
DEPTH:	23”
PRESOAK:	1:55
4:40	8-1/2”
4:50	18”
5:00	19”
5:10	19-1/4"
5:20	19-3/8"
5:30	19-1/2"
5:40	19-9/16"
RATE:	1”/>100 MINUTES

P-628

DIAMETER:	7”
DEPTH:	21”
PRESOAK:	2:05
4:41	8-1/2”
4:51	DRY
RATE:	1”/<1 MINUTE

P-629

DIAMETER:	9”
PRESOAK:	2:30

PRESOAK NEVER RAN DRY
(BY 5:35 ONLY DOWN 3")

TESTING PERFORMED: 5/21/07

P-630

DIAMETER:	9”
DEPTH:	20”
PRESOAK:	3:00 5/21/07
TEST RUN:	5/22/07
1:58	4-1/4”
2:08	9-1/2”
2:18	12-1/4”
2:28	14-1/4"
2:38	15-1/2"
2:48	DRY
RATE:	1”/8 MINUTES

P-631

DIAMETER:	7”
DEPTH:	21”
PRESOAK:	3:15 5/21/07
TEST RUN:	5/22/07
1:59	4-1/2”
2:09	11-3/4”
2:19	14-3/4”
2:29	16-5/8”
2:39	DRY
RATE:	1”/6 MINUTES

P-632

DIAMETER:	7”
DEPTH:	19”
PRESOAK:	3:30 5/21/07
TEST RUN:	5/22/07
2:00	3-1/2”
2:10	10-1/2”
2:20	12-1/4”
2:30	13-3/4"
2:40	14-7/8"
2:50	DRY
RATE:	1”/9 MINUTES

P-633

DIAMETER:	8”
DEPTH:	17”
PRESOAK:	3:50 5/21/07
TEST RUN:	5/22/07
3:06	2-1/2”
3:16	10”
3:26	11”
3:36	12-1/4”
3:46	DRY
RATE:	1”/10 MINUTES

P-634

DIAMETER:	7”
DEPTH:	17”
PRESOAK:	4:10 5/21/07
TEST RUN:	5/22/07
3:07	2”
3:17	DRY
RATE:	1”/<10 MINUTES

139 TURKEY ROOST
MONROE

DEEP TEST RESULTS

TESTING PERFORMED: 4-14-2020 TMR, KEITH ROMANO

TH-1

0	-	8”	Top Soil	
8”	-	38”	Orange Brow Sandy Loam	
38”	-	70”	Tan Fine Silty Sand	
Ledge at 70			No Water	No Redoximorphic Features

TH-2

0	-	12”	Top Soil	
12”	-	40”	Orange Brow Sandy Loam	
40”	-	80”	Olive Brown Fine Silty Sand	
Ledge at 80			No Water	No Redoximorphic Features

TH-3

0	-	10”	Top Soil	
10”	-	27”	Orange Brow Sandy Loam	
27”	-	72”	Tan Fine Silty Sand	
Ledge at 72			No Water	No Redoximorphic Features

TH-4

0	-	12”	Top Soil	
12”	-	40”	Orange Brow Sandy Loam	
40”	-	108”	Tan Fine Silty Sand	
Ledge at 108			No Water	No Redoximorphic Features

TH-5

0	-	12”	Top Soil	
12”	-	24”	Orange Brow Sandy Loam	
24”	-	110”	Tan Fine Sand and Gravel	
Ledge at 110			No Water	No Redoximorphic Features

TH-6

0	-	10”	Top Soil	
10”	-	30”	Orange Brow Sandy Loam	
30”	-	105”	Tan Fine Sand and Gravel	
Ledge at 105			No Water	No Redoximorphic Features

TH-7

0	-	12”	Top Soil	
12”	-	32”	Orange Brow Sandy Loam	
32”	-	84”	Tan Fine Sand and Gravel	
No Ledge (Refusal at 84)			No Water	No Redoximorphic Features

TH-8

0	-	10”	Top Soil
10”	-	24”	Orange Brow Sandy Loam
24”	-	108”	Tan Fine Sand and Gravel *Gravel Throughout*

No Ledge No Water No Redoximorphic Features

TH-9

0	-	12”	Top Soil
12”	-	28”	Orange Brow Sandy Loam
28”	-	105”	Tan Fine Sand and Gravel *Gravel Throughout*

No Ledge No Water No Redoximorphic Features

TESTING PERFORMED: 5-28-2020 TMR, KEITH ROMANO

TH-100

0	-	12”	Top Soil
12”	-	36”	Orange Brow Sandy Loam
36”	-	40”	Tan Fine Sand and Gravel

Ledge at 40" No Water No Redoximorphic Features

TH-101

0	-	12”	Top Soil
12”	-	48”	Orange Brow Sandy Loam
48”	-	120”	Tan Fine Sand and Gravel

Ledge at 120" No Water No Redoximorphic Features

TH-102

0	-	14”	Top Soil
14”	-	42”	Orange Brow Sandy Loam
42”	-	142”	Tan Fine Sand and Gravel

Ledge at 142" No Water No Redoximorphic Features

TH-103

0	-	12”	Top Soil
12”	-	46”	Orange Brow Sandy Loam
46”	-	108”	Tan Fine Sand and Gravel

Ledge at 108" No Water No Redoximorphic Features

TH-104

0	-	18”	Top Soil
18”	-	50”	Orange Brow Sandy Loam
50”	-	120”	Tan Fine Sand and Gravel

Ledge at 120" No Water No Redoximorphic Features

TH-105

Ledge at 40" No Water No Redoximorphic Features

TH-106

0	-	12”	Top Soil	
12”	-	36”	Orange Brow Sandy Loam Tan Fine	
36”	-	88”	Sand and Gravel	
Ledge at 88"			No Water	No Redoximorphic Features

TH-107

0	-	15”	Top Soil	
15”	-	46”	Orange Brow Sandy Loam	
46”	-	120”	Tan Fine Sand and Gravel	
Ledge at 120"			No Water	No Redoximorphic Features

TH-108

0	-	10”	Top Soil	
10”	-	42”	Orange Brow Sandy Loam	
42”	-	72”	Tan Fine Sand and Gravel	
Ledge at 72"			No Water	No Redoximorphic Features

TH-109

0	-	12”	Top Soil	
12”	-	36”	Orange Brow Sandy Loam	
36”	-	135”	Tan Fine Sand and Gravel	
Ledge at 135"			No Water	No Redoximorphic Features

TH-110

0	-	12”	Top Soil	
12”	-	40”	Orange Brow Sandy Loam	
40”	-	128”	Tan Fine Sand and Gravel	
Ledge at 128"			Water at 72"	No Redoximorphic Features

TH-111

0	-	13”	Top Soil	
13”	-	51”	Orange Brow Sandy Loam	
51”	-	189”	Tan Fine Sand and Gravel	
Ledge at 189"			No Water	No Redoximorphic Features

DEEP HOLE TESTS
05-05-2023
JEDWARDS ASSOCIATES, LLC

TH 2048
8- TOPSOIL
24- RED-BROWN MEDIUM SAND
34- TAN FINE SAND
96- OLIVE BROWN MEDIUM SAND & GRAVEL
NO MOTTLES
NO LEDGE
WATER @ 60” (SEEP)
NO ROOTS

TH 2045A (2045 PT IS IN TS STOCKPILE)
0-15- TOPSOIL
15-?- DARK GRAY FILL W/ ORGANICS, DEBRIS, GARBAGE
NO MOTTLES
NO LEGDE
NO WATER
NO ROOTS

TH 245B
0-8- TOPSOIL
8-30- RED-BROWN SILTY SANDY LOAM
NO MOTTLES
LEDEGE @ 30
NO WATER
NO ROOTS

TH 2045C
0-8- TOPSOIL
8-114- DARK GRAY BROWN FILL W/ ORGANICS, DEBRIS, GARBAGE
NO MOTTLES
LEDGE @ 114
WATER @ 102
NO ROOTS
SURFACE WATER SEEP @ 10-12

TH 2045D
0-10- TOPSOIL
10-15FT DARK GRAY BRON FILL W/ ORGANICS, DEBRIS, GARBAGE
NO WATER
NO LEDEGE
NO MOTTLES
NO ROOTS

TH 2046

6- TOPSOIL
84- OLIVE BROWN SILTY LOAM
106- GRAY BROWN MOTTLED FINE SILTY SAND
LEDGE @ 106
NO WATER
NO ROOTS
MOTTLES @ 84

TH 2027
4- TOPSOIL
14- RED BROWN SANDY LOAM
56- OLIVE GRAY FILL W/ ORGANIC AND DEBRIS
84 OLIVE BROWN SILT
WATER @ 56
NO ROOTS
MOTTLES @ 56

TH 2027 A
6- TOPSOIL
20- BROWN RED SANDY LOAM
32- ORIGINAL TOPSOIL
60- GRAY MOTTLED HARD SAND
86- RED BROWN SAND AND GRAVEL
NO LEDGE
NO WATER
ROOTS @ 32
MOTLLES @ 32

TH 801
10- TOPSOIL
26- ORANGE BROWN SANDY LOAM
102- OLIVE BROWN SILTY SAND
NO LEDGE
NO MOTTLES
NO WATER
ROOTS TO 26

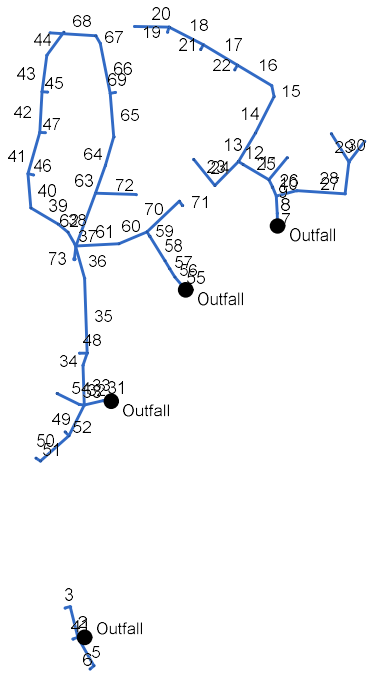
TH 802
12- TOPSOIL
24- ORANGE BROWN SANDY LOAM
108- OLIVE BROWN SILTY SAND
NO MOTTLES
NO WATER
ROOTS TO 24

TH 803
12- TOPSOIL
32- ORANGE BROWN SILTY LOAM
108- OLIVE BROWN SILTY SAND AND GRAVEL

NO LEDGE
NO MOTTLES
NO WATER
ROOTS TO 32

TH 804
0-8- TOPSOIL
8-26- ORANGE BROWN SILTY LOAM
26-106- OLIVE BROWN SILTY SAND AND GRAVEL
NO LEDGE
NO MOTTLES
NO WATER
ROOTS TO 26

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: 3302-KWF.stm	Number of lines: 73	Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	25.195	178.669	Grate	0.61	0.00	0.00	5.0	373.50	0.99	373.75	15	Cir	0.012	1.50	381.80	Pipe - (32)
2	1	119.778	77.404	Grate	1.17	0.00	0.00	5.0	373.75	11.06	387.00	15	Cir	0.012	1.50	391.07	Pipe - (31)
3	2	20.216	-89.493	Grate	3.23	0.00	0.00	5.0	387.00	0.99	387.20	15	Cir	0.012	1.00	391.07	Pipe - (30)
4	1	20.027	-15.103	Grate	0.61	0.00	0.00	5.0	377.95	1.00	378.15	15	Cir	0.012	1.00	381.80	Pipe - (33)
5	1	122.337	-118.049	Grate	0.52	0.00	0.00	5.0	373.75	0.51	374.38	15	Cir	0.012	1.47	378.46	Pipe - (35)
6	5	20.035	77.965	Grate	0.52	0.00	0.00	5.0	374.38	1.00	374.58	15	Cir	0.012	1.00	378.46	Pipe - (34)
7	End	48.007	-92.256	Grate	0.00	0.00	0.00	5.0	379.00	1.04	379.50	30	Cir	0.012	0.50	394.00	Pipe - (43)
8	7	65.929	-0.056	Grate	5.72	0.00	0.00	5.0	387.50	3.79	390.00	30	Cir	0.012	1.47	398.00	Pipe - (42)
9	8	37.291	-22.364	Grate	0.00	0.00	0.00	5.0	393.50	9.92	397.20	24	Cir	0.012	0.50	410.00	Pipe - (41)
10	9	29.905	-0.219	Grate	0.00	0.00	0.00	5.0	402.90	18.73	408.50	24	Cir	0.012	1.37	422.00	Pipe - (40)
11	10	114.159	-34.174	Grate	1.59	0.00	0.00	5.0	408.86	4.94	414.50	24	Cir	0.012	0.50	427.62	Pipe - (39)
12	11	20.331	0.010	Grate	1.03	0.00	0.00	5.0	414.30	8.36	416.00	24	Cir	0.012	2.20	427.62	Pipe - (38)
13	12	126.011	89.964	Grate	1.83	0.00	0.00	5.0	416.50	1.59	418.50	18	Cir	0.012	0.50	429.48	Pipe - (37)
14	13	154.272	-4.096	Grate	0.00	0.00	0.00	5.0	418.75	2.99	423.36	15	Cir	0.012	1.01	432.26	Pipe - (36)
15	14	42.372	-38.754	Grate	1.41	0.00	0.00	5.0	423.36	1.51	424.00	15	Cir	0.012	1.16	433.38	Pipe - (56)
16	15	150.146	-47.123	Grate	1.45	0.00	0.00	5.0	424.00	2.16	427.25	15	Cir	0.012	1.50	436.48	Pipe - (55)
17	16	150.143	0.038	Grate	1.50	0.00	0.00	5.0	427.25	2.50	431.00	15	Cir	0.012	1.50	439.78	Pipe - (54)
18	17	145.164	-3.588	Grate	1.45	0.00	0.00	5.0	431.00	2.24	434.25	15	Cir	0.012	1.67	442.94	Pipe - (53)
19	18	20.331	-101.174	Grate	1.45	0.00	0.00	5.0	439.30	0.98	439.50	15	Cir	0.012	1.00	442.94	Pipe - (57)
20	18	130.074	-26.117	Grate	1.41	0.00	0.00	5.0	434.25	2.11	437.00	15	Cir	0.012	1.00	445.72	Pipe - (52)
21	17	20.184	-90.562	Grate	1.41	0.00	0.00	5.0	431.00	0.99	431.20	15	Cir	0.012	1.00	439.78	Pipe - (58)
22	16	19.955	-90.012	Grate	1.45	0.00	0.00	5.0	427.25	1.00	427.45	15	Cir	0.012	1.00	436.48	Pipe - (59)
23	12	126.506	-76.540	Grate	1.31	0.00	0.00	5.0	416.50	1.63	418.56	18	Cir	0.012	1.50	426.21	Pipe - (45)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	23	127.017	96.384	Grate	13.45	0.00	0.00	5.0	419.40	2.83	423.00	15	Cir	0.012	1.00	427.00	Pipe - (44)
25	10	108.029	64.013	Grate	1.64	0.00	0.00	5.0	415.41	3.79	419.50	15	Cir	0.012	1.00	423.00	Pipe - (46)
26	8	79.019	78.015	Grate	0.14	0.00	0.00	5.0	390.10	1.01	390.90	24	Cir	0.012	0.54	395.00	Pipe - (50)
27	26	181.944	17.880	Grate	0.80	0.00	0.00	5.0	390.90	0.49	391.80	24	Cir	0.012	1.50	397.00	Pipe - (49)
28	27	121.251	-86.188	Grate	0.75	0.00	0.00	5.0	391.80	9.98	403.90	24	Cir	0.012	1.02	414.30	Pipe - (48)
29	28	97.602	29.580	Grate	22.14	0.00	0.00	5.0	408.25	9.99	418.00	15	Cir	0.012	1.00	419.86	Pipe - (47)
30	28	126.206	-39.286	Grate	4.41	0.00	0.00	5.0	408.00	9.51	420.00	15	Cir	0.012	1.00	427.50	Pipe - (51)
31	End	30.000	-176.000	Grate	0.00	0.00	0.00	5.0	377.50	2.30	378.19	36	Cir	0.012	0.51	389.50	Pipe - (83)
32	31	73.386	-17.000	Grate	0.56	0.00	0.00	5.0	378.19	0.50	378.56	36	Cir	0.012	2.15	415.05	Pipe - (82)
33	32	150.569	100.995	Grate	0.00	0.00	0.00	5.0	383.50	4.74	390.63	18	Cir	0.012	0.61	415.80	Pipe - (74)
34	33	47.994	20.707	Grate	4.16	0.00	0.00	5.0	390.63	4.94	393.00	18	Cir	0.012	1.50	416.05	Pipe - (73)
35	34	284.334	-20.554	Grate	1.78	0.00	0.00	5.0	393.00	5.70	409.20	18	Cir	0.012	0.50	417.47	Pipe - (72)
36	35	133.139	-13.986	Grate	1.78	0.00	0.00	5.0	409.20	5.11	416.00	18	Cir	0.012	0.50	421.48	Pipe - (71)
37	36	53.198	-14.690	Grate	1.92	0.00	0.00	5.0	416.00	1.00	416.53	18	Cir	0.012	0.58	421.83	Pipe - (67)
38	37	47.067	-19.423	Grate	1.27	0.00	0.00	5.0	416.53	1.00	417.00	18	Cir	0.012	0.50	424.03	Pipe - (66)
39	38	120.653	-9.419	Grate	1.41	0.00	0.00	5.0	417.00	0.99	418.20	18	Cir	0.012	1.27	429.11	Pipe - (65)
40	39	130.403	54.984	Grate	1.22	0.00	0.00	5.0	420.65	2.84	424.35	15	Cir	0.012	1.50	433.82	Pipe - (64)
41	40	161.656	20.177	Grate	1.50	0.00	0.00	5.0	424.35	3.34	429.75	15	Cir	0.012	1.47	439.06	Pipe - (63)
42	41	154.069	-12.665	Grate	1.45	0.00	0.00	5.0	429.75	3.28	434.80	15	Cir	0.012	1.50	443.95	Pipe - (62)
43	42	140.369	4.401	Grate	1.27	0.00	0.00	5.0	434.80	3.35	439.50	15	Cir	0.012	0.81	448.33	Pipe - (61)
44	43	107.999	28.774	Grate	0.89	0.00	0.00	5.0	439.50	2.78	442.50	15	Cir	0.012	1.00	451.27	Pipe - (60)
45	42	20.089	90.444	Grate	1.92	0.00	0.00	5.0	434.80	1.00	435.00	15	Cir	0.012	1.00	443.95	Pipe - (70)
46	40	20.249	107.575	Grate	1.31	0.00	0.00	5.0	430.18	0.99	430.38	15	Cir	0.012	1.00	433.82	Pipe - (69)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
47	41	19.915	77.472	Grate	1.45	0.00	0.00	5.0	429.75	1.00	429.95	15	Cir	0.012	1.00	439.06	Pipe - (68)
48	34	28.928	-107.619	Grate	0.28	0.00	0.00	5.0	393.25	2.59	394.00	15	Cir	0.012	1.00	399.86	Pipe - (75)
49	32	129.835	-50.282	Grate	0.28	0.00	0.00	5.0	379.31	1.88	381.75	15	Cir	0.012	1.50	386.83	Pipe - (78)
50	49	143.637	21.543	Grate	0.00	0.00	0.00	5.0	381.75	3.10	386.20	15	Cir	0.012	1.46	389.65	Pipe - (77)
51	50	20.226	74.652	Grate	0.23	0.00	0.00	5.0	386.20	0.99	386.40	15	Cir	0.012	1.00	389.65	Pipe - (76)
52	49	20.197	108.231	Grate	0.23	0.00	0.00	5.0	381.75	0.99	381.95	15	Cir	0.012	1.00	386.83	Pipe - (79)
53	32	19.805	21.738	Grate	1.13	0.00	0.00	5.0	378.56	1.01	378.76	24	Cir	0.012	0.53	388.93	Pipe - (81)
54	53	92.886	17.579	Grate	11.90	0.00	0.00	5.0	378.76	-0.01	378.75	36	Cir	0.012	1.00	382.40	Pipe - (80)
55	End	64.098	-130.308	Grate	0.00	0.00	0.00	5.0	378.00	1.01	378.65	24	Cir	0.012	0.50	422.29	Pipe - (25)
56	55	36.295	8.835	Grate	0.00	0.00	0.00	5.0	382.80	9.92	386.40	24	Cir	0.012	0.50	422.47	Pipe - (24)
57	56	35.254	0.102	Grate	0.00	0.00	0.00	5.0	397.40	10.21	401.00	24	Cir	0.012	0.50	422.64	Pipe - (23)
58	57	108.716	-0.157	Grate	1.08	0.00	0.00	5.0	409.50	1.00	410.59	24	Cir	0.012	0.50	423.19	Pipe - (22)
59	58	20.237	-0.808	Grate	1.27	0.00	0.00	5.0	410.59	0.99	410.79	24	Cir	0.012	2.22	423.29	Pipe - (21)
60	59	115.221	-80.955	Grate	1.27	0.00	0.00	5.0	410.79	0.62	411.50	24	Cir	0.012	0.60	423.86	Pipe - (20)
61	60	161.486	20.347	Grate	3.96	0.00	0.00	5.0	411.50	0.62	412.50	24	Cir	0.012	1.50	424.67	Pipe - (19)
62	61	213.210	112.988	Grate	0.00	0.00	0.00	5.0	412.50	1.99	416.75	24	Cir	0.012	1.44	425.74	Pipe - (18)
63	62	111.216	-0.103	Grate	0.00	0.00	0.00	5.0	417.50	5.39	423.50	15	Cir	0.012	0.50	434.50	Pipe - (17)
64	63	112.817	-3.650	Grate	4.22	0.00	0.00	5.0	423.50	1.33	425.00	15	Cir	0.012	0.62	433.32	Pipe - (16)
65	64	165.213	-21.253	Grate	1.78	0.00	0.00	5.0	425.00	1.82	428.00	18	Cir	0.012	1.50	438.09	Pipe - (13)
66	65	192.294	-6.191	Grate	1.55	0.00	0.00	5.0	428.00	5.98	439.50	15	Cir	0.012	0.58	448.20	Pipe - (12)
67	66	33.674	-19.615	Grate	1.69	0.00	0.00	5.0	439.50	1.48	440.00	15	Cir	0.012	1.28	448.53	Pipe - (14)
68	67	172.625	-55.300	Grate	1.03	0.00	0.00	5.0	440.00	1.45	442.50	15	Cir	0.012	1.00	451.00	Pipe - (10)
69	65	20.277	85.629	Grate	1.50	0.00	0.00	5.0	428.00	0.99	428.20	15	Cir	0.012	1.00	438.09	Pipe - (15)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
70	59	168.359	79.156	Grate	1.45	0.00	0.00	5.0	413.85	1.00	415.53	15	Cir	0.012	1.50	424.75	Pipe - (29)
71	70	19.738	96.881	Grate	1.78	0.00	0.00	5.0	421.10	1.01	421.30	15	Cir	0.012	1.00	424.75	Pipe - (28)
72	62	153.378	71.930	Grate	3.56	0.00	0.00	5.0	417.50	0.98	419.00	15	Cir	0.012	1.00	423.00	Pipe - (26)
73	61	50.000	-80.000	Curb	2.34	0.00	0.00	0.0	413.00	2.00	414.00	15	Cir	0.012	1.00	421.00	

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	2+99RT	Grate	381.80	Rect	4.00	4.50	15	Cir	373.75	15 15 15	Cir Cir Cir	373.75 377.95 373.75
2	4+20RT	Grate	391.07	Rect	4.00	4.50	15	Cir	387.00	15	Cir	387.00
3	4+20LT	Grate	391.07	Rect	4.00	4.50	15	Cir	387.20			
4	2+99LT	Grate	381.80	Rect	4.00	4.50	15	Cir	378.15			
5	1+67RT	Grate	378.46	Rect	4.00	4.50	15	Cir	374.38	15	Cir	374.38
6	1+67LT	Grate	378.46	Rect	4.00	4.50	15	Cir	374.58			
7	Structure - (52)	Grate	394.00	Rect	4.00	4.50	30	Cir	379.50	30	Cir	387.50
8	CC CB7	Grate	398.00	Rect	4.00	4.50	30	Cir	390.00	24 24	Cir Cir	393.50 390.10
9	CC MH3	Grate	410.00	Rect	4.00	4.50	24	Cir	397.20	24	Cir	402.90
10	CC MH2	Grate	422.00	Rect	4.00	4.50	24	Cir	408.50	24 15	Cir Cir	408.86 415.41
11	3+0 LT	Grate	427.62	Rect	4.00	4.50	24	Cir	414.50	24	Cir	414.30
12	3+0 RT	Grate	427.62	Rect	4.00	4.50	24	Cir	416.00	18 18	Cir Cir	416.50 416.50
13	1+75 RT	Grate	429.48	Rect	4.00	4.50	18	Cir	418.50	15	Cir	418.75
14	30+78RT	Grate	432.26	Rect	4.00	4.50	15	Cir	423.36	15	Cir	423.36
15	30+48LT	Grate	433.38	Rect	4.00	4.50	15	Cir	424.00	15	Cir	424.00
16	28+98LT	Grate	436.48	Rect	4.00	4.50	15	Cir	427.25	15 15	Cir Cir	427.25 427.25
17	27+48LT	Grate	439.78	Rect	4.00	4.50	15	Cir	431.00	15 15	Cir Cir	431.00 431.00
18	26+05LT	Grate	442.94	Rect	4.00	4.50	15	Cir	434.25	15 15	Cir Cir	439.30 434.25
19	26_05RT	Grate	442.94	Rect	4.00	4.50	15	Cir	439.50			

Project File: 3302-KWF.stm | Number of Structures: 73 | Run Date: 5/17/2023

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
20	24+79LT	Grate	445.72	Rect	4.00	4.50	15	Cir	437.00			
21	27+48RT	Grate	439.78	Rect	4.00	4.50	15	Cir	431.20			
22	28+98RT	Grate	436.48	Rect	4.00	4.50	15	Cir	427.45			
23	4+34 RT	Grate	426.21	Rect	4.00	4.50	18	Cir	418.56	15	Cir	419.40
24	CC CB 1	Grate	427.00	Rect	4.00	4.50	15	Cir	423.00			
25	CC CB6	Grate	423.00	Rect	4.00	4.50	15	Cir	419.50			
26	CC CB5A	Grate	395.00	Rect	4.00	4.50	24	Cir	390.90	24	Cir	390.90
27	CC CB 5	Grate	397.00	Rect	4.00	4.50	24	Cir	391.80	24	Cir	391.80
28	CC CB4	Grate	414.30	Rect	4.00	4.50	24	Cir	403.90	15 15	Cir Cir	408.25 408.00
29	FE	Grate	419.86	Rect	4.00	4.50	15	Cir	418.00			
30	33+47	Grate	427.50	Rect	4.00	4.50	15	Cir	420.00			
31	XC5	Grate	389.50	Rect	4.00	4.50	36	Cir	378.19	36	Cir	378.19
32	12+18RT	Grate	415.05	Rect	4.00	4.50	36	Cir	378.56	18 15 24	Cir Cir Cir	383.50 379.31 378.56
33	13+95	Grate	415.80	Rect	4.00	4.50	18	Cir	390.63	18	Cir	390.63
34	14+XRT	Grate	416.05	Rect	4.00	4.50	18	Cir	393.00	18 15	Cir Cir	393.00 393.25
35	17+0	Grate	417.47	Rect	4.00	4.50	18	Cir	409.20	18	Cir	409.20
36	11+26LT	Grate	421.48	Rect	4.00	4.50	18	Cir	416.00	18	Cir	416.00
37	11+62RT	Grate	421.83	Rect	4.00	4.50	18	Cir	416.53	18	Cir	416.53
38	12+14RT	Grate	424.03	Rect	4.00	4.50	18	Cir	417.00	18	Cir	417.00
39	13+37LT	Grate	429.11	Rect	4.00	4.50	18	Cir	418.20	15	Cir	420.65
40	14+63LT	Grate	433.82	Rect	4.00	4.50	15	Cir	424.35	15 15	Cir Cir	424.35 430.18

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
41	16+28lt	Grate	439.06	Rect	4.00	4.50	15	Cir	429.75	15 15	Cir Cir	429.75 429.75
42	17+28LT	Grate	443.95	Rect	4.00	4.50	15	Cir	434.80	15 15	Cir Cir	434.80 434.80
43	19+20	Grate	448.33	Rect	4.00	4.50	15	Cir	439.50	15	Cir	439.50
44	20+24	Grate	451.27	Rect	4.00	4.50	15	Cir	442.50			
45	17+28RT	Grate	443.95	Rect	4.00	4.50	15	Cir	435.00			
46	14+63RT	Grate	433.82	Rect	4.00	4.50	15	Cir	430.38			
47	16+28RT	Grate	439.06	Rect	4.00	4.50	15	Cir	429.95			
48	14+XLT	Grate	399.86	Rect	4.00	4.50	15	Cir	394.00			
49	10+92RT	Grate	386.83	Rect	4.00	4.50	15	Cir	381.75	15 15	Cir Cir	381.75 381.75
50	9+45RT	Grate	389.65	Rect	4.00	4.50	15	Cir	386.20	15	Cir	386.20
51	9+45LT	Grate	389.65	Rect	4.00	4.50	15	Cir	386.40			
52	10+92LT	Grate	386.83	Rect	4.00	4.50	15	Cir	381.95			
53	12+18LT	Grate	388.93	Rect	4.00	4.50	24	Cir	378.76	36	Cir	378.76
54	FE-IN	Grate	382.40	Rect	4.00	4.50	36	Cir	378.75			
55	Structure - (32)	Grate	422.29	Rect	4.00	4.50	24	Cir	378.65	24	Cir	382.80
56	Structure - (31)	Grate	422.47	Rect	4.00	4.50	24	Cir	386.40	24	Cir	397.40
57	Structure - (30)	Grate	422.64	Rect	4.00	4.50	24	Cir	401.00	24	Cir	409.50
58	7+50LT	Grate	423.19	Rect	4.00	4.50	24	Cir	410.59	24	Cir	410.59
59	7+50RT	Grate	423.29	Rect	4.00	4.50	24	Cir	410.79	24 15	Cir Cir	410.79 413.85
60	8+69RT	Grate	423.86	Rect	4.00	4.50	24	Cir	411.50	24	Cir	411.50
61	10+33RT	Grate	424.67	Rect	4.00	4.50	24	Cir	412.50	24 15	Cir Cir	412.50 413.00

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
62	CC 3	Grate	425.74	Rect	4.00	4.50	24	Cir	416.75	15 15	Cir Cir	417.50 417.50
63	CC MH1	Grate	434.50	Rect	4.00	4.50	15	Cir	423.50	15	Cir	423.50
64	3+76RT	Grate	433.32	Rect	4.00	4.50	15	Cir	425.00	18	Cir	425.00
65	2+11rt	Grate	438.09	Rect	4.00	4.50	18	Cir	428.00	15 15	Cir Cir	428.00 428.00
66	23+25RT	Grate	448.20	Rect	4.00	4.50	15	Cir	439.50	15	Cir	439.50
67	23+25LT	Grate	448.53	Rect	4.00	4.50	15	Cir	440.00	15	Cir	440.00
68	21+52	Grate	451.00	Rect	4.00	4.50	15	Cir	442.50			
69	2+11LT	Grate	438.09	Rect	4.00	4.50	15	Cir	428.20			
70	5+80RT	Grate	424.75	Rect	4.00	4.50	15	Cir	415.53	15	Cir	421.10
71	5+80LT	Grate	424.75	Rect	4.00	4.50	15	Cir	421.30			
72	CC 2	Grate	423.00	Rect	4.00	4.50	15	Cir	419.00			
73		Curb-	421.00	Cir	4.00	4.00	15	Cir	414.00			

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (32)	6.66	15	Cir	25.195	373.50	373.75	0.992	374.71	374.79	n/a	374.79	End	Grate
2	Pipe - (31)	4.40	15	Cir	119.778	373.75	387.00	11.062	374.79	387.85	n/a	387.85 j	1	Grate
3	Pipe - (30)	3.23	15	Cir	20.216	387.00	387.20	0.989	387.85	387.92	n/a	387.92	2	Grate
4	Pipe - (33)	0.61	15	Cir	20.027	377.95	378.15	0.999	378.20	378.45	n/a	378.45	1	Grate
5	Pipe - (35)	1.04	15	Cir	122.337	373.75	374.38	0.515	374.79	374.78	n/a	374.78	1	Grate
6	Pipe - (34)	0.52	15	Cir	20.035	374.38	374.58	0.998	374.78	374.86	n/a	374.86	5	Grate
7	Pipe - (43)	66.34	30	Cir	48.007	379.00	379.50	1.042	381.50*	382.57*	n/a	383.99	End	Grate
8	Pipe - (42)	66.34	30	Cir	65.929	387.50	390.00	3.792	389.14	392.43	n/a	392.43	7	Grate
9	Pipe - (41)	32.38	24	Cir	37.291	393.50	397.20	9.922	394.40	399.09	n/a	399.09	8	Grate
10	Pipe - (40)	32.38	24	Cir	29.905	402.90	408.50	18.726	403.66	410.39	n/a	410.39	9	Grate
11	Pipe - (39)	30.74	24	Cir	114.159	408.86	414.50	4.940	410.39	416.37	n/a	416.37	10	Grate
12	Pipe - (38)	29.15	24	Cir	20.331	414.30	416.00	8.362	416.37	417.85	n/a	417.85	11	Grate
13	Pipe - (37)	13.36	18	Cir	126.011	416.50	418.50	1.587	417.85	419.86	n/a	419.86	12	Grate
14	Pipe - (36)	11.53	15	Cir	154.272	418.75	423.36	2.988	419.86	424.57	n/a	424.57	13	Grate
15	Pipe - (56)	11.53	15	Cir	42.372	423.36	424.00	1.510	424.61*	425.76*	n/a	427.35	14	Grate
16	Pipe - (55)	10.12	15	Cir	150.146	424.00	427.25	2.165	427.35*	430.50*	n/a	432.08	15	Grate
17	Pipe - (54)	7.22	15	Cir	150.143	427.25	431.00	2.498	432.08*	433.68*	n/a	434.49	16	Grate
18	Pipe - (53)	4.31	15	Cir	145.164	431.00	434.25	2.239	434.49	435.09	n/a	435.09	17	Grate
19	Pipe - (57)	1.45	15	Cir	20.331	439.30	439.50	0.984	439.69	439.98	n/a	439.98	18	Grate
20	Pipe - (52)	1.41	15	Cir	130.074	434.25	437.00	2.114	435.09	437.47	n/a	437.47	18	Grate
21	Pipe - (58)	1.41	15	Cir	20.184	431.00	431.20	0.991	434.49*	434.50*	n/a	434.52	17	Grate
22	Pipe - (59)	1.45	15	Cir	19.955	427.25	427.45	1.002	432.08*	432.09*	n/a	432.11	16	Grate
23	Pipe - (45)	14.76	18	Cir	126.506	416.50	418.56	1.628	417.85	419.96	n/a	419.96	12	Grate
24	Pipe - (44)	13.45	15	Cir	127.017	419.40	423.00	2.834	420.65*	425.35*	n/a	427.21	23	Grate

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NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	Pipe - (46)	1.64	15	Cir	108.029	415.41	419.50	3.786	415.70	420.01	n/a	420.01	10	Grate
26	Pipe - (50)	28.24	24	Cir	79.019	390.10	390.90	1.012	392.43*	393.48*	n/a	394.16	8	Grate
27	Pipe - (49)	28.10	24	Cir	181.944	390.90	391.80	0.495	394.16*	396.55*	n/a	398.41	26	Grate
28	Pipe - (48)	27.30	24	Cir	121.251	391.80	403.90	9.979	398.41	405.71	n/a	405.71	27	Grate
29	Pipe - (47)	22.14	15	Cir	97.602	408.25	418.00	9.990	409.28	419.25	n/a	419.25	28	Grate
30	Pipe - (51)	4.41	15	Cir	126.206	408.00	420.00	9.508	408.38	420.85	n/a	420.85	28	Grate
31	Pipe - (83)	37.94	36	Cir	30.000	377.50	378.19	2.300	379.80	380.19	n/a	380.19	End	Grate
32	Pipe - (82)	37.94	36	Cir	73.386	378.19	378.56	0.504	380.19	380.56	n/a	380.56	31	Grate
33	Pipe - (74)	23.61	18	Cir	150.569	383.50	390.63	4.735	384.67	392.11	n/a	392.11	32	Grate
34	Pipe - (73)	23.61	18	Cir	47.994	390.63	393.00	4.938	392.11	394.48	n/a	394.48	33	Grate
35	Pipe - (72)	19.17	18	Cir	284.334	393.00	409.20	5.698	394.48	410.66	n/a	410.66	34	Grate
36	Pipe - (71)	17.39	18	Cir	133.139	409.20	416.00	5.107	410.66	417.44	n/a	417.44	35	Grate
37	Pipe - (67)	15.61	18	Cir	53.198	416.00	416.53	0.996	417.50*	418.50*	n/a	419.21	36	Grate
38	Pipe - (66)	13.69	18	Cir	47.067	416.53	417.00	0.999	419.21*	419.89*	n/a	420.35	37	Grate
39	Pipe - (65)	12.42	18	Cir	120.653	417.00	418.20	0.995	420.35*	421.79*	n/a	422.77	38	Grate
40	Pipe - (64)	11.01	15	Cir	130.403	420.65	424.35	2.837	422.77*	426.00*	n/a	427.88	39	Grate
41	Pipe - (63)	8.48	15	Cir	161.656	424.35	429.75	3.340	427.88	430.89	n/a	430.89	40	Grate
42	Pipe - (62)	5.53	15	Cir	154.069	429.75	434.80	3.278	430.89	435.75	n/a	435.75	41	Grate
43	Pipe - (61)	2.16	15	Cir	140.369	434.80	439.50	3.348	435.75	440.09	n/a	440.09	42	Grate
44	Pipe - (60)	0.89	15	Cir	107.999	439.50	442.50	2.778	440.09	442.87	n/a	442.87	43	Grate
45	Pipe - (70)	1.92	15	Cir	20.089	434.80	435.00	0.996	435.75	435.55	n/a	435.55	42	Grate
46	Pipe - (69)	1.31	15	Cir	20.249	430.18	430.38	0.988	430.55	430.83	n/a	430.83	40	Grate
47	Pipe - (68)	1.45	15	Cir	19.915	429.75	429.95	1.004	430.89	430.43	n/a	430.43	41	Grate
48	Pipe - (75)	0.28	15	Cir	28.928	393.25	394.00	2.593	394.48	394.20	n/a	394.20	34	Grate

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
49	Pipe - (78)	0.74	15	Cir	129.835	379.31	381.75	1.879	380.56	382.09	n/a	382.09	32	Grate
50	Pipe - (77)	0.23	15	Cir	143.637	381.75	386.20	3.098	382.09	386.39	n/a	386.39	49	Grate
51	Pipe - (76)	0.23	15	Cir	20.226	386.20	386.40	0.989	386.39	386.59	n/a	386.59	50	Grate
52	Pipe - (79)	0.23	15	Cir	20.197	381.75	381.95	0.990	382.09	382.14	n/a	382.14	49	Grate
53	Pipe - (81)	13.03	24	Cir	19.805	378.56	378.76	1.010	380.56	380.59	n/a	380.75	32	Grate
54	Pipe - (80)	11.90	36	Cir	92.886	378.76	378.75	-0.011	380.75	380.79	n/a	380.88	53	Grate
55	Pipe - (25)	28.48	24	Cir	64.098	378.00	378.65	1.014	379.84*	380.75*	n/a	381.39	End	Grate
56	Pipe - (24)	28.48	24	Cir	36.295	382.80	386.40	9.919	383.64	388.24	n/a	388.24	55	Grate
57	Pipe - (23)	28.48	24	Cir	35.254	397.40	401.00	10.212	398.23	402.84	n/a	402.84	56	Grate
58	Pipe - (22)	28.48	24	Cir	108.716	409.50	410.59	1.003	411.50*	412.97*	n/a	413.61	57	Grate
59	Pipe - (21)	27.40	24	Cir	20.237	410.59	410.79	0.988	413.61*	413.86*	n/a	416.49	58	Grate
60	Pipe - (20)	22.90	24	Cir	115.221	410.79	411.50	0.616	416.49*	417.49*	n/a	417.99	59	Grate
61	Pipe - (19)	21.63	24	Cir	161.486	411.50	412.50	0.619	417.99*	419.25*	n/a	420.35	60	Grate
62	Pipe - (18)	15.33	24	Cir	213.210	412.50	416.75	1.993	420.35*	421.19*	n/a	421.72	61	Grate
63	Pipe - (17)	11.77	15	Cir	111.216	417.50	423.50	5.395	421.72	424.74	n/a	425.45	62	Grate
64	Pipe - (16)	11.77	15	Cir	112.817	423.50	425.00	1.330	425.45*	428.65*	n/a	429.54	63	Grate
65	Pipe - (13)	7.55	18	Cir	165.213	425.00	428.00	1.816	429.54*	430.26*	n/a	430.69	64	Grate
66	Pipe - (12)	4.27	15	Cir	192.294	428.00	439.50	5.980	430.69	440.34	n/a	440.34	65	Grate
67	Pipe - (14)	2.72	15	Cir	33.674	439.50	440.00	1.485	440.34	440.66	n/a	440.66	66	Grate
68	Pipe - (10)	1.03	15	Cir	172.625	440.00	442.50	1.448	440.66	442.90	n/a	442.90	67	Grate
69	Pipe - (15)	1.50	15	Cir	20.277	428.00	428.20	0.986	430.69*	430.70*	n/a	430.72	65	Grate
70	Pipe - (29)	3.23	15	Cir	168.359	413.85	415.53	0.998	416.49*	416.85*	n/a	417.01	59	Grate
71	Pipe - (28)	1.78	15	Cir	19.738	421.10	421.30	1.013	421.53	421.83	n/a	421.83	70	Grate
72	Pipe - (26)	3.56	15	Cir	153.378	417.50	419.00	0.978	421.72*	422.12*	n/a	422.25	62	Grate

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
73		2.34	15	Cir	50.000	413.00	414.00	2.000	420.35*	420.41*	n/a	420.47	61	Curb-

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	25.195	0.00	0.00	0.00	0.00	0.00	5.0	8.2	0.0	6.66	6.97	5.80	15	0.99	373.50	373.75	374.71	374.79	375.36	381.80	Pipe - (32)
2	1	119.778	0.00	0.00	0.00	0.00	0.00	5.0	5.1	0.0	4.40	23.27	4.50	15	11.06	373.75	387.00	374.79	387.85	381.80	391.07	Pipe - (31)
3	2	20.216	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	3.23	0.00	4.01	15	0.99	387.00	387.20	387.85	387.92	391.07	391.07	Pipe - (30)
4	1	20.027	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.61	0.00	3.07	15	1.00	377.95	378.15	378.20	378.45	381.80	381.80	Pipe - (33)
5	1	122.337	0.00	0.00	0.00	0.00	0.00	5.0	5.8	0.0	1.04	0.00	2.01	15	0.51	373.75	374.38	374.79	374.78	381.80	378.46	Pipe - (35)
6	5	20.035	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.52	0.00	2.03	15	1.00	374.38	374.58	374.78	374.86	378.46	378.46	Pipe - (34)
7	End	48.007	0.00	0.00	0.00	0.00	0.00	5.0	9.4	0.0	66.34	0.00	13.52	30	1.04	379.00	379.50	381.50	382.57	382.13	394.00	Pipe - (43)
8	7	65.929	0.00	0.00	0.00	0.00	0.00	5.0	9.3	0.0	66.34	0.00	16.53	30	3.79	387.50	390.00	389.14	392.43	394.00	398.00	Pipe - (42)
9	8	37.291	0.00	0.00	0.00	0.00	0.00	5.0	9.2	0.0	32.38	0.00	17.00	24	9.92	393.50	397.20	394.40	399.09	398.00	410.00	Pipe - (41)
10	9	29.905	0.00	0.00	0.00	0.00	0.00	5.0	9.2	0.0	32.38	0.00	20.08	24	18.73	402.90	408.50	403.66	410.39	410.00	422.00	Pipe - (40)
11	10	114.159	0.00	0.00	0.00	0.00	0.00	5.0	9.0	0.0	30.74	0.00	10.97	24	4.94	408.86	414.50	410.39	416.37	422.00	427.62	Pipe - (39)
12	11	20.331	0.00	0.00	0.00	0.00	0.00	5.0	8.9	0.0	29.15	0.00	9.45	24	8.36	414.30	416.00	416.37	417.85	427.62	427.62	Pipe - (38)
13	12	126.011	0.00	0.00	0.00	0.00	0.00	5.0	8.7	0.0	13.36	0.00	7.95	18	1.59	416.50	418.50	417.85	419.86	427.62	429.48	Pipe - (37)
14	13	154.272	0.00	0.00	0.00	0.00	0.00	5.0	8.4	0.0	11.53	0.00	9.74	15	2.99	418.75	423.36	419.86	424.57	429.48	432.26	Pipe - (36)
15	14	42.372	0.00	0.00	0.00	0.00	0.00	5.0	8.3	0.0	11.53	0.00	9.40	15	1.51	423.36	424.00	424.61	425.76	432.26	433.38	Pipe - (56)
16	15	150.146	0.00	0.00	0.00	0.00	0.00	5.0	8.0	0.0	10.12	0.00	8.25	15	2.16	424.00	427.25	427.35	430.50	433.38	436.48	Pipe - (55)
17	16	150.143	0.00	0.00	0.00	0.00	0.00	5.0	7.6	0.0	7.22	0.00	5.88	15	2.50	427.25	431.00	432.08	433.68	436.48	439.78	Pipe - (54)
18	17	145.164	0.00	0.00	0.00	0.00	0.00	5.0	6.9	0.0	4.31	0.00	4.21	15	2.24	431.00	434.25	434.49	435.09	439.78	442.94	Pipe - (53)
19	18	20.331	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.45	0.00	3.92	15	0.98	439.30	439.50	439.69	439.98	442.94	442.94	Pipe - (57)
20	18	130.074	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.41	0.00	2.48	15	2.11	434.25	437.00	435.09	437.47	442.94	445.72	Pipe - (52)
21	17	20.184	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.41	0.00	1.15	15	0.99	431.00	431.20	434.49	434.50	439.78	439.78	Pipe - (58)
22	16	19.955	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.45	0.00	1.18	15	1.00	427.25	427.45	432.08	432.09	436.48	436.48	Pipe - (59)

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	12	126.506	0.00	0.00	0.00	0.00	0.00	5.0	5.2	0.0	14.76	0.00	8.71	18	1.63	416.50	418.56	417.85	419.96	427.62	426.21	Pipe - (45)
24	23	127.017	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	13.45	0.00	10.96	15	2.83	419.40	423.00	420.65	425.35	426.21	427.00	Pipe - (44)
25	10	108.029	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.64	0.00	5.49	15	3.79	415.41	419.50	415.70	420.01	422.00	423.00	Pipe - (46)
26	8	79.019	0.00	0.00	0.00	0.00	0.00	5.0	6.2	0.0	28.24	0.00	8.99	24	1.01	390.10	390.90	392.43	393.48	398.00	395.00	Pipe - (50)
27	26	181.944	0.00	0.00	0.00	0.00	0.00	5.0	5.8	0.0	28.10	0.00	8.95	24	0.49	390.90	391.80	394.16	396.55	395.00	397.00	Pipe - (49)
28	27	121.251	0.00	0.00	0.00	0.00	0.00	5.0	5.6	0.0	27.30	0.00	8.90	24	9.98	391.80	403.90	398.41	405.71	397.00	414.30	Pipe - (48)
29	28	97.602	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	22.14	0.00	19.29	15	9.99	408.25	418.00	409.28	419.25	414.30	419.86	Pipe - (47)
30	28	126.206	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	4.41	0.00	9.38	15	9.51	408.00	420.00	408.38	420.85	414.30	427.50	Pipe - (51)
31	End	30.000	0.00	0.00	0.00	0.00	0.00	5.0	23.4	0.0	37.94	0.00	7.05	36	2.30	377.50	378.19	379.80	380.19	383.00	389.50	Pipe - (83)
32	31	73.386	0.00	0.00	0.00	0.00	0.00	5.0	23.2	0.0	37.94	0.00	7.57	36	0.50	378.19	378.56	380.19	380.56	389.50	415.05	Pipe - (82)
33	32	150.569	0.00	0.00	0.00	0.00	0.00	5.0	11.2	0.0	23.61	0.00	14.67	18	4.74	383.50	390.63	384.67	392.11	415.05	415.80	Pipe - (74)
34	33	47.994	0.00	0.00	0.00	0.00	0.00	5.0	11.2	0.0	23.61	0.00	13.39	18	4.94	390.63	393.00	392.11	394.48	415.80	416.05	Pipe - (73)
35	34	284.334	0.00	0.00	0.00	0.00	0.00	5.0	10.7	0.0	19.17	0.00	10.90	18	5.70	393.00	409.20	394.48	410.66	416.05	417.47	Pipe - (72)
36	35	133.139	0.00	0.00	0.00	0.00	0.00	5.0	10.5	0.0	17.39	0.00	9.94	18	5.11	409.20	416.00	410.66	417.44	417.47	421.48	Pipe - (71)
37	36	53.198	0.00	0.00	0.00	0.00	0.00	5.0	10.4	0.0	15.61	0.00	8.83	18	1.00	416.00	416.53	417.50	418.50	421.48	421.83	Pipe - (67)
38	37	47.067	0.00	0.00	0.00	0.00	0.00	5.0	10.3	0.0	13.69	0.00	7.75	18	1.00	416.53	417.00	419.21	419.89	421.83	424.03	Pipe - (66)
39	38	120.653	0.00	0.00	0.00	0.00	0.00	5.0	10.0	0.0	12.42	0.00	7.03	18	0.99	417.00	418.20	420.35	421.79	424.03	429.11	Pipe - (65)
40	39	130.403	0.00	0.00	0.00	0.00	0.00	5.0	9.8	0.0	11.01	0.00	8.97	15	2.84	420.65	424.35	422.77	426.00	429.11	433.82	Pipe - (64)
41	40	161.656	0.00	0.00	0.00	0.00	0.00	5.0	9.4	0.0	8.48	0.00	7.08	15	3.34	424.35	429.75	427.88	430.89	433.82	439.06	Pipe - (63)
42	41	154.069	0.00	0.00	0.00	0.00	0.00	5.0	8.8	0.0	5.53	0.00	5.12	15	3.28	429.75	434.80	430.89	435.75	439.06	443.95	Pipe - (62)
43	42	140.369	0.00	0.00	0.00	0.00	0.00	5.0	7.5	0.0	2.16	0.00	2.99	15	3.35	434.80	439.50	435.75	440.09	443.95	448.33	Pipe - (61)
44	43	107.999	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.89	0.00	2.25	15	2.78	439.50	442.50	440.09	442.87	448.33	451.27	Pipe - (60)

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	42	20.089	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.92	0.00	2.80	15	1.00	434.80	435.00	435.75	435.55	443.95	443.95	Pipe - (70)
46	40	20.249	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.31	0.00	3.81	15	0.99	430.18	430.38	430.55	430.83	433.82	433.82	Pipe - (69)
47	41	19.915	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.45	0.00	2.31	15	1.00	429.75	429.95	430.89	430.43	439.06	439.06	Pipe - (68)
48	34	28.928	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.28	0.00	1.18	15	2.59	393.25	394.00	394.48	394.20	416.05	399.86	Pipe - (75)
49	32	129.835	0.00	0.00	0.00	0.00	0.00	5.0	19.6	0.0	0.74	0.00	1.69	15	1.88	379.31	381.75	380.56	382.09	415.05	386.83	Pipe - (78)
50	49	143.637	0.00	0.00	0.00	0.00	0.00	5.0	6.8	0.0	0.23	0.00	1.45	15	3.10	381.75	386.20	382.09	386.39	386.83	389.65	Pipe - (77)
51	50	20.226	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.23	0.00	2.03	15	0.99	386.20	386.40	386.39	386.59	389.65	389.65	Pipe - (76)
52	49	20.197	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.23	0.00	1.45	15	0.99	381.75	381.95	382.09	382.14	386.83	386.83	Pipe - (79)
53	32	19.805	0.00	0.00	0.00	0.00	0.00	5.0	5.9	0.0	13.03	0.00	4.24	24	1.01	378.56	378.76	380.56	380.59	415.05	388.93	Pipe - (81)
54	53	92.886	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	11.90	0.00	2.36	36	-0.01	378.76	378.75	380.75	380.79	388.93	382.40	Pipe - (80)
55	End	64.098	0.00	0.00	0.00	0.00	0.00	5.0	12.4	0.0	28.48	0.00	9.24	24	1.01	378.00	378.65	379.84	380.75	421.97	422.29	Pipe - (25)
56	55	36.295	0.00	0.00	0.00	0.00	0.00	5.0	12.3	0.0	28.48	0.00	16.06	24	9.92	382.80	386.40	383.64	388.24	422.29	422.47	Pipe - (24)
57	56	35.254	0.00	0.00	0.00	0.00	0.00	5.0	12.3	0.0	28.48	0.00	16.19	24	10.21	397.40	401.00	398.23	402.84	422.47	422.64	Pipe - (23)
58	57	108.716	0.00	0.00	0.00	0.00	0.00	5.0	12.1	0.0	28.48	0.00	9.07	24	1.00	409.50	410.59	411.50	412.97	422.64	423.19	Pipe - (22)
59	58	20.237	0.00	0.00	0.00	0.00	0.00	5.0	12.0	0.0	27.40	0.00	8.72	24	0.99	410.59	410.79	413.61	413.86	423.19	423.29	Pipe - (21)
60	59	115.221	0.00	0.00	0.00	0.00	0.00	5.0	11.8	0.0	22.90	0.00	7.29	24	0.62	410.79	411.50	416.49	417.49	423.29	423.86	Pipe - (20)
61	60	161.486	0.00	0.00	0.00	0.00	0.00	5.0	11.4	0.0	21.63	0.00	6.89	24	0.62	411.50	412.50	417.99	419.25	423.86	424.67	Pipe - (19)
62	61	213.210	0.00	0.00	0.00	0.00	0.00	5.0	10.6	0.0	15.33	0.00	4.88	24	1.99	412.50	416.75	420.35	421.19	424.67	425.74	Pipe - (18)
63	62	111.216	0.00	0.00	0.00	0.00	0.00	5.0	10.4	0.0	11.77	0.00	9.60	15	5.39	417.50	423.50	421.72	424.74	425.74	434.50	Pipe - (17)
64	63	112.817	0.00	0.00	0.00	0.00	0.00	5.0	10.2	0.0	11.77	0.00	9.59	15	1.33	423.50	425.00	425.45	428.65	434.50	433.32	Pipe - (16)
65	64	165.213	0.00	0.00	0.00	0.00	0.00	5.0	9.6	0.0	7.55	0.00	4.27	18	1.82	425.00	428.00	429.54	430.26	433.32	438.09	Pipe - (13)
66	65	192.294	0.00	0.00	0.00	0.00	0.00	5.0	8.7	0.0	4.27	0.00	4.19	15	5.98	428.00	439.50	430.69	440.34	438.09	448.20	Pipe - (12)

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
67	66	33.674	0.00	0.00	0.00	0.00	0.00	5.0	8.4	0.0	2.72	0.00	3.62	15	1.48	439.50	440.00	440.34	440.66	448.20	448.53	Pipe - (14)
68	67	172.625	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.03	0.00	2.31	15	1.45	440.00	442.50	440.66	442.90	448.53	451.00	Pipe - (10)
69	65	20.277	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.50	0.00	1.22	15	0.99	428.00	428.20	430.69	430.70	438.09	438.09	Pipe - (15)
70	59	168.359	0.00	0.00	0.00	0.00	0.00	5.0	5.2	0.0	3.23	0.00	2.63	15	1.00	413.85	415.53	416.49	416.85	423.29	424.75	Pipe - (29)
71	70	19.738	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.78	0.00	4.19	15	1.01	421.10	421.30	421.53	421.83	424.75	424.75	Pipe - (28)
72	62	153.378	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	3.56	0.00	2.90	15	0.98	417.50	419.00	421.72	422.12	425.74	423.00	Pipe - (26)
73	61	50.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.34	0.00	1.91	15	2.00	413.00	414.00	420.35	420.41	424.67	421.00	

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
1	1.09	1.09	Offsite	0.20	0.50	0.90	6.97	1.04	0.050	0.020	....	178.669	1.21	1.04**	Outfall	0.00	871428.86	375.29	375.37	0.000
2	0.89	0.89	Offsite	0.20	0.50	0.90	23.27	0.85	0.050	0.020	....	77.404	1.04	0.85**	1	0.00	871400.03	375.17	388.23	0.000
3	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-89.493	0.00	0.00**	2	0.00	871380.37	388.15	387.92	0.000
4	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-15.103	0.00	0.00**	1	0.00	871409.65	378.31	378.45	0.000
5	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-118.049	0.00	0.00**	1	0.00	871488.88	374.93	374.78	0.000
6	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	77.965	0.00	0.00**	5	0.00	871473.85	374.88	374.86	0.000
7	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-92.256	0.00	0.00**	Outfall	0.00	872179.53	384.34	382.57	0.000
8	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.056	0.00	0.00**	7	0.00	872176.87	392.03	392.43	0.000
9	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-22.364	0.00	0.00**	8	0.00	872161.30	396.13	399.09	0.000
10	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.219	0.00	0.00**	9	0.00	872148.72	405.38	410.39	0.000
11	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-34.174	0.00	0.00**	10	0.00	872050.79	411.97	416.37	0.000
12	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	0.010	0.00	0.00**	11	0.00	872033.35	417.71	417.85	0.000
13	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	89.964	0.00	0.00**	12	0.00	872098.07	418.82	419.86	0.000
14	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-4.096	0.00	0.00**	13	0.00	872167.65	421.26	424.57	0.000
15	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-38.754	0.00	0.00**	14	0.00	872158.88	425.98	425.76	0.000
16	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-47.123	0.00	0.00**	15	0.00	872030.09	428.41	430.50	0.000
17	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	0.038	0.00	0.00**	16	0.00	871901.35	432.62	433.68	0.000
18	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-3.588	0.00	0.00**	17	0.00	871772.45	434.68	435.09	0.000
19	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-101.174	0.00	0.00**	18	0.00	871766.78	439.87	439.98	0.000
20	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-26.117	0.00	0.00**	18	0.00	871642.41	435.26	437.47	0.000
21	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-90.562	0.00	0.00**	17	0.00	871891.14	434.51	434.50	0.000
22	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-90.012	0.00	0.00**	16	0.00	872019.84	432.10	432.09	0.000
23	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-76.540	0.00	0.00**	12	0.00	871944.84	419.00	419.96	0.000

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
24	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	96.384	0.00	0.00**	23	0.00	871864.54	422.52	425.35	0.000
25	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	64.013	0.00	0.00**	10	0.00	872216.87	415.89	420.01	0.000
26	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	78.015	0.00	0.00**	8	0.00	872253.44	393.68	393.48	0.000
27	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	17.880	0.00	0.00**	26	0.00	872435.03	395.40	396.55	0.000
28	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-86.188	0.00	0.00**	27	0.00	872450.64	399.59	405.71	0.000
29	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	29.580	0.00	0.00**	28	0.00	872509.34	414.34	419.25	0.000
30	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-39.286	0.00	0.00**	28	0.00	872383.96	408.77	420.85	0.000
31	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-176.000	0.00	0.00**	Outfall	0.00	871524.51	380.69	380.19	0.000
32	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-17.000	0.00	0.00**	31	0.00	871453.01	381.08	380.56	0.000
33	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	100.995	0.00	0.00**	32	0.00	871447.74	387.46	392.11	0.000
34	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	20.707	0.00	0.00**	33	0.00	871463.13	394.90	394.48	0.000
35	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-20.554	0.00	0.00**	34	0.00	871453.94	396.34	410.66	0.000
36	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-13.986	0.00	0.00**	35	0.00	871417.60	412.20	417.44	0.000
37	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-14.690	0.00	0.00**	36	0.00	871390.58	418.71	418.50	0.000
38	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-19.423	0.00	0.00**	37	0.00	871354.55	420.14	419.89	0.000
39	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-9.419	0.00	0.00**	38	0.00	871250.73	421.12	421.79	0.000
40	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	54.984	0.00	0.00**	39	0.00	871240.76	424.02	426.00	0.000
41	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	20.177	0.00	0.00**	40	0.00	871284.75	428.62	430.89	0.000
42	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-12.665	0.00	0.00**	41	0.00	871293.15	431.36	435.75	0.000
43	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	4.401	0.00	0.00**	42	0.00	871311.54	435.98	440.09	0.000
44	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	28.774	0.00	0.00**	43	0.00	871375.48	440.22	442.87	0.000
45	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	90.444	0.00	0.00**	42	0.00	871313.20	435.96	435.55	0.000
46	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	107.575	0.00	0.00**	40	0.00	871260.47	430.71	430.83	0.000

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
47	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	77.472	0.00	0.00**	41	0.00	871304.63	431.06	430.43	0.000
48	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-107.619	0.00	0.00**	34	0.00	871434.20	394.55	394.20	0.000
49	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-50.282	0.00	0.00**	32	0.00	871394.63	380.57	382.09	0.000
50	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	21.543	0.00	0.00**	49	0.00	871287.45	382.15	386.39	0.000
51	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	74.652	0.00	0.00**	50	0.00	871270.47	386.45	386.59	0.000
52	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	108.231	0.00	0.00**	49	0.00	871380.34	382.15	382.14	0.000
53	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	21.738	0.00	0.00**	32	0.00	871433.43	380.83	380.59	0.000
54	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	17.579	0.00	0.00**	53	0.00	871350.17	380.83	380.79	0.000
55	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-130.308	0.00	0.00**	Outfall	0.00	871793.56	381.22	380.75	0.000
56	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	8.835	0.00	0.00**	55	0.00	871774.61	385.02	388.24	0.000
57	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	0.102	0.00	0.00**	56	0.00	871756.25	399.62	402.84	0.000
58	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.157	0.00	0.00**	57	0.00	871699.41	412.78	412.97	0.000
59	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.808	0.00	0.00**	58	0.00	871688.58	414.79	413.86	0.000
60	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-80.955	0.00	0.00**	59	0.00	871582.75	417.31	417.49	0.000
61	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	20.347	0.00	0.00**	60	0.00	871421.48	418.73	419.25	0.000
62	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	112.988	0.00	0.00**	61	0.00	871494.55	420.73	421.19	0.000
63	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-0.103	0.00	0.00**	62	0.00	871532.48	423.15	424.74	0.000
64	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-3.650	0.00	0.00**	63	0.00	871564.13	426.88	428.65	0.000
65	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-21.253	0.00	0.00**	64	0.00	871549.84	429.82	430.26	0.000
66	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-6.191	0.00	0.00**	65	0.00	871512.64	430.88	440.34	0.000
67	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-19.615	0.00	0.00**	66	0.00	871495.42	440.60	440.66	0.000
68	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	-55.300	0.00	0.00**	67	0.00	871323.20	440.81	442.90	0.000
69	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	85.629	0.00	0.00**	65	0.00	871569.85	430.71	430.70	0.000

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NOTES: ** Critical depth

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
70	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	79.156	0.00	0.00**	59	0.00	871811.35	416.60	416.85	0.000
71	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	96.881	0.00	0.00**	70	0.00	871823.03	421.73	421.83	0.000
72	0.00	0.00	Offsite	0.20	0.50	0.90	0.00	0.00	0.050	0.020	....	71.930	0.00	0.00**	62	0.00	871647.84	421.85	422.12	0.000
73	0.00	0.00	Sag	0.20	0.50	0.90	0.00	0.00	0.050	0.020	4.05	-80.000	0.00	0.00**	61	0.00	871415.33	420.41	420.41	0.000

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
6.66	0.000	0.000	....	2.00	2.00	375.36	381.80	0.15	0.010	4.58	2.00	374.71	374.79	374.79	....	....	0.00	0.61	0.15	89
4.40	0.000	0.000	....	2.00	2.00	381.80	391.07	0.19	0.010	6.34	2.00	374.79	387.85 j	387.85	375.92	376.01	0.00	1.17	0.19	76
3.23	0.000	0.000	....	2.00	2.00	391.07	391.07	0.26	0.010	9.86	2.00	387.85	387.92	387.92	....	....	0.00	3.23	0.26	56
0.61	0.000	0.000	....	2.00	2.00	381.80	381.80	0.15	0.010	4.58	2.00	378.20	378.45	378.45	....	....	0.00	0.61	0.15	89
1.04	0.000	0.000	....	2.00	2.00	381.80	378.46	0.14	0.010	4.20	2.00	374.79	374.78	374.78	....	....	0.00	0.52	0.14	92
0.52	0.000	0.000	....	2.00	2.00	378.46	378.46	0.14	0.010	4.20	2.00	374.78	374.86	374.86	....	....	0.00	0.52	0.14	92
66.34	0.000	0.000	....	2.00	2.00	382.13	394.00	0.00	0.010	0.00	2.00	381.50	382.57	383.99	....	....	0.00	0.00	0.00	0
66.34	0.000	0.000	....	2.00	2.00	394.00	398.00	0.31	0.010	12.43	2.00	389.14	392.43	392.43	....	....	0.00	5.72	0.31	46
32.38	0.000	0.000	....	2.00	2.00	398.00	410.00	0.00	0.010	0.00	2.00	394.40	399.09	399.09	....	....	0.00	0.00	0.00	0
32.38	0.000	0.000	....	2.00	2.00	410.00	422.00	0.00	0.010	0.00	2.00	403.66	410.39	410.39	....	....	0.00	0.00	0.00	0
30.74	0.000	0.000	....	2.00	2.00	422.00	427.62	0.21	0.010	7.28	2.00	410.39	416.37	416.37	....	....	0.00	1.59	0.21	70
29.15	0.000	0.000	....	2.00	2.00	427.62	427.62	0.18	0.010	5.97	2.00	416.37	417.85	417.85	....	....	0.00	1.03	0.18	79
13.36	0.000	0.000	....	2.00	2.00	427.62	429.48	0.21	0.010	7.75	2.00	417.85	419.86	419.86	....	....	0.00	1.83	0.21	67
11.53	0.000	0.000	....	2.00	2.00	429.48	432.26	0.00	0.010	0.00	2.00	419.86	424.57	424.57	....	....	0.00	0.00	0.00	0
11.53	0.000	0.000	....	2.00	2.00	432.26	433.38	0.20	0.010	6.90	2.00	424.61	425.76	427.35	....	....	0.00	1.41	0.20	72
10.12	0.000	0.000	....	2.00	2.00	433.38	436.48	0.20	0.010	6.99	2.00	427.35	430.50	432.08	....	....	0.00	1.45	0.20	72
7.22	0.000	0.000	....	2.00	2.00	436.48	439.78	0.20	0.010	7.10	2.00	432.08	433.68	434.49	....	....	0.00	1.50	0.20	71
4.31	0.000	0.000	....	2.00	2.00	439.78	442.94	0.20	0.010	6.99	2.00	434.49	435.09	435.09	....	....	0.00	1.45	0.20	72
1.45	0.000	0.000	....	2.00	2.00	442.94	442.94	0.20	0.010	6.99	2.00	439.69	439.98	439.98	....	....	0.00	1.45	0.20	72
1.41	0.000	0.000	....	2.00	2.00	442.94	445.72	0.20	0.010	6.90	2.00	435.09	437.47	437.47	....	....	0.00	1.41	0.20	72
1.41	0.000	0.000	....	2.00	2.00	439.78	439.78	0.20	0.010	6.90	2.00	434.49	434.50	434.52	....	....	0.00	1.41	0.20	72
1.45	0.000	0.000	....	2.00	2.00	436.48	436.48	0.20	0.010	6.99	2.00	432.08	432.09	432.11	....	....	0.00	1.45	0.20	72
14.76	0.000	0.000	....	2.00	2.00	427.62	426.21	0.19	0.010	6.68	2.00	417.85	419.96	419.96	....	....	0.00	1.31	0.19	74

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
13.45	0.000	0.000	....	2.00	2.00	426.21	427.00	0.41	0.010	17.39	2.00	420.65	425.35	427.21	....	....	0.00	13.45	0.41	34
1.64	0.000	0.000	....	2.00	2.00	422.00	423.00	0.21	0.010	7.38	2.00	415.70	420.01	420.01	....	....	0.00	1.64	0.21	69
28.24	0.000	0.000	....	2.00	2.00	398.00	395.00	0.09	0.010	1.80	2.00	392.43	393.48	394.16	....	....	0.00	0.14	0.09	100
28.10	0.000	0.000	....	2.00	2.00	395.00	397.00	0.17	0.010	5.28	2.00	394.16	396.55	398.41	....	....	0.00	0.80	0.17	84
27.30	0.000	0.000	....	2.00	2.00	397.00	414.30	0.16	0.010	5.11	2.00	398.41	405.71	405.71	....	....	0.00	0.75	0.16	85
22.14	0.000	0.000	....	2.00	2.00	414.30	419.86	0.48	0.010	21.07	2.00	409.28	419.25	419.25	....	....	0.00	22.14	0.48	28
4.41	0.000	0.000	....	2.00	2.00	414.30	427.50	0.28	0.010	11.19	2.00	408.38	420.85	420.85	....	....	0.00	4.41	0.28	50
37.94	0.000	0.000	....	2.00	2.00	383.00	389.50	0.00	0.010	0.00	2.00	379.80	380.19	380.19	....	....	0.00	0.00	0.00	0
37.94	0.000	0.000	....	2.00	2.00	389.50	415.05	0.15	0.010	4.37	2.00	380.19	380.56	380.56	....	....	0.00	0.56	0.15	90
23.61	0.000	0.000	....	2.00	2.00	415.05	415.80	0.00	0.010	0.00	2.00	384.67	392.11	392.11	....	....	0.00	0.00	0.00	0
23.61	0.000	0.000	....	2.00	2.00	415.80	416.05	0.28	0.010	10.93	2.00	392.11	394.48	394.48	....	....	0.00	4.16	0.28	51
19.17	0.000	0.000	....	2.00	2.00	416.05	417.47	0.21	0.010	7.66	2.00	394.48	410.66	410.66	....	....	0.00	1.78	0.21	67
17.39	0.000	0.000	....	2.00	2.00	417.47	421.48	0.21	0.010	7.66	2.00	410.66	417.44	417.44	....	....	0.00	1.78	0.21	67
15.61	0.000	0.000	....	2.00	2.00	421.48	421.83	0.22	0.010	7.91	2.00	417.50	418.50	419.21	....	....	0.00	1.92	0.22	66
13.69	0.000	0.000	....	2.00	2.00	421.83	424.03	0.19	0.010	6.58	2.00	419.21	419.89	420.35	....	....	0.00	1.27	0.19	74
12.42	0.000	0.000	....	2.00	2.00	424.03	429.11	0.20	0.010	6.90	2.00	420.35	421.79	422.77	....	....	0.00	1.41	0.20	72
11.01	0.000	0.000	....	2.00	2.00	429.11	433.82	0.19	0.010	6.46	2.00	422.77	426.00	427.88	....	....	0.00	1.22	0.19	75
8.48	0.000	0.000	....	2.00	2.00	433.82	439.06	0.20	0.010	7.10	2.00	427.88	430.89	430.89	....	....	0.00	1.50	0.20	71
5.53	0.000	0.000	....	2.00	2.00	439.06	443.95	0.20	0.010	6.99	2.00	430.89	435.75	435.75	....	....	0.00	1.45	0.20	72
2.16	0.000	0.000	....	2.00	2.00	443.95	448.33	0.19	0.010	6.58	2.00	435.75	440.09	440.09	....	....	0.00	1.27	0.19	74
0.89	0.000	0.000	....	2.00	2.00	448.33	451.27	0.17	0.010	5.56	2.00	440.09	442.87	442.87	....	....	0.00	0.89	0.17	82
1.92	0.000	0.000	....	2.00	2.00	443.95	443.95	0.22	0.010	7.91	2.00	435.75	435.55	435.55	....	....	0.00	1.92	0.22	66
1.31	0.000	0.000	....	2.00	2.00	433.82	433.82	0.19	0.010	6.68	2.00	430.55	430.83	430.83	....	....	0.00	1.31	0.19	74

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
1.45	0.000	0.000	....	2.00	2.00	439.06	439.06	0.20	0.010	6.99	2.00	430.89	430.43	430.43	....	....	0.00	1.45	0.20	72
0.28	0.000	0.000	....	2.00	2.00	416.05	399.86	0.12	0.010	2.82	2.00	394.48	394.20	394.20	....	....	0.00	0.28	0.12	99
0.74	0.000	0.000	....	2.00	2.00	415.05	386.83	0.12	0.010	2.82	2.00	380.56	382.09	382.09	....	....	0.00	0.28	0.12	99
0.23	0.000	0.000	....	2.00	2.00	386.83	389.65	0.00	0.010	0.00	2.00	382.09	386.39	386.39	....	....	0.00	0.00	0.00	0
0.23	0.000	0.000	....	2.00	2.00	389.65	389.65	0.11	0.010	2.42	2.00	386.39	386.59	386.59	....	....	0.00	0.23	0.11	100
0.23	0.000	0.000	....	2.00	2.00	386.83	386.83	0.11	0.010	2.42	2.00	382.09	382.14	382.14	....	....	0.00	0.23	0.11	100
13.03	0.000	0.000	....	2.00	2.00	415.05	388.93	0.18	0.010	6.23	2.00	380.56	380.59	380.75	....	....	0.00	1.13	0.18	77
11.90	0.000	0.000	....	2.00	2.00	388.93	382.40	0.39	0.010	16.58	2.00	380.75	380.79	380.88	....	....	0.00	11.90	0.39	36
28.48	0.000	0.000	....	2.00	2.00	421.97	422.29	0.00	0.010	0.00	2.00	379.84	380.75	381.39	....	....	0.00	0.00	0.00	0
28.48	0.000	0.000	....	2.00	2.00	422.29	422.47	0.00	0.010	0.00	2.00	383.64	388.24	388.24	....	....	0.00	0.00	0.00	0
28.48	0.000	0.000	....	2.00	2.00	422.47	422.64	0.00	0.010	0.00	2.00	398.23	402.84	402.84	....	....	0.00	0.00	0.00	0
28.48	0.000	0.000	....	2.00	2.00	422.64	423.19	0.18	0.010	6.10	2.00	411.50	412.97	413.61	....	....	0.00	1.08	0.18	78
27.40	0.000	0.000	....	2.00	2.00	423.19	423.29	0.19	0.010	6.58	2.00	413.61	413.86	416.49	....	....	0.00	1.27	0.19	74
22.90	0.000	0.000	....	2.00	2.00	423.29	423.86	0.19	0.010	6.58	2.00	416.49	417.49	417.99	....	....	0.00	1.27	0.19	74
21.63	0.000	0.000	....	2.00	2.00	423.86	424.67	0.27	0.010	10.72	2.00	417.99	419.25	420.35	....	....	0.00	3.96	0.27	52
15.33	0.000	0.000	....	2.00	2.00	424.67	425.74	0.00	0.010	0.00	2.00	420.35	421.19	421.72	....	....	0.00	0.00	0.00	0
11.77	0.000	0.000	....	2.00	2.00	425.74	434.50	0.00	0.010	0.00	2.00	421.72	424.74	425.45	....	....	0.00	0.00	0.00	0
11.77	0.000	0.000	....	2.00	2.00	434.50	433.32	0.28	0.010	10.99	2.00	425.45	428.65	429.54	....	....	0.00	4.22	0.28	51
7.55	0.000	0.000	....	2.00	2.00	433.32	438.09	0.21	0.010	7.66	2.00	429.54	430.26	430.69	....	....	0.00	1.78	0.21	67
4.27	0.000	0.000	....	2.00	2.00	438.09	448.20	0.20	0.010	7.20	2.00	430.69	440.34	440.34	....	....	0.00	1.55	0.20	70
2.72	0.000	0.000	....	2.00	2.00	448.20	448.53	0.21	0.010	7.48	2.00	440.34	440.66	440.66	....	....	0.00	1.69	0.21	68
1.03	0.000	0.000	....	2.00	2.00	448.53	451.00	0.18	0.010	5.97	2.00	440.66	442.90	442.90	....	....	0.00	1.03	0.18	79
1.50	0.000	0.000	....	2.00	2.00	438.09	438.09	0.20	0.010	7.10	2.00	430.69	430.70	430.72	....	....	0.00	1.50	0.20	71

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
3.23	0.000	0.000	....	2.00	2.00	423.29	424.75	0.20	0.010	6.99	2.00	416.49	416.85	417.01	....	....	0.00	1.45	0.20	72
1.78	0.000	0.000	....	2.00	2.00	424.75	424.75	0.21	0.010	7.66	2.00	421.53	421.83	421.83	....	....	0.00	1.78	0.21	67
3.56	0.000	0.000	....	2.00	2.00	425.74	423.00	0.27	0.010	10.26	2.00	421.72	422.12	422.25	....	....	0.00	3.56	0.27	54
2.34	0.000	0.000	....	....	....	424.67	421.00	0.32	Sag	13.02	2.00	420.35	420.41	420.47	....	....	0.00	2.34	0.32	100

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
2+99RT	On Grade		5.0	0.00	0.00	373.50	373.75	....	....	0.00	0.00	1.50 z	Grate	0.61	1,018	916	865	Pipe - (32)
4+20RT	On Grade		5.0	0.00	0.00	373.75	387.00	11.98	4.25	0.38	1.78	1.50 z	Grate	1.17	4,618	4,156	3,925	Pipe - (31)
4+20LT	On Grade		5.0	0.00	0.00	387.00	387.20	....	....	0.00	0.00	1.00	Grate	3.23	735	662	625	Pipe - (30)
2+99LT	On Grade		5.0	0.00	0.00	377.95	378.15	....	....	0.00	0.00	1.00	Grate	0.61	700	630	595	Pipe - (33)
1+67RT	On Grade		5.0	0.00	0.00	373.75	374.38	....	....	0.00	0.00	1.47	Grate	0.52	4,713	4,241	4,006	Pipe - (35)
1+67LT	On Grade		5.0	0.00	0.00	374.38	374.58	....	....	0.00	0.00	1.00	Grate	0.52	740	666	629	Pipe - (34)
Structure - (52)	On Grade		5.0	0.00	0.00	379.00	379.50	....	....	0.00	0.00	0.50	Grate	0.00	3,207	2,886	2,726	Pipe - (43)
CC CB7	On Grade		5.0	0.00	0.00	387.50	390.00	....	....	0.00	0.00	1.47	Grate	5.72	3,798	3,418	3,228	Pipe - (42)
CC MH3	On Grade		5.0	0.00	0.00	393.50	397.20	....	....	0.00	0.00	0.50	Grate	0.00	2,284	2,056	1,941	Pipe - (41)
CC MH2	On Grade		5.0	0.00	0.00	402.90	408.50	....	....	0.00	0.00	1.37	Grate	0.00	2,013	1,812	1,711	Pipe - (40)
3+0 LT	On Grade		5.0	0.00	0.00	408.86	414.50	....	....	0.00	0.00	0.50	Grate	1.59	8,140	7,326	6,919	Pipe - (39)
3+0 RT	On Grade		5.0	0.00	0.00	414.30	416.00	....	....	0.00	0.00	2.20	Grate	1.03	1,528	1,375	1,298	Pipe - (38)
1+75 RT	On Grade		5.0	0.00	0.00	416.50	418.50	....	....	0.00	0.00	0.50	Grate	1.83	7,080	6,372	6,018	Pipe - (37)
30+78RT	On Grade		5.0	0.00	0.00	418.75	423.36	....	....	0.00	0.00	1.01	Grate	0.00	7,378	6,640	6,271	Pipe - (36)
30+48LT	On Grade		5.0	0.00	0.00	423.36	424.00	....	....	0.00	0.00	1.16	Grate	1.41	2,030	1,827	1,726	Pipe - (56)
28+98LT	On Grade		5.0	0.00	0.00	424.00	427.25	....	....	0.00	0.00	1.50	Grate	1.45	6,890	6,201	5,857	Pipe - (55)
27+48LT	On Grade		5.0	0.00	0.00	427.25	431.00	....	....	0.00	0.00	1.50	Grate	1.50	6,890	6,201	5,857	Pipe - (54)
26+05LT	On Grade		5.0	0.00	0.00	431.00	434.25	....	....	0.00	0.00	1.67	Grate	1.45	6,665	5,999	5,665	Pipe - (53)
26_05RT	On Grade		5.0	0.00	0.00	439.30	439.50	....	....	0.00	0.00	1.00	Grate	1.45	700	630	595	Pipe - (57)
24+79LT	On Grade		5.0	0.00	0.00	434.25	437.00	....	....	0.00	0.00	1.00	Grate	1.41	5,990	5,391	5,092	Pipe - (52)
27+48RT	On Grade		5.0	0.00	0.00	431.00	431.20	....	....	0.00	0.00	1.00	Grate	1.41	1,040	936	884	Pipe - (58)
28+98RT	On Grade		5.0	0.00	0.00	427.25	427.45	....	....	0.00	0.00	1.00	Grate	1.45	1,018	916	865	Pipe - (59)
4+34 RT	On Grade		5.0	0.00	0.00	416.50	418.56	....	....	0.00	0.00	1.50	Grate	1.31	6,593	5,933	5,604	Pipe - (45)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82 -- Return period = 25 Yrs. ; ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
CC CB 1	On Grade		5.0	0.00	0.00	419.40	423.00	....	....	0.00	0.00	1.00	Grate	13.45	4,728	4,255	4,018	Pipe - (44)
CC CB6	On Grade		5.0	0.00	0.00	415.41	419.50	....	....	0.00	0.00	1.00	Grate	1.64	3,895	3,506	3,311	Pipe - (46)
CC CB5A	On Grade		5.0	0.00	0.00	390.10	390.90	....	....	0.00	0.00	0.54	Grate	0.14	3,912	3,521	3,325	Pipe - (50)
CC CB 5	On Grade		5.0	0.00	0.00	390.90	391.80	....	....	0.00	0.00	1.50	Grate	0.80	8,106	7,295	6,890	Pipe - (49)
CC CB4	On Grade		5.0	0.00	0.00	391.80	403.90	....	....	0.00	0.00	1.02	Grate	0.75	6,790	6,111	5,771	Pipe - (48)
FE	On Grade		5.0	0.00	0.00	408.25	418.00	....	....	0.00	0.00	1.00	Grate	22.14	3,268	2,941	2,777	Pipe - (47)
33+47	On Grade		5.0	0.00	0.00	408.00	420.00	....	....	0.00	0.00	1.00	Grate	4.41	5,170	4,653	4,395	Pipe - (51)
XC5	On Grade		5.0	0.00	0.00	377.50	378.19	....	....	0.00	0.00	0.51	Grate	0.00	2,126	1,913	1,807	Pipe - (83)
12+18RT	On Grade		5.0	0.00	0.00	378.19	378.56	....	....	0.00	0.00	2.15	Grate	0.56	7,370	6,633	6,264	Pipe - (82)
13+95	On Grade		5.0	0.00	0.00	383.50	390.63	....	....	0.00	0.00	0.61	Grate	0.00	11,288	10,159	9,594	Pipe - (74)
14+XRT	On Grade		5.0	0.00	0.00	390.63	393.00	....	....	0.00	0.00	1.50	Grate	4.16	3,563	3,206	3,028	Pipe - (73)
17+0	On Grade		5.0	0.00	0.00	393.00	409.20	....	....	0.00	0.00	0.50	Grate	1.78	18,690	16,821	15,887	Pipe - (72)
11+26LT	On Grade		5.0	0.00	0.00	409.20	416.00	....	....	0.00	0.00	0.50	Grate	1.78	6,043	5,438	5,136	Pipe - (71)
11+62RT	On Grade		5.0	0.00	0.00	416.00	416.53	....	....	0.00	0.00	0.58	Grate	1.92	2,240	2,016	1,904	Pipe - (67)
12+14RT	On Grade		5.0	0.00	0.00	416.53	417.00	....	....	0.00	0.00	0.50	Grate	1.27	2,150	1,935	1,828	Pipe - (66)
13+37LT	On Grade		5.0	0.00	0.00	417.00	418.20	....	....	0.00	0.00	1.27	Grate	1.41	6,168	5,551	5,242	Pipe - (65)
14+63LT	On Grade		5.0	0.00	0.00	420.65	424.35	....	....	0.00	0.00	1.50	Grate	1.22	5,990	5,391	5,092	Pipe - (64)
16+28lt	On Grade		5.0	0.00	0.00	424.35	429.75	....	....	0.00	0.00	1.47	Grate	1.50	7,408	6,667	6,296	Pipe - (63)
17+28LT	On Grade		5.0	0.00	0.00	429.75	434.80	....	....	0.00	0.00	1.50	Grate	1.45	7,070	6,363	6,010	Pipe - (62)
19+20	On Grade		5.0	0.00	0.00	434.80	439.50	....	....	0.00	0.00	0.81	Grate	1.27	6,440	5,796	5,474	Pipe - (61)
20+24	On Grade		5.0	0.00	0.00	439.50	442.50	....	....	0.00	0.00	1.00	Grate	0.89	4,978	4,480	4,231	Pipe - (60)
17+28RT	On Grade		5.0	0.00	0.00	434.80	435.00	....	....	0.00	0.00	1.00	Grate	1.92	1,040	936	884	Pipe - (70)
14+63RT	On Grade		5.0	0.00	0.00	430.18	430.38	....	....	0.00	0.00	1.00	Grate	1.31	700	630	595	Pipe - (69)

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82 -- Return period = 25 Yrs. ; ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
16+28RT	On Grade		5.0	0.00	0.00	429.75	429.95	....	....	0.00	0.00	1.00	Grate	1.45	1,018	916	865	Pipe - (68)
14+XLT	On Grade		5.0	0.00	0.00	393.25	394.00	....	....	0.00	0.00	1.00	Grate	0.28	1,755	1,580	1,492	Pipe - (75)
10+92RT	On Grade		5.0	0.00	0.00	379.31	381.75	....	....	0.00	0.00	1.50	Grate	0.28	8,165	7,349	6,940	Pipe - (78)
9+45RT	On Grade		5.0	0.00	0.00	381.75	386.20	....	....	0.00	0.00	1.46	Grate	0.00	4,880	4,392	4,148	Pipe - (77)
9+45LT	On Grade		5.0	0.00	0.00	386.20	386.40	....	....	0.00	0.00	1.00	Grate	0.23	700	630	595	Pipe - (76)
10+92LT	On Grade		5.0	0.00	0.00	381.75	381.95	....	....	0.00	0.00	1.00	Grate	0.23	820	738	697	Pipe - (79)
12+18LT	On Grade		5.0	0.00	0.00	378.56	378.76	....	....	0.00	0.00	0.53	Grate	1.13	1,733	1,559	1,473	Pipe - (81)
FE-IN	On Grade		5.0	0.00	0.00	378.76	378.75	....	....	0.00	0.00	1.00	Grate	11.90	5,602	5,042	4,762	Pipe - (80)
Structure - (32)	On Grade		5.0	0.00	0.00	378.00	378.65	....	....	0.00	0.00	0.50	Grate	0.00	5,440	4,896	4,624	Pipe - (25)
Structure - (31)	On Grade		5.0	0.00	0.00	382.80	386.40	....	....	0.00	0.00	0.50	Grate	0.00	3,060	2,754	2,601	Pipe - (24)
Structure - (30)	On Grade		5.0	0.00	0.00	397.40	401.00	....	....	0.00	0.00	0.50	Grate	0.00	2,975	2,678	2,529	Pipe - (23)
7+50LT	On Grade		5.0	0.00	0.00	409.50	410.59	....	....	0.00	0.00	0.50	Grate	1.08	7,755	6,980	6,592	Pipe - (22)
7+50RT	On Grade		5.0	0.00	0.00	410.59	410.79	....	....	0.00	0.00	2.22	Grate	1.27	1,560	1,404	1,326	Pipe - (21)
8+69RT	On Grade		5.0	0.00	0.00	410.79	411.50	....	....	0.00	0.00	0.60	Grate	1.27	8,210	7,389	6,979	Pipe - (20)
10+33RT	On Grade		5.0	0.00	0.00	411.50	412.50	....	....	0.00	0.00	1.50	Grate	3.96	11,430	10,287	9,716	Pipe - (19)
CC 3	On Grade		5.0	0.00	0.00	412.50	416.75	....	....	0.00	0.00	1.44	Grate	0.00	13,700	12,330	11,645	Pipe - (18)
CC MH1	On Grade		5.0	0.00	0.00	417.50	423.50	....	....	0.00	0.00	0.50	Grate	0.00	5,348	4,813	4,545	Pipe - (17)
3+76RT	On Grade		5.0	0.00	0.00	423.50	425.00	....	....	0.00	0.00	0.62	Grate	4.22	5,413	4,871	4,601	Pipe - (16)
2+11rt	On Grade		5.0	0.00	0.00	425.00	428.00	....	....	0.00	0.00	1.50	Grate	1.78	8,443	7,598	7,176	Pipe - (13)
23+25RT	On Grade		5.0	0.00	0.00	428.00	439.50	....	....	0.00	0.00	0.58	Grate	1.55	8,840	7,956	7,514	Pipe - (12)
23+25LT	On Grade		5.0	0.00	0.00	439.50	440.00	....	....	0.00	0.00	1.28	Grate	1.69	1,648	1,483	1,400	Pipe - (14)
21+52	On Grade		5.0	0.00	0.00	440.00	442.50	....	....	0.00	0.00	1.00	Grate	1.03	7,903	7,112	6,717	Pipe - (10)
2+11LT	On Grade		5.0	0.00	0.00	428.00	428.20	....	....	0.00	0.00	1.00	Grate	1.50	1,085	977	922	Pipe - (15)

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MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
5+80RT	On Grade		5.0	0.00	0.00	413.85	415.53	....	....	0.00	0.00	1.50	Grate	1.45	7,700	6,930	6,545	Pipe - (29)
5+80LT	On Grade		5.0	0.00	0.00	421.10	421.30	....	....	0.00	0.00	1.00	Grate	1.78	685	617	582	Pipe - (28)
CC 2	On Grade		5.0	0.00	0.00	417.50	419.00	....	....	0.00	0.00	1.00	Grate	3.56	5,903	5,312	5,017	Pipe - (26)
	Sag		0.0	0.00	0.00	413.00	414.00	....	....	0.00	0.00	1.00	Curb	2.34	2,413	2,171	2,051	

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NOTES: Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82 -- Return period = 25 Yrs. ; ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
25.195	15	0.99	Cir	0.0	0.013	0.012	n/a	688949.93	0.08	0.07	0.54	0.00	15	0.00	15	0.00	0.00	0.00	8.2	....
119.778	15	11.06	Cir	0.0	0.013	0.012	n/a	689066.18	0.56	0.28	0.89	0.00	15	0.00	15	0.00	0.00	0.00	5.1	....
20.216	15	0.99	Cir	0.0	0.013	0.012	n/a	689061.49	0.13	1.43	1.80	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.027	15	1.00	Cir	0.0	0.013	0.012	n/a	688944.26	0.67	0.07	0.54	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
122.337	15	0.51	Cir	0.0	0.013	0.012	n/a	688843.32	2.41	0.04	0.48	0.00	15	0.00	15	0.00	0.00	0.00	5.8	....
20.035	15	1.00	Cir	0.0	0.013	0.012	n/a	688830.07	0.79	0.04	0.48	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
48.007	30	1.04	Cir	0.0	0.013	0.012	n/a	690555.33	0.06	-nan(ind).00	-nan(ind).00	0.00	30	0.00	30	0.00	0.00	0.00	9.4	....
65.929	30	3.79	Cir	0.0	0.013	0.012	n/a	690621.21	0.08	3.09	2.63	0.00	30	0.00	30	0.00	0.00	0.00	9.3	....
37.291	24	9.92	Cir	0.0	0.013	0.012	n/a	690655.09	0.06	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	9.2	....
29.905	24	18.73	Cir	0.0	0.013	0.012	n/a	690682.22	0.05	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	9.2	....
114.159	24	4.94	Cir	0.0	0.013	0.012	n/a	690740.90	0.19	0.48	1.11	0.00	24	0.00	24	0.00	0.00	0.00	9.0	....
20.331	24	8.36	Cir	0.0	0.013	0.012	n/a	690751.35	0.04	0.22	0.81	0.00	24	0.00	24	0.00	0.00	0.00	8.9	....
126.011	18	1.59	Cir	0.0	0.013	0.012	n/a	690859.47	0.28	0.61	1.22	0.00	18	0.00	18	0.00	0.00	0.00	8.7	....
154.272	15	2.99	Cir	0.0	0.013	0.012	n/a	690997.16	0.27	-nan(ind).00	-nan(ind).00	0.00	15	0.00	15	0.00	0.00	0.00	8.4	....
42.372	15	1.51	Cir	0.0	0.013	0.012	n/a	691038.62	0.08	0.39	1.02	0.00	15	0.00	15	0.00	0.00	0.00	8.3	....
150.146	15	2.16	Cir	0.0	0.013	0.012	n/a	691115.80	0.30	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	8.0	....
150.143	15	2.50	Cir	0.0	0.013	0.012	n/a	691193.06	0.43	0.44	1.06	0.00	15	0.00	15	0.00	0.00	0.00	7.6	....
145.164	15	2.24	Cir	0.0	0.013	0.012	n/a	691259.82	0.69	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	6.9	....
20.331	15	0.98	Cir	0.0	0.013	0.012	n/a	691240.30	0.29	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
130.074	15	2.11	Cir	0.0	0.013	0.012	n/a	691262.69	1.89	0.39	1.02	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.184	15	0.99	Cir	0.0	0.013	0.012	n/a	691175.65	0.29	0.39	1.02	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
19.955	15	1.00	Cir	0.0	0.013	0.012	n/a	691098.68	0.28	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
126.506	18	1.63	Cir	0.0	0.013	0.012	n/a	690660.97	0.25	0.35	0.96	0.00	18	0.00	18	0.00	0.00	0.00	5.2	....

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
127.017	15	2.83	Cir	0.0	0.013	0.012	n/a	690759.38	0.19	8.88	4.57	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
108.029	15	3.79	Cir	0.0	0.013	0.012	n/a	690766.04	1.35	0.51	1.13	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
79.019	24	1.01	Cir	0.0	0.013	0.012	n/a	690640.72	0.15	0.00	0.14	0.00	24	0.00	24	0.00	0.00	0.00	6.2	....
181.944	24	0.49	Cir	0.0	0.013	0.012	n/a	690629.35	0.34	0.13	0.67	0.00	24	0.00	24	0.00	0.00	0.00	5.8	....
121.251	24	9.98	Cir	0.0	0.013	0.012	n/a	690749.59	0.23	0.11	0.64	0.00	24	0.00	24	0.00	0.00	0.00	5.6	....
97.602	15	9.99	Cir	0.0	0.013	0.012	n/a	690827.57	0.09	15.88	6.26	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
126.206	15	9.51	Cir	0.0	0.013	0.012	n/a	690856.75	0.59	2.19	2.22	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
30.000	36	2.30	Cir	0.0	0.013	0.012	n/a	689846.16	0.09	-nan(ind).00	-nan(ind).00	0.00	36	0.00	36	0.00	0.00	0.00	23.4	....
73.386	36	0.50	Cir	0.0	0.013	0.012	n/a	689829.65	0.23	0.05	0.51	0.00	36	0.00	36	0.00	0.00	0.00	23.2	....
150.569	18	4.74	Cir	0.0	0.013	0.012	n/a	689980.12	0.19	-nan(ind).00	-nan(ind).00	0.00	18	0.00	18	0.00	0.00	0.00	11.2	....
47.994	18	4.94	Cir	0.0	0.013	0.012	n/a	690025.58	0.06	2.02	2.14	0.00	18	0.00	18	0.00	0.00	0.00	11.2	....
284.334	18	5.70	Cir	0.0	0.013	0.012	n/a	690309.77	0.44	0.58	1.20	0.00	18	0.00	18	0.00	0.00	0.00	10.7	....
133.139	18	5.11	Cir	0.0	0.013	0.012	n/a	690437.85	0.23	0.58	1.20	0.00	18	0.00	18	0.00	0.00	0.00	10.5	....
53.198	18	1.00	Cir	0.0	0.013	0.012	n/a	690483.68	0.10	0.66	1.26	0.00	18	0.00	18	0.00	0.00	0.00	10.4	....
47.067	18	1.00	Cir	0.0	0.013	0.012	n/a	690513.96	0.10	0.33	0.94	0.00	18	0.00	18	0.00	0.00	0.00	10.3	....
120.653	18	0.99	Cir	0.0	0.013	0.012	n/a	690575.43	0.29	0.39	1.02	0.00	18	0.00	18	0.00	0.00	0.00	10.0	....
130.403	15	2.84	Cir	0.0	0.013	0.012	n/a	690705.46	0.24	0.30	0.92	0.00	15	0.00	15	0.00	0.00	0.00	9.8	....
161.656	15	3.34	Cir	0.0	0.013	0.012	n/a	690861.01	0.39	0.44	1.06	0.00	15	0.00	15	0.00	0.00	0.00	9.4	....
154.069	15	3.28	Cir	0.0	0.013	0.012	n/a	691014.85	0.57	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	8.8	....
140.369	15	3.35	Cir	0.0	0.013	0.012	n/a	691154.01	1.33	0.33	0.94	0.00	15	0.00	15	0.00	0.00	0.00	7.5	....
107.999	15	2.78	Cir	0.0	0.013	0.012	n/a	691241.05	2.48	0.16	0.73	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.089	15	1.00	Cir	0.0	0.013	0.012	n/a	691013.60	0.21	0.66	1.26	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.249	15	0.99	Cir	0.0	0.013	0.012	n/a	690700.84	0.32	0.35	0.96	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
19.915	15	1.00	Cir	0.0	0.013	0.012	n/a	690859.88	0.28	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
28.928	15	2.59	Cir	0.0	0.013	0.012	n/a	690026.13	2.11	0.00	0.28	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
129.835	15	1.88	Cir	0.0	0.013	0.012	n/a	689713.67	3.59	0.00	0.28	0.00	15	0.00	15	0.00	0.00	0.00	19.6	....
143.637	15	3.10	Cir	0.0	0.013	0.012	n/a	689618.05	12.77	-nan(ind).00	-nan(ind).00	0.00	15	0.00	15	0.00	0.00	0.00	6.8	....
20.226	15	0.99	Cir	0.0	0.013	0.012	n/a	689629.04	1.80	0.00	0.23	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.197	15	0.99	Cir	0.0	0.013	0.012	n/a	689727.94	1.80	0.00	0.23	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
19.805	24	1.01	Cir	0.0	0.013	0.012	n/a	689832.66	0.08	0.26	0.87	0.00	24	0.00	24	0.00	0.00	0.00	5.9	....
92.886	36	-0.01	Cir	0.0	0.013	0.012	n/a	689873.84	0.92	7.68	4.22	0.00	36	0.00	36	0.00	0.00	0.00	5.0	....
64.098	24	1.01	Cir	0.0	0.013	0.012	n/a	690314.64	0.12	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	12.4	....
36.295	24	9.92	Cir	0.0	0.013	0.012	n/a	690345.59	0.07	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	12.3	....
35.254	24	10.21	Cir	0.0	0.013	0.012	n/a	690375.69	0.06	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	12.3	....
108.716	24	1.00	Cir	0.0	0.013	0.012	n/a	690468.36	0.20	0.24	0.84	0.00	24	0.00	24	0.00	0.00	0.00	12.1	....
20.237	24	0.99	Cir	0.0	0.013	0.012	n/a	690485.46	0.04	0.33	0.94	0.00	24	0.00	24	0.00	0.00	0.00	12.0	....
115.221	24	0.62	Cir	0.0	0.013	0.012	n/a	690439.90	0.26	0.33	0.94	0.00	24	0.00	24	0.00	0.00	0.00	11.8	....
161.486	24	0.62	Cir	0.0	0.013	0.012	n/a	690431.61	0.39	1.89	2.07	0.00	24	0.00	24	0.00	0.00	0.00	11.4	....
213.210	24	1.99	Cir	0.0	0.013	0.012	n/a	690631.90	0.73	-nan(ind).00	-nan(ind).00	0.00	24	0.00	24	0.00	0.00	0.00	10.6	....
111.216	15	5.39	Cir	0.0	0.013	0.012	n/a	690736.45	0.19	-nan(ind).00	-nan(ind).00	0.00	15	0.00	15	0.00	0.00	0.00	10.4	....
112.817	15	1.33	Cir	0.0	0.013	0.012	n/a	690844.74	0.20	2.06	2.16	0.00	15	0.00	15	0.00	0.00	0.00	10.2	....
165.213	18	1.82	Cir	0.0	0.013	0.012	n/a	691009.33	0.64	0.58	1.20	0.00	18	0.00	18	0.00	0.00	0.00	9.6	....
192.294	15	5.98	Cir	0.0	0.013	0.012	n/a	691197.99	0.92	0.46	1.09	0.00	15	0.00	15	0.00	0.00	0.00	8.7	....
33.674	15	1.48	Cir	0.0	0.013	0.012	n/a	691226.93	0.25	0.53	1.16	0.00	15	0.00	15	0.00	0.00	0.00	8.4	....
172.625	15	1.45	Cir	0.0	0.013	0.012	n/a	691238.76	3.43	0.22	0.81	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
20.277	15	0.99	Cir	0.0	0.013	0.012	n/a	691012.62	0.28	0.44	1.06	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)
168.359	15	1.00	Cir	0.0	0.013	0.012	n/a	690600.67	1.07	0.41	1.04	0.00	15	0.00	15	0.00	0.00	0.00	5.2	....
19.738	15	1.01	Cir	0.0	0.013	0.012	n/a	690584.76	0.23	0.58	1.20	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
153.378	15	0.98	Cir	0.0	0.013	0.012	n/a	690626.62	0.88	1.63	1.93	0.00	15	0.00	15	0.00	0.00	0.00	5.0	....
50.000	15	2.00	Cir	0.0	....	0.012	n/a	690381.98	0.44	0.00	2.34	0.00	15	0.00	15	0.00	0.00	0.00	0.0	4.0

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)	
0.00	0.00	0.00	5.80	5.48	0.58	0.58	6.12	0.61	6.80	29.20	
0.00	0.00	0.00	4.50	4.04	0.38	0.38	4.96	6.80	2.82	118.76	
0.00	0.00	0.00	4.01	3.64	0.00	0.00	4.39	2.82	2.62	0.00	
0.00	0.00	0.00	3.07	3.50	0.00	0.00	2.64	2.60	2.40	0.00	
0.00	0.00	0.00	2.01	0.96	0.00	0.00	3.06	6.80	2.83	0.00	
0.00	0.00	0.00	2.03	1.53	0.00	0.00	2.53	2.83	2.63	0.00	
0.00	0.00	0.00	13.52	13.52	0.00	0.00	13.51	0.63	12.00	0.00	
0.00	0.00	0.00	16.53	19.42	0.00	0.00	13.63	4.00	5.50	0.00	
0.00	0.00	0.00	17.00	23.48	0.00	0.00	10.52	2.50	10.80	0.00	
0.00	0.00	0.00	20.08	29.63	0.00	0.00	10.52	5.10	11.50	0.00	
0.00	0.00	0.00	10.97	11.89	0.00	0.00	10.05	11.14	11.12	0.00	
0.00	0.00	0.00	9.45	9.28	0.00	0.00	9.61	11.32	9.62	0.00	
0.00	0.00	0.00	7.95	7.98	0.00	0.00	7.92	9.62	9.48	0.00	
0.00	0.00	0.00	9.74	10.00	0.00	0.00	9.48	9.48	7.65	0.00	
0.00	0.00	0.00	9.40	9.40	0.00	0.00	9.40	7.65	8.13	0.00	
0.00	0.00	0.00	8.25	8.25	0.00	0.00	8.25	8.13	7.98	0.00	
0.00	0.00	0.00	5.88	5.88	0.00	0.00	5.88	7.98	7.53	0.00	
0.00	0.00	0.00	4.21	3.51	0.00	0.00	4.91	7.53	7.44	0.00	
0.00	0.00	0.00	3.92	4.47	0.00	0.00	3.38	2.39	2.19	0.00	
0.00	0.00	0.00	2.48	1.61	0.00	0.00	3.35	7.44	7.47	0.00	
0.00	0.00	0.00	1.15	1.15	0.00	0.00	1.15	7.53	7.33	0.00	
0.00	0.00	0.00	1.18	1.18	0.00	0.00	1.18	7.98	7.78	0.00	
0.00	0.00	0.00	8.71	8.82	0.00	0.00	8.60	9.62	6.15	0.00	

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.00	0.00	0.00	10.96	10.96	0.00	0.00	10.96	5.56	2.75	0.00
0.00	0.00	0.00	5.49	7.48	0.00	0.00	3.51	5.34	2.25	0.00
0.00	0.00	0.00	8.99	8.99	0.00	0.00	8.99	5.90	2.10	0.00
0.00	0.00	0.00	8.95	8.95	0.00	0.00	8.94	2.10	3.20	0.00
0.00	0.00	0.00	8.90	8.69	0.00	0.00	9.12	3.20	8.40	0.00
0.00	0.00	0.00	19.29	20.53	0.00	0.00	18.04	4.80	0.61	0.00
0.00	0.00	0.00	9.38	13.79	0.00	0.00	4.96	5.05	6.25	0.00
0.00	0.00	0.00	7.05	6.52	0.00	0.00	7.57	2.50	8.31	0.00
0.00	0.00	0.00	7.57	7.57	0.00	0.00	7.57	8.31	33.49	0.00
0.00	0.00	0.00	14.67	15.95	0.00	0.00	13.39	30.05	23.67	0.00
0.00	0.00	0.00	13.39	13.39	0.00	0.00	13.39	23.67	21.55	0.00
0.00	0.00	0.00	10.90	10.87	0.00	0.00	10.92	21.55	6.77	0.00
0.00	0.00	0.00	9.94	9.91	0.00	0.00	9.96	6.77	3.98	0.00
0.00	0.00	0.00	8.83	8.84	0.00	0.00	8.83	3.98	3.80	0.00
0.00	0.00	0.00	7.75	7.75	0.00	0.00	7.75	3.80	5.53	0.00
0.00	0.00	0.00	7.03	7.03	0.00	0.00	7.03	5.53	9.41	0.00
0.00	0.00	0.00	8.97	8.97	0.00	0.00	8.97	7.21	8.22	0.00
0.00	0.00	0.00	7.08	6.91	0.00	0.00	7.24	8.22	8.06	0.00
0.00	0.00	0.00	5.12	4.72	0.00	0.00	5.51	8.06	7.90	0.00
0.00	0.00	0.00	2.99	2.15	0.00	0.00	3.82	7.90	7.58	0.00
0.00	0.00	0.00	2.25	1.58	0.00	0.00	2.93	7.58	7.52	0.00
0.00	0.00	0.00	2.80	1.91	0.00	0.00	3.68	7.90	7.70	0.00
0.00	0.00	0.00	3.81	4.35	0.00	0.00	3.28	2.39	2.19	0.00

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.00	0.00	0.00	2.31	1.24	0.00	0.00	3.38	8.06	7.86	0.00
0.00	0.00	0.00	1.18	0.23	0.00	0.00	2.14	21.55	4.61	0.00
0.00	0.00	0.00	1.69	0.60	0.00	0.00	2.78	34.49	3.83	0.00
0.00	0.00	0.00	1.45	0.86	0.00	0.00	2.03	3.83	2.20	0.00
0.00	0.00	0.00	2.03	2.03	0.00	0.00	2.03	2.20	2.00	0.00
0.00	0.00	0.00	1.45	0.86	0.00	0.00	2.03	3.83	3.63	0.00
0.00	0.00	0.00	4.24	4.15	0.00	0.00	4.32	34.49	8.17	0.00
0.00	0.00	0.00	2.36	2.40	0.00	0.00	2.32	7.17	0.65	0.00
0.00	0.00	0.00	9.24	9.42	0.00	0.00	9.07	41.97	41.64	0.00
0.00	0.00	0.00	16.06	22.70	0.00	0.00	9.43	37.49	34.07	0.00
0.00	0.00	0.00	16.19	22.94	0.00	0.00	9.43	23.07	19.64	0.00
0.00	0.00	0.00	9.07	9.07	0.00	0.00	9.07	11.14	10.60	0.00
0.00	0.00	0.00	8.72	8.72	0.00	0.00	8.72	10.60	10.50	0.00
0.00	0.00	0.00	7.29	7.29	0.00	0.00	7.29	10.50	10.36	0.00
0.00	0.00	0.00	6.89	6.89	0.00	0.00	6.89	10.36	10.17	0.00
0.00	0.00	0.00	4.88	4.88	0.00	0.00	4.88	10.17	6.99	0.00
0.00	0.00	0.00	9.60	9.59	0.00	0.00	9.61	6.99	9.75	0.00
0.00	0.00	0.00	9.59	9.59	0.00	0.00	9.59	9.75	7.07	0.00
0.00	0.00	0.00	4.27	4.27	0.00	0.00	4.27	6.82	8.59	0.00
0.00	0.00	0.00	4.19	3.48	0.00	0.00	4.89	8.84	7.45	0.00
0.00	0.00	0.00	3.62	3.12	0.00	0.00	4.13	7.45	7.28	0.00
0.00	0.00	0.00	2.31	1.56	0.00	0.00	3.05	7.28	7.25	0.00
0.00	0.00	0.00	1.22	1.22	0.00	0.00	1.22	8.84	8.64	0.00

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

MyReport

Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.00	0.00	0.00	2.63	2.63	0.00	0.00	2.63	8.19	7.97	0.00
0.00	0.00	0.00	4.19	4.78	0.00	0.00	3.60	2.40	2.20	0.00
0.00	0.00	0.00	2.90	2.90	0.00	0.00	2.90	6.99	2.75	0.00
0.00	0.00	0.00	1.91	1.91	0.00	0.00	1.91	10.42	5.75	0.00

Project File: 3302-KWF.stm | Number of lines: 73 | Date: 5/17/2023

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
1	Pipe - (32)	User																		5.00
2	Pipe - (31)	User																		5.00
3	Pipe - (30)	User																		5.00
4	Pipe - (33)	User																		5.00
5	Pipe - (35)	User																		5.00
6	Pipe - (34)	User																		5.00
7	Pipe - (43)	User																		5.00
8	Pipe - (42)	User																		5.00
9	Pipe - (41)	User																		5.00
10	Pipe - (40)	User																		5.00
11	Pipe - (39)	User																		5.00
12	Pipe - (38)	User																		5.00
13	Pipe - (37)	User																		5.00
14	Pipe - (36)	User																		5.00
15	Pipe - (56)	User																		5.00
16	Pipe - (55)	User																		5.00
17	Pipe - (54)	User																		5.00
18	Pipe - (53)	User																		5.00
19	Pipe - (57)	User																		5.00
20	Pipe - (52)	User																		5.00
21	Pipe - (58)	User																		5.00
22	Pipe - (59)	User																		5.00
23	Pipe - (45)	User																		5.00
24	Pipe - (44)	User																		5.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
25	Pipe - (46)	User																		5.00
26	Pipe - (50)	User																		5.00
27	Pipe - (49)	User																		5.00
28	Pipe - (48)	User																		5.00
29	Pipe - (47)	User																		5.00
30	Pipe - (51)	User																		5.00
31	Pipe - (83)	User																		5.00
32	Pipe - (82)	User																		5.00
33	Pipe - (74)	User																		5.00
34	Pipe - (73)	User																		5.00
35	Pipe - (72)	User																		5.00
36	Pipe - (71)	User																		5.00
37	Pipe - (67)	User																		5.00
38	Pipe - (66)	User																		5.00
39	Pipe - (65)	User																		5.00
40	Pipe - (64)	User																		5.00
41	Pipe - (63)	User																		5.00
42	Pipe - (62)	User																		5.00
43	Pipe - (61)	User																		5.00
44	Pipe - (60)	User																		5.00
45	Pipe - (70)	User																		5.00
46	Pipe - (69)	User																		5.00
47	Pipe - (68)	User																		5.00
48	Pipe - (75)	User																		5.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
49	Pipe - (78)	User																		5.00
50	Pipe - (77)	User																		5.00
51	Pipe - (76)	User																		5.00
52	Pipe - (79)	User																		5.00
53	Pipe - (81)	User																		5.00
54	Pipe - (80)	User																		5.00
55	Pipe - (25)	User																		5.00
56	Pipe - (24)	User																		5.00
57	Pipe - (23)	User																		5.00
58	Pipe - (22)	User																		5.00
59	Pipe - (21)	User																		5.00
60	Pipe - (20)	User																		5.00
61	Pipe - (19)	User																		5.00
62	Pipe - (18)	User																		5.00
63	Pipe - (17)	User																		5.00
64	Pipe - (16)	User																		5.00
65	Pipe - (13)	User																		5.00
66	Pipe - (12)	User																		5.00
67	Pipe - (14)	User																		5.00
68	Pipe - (10)	User																		5.00
69	Pipe - (15)	User																		5.00
70	Pipe - (29)	User																		5.00
71	Pipe - (28)	User																		5.00
72	Pipe - (26)	User																		5.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
73		User																		0.00

Project File: 3302-KWF.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 73 | Date: 5/17/2023

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	6.66	373.50	374.71	1.21	1.09	5.48	0.58	375.29	0.000	25.195	373.75	374.79	1.04**	1.09	6.12	0.58	375.37	0.000	0.000	n/a	1.50	n/a
2	15	4.40	373.75	374.79	1.04	0.89	4.04	0.38	375.17	0.000	119.778	387.00	387.85 j	0.85**	0.89	4.96	0.38	388.23	0.000	0.000	n/a	1.50	0.57
3	15	3.23	387.00	387.85	0.00	0.00	3.64	0.00	387.85	0.000	20.216	387.20	387.92	0.00**	0.00	4.39	0.00	387.92	0.000	0.000	0.000	1.00	n/a
4	15	0.61	377.95	378.20	0.00	0.00	3.50	0.00	378.20	0.000	20.027	378.15	378.45	0.00**	0.00	2.64	0.00	378.45	0.000	0.000	0.000	1.00	n/a
5	15	1.04	373.75	374.79	0.00	0.00	0.96	0.00	374.79	0.000	122.337	374.38	374.78	0.00**	0.00	3.06	0.00	374.78	0.000	0.000	0.000	1.47	n/a
6	15	0.52	374.38	374.78	0.00	0.00	1.53	0.00	374.78	0.000	20.035	374.58	374.86	0.00**	0.00	2.53	0.00	374.86	0.000	0.000	0.000	1.00	n/a
7	30	66.34	379.00	381.50	0.00*	0.00	13.52	0.00	381.50	0.000	48.007	379.50	382.57	0.00**	0.00	13.51	0.00	382.57	0.000	0.000	0.000	0.50	n/a
8	30	66.34	387.50	389.14	0.00	0.00	19.42	0.00	389.14	0.000	65.929	390.00	392.43	0.00**	0.00	13.63	0.00	392.43	0.000	0.000	0.000	1.47	n/a
9	24	32.38	393.50	394.40	0.00	0.00	23.48	0.00	394.40	0.000	37.291	397.20	399.09	0.00**	0.00	10.52	0.00	399.09	0.000	0.000	0.000	0.50	n/a
10	24	32.38	402.90	403.66	0.00	0.00	29.63	0.00	403.66	0.000	29.905	408.50	410.39	0.00**	0.00	10.52	0.00	410.39	0.000	0.000	0.000	1.37	n/a
11	24	30.74	408.86	410.39	0.00	0.00	11.89	0.00	410.39	0.000	114.159	414.50	416.37	0.00**	0.00	10.05	0.00	416.37	0.000	0.000	0.000	0.50	n/a
12	24	29.15	414.30	416.37	0.00	0.00	9.28	0.00	416.37	0.000	20.331	416.00	417.85	0.00**	0.00	9.61	0.00	417.85	0.000	0.000	0.000	2.20	n/a
13	18	13.36	416.50	417.85	0.00	0.00	7.98	0.00	417.85	0.000	126.011	418.50	419.86	0.00**	0.00	7.92	0.00	419.86	0.000	0.000	0.000	0.50	n/a
14	15	11.53	418.75	419.86	0.00	0.00	10.00	0.00	419.86	0.000	154.272	423.36	424.57	0.00**	0.00	9.48	0.00	424.57	0.000	0.000	0.000	1.01	n/a
15	15	11.53	423.36	424.61	0.00*	0.00	9.40	0.00	424.61	0.000	42.372	424.00	425.76	0.00**	0.00	9.40	0.00	425.76	0.000	0.000	0.000	1.16	n/a
16	15	10.12	424.00	427.35	0.00	0.00	8.25	0.00	427.35	0.000	150.146	427.25	430.50	0.00**	0.00	8.25	0.00	430.50	0.000	0.000	0.000	1.50	n/a
17	15	7.22	427.25	432.08	0.00	0.00	5.88	0.00	432.08	0.000	150.143	431.00	433.68	0.00**	0.00	5.88	0.00	433.68	0.000	0.000	0.000	1.50	n/a
18	15	4.31	431.00	434.49	0.00	0.00	3.51	0.00	434.49	0.000	145.164	434.25	435.09	0.00**	0.00	4.91	0.00	435.09	0.000	0.000	0.000	1.67	n/a
19	15	1.45	439.30	439.69	0.00	0.00	4.47	0.00	439.69	0.000	20.331	439.50	439.98	0.00**	0.00	3.38	0.00	439.98	0.000	0.000	0.000	1.00	n/a
20	15	1.41	434.25	435.09	0.00	0.00	1.61	0.00	435.09	0.000	130.074	437.00	437.47	0.00**	0.00	3.35	0.00	437.47	0.000	0.000	0.000	1.00	n/a
21	15	1.41	431.00	434.49	0.00	0.00	1.15	0.00	434.49	0.000	20.184	431.20	434.50	0.00**	0.00	1.15	0.00	434.50	0.000	0.000	0.000	1.00	n/a
22	15	1.45	427.25	432.08	0.00	0.00	1.18	0.00	432.08	0.000	19.955	427.45	432.09	0.00**	0.00	1.18	0.00	432.09	0.000	0.000	0.000	1.00	n/a

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
23	18	14.76	416.50	417.85	0.00	0.00	8.82	0.00	417.85	0.000	126.506	418.56	419.96	0.00**	0.00	8.60	0.00	419.96	0.000	0.000	0.000	1.50	n/a
24	15	13.45	419.40	420.65	0.00*	0.00	10.96	0.00	420.65	0.000	127.017	423.00	425.35	0.00**	0.00	10.96	0.00	425.35	0.000	0.000	0.000	1.00	n/a
25	15	1.64	415.41	415.70	0.00	0.00	7.48	0.00	415.70	0.000	108.029	419.50	420.01	0.00**	0.00	3.51	0.00	420.01	0.000	0.000	0.000	1.00	n/a
26	24	28.24	390.10	392.43	0.00	0.00	8.99	0.00	392.43	0.000	79.019	390.90	393.48	0.00**	0.00	8.99	0.00	393.48	0.000	0.000	0.000	0.54	n/a
27	24	28.10	390.90	394.16	0.00	0.00	8.95	0.00	394.16	0.000	181.944	391.80	396.55	0.00**	0.00	8.94	0.00	396.55	0.000	0.000	0.000	1.50	n/a
28	24	27.30	391.80	398.41	0.00	0.00	8.69	0.00	398.41	0.000	121.251	403.90	405.71	0.00**	0.00	9.12	0.00	405.71	0.000	0.000	0.000	1.02	n/a
29	15	22.14	408.25	409.28	0.00	0.00	20.53	0.00	409.28	0.000	97.602	418.00	419.25	0.00**	0.00	18.04	0.00	419.25	0.000	0.000	0.000	1.00	n/a
30	15	4.41	408.00	408.38	0.00	0.00	13.79	0.00	408.38	0.000	126.206	420.00	420.85	0.00**	0.00	4.96	0.00	420.85	0.000	0.000	0.000	1.00	n/a
31	36	37.94	377.50	379.80	0.00	0.00	6.52	0.00	379.80	0.000	30.000	378.19	380.19	0.00**	0.00	7.57	0.00	380.19	0.000	0.000	0.000	0.51	n/a
32	36	37.94	378.19	380.19	0.00	0.00	7.57	0.00	380.19	0.000	73.386	378.56	380.56	0.00**	0.00	7.57	0.00	380.56	0.000	0.000	0.000	2.15	n/a
33	18	23.61	383.50	384.67	0.00	0.00	15.95	0.00	384.67	0.000	150.569	390.63	392.11	0.00**	0.00	13.39	0.00	392.11	0.000	0.000	0.000	0.61	n/a
34	18	23.61	390.63	392.11	0.00	0.00	13.39	0.00	392.11	0.000	47.994	393.00	394.48	0.00**	0.00	13.39	0.00	394.48	0.000	0.000	0.000	1.50	n/a
35	18	19.17	393.00	394.48	0.00	0.00	10.87	0.00	394.48	0.000	284.334	409.20	410.66	0.00**	0.00	10.92	0.00	410.66	0.000	0.000	0.000	0.50	n/a
36	18	17.39	409.20	410.66	0.00	0.00	9.91	0.00	410.66	0.000	133.139	416.00	417.44	0.00**	0.00	9.96	0.00	417.44	0.000	0.000	0.000	0.50	n/a
37	18	15.61	416.00	417.50	0.00*	0.00	8.84	0.00	417.50	0.000	53.198	416.53	418.50	0.00**	0.00	8.83	0.00	418.50	0.000	0.000	0.000	0.58	n/a
38	18	13.69	416.53	419.21	0.00	0.00	7.75	0.00	419.21	0.000	47.067	417.00	419.89	0.00**	0.00	7.75	0.00	419.89	0.000	0.000	0.000	0.50	n/a
39	18	12.42	417.00	420.35	0.00	0.00	7.03	0.00	420.35	0.000	120.653	418.20	421.79	0.00**	0.00	7.03	0.00	421.79	0.000	0.000	0.000	1.27	n/a
40	15	11.01	420.65	422.77	0.00	0.00	8.97	0.00	422.77	0.000	130.403	424.35	426.00	0.00**	0.00	8.97	0.00	426.00	0.000	0.000	0.000	1.50	n/a
41	15	8.48	424.35	427.88	0.00	0.00	6.91	0.00	427.88	0.000	161.656	429.75	430.89	0.00**	0.00	7.24	0.00	430.89	0.000	0.000	0.000	1.47	n/a
42	15	5.53	429.75	430.89	0.00	0.00	4.72	0.00	430.89	0.000	154.069	434.80	435.75	0.00**	0.00	5.51	0.00	435.75	0.000	0.000	0.000	1.50	n/a
43	15	2.16	434.80	435.75	0.00	0.00	2.15	0.00	435.75	0.000	140.369	439.50	440.09	0.00**	0.00	3.82	0.00	440.09	0.000	0.000	0.000	0.81	n/a
44	15	0.89	439.50	440.09	0.00	0.00	1.58	0.00	440.09	0.000	107.999	442.50	442.87	0.00**	0.00	2.93	0.00	442.87	0.000	0.000	0.000	1.00	n/a

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
45	15	1.92	434.80	435.75	0.00	0.00	1.91	0.00	435.75	0.000	20.089	435.00	435.55	0.00**	0.00	3.68	0.00	435.55	0.000	0.000	0.000	1.00	n/a
46	15	1.31	430.18	430.55	0.00	0.00	4.35	0.00	430.55	0.000	20.249	430.38	430.83	0.00**	0.00	3.28	0.00	430.83	0.000	0.000	0.000	1.00	n/a
47	15	1.45	429.75	430.89	0.00	0.00	1.24	0.00	430.89	0.000	19.915	429.95	430.43	0.00**	0.00	3.38	0.00	430.43	0.000	0.000	0.000	1.00	n/a
48	15	0.28	393.25	394.48	0.00	0.00	0.23	0.00	394.48	0.000	28.928	394.00	394.20	0.00**	0.00	2.14	0.00	394.20	0.000	0.000	0.000	1.00	n/a
49	15	0.74	379.31	380.56	0.00	0.00	0.60	0.00	380.56	0.000	129.835	381.75	382.09	0.00**	0.00	2.78	0.00	382.09	0.000	0.000	0.000	1.50	n/a
50	15	0.23	381.75	382.09	0.00	0.00	0.86	0.00	382.09	0.000	143.637	386.20	386.39	0.00**	0.00	2.03	0.00	386.39	0.000	0.000	0.000	1.46	n/a
51	15	0.23	386.20	386.39	0.00	0.00	2.03	0.00	386.39	0.000	20.226	386.40	386.59	0.00**	0.00	2.03	0.00	386.59	0.000	0.000	0.000	1.00	n/a
52	15	0.23	381.75	382.09	0.00	0.00	0.86	0.00	382.09	0.000	20.197	381.95	382.14	0.00**	0.00	2.03	0.00	382.14	0.000	0.000	0.000	1.00	n/a
53	24	13.03	378.56	380.56	0.00	0.00	4.15	0.00	380.56	0.000	19.805	378.76	380.59	0.00**	0.00	4.32	0.00	380.59	0.000	0.000	0.000	0.53	n/a
54	36	11.90	378.76	380.75	0.00	0.00	2.40	0.00	380.75	0.000	92.886	378.75	380.79	0.00**	0.00	2.32	0.00	380.79	0.000	0.000	0.000	1.00	n/a
55	24	28.48	378.00	379.84	0.00	0.00	9.42	0.00	379.84	0.000	64.098	378.65	380.75	0.00**	0.00	9.07	0.00	380.75	0.000	0.000	0.000	0.50	n/a
56	24	28.48	382.80	383.64	0.00	0.00	22.70	0.00	383.64	0.000	36.295	386.40	388.24	0.00**	0.00	9.43	0.00	388.24	0.000	0.000	0.000	0.50	n/a
57	24	28.48	397.40	398.23	0.00	0.00	22.94	0.00	398.23	0.000	35.254	401.00	402.84	0.00**	0.00	9.43	0.00	402.84	0.000	0.000	0.000	0.50	n/a
58	24	28.48	409.50	411.50	0.00*	0.00	9.07	0.00	411.50	0.000	108.716	410.59	412.97	0.00**	0.00	9.07	0.00	412.97	0.000	0.000	0.000	0.50	n/a
59	24	27.40	410.59	413.61	0.00	0.00	8.72	0.00	413.61	0.000	20.237	410.79	413.86	0.00**	0.00	8.72	0.00	413.86	0.000	0.000	0.000	2.22	n/a
60	24	22.90	410.79	416.49	0.00	0.00	7.29	0.00	416.49	0.000	115.221	411.50	417.49	0.00**	0.00	7.29	0.00	417.49	0.000	0.000	0.000	0.60	n/a
61	24	21.63	411.50	417.99	0.00	0.00	6.89	0.00	417.99	0.000	161.486	412.50	419.25	0.00**	0.00	6.89	0.00	419.25	0.000	0.000	0.000	1.50	n/a
62	24	15.33	412.50	420.35	0.00	0.00	4.88	0.00	420.35	0.000	213.210	416.75	421.19	0.00**	0.00	4.88	0.00	421.19	0.000	0.000	0.000	1.44	n/a
63	15	11.77	417.50	421.72	0.00	0.00	9.59	0.00	421.72	0.000	111.216	423.50	424.74	0.00**	0.00	9.61	0.00	424.74	0.000	0.000	0.000	0.50	n/a
64	15	11.77	423.50	425.45	0.00	0.00	9.59	0.00	425.45	0.000	112.817	425.00	428.65	0.00**	0.00	9.59	0.00	428.65	0.000	0.000	0.000	0.62	n/a
65	18	7.55	425.00	429.54	0.00	0.00	4.27	0.00	429.54	0.000	165.213	428.00	430.26	0.00**	0.00	4.27	0.00	430.26	0.000	0.000	0.000	1.50	n/a
66	15	4.27	428.00	430.69	0.00	0.00	3.48	0.00	430.69	0.000	192.294	439.50	440.34	0.00**	0.00	4.89	0.00	440.34	0.000	0.000	0.000	0.58	n/a

Project File: 3302-KWF.stm | Number of lines: 73 | Run Date: 5/17/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

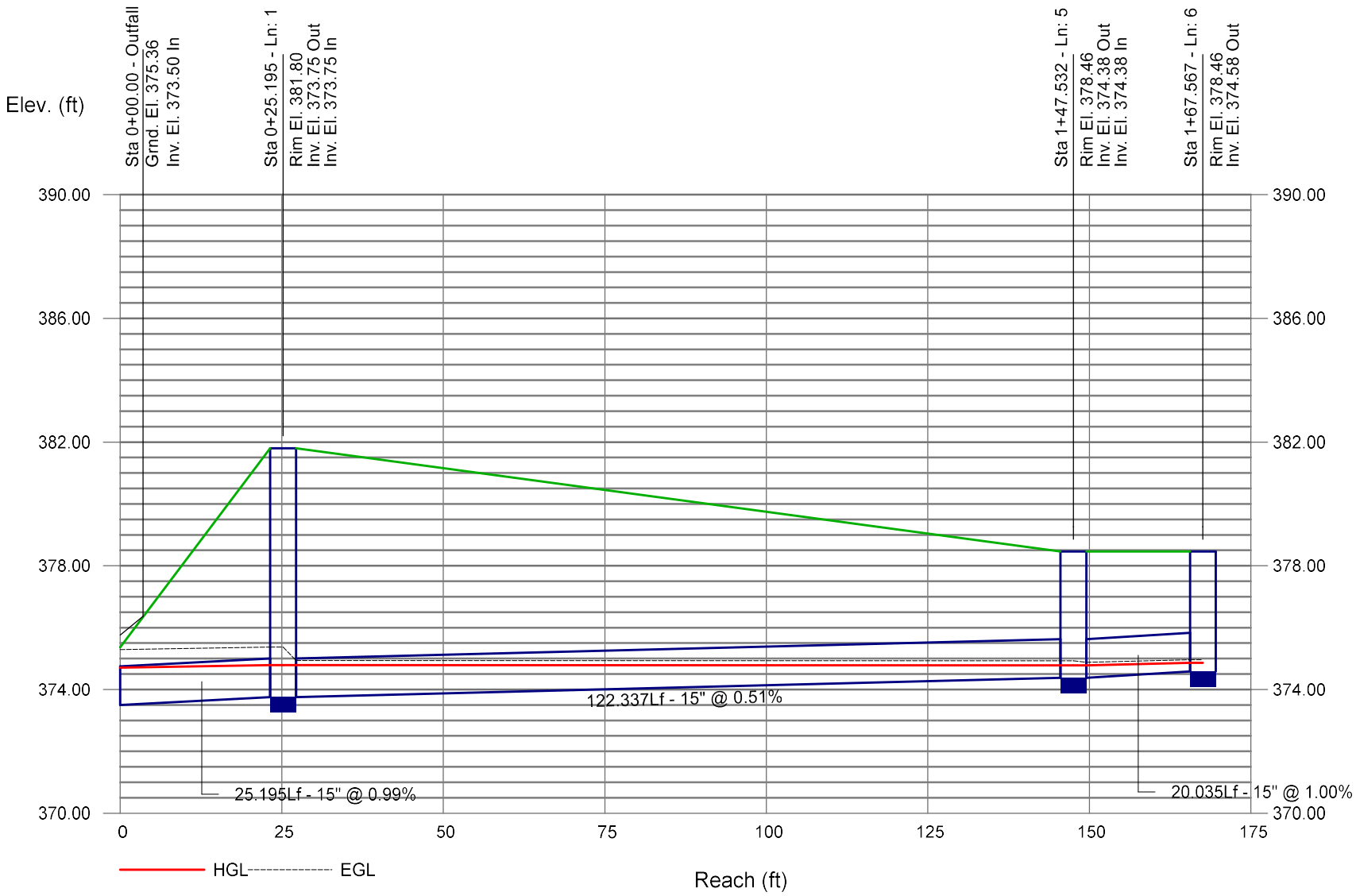
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			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
67	15	2.72	439.50	440.34	0.00	0.00	3.12	0.00	440.34	0.000	33.674	440.00	440.66	0.00**	0.00	4.13	0.00	440.66	0.000	0.000	0.000	1.28	n/a
68	15	1.03	440.00	440.66	0.00	0.00	1.56	0.00	440.66	0.000	172.625	442.50	442.90	0.00**	0.00	3.05	0.00	442.90	0.000	0.000	0.000	1.00	n/a
69	15	1.50	428.00	430.69	0.00	0.00	1.22	0.00	430.69	0.000	20.277	428.20	430.70	0.00**	0.00	1.22	0.00	430.70	0.000	0.000	0.000	1.00	n/a
70	15	3.23	413.85	416.49	0.00	0.00	2.63	0.00	416.49	0.000	168.359	415.53	416.85	0.00**	0.00	2.63	0.00	416.85	0.000	0.000	0.000	1.50	n/a
71	15	1.78	421.10	421.53	0.00	0.00	4.78	0.00	421.53	0.000	19.738	421.30	421.83	0.00**	0.00	3.60	0.00	421.83	0.000	0.000	0.000	1.00	n/a
72	15	3.56	417.50	421.72	0.00	0.00	2.90	0.00	421.72	0.000	153.378	419.00	422.12	0.00**	0.00	2.90	0.00	422.12	0.000	0.000	0.000	1.00	n/a
73	15	2.34	413.00	420.35	0.00	0.00	1.91	0.00	420.35	0.000	50.000	414.00	420.41	0.00**	0.00	1.91	0.00	420.41	0.000	0.000	0.000	1.00	n/a

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Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

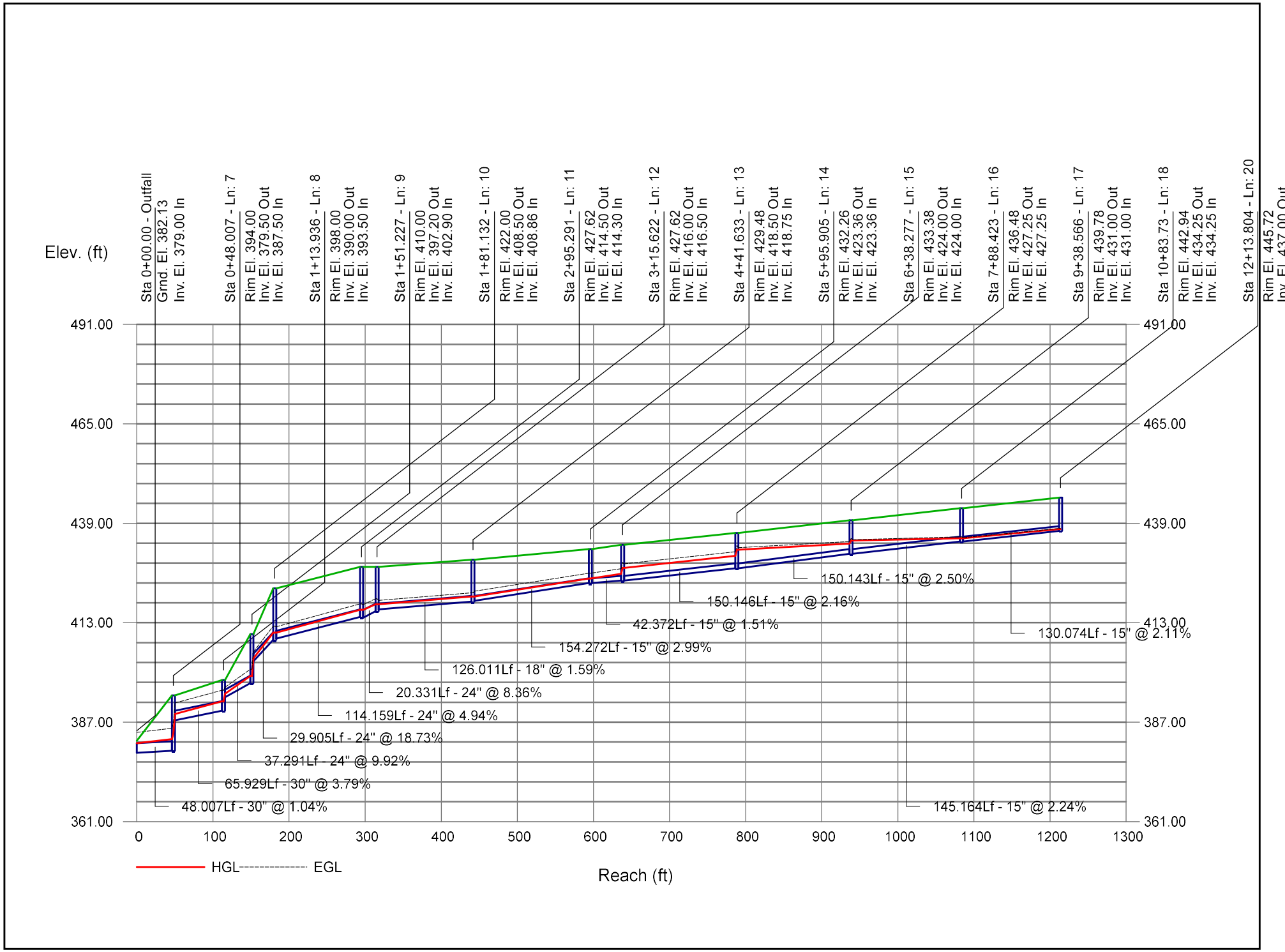
Storm Sewer Profile

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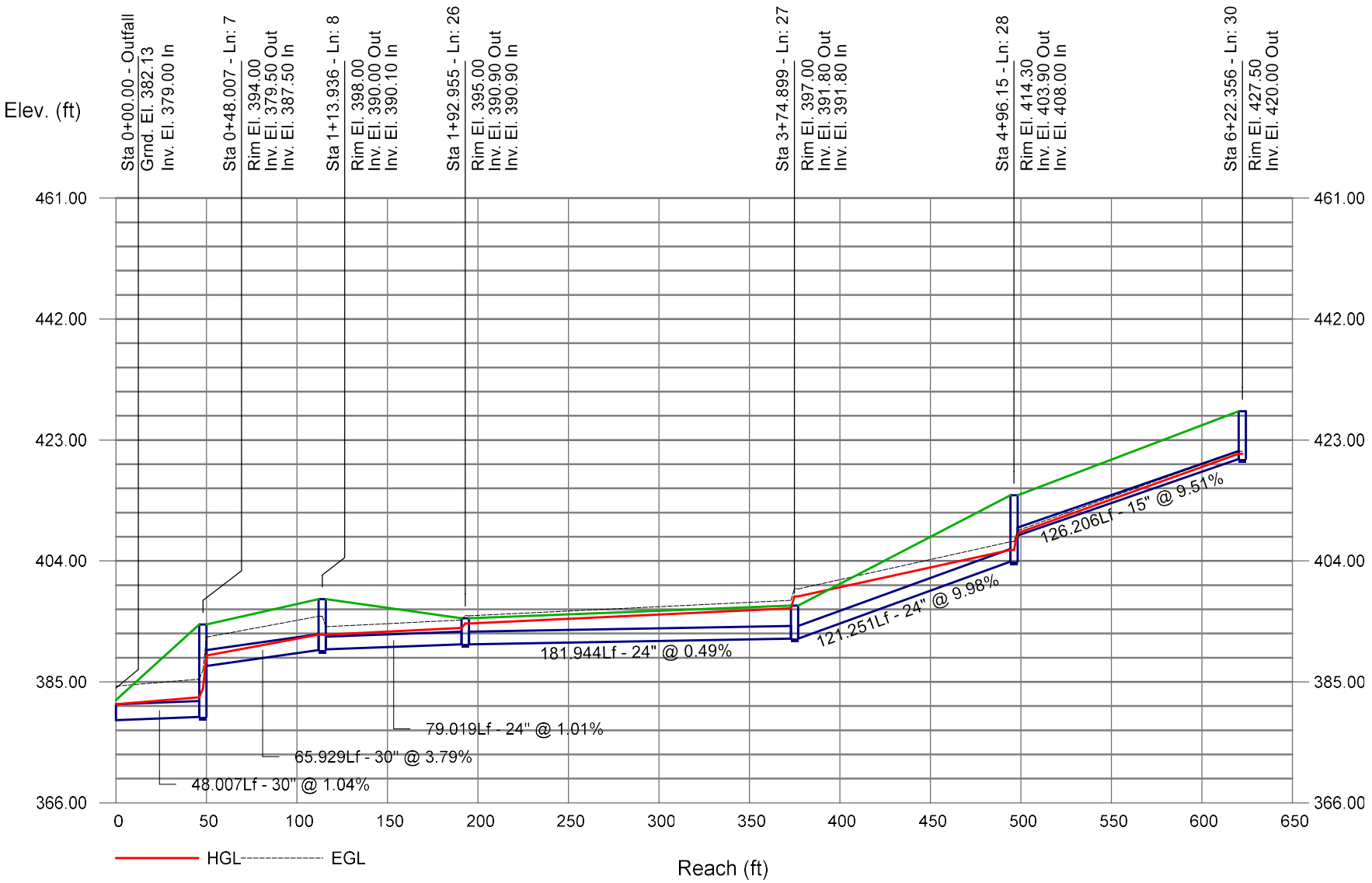
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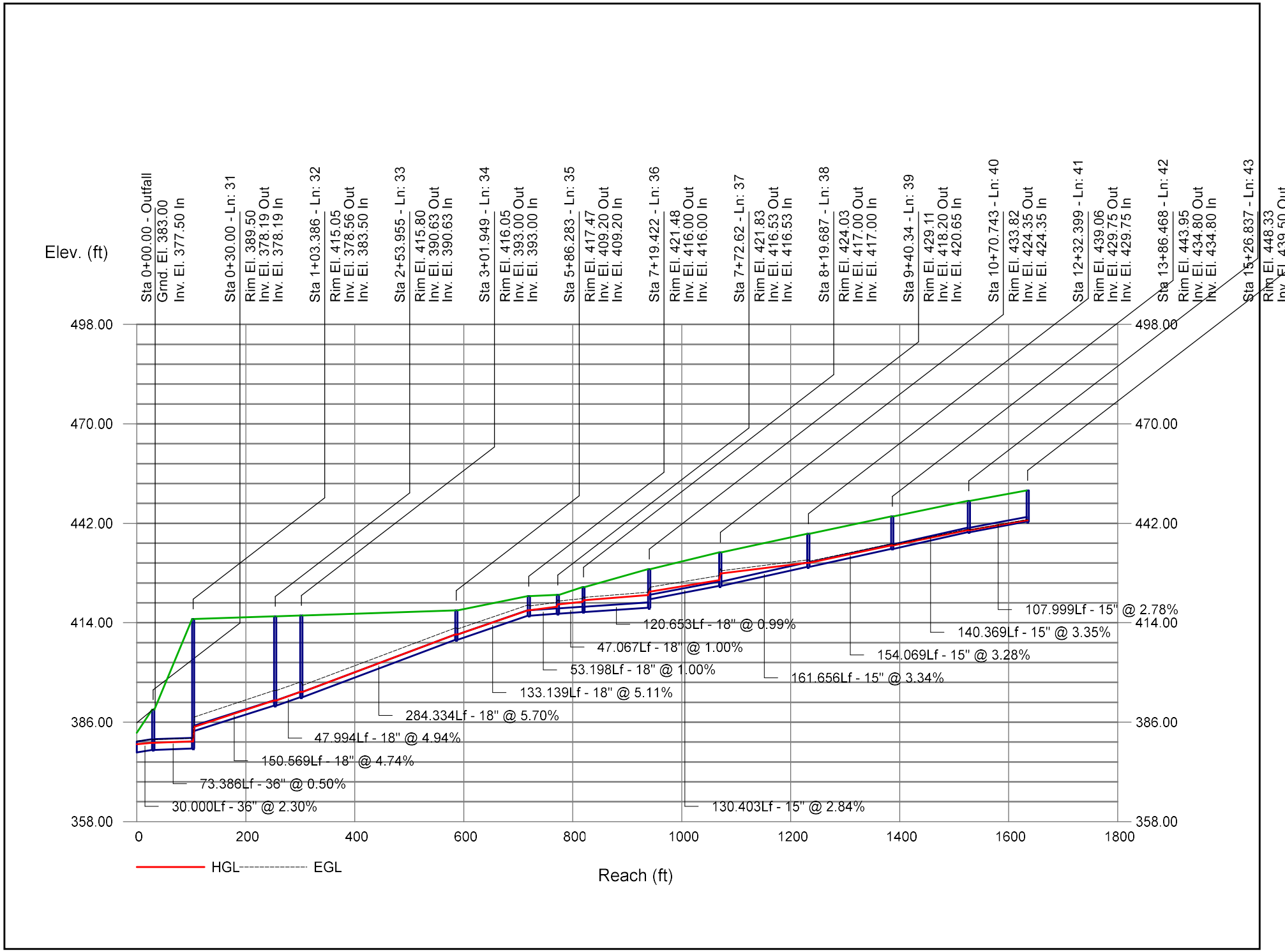
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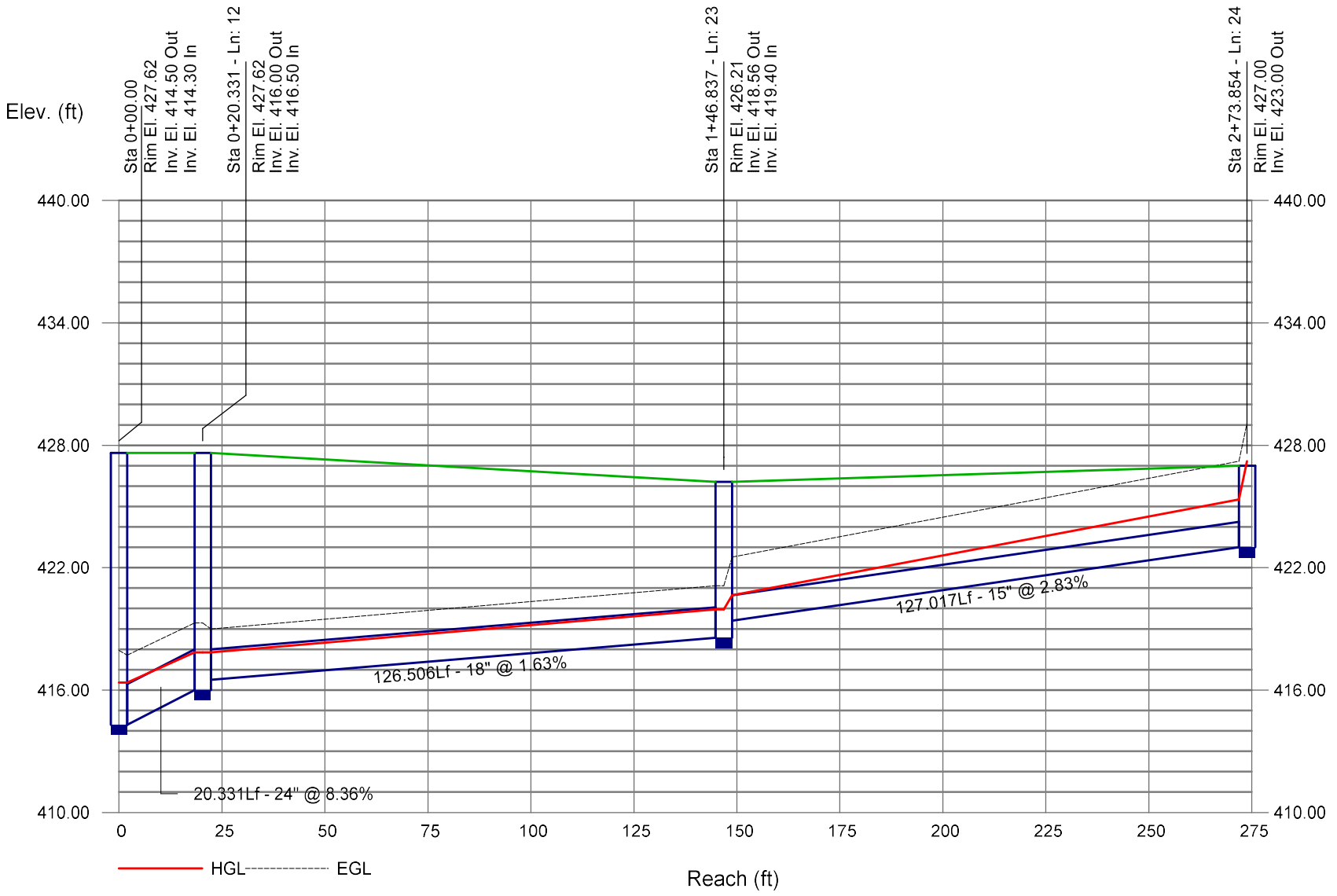
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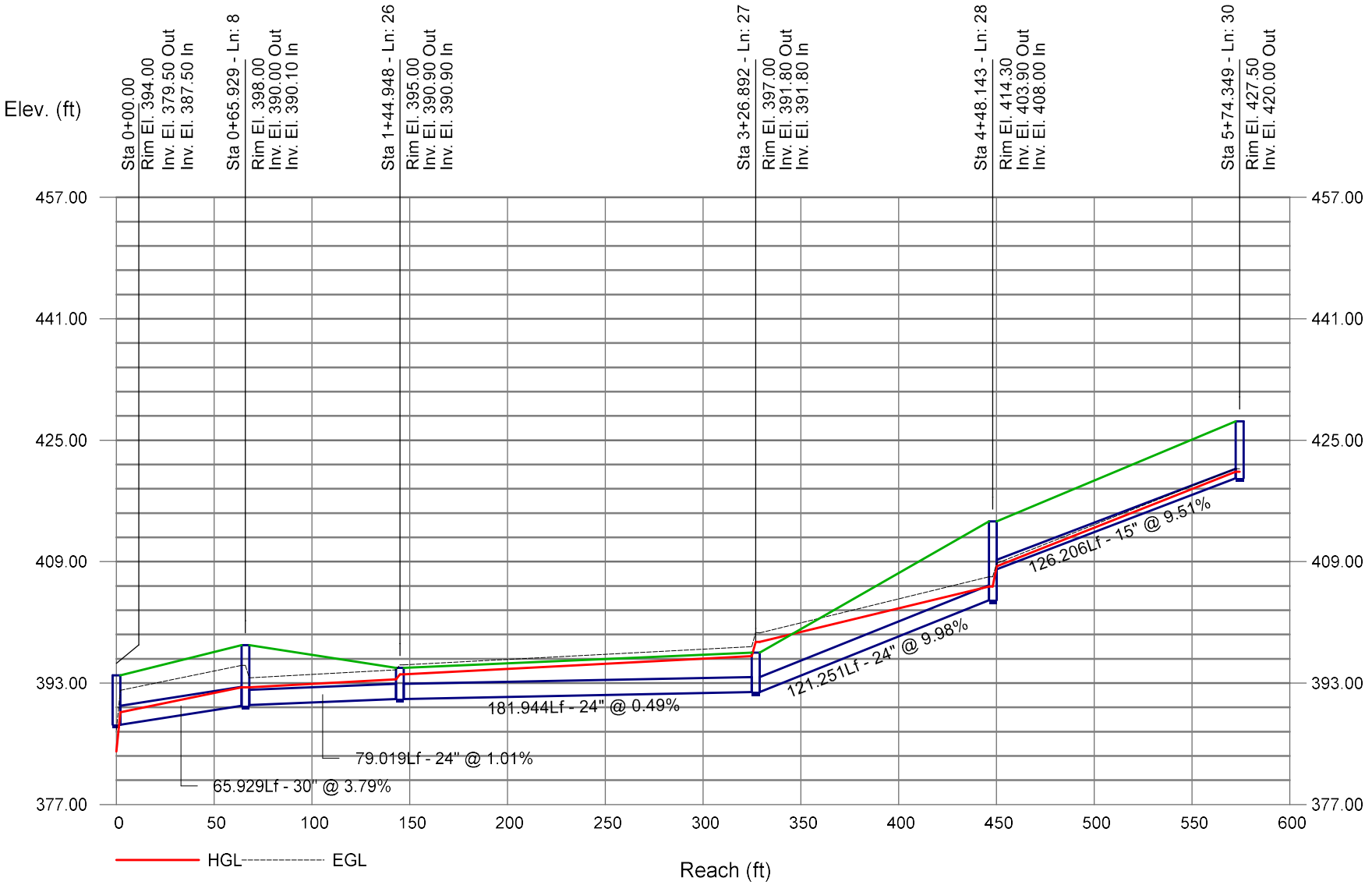
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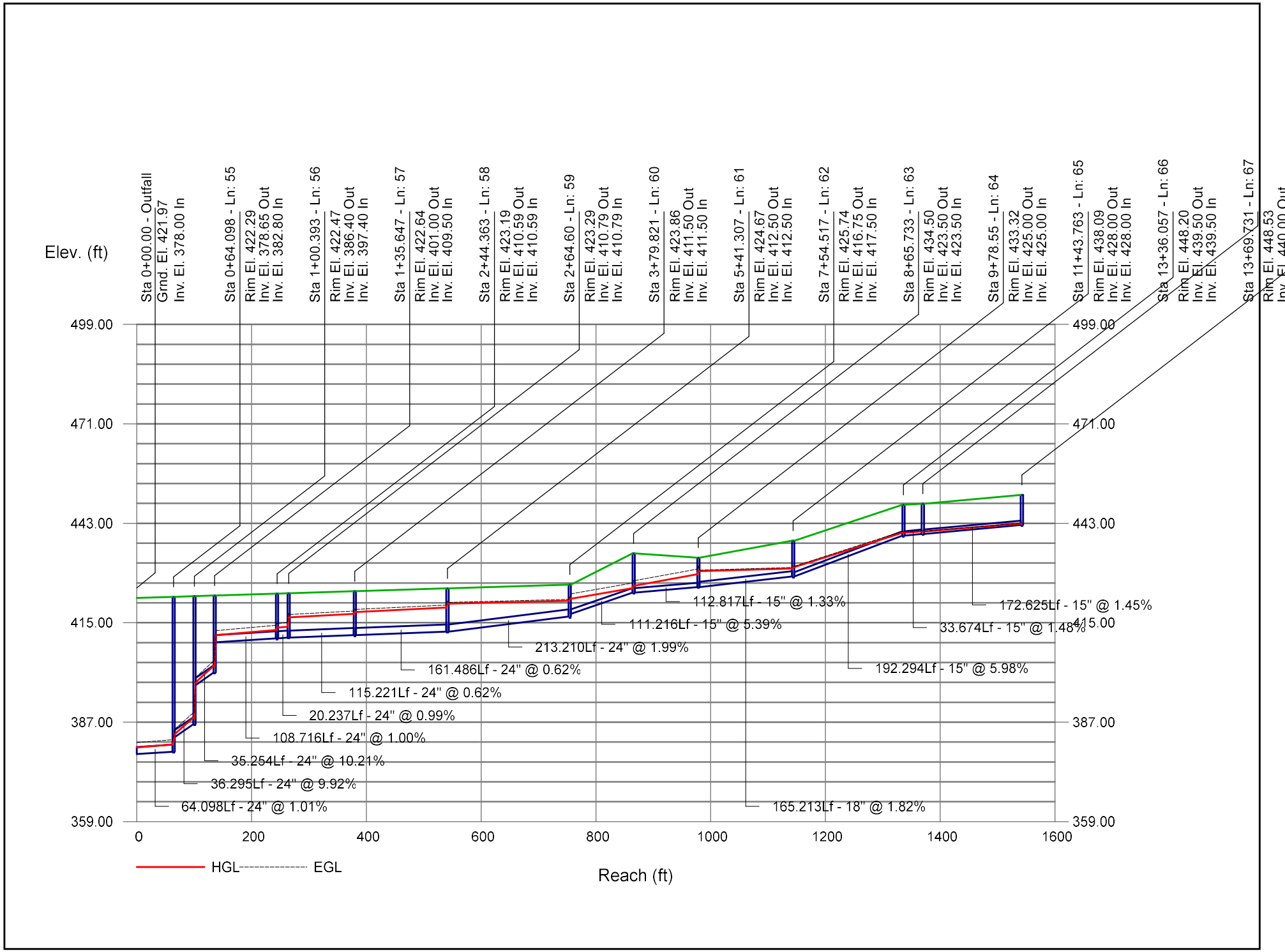
Storm Sewer Profile

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Storm Sewer Profile

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Wetland Assessment and Impact Evaluation

Quarry Ridge Residential Development
Turkey Roost Road, Monroe

Submitted To:
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March 20, 2023

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1.0 INTRODUCTION

Davison Environmental, LLC has prepared this wetland assessment and impact evaluation in conjunction with an Inland Wetlands and Watercourses Commission application to the Town of Monroe for a proposed development (the "Project" hereinafter) on a property located north of Turkey Roost Road in Monroe (the "Site" hereinafter). The Site is accessed from Turkey Roost Road to the south, and roughly borders Pinto Lane to the west and Morgan Lane to the north. See Appendix B - Figures 1 and 2 illustrating the Site location.

2.0 EXISTING ENVIRONMENT

2.1 General Site Description

Site photographs are provided in Appendix A. The Site is currently undeveloped and consists of a former gravel mine that has been left fallow for a number of years. The former mining areas were allowed to revegetate naturally, and now consist of "old field"[1] habitat dominated by invasive non-native species along with native pioneer species. Mining activity is visible on historical aerial photography as early as 1952 (source: Connecticut State Library). Mining activity was largely focused on the southern portions of the Site, where sand and gravel surficial material was present. The eastern half of the site consists of mixed hardwood forest and forested wetlands.

2.2 Surficial Geology and Watershed

The surficial materials at the site have been modified by the historic mining activity which stripped the upper layers of material from the Site. The Site's surficial geology is comprised of sand and gravel along the southern portions of the Site, with thin till dominated the northern portion of the Site. Most of the Site consists of thin glacial till. Tills are ice-laid deposits were derived directly from the ice and consist of non-sorted, generally non-stratified mixtures of grain-sizes ranging from clay to large boulders. The matrix of most tills is predominantly sand and silt and boulders can be sparse to abundant. Some tills contain lenses of sorted sand and gravel and occasionally masses of laminated fine-grained sediment.

Sand and gravel surficial materials are glacial meltwater deposits that were laid down in glacial streams, lakes and ponds which occupied the valleys and lowlands of Connecticut as the last ice sheet melted away to the north. They are composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. They are often composed of

[1] Old Field habitat refers to habitats that contain an interspersion of shrubs and small trees (typically less than 30% total cover) interspersed with herbaceous vegetation consisting of grasses and forbs.

layers of well-to-poorly sorted sands, gravels, silts and clays with few to no boulders, and owing to their water-related depositional origins they have many characteristics that are favorable for development.

The Site is located within the Halfway River watershed. Along the southern portions of the Site is Smith Pond Brook which drains in a northeasterly direction into Copper Mill Brook which flows along the eastern side of the Site. Smith Pond Brook drains north into the Halfway River north of Hammertown Road. See Figure 1 – *Location Map* which illustrates these waterway locations.

2.3 Wetland Delineation and Soil Types

Wetlands and watercourses are regulated in the State of Connecticut General Statutes, Chapter 440, sections 22a-28 to 22a-45. Inland Wetlands "means land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the National Resources Conservation Service (NRCS) of the United States Department of Agriculture" section 22a-38(15).

Davison Environmental, LLC Registered Soil Scientists Michael Klein and Eric Davison delineated Site wetlands in June of 2020. Wetlands were delineated by walking across the Site and examining the soil profile using a hand auger to a minimum depth of 20 inches in order to determine soil drainage class.

Digitally available updated soil survey information was obtained from the Natural Resources Conservation Service and generally confirmed during the field investigation, with the exception of historic material extraction areas which presented as a modified condition of the relevant native soil. Soil classifications present on the property are as follows:

Wetland Soils

Wetland soils on the site consist of the Ridgebury, Leicester and Whitman complex, Aquents, the Saco series and the Rippowam series. The Ridgebury, Leicester and Whitman complex is an undifferentiated mapping unit consisting of two poorly drained (Ridgebury and Leicester) and one very poorly drained (Whitman) soil developed on glacial till in depressions and drainageways in uplands and valleys. Their use interpretations are very similar, and they typically are so intermingled on the landscape that separation is not practical. The Ridgebury and Leicester series have a seasonal high water table at or near the surface (0-6") from fall through spring. They differ in that the Leicester soil has a more friable compact layer or hardpan, while the Ridgebury soils have a dense to very dense compact layer. The Whitman soil has a high water table for much of the year and may frequently be ponded.

The Aquents map unit is a miscellaneous land type used to denote man-made or man-disturbed areas that are wet. This soil condition dominates the former mining areas of the Site. These soils have an aquic soil moisture regime and can be expected to support hydrophytic vegetation. Typically, these soils occur in places where less than 2 feet of earthen material have been placed over poorly or very poorly drained soils; areas where the natural soils have been mixed so that the natural soil layers are not identifiable; or where the soil materials have been excavated to the watertable.

The Rippowam series consists of very deep, poorly drained loamy soils formed in alluvial sediments. They are nearly level soils on flood plains subject to frequent flooding. Permeability is moderate or moderately rapid in the loamy layers and rapid or very rapid in the underlying sandy materials.

The Saco series consists of very deep, very poorly drained soils formed in silty alluvial deposits. They are nearly level soils on flood plains, subject to frequent flooding. Depth to the coarse-textured substratum layers is more than 40 inches. The surface soil is very dark gray to black silt loam, underlain directly by a mottled, gray to grayish brown substratum. Some pedons have a mucky surface up to 5 inches thick. The soils formed in depressions in recent silty alluvium. In places water is ponded on the surface from late fall through early spring. These soils flood in the spring and after periods of heavy rainfall.

Non-Wetland Soils

The non-wetland soils were not examined in detail, except as was necessary to determine the wetland boundary. Non-wetland soils consist primarily of Udorthents associated with the historic site disturbance. Native soil types present in whole or modified from mining activity include the Canton and Charlton complex and the Charlton-Chatfield complex.

The Canton series consists of very deep, well drained soils formed in a loamy mantle underlain by sandy glacial till. They are on nearly level to very steep glaciated plains, hills, and ridges. Permeability is moderately rapid in the solum and rapid in the substratum. The soils developed in a fine sandy loam mantle over acid sandy glacial till of Wisconsin age derived mainly from granite and gneiss and some fine-grained sandstone.

The Charlton series is a very deep, well drained loamy soil formed in friable till. They are nearly level to very steep soils on till plains and hills. Depth to bedrock and the seasonal high water table is commonly more than 6 feet.

The Chatfield series consists of moderately deep, well drained, and somewhat excessively drained soils formed in till. They are nearly level to very steep soils on glaciated plains, hills, and ridges. Crystalline bedrock is at depths of 20 to 40 inches. The soils formed in a moderately thick mantle of glacial till overlying granite, gneiss, or schist bedrock. Rock outcrops are rare to common and are limited to the more resistant bedrock.

2.4 Wetland Description

Wetlands consist of: (1) a single small, isolated wetland (Wetland 1) located in the northeast corner of the Site; and (2) a large, interconnected wetland system that runs along the southern and eastern portions of the Site (Wetland 2). The physical, hydrologic and vegetative conditions of these two wetland areas are described in detail in the following sections:

Wetland 1

Wetland 1 is demarcated by flags 1X-16X shown on Sheet S6. It is a small, isolate forested wetland with a temporarily flooded hydrology. The wetland appears to be entirely anthropogenic in origin, with the topography showing evidence of creation by heavy equipment. It has two inlets, one on the south side and one on the west side, and the internal flows discharges from the wetland into a culvert on the north side. The outlet culvert is partially buried in sediment.

The vegetation consists of upland tree cover of black birch (*Betula lenta*) on the banks of the wetland along with the invasive non-native autumn olive, with the interior being dominated by multiflora rose (*Rosa mutliflora*), along with goldenrods (*Solidago sp.*).

Wetland 2

Wetland 2 is a large, interconnected wetland system that flows east, draining into Smith Pond Brook. The entirety of the wetland has been altered by the former mining activities, with areas of wetland having been excavated, channelized, and culverts installed to accommodate road crossing. The wetland is described in five segments as noted below:

Wetland 2A: Wetland Area 2A is demarcated by flags 120-175 as shown in Sheet S2/S6. The wetland is a hillside groundwater slope wetland that extends up the slope towards the proposed development area. It terminates just east of proposed Lots 43-45. This wetland area was completely disturbed from the mining activities, and possibly, the wetland was entirely created as a result of the mining which lowered the ground surface elevation resulting in the interception of groundwater and the creation of a hydric soil conditions due to regular groundwater discharge.

Groundwater discharges into the wetland at the two upper slope “fingers” (at the westernmost end) which originate at the base of a steep embankment. Flow travels downslope to the east,

draining into the large northeast pond. Flow is concentrated into a defined channel which is averages approximately 3 feet wide and 1.5 feet in depth. The vegetation consists of young "pioneer" species consistent with a wetland that was recently created. The cover type is scrub-shrub but includes scattered small trees. The dominant canopy species is willow (*Salix sp.*), with the shrub layer being dominated by autumn olive and multiflora rose, the herb layer is dominated by Japanese stiltgrass (*Microstegium vimineum*) along with sedges (*Carex sp.*) and rushes (*Juncus sp.*). The immediately adjacent uplands consist of a dense growth of the invasive non-native mugwort (*Artemesia vulgaris*). The eastern portion of the wetland becomes more steeply sloped which results in the wetland narrowing in width, and the flow becoming higher velocity flow confined to a narrow well-defined channel.

Wetland 2B: Wetland Area 2B is the northeast pond demarcated by flags 96-120, and 175-196 shown on Sheets S2/S6. This is the receiving pond for Wetland 2A. This is a large man-made pond with a well-defined shoreline, with little bordering wetlands. The shoreline is well-vegetated with emergent marsh vegetation. The pond is separated from Smith Pond Brook by a narrow earthen berm along the southeast side of the pond. The pond eventually discharges to Smith Pond Brook near its confluence with Copper Mill Brook. Details of the ponds physical or water quality conditions are not known. The vegetation includes a dense cover of the floating aquatic duckweed (*Lemna minor*), and a shoreline that is densely vegetated with marsh species including the invasive non-native common reed (*Phragmites australis*), along with cattail (*Typha latifolia*), pickerelweed (*Pontederia cordata*), arrow tearthumb (*Persicaria sagittata*) and alder (*Alnus rugosa*).

Wetland 2C: Wetland Area 2C refers to the southwestern portion of the wetland (west of the main access road), demarcated by flags 1X-37X as shown on Sheet S2. Wetland hydrology ranges from semi-permanently flooded along the perimeter of the wetland, and permanently flooded within the interior of the wetland. It is presumed that the wetland's shape and topography resulted from alterations that occurred from the mining operation. It was likely used historically as a settling basin. Water drains out of this wetland slowly (due to the gently sloping topography) to the east where it drains into the culvert and discharges on the east side of the access road.

The vegetation within the interior low elevation portions of the wetland consists of a dense growth of American bur-reed (*Sparganium Americanum*), a grass-like aquatic plant. The dominant plant along the wetland edges is a dense growth of Japanese stiltgrass. The shoreline includes some willow trees, along with gray birch and black birch, but generally has an open canopy.

Wetland 2D: Wetland 2D is demarcated by wetland flags 44-59 and is located on the east side of the interior access road as shown on Sheet S2. It is fed by the culvert outlet from Wetland Area 2C, and discharges to a culvert on the east side of the wetland where there is another culvert crossing. The culvert is in poor condition and is partially buried in sediment. The wetland hydrology is perennial flow, with shallow gentle flow to the east. There is a low central channel bordered by steeply sided banks.

Wetland vegetation is dictated by the deep shade provided by the white pine (*Pinus strobus*) tree canopy bordering the southern side of the wetland. There is little interior wetland vegetation present except for a few small patches of American bur-reed and scattered poison ivy (*Toxicodendron radicans*). The banks of the wetland consist of a dense monoculture of Japanese barberry along with scattered autumn olive along with black birch and red maple (*Acer rubrum*).

Wetland 2E: Wetland Area 2E is located at the downstream side of the culvert discharge from Wetland Area 2D. This wetland area is a high-gradient perennial watercourse with a meandering channel alignment and a stony (gravel-to-cobble sized) stream bottom. The banks are steeply sloping with no bordering wetlands. This stream segment drains east into Smith Pond Brook.

The shoreline vegetation consists of hardwood tree species including black birch, red maple, sugar maple and hickories (*Carya sp.*). The shrub cover is dominated by autumn olive, and the groundcover consists of poison ivy, Christmas fern (*Polystichum acrostichoides*) and Asiatic bittersweet.

2.5 Rare Species Habitat

Field surveys to inventory Site wildlife were not conducted as a part of our work. Based on a review of the most recently updated (June 2021) Connecticut Department of Energy and Environmental Protection Natural Diversity Database (NDDB) mapping, NDDB records overlap the Site. Additionally, a single adult male eastern box turtle (*Terrapene c. carolina*), a State-listed species of special concern, was observed during the wetland delineation work in June, west of Sheet S2 in the 32.68 acre proposed open space parcel. The turtle was found basking at the edge of the mixed hardwood forest, near the forest/old field interface near the edge of a wetland.

3.0 WETLAND FUNCTIONS AND VALUES

3.1 Wetland Functions and Values

The functions and values of the wetland and watercourse which would be subject to filling or enhancement are summarized in Table 1. The *Highway Methodology* recognizes 13 separate wetland functions and values, including: groundwater recharge/discharge, floodwater storage,

fish and shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization, wetland wildlife habitat, recreational value, educational/scientific value, uniqueness, visual/aesthetic quality and threatened and endangered species habitat.

The degree to which a wetland provides each of these functions is determined by one or more of the following factors: landscape position, substrate, hydrology, vegetation, history of disturbance, and size. Each wetland may provide one or more of the listed functions at significant levels. The determining factors that affect the level of function provided by a wetland can often be broken into two categories. The effectiveness of a wetland to provide a specified function is generally dependent on factors within the wetland whereas the opportunity to provide a function is often influenced by the wetland's position in the landscape as well as adjacent land uses. For example, a depressed wetland with a restricted outlet may be considered highly effective in trapping sediment due to the long residence time of runoff water passing through the system. If this wetland is located in gently sloping woodland, however, there is no significant source of sediment in the runoff therefore the wetland is considered to have a small opportunity of providing this function.

Table 1: Summary of Wetland Functions and Values

Wetland Functions and Values	Groundwater Recharge/Discharge	Sediment/Shoreline Stabilization	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/Toxicant/ Pathogen Retention	Nutrient Removal/Attenuation	Production Export	Wildlife Habitat	Recreation	Educational/Scientific Value	Uniqueness/Heritage	Visual Quality/Aesthetics	Listed Species Habitat
Wetland 1	S	N/A	N/A	N/A	S	S	S	S	U	U	U	U	U
Wetland 2	P	S	P	S	P	P	S	S	U	U	U	U	U

Suitability

P = principal function

S = secondary function

U = function unlikely to be provided at a significant level

N/A = not applicable

Wetland functions and values are heavily influenced by the site history. The wetlands throughout the site have been heavily disturbed, including large scale grading, filling, channelization and flow diversions. The wetlands are in essence "young wetlands" with soils, hydrology and vegetation still in the development stages. A brief description of the wetland's principal functions and values is provided below.

Wetland 1

Wetland 1 is a small historically disturbed wetland that provides few functions and values. It does not have a hydrology suitable for aquatic species, or species that require seasonal flooding (e.g., vernal pool species). The small size of the wetland is the primary limiting factor with respect to its ability to provide functions and values. The wetland's principal function is to convey flow to the downstream wetland system via the existing culvert system. The vegetation is dominated by invasive non-native species and therefore has relatively low plant species diversity.

Wetland 2

Wetland 2 is far more significant with respect to the functions and values it provides. This is largely the result of its large size, longer hydroperiod, and its surface water connection to Smith Pond Brook which makes its ability to provide water quality renovation functions important to protect downstream resources. Its principal functions include groundwater recharge/discharge, floodflow alteration, sediment/toxicant/pathogen retention, and nutrient removal/attenuation.

4.0 REGULATED ACTIVITIES

No activities are proposed within Site wetlands (i.e., there are no direct wetland impacts). Due to the needs of the proposed Project and the location and proximity of surrounding wetlands, activities are proposed within the Town of Monroe's 100-foot upland review area (URA). A total of 74,800 square feet of work is proposed within the URA. The majority of this work is related to the construction of the stormwater management basins. The closest activity to wetlands will occur at the entrance road which will require improvement on either side of the existing culvert crossing. Overall, most construction activity will occur a significant distance from wetlands. Estimating the distance of the activity from wetlands (using twelve of the closest activity locations), an average setback of ±60 feet from wetlands is proposed. Upon completion of construction, the closest proposed home to wetlands will be 102 feet.

5.0 WETLAND IMPACT ASSESSMENT AND RECOMMENDATIONS

5.1 Potential Short-term Impacts

Potential short-term Project impacts to wetlands and watercourses are primarily related to discharges during construction. In order to minimize the potential for these impacts, erosion and sediment ("E&S") control measures have been designed in accordance with the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control", CT DEEP Bulletin No. 34, and all amendments and addenda thereto as published by the Connecticut Department of Energy and Environmental Protection. Sediment and erosion control measures proposed for this project include:

- Temporary sediment traps
- Anti-tracking pad
- Silt-sacks at catch basins
- Wood chip berms
- Geotextile silt fencing (including double rows)

At critical locations (e.g., upslope of Wetland 2) barrier controls consist of a wood chip berm as the interior control, backed by a double row of silt fencing. These measures in combination will be highly effective at slowing the flow of runoff and trapping sediment generated during construction.

Most wetland sedimentation impacts during construction occur because of contractor's not properly installing and maintaining the control measures as designed. Therefore, it is imperative that the contractor properly install and maintain these measures throughout the duration of construction. This should include daily inspection by the contractor of all Site controls, but in particular the outer barrier control measures closest to wetlands just prior to, and after, a significant rainfall event.

5.2 Potential Long-term Impacts

Potential long-term Project impacts to wetlands and watercourses are most often related to the loss of wetland functions and values resulting from filling and water quality degradation resulting from stormwater discharges.

Proposed upland review area activities would primarily occur within portions of the Site which were previously occupied by the sand and gravel mine and have thus been disturbed. These areas no longer have native plant communities or soil. The topsoil and subsoil have been stripped and processed, and the topography radically altered. Therefore, wetland and hydrologic impacts

resulting from such activities (carbon loss, soil compaction, habitat loss and alteration, alteration of groundwater infiltration patterns) have already occurred. In other words, the impacts to the wetland buffer (a.k.a. the upland review area) that result from development have already occurred at this Site.

Potential long-term impacts to water resources are primarily related to the loss of functions and values and/or water quality degradation resulting from wetland filling and stormwater discharges. In the case of the proposed development no wetland filling is proposed. With respect to degradation of water quality, the development incorporates *primary treatment* practices as described in CTDEP's 2004 Stormwater Quality Manual. This includes three stormwater treatment ponds and a settling basin fed by a rip-rap swale with stone check dams. Therefore, converting the former mining lands to residential development is unlikely to adversely affect principal wetland functions and values. This is because the proposed treatment system are designed to maximize the removal of stormwater pollutants including nutrients, sediment and hydrocarbons from stormwater runoff.

5.3 Recommendations

1. Invasive non-native species dominate the proposed development area. It is recommended that an Invasive Species Control Plan be developed by a qualified herbicide applicator with experience in eradicating invasive species, particularly mugwort, autumn olive and multiflora rose. Efforts should focus on the limits of disturbance, particularly in areas that will include landscaping and stormwater wetlands along the margins of the development where invasive plants could most easily reestablish after construction is completed.

2. During construction, the disposal of invasive plant material should comply with CT Invasive Plants Working Group guidelines (source: https://cipwg.uconn.edu/).

3. The limits of disturbance coincide with the areas of the former quarry that are either sparsely vegetated, or not vegetated at all as they consist of sorted gravel and cobble piles. It is recommended that these areas be restored with topsoil and vegetated with a native meadow or no-mow seed mix.

4. To protect the eastern box turtle during construction, it is recommended that the *Eastern Box Turtle Protection Plan* (see Appendix C) be implemented during construction if construction is proposed to occur during the turtle's active period (which typically occurs between April 1st and October 30th). Note that this plan is not intended to mitigate for the loss of habitat that will result from the proposed development project. Rather, it is intended to prevent incidental

mortality of turtles during construction (e.g., being crushed by equipment). This protection plan is a necessary measure as the proposed development areas represent suitable basking, foraging and nesting habitat for box turtle likely to be used during the late spring and early summer. Should the work occur during the turtle's dormancy period (roughly from October 1st through April 1st) this plan is not deemed necessary, as the development areas do not represent suitable overwintering habitat for box turtle due to the lack of tree cover, topsoil (and duff) and subsoil, along with the low vegetation density.

5. To maximize the pollutant uptake function of the stormwater basin the goal is to establish well-vegetated stormwater basins. The following construction sequence is recommended:

    a. Compaction of the wetland basins shall be minimized to the maximum extent feasible by using temporary construction matting, grading from outside of the creation area, using light equipment with turf tires, or wide track equipment. The contractor shall ensure that proper soil compaction levels (loose to friable) are maintained.

    b. If compaction does occur, the compacted zone shall be tilled to refracture at least 12" of underlying natural soil.

    c. Wetland topsoil consisting of a 1:1 mixture (or equal volumes) of organic and mineral materials that contains at least 12 percent organic carbon content by weight will be placed over the bottom of the creation area at a minimum depth of 6". Clean leaf compost or commercially available compost (well to partially decomposed) is the preferred amendment to achieve this standard, though other materials may be used if approved by the supervising wetland scientist. Soil amendments should be uncontaminated and void of any woodchips or invasive species. Woody debris, comprised of native materials collected from the surrounding property, will be placed on the bottom of the creation area to enhance habitat value under the direction of the supervising wetland scientist.

    d. The qualified wetland scientist may determine that dewatering is needed during the grading and planting. If necessary, excess water will be discharged into a temporary sediment trap. The need for dewatering and any specific method for dewatering is site specific and may be modified by the Contractor to accommodate field conditions. The Contractor shall provide the means and methods of

dewatering consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

e. Basin plantings will take place once the above listed tasks have been completed. Seed non-ponded emergent areas with WetMix (product of New England Wetland Plants source: https://newp.com/catalog/seed-mixes/#wetland) or equivalent per the manufacturers specifications. Seed the side slopes with New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites (source: https://newp.com/catalog/seed-mixes/#erosionMoist) or equivalent.

f. All plantings to be spaced to provide a dense planting bed. Final plant locations shall be reviewed in the field and approved by a qualified wetland scientist. Live plugs are species contained within these seed mixes if field conditions or construction schedule do not favor seed mix establishment.

g. The contractor hired to construct the creation area shall be responsible for the careful installation, maintenance (including watering if necessary), and establishment of the plant material in the basin area. All plants shall be guaranteed by the contractor to remain alive and healthy for a full twenty four (24) month period.

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Appendix A: Site Photographs



Photo 1: Wetland 1, overall view



Photo 2: Wetland 1 showing the southern 4” PVC discharge pipe.



Photo 3: upper reaches of Wetland 2A, immediately downslope of the former gravel mining limits.



Photo 4: lower reaches of Wetland 2A where the channelized flow drains into the lower pond.



Photo 5: Wetland 2C, historically created/ disturbed from mining activity. Note flooded central portions of wetland bordered by slopes dominated by a dense cover of the invasive Japanese stiltgrass.



Photo 6: Wetland 2D just downstream of road crossing, looking east.



Photo 7: outlet discharge to Wetland 2D, on the east side of the easternmost crossing.



Photo 8: easterly portion of Wetland 2D where perennial stream flow drains to Smith Pond Brook.



Photo 9: unvegetated slopes above Wetland 2A, at the limit of the historic mining area.



Photo 9: uplands within the proposed development area.

Appendix B: Figures



FIGURE 1
Location Map
Turkey Roost Rd
Monroe, CT

Legend

Site Boundary (approx)

Map Description: USGS topographic map (source USGS) showing approximate site boundary. This map is intended for general planning purposes only.

SCALE
0 450 900 Feet

N

DAVISON ENVIRONMENTAL
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FIGURE 2
Aerial Site Map
Turkey Roost Rd
Monroe, CT

Legend

Site Boundary (approx)

Map Description: 2019 aerial photograph (source CT ECO) showing approximate site boundary. This map is intended for general planning purposes only.

SCALE
0 237.5 475
Feet

N

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Appendix C: Eastern Box Turtle Protection Plan

Eastern Box Turtle Protection Plan

Quarry Ridge Residential Development
Turkey Roost Road, Monroe

Eastern Box Turtle Protection Plan

Eastern Box Turtle, a State Special Concern species afforded protection under the Connecticut Endangered Species Act and listed as a Greatest Conservation Need species in Connecticut's Comprehensive Wildlife Conservation Strategy (CT DEEP 2005), is known to occur on the site. The following protective measures are recommended to satisfy requirements from the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division and follow protocols developed from previous rare species consultations and state-approved protection plans. This plan is focused on preventing incidental mortality to eastern box turtle but will also serve to limit mortality to other herpetofauna located within the construction, including hognose snake, should they be present.

This plan is intended to be implemented during the box turtle's active period which typically occurs between April 1st and October 30th.

Davison Environmental, LLC will serve as the Environmental Monitor for this project to ensure that Eastern Box Turtle protection measures are implemented properly.

The Contractor shall contact Eric Davison at least 5 business days prior to the pre-construction meeting. Mr. Davison can be reached by phone at (860) 803-0938 or via email at eric@davisonenvironmental.com.

The recommended Eastern Box Turtle protection program consists of the following components:

1. Isolation of the project perimeter
2. Targeted searches of the project area prior to construction
3. Periodic inspection and maintenance of isolation structures throughout construction period
4. Education of all contractors and sub-contractors prior to initiation of work on the site
5. Documentation and reporting submitted to the NDDB Program

1. Isolation Barrier (Erosion and Sedimentation Controls)

a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. These products or reinforced silt fence should not be used on the project. Temporary erosion control products, either erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) and/or netting composed of planar woven natural biodegradable fiber should be used to avoid/minimize wildlife entanglement.

b. Installation of erosion and sedimentation controls (i.e., silt fencing), required for erosion control compliance and creation of a barrier to migrating/dispersing herpetofauna, should be

installed by the Contractor prior to clearing activities or any earthwork. This fencing will need to be nearly continuous, as directed in the field by Davison Environmental.

c. The fencing will consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. The Contractor is responsible for daily inspections of the fencing for tears or breeches in the fabric and accumulation levels of sediment, particularly following storm events of 0.25 inch or greater. Davison Environmental will provide periodic inspections of the fencing throughout the duration of construction activities, generally on a biweekly frequency or more frequently if site conditions warrant.

d. All openings in the isolation barrier, used during the work day for accessibility, should be closed with hay bales at the completion of each day. This should be done under the direction of Davison Environmental, with the understanding that during certain seasonal periods and construction phases, this may not be necessary at all work area entrances.

e. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Targeted Searches – Pre-Construction

a. Upon completion of the barrier fence installation, the project limits will be searched for eastern box turtle. The purpose of this work is to locate and remove all box turtles from within the construction zone.

b. All turtles observed will removed from the project area just beyond the limits of work.

c. The time of day, frequency and intensity of the pre-construction searches should be determined by the Environmental Monitor based on weather conditions and success of relocation progression. It is anticipated that searches will be conducted once per week at a minimum, with more intensive and frequent searches conducted during periods of high activity which would increase the likelihood of captures.

3. Contractor Education

a. Prior to the start of construction, the Contractor shall attend an educational session at the pre-construction meeting with Davison Environmental. This orientation and educational session will consist of an introductory meeting with Davison Environmental providing photos of herpetofauna that may be encountered during construction activities, including eastern box turtles, emphasizing the non-aggressive nature of these species, the absence of need to destroy wildlife that might be encountered and the need to follow the prescribed protection measures.

b. The Contractor will be provided with cell phone and email contacts for Davison Environmental to immediately report encounters with any turtles or other herpetofauna. Educational poster

materials will be provided by Davison Environmental and displayed on the job site to maintain worker awareness as the project progresses.

4. Turtle Protective Measures – During Construction

a. Prior to the start of construction each day, the Contractor shall search the entire work area for turtles. The Environmental Monitor will also conduct periodic inspections of the work area depending upon weather conditions, observed turtle activity, or other factors.

b. If a turtle is found, it shall be immediately moved by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier closest to where it was encountered. The Environmental Monitor should be notified of any observed eastern box turtle.

c. Special care shall be taken by the Contractor during early morning hours and on overcast rainy days so that possible basking or foraging turtles are not harmed by construction activities.

5. Reporting

a. Following completion of the construction project, Davison Environmental will provide a summary of observations of eastern box turtle (or other state listed species) including a submission of a *Special Animal Survey Form* to the CTDEEP with photo-documentation and with specific information on the location and disposition of the animals observed.

Quarry Ridge
Wastewater Absorption Assessment

Quarry Ridge Associates, LLC
139, 141, & 201 Turkey Roost Road
& 30 Cobblers Hill Court

May 1, 2023

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HYDRAULIC MOUNDING ANALYSIS
139-141 TURKEY ROOST ROAD
MONROE, CONNECTICUT

PROJECT NO.: 31404418.000
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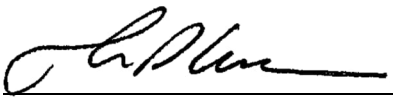
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II Stream Flow Information
III Sieve Analysis Results
IV Hydrographs
V Slug Test Analysis 2022
VI Seasonal High Water-Level Correlation
VII Model Boundary Conditions and Grid

1.0 INTRODUCTION

WSP USA (WSP), in association with J. Edwards Associates, LLC (JEA), formally Spath Bjorklund Associates, Inc., has completed a groundwater mounding analysis for proposed subsurface sewage disposal systems (SSDS) at 139 Turkey Roost Road (139 Property) and the portion of 201 Turkey Roost Road (201 Property) directly north of the 139 Property and east of the Quarry Pond. As part of this analysis, WSP reviewed available published geologic and hydrogeologic data for the study area, data from a hydrogeologic investigation completed for a proposed SSDS at 141 Turkey Roost Road (141 Property) by WSP in 2006 and data from subsurface investigations conducted by JEA (2020 and 2022) and WSP (2022). WSP then expanded and updated the groundwater flow model utilized for the 2006 141 Property mounding analysis. The updated model was used by WSP to simulate various load conditions for proposed SSDS configurations provided by JEA and evaluate the associated groundwater mound. WSP also used the model to estimate groundwater travel time from the SSDSs to the property boundary and nearest sensitive receptor(s).

This report presents a summary of the physical setting of the study area, the hydrogeologic investigation activities and results, and the mounding and the travel time analyses.

2.0 BACKGROUND

JEA is engineering a proposed housing development that would utilize a sewage treatment plant and SSDS. A previous version of the development plan included a single SSDS located on the 141 Turkey Roost Road parcel, sized for a design flow of 30,375 gpd (gallons per day) from 90 residential units; [90 units x 3 persons per unit x 75/gpd per person x 1.5 factor of safety]. Hydrogeologic studies completed in 2006 determined the resulting groundwater mound beneath the single SSDS would comply with the regulatory design criteria for separation and breakout.

JEA is currently evaluating expansion of the development to 150 units that would require additional SSDS capacity of approximately 20,250 gpd to manage a total design flow of 50,625 gpd. JEA has identified an area on the adjoining 139 Turkey Roost Road and 201 Turkey Roost Road parcels for additional SSDS areas. The combined capacity of the tested and new SSDS areas will be a key factor in determining the number of units that can be incorporated into the proposed housing development.

As the proposed discharge volume exceeds 7,500 gpd, the SSDSs must be permitted with the Connecticut Department of Energy and Environmental Protection (CTDEEP) prior to initiating the discharge. The application for CTDEEP approval requires detailed information about the groundwater hydrology, system design and hydraulic capacity that must consider the resulting groundwater configuration (mound) and velocities under season-high groundwater conditions.

The proposed SSDS expansion areas were selected by JEA based on the results of the hydrogeological testing program. As the effluent is discharged into the soil through leaching systems, groundwater mounds are formed. The goal of this analysis was to provide a conservative estimate of potential groundwater mounding. The treated effluent generated from the proposed SSDS would be discharged to shallow sediments through infiltration galleries or other subsurface leaching facilities that will be designed by JEA.

Predictions from this analysis were used to determine: 1) if the soils could accept the design flow rate without excessive mounding up into the leaching systems; 2) the potential for premature breakout on side slopes using conservative assumptions; and 3) the estimated 21-day travel distance for groundwater as it flows from the mounds, in order to make certain that any pathogenic bacteria in the effluent has sufficient time in the soil to die off. This report addresses only issues related to mounding and travel time and does not evaluate treatment levels.

3.0 PHYSICAL SETTING

The topography on the 139 Property and the 201 Property where the proposed SSDS expansion area are located ranges in elevation from approximately 441 ft msl (feet above mean sea level) in the northeastern portion of the 139 Property to 376 ft msl near the Quarry Pond on both properties (Figure 1).

The surficial materials beneath the study area are mapped as glacial outwash comprised of coarse sand and gravel deposited in a series of ice dammed ponds with glacial till occupying the higher elevation upland areas (ArcGIS Map Services, http://www.ctecoapp2.uconn.edu/arcgis/rest/services). The bedrock beneath the SSDS areas is mapped as the Newtown Gneiss, a medium-grained, poorly foliated to massive biotite-quartz-feldspar (Crowley, 1968). The bedrock to the east and hydraulically downgradient of the proposed SSDS expansion area is mapped as the Collinsville Formation, a medium- to coarse-grained feldspathic biotite gneiss.

The soils beneath the 139 and 201 properties are predominately classified as the "Hinckley" series. Hinckley soils are described as excessively well drained and typically consisting of sandy to gravelly loam. Typically, the depth to groundwater in Hinckley soils is greater than 6 ft bg (feet below grade) (NRCS web page, http://websoilsurvey.nrcs.usda.gov).

The nearest surface-water bodies to the proposed SSDS expansion areas are the unnamed pond (herein referred to at the Quarry Pond), associated perimeter wetlands and Smith Pond Brook (Figure 1). The Quarry Pond and wetland complex are located approximately 200 and 50 feet west of the proposed SSDS expansion area on the 139 Property, respectively. Smith Pond Brook flows southwest to northeast approximately 200 feet to 300 feet south of the proposed SSDS expansion areas on the 139 Property.

4.0 PREVIOUS INVESTIGATIONS

4.1 WSP Investigation 2006

In February and April 2006, WSP completed subsurface investigations in the original proposed SSDS area on the 141 Property. The investigations included the installation of five overburden test borings/monitoring wells, digging of two shallow test pits in the unconsolidated overburden and the completion of in-situ permeability tests in the five groundwater-monitoring wells. The data obtained from these investigations indicate that the unconsolidated material in the proposed disposal area is comprised of well-sorted fine to medium sand with some coarse sand and silt. The depth-to-bedrock beneath the SSDS area ranges from 33 ft bg to greater than 45 ft bg. Data from grain-size analysis of samples retrieved from the test borings were used to estimate hydraulic conductivity values for the unsaturated deposits and to verify the results of the in-situ permeability tests. The investigation data was used to develop a groundwater model that confirmed the sediments in the proposed SSDS area could manage the proposed design flow from 91 units of 30,375 gpd.

4.2 WSP Investigation 2013

In 2013, WSP re-assessed the 2006 investigation data and groundwater model analysis to determine if additional discharge could be directed to the proposed SSDS area on the 141 Property. As a part of this analysis, WSP utilized the existing groundwater flow model to simulate a 25-percent increase in discharge to the proposed SSDS. The results from this analysis indicated that the sediments in the proposed SSDS area on the 141 Property could manage a maximum design flow of 37,970 gpd.

4.3 JEA Investigation 2020

In the Spring of 2020, JEA excavated a total of 21 test holes (TH-1 to TH-9 and TH-100 to TH-111) within and immediately downgradient of the proposed SSDS expansion area on the 139 Property. The test holes determined the depth-to-bedrock ranged from approximately 6 to 16 ft bg and overburden sediments were dry within most of the study area. The overburden sediments were described as a sandy loam overlying sand and gravel. Groundwater was encountered in the overburden at test holes TH-107 and TH-110, located immediately downgradient of the proposed SSDS expansion area, at depths ranging from approximately 4 to 8 ft bg (Figure 2). No mottling features associated with seasonal water table fluctuations were observed in any of the test pits.

4.4 WSP Investigation 2021

In 2021, WSP conducted a desktop assessment of hydraulic capacity for the additional SSDS area located on the 139 Turkey Roost Road parcel. The results of the preliminary mounding analysis indicate that the soil beneath the proposed SSDS area should be able to accept approximately 23,000 gpd as a six-month average without excessive mounding, provided that the seasonal high groundwater elevation is not significantly higher than projected. The analysis also indicates, with the exception of a small portion of the northwest corner of the proposed expansion area, that the 21-day travel distance from the proposed SSDS area is adequate to prevent potential impact to downgradient sensitive receptors from pathogenic bacteria and breakout proper to bacteria die-off. The portion of the proposed SSDS expansion area where groundwater may reach the quarry pond within the 21-day travel time may be assessed by disinfection and/or by moving SSDS area further 20 feet to the south and east away from Quarry Pond.

5 HYDROGEOLOGIC INVESTIGATION

WSP completed a hydrogeologic investigation (May, June and December 2022) to define the aquifer characteristics and groundwater configuration beneath the proposed SSDS areas on the 139 and 201 Properties. The investigations included digging seven test pits (TH-300 through TH-306), installing standpipes in selected test pits, drilling one test boring, installing five groundwater-monitoring wells (TW-1, TW-2, TW-4 through TW-6), installing one piezometer (PZ-1) and the installation of two stream gaging locations (SG-1 and SG-2). Data from sieve analyses conducted on selected sediment samples collected from test pits and test borings were used to estimate hydraulic conductivity. WSP also completed in-situ permeability tests in the new monitoring wells to estimate hydraulic conductivity of the shallow sediments. WSP also made water-level measurements in standpipe, monitoring wells and piezometers to determine the groundwater configuration.

5.1 Digging of Test Pits and Installation of Standpipes

JEA excavated seven test pits; TH-300 through TH-306 on the 201 Property, installing standpipes in select test pits to monitor groundwater levels (Figure 2). The test pits were dug using a backhoe with a maximum reach depth of 9 to 14 ft bg. The test pits were dug to the maximum depth practicable, several feet below the water table or refusal, whichever was encountered first. The total depths of the test pits ranged from 6.5 to 10.5 ft bg. Bedrock was encountered each of the test pits at 6.5 and 10.5 ft bg. WSP described and recorded the geologic materials encountered in each test pit. Standpipes were installed in test pits TH-301 through TH-306. Copies of the geologic logs are included in Appendix I.

5.2 Drilling and Monitoring Well Installation

Between April 25 and 26, 2022, WSP supervised the advancement of six soil borings on the 139 Property using the hollow-stem auger drilling method (Figure 2). Soil descriptions were logged by WSP personnel with soil samples collected with a split-spoon sampler over 2-foot intervals based on change in lithology to identify the depth of saturation. Select soil samples from zones above, at, and below the water table were retained for sieve analysis.

The borings were advanced to depths ranging from 5 ft to 20 ft bg. Each boring was drilled to their maximum depth until hitting bedrock. Groundwater was encountered in the overburden in test wells TW-1, TW-2, TW-5, and TW-6 with depths ranging from 6 to 10 ft bg. Test well 4 (TW-4) was drilled to 14.5 feet until bedrock and was dry. Two of the borings hit refusal (TB-3 and TW-6) less than 10 ft bg. At TB-3, refusal was hit at 5 feet and another boring could not be drilled due to the surrounding area being inaccessible to the drill rig. At TW-6, refusal was hit at 14 feet.

Groundwater test wells were installed in five of the completed borings (TW-1, TW-2, TW-4, TW-5 and TW-6) at depths of 10.5 to 20 ft bg. The monitoring wells were constructed with 10 feet of 10-slot, Schedule 40 PVC well screen, with the top of the screen set above and below the water table. Copies of the geological logs, including well construction details, are included in Appendix I.

5.3 Piezometer Installation

One piezometer (PZ-1) was installed in Quarry Pond, along the southeastern shoreline (Figure 2) east the 139 Property, to establish the seasonal relationship between surface water in the pond and the underlying groundwater. The piezometer was constructed with a 1-foot long, stainless-steel, wire-wrapped screen affixed to one 5-foot length of galvanized steel pipe. The piezometer was installed using a slide hammer until the top of the screen was a was a minimum of 2 feet below the pond bottom, then developed by surging and pumping.

5.4 Stream Gaging

Stream flow information for Smith Pond Brook was obtained by WSP in May and June 2022 (Appendix II). Information for Smith Pond Brook was obtained at two locations (SG-1 and SG-2). The locations of these stream gaging stations are shown on Figure 2. Stream flow was monitored to provide reasonable values for flow and stage in the brook during the update of the existing groundwater flow model discussed below.

5.5 Permeability Testing

5.5.1 Permeability Test by Sieve Analysis

Sieve analyses were conducted on selected sediment samples collected from the newly installed soil borings and test pits. The sediment samples were initially dried by heating, weighed and placed atop a series of wire screens of decreasing mesh size. The samples were mechanically shaken at a constant frequency for a period of 10 minutes. The amount of sample trapped by each screen in the series was then weighed to obtain the grain-size distribution for the sample. The grain-size distribution data was input into the excel spreadsheet program HydrogeoSieveXL V2.3.2 (J.F. Devlin, 2015) to calculate theoretical hydraulic conductivity. The sieve and HydrogeoSieveXL hydraulic conductivity results are included in Appendix II.

5.5.2 In-Situ Permeability Test in Monitor Wells

WSP conducted in-situ permeability tests (slug tests) in three of the newly-installed monitoring wells (TW-1, TW-2 and TW-5) to determine hydraulic conductivity values for the saturated sediments beneath the proposed SSDS areas. The slug tests for each well were completed by using the solid slug method, recording both rising-head and falling-head test data. Note, monitoring Wells TW-4 and TW-6 were dry at the time of testing.

A WSP Hydrogeologist first measured the static, pre-test depth-to-water (DTW) in the well, then installed a pressure transducer with a built-in datalogger (LevelTroll®) to allow for automated water-level measurements throughout the testing period. The LevelTroll® was programmed to make and record measurements at one-tenth second intervals to ensure an adequate number of data points would be recorded.

The slug tests were conducted by first affixing a measured cable to a 5-foot long, 1.5-inch diameter capped PVC pipe "slug" filled with sand. The pre-test DTW was marked on the cable, and the slug was lowered into the well so that the bottom of the slug was suspended immediately above the water column. The LevelTroll® was then set to begin recording measurements, and the slug was quickly lowered into the water column using the measured cable as to be completely submerged. This testing method is commonly referred to as a "falling head" test. The water level in the well was then allowed to return to within 99% of the pre-test DTW measurement. Following the return to pre-test conditions, the slug was rapidly lifted out of the water column and removed from the well. This testing method is commonly referred to as a "rising head" test. Water-level measurements were recorded every tenth-second by the LevelTroll® through the duration of both testing methods. The resulting water-level data were used to calculate the permeability of the saturated sediments.

5.5.3 Water-Level Monitoring in Wells and Piezometers

On May 5, 2022, HOBO® water-level data loggers were installed in four of the newly-installed monitoring wells (TW-1, TW-2, TW-5 and TW-6), and set to record water levels at one-hour intervals. The HOBOs® were removed on June 30, 2022 because of declining water level. The nearly continuous DTW data obtained over this 56-day period was used to assess the seasonal water-level fluctuation and assist with determination of the seasonal high groundwater elevation for the properties. Hydrographs of the data are included in Appendix IV.

To supplement the automated data, manual DTW measurements were made in the newly-installed groundwater-monitoring wells in May (5,6,16 and 25), June (2 and 23) December (12) in 2022 and January 6, 2023 with clean steel tape and chalk or water-level meter (Figure 2).

5.5.4 Survey of Monitoring Points

Survey information for the location, top-of-casing (TOC) and grade elevations of the standpipes and monitoring wells at the 139 and 201 Properties were provided to WSP by JEA. The horizontal locations were referenced to North American Datum 1983 (NAD83), while the TOC and grade elevations were referenced to the 1988 North American Vertical Datum (NAVD88).

6 INVESTIGATION RESULTS

The data obtained from the above-described investigations were used to determine the aquifer characteristics and groundwater configuration beneath the properties and update the existing groundwater-flow model that was used to simulate various load conditions for the proposed SSDS areas, evaluate the associated groundwater mound and estimated the 21-day travel distance for groundwater as it flows from the mound.

6.1 Composition of Unconsolidated Sediments

WSP reviewed available boring and test pit logs to identify any significant confining or stratigraphically different units beneath the study area, which then would need to be incorporated into the mounding analysis. Analysis of the geologic logs revealed that the unconsolidated material beneath the properties is comprised mainly of fine to coarse sand with varying amounts of silt, gravel, cobbles from grade to refusal. In general, the unconsolidated sediments beneath the properties appear to become somewhat coarser with depth.

Based on WSP's review of the unconsolidated sediments there appears to be no significant (i.e., aerially extensive) restrictive, confining or stratigraphically unique units that would need to be incorporated into the mounding analysis. The geologic boring logs including descriptions of the overburden material are attached in Appendix I.

6.1.1 Depth to Bedrock

The depth to bedrock beneath the identified SSDS areas on both properties ranges from 3.3 ft bg to greater than 20 ft bg. Bedrock was encountered in nearly all of the test pits and borings located on both the 139 (TH-1 through TH-6, TH-100 through TH-111, TW-1, TW-2, TW-4 Through TW-6 and TB-3) and the 201 (TH-300 through TH-306) Properties. The geologic logs including descriptions of the overburden materials and bedrock refusal depths are included in Appendix I.

Boring logs from existing and newly-installed monitoring wells, nearby potable homeowner wells and published data indicate that the depth bedrock in areas outside the SSDS areas ranges from 3.6 to 51 ft bg. The depth to bedrock data was used in conjunction with survey data and data from a DEM model of the area to construct a bedrock elevation contour map for the area (Figure 3). Figure 3 shows that the elevation of bedrock in the study area ranges from 320 ft msl (feet above mean sea level) to 410 ft msl.

6.2 Permeability of Unconsolidated Sediments

6.2.1 In-Situ Permeability Results

The computer program AQTESOLV® was used to interpret the slug test data and calculate hydraulic conductivity values for the saturated soils beneath the site. The program requires basic input parameters including the initial water-level displacement following the insertion/removal of the slug (H0), water-level measurements at various times throughout the test, radius of the well and borehole, length of the well screen, depth of the base of the well screen and saturated thickness of the aquifer.

The KGS Model (Hyder, Butler, McElwee and Liu, 1994) for slug test analysis were used for the calculation of conductivity values from the slug test data, as it readily applies to both fully and partially penetrating wells in unconfined aquifers and is suitable for highly permeable sands and gravel. The program generates a graph of the water-level displacement versus time and places, a best-fit line through the earliest portion of the graph plot. The slope of the line is then used with the other input parameters to calculate an average hydraulic conductivity value.

The average hydraulic conductivity values calculated for the saturated soils using slug test data for TW-1, TW-2 and TW-5 were, 5.3 ft/day, 42.0 ft/day and 12.4 ft/day, respectively. The results of the individual slug test analyses are included in Appendix V.

6.2.2 Sieve Analysis Permeability Results

A summary of sieve analysis results and graphs of the grain-size distribution for each sample are included in Appendix III.

The excel spreadsheet program HydrogeoSieveXL V2.3.2 (J.F. Devlin, 2015) was used to calculate theoretical hydraulic conductivities in the unsaturated and saturated soil. Sieve analysis data for soil samples collected from the soil borings were entered into the program, which uses a number of methods to calculate hydraulic conductivity. The methods are generally specific to certain soil types and are applicable based on average grain-size diameter and the uniformity coefficient of the sample.

For the purposes of this study, the median hydraulic conductivity values from all of the applicable methods were used for calculation of hydraulic conductivity. The available methods are Hazen, Hazen K (cm/s) = d102 (mm2), Slichter, Terzaghi, Beyer, Sauerbrei, Kruger, Kozeny-Carmen, Zunker, Zamarin, USBR, Barr, Alyamani and Sen, Chapuis, Krumbein and Monk. The applicability of each method is based primarily on the uniformity coefficient, the effective grain size and the median grain size. Each method applies to fine- to coarse-grained sands. Using the sieve data, HydrogeoSieveXL calculates a theoretical horizontal hydraulic conductivity of the sample material in centimeters per second, which is then converted to ft/day.

The hydraulic conductivity values calculated for the unsaturated materials ranged from 10 to 82 ft/day with an average of 23 ft/day. The hydraulic conductivity values calculated for the saturated materials ranged from 5.3 to 79 ft/day with an average of 30 ft/day. The results of the HydrogeoSieveXL analyses are included in Appendix III.

Table 1 shows the estimated hydraulic conductivity values the current as well as previous investigations at the 139, 141 and 201 properties.

The hydraulic conductivity values calculated for the unconsolidated deposits for all three properties ranges from 2.3 ft/day to 181 ft/day with an average of 27.8 ft/day. The hydraulic conductivity values calculated for MW-2 (29 to 44 ft bg), TP-2020 (181 ft bg) and MW-3 (15 to 17 ft bg) at 141 Turkey Roost Road were 2.3 ft/day, 181 ft/day and 165 ft/day, respectively. These values were considered statistical outliers as defined Appendix C of the "Guidance for Design of Large-Scale On-site Wastewater Renovation Systems" (Nathan Jacobson & Associates, Inc., 2006). After the removal of the statical outliers, the geometric mean for the hydraulic conductivity values was 17.6 ft/day and the 95-percent low and high conductivity values were 14.5 ft/day and 21.5 ft/day respectively.

6.3 Streamflow

The stream flow records at the WSP gaging stations are not sufficient to directly calculate historical stream flow in the region. Thus, historical stream flow data at gaging station SG-1was calculated based on statistical analysis, by correlating the measured river flow observed at the gaging station to the observed flow at the USGS Fivemile River Gaging Station (Station Number 01209761). No statistical correlation was calculated for SG-2 because of the poor quality of the gaging station.

The Fivemile River gaging station is located in New Canaan, Connecticut. Continuous flow data have been recorded at the station since May 1998. The drainage area for this gaging station is 1 square mile. WSP used several readily-available stream and basin characteristics to select a representative gaging station for statistical analysis. These characteristics included basin size and percent of basin underlain by stratified drift and were obtained from USGS' Streamstats program (https://streamstats.usgs.gov/ss/).

Gage measurements collected at WSP SG-1 between May 25 and June 23, 2022 were used to develop a correlation between the Smith Pond Brook gage and the Fivemile River gage. A plot and table showing the measured stream flows at WSP SG-1 (and USGS Gage 01209761) versus the reported flow at the USGS Fivemile Gaging Station are presented Appendix II.

The Pearson correlation coefficient is a statistical measure of the strength of the relationship between the relative movements of two variables, in this case, measured stream flows at WSP SG-1 and the USGS Fivemile River station and WSP SG-1. A correlation of 1.0 shows a perfect positive correlation and a correlation of 0.0 shows no linear relationship between the data sets. As expected, because the gages are located within similar types of watersheds, there is a strong positive correlation between the USGS Fivemile River and WSP SG-1 gaging stations. The plot included in Appendix II show that the Pearson correlation between the measured flow at the USGS and WSP gaging stations was 99.9 percent. This Pearson correlation coefficients is indicative of a very strong relationship measured between the USGS Fivemile River flow and the WSP SG-1 flow. Once the correlation was established, the river flow at WSP gaging station were adjusted utilizing the equations shown on the plots in Appendix II to estimate historical stream flows.

6.4 Water-Level Monitoring Results

The groundwater beneath the 139 and 201 Properties exists in the unconsolidated sediments under phreatic, water-table conditions at depths ranging from 3.87 ft bg at TW-2 to 12.60 ft bg at TW-6. Hydrographs depicting changes in water levels measured in water levels during the monitoring period (May 5 through June 30, 2022) compared to total weekly precipitation, average weekly Smith Pond Brook stream flow at WSP-SG-1 and average daily depth to water in Geological Survey (USGS) Station CT-SB 42 from May 5 through June 30, 2022 are included in Appendix VI.

As expected, because the monitoring wells are relatively shallow and screened in an unconfined aquifer, the hydrographs show that the water levels at each monitoring location are heavily influence by changes in precipitation and stream flow. The hydrographs also illustrate that the aquifer did not reach near steady-state conditions as evidenced by observed fluctuation in groundwater levels during the monitoring period.

The water-level monitoring period is not sufficient to directly estimate the seasonal high groundwater elevation beneath the properties. Therefore, the seasonal high groundwater levels in proposed SSDS areas were estimated by correlating the water-levels fluctuations observed in onsite groundwater-monitoring wells to fluctuations observed in selected offsite groundwater-monitoring wells. This correlation allows one to estimate the groundwater levels at any time of year based on statistical analysis. Correlations were developed between existing onsite monitoring wells TW-1, TW-2, TW-5 and TW-6, located on the 139 Property and the offsite USGS monitoring well CT-SB 42 (Appendix VI).

The water-level measurements at the United States Geological Survey (USGS) Station CT-SB 42, located along Route 84 in Southbury, CT, were used to characterize the seasonal high groundwater level in the area. This is the closest USGS well to the property with a sufficiently long period of water-level measurements. Well SB-42 is also installed in a glacial sand and gravel aquifer. A hydrograph of water-level measurements made in CL-42 is included in Appendix VI. For this analysis, the seasonal high DTW is assumed to be the water-level depth higher than 80 percent of the daily water-level measurements made at the gaging station (March 2002 through December 2022).

Once the correlations were established, the water-level data for each monitoring well was adjusted to reflect the groundwater-elevation data from February 21, 2006. The Pearson correlation coefficient between USGS CT-SB 42 and onsite wells TW-1, TW-2, TW-5 and TW-6 were 79 , 92 , 91 and 85 percent, respectively. These Pearson correlation coefficients are indicative of a very strong relationship measured between the USGS well and the onsite wells.

The groundwater-elevation data from February 21, 2006 was the seasonal high groundwater elevation derived during the hydrogeologic investigation of the 141 Property. Water-level data for USGS monitoring well SB-42 shows that the regional water level on February 21, 2006 was higher than 84 percent of the daily water-level

measurements made between March 2002 and December 2022; exceeding the 80th percentile assumption for seasonal high conditions stated above. This confirms that the February 21, 2006 groundwater-elevation data are a conservative estimate of the seasonal high groundwater levels in proposed SSDS areas.

Figure 4 is a plot of the February 21, 2006 seasonal-high groundwater elevation beneath the 139, 141 and 201 Properties. Elevation of nearby surface water from topographic maps and survey data were used to construct the groundwater elevation contour map. This figure was constructed to obtain an understanding of the typical groundwater flow pattern beneath the properties. The figure shows that the groundwater beneath the parcels generally flows radially from the shallow bedrock located between the parcels, toward nearby surface-water bodies and wetlands. The figure also suggests that the unconsolidated deposits near the bedrock outcrop area are dry.

7 MOUNDING ANALYSIS

A computer model was developed to simulate various load conditions for selected proposed SSDS areas, evaluate the associated groundwater mound and estimate the maximum load capacity for the site soils. The computer model was developed using MODFLOW-2005 by Harbaugh (2005). This code, published by the USGS, is currently the most widely used and accepted groundwater modeling code and has been used in numerous mounding projects in Connecticut that have been accepted by the Connecticut Department of Energy and Environmental Protection (CTDEEP).

The model developed for this study was designed to be used like an analytical model. Therefore, the model is not suited for predictions of groundwater elevations and no attempt was made to calibrate the model to measured heads or fluxes. Another purposely conservative assumption (or boundary conditions) is that the seasonal-high water level (as discussed above) would be maintained for 365 days; also a very conservative assumption.

WSP updated the 2021 version of the model that used data derived from the 2006 and 2020 hydrogeologic investigations of the 139 and 141 Properties to simulate various load conditions for selected proposed SSDS areas, evaluate the associated groundwater mound and estimate the maximum load capacity for the site soils.

Updates to the 2021 model include the updating of the simulated bedrock elevation, hydraulic conductivity values based on data derived from the 2022 field investigations, and model grid spacing. These modifications were made to the 2021 model to allow for a more accurate simulation of potential groundwater mounding and travel times.

7.1 Groundwater Flow Model

7.1.1 Model Layers

The updated Quarry Ridge Model (QRM) was developed as a two-dimensional, one-layer model. The hydrogeologic system was simulated as a water table or unconfined aquifer. The bottom elevation for the QRM was assumed to be the top of the bedrock surface. Bedrock elevation contours for the area were estimated using well logs from existing borings, wells and test holes and the published USGS stratified-drift thickness contour map for the area.

7.1.2 Grid Design

Finite difference models, such as MODFLOW, require that the areas under investigation be divided into discrete sub-areas (blocks). The finite-difference grid developed for this model consists of 535 rows and

433 columns. The model utilized a variable spaced grid. The grid spacing is the finest near the proposed SSDS, with node area dimensions of 5 feet by 5 feet. The areas furthest from the proposed SSDS have node area dimensions of up to 20 feet by 20 feet. The model grid and boundary conditions for Layer 1 are presented in Appendix VII.

7.1.3 Boundary Conditions

In general, the southern and northern boundaries of the QRM correspond to the stratified-drift/till contact presented in the published surficial geology map for the area. These boundaries were simulated in the model as flux boundaries. Flux boundaries add water to model boundaries that are normally no-flow boundaries in MODFLOW. A flux boundary is desirable along these model boundaries to simulate lateral recharge entering the model from upland regions adjacent to the simulated area. These boundaries were simulated by adding wells to the model nodes along the boundaries. Each well represents groundwater underflow from the upland regions adjacent to the well. The amount of recharge that each region contributes to the aquifer is calculated by delineating (based on surface topography) the watershed area of the boundary region represented by the well and applying a recharge value to each area. The resulting rate was assigned to the well. For average conditions, the amount of recharge each simulated well contributed to the aquifer system was calculated using an average annual recharge rate to till of 8.83 inches per year and an average annual recharge rate to stratified drift of 23.85 inches per year over the areas drained by each portion of the model boundary.

The northern and southern physical limit of the simulated area is located approximately 2,500 feet and 2,800 feet east and west of the proposed SSDS expansion area on the 139 and 201 Properties, respectively. These boundaries are located along drainage basin divides and are sufficiently distant from the area of interest as to not affect model predictions. These boundaries were simulated as no-flow boundaries. The bedrock outcrop located northeast of the proposed new SSDS area on the 139 Property, southeast of the proposed new SSDS area on the 201 Property and west of the SSDS area on the 141 Property was also simulated as a no-flow boundary.

The top boundary of the aquifer is the water table and is treated in the model as a free surface recharge boundary. Recharge from precipitation is added uniformly to each cell of the model grid. The water table can move up and down depending on variable stresses in the model.

The bottom boundary of the model was chosen to be the contact between the loose sand and gravel deposits and the dense lower deposits of till, unless the sand and gravel deposits directly interface with the bedrock. This boundary was simulated as a no-flow boundary in the model. Some water may flow upward or downward from the bedrock to the stratified drift deposits. However, the amount should be small enough such that no significant error will be introduced by assuming the no-flow boundary, because any potential recharge from bedrock is accounted for with the water from the upland areas entering the model along the southern and northern boundaries.

Smith Pond Brook and its tributaries were simulated in the model using the Stream Flow Routing Package (SFR) in MODFLOW. The locations of the SFR nodes are shown in Appendix VII. The SFR package allows initial flow values to be entered at the model boundaries, keeps track of flows into and out of the stream from the underlying aquifer and allows stream cells to go dry if the streamflow goes to zero. The SFR package also estimates stream stage utilizing a derivation of the Manning equation. Stream conductance (C) values (in feet per day) for each cell containing a stream, were initially calculated by WSP as described below. Conductance values were calculated to simulate leakage to and from the node by the equation:

$$C=KA/b$$

where:

C = stream conductance (feet2/day);

K = vertical hydraulic conductivity of the streambed (feet/day);

A = area of the stream within the node (feet2); and

b = streambed thickness (feet).

In calculating the streambed conductance, the thickness of the streambed was assumed to be 1 foot. Vertical hydraulic conductivity values ranging for 0.2 to 30 ft/day (feet per day) were used for Smith Pond Brook and its tributaries. These values were estimated based on characteristics of streambed material observed by WSP personnel. Stream elevation and stream-width data and average stage heights for Smith Pond Brook and its tributaries were taken from the USGS topographic map. The SFR also requires that the initial discharge be inputted in the first cell of each stream. Initial stream discharge values used for Smith Pond Brook and its tributary during model calibration were derived using WSP gaging data and the USGS developed online program call StreamStats (https://streamstats.usgs.gov/ss/).

Smith Pond, Quarry Pond and seven unnamed ponds located throughout the model domain were simulated in the model using the Drain Package in MODFLOW-2005. The drain package works in much the same way as the stream package, except that leakage from the drain to the aquifer is not allowed (Anderson and Woessner, 1992) and flow is not tracked throughout the area. This makes the drain package ideal for simulating small artificial ponds. The location of the drain nodes are shown in yellow on the Plate in Appendix VII. Drain elevation and lakebed conductance values are required for the drain package. The drain elevations were taken from topography maps. The vertical hydraulic conductivity values ranged from was initially assumed to be 1 to 66 ft/day.

7.2 Model Input

The model requires three basic input parameters, recharge rates, horizontal and vertical hydraulic conductivity, and the size and shape of the proposed SSDS.

7.2.1 Recharge

The recharge rate used in the QRM is based on the average annual recharge for the Monroe area; estimated to be 23.85 inches per year to Layer 1. This value was estimated by analyzing Copper Mill Brook stream flow records from the USGS Monroe gaging station. Data from the Copper Mill Brook gaging station was used for this analysis because of its close proximity to the study area and long-term record (1958 – 1976). Estimated groundwater recharge was calculated using “WHAT”, a web-based hydrograph separation system (K.J. Lim, et al., 2005). WHAT is a computer program that separates stream flow into groundwater and surface-water components and is used to estimate groundwater discharge (or recharge) from a basin.

7.2.2 Horizontal and Vertical Hydraulic Conductivity

The simulated hydraulic conductivities for the permitted SSDS area (141 Property) and the proposed SSDS expansion area (139 and 201 Properties) were based on data derived from in-situ permeability test and sieve analysis

completed as part of the subsurface investigations completed at the properties to date. The hydraulic conductivity values entered into the model with in the proposed SSDS areas were estimated by contouring the average hydraulic conductivity estimated for each test pit and monitoring well. Figure 5 shows the simulated hydraulic conductivity values for each of the properties. The horizontal hydraulic conductivity values in the proposed SSDS areas range from ranged from 5 ft/day for the tighter units located throughout the region to 49 ft/day for the fine to coarse sand and gravel glacial-outwash deposits within the area. For the remaining portions of the simulated area, the 95-percent lower confidence for all of the estimated hydraulic values (14.5 ft/day) were input into the model.

The ratio of vertical to horizontal hydraulic conductivity between the model layers was assumed to be 1:10, a value supported in published literature.

The specific yield of the unconsolidated deposits in the SSDS areas was estimated to be 0.30; a value typical of unconfined aquifers with limited stratification.

7.3 Proposed and Existing SSDS Areas

The third input parameter required by the model is the size and shape of the proposed SSDS areas. Figure 2 and Table 2 show the location and approximate aerial extent of the SSDS area at the 139, 141 and 201 Properties that were used in the mounding analysis.

The discharge rate for the permitted SSDS area at the 141 Property was 30,375 gpd, the permitted rate. The discharge rate for the proposed new SSDS expansion areas at the 139 and 201 Properties (30,375 gpd) was provided by JEA. Note, the analysis is made more conservative by assuming that the maximum day discharge would continue for six months. The permitted and proposed new SSDS expansion areas were simulated using the Well Package in MODFLOW-2005.

7.4 Mounding Criteria

Prior to the analysis, the following criteria were developed to evaluate if mounding from the proposed discharge areas would be excessive.

Criteria #1 - Post-mounding seasonal high groundwater could not be within 3 feet of the bottom of the proposed leaching facilities or 4 ft bg (one of the model assumptions). This criterion was selected (for treatment purposes) to prevent mounding into or within the leaching beds; noting that a typical system is constructed so that the leaching facilities are at least 1 to 2 ft bg and 3 feet above the seasonal high groundwater level.

Criteria #2 - For areas outside the SSDS areas the mounded water levels could not intersect land surfaces in areas not within close proximity to existing surface-water bodies. This criterion was selected to ensure that any renovated discharge breakout would enter directly into an existing surface-water body and prevent exposure to non-renovated discharge water along hillside slopes.

7.5 Model Results

The results from the analysis predicted mounding for combined discharge rate of 60,750 gpd. The maximum mounding on the 141, 139 and 201 properties were approximately 8 feet, 6 feet and 5 feet, respectively, after 180 consecutive days of discharge (Figure 6). To evaluate if simulated mounding was excessive, the mound was compared to the estimated depth-to-water in the study area. The results from this comparison (Figure 7) indicates that the simulated groundwater mound is within the previously established criteria within the proposed SSDS areas. There was however an area approximately 50 feet from the SSDS System VI (Figure 7) where between 0.5 and 1.5 of fill (to raise land surface) would be required to meet the established criterial outside the SSDS areas.

Based on the simulation results, the soils in the proposed new SSDS expansion areas at the 139 and 201 Properties should be able to accept approximately 30,375 gpd of treated effluent as a six-month average provided fill (in accordance with regulatory criteria) are incorporated into JEA's final design. Thus, the combined discharge for the SSDSs located at the 139, 141 and 201 Properties is 60,750 gpd.

7.6 Travel Time Analysis

A travel-time analysis was conducted to ensure there is sufficient time for full die-off of pathogenic bacteria (about 21 days per Healy & May, 1982) prior to reaching any downgradient sensitive receptors, including property boundaries, surface-water bodies, and groundwater-supply wells. The analysis was completed using the post-mound, groundwater-elevation data and PATH3D (S.S. Papadopulos and Associates, Inc. 1989).

Figure 8 is a plot showing the simulated post-mounding groundwater elevation contour map with the predicted flow paths and 21-day travel time of groundwater emanating from the proposed SSDS areas. The porosity value used for the analysis was assumed to be 30 percent; a value typical for sand and gravel materials. Note, in areas of no saturated thickness, it was assumed flow paths would follow bedrock topography.

The post-mounding groundwater velocities ranged from 0.3 ft/day to 5.1 ft/day, which equate to 21-day travel distances of 6.3 feet and 107.1 feet, respectively. The results of this analysis indicate that SSDS effluent will not cross a property boundary, enter a surface-water body or breakout at the identified locations before 21 days of travel time is reached.

8 CONCLUSION

The results of this hydrogeologic study indicate that the sediments beneath the 139 and 201 Properties should be able to accept approximately 30,375 gpd of treated effluent as a six-month average without excessive mounding, provided fill (in accordance with regulatory criteria) are incorporated into JEA's final design. When added to the previously permitted SSDS discharge at the 141 Property, the combined discharge for the SSDSs located at the 139, 141 and 201 Properties is 60,750 gpd.

The analysis also indicates that there is sufficient horizontal separation to meet the CTDEEP requirement to provide 21 days' time of travel from the proposed SSDS facilities to any nearby sensitive receptor.

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February 21, 2023
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TABLES

TABLE 1

HYDRAULIC MOUNDING ANALYSIS
139-141 TURKEY ROOST ROAD
MONROE, CONNECTICUT

Estimated Hydraulic Conductivity Values

Location ID	Property	Hydraulic Conductivity (ft/day)	Sample Depth (ft bg)		Method
			Top	Bottom	
MW-1	141 Turkey Roost Road	6.3	30.0	32.0	Sieve (geometric mean)
MW-1		8.2	28.5	38.5	Slug -Test
MW-2	141 Turkey Roost Road	11.0	20.0	22.0	Sieve (geometric mean)
MW-2		22.4	26.0	28.0	Sieve (geometric mean)
MW-2		7.5	34.0	36.0	Sieve (geometric mean)
MW-2		2.3	29.0	44.0	Slug -Test
MW-3	141 Turkey Roost Road	165.1	15.0	17.0	Sieve (geometric mean)
MW-3		15.8	25.0	27.0	Sieve (geometric mean)
MW-3		18.4	35.0	37.0	Sieve (geometric mean)
MW-3		4.0	28.0	38.0	Slug -Test
MW-4	141 Turkey Roost Road	24.7	20.0	22.0	Sieve (geometric mean)
MW-4		39.7	22.0	32.0	Slug -Test
MW-5	141 Turkey Roost Road	15.7	19.0	21.0	Sieve (geometric mean)
MW-5		11.6	21.0	23.0	Sieve (geometric mean)
MW-5		6.4	21.0	31.0	Slug -Test
TP - 2020	141 Turkey Roost Road	181.4	3.5	3.5	Slug -Test
Mapped Soils	141 Turkey Roost Road	6.5	2.3	5.4	NRCS - Soil Type- 73E Charlton Chatfield
Mapped Soils		23.3	1.6	5.4	NRCS - Soil Type- 38C Hinckley Loamy Sand
TW-1	139 Turkey Roost Road	28.1	0.0	4.0	Sieve (geometric mean)
TW-1		22.8	4.0	6.0	Sieve (geometric mean)
TW-1		18.2	6.0	8.0	Sieve (geometric mean)
TW-1		38.4	8.0	10.0	Sieve (geometric mean)
TW-1		19.7	10.0	12.0	Sieve (geometric mean)
TW-1		5.3	10.0	20.0	Slug-Test
TW-2	139 Turkey Roost Road	10.1	0.0	2.0	Sieve (geometric mean)
TW-2		15.8	2.0	4.0	Sieve (geometric mean)
TW-2		79.1	4.0	6.0	Sieve (geometric mean)
TW-2		58.3	6.0	8.0	Sieve (geometric mean)
TW-2		12.9	8.0	10.0	Sieve (geometric mean)
TW-2		11.4	10.0	12.0	Sieve (geometric mean)
TW-2		41.5	15.0	19.0	Sieve (geometric mean)
TW-2		42.0	8.5	18.5	Slug-Test
TB-3	139 Turkey Roost Road	23.6	4.0	6.0	Sieve (geometric mean)
TW-4	139 Turkey Roost Road	10.8	12.0	14.0	Sieve (geometric mean)
TW-5	139 Turkey Roost Road	11.5	5.0	7.0	Sieve (geometric mean)
TW-5		47.8	8.0	10.0	Sieve (geometric mean)
TW-5		12.5	10.0	12.0	Sieve (geometric mean)
TW-5		12.4	0.5	10.5	Slug-Test
TW-6	139 Turkey Roost Road	28.4	6.0	8.0	Sieve (geometric mean)
TW-6		12.3	8.0	10.0	Sieve (geometric mean)
TW-6		12.1	10.0	12.0	Sieve (geometric mean)
TH-301	201 Turkey Roost Road	18.1	2.5	2.5	Sieve (geometric mean)
TH-301		17.9	7.5	7.5	Sieve (geometric mean)

TABLE 1

HYDRAULIC MOUNDING ANALYSIS
139 141 TURKEY ROOST ROAD
MONROE, CONNECTICUT

Estimated Hydraulic Conductivity Values

Location ID	Property	Hydraulic Conductivity (ft/day)	Sample Depth (ft bg)		Method
			Top	Bottom	
TH-302	201 Turkey Roost Road	47.5	5.0	5.0	Sieve (geometric mean)
TH-303	201 Turkey Roost Road	28.1	2.0	2.0	Sieve (geometric mean)
TH-303		47.1	6.0	6.0	Sieve (geometric mean)
TH-303		20.5	8.0	8.0	Sieve (geometric mean)
TH-304	201 Turkey Roost Road	16.8	3.5	3.5	Sieve (geometric mean)
TH-304		9.3	6.0	6.0	Sieve (geometric mean)
TH-305	201 Turkey Roost Road	11.1	2.0	2.0	Sieve (geometric mean)
TH-305		13.6	9.0	9.0	Sieve (geometric mean)
TH-306	201 Turkey Roost Road	16.5	3.0	3.0	Sieve (geometric mean)
TH-306		81.6	9.0	9.0	Sieve (geometric mean)

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TABLE 2

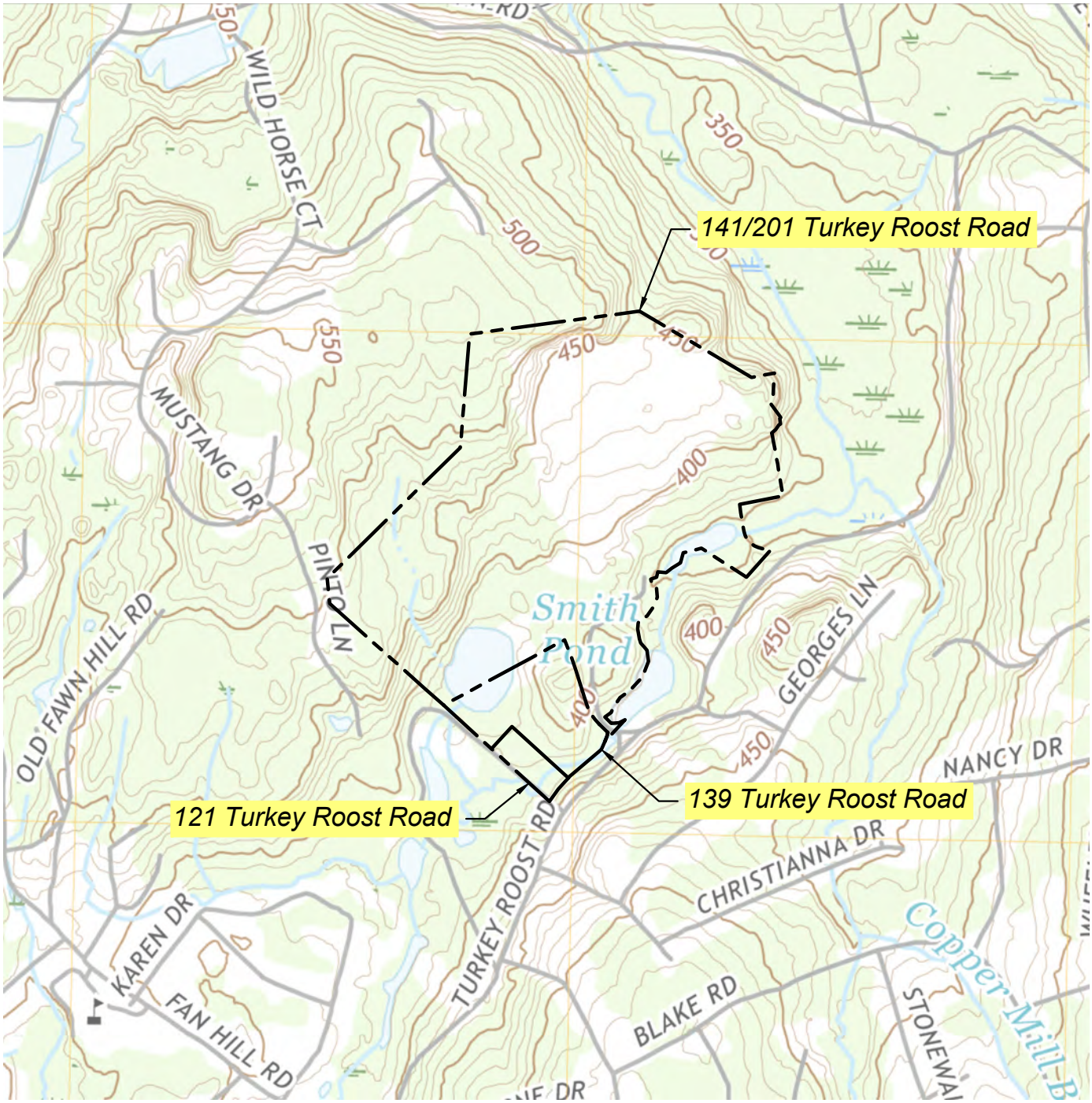
HYDRAULIC MOUNDING ANALYSIS
139-141 TURKEY ROOST ROAD
MONROE, CONNECTICUT

SSDS Areas and Simulated Discharge Rates

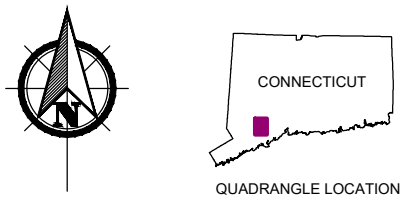
System	Address	SSDS Area (square feet)	Discharge (gallons per day)
Permitted System	141 Turkey Roost Road	16,745	30,375
Area I	139 Turkey Roost Road	4,157	2,640
Area II		5,238	8,669
Area III		3,943	5,001
Area IV		2,599	2,805
Area V		1,525	1,091
Total Section		**17,461**	**20,206**
Area VI	201 Turkey Roost Road	3,382	2,887
Area VII		7,273	7,282
Total Section		**10,656**	**10,169**
Total System		**44,862**	**60,750**

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FIGURES



SOURCE: USGS TOPOGRAPHIC QUADRANGLE LONG HILL, CONNECTICUT (2018).



LEGEND

PROPERTY BOUNDARY

0 1000

SCALE IN FEET

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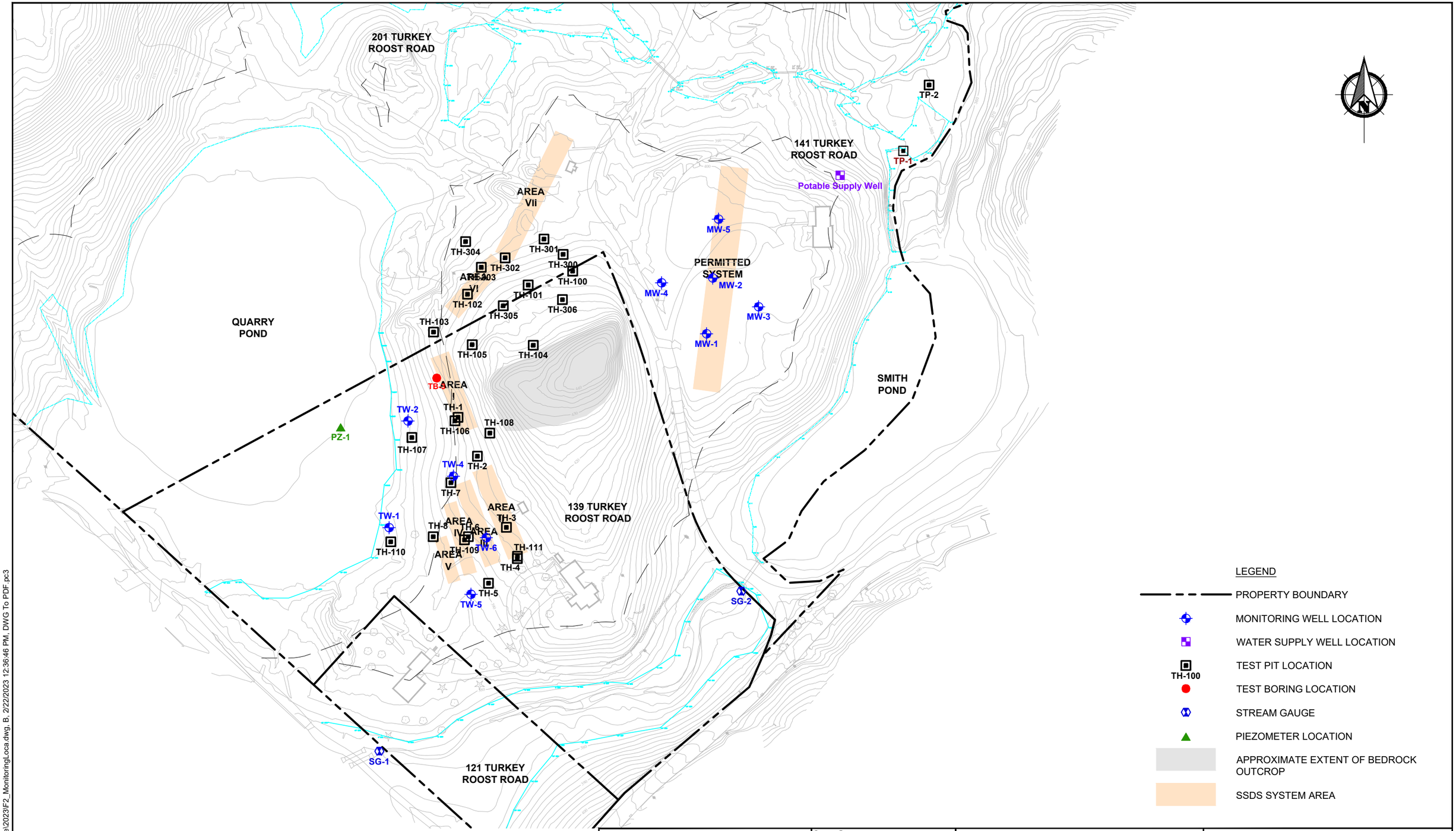
Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

SITE LOCATION MAP

FIGURE 1

DWG Date: 02/22/23
Checked: KT
Approved: KT
Drawn By: RAC
A

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Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

MONITORING LOCATIONS

FIGURE 2

B

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201 TURKEY ROOST ROAD

141 TURKEY ROOST ROAD

139 TURKEY ROOST ROAD

121 TURKEY ROOST ROAD

AREA VII

AREA VI

AREA V

AREA IV

AREA III

AREA II

AREA I

PERMITTED SYSTEM

QUARRY POND

SMITH POND

TP-1 TP-2 TH-1 TH-2 TH-3 TH-4 TH-5 TH-6 TH-7 TH-100 TH-101 TH-102 TH-103 TH-104 TH-105 TH-106 TH-107 TH-108 TH-109 TH-110 TH-141 TH-301 TH-302 TH-303 TH-304 TH-305 TH-306

MW-1 MW-2 MW-3 MW-4 MW-5

TW-1 TW-2 TW-3 TW-4 TW-5 TW-6

SG-1 SG-2

PZ-1

Potable Supply Well

LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- WATER SUPPLY WELL LOCATION
- TH-100 TEST PIT LOCATION
- TEST BORING LOCATION
- STREAM GAUGE
- PIEZOMETER LOCATION
- APPROXIMATE EXTENT OF BEDROCK OUTCROP
- SSDS SYSTEM AREA
- 335 BEDROCK ELEVATION CONTOUR (FEET)

0 150

SCALE IN FEET

B

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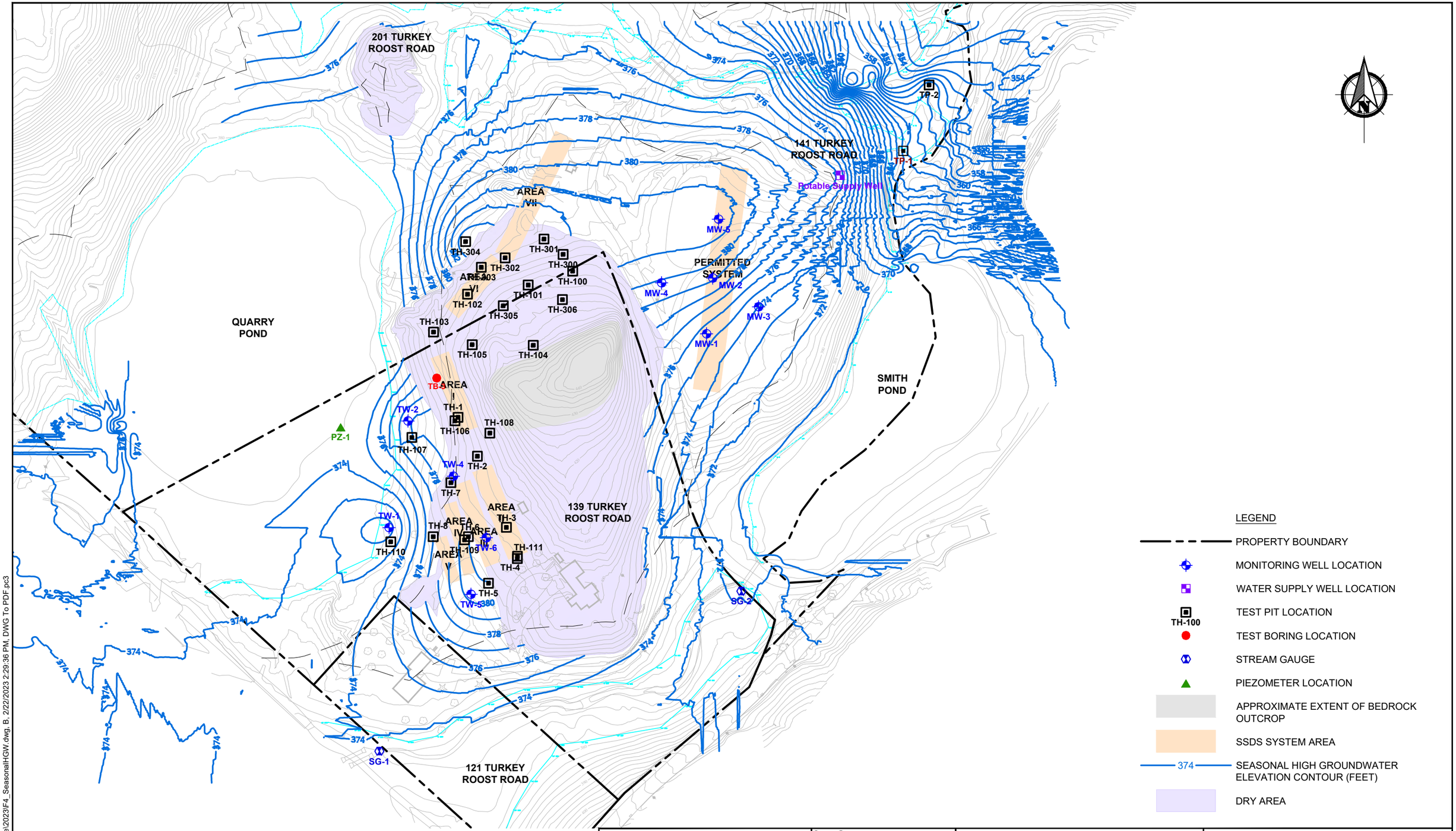
Drawn By:	RAC
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DWG Date:	02/22/23

Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

BEDROCK ELEVATION CONTOUR MAP

FIGURE 3

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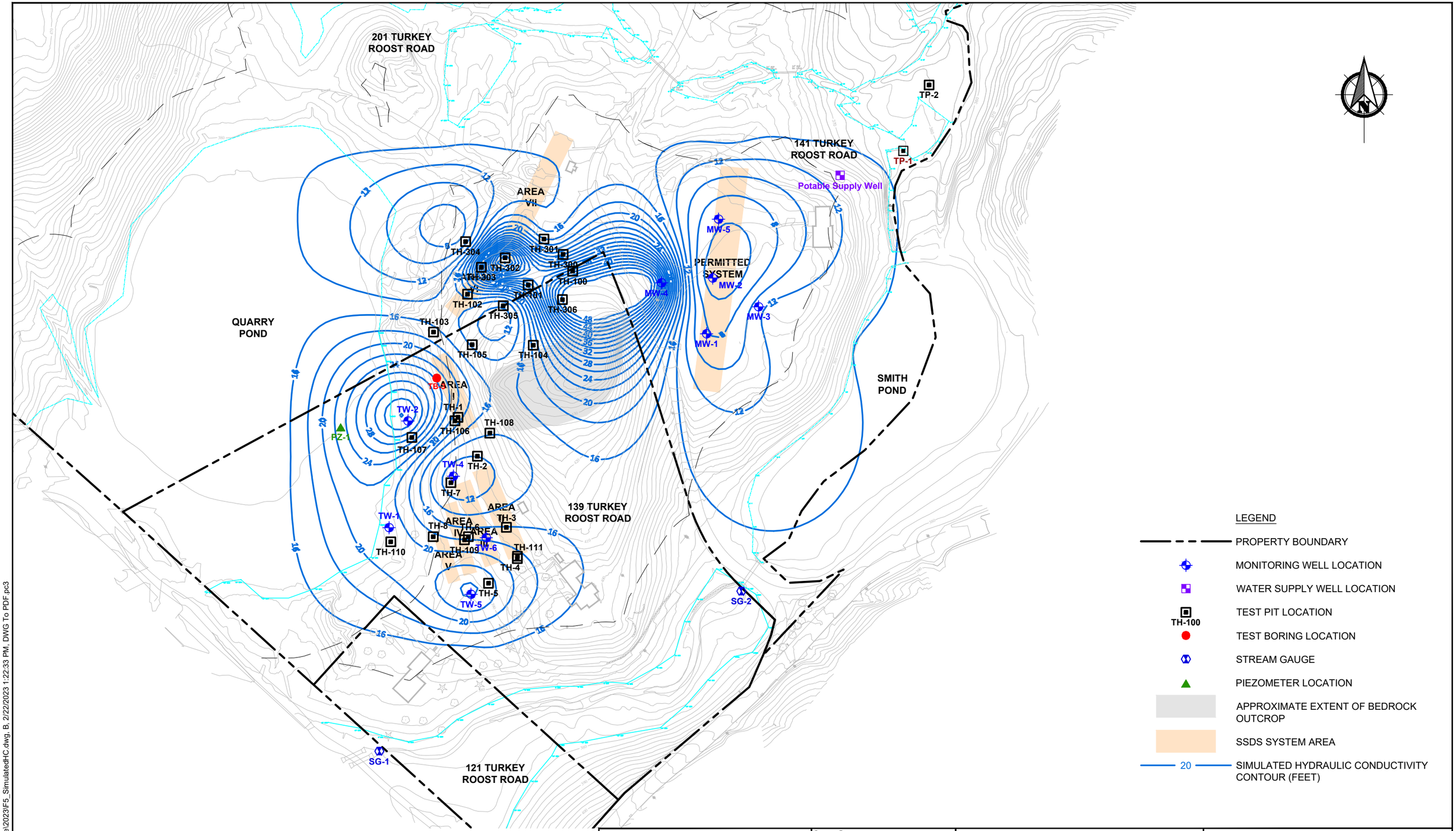
Drawn By:	RAC
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DWG Date:	02/22/23

Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

SEASONAL HIGH GROUNDWATER ELEVATION CONTOUR MAP

FIGURE 4

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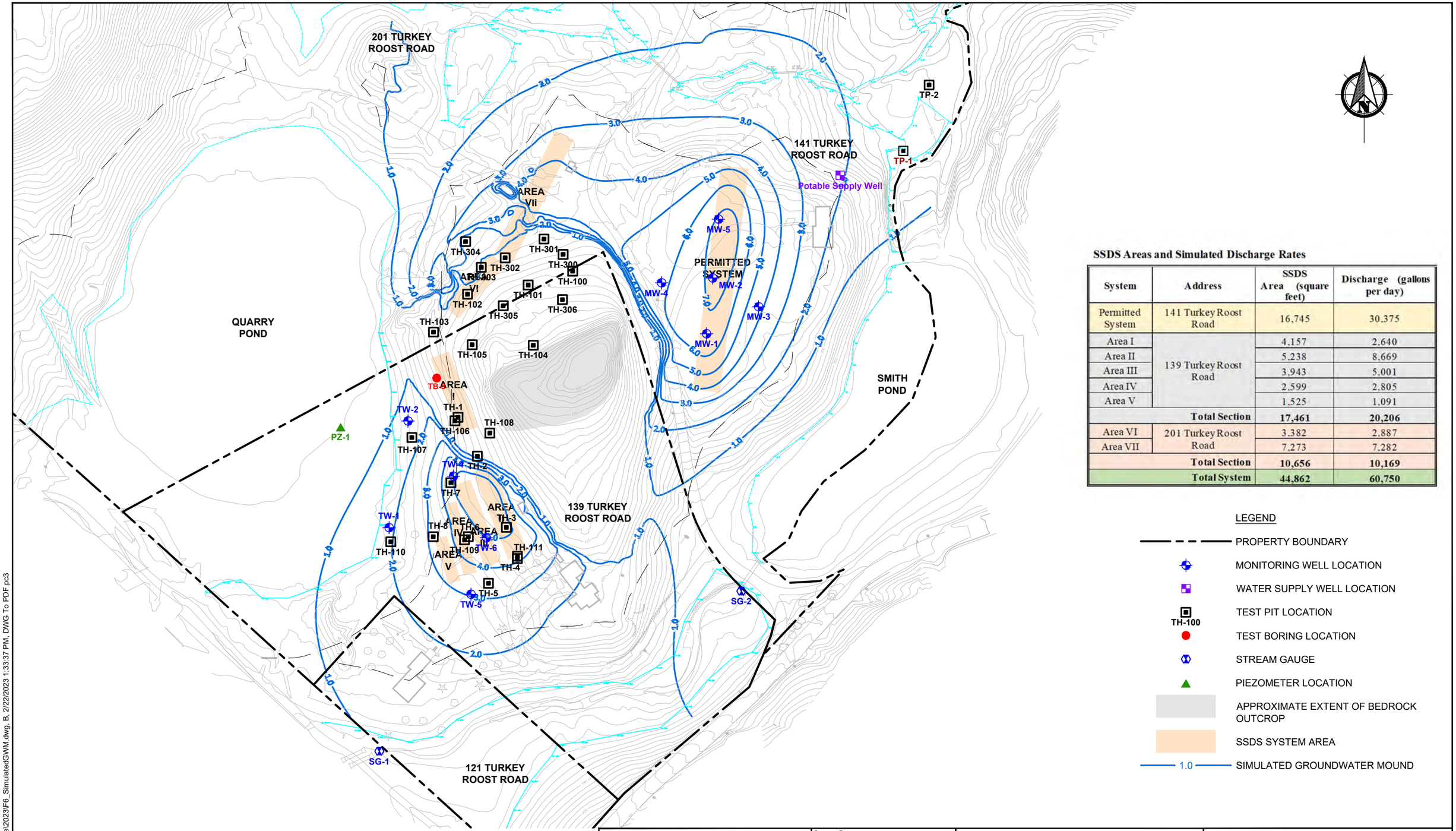
Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

SIMULATED HYDRAULIC CONDUCTIVITY CONTOUR MAP

FIGURE 5

B

O:\DWG\Quarry Ridge\2023\F5_SimulatedHC.dwg, B, 2/22/2023 1:22:33 PM, DWG To PDF.pc3



SSDS Areas and Simulated Discharge Rates

System	Address	SSDS Area (square feet)	Discharge (gallons per day)
Permitted System	141 Turkey Roost Road	16,745	30,375
Area I	139 Turkey Roost Road	4,157	2,640
Area II		5,238	8,669
Area III		3,943	5,001
Area IV		2,599	2,805
Area V		1,525	1,091
Total Section		**17,461**	**20,206**
Area VI	201 Turkey Roost Road	3,382	2,887
Area VII		7,273	7,282
Total Section		**10,656**	**10,169**
Total System		**44,862**	**60,750**

LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- WATER SUPPLY WELL LOCATION
- TEST PIT LOCATION (TH-100)
- TEST BORING LOCATION
- STREAM GAUGE
- PIEZOMETER LOCATION
- APPROXIMATE EXTENT OF BEDROCK OUTCROP
- SSDS SYSTEM AREA
- 1.0 SIMULATED GROUNDWATER MOUND

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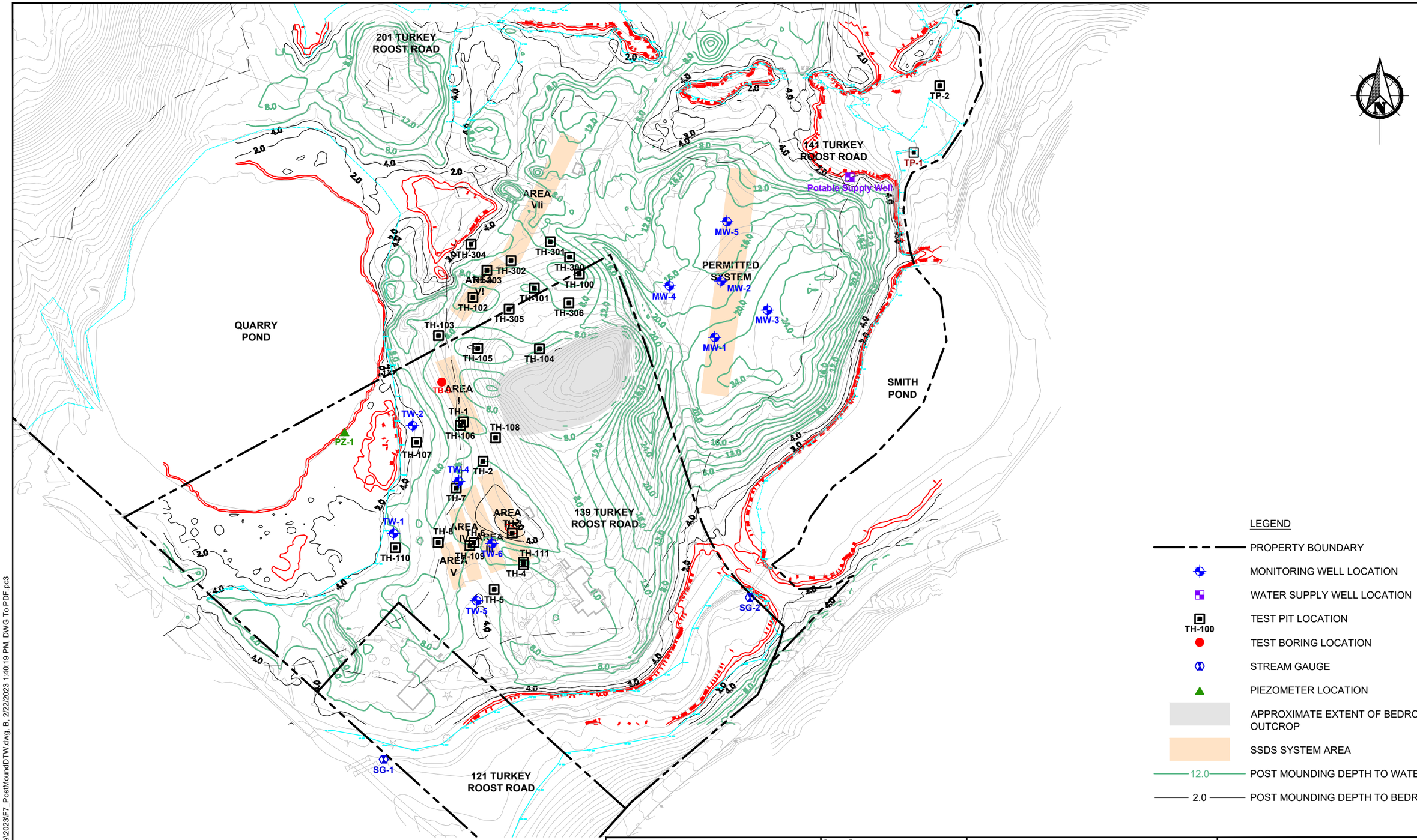
Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

SIMULATED GROUNDWATER MOUND AT 60,750 GPD

FIGURE 6

B

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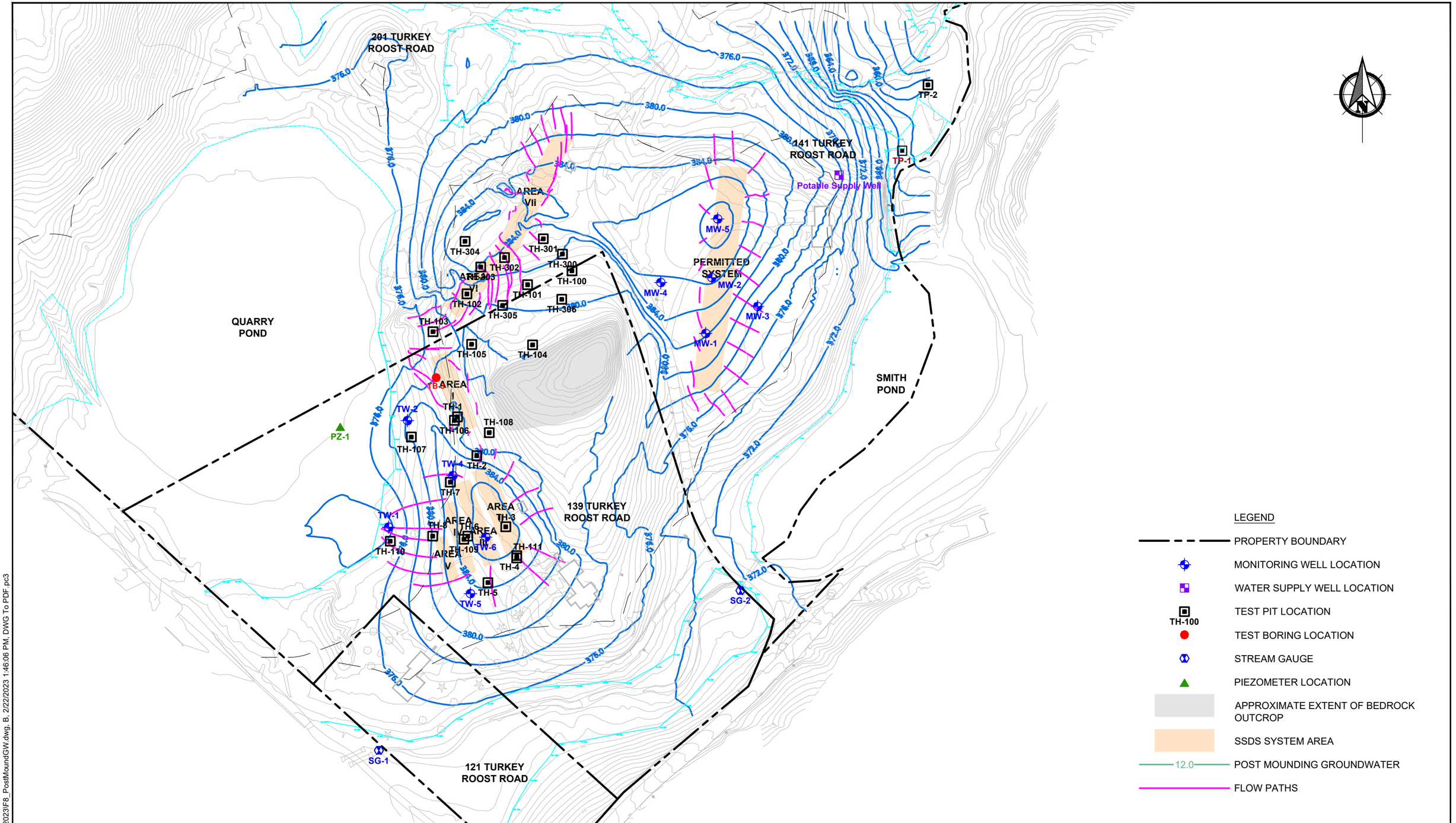
Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

POST-MOUNDING DEPTH TO WATER/DEPTH TO BEDROCK

FIGURE 7

B

O:\DWG\Quarry Ridge\2023\F7_PostMoundDTW.dwg, B, 2/22/2023 1:40:19 PM, DWG To PDF.pc3



0 150
SCALE IN FEET

B

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Checked:	KT
Approved:	KT
DWG Date:	02/22/23

Quarry Ridge
139 Turkey Roost Road
Monroe, Connecticut

SIMULATED POST MOUNDING GROUNDWATER AND 21-DAY FLOW PATHS

FIGURE 8

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APPENDIX I

Well ID	Parcel	Type	Boring Depth (ft bg)	Refusal	Depth to Top of Screen (ft bg)	Screen Lenth (feet)	Screen/Casing Diameter (inches)	Depth to Water 5/6/22-1/6/23 (feet)	Stickup (feet)	Well Cap To Top of Casing (feet)	Grundwater Elevation	Bedrock Elevation	Saturated Thickness	feet below grade	Seasonal High DTW	Seasonal High Elevation	X -Coordinate (feet, NAVD 1988)	Y - Coordinate (feet, NAVD 1988)	Grade Elevation (feet NAD83)	Top of Casing Elevation (feet NAD83)	Top of Well Elevation (feet NAD83)
TW-1	139 Turkey Roost Road	Well	20.0	no	10	10	2	11.17	3.13	0.08	371.73	359.77	11.96	8.04	11.32	371.58	870,899	688,890	379.77	382.90	382.98
TW-2	139 Turkey Roost Road	Well	18.5	yes	8.5	10	2	7.18	3.31	0.07	378.63	364.00	14.63	3.87	7.36	378.45	870,930	689,068	382.50	385.81	385.88
TB-3	139 Turkey Roost Road	Boring	6.5	yes	na	na	na	dry	na	na	dry	388.69	dry				870,978	689,139	395.19	na	na
TW-4	139 Turkey Roost Road	Well	14.5	yes	7.5	7	2	dry	3.16	0.20	dry	380.81	dry				871,006	688,976	395.31	398.47	398.67
TW-5	139 Turkey Roost Road	Well	10.5	yes	0.5	10	2	10.06	3.32	0.21	380.38	376.62	3.76		10.19	380.25	871,035	688,779	387.12	390.44	390.65
TW-6	139 Turkey Roost Road	Well	14.0	yes	7	7	2	15.8	3.20	0.09	382.26	380.86	1.40		15.96	382.10	871,061	688,873	394.86	398.06	398.15
TH-1	139 Turkey Roost Road	Pit	5.8	yes	na	7.3	4	dry	1.5	0.00	dry	389.33	dry				871,014	689,074	395.16	396.66	396.66
TH-2	139 Turkey Roost Road	Pit	6.7	yes	na	10.1	4	dry	3.0	0.00	dry	390.08	dry				871,046	689,009	396.75	399.75	399.75
TH-3	139 Turkey Roost Road	Pit	6.0	yes	na	7.2	4	dry	0.8	0.00	dry	392.66	dry				871,094	688,891	398.66	399.49	399.49
TH-4	139 Turkey Roost Road	Pit	9.0	yes	na	9.9	4	dry	1.0	0.00	dry	386.28	dry				871,113	688,839	395.28	396.28	396.28
TH-5	139 Turkey Roost Road	Pit	9.2	yes	na	9.6	4	dry	1.0	0.00	dry	379.74	dry				871,064	688,798	388.91	389.91	389.91
TH-6	139 Turkey Roost Road	Pit	8.8	yes	na	9.9	4	dry	1.2	0.00	dry	382.53	dry				871,031	688,875	391.28	392.45	392.45
TH-7	139 Turkey Roost Road	Pit	7.0	no	na	8.1	4	dry	1.3	0.00	dry	na	dry				871,000	688,964	392.99	394.32	394.32
TH-8	139 Turkey Roost Road	Pit	9.0	no	na	10.1	4	dry	1.3	0.00	dry	na	dry				870,971	688,875	386.61	387.94	387.94
TH-9	139 Turkey Roost Road	Pit	8.8	no	na	9.5	4	dry	0.8	0.00	dry	na	dry				870,990	688,791	388.07	388.90	388.90
TH-100	139 Turkey Roost Road	Pit	3.3	yes	na	na	na	dry	na	na	dry	402.67	dry				871,205	689,318	406.00	na	No Pipe
TH-101	139 Turkey Roost Road	Pit	10.0	yes	na	12.9	4	dry	1.9	0.00	dry	396.13	dry				871,131	689,294	406.13	408.05	408.05
TH-102	139 Turkey Roost Road	Pit	11.8	yes	na	12.5	4	dry	1.4	0.00	dry	371.60	dry				871,030	689,279	383.43	384.85	384.85
TH-103	139 Turkey Roost Road	Pit	9.0	yes	na	10.3	4	dry	0.8	0.00	dry	388.37	dry				870,973	689,216	397.37	398.20	398.20
TH-104	139 Turkey Roost Road	Pit	10.0	yes	na	10.2	4	dry	1.8	0.00	dry	401.69	dry				871,133	689,216	411.69	413.52	413.52
TH-105	139 Turkey Roost Road	Pit	3.3	yes	na	na	na	dry	na	na	dry	401.99	dry				871,025	689,198	405.33	na	No Pipe
TH-106	139 Turkey Roost Road	Pit	7.3	yes	na	10.0	4	dry	3.3	0.00	dry	385.74	dry				871,006	689,068	393.08	396.41	396.41
TH-107	139 Turkey Roost Road	Pit	10.0	yes	na	10.3	4	6.36	0.6	0.00	377.09	372.87	4.22	7.61	8.21	375.24	870,937	689,040	382.87	383.45	383.45
TH-108	139 Turkey Roost Road	Pit	6.0	yes	na	na	na	dry	na	0.00	dry	397.47	dry				871,057	689,043	403.47	an	No Pipe
TH-109	139 Turkey Roost Road	Pit	11.3	yes	na	12.1	4	10.74	0.8	na	380.69	379.43	1.26				871,025	688,870	390.68	391.43	391.43
TH-110	139 Turkey Roost Road	Pit	10.7	yes	na	6.5	4	2.48	0.7	0.00	376.84	367.99	8.85		4.17	375.15	870,902	688,867	378.65	379.32	379.32
TH-111	139 Turkey Roost Road	Pit	15.8	yes	na	19.2	4	dry	4.2	0.00	dry	376.82	dry				871,113	688,843	392.57	396.74	396.74
TH-300	201 TURKEY ROOST RD	Pit		yes	na	12.5	4	dry	2.37	0.00	dry	402.55	dry				871,189	689,345	402.55	404.92	404.92
TH-301	201 TURKEY ROOST RD	Pit	10.5	yes	na		4	dry	2.37	0.00	dry	387.56	dry				871,157	689,371	398.06	400.43	400.43
TH-302	201 TURKEY ROOST RD	Pit	8.0	yes	na	9.6	4	dry	2.00	0.00	dry	389.65	dry				871,092	689,340	397.65	399.65	399.65
TH-303	201 TURKEY ROOST RD	Pit	9.5	yes	na	11.2	4	dry	2.99	0.00	dry	387.54	dry				871,053	689,324	397.04	400.03	400.03
TH-304	201 TURKEY ROOST RD	Pit	6.5	yes	na		4	7.37	2.03	0.00	383.74	382.58	1.16				871,026	689,367	389.08	391.11	391.11
TH-305	201 TURKEY ROOST RD	Pit	10.0	yes	na	11.1	4	dry	1.04	0.00	dry	400.22	dry				871,089	689,260	410.22	411.26	411.26
TH-306	201 TURKEY ROOST RD	Pit	7.0	yes	na	9.8	4	dry	3.20	0.00	dry	406.06	dry				871,188	689,270	413.06	416.26	416.26
MW-1	141 Turkey Roost Road	Well	38.5	yes	28.5	10	2	31.43	2.12	0.00	375.48	366.29	9.19		31.99	374.92	871,428	689,213	404.79	406.91	406.91
MW-2	141 Turkey Roost Road	Well	45.0	no	29	15	2	26.80	2.06	0.00	379.18	na	na		27.75	378.23	871,438	689,306	403.92	405.98	405.98
MW-3	141 Turkey Roost Road	Well	45.3	yes	28	10	2	30.63	2.03	0	373.98	357.33	16.65		31.40	373.21	871,515	689,258	402.58	404.61	404.61
MW-4	141 Turkey Roost Road	Well	32.5	yes	22	10	2	25.95	1.85	0	379.86	371.46	8.40		26.96	378.85	871,353	689,298	403.96	405.81	405.81
MW-5	141 Turkey Roost Road	Well	38.0	yes	21	10	2	24.62	1.92	0	381.66	366.36	15.3		25.53	380.75	871,448	689,404	404.36	406.28	406.28

139 TURKEY ROOST
MONROE

DEEP TEST RESULTS

TESTING PERFORMED:4-14-2020 TMR, KEITH ROMANO

TH-1

0	-	8"	Top Soil	
8"	-	38"	Orange Brow Sandy Loam	
38"	-	70"	Tan Fine Silty Sand	
Ledge at 70			No Water	No Redoximorphic Features

TH-2

0	-	12"	Top Soil	
12"	-	40"	Orange Brow Sandy Loam	
40"	-	80"	Olive Brown Fine Silty Sand	
Ledge at 80			No Water	No Redoximorphic Features

TH-3

0	-	10"	Top Soil	
10"	-	27"	Orange Brow Sandy Loam	
27"	-	72"	Tan Fine Silty Sand	
Ledge at 72			No Water	No Redoximorphic Features

TH-4

0	-	12"	Top Soil	
12"	-	40"	Orange Brow Sandy Loam	
40"	-	108"	Tan Fine Silty Sand	
Ledge at 108			No Water	No Redoximorphic Features

TH-5

0	-	12"	Top Soil	
12"	-	24"	Orange Brow Sandy Loam	
24"	-	110"	Tan Fine Sand and Gravel	
Ledge at 110			No Water	No Redoximorphic Features

TH-6

0	-	10"	Top Soil	
10"	-	30"	Orange Brow Sandy Loam	
30"	-	105"	Tan Fine Sand and Gravel	
Ledge at 105			No Water	No Redoximorphic Features

TH-7

0	-	12"	Top Soil	
12"	-	32"	Orange Brow Sandy Loam	
32"	-	84"	Tan Fine Sand and Gravel	
No Ledge (Refusal at 84)			No Water	No Redoximorphic Features

TH-8

0	-	10"	Top Soil	
10"	-	24"	Orange Brow Sandy Loam	
24"	-	108"	Tan Fine Sand and Gravel *Gravel Throughout*	
No Ledge			No Water	No Redoximorphic Features

TH-9

0	-	12"	Top Soil	
12"	-	28"	Orange Brow Sandy Loam	
28"	-	105"	Tan Fine Sand and Gravel *Gravel Throughout*	
No Ledge			No Water	No Redoximorphic Features

TESTING PERFORMED: 5-28-2020 TMR, KEITH ROMANO

TH-100

0	-	12"	Top Soil	
12"	-	36"	Orange Brow Sandy Loam	
36"	-	40"	Tan Fine Sand and Gravel	
Ledge at 40"			No Water	No Redoximorphic Features

TH-101

0	-	12"	Top Soil	
12"	-	48"	Orange Brow Sandy Loam	
48"	-	120"	Tan Fine Sand and Gravel	
Ledge at 120"			No Water	No Redoximorphic Features

TH-102

0	-	14"	Top Soil	
14"	-	42"	Orange Brow Sandy Loam	
42"	-	142"	Tan Fine Sand and Gravel	
Ledge at 142"			No Water	No Redoximorphic Features

TH-103

0	-	12"	Top Soil	
12"	-	46"	Orange Brow Sandy Loam	
46"	-	108"	Tan Fine Sand and Gravel	
Ledge at 108"			No Water	No Redoximorphic Features

TH-104

0	-	18"	Top Soil	
18"	-	50"	Orange Brow Sandy Loam	
50"	-	120"	Tan Fine Sand and Gravel	
Ledge at 120"			No Water	No Redoximorphic Features

TH-105

Ledge at 40"			No Water	No Redoximorphic Features

TH-106

0	-	12"	Top Soil	
12"	-	36"	Orange Brow Sandy Loam	
36"	-	88"	Tan Fine Sand and Gravel	
Ledge at 88"			No Water	No Redoximorphic Features

TH-107

0	-	15"	Top Soil	
15"	-	46"	Orange Brow Sandy Loam	
46"	-	120"	Tan Fine Sand and Gravel	
Ledge at 120"			No Water	No Redoximorphic Features

TH-108

0	-	10"	Top Soil	
10"	-	42"	Orange Brow Sandy Loam	
42"	-	72"	Tan Fine Sand and Gravel	
Ledge at 72"			No Water	No Redoximorphic Features

TH-109

0	-	12"	Top Soil	
12"	-	36"	Orange Brow Sandy Loam	
36"	-	135"	Tan Fine Sand and Gravel	
Ledge at 135"			No Water	No Redoximorphic Features

TH-110

0	-	12"	Top Soil	
12"	-	40"	Orange Brow Sandy Loam	
40"	-	128"	Tan Fine Sand and Gravel	
Ledge at 128"			Water at 72"	No Redoximorphic Features

TH-111

0	-	13"	Top Soil	
13"	-	51"	Orange Brow Sandy Loam	
51"	-	189"	Tan Fine Sand and Gravel	
Ledge at 189"			No Water	No Redoximorphic Features

GEOLOGIC LOG WSP USA SHELTON, CONNECTICUT	**OWNER:** Quarry Ridge
	BORING NO: TW-1 (Well 1)
	PAGE 1 **OF** 2
SITE LOCATION: 139 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch PVC pipe and riser **SLOT NO.:** 10 **SETTING:** 10 to 20 = 10 feet of screen
DATE COMPLETED: 4/25/2022	**SAND PACK SIZE & TYPE:** Filpro Sand # 1 **SETTING:** 8 to 20 feet and then 2 to 6 feet.
DRILLING COMPANY: Soil Testing Ahmed and Ali	**CASING SIZE & TYPE:** Stick-up and then cement bottom
DRILLING METHOD: Hollow Stem Auger	**SETTING:** 0 to 2 feet (1.98 feet)/ cement 0.2 feet above grade
SAMPLING METHOD: Split Spoon (SS)	**SEAL TYPE:** Bentonite Chips
OBSERVER: RS	**SETTING:** 6 to 8 feet = 2-foot layer, 4 feet above screen.
REFERENCE POINT (RP):	**BACKFILL TYPE:** Cuttings approximately 0 to 2 feet.
ELEVATION OF RP:	**STATIC WATER LEVEL:** Wet at 8.10 feet
STICK-UP: Total = 4.92 feet to top (no cap) / 2.94 feet above grade	**DEVELOPMENT METHOD:**
SURFACE COMPLETION:	**DURATION:** **YIELD:**
REMARKS: SS sampling every 2 feet except where we encountered rock/refusal	
GPS COORDINATES: --	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube REC = recovery PPM = parts per million	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	3-2-3-4	1.10	N/A	Medium to Fine sand with trace Silt, small roots, dry, compact, brown
2	4	SS	3-3-7-10	0.32	N/A	Fine sand with trace silt, dry, compact, brown
4	6	SS	6-6-7-8	1.20	N/A	Medium to Coarse sand, dry, compact, brown
6	8	SS	12-10-8-15	2.0	N/A	Medium to Coarse sand, dry, loose, light brown
8	10	SS	8-10-12-11	1.3	N/A	Medium to Coarse sand with some gravel, compact, **wet at 8.10 feet**, brown
10	12	SS	30-29-38-43	2.0	N/A	Medium to Fine sand with some gravel and trace silt, densely compact
12	14	SS			N/A	Unable to take a sample, couldn't get SS down
15	17	SS	9-19-50 for 2"	0.4	N/A	Refusal at 16.3 feet Medium to Fine sand with some gravel, wet

SITE LOCATION: 139 Turkey Roost Road Monroe, CT

Boring ID.: TW-1 (Well 1) **DATE:** 4/25/2022 **PAGE** 2 **OF** 2

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
17	20	SS			N/A	Unable to take a sample, couldn't get SS down used Stem Auger to continue to 20 feet.
	20					End of Well.

GEOLOGIC LOG WSP USA SHELTON, CONNECTICUT	**OWNER:** Quarry Ridge
	BORING NO: TW-2 (Well 2)
	PAGE 1 **OF** 2
SITE LOCATION: 139 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch PVC pipe and riser **SLOT NO.:** 10 **SETTING:** 8.5 to 18.5 feet = 10 feet of screen
DATE COMPLETED: 4/26/2022	**SAND PACK SIZE & TYPE:** Filpro # 1
DRILLING COMPANY: Soil Testing Ahmed and Ali	**SETTING:** 2 to 18.5 feet **put in too much sand
	CASING SIZE & TYPE: Stickup and Cement
DRILLING METHOD: Hollow Stem Auger	**SETTING:** 0 to 2 feet (1.81 feet)/cement 0.2 feet above grade
SAMPLING METHOD: Split Spoon (SS)	**SEAL TYPE:** Bentonite Chips
OBSERVER: RS	**SETTING:** 1 to 2 feet
REFERENCE POINT (RP):	**BACKFILL TYPE:** Cuttings approximately 0 to 1 foot
ELEVATION OF RP:	**STATIC WATER LEVEL:** Wet at 6 feet
STICK-UP: total = 4.92 feet to top (no cap) / 3.11 feet above grade	**DEVELOPMENT METHOD:**
SURFACE COMPLETION:	**DURATION:** **YIELD:**
REMARKS: SS sampling every 2 feet except where we encountered rock/refusal	
GPS COORDINATES: --	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube REC = recovery PPM = parts per million	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	2-3-7-6	1.21	N/A	Medium to Fine sand with trace gravel, semi-compact, dry, brown
2	4	SS	3-3-3-8	0.60	N/A	Medium to Fine sand with trace gravel, dry, brown
4	6	SS	15-43-49-33	0.76	N/A	Medium to Fine sand with trace gravel, dry, brown Moist at 4.40 feet, brown and red
6	8	SS	28-26-23-29	1.23	N/A	Medium to Fine sand, wet at 6 feet, brown and red
8	10	SS	53-62-39-19	0.68	N/A	Medium to Fine sand and gravel, wet, brown
10	12	SS	33-28-19-26	0.95	N/A	Medium to Fine sand and gravel, wet, brown
12	14	SS			N/A	Unable to take sample, couldn't get SS down
15	17	SS	31-18-30-29	1.55	N/A	Medium to Coarse sand with gravel, wet, brown

SITE LOCATION: 139 Turkey Roost Road Monroe, CT

Boring ID.: TW-2 (Well 2) **DATE:** 4/25/2022

DEPTH (FEET) FROM	DEPTH (FEET) TO	SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
17	19	SS	100 for 4"	1.56	N/A	Refusal at 17.5 feet Medium to Coarse sand with gravel, wet, brown
	18.5					Hit Refusal End of Well

GEOLOGIC LOG WSP USA SHELTON, CONNECTICUT	**OWNER:** Quarry Ridge
	BORING NO: TW-4 (Well 4)
	PAGE 1 **OF** 2
SITE LOCATION: 139 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2 inch PVC pipe and riser **SLOT NO.:** 10 **SETTING:** 7.5 to 14.5 feet = 7 feet of screen
DATE COMPLETED: 4/25/2022	**SAND PACK SIZE & TYPE:** Filpro Sand # 1
DRILLING COMPANY: Soil Testing Ahmed and Ali	**SETTING:** 7 to 14.5 feet
	CASING SIZE & TYPE: Stick-up and then cement bottom
DRILLING METHOD: Hollow Stem Auger	**SETTING:** 0 to 2 feet (1.81 feet)/ cement 0.2 feet above grade
SAMPLING METHOD: Split Spoon (SS)	**SEAL TYPE:** Bentonite Chips
OBSERVER: RS	**SETTING:** 5 to 7 feet = 2-foot layer, 2 feet above screen
REFERENCE POINT (RP):	**BACKFILL TYPE:** Cuttings approximately 0 to 2 feet
ELEVATION OF RP:	**STATIC WATER LEVEL:** Dry at 14.5 feet
STICK-UP: Total = 4.92 feet to top (no cap) / 3.11 feet	**DEVELOPMENT METHOD:**
SURFACE COMPLETION:	**DURATION:** **YIELD:**
REMARKS: Well was dry at 14.5 feet, only put in 7 ft screen since on average DTW is 8-10 feet.	
GPS COORDINATES: --	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube REC = recovery PPM = parts per million	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	3-3-5-3	0.60	N/A	Medium to Fine sand with some gravel, small roots, compacted, dry, brown
2	4	SS	4-6-10-9	0.96	N/A	Medium to Coarse sand with some gravel, semi loose, dry, brown
4	6	SS	17-57-54—50 for 5"	1.10	N/A	Refusal at 5.5 feet Medium to Fine sand with some gravel, compact Rock at 5.20 feet
6	8					Unable to take a sample, couldn't get SS down
8	10	SS	50 for 1"	0.20	N/A	Medium to Fine sand, gray
10	12	SS	25-31-35-40	1.0	N/A	Medium to Coarse sand with gravel, compact, dry, brown

SITE LOCATION: 139 Turkey Roost Road Monroe, CT

Boring ID.: TW-4 (Well 4) **DATE:** 4/25/2022

DEPTH (FEET) FROM	DEPTH (FEET) TO	SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
12	14	SS	52-40-50 for 4"	1.49	N/A	Refusal at 13.5 feet Medium to Coarse sand with gravel, compact, dry, brown
	14.5					Hit Refusal End of Well
						*The well was dry but we still put in a well.

GEOLOGIC LOG WSP USA SHELTON, CONNECTICUT	**OWNER:** Quarry Ridge
	BORING NO: TW-5 (Well 5)
	PAGE 1 **OF** 1
SITE LOCATION: 139 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch PVC pipe and riser **SLOT NO.:** 10 **SETTING:** 10.5 to 0.5 = 10 feet of screen
DATE COMPLETED: 4/25/2022	**SAND PACK SIZE & TYPE:** Filpro Sand # 1
DRILLING COMPANY: Soil Testing Ahmed and Ali	**SETTING:** 1 to 10.5
	CASING SIZE & TYPE: Stick-up and then cement bottom
DRILLING METHOD: Hollow Stem Auger	**SETTING:** 0 to 2 feet (1.98 feet)/ cement 0.2 feet above grade
SAMPLING METHOD: Split Spoon (SS)	**SEAL TYPE:** Bentonite Chips
OBSERVER: RS	**SETTING:** 0 to 0.5 feet = 1/2-foot layer
REFERENCE POINT (RP):	**BACKFILL TYPE:** Cuttings approximately 0 to 1 feet.
ELEVATION OF RP:	**STATIC WATER LEVEL:** Wet at 8.0 feet
STICK-UP: Total = 4.92 feet to top (no cap) / 3.16 feet above grade	**DEVELOPMENT METHOD:**
SURFACE COMPLETION:	**DURATION:** **YIELD:**
REMARKS: SS sampling every 2 feet except where we encountered rock/refusal	
GPS COORDINATES: --	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube REC = recovery PPM = parts per million	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	2-2-2-3	1.50	N/A	Medium to Fine sand with some gravel, small roots, dry, brown
2	4	SS	3-7-20-20	1.41	N/A	Fine sand with some gravel, dry, brown At 3.80 feet Medium to Coarse sand, dry, gray
4	5	SS			N/A	Unable to take sample, couldn't get SS down
5	7	SS	8-50 for 2"	1.15	N/A	Fine sand with some silt and some gravel, moist, brown
7	8	SS			N/A	Unable to take sample, couldn't get SS down
8	10	SS	50 for 5"	0.40	N/A	Medium to Coarse sand with some gravel, **wet at 8 feet**
10	10.5	SS	50 for 1"	0.30	N/A	Medium to Coarse sand with trace gravel, wet, brown
	10.5	SS			N/A	Hit Refusal End of Well

GEOLOGIC LOG WSP USA SHELTON, CONNECTICUT	**OWNER:** Quarry Ridge
	BORING NO: TW-6 (Well 6)
	PAGE 1 **OF** 1
SITE LOCATION: 139 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch PVC pipe and riser **SLOT NO.:** 10 **SETTING:** 7 to 14 = 7 feet of screen
DATE COMPLETED: 4/26/2022	**SAND PACK SIZE & TYPE:** Filpro Sand # 1
DRILLING COMPANY: Soil Testing Ahmed and Ali	**SETTING:** 8 to 14 feet and then 4 to 6 feet.
	CASING SIZE & TYPE: Stick-up and then cement bottom
DRILLING METHOD: Hollow Stem Auger	**SETTING:** 0 to 2 feet (1.68 feet)/ cement 0.2 feet above grade
SAMPLING METHOD: Split Spoon (SS)	**SEAL TYPE:** Bentonite Chips
OBSERVER: RS	**SETTING:** 6 to 8 feet = 2-foot layer, 1 feet above screen.
REFERENCE POINT (RP):	**BACKFILL TYPE:** Cuttings approximately 0 to 4 feet.
ELEVATION OF RP:	**STATIC WATER LEVEL:** Wet at 10.20 feet
STICK-UP: Total = 4.92 feet to top (no cap) / 3.24 feet above grade	**DEVELOPMENT METHOD:**
SURFACE COMPLETION:	**DURATION:** **YIELD:**
REMARKS: SS sampling every 2 feet except where we encountered rock/refusal	
GPS COORDINATES: --	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube REC = recovery PPM = parts per million	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	3-4-3-3	0.96	N/A	Medium to Fine sand with trace silt, small roots, dry, semi-compact, brown
2	4	SS	4-8-9-15	1.06	N/A	Medium to Coarse sand and gravel, dry, brown
4	6	SS	18-15-18-21	0.99	N/A	Medium to Coarse sand with some gravel, dry, brown
6	8	SS	23-57 for 2"	0.73	N/A	Refusal at 6.7 feet 6-6.5 was Medium to Coarse sand with some gravel, dry, light brown 6.5-6.7 was Medium to Fine sand, dry, brown,
8	10	SS	67-30-36-68	1.53	N/A	Medium to Fine sand and gravel, dry, gray
10	12	SS	87-35-27-28	1.02	N/A	Medium to Fine sand with trace silt, **wet at 10.20 feet**, gray
12	14	SS			N/A	Unable to take a sample, couldn't get SS down
	14	SS			N/A	Hit Refusal End of Well

GEOLOGIC LOG WSP USA SHELTON, CONNECTICUT	**OWNER:** Quarry Ridge
	BORING NO: TW-3 (Boring TW-3)
	PAGE 1 **OF** 1
SITE LOCATION: 139 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** **SLOT NO.:** **SETTING:**
DATE COMPLETED: 4/26/2022	**SAND PACK SIZE & TYPE: SETTING:**
DRILLING COMPANY: Soil Testing Ahmed and Ali	**CASING SIZE & TYPE: SETTING:**
DRILLING METHOD: Hollow Stem Auger	
SAMPLING METHOD: Split Spoon (SS)	**SEAL TYPE:**
OBSERVER: RS	**SETTING:**
REFERENCE POINT (RP):	**BACKFILL TYPE:**
ELEVATION OF RP:	**STATIC WATER LEVEL:**
STICK-UP:	**DEVELOPMENT METHOD:**
SURFACE COMPLETION:	**DURATION:** **YIELD:**
REMARKS: Started drilling and then couldn't get past 6 feet. No Water, decided not to put well in.	
GPS COORDINATES: --	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube REC = recovery PPM = parts per million	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	3-5-9-21	1.25	N/A	Medium to Fine Sand with some gravel, dry, brown to light brown
2	4	SS	18-32-29-29	1.25	N/A	Medium to Coarse sand and gravel, dry light brown
4	6	SS	44-60-92-100 for 3"	1.77	N/A	Refusal at 5.7 feet Medium to Coarse sand and gravel, dry, brown
	6.5					Refusal End of Boring
						*Decided not to put a well here.

GEOLOGIC LOG WSP USA SHELTON, CONNECTICUT	**OWNER:** Quarry Ridge
	BORING NO: TW-6 (Boring TW-6)
	PAGE 1 **OF** 1
SITE LOCATION: 139 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2 inch PVC pipe and riser **SLOT NO.:** 10 **SETTING:**
DATE COMPLETED: 4/26/2022	**SAND PACK SIZE & TYPE:** Filpro Sand # 1 **SETTING:**
DRILLING COMPANY: Soil Testing Ahmed and Ali	**CASING SIZE & TYPE:** Stick-up and then cement bottom
DRILLING METHOD: Hollow Stem Auger	**SETTING:**
SAMPLING METHOD: Split Spoon (SS)	**SEAL TYPE:** Bentonite Chips
OBSERVER: RS	**SETTING:**
REFERENCE POINT (RP):	**BACKFILL TYPE:** Cuttings
ELEVATION OF RP:	**STATIC WATER LEVEL:**
STICK-UP: 4.92 feet to top (no cap)	**DEVELOPMENT METHOD:**
SURFACE COMPLETION:	**DURATION:** **YIELD:**
REMARKS: Started drilling and then couldn't get past 5 feet. No Water, decided change locations.	
GPS COORDINATES: --	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube REC = recovery PPM = parts per million	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	3-3-4-4	1.47	N/A	0-0.5 feet was Medium to Coarse sand, dry, brown 0.5-1.47 Medium to Fine sand, dry, brown
2	4	SS	8-7-50 for 5"	0.86	N/A	Refusal at 3.7 feet Medium to Fine sand, dry, light brown
4	5	SS	50 for 2"	0.23	N/A	Refusal at 4.3 feet Medium to Coarse sand, tree roots, dry, brown
	5					Refusal End of Boring
						*Decided not to put a well here.

GEOLOGIC LOG LEGGETTE, BRASHEARS & GRAHAM, INC. FARMINGTON, CONNECTICUT	**OWNER:** Quarry Ridge Associates, LLC **WELL NO:** TB-1/MW-1 **PAGE 1 OF 2 PAGES**
SITE LOCATION: 141 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch Schedule 40 PVC **SLOT NO.:** 0.010 **SETTING:** 38.5 to 28.5 ft bg
DATE COMPLETED: February 16, 2006	**SAND PACK SIZE & TYPE:** #1 Holliston Sand
DRILLING COMPANY: Soil Testing Inc. Oxford, CT	**SETTING:** 38.5 to 26.5 ft bg **CASING SIZE & TYPE:** 2-inch Schedule 40 PVC
DRILLING METHOD: Hollow-stem Auger	**SETTING:** +2.12 to 38.5 ft bg
SAMPLING METHOD: Spilt Spoon	**SEAL TYPE:** Bentonite Pellets
OBSERVER: T. Hochdorfer/J. Zbell	**SETTING:** 26.5 to 24.5 ft bg
REFERENCE POINT (RP): Grade	**BACKFILL TYPE:** Native Soil
ELEVATION OF RP: 404.79	**STATIC WATER LEVEL:** 33.62
STICK-UP: 2.12	**DEVELOPMENT METHOD:** Submersible Pump
SURFACE COMPLETION: Metal stick up casing	**DURATION:** ~20 minutes **YIELD:** ~2gpm
REMARKS:	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube **REC = Recovery PPM = parts per million MC = macrocore**	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	3-7-5-5	0.9	--	0-0.5 SAND, very fine; some silt; little organics. 0.5-0.9 SAND, very fine; some silt; trace clay; little fine gravel.
5	7	SS	18-22-26-28	1.05	--	SAND, fine to very fine.
10	12	SS	10-15-19-22	1.15	--	SAND, coarse; little fine gravel; trace medium gravel; little very fine sand.
15	17	SS	16-18-22-25	1.60	--	15-15.7 SAND, coarse; little fine gravel; trace medium gravel; little very fine sand. 15.7-16.5 SAND, very fine. 16.5-16.6 SAND, very fine; trace silt.
20	22	SS	7-7-10-10	1.10	--	SAND, coarse; little fine gravel; trace fine to medium sand.
25	27	SS	3-5-10-14	1.10	--	25-25.8 SAND, coarse; little fine gravel; trace fine to medium sand. 25.8-26.1 SAND, fine; little very fine sand; trace silt at tip.

OWNER: Quarry Ridge Associates, LLC

WELL NO.: TB-1/MW-1 **PAGE 2 OF 2 PAGES**

DEPTH (FEET) FROM	DEPTH (FEET) TO	SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
29	29					Auger on cobble.
30	32	SS	33-25-28-61	1.20	--	30-30.7 SAND, medium to fine; trace very fine; trace silt; moist. 30.7-31.2 SILT; some very fine sand; wet.
32	34	SS	35-90-44-100/4"	1.30	--	32-32.7 SILT; some very fine sand. 32.7-33.3 SAND, medium to fine; trace very fine.
35	36	SS	52-115	1.34	--	35-35.5 SAND, coarse; some medium. 35.5-36.34 SAND, fine; some very fine.
38.5	--	--	--	--	--	Auger refusal. End of boring.

GEOLOGIC LOG LEGGETTE, BRASHEARS & GRAHAM, INC. FARMINGTON, CONNECTICUT	**OWNER:** Quarry Ridge Associates, LLC **WELL NO:** TB-2/MW-2 **PAGE 1 OF 2 PAGES**
SITE LOCATION: 141 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch Schedule 40 PVC **SLOT NO.:** 0.010 **SETTING:** 44 to 29 ft bg
DATE COMPLETED: February 16, 2006	**SAND PACK SIZE & TYPE:** #1 Holliston Sand
DRILLING COMPANY: Soil Testing Inc. Oxford, CT	**SETTING:** 44 to 27 ft bg **CASING SIZE & TYPE:** 2-inch Schedule 40 PVC
DRILLING METHOD: Hollow-stem Auger	**SETTING:** +2.06 to 44 ft bg
SAMPLING METHOD: Spilt Spoon	**SEAL TYPE:** Bentonite Pellets
OBSERVER: T. Hochdorfer	**SETTING:** 27 to 25 ft bg
REFERENCE POINT (RP): Grade	**BACKFILL TYPE:** Native Soil
ELEVATION OF RP: 403.92	**STATIC WATER LEVEL:** 29.40
STICK-UP: 2.06	**DEVELOPMENT METHOD:** Submersible Pump
SURFACE COMPLETION: Metal stick up casing	**DURATION:** ~20 minutes **YIELD:** ~2gpm
REMARKS:	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube **REC = Recovery PPM = parts per million MC = macrocore**	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	3-2-4-5	1.10	--	SAND, fine; some very fine; little organics.
2	4	SS	4-9-20-14	1.10	--	2-2.5 SAND, fine; some very fine. 2.5-3.1 SAND, fine; some very fine sand, some medium gravel.
4	6	SS	5-15-39-54	1.25	--	SAND, fine; some coarse sand; some medium gravel.
6	8	SS	41-62-43-53	1.40	--	SAND, fine; some coarse; some medium sand; some medium gravel.
8	10	SS	36-37-32-33	1.10	--	SAND, medium; some coarse sand; some medium gravel.
10	12	SS	14-16-14-18	1.10	--	SAND, medium; some coarse sand; some medium gravel.
12	14	SS	18-14-15-15	1.20	--	SAND, medium; some coarse sand; some medium gravel, trace large gravel.
14	16	SS	5-24-26-29	0.40	--	SAND, medium; some coarse; some medium to large gravel.

OWNER: Quarry Ridge Associates, LLC

WELL NO.: TB-2/MW-2 **PAGE 2 OF 2 PAGES**

DEPTH (FEET) FROM	DEPTH (FEET) TO	SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
16	18	SS	34-32-34-36	1.30	--	16-17 SAND, medium; some coarse sand; some medium gravel. 17-17.3 SAND, fine; trace very fine sand.
18	20	SS	26-27-43-48	0.90	--	SAND, fine; trace very fine sand.
20	22	SS	15-26-27-27	1.20	--	20-20.3 SAND, fine; trace very fine sand 20.3-21 SAND, medium; some coarse; trace gravel. 21-21.2 SAND, fine; little very fine sand; trace silt; moist.
22	24	SS	32-30-42-48	1.65	--	22-23.1 SAND, fine; little very fine; trace silt; wet. 23.1-23.5 SAND, medium; some small gravel.
24	26	SS	6-10-12-18	1.50	--	SAND, fine; trace very fine; some medium.
26	28	SS	11-21-38-42	1.90	--	SAND, fine; trace very fine; some medium; moist.
28	30	SS	8-10-12-14	2.00	--	SAND, fine; trace very fine; trace silt; wet.
30	32	SS	7-7-7-11	2.00	--	30-31.5 SAND, fine; trace very fine; trace silt; wet. 31.5-31.65 SILT; wet. 31.65-32 SAND, fine; little very fine; trace silt.
32	34	SS	9-14-18-16	2.00	--	32-33 SAND, fine; little very fine; trace silt. 33-33.5 SILT; some very fine sand. 33.5-34 SAND, fine; some medium.
34	36	SS	10-14-14-18	2.00	--	SAND, fine to very fine with depth; trace silt.
36	38	SS	12-18-50-100	1.70	--	SAND, fine; some medium; some small gravel; little very fine sand.
38	40	SS	105-83-39-43	1.50	--	SAND, fine; some medium; some coarse; some medium gravel.
40	41'3"	SS	60-70-100/3"	0.6	--	SAND, fine; some medium; some coarse; some medium gravel.
42	44	SS	57-65-106	1.40	--	42-42.9 SAND, fine; some medium; some coarse; some medium gravel. 42.9-43.4 SAND, fine; trace very fine; trace silt.
44	45	SS	73-100/4"	2	--	44-44.8 SAND, medium; some coarse; rock fragments. 44.8-45 SAND, fine; trace very fine.
45	--	--	--	--	--	End of boring.

GEOLOGIC LOG LEGGETTE, BRASHEARS & GRAHAM, INC. FARMINGTON, CONNECTICUT	**OWNER:** Quarry Ridge Associates, LLC
	WELL NO: TB-3/MW-3
	PAGE 1 OF 2 PAGES
SITE LOCATION: 141 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch Schedule 40 PVC **SLOT NO.:** 0.010 **SETTING:** 38 to 28 ft bg
DATE COMPLETED: February 17, 2006	**SAND PACK SIZE & TYPE:** #1 Holliston Sand
DRILLING COMPANY: Soil Testing Inc. Oxford, CT	**SETTING:** 38 to 26 ft bg
	CASING SIZE & TYPE: 2-inch Schedule 40 PVC
DRILLING METHOD: Hollow-stem Auger	**SETTING:** +2.03 to 38 ft bg
SAMPLING METHOD: Spilt Spoon	**SEAL TYPE:** Bentonite Pellets
OBSERVER: T. Hochdorfer	**SETTING:** 26 to 24 ft bg
REFERENCE POINT (RP): Grade	**BACKFILL TYPE:** Native Soil
ELEVATION OF RP: 402.58	**STATIC WATER LEVEL:** 32.84
STICK-UP: 2.03	**DEVELOPMENT METHOD:** Submersible Pump
SURFACE COMPLETION: Metal stick up casing	**DURATION:** ~20 minutes **YIELD:** ~1gpm
REMARKS:	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube **REC = Recovery PPM = parts per million MC = macrocore**	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	9-8-15-32	0.9	--	SAND, fine; some medium; some organics.
5	7	SS	22-15-22-21	1.10	--	SAND, fine; some medium; some medium gravel.
10	12	SS	12-18-36-45	1.0	--	SAND, fine; little very fine; some large gravel.
15	17	SS	10-12-11-10	0.80	--	SAND, fine; some coarse; some large gravel; some medium gravel; large piece of gravel stuck in tip.
20	22	SS	12-18-25-26	1.30	--	20-20.7 SAND, very fine; some silt; wet. 20.7-21.3 SAND, fine; little very fine; dry.
25	27	SS	18-28-27-31	1.50	--	SAND, fine; little very fine; moist at 26'.
30	32	SS	9-14-18-16	1.60	--	30-30.5 SAND, fine; little very fine; wet. 30.5-31.2 SAND, medium; some fine; some small gravel; wet. 31.2-31.6 SAND, fine; little very fine; wet.

OWNER: Quarry Ridge Associates, LLC

WELL NO.: TB-3/MW-3 **PAGE 2 OF 2 PAGES**

DEPTH (FEET) FROM	DEPTH (FEET) TO	SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
33	33					Augers on cobble.
35	37	SS	80-85-100	0.50	--	SAND, fine; some very fine; some large gravel in lower 0.2' and tip of spoon.
40	42	SS	152/6"	0.40	--	SAND, fine; some very fine; some medium gravel.
45	45'.25"	SS	150/3"	--	--	Silt traces on spoon tip.
45.25	--	--	--	--	--	Auger refusal. End of boring.

GEOLOGIC LOG LEGGETTE, BRASHEARS & GRAHAM, INC. FARMINGTON, CONNECTICUT	**OWNER:** Quarry Ridge Associates, LLC **WELL NO:** TB-4/MW-4 **PAGE 1 OF 1 PAGES**
SITE LOCATION: 141 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch Schedule 40 PVC **SLOT NO.:** 0.010 **SETTING:** 32 to 22 ft bg
DATE COMPLETED: February 17, 2006	**SAND PACK SIZE & TYPE:** #1 Holliston Sand
DRILLING COMPANY: Soil Testing Inc. Oxford, CT	**SETTING:** 32 to 20 ft bg **CASING SIZE & TYPE:** 2-inch Schedule 40 PVC
DRILLING METHOD: Hollow-stem Auger	**SETTING:** +1.85 to 32 ft bg
SAMPLING METHOD: Spilt Spoon	**SEAL TYPE:** Bentonite Pellets
OBSERVER: T. Hochdorfer	**SETTING:** 20 to 18 ft bg
REFERENCE POINT (RP): Grade	**BACKFILL TYPE:** Native Soil
ELEVATION OF RP: 403.96	**STATIC WATER LEVEL:** 27.80
STICK-UP: 1.85	**DEVELOPMENT METHOD:** Submersible Pump
SURFACE COMPLETION: Stick up	**DURATION:** ~20 minutes **YIELD:** ~1gpm
REMARKS:	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube **REC = Recovery PPM = parts per million MC = macrocore**	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	9-24-13-20	0.30	--	SAND, fine; some medium; some medium gravel; organics.
5	7	SS	7-10-20-23	1.00	--	5-5.5 SAND, fine; little very fine; trace gravel. 5.5-6 SAND, medium; some fine; some medium gravel.
10	12	SS	10-14-15-15	1.30	--	SAND, fine; some medium; some little gravel.
15	17	SS	6-8-14-16	1.60	--	15-15.9 SAND, fine; some very fine. 15.9-16.6 SAND, fine; some medium; some medium gravel.
20	22	SS	9-11-15-19	1.30	--	SAND, fine; some very fine; moist.
25	27	SS	4-8-8-54	1.50	--	SAND, fine; some medium; rock fragments at tip; wet.
30	32	SS	69-65-69-105	1.20	--	30-30.5 SAND, fine; some very fine; trace silt; little medium gravel. 30.5-31.2 SAND, fine; some very fine; some large gravel; rock frags.
32.5	--	--	--	--	--	Auger refusal. End of boring.

GEOLOGIC LOG LEGGETTE, BRASHEARS & GRAHAM, INC. FARMINGTON, CONNECTICUT	**OWNER:** Quarry Ridge Associates, LLC **WELL NO:** TB-5/MW-5 **PAGE 1 OF 2 PAGES**
SITE LOCATION: 141 Turkey Roost Road Monroe, CT	**SCREEN SIZE & TYPE:** 2-inch Schedule 40 PVC **SLOT NO.:** 0.010 **SETTING:** 31 to 21 ft bg
DATE COMPLETED: February 17, 2006	**SAND PACK SIZE & TYPE:** #1 Holliston Sand **SETTING:** 31 to 19 ft bg
DRILLING COMPANY: Soil Testing Inc. Oxford, CT	**CASING SIZE & TYPE:** 2-inch Schedule 40 PVC **SETTING:** +1.92 to 31 ft bg
DRILLING METHOD: Hollow-stem Auger	
SAMPLING METHOD: Spilt Spoon	**SEAL TYPE:** Bentonite Pellets **SETTING:** 19 to 17 ft bg
OBSERVER: T. Hochdorfer	
REFERENCE POINT (RP): Grade	**BACKFILL TYPE:** Native Soil
ELEVATION OF RP: 404.36	**STATIC WATER LEVEL:** 26.68
STICK-UP: 1.92	**DEVELOPMENT METHOD:** Submersible Pump
SURFACE COMPLETION: Stick up	**DURATION:** ~20 minutes **YIELD:** ~1gpm
REMARKS:	
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelby tube **REC = Recovery PPM = parts per million MC = macrocore**	

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	2-2-4-9	1.00	--	SAND, fine; some medium; little very fine; trace silt; organics; little medium gravel.
5	7	SS	21-43-65-56	0.70	--	SAND, fine; some medium; little large gravel; trace small gravel.
10	12	SS	15-16-19-24	0.50	--	SAND, medium; some coarse; trace fine; some large gravel; some medium gravel; some small gravel.
15	17	SS	9-10-15-17	1.40	--	SAND, fine; some medium.
17	19	SS	17-14-15-20	1.30	--	SAND, fine; some medium; moist.
19	21	SS	10-14-18-22	1.40	--	SAND, fine; some medium; trace very fine; wet.
21	23	SS	10-13-18-29	2.00	--	21-22.7 SAND, fine; some medium; trace very fine; wet. 22.7-22.75 SILT 22.75-23 SAND, fine; some very fine; dry.

OWNER: Quarry Ridge Associates, LLC

WELL NO.: TB-5/MW-5 **PAGE 2 OF 2 PAGES**

DEPTH (FEET) FROM	DEPTH (FEET) TO	SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
23	25	SS	28-26-39-40	1.30	--	SAND, fine; some very fine; wet.
25	27	SS	5-10-39-41	1.40	--	SAND, fine; little very fine; some medium; wet.
27	29	SS	45-47-43-37	1.40	--	SAND, medium; some coarse; little fine; wet.
30	32	SS	7-19-27-27	2.00	--	SAND, fine; some very fine; trace medium; wet.
35	37	SS	7-9-11-15	1.70	--	35-36.1 SAND, fine; some very fine; trace medium; wet. 36.1-36.6 SILT; some very fine sand; wet.
37	--	--	--	--	--	Cobbles, boulders, fractured rock.
38	--	--	--	--	--	Auger refusal. End of boring.

TH-301

Total Depth	10.5	301
Depth to Water	None	

No Redoximorphic Features





TH-302

Total Depth 8 ft

Depth to Water None

No Redoximorphic Features



TH-303

Total Depth	9.5	ft
Depth to Water	None	

No Redoximorphic Features



TH-304

Total Depth	6.5	ft
Depth to Water	7.37	ft

No Redoximorphic Features



TH-305

Total Depth	10	ft
Depth to Water	none	ft

No Redoximorphic Features



TH-306

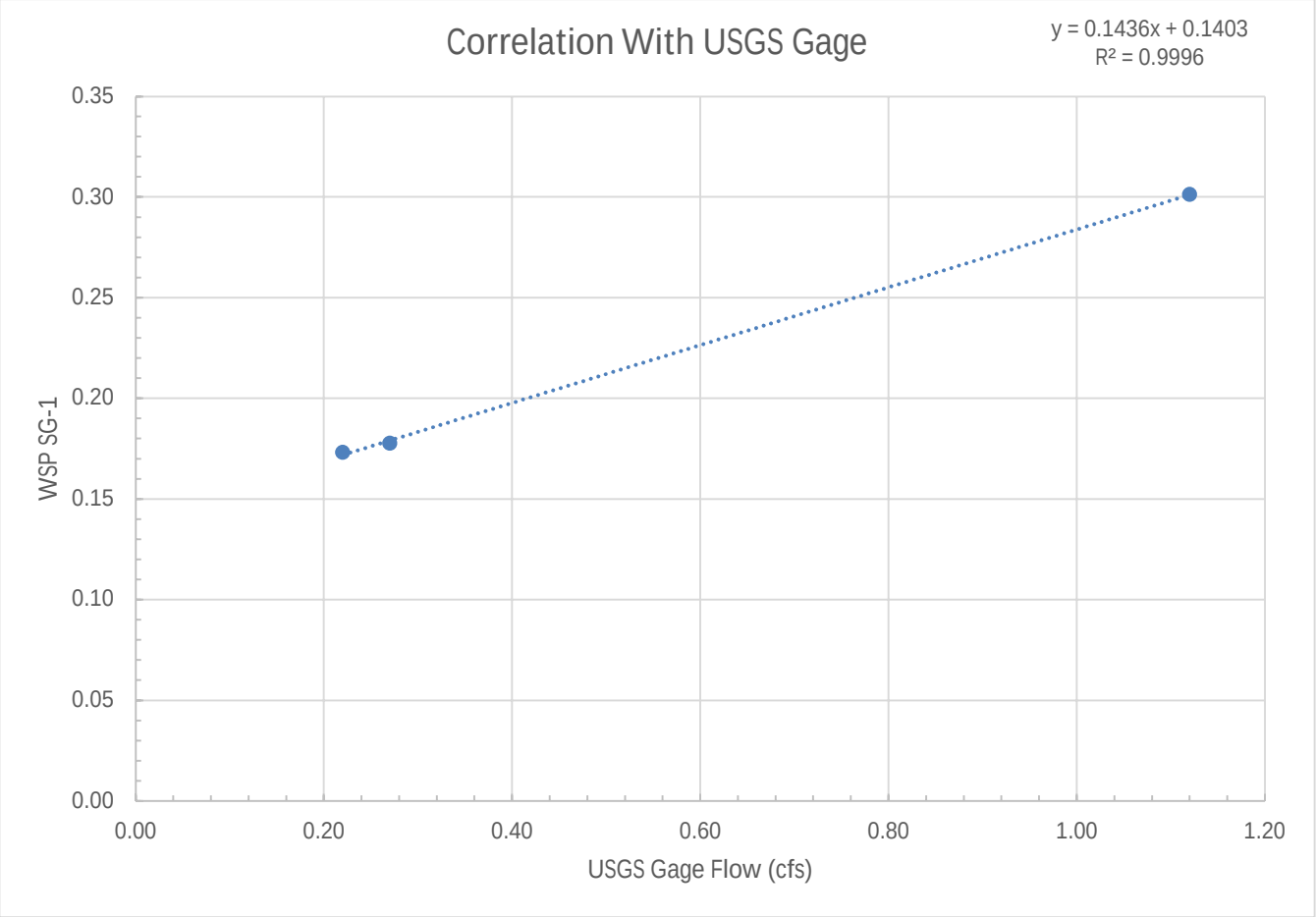
Total Depth	7	ft
Depth to Water	none	ft

No Redoximorphic Features



APPENDIX II

Date	USGS Gage	WSP Gagaging Locations			
	Flow (cfs)	WSP SG-1	WSP SG-2		Gaining
5/5/2022					
5/6/2022					
5/16/2022	0.76	0.53	1.18		0.65
5/25/2022	0.27	0.18	0.42		0.24
6/2/2022	1.12	0.30	0.38		0.08
6/23/2022	0.22	0.17	0.27		0.10



Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
1/1/2020	5	1.30			
1/2/2020	3.78	1.02			
1/3/2020	3.6	0.98			
1/4/2020	3.96	1.07			
1/5/2020	3.51	0.96			
1/6/2020	2.93	0.83			
1/7/2020	2.76	0.79			
1/8/2020	2.64	0.76			
1/9/2020	2.16	0.65			
1/10/2020	2.1	0.64			
1/11/2020	2.35	0.70			
1/12/2020	2.68	0.77			
1/13/2020	2.27	0.68			
1/14/2020	2.05	0.63			
1/15/2020	2.06	0.63			
1/16/2020	2.45	0.72			
1/17/2020	1.89	0.59			
1/18/2020	1.37	0.47			
1/19/2020	1.99	0.62			
1/20/2020	1.82	0.58			
1/21/2020	1.35	0.47			
1/22/2020	1.31	0.46			
1/23/2020	1.31	0.46			
1/24/2020	1.44	0.49			
1/25/2020	6.94	1.75			
1/26/2020	12.3	2.97			
1/27/2020	5.52	1.42			
1/28/2020	3.86	1.04			
1/29/2020	3.11	0.87			
1/30/2020	2.51	0.73			
1/31/2020	2.32	0.69			
2/1/2020	2.42	0.71			
2/2/2020	2.37	0.70			
2/3/2020	2.29	0.68			
2/4/2020	2.07	0.63			
2/5/2020	2.17	0.66			
2/6/2020	3.05	0.86			
2/7/2020	5.01	1.31			
2/8/2020	3.98	1.07			
2/9/2020	2.7	0.78			
2/10/2020	2.83	0.81			
2/11/2020	4.71	1.24			
2/12/2020	3.96	1.07			
2/13/2020	6.92	1.74			
2/14/2020	4.89	1.28			
2/15/2020	2.98	0.84			
2/16/2020	2.77	0.79			
2/17/2020	2.79	0.80			
2/18/2020	2.58	0.75			
2/19/2020	2.47	0.73			
2/20/2020	2.06	0.63			
2/21/2020	1.78	0.57			
2/22/2020	1.69	0.55			
2/23/2020	1.68	0.54			
2/24/2020	1.68	0.54			
2/25/2020	1.72	0.55			
2/26/2020	2.15	0.65			
2/27/2020	6.6	1.67			
2/28/2020	4.12	1.10			
2/29/2020	2.86	0.81			
3/1/2020	2.02	0.62			
3/2/2020	1.88	0.59			
3/3/2020	2.1	0.64			
3/4/2020	2.65	0.77			
3/5/2020	2	0.62			
3/6/2020	1.75	0.56			
3/7/2020	2.05	0.63			
3/8/2020	1.45	0.49			
3/9/2020	1.45	0.49			
3/10/2020	1.46	0.49			
3/11/2020	1.53	0.51			
3/12/2020	1.36	0.47			
3/13/2020	2.62	0.76			
3/14/2020	2.22	0.67			
3/15/2020	1.59	0.52			
3/16/2020	1.37	0.47			
3/17/2020	1.65	0.54			
3/18/2020	1.52	0.51			
3/19/2020	4.59	1.21			
3/20/2020	3.51	0.96			
3/21/2020	2.35	0.70			
3/22/2020	1.62	0.53			
3/23/2020	3.59	0.98			
3/24/2020	6.34	1.61			
3/25/2020	3.48	0.96			
3/26/2020	2.4	0.71			
3/27/2020	2.06	0.63			
3/28/2020	2.04	0.63			
3/29/2020	4.7	1.24			
3/30/2020	4.53	1.20			
3/31/2020	3.35	0.93			
4/1/2020	2.78	0.80			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
4/2/2020	2.79	0.80			
4/3/2020	2.38	0.70			
4/4/2020	2.21	0.67			
4/5/2020	2.04	0.63			
4/6/2020	1.87	0.59			
4/7/2020	1.67	0.54			
4/8/2020	2.16	0.65			
4/9/2020	2.92	0.83			
4/10/2020	2.98	0.84			
4/11/2020	1.88	0.59			
4/12/2020	1.46	0.49			
4/13/2020	30.9	7.23			
4/14/2020	15.2	3.64			
4/15/2020	6.25	1.59			
4/16/2020	4.5	1.19			
4/17/2020	3.57	0.98			
4/18/2020	6.11	1.56			
4/19/2020	4.22	1.13			
4/20/2020	3.25	0.90			
4/21/2020	3.43	0.94			
4/22/2020	3.27	0.91			
4/23/2020	2.42	0.71			
4/24/2020	4.76	1.25			
4/25/2020	3.66	1.00			
4/26/2020	3.03	0.85			
4/27/2020	3.06	0.86			
4/28/2020	2.5	0.73			
4/29/2020	2.11	0.64			
4/30/2020	3.66	1.00			
5/1/2020	9.04	2.23			
5/2/2020	4.32	1.15			
5/3/2020	3.42	0.94			
5/4/2020	2.67	0.77			
5/5/2020	2.01	0.62			
5/6/2020	1.82	0.58			
5/7/2020	1.8	0.57			
5/8/2020	2.08	0.64			
5/9/2020	3.48	0.96			
5/10/2020	2.02	0.62			
5/11/2020	1.69	0.55			
5/12/2020	1.5	0.50			
5/13/2020	1.32	0.46			
5/14/2020	1.26	0.45			
5/15/2020	1.39	0.48			
5/16/2020	3.13	0.88			
5/17/2020	1.66	0.54			
5/18/2020	1.31	0.46			
5/19/2020	1.12	0.42			
5/20/2020	0.97	0.38			
5/21/2020	0.89	0.36			
5/22/2020	0.89	0.36			
5/23/2020	0.96	0.38			
5/24/2020	0.89	0.36			
5/25/2020	0.77	0.34			
5/26/2020	0.81	0.35			
5/27/2020	0.74	0.33			
5/28/2020	0.73	0.33			
5/29/2020	0.88	0.36			
5/30/2020	1	0.39			
5/31/2020	0.63	0.30			
6/1/2020	0.43	0.26			
6/2/2020	0.4	0.25			
6/3/2020	0.44	0.26			
6/4/2020	0.53	0.28			
6/5/2020	0.81	0.35			
6/6/2020	0.83	0.35			
6/7/2020	0.55	0.29			
6/8/2020	0.35	0.24			
6/9/2020	0.3	0.23			
6/10/2020	0.29	0.23			
6/11/2020	0.31	0.23			
6/12/2020	0.38	0.25			
6/13/2020	0.34	0.24			
6/14/2020	0.27	0.22			
6/15/2020	0.27	0.22			
6/16/2020	0.26	0.22			
6/17/2020	0.25	0.22			
6/18/2020	0.26	0.22			
6/19/2020	0.25	0.22			
6/20/2020	0.24	0.21			
6/21/2020	0.25	0.22			
6/22/2020	0.2	0.21			
6/23/2020	0.2	0.21			
6/24/2020	0.19	0.20			
6/25/2020	0.17	0.20			
6/26/2020	0.18	0.20			
6/27/2020	0.19	0.20			
6/28/2020	0.21	0.21			
6/29/2020	0.18	0.20			
6/30/2020	0.18	0.20			
7/1/2020	0.18	0.20			
7/2/2020	0.18	0.20			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
7/3/2020	0.36	0.24			
7/4/2020	0.29	0.23			
7/5/2020	0.16	0.20			
7/6/2020	0.16	0.20			
7/7/2020	0.16	0.20			
7/8/2020	0.27	0.22			
7/9/2020	0.2	0.21			
7/10/2020	0.37	0.24			
7/11/2020	0.62	0.30			
7/12/2020	0.35	0.24			
7/13/2020	0.2	0.21			
7/14/2020	0.15	0.19			
7/15/2020	0.14	0.19			
7/16/2020	0.12	0.19			
7/17/2020	0.13	0.19			
7/18/2020	0.12	0.19			
7/19/2020	0.12	0.19			
7/20/2020	0.12	0.19			
7/21/2020	0.1	0.18			
7/22/2020	0.11	0.18			
7/23/2020	0.12	0.19			
7/24/2020	0.1	0.18			
7/25/2020	0.09	0.18			
7/26/2020	0.08	0.18			
7/27/2020	0.07	0.18			
7/28/2020	0.07	0.18			
7/29/2020	0.07	0.18			
7/30/2020	0.08	0.18			
7/31/2020	0.14	0.19			
8/1/2020	0.08	0.18			
8/2/2020	0.09	0.18			
8/3/2020	0.08	0.18			
8/4/2020	0.14	0.19			
8/5/2020	0.12	0.19			
8/6/2020	0.1	0.18			
8/7/2020	0.1	0.18			
8/8/2020	0.08	0.18			
8/9/2020	0.08	0.18			
8/10/2020	0.07	0.18			
8/11/2020	0.07	0.18			
8/12/2020	0.06	0.17			
8/13/2020	0.05	0.17			
8/14/2020	0.05	0.17			
8/15/2020	0.05	0.17			
8/16/2020	0.1	0.18			
8/17/2020	0.15	0.19			
8/18/2020	0.16	0.20			
8/19/2020	0.14	0.19			
8/20/2020	0.14	0.19			
8/21/2020	0.14	0.19			
8/22/2020	0.13	0.19			
8/23/2020	0.12	0.19			
8/24/2020	0.11	0.18			
8/25/2020	0.11	0.18			
8/26/2020	0.11	0.18			
8/27/2020	0.12	0.19			
8/28/2020	0.11	0.18			
8/29/2020	0.12	0.19			
8/30/2020	0.11	0.18			
8/31/2020	0.1	0.18			
9/1/2020	0.09	0.18			
9/2/2020	0.11	0.18			
9/3/2020	0.14	0.19			
9/4/2020	0.15	0.19			
9/5/2020	0.1	0.18			
9/6/2020	0.09	0.18			
9/7/2020	0.09	0.18			
9/8/2020	0.08	0.18			
9/9/2020	0.08	0.18			
9/10/2020	0.11	0.18			
9/11/2020	0.11	0.18			
9/12/2020	0.09	0.18			
9/13/2020	0.09	0.18			
9/14/2020	0.08	0.18			
9/15/2020	0.08	0.18			
9/16/2020	0.09	0.18			
9/17/2020	0.09	0.18			
9/18/2020	0.08	0.18			
9/19/2020	0.07	0.18			
9/20/2020	0.07	0.18			
9/21/2020	0.08	0.18			
9/22/2020	0.07	0.18			
9/23/2020	0.07	0.18			
9/24/2020	0.07	0.18			
9/25/2020	0.07	0.18			
9/26/2020	0.07	0.18			
9/27/2020	0.07	0.18			
9/28/2020	0.09	0.18			
9/29/2020	0.13	0.19			
9/30/2020	0.92	0.37			
10/1/2020	0.14	0.19			
10/2/2020	0.14	0.19			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
10/3/2020	0.14	0.19			
10/4/2020	0.15	0.19			
10/5/2020	0.15	0.19			
10/6/2020	0.14	0.19			
10/7/2020	0.14	0.19			
10/8/2020	0.14	0.19			
10/9/2020	0.16	0.20			
10/10/2020	0.18	0.20			
10/11/2020	0.13	0.19			
10/12/2020	0.16	0.20			
10/13/2020	0.22	0.21			
10/14/2020	0.26	0.22			
10/15/2020	0.2	0.21			
10/16/2020	1.34	0.47			
10/17/2020	1.09	0.41			
10/18/2020	0.22	0.21			
10/19/2020	0.2	0.21			
10/20/2020	0.2	0.21			
10/21/2020	0.21	0.21			
10/22/2020	0.19	0.20			
10/23/2020	0.2	0.21			
10/24/2020	0.22	0.21			
10/25/2020	0.22	0.21			
10/26/2020	0.24	0.21			
10/27/2020	0.25	0.22			
10/28/2020	0.36	0.24			
10/29/2020	2.38	0.70			
10/30/2020	2.26	0.68			
10/31/2020	0.59	0.29			
11/1/2020	0.96	0.38			
11/2/2020	0.95	0.38			
11/3/2020	0.53	0.28			
11/4/2020	0.47	0.27			
11/5/2020	0.46	0.26			
11/6/2020	0.47	0.27			
11/7/2020	0.46	0.26			
11/8/2020	0.43	0.26			
11/9/2020	0.44	0.26			
11/10/2020	0.47	0.27			
11/11/2020	1.43	0.49			
11/12/2020	2.32	0.69			
11/13/2020	1.02	0.39			
11/14/2020	0.63	0.30			
11/15/2020	0.57	0.29			
11/16/2020	1.14	0.42			
11/17/2020	0.55	0.29			
11/18/2020	0.47	0.27			
11/19/2020	0.46	0.26			
11/20/2020	0.45	0.26			
11/21/2020	0.44	0.26			
11/22/2020	0.46	0.26			
11/23/2020	1.98	0.61			
11/24/2020	0.86	0.36			
11/25/2020	0.47	0.27			
11/26/2020	2.05	0.63			
11/27/2020	1	0.39			
11/28/2020	0.53	0.28			
11/29/2020	0.47	0.27			
11/30/2020	3.56	0.97			
12/1/2020	2.51	0.73			
12/2/2020	0.95	0.38			
12/3/2020	0.68	0.32			
12/4/2020	0.68	0.32			
12/5/2020	3.66	1.00			
12/6/2020	1.78	0.57			
12/7/2020	0.99	0.39			
12/8/2020	0.77	0.34			
12/9/2020	0.65	0.31			
12/10/2020	0.65	0.31			
12/11/2020	0.59	0.29			
12/12/2020	0.59	0.29			
12/13/2020	0.61	0.30			
12/14/2020	0.64	0.31			
12/15/2020	0.59	0.29			
12/16/2020	0.52	0.28			
12/17/2020	0.54	0.28			
12/18/2020	0.63	0.30			
12/19/2020	0.53	0.28			
12/20/2020	0.52	0.28			
12/21/2020	0.59	0.29			
12/22/2020	0.64	0.31			
12/23/2020	0.61	0.30			
12/24/2020	1.08	0.41			
12/25/2020	4.69	1.23			
12/26/2020	1.76	0.56			
12/27/2020	0.95	0.38			
12/28/2020	0.82	0.35			
12/29/2020	0.73	0.33			
12/30/2020	1	0.39			
12/31/2020	3.98	1.07			
1/1/2021	3.75	1.02			
1/2/2021	4.94	1.29			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
1/3/2021	3.75	1.02			
1/4/2021	3.39	0.94			
1/5/2021	3.11	0.87			
1/6/2021	2.82	0.81			
1/7/2021	2.48	0.73			
1/8/2021	2.17	0.66			
1/9/2021	2.11	0.64			
1/10/2021	1.74	0.56			
1/11/2021	1.63	0.53			
1/12/2021	1.65	0.54			
1/13/2021	1.88	0.59			
1/14/2021	1.75	0.56			
1/15/2021	1.76	0.56			
1/16/2021	10.2	2.49			
1/17/2021	6.38	1.62			
1/18/2021	4.06	1.09			
1/19/2021	3.19	0.89			
1/20/2021	2.83	0.81			
1/21/2021	2.53	0.74			
1/22/2021	2.46	0.72			
1/23/2021	2.27	0.68			
1/24/2021	1.73	0.56			
1/25/2021	1.58	0.52			
1/26/2021	1.83	0.58			
1/27/2021	2.07	0.63			
1/28/2021	1.89	0.59			
1/29/2021	1.42	0.48			
1/30/2021	1.01	0.39			
1/31/2021	0.91	0.37			
2/1/2021	2.36	0.70			
2/2/2021	2.1	0.64			
2/3/2021	1.75	0.56			
2/4/2021	1.6	0.53			
2/5/2021	1.81	0.57			
2/6/2021	1.85	0.58			
2/7/2021	1.96	0.61			
2/8/2021	1.69	0.55			
2/9/2021	1.59	0.52			
2/10/2021	1.42	0.48			
2/11/2021	1.42	0.48			
2/12/2021	1.28	0.45			
2/13/2021	1.19	0.43			
2/14/2021	1.19	0.43			
2/15/2021	1.23	0.44			
2/16/2021	5.6	1.44			
2/17/2021	5.67	1.46			
2/18/2021	3.49	0.96			
2/19/2021	2.85	0.81			
2/20/2021	2.32	0.69			
2/21/2021	1.87	0.59			
2/22/2021	2.23	0.67			
2/23/2021	3.18	0.89			
2/24/2021	3.35	0.93			
2/25/2021	4.1	1.10			
2/26/2021	3.67	1.00			
2/27/2021	5.24	1.36			
2/28/2021	6.13	1.56			
3/1/2021	8.44	2.09			
3/2/2021	6.18	1.57			
3/3/2021	4.4	1.17			
3/4/2021	4.2	1.12			
3/5/2021	3.55	0.97			
3/6/2021	3.1	0.87			
3/7/2021	2.8	0.80			
3/8/2021	2.6	0.75			
3/9/2021	2.86	0.81			
3/10/2021	3.1	0.87			
3/11/2021	3.09	0.87			
3/12/2021	3	0.85			
3/13/2021	2.45	0.72			
3/14/2021	2.44	0.72			
3/15/2021	1.86	0.59			
3/16/2021	1.65	0.54			
3/17/2021	1.92	0.60			
3/18/2021	4.08	1.09			
3/19/2021	5.86	1.50			
3/20/2021	3.2	0.89			
3/21/2021	2.59	0.75			
3/22/2021	2.3	0.69			
3/23/2021	2.16	0.65			
3/24/2021	2.3	0.69			
3/25/2021	4	1.08			
3/26/2021	3.1	0.87			
3/27/2021	2.25	0.67			
3/28/2021	4.21	1.12			
3/29/2021	5.79	1.48			
3/30/2021	3.14	0.88			
3/31/2021	2.94	0.83			
4/1/2021	5.31	1.38			
4/2/2021	3.32	0.92			
4/3/2021	2.59	0.75			
4/4/2021	2.35	0.70			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
4/5/2021	2.3	0.69			
4/6/2021	1.96	0.61			
4/7/2021	1.88	0.59			
4/8/2021	1.8	0.57			
4/9/2021	1.68	0.54			
4/10/2021	1.64	0.54			
4/11/2021	1.79	0.57			
4/12/2021	3.45	0.95			
4/13/2021	3.47	0.95			
4/14/2021	2.35	0.70			
4/15/2021	4.89	1.28			
4/16/2021	8.42	2.09			
4/17/2021	4.15	1.11			
4/18/2021	3.04	0.86			
4/19/2021	2.55	0.74			
4/20/2021	2.27	0.68			
4/21/2021	2.93	0.83			
4/22/2021	2.94	0.83			
4/23/2021	2.03	0.62			
4/24/2021	1.73	0.56			
4/25/2021	3.76	1.02			
4/26/2021	3.04	0.86			
4/27/2021	1.97	0.61			
4/28/2021	1.76	0.56			
4/29/2021	2.18	0.66			
4/30/2021	2.08	0.64			
5/1/2021	1.24	0.44			
5/2/2021	1.15	0.42			
5/3/2021	1.35	0.47			
5/4/2021	6.96	1.75			
5/5/2021	3.96	1.07			
5/6/2021	3.38	0.93			
5/7/2021	2.05	0.63			
5/8/2021	1.63	0.53			
5/9/2021	1.87	0.59			
5/10/2021	5.45	1.41			
5/11/2021	2.77	0.79			
5/12/2021	1.73	0.56			
5/13/2021	1.32	0.46			
5/14/2021	1.25	0.45			
5/15/2021	1.06	0.40			
5/16/2021	0.91	0.37			
5/17/2021	0.85	0.35			
5/18/2021	0.63	0.30			
5/19/2021	0.5	0.27			
5/20/2021	0.42	0.26			
5/21/2021	0.37	0.24			
5/22/2021	0.35	0.24			
5/23/2021	0.38	0.25			
5/24/2021	0.2	0.21			
5/25/2021	0.22	0.21			
5/26/2021	0.22	0.21			
5/27/2021	0.33	0.24			
5/28/2021	0.55	0.29			
5/29/2021	5.03	1.31			
5/30/2021	4.1	1.10			
5/31/2021	3.82	1.03			
6/1/2021	1.27	0.45			
6/2/2021	0.62	0.30			
6/3/2021	0.78	0.34			
6/4/2021	0.99	0.39			
6/5/2021	0.56	0.29			
6/6/2021	0.27	0.22			
6/7/2021	0.3	0.23			
6/8/2021	0.61	0.30			
6/9/2021	0.82	0.35			
6/10/2021	0.54	0.28			
6/11/2021	0.44	0.26			
6/12/2021	0.39	0.25			
6/13/2021	0.39	0.25			
6/14/2021	0.44	0.26			
6/15/2021	0.49	0.27			
6/16/2021	0.42	0.26			
6/17/2021	0.33	0.24			
6/18/2021	0.33	0.24			
6/19/2021	0.36	0.24			
6/20/2021	0.39	0.25			
6/21/2021	0.39	0.25			
6/22/2021	0.43	0.26			
6/23/2021	0.43	0.26			
6/24/2021	0.39	0.25			
6/25/2021	0.39	0.25			
6/26/2021	0.39	0.25			
6/27/2021	0.39	0.25			
6/28/2021	0.37	0.24			
6/29/2021	0.34	0.24			
6/30/2021	0.34	0.24			
7/1/2021	0.38	0.25			
7/2/2021	1.62	0.53			
7/3/2021	1.73	0.56			
7/4/2021	0.88	0.36			
7/5/2021	0.54	0.28			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
7/6/2021	0.62	0.30			
7/7/2021	0.67	0.31			
7/8/2021	1.03	0.40			
7/9/2021	17.1	4.07			
7/10/2021	5.09	1.32			
7/11/2021	1.55	0.51			
7/12/2021	1.16	0.43			
7/13/2021	1.14	0.42			
7/14/2021	0.84	0.35			
7/15/2021	0.62	0.30			
7/16/2021	0.44	0.26			
7/17/2021	0.33	0.24			
7/18/2021	0.52	0.28			
7/19/2021	0.46	0.26			
7/20/2021	0.32	0.23			
7/21/2021	0.29	0.23			
7/22/2021	0.32	0.23			
7/23/2021	0.25	0.22			
7/24/2021	0.24	0.21			
7/25/2021	0.24	0.21			
7/26/2021	0.25	0.22			
7/27/2021	0.22	0.21			
7/28/2021	0.24	0.21			
7/29/2021	1.35	0.47			
7/30/2021	2.05	0.63			
7/31/2021	0.47	0.27			
8/1/2021	0.29	0.23			
8/2/2021	0.27	0.22			
8/3/2021	0.22	0.21			
8/4/2021	0.22	0.21			
8/5/2021	0.22	0.21			
8/6/2021	0.22	0.21			
8/7/2021	0.22	0.21			
8/8/2021	0.22	0.21			
8/9/2021	0.22	0.21			
8/10/2021	0.25	0.22			
8/11/2021	0.27	0.22			
8/12/2021	0.27	0.22			
8/13/2021	0.25	0.22			
8/14/2021	0.24	0.21			
8/15/2021	0.23	0.21			
8/16/2021	0.22	0.21			
8/17/2021	0.22	0.21			
8/18/2021	0.22	0.21			
8/19/2021	0.29	0.23			
8/20/2021	4.14	1.11			
8/21/2021	9.3	2.29			
8/22/2021	9.72	2.38			
8/23/2021	6.05	1.54			
8/24/2021	0.42	0.26			
8/25/2021	0.27	0.22			
8/26/2021	0.27	0.22			
8/27/2021	0.27	0.22			
8/28/2021	0.44	0.26			
8/29/2021	0.27	0.22			
8/30/2021	0.27	0.22			
8/31/2021	0.27	0.22			
9/1/2021	8.26	2.05			
9/2/2021	54.3	12.59			
9/3/2021	6.3	1.60			
9/4/2021	3.39	0.94			
9/5/2021	3.25	0.90			
9/6/2021	3.17	0.89			
9/7/2021	1.3	0.46			
9/8/2021	0.54	0.28			
9/9/2021	2.55	0.74			
9/10/2021	1.86	0.59			
9/11/2021	0.34	0.24			
9/12/2021	0.2	0.21			
9/13/2021	0.17	0.20			
9/14/2021	0.08	0.18			
9/15/2021	0.08	0.18			
9/16/2021	0.09	0.18			
9/17/2021	0.1	0.18			
9/18/2021	0.12	0.19			
9/19/2021	0.11	0.18			
9/20/2021	0.09	0.18			
9/21/2021	0.08	0.18			
9/22/2021	0.09	0.18			
9/23/2021	0.8	0.34			
9/24/2021	31.8	7.44			
9/25/2021	10.5	2.56			
9/26/2021	10.3	2.52			
9/27/2021	3.27	0.91			
9/28/2021	0.31	0.23			
9/29/2021	0.22	0.21			
9/30/2021	0.16	0.20			
10/1/2021	0.14	0.19			
10/2/2021	0.16	0.20			
10/3/2021	0.16	0.20			
10/4/2021	1.08	0.41			
10/5/2021	0.88	0.36			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
10/6/2021	0.25	0.22			
10/7/2021	0.21	0.21			
10/8/2021	0.2	0.21			
10/9/2021	0.22	0.21			
10/10/2021	0.29	0.23			
10/11/2021	0.33	0.24			
10/12/2021	0.31	0.23			
10/13/2021	0.36	0.24			
10/14/2021	0.37	0.24			
10/15/2021	0.31	0.23			
10/16/2021	0.33	0.24			
10/17/2021	0.67	0.31			
10/18/2021	0.45	0.26			
10/19/2021	0.63	0.30			
10/20/2021	0.63	0.30			
10/21/2021	0.64	0.31			
10/22/2021	0.77	0.34			
10/23/2021	0.77	0.34			
10/24/2021	0.77	0.34			
10/25/2021	6.19	1.58			
10/26/2021	28.9	6.77			
10/27/2021	22.3	5.26			
10/28/2021	12.1	2.93			
10/29/2021	8.59	2.13			
10/30/2021	7.87	1.96			
10/31/2021	7.51	1.88			
11/1/2021	3.61	0.99			
11/2/2021	1.87	0.59			
11/3/2021	1.86	0.59			
11/4/2021	1.83	0.58			
11/5/2021	1.8	0.57			
11/6/2021	1.84	0.58			
11/7/2021	1.83	0.58			
11/8/2021	1.77	0.56			
11/9/2021	1.87	0.59			
11/10/2021	3.13	0.88			
11/11/2021	3.5	0.96			
11/12/2021	8.44	2.09			
11/13/2021	7.84	1.95			
11/14/2021	6.19	1.58			
11/15/2021	4.69	1.23			
11/16/2021	3.87	1.05			
11/17/2021	3.34	0.92			
11/18/2021	3.6	0.98			
11/19/2021	4.04	1.08			
11/20/2021	3.04	0.86			
11/21/2021	3.17	0.89			
11/22/2021	3.91	1.05			
11/23/2021	3.39	0.94			
11/24/2021	2.8	0.80			
11/25/2021	2.63	0.76			
11/26/2021	3.49	0.96			
11/27/2021	3.12	0.87			
11/28/2021	2.41	0.71			
11/29/2021	2.61	0.76			
11/30/2021	2.46	0.72			
12/1/2021	2.48	0.73			
12/2/2021	2.59	0.75			
12/3/2021	2.92	0.83			
12/4/2021	2.22	0.67			
12/5/2021	2.36	0.70			
12/6/2021	3.63	0.99			
12/7/2021	4.34	1.15			
12/8/2021	3.08	0.86			
12/9/2021	2.74	0.79			
12/10/2021	2.31	0.69			
12/11/2021	2.44	0.72			
12/12/2021	3.2	0.89			
12/13/2021	2.29	0.68			
12/14/2021	1.92	0.60			
12/15/2021	1.48	0.50			
12/16/2021	1.79	0.57			
12/17/2021	1.9	0.59			
12/18/2021	1.77	0.56			
12/19/2021	2.6	0.75			
12/20/2021	1.36	0.47			
12/21/2021	1.19	0.43			
12/22/2021	2.29	0.68			
12/23/2021	1.98	0.61			
12/24/2021	1.58	0.52			
12/25/2021	2.56	0.75			
12/26/2021	2.99	0.84			
12/27/2021	1.98	0.61			
12/28/2021	2.22	0.67			
12/29/2021	2.02	0.62			
12/30/2021	1.81	0.57			
12/31/2021	1.8	0.57			
1/1/2022	1.94	0.60			
1/2/2022	4.94	1.29			
1/3/2022	3.19	0.89			
1/4/2022	1.53	0.51			
1/5/2022	2.31	0.69			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
1/6/2022	2.95	0.83			
1/7/2022	2.78	0.80			
1/8/2022	1.84	0.58			
1/9/2022	1.78	0.57			
1/10/2022	2.88	0.82			
1/11/2022	1.8	0.57			
1/12/2022	0.95	0.38			
1/13/2022	1.02	0.39			
1/14/2022	Ice				
1/15/2022	Ice				
1/16/2022	0.69	0.32			
1/17/2022	8.94	2.21			
1/18/2022	6.39	1.62			
1/19/2022	3.93	1.06			
1/20/2022	4.36	1.16			
1/21/2022	3.25	0.90			
1/22/2022	2.14	0.65			
1/23/2022	1.82	0.58			
1/24/2022	1.82	0.58			
1/25/2022	1.86	0.59			
1/26/2022	1.58	0.52			
1/27/2022	1.16	0.43			
1/28/2022	1.06	0.40			
1/29/2022	2.04	0.63			
1/30/2022	1.46	0.49			
1/31/2022	1.1	0.41			
2/1/2022	0.96	0.38			
2/2/2022	1.14	0.42			
2/3/2022	3.63	0.99			
2/4/2022	14.1	3.39			
2/5/2022	6.97	1.75			
2/6/2022	3.57	0.98			
2/7/2022	3.17	0.89			
2/8/2022	5.23	1.36			
2/9/2022	4.19	1.12			
2/10/2022	3.68	1.00			
2/11/2022	3.76	1.02			
2/12/2022	4	1.08			
2/13/2022	3.96	1.07			
2/14/2022	2.89	0.82			
2/15/2022	2.22	0.67			
2/16/2022	2.07	0.63			
2/17/2022	2.85	0.81			
2/18/2022	8.64	2.14			
2/19/2022	5.02	1.31			
2/20/2022	3.09	0.87			
2/21/2022	2.72	0.78			
2/22/2022	3.96	1.07			
2/23/2022	7.51	1.88			
2/24/2022	4.1	1.10			
2/25/2022	4.49	1.19			
2/26/2022	4.02	1.08			
2/27/2022	3.57	0.98			
2/28/2022	3.29	0.91			
3/1/2022	2.8	0.80			
3/2/2022	3.16	0.88			
3/3/2022	3.3	0.91			
3/4/2022	2.51	0.73			
3/5/2022	2.18	0.66			
3/6/2022	3.04	0.86			
3/7/2022	3.42	0.94			
3/8/2022	3.26	0.91			
3/9/2022	3.05	0.86			
3/10/2022	3.83	1.04			
3/11/2022	3.44	0.95			
3/12/2022	4.07	1.09			
3/13/2022	3.14	0.88			
3/14/2022	2.76	0.79			
3/15/2022	2.57	0.75			
3/16/2022	2.37	0.70			
3/17/2022	2.61	0.76			
3/18/2022	2.62	0.76			
3/19/2022	2.32	0.69			
3/20/2022	3.02	0.85			
3/21/2022	2.18	0.66			
3/22/2022	1.68	0.54			
3/23/2022	1.64	0.54			
3/24/2022	4.46	1.18			
3/25/2022	8.39	2.08			
3/26/2022	6.2	1.58			
3/27/2022	6.07	1.55			
3/28/2022	2.83	0.81			
3/29/2022	0.53	0.28			
3/30/2022	0.55	0.29			
3/31/2022	0.69	0.32			
4/1/2022	6.26	1.59			
4/2/2022	4.12	1.10			
4/3/2022	3.32	0.92			
4/4/2022	3.06	0.86			
4/5/2022	2.4	0.71			
4/6/2022	4	1.08			
4/7/2022	8.21	2.04			

Date	USGS	WSP-1	ID	USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
4/8/2022	36.2	8.44			
4/9/2022	8.21	2.04			
4/10/2022	5.8	1.49			
4/11/2022	4.44	1.18			
4/12/2022	4.11	1.10			
4/13/2022	3.49	0.96			
4/14/2022	3.81	1.03			
4/15/2022	4.42	1.17			
4/16/2022	2.91	0.83			
4/17/2022	3.28	0.91			
4/18/2022	2.37	0.70			
4/19/2022	24.6	5.79			
4/20/2022	4.35	1.16			
4/21/2022	3.83	1.04			
4/22/2022	3.49	0.96			
4/23/2022	2.9	0.82			
4/24/2022	2.62	0.76			
4/25/2022	2.26	0.68			
4/26/2022	2.07	0.63			
4/27/2022	2.11	0.64			
4/28/2022	1.58	0.52			
4/29/2022	1.16	0.43			
4/30/2022	1.05	0.40			
5/1/2022	1.01	0.39			
5/2/2022	1.36	0.47			
5/3/2022	1.36	0.47			
5/4/2022	1.71	0.55			
5/5/2022	1.47	0.50			
5/6/2022	1.63	0.53			
5/7/2022	5.33	1.38			
5/8/2022	3.3	0.91			
5/9/2022	1.48	0.50			
5/10/2022	0.96	0.38			
5/11/2022	0.81	0.35			
5/12/2022	0.75	0.33			
5/13/2022	0.76	0.33			
5/14/2022	0.74	0.33			
5/15/2022	0.99	0.39			
5/16/2022	0.76	0.33			
5/17/2022	0.63	0.30			
5/18/2022	0.37	0.24			
5/19/2022	1.2	0.43			
5/20/2022	0.92	0.37			
5/21/2022	1.01	0.39			
5/22/2022	0.61	0.30			
5/23/2022	0.46	0.26			
5/24/2022	0.27	0.22			
5/25/2022	0.26	0.22			
5/26/2022	0.24	0.21			
5/27/2022	0.31	0.23			
5/28/2022	1.31	0.46			
5/29/2022	1.14	0.42			
5/30/2022	0.45	0.26			
5/31/2022	0.31	0.23			
6/1/2022	0.31	0.23			
6/2/2022	2.53	0.74			
6/3/2022	2.34	0.70			
6/4/2022					
6/5/2022	0.37	0.24			
6/6/2022					
6/7/2022					
6/8/2022	0.43	0.26			
6/9/2022	6.2	1.58			
6/10/2022	1.63	0.53			
6/11/2022	0.44	0.26			
6/12/2022	0.33	0.24			
6/13/2022	0.53	0.28			
6/14/2022					
6/15/2022					
6/16/2022					
6/17/2022	0.24	0.21			
6/18/2022	0.26	0.22			
6/19/2022	0.18	0.20			
6/20/2022	0.15	0.19			
6/21/2022	0.15	0.19			
6/22/2022	0.2	0.21			
6/23/2022	0.2	0.21			
6/24/2022	0.18	0.20			
6/25/2022	0.17	0.20			
6/26/2022	0.15	0.19			
6/27/2022	0.19	0.20			
6/28/2022	0.18	0.20			
6/29/2022	0.16	0.20			
6/30/2022	0.15	0.19			

USGS DTW October 2006-June 06 2022(cfs)	Flow Duration
0.0144	99.9%
0.0300	99.5%
0.0400	99.2%
0.0400	99.0%
0.0600	98.0%
0.0800	97.0%
0.0900	96.0%
0.1000	95.0%
0.1500	90.0%
0.2200	85.0%
0.2600	80.0%
0.3200	75.0%
0.4100	70.0%
0.5300	65.0%
0.6500	60.0%
0.7800	55.0%
0.9300	50.0%
1.4200	40%
2.2000	30.0%
3.3080	20.0%
5.4000	10.0%
8.4095	5.0%
22.0590	1.0%

Date	DTW (ft bg)	Elevation Equaled or
12/1/2007	0.85	52.7%
12/1/2008	5.14	11.2%
12/1/2009	2.29	29.2%
12/25/2010	0.23	83.8%
4/21/2020	3.43	19.4%
5/1/2021	1.24	43.7%
5/1/2022	1.01	48.4%
6/23/2022	0.20	86.4%
Target	3.308	20.0%

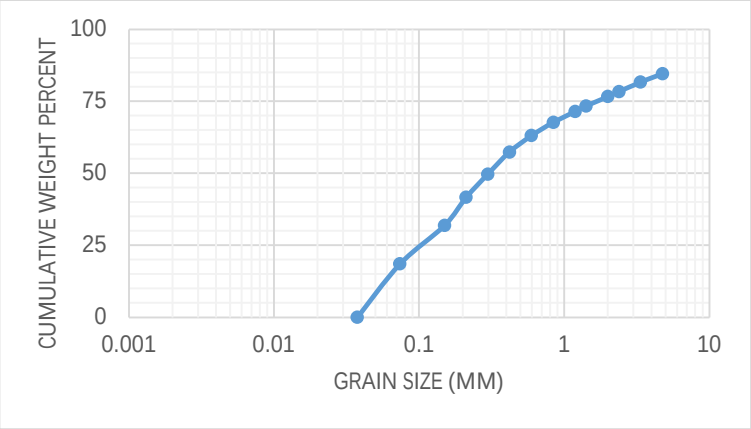
APPENDIX III

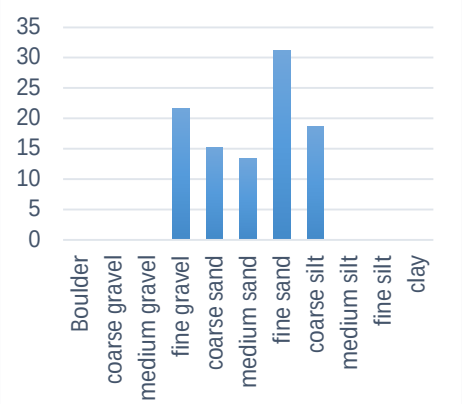
Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-304(6ft)

Mass Sample (g): 362.6 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	55.9	0.154164	84.58356
3.3528	10.5	0.028958	81.68781
2.37998	12	0.033094	78.37838
1.99898	6.1	0.016823	76.69608
1.4097	12	0.033094	73.38665
1.19126	6.7	0.018478	71.53889
0.84074	13.8	0.038058	67.73304
0.59436	16.7	0.046056	63.12741
0.4191	20.7	0.057088	57.41864
0.29718	27.8	0.076669	49.75179
0.21082	29.3	0.080805	41.67126
0.14986	35.1	0.096801	31.99117
0.07366	48.6	0.134032	18.58798
0.0375	67.4	0.18588	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.057	Uniformity Coef.	8.75
d17	0.071	n computed	0.30
d20	0.082	g (cm/s^2)	980.00
d50	0.301	ρ (g/cm^3)	0.9981
d60	0.498	μ (g/cm s)	0.0098
de (Kruger)	0.170	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.154	tau (Sauerbrei)	1.053
de (Zunker)	0.159	$d_{geometric\ mean}$	0.315
de (Zamarin)	0.165	σ_ϕ	2.539
Io (Alyameni)	-0.004		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	21.62162162
0.5 - 2	coarse sand	15.25096525
0.25 - 0.5	medium sand	13.37562052
0.063 - 0.25	fine sand	31.16381688
0.016 - 0.063	coarse silt	18.58797573
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

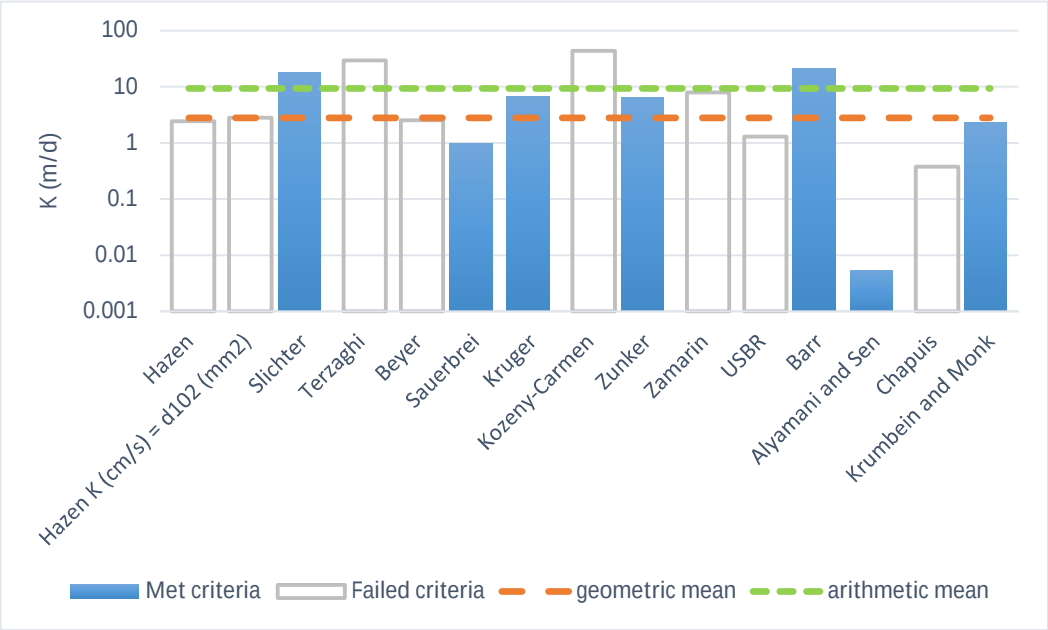
WSP USA.

K from Grain Size Analysis Report Date: #########

Sample Name: TP-304(6ft)

Mass Sample (g): 362.6 20 T (oC) 20

Poorly sorted gravelly sand low in fines



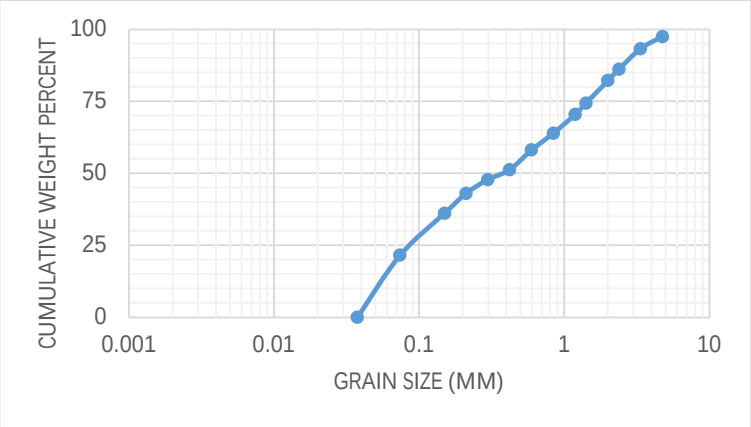
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.280E-02	.280E-04	2.42	7.9
Hazen K (cm/s) = d_{10} (mm)	.324E-02	.324E-04	2.80	9.2
Slichter	.208E-01	.208E-03	18.00	59.1
Terzaghi	.341E-01	.341E-03	29.44	96.6
Beyer	.294E-02	.294E-04	2.54	8.3
Sauerbrei	.115E-02	.115E-04	0.99	3.3
Kruger	.787E-02	.787E-04	6.80	22.3
Kozeny-Carmen	.508E-01	.508E-03	43.86	143.9
Zunker	.752E-02	.752E-04	6.50	21.3
Zamarin	.913E-02	.913E-04	7.89	25.9
USBR	.150E-02	.150E-04	1.30	4.3
Barr	.246E-01	.246E-03	21.24	69.7
Alyamani and Sen	.611E-05	.611E-07	0.01	0.0
Chapuis	.434E-03	.434E-05	0.38	1.2
Krumbein and Monk	.266E-02	.266E-04	2.30	7.5
Shepherd	.228E-01	.228E-03	19.71	64.7
geometric mean	.326E-02	.326E-04	2.82	9.3
arithmetic mean	.109E-01	.109E-03	9.44	31.0

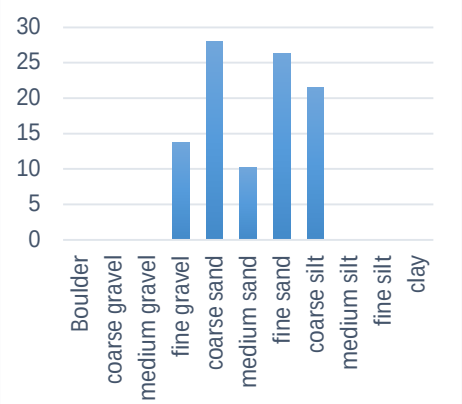
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-304 (3.5ft)

Mass Sample (g): 307.5 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	7.6	0.024715	97.52846
3.3528	13.1	0.042602	93.26829
2.37998	21.8	0.070894	86.17886
1.99898	12.1	0.03935	82.2439
1.4097	24.1	0.078374	74.4065
1.19126	11.9	0.038699	70.53659
0.84074	20.2	0.065691	63.96748
0.59436	18	0.058537	58.11382
0.4191	21.1	0.068618	51.25203
0.29718	10.4	0.033821	47.86992
0.21082	14.8	0.04813	43.05691
0.14986	21.1	0.068618	36.19512
0.07366	45	0.146341	21.56098
0.0375	66.3	0.21561	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.054	Uniformity Coef.	12.41
d17	0.066	n computed	0.28
d20	0.071	g (cm/s^2)	980.00
d50	0.374	ρ (g/cm^3)	0.9981
d60	0.674	μ (g/cm s)	0.0098
de (Kruger)	0.160	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.144	tau (Sauerbrei)	1.053
de (Zunker)	0.149	$d_{geometric\ mean}$	0.354
de (Zamarin)	0.154	σ_ϕ	2.241
Io (Alyameni)	-0.026		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	13.82113821
0.5 - 2	coarse sand	28.06504065
0.25 - 0.5	medium sand	10.24390244
0.063 - 0.25	fine sand	26.30894309
0.016 - 0.063	coarse silt	21.56097561
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

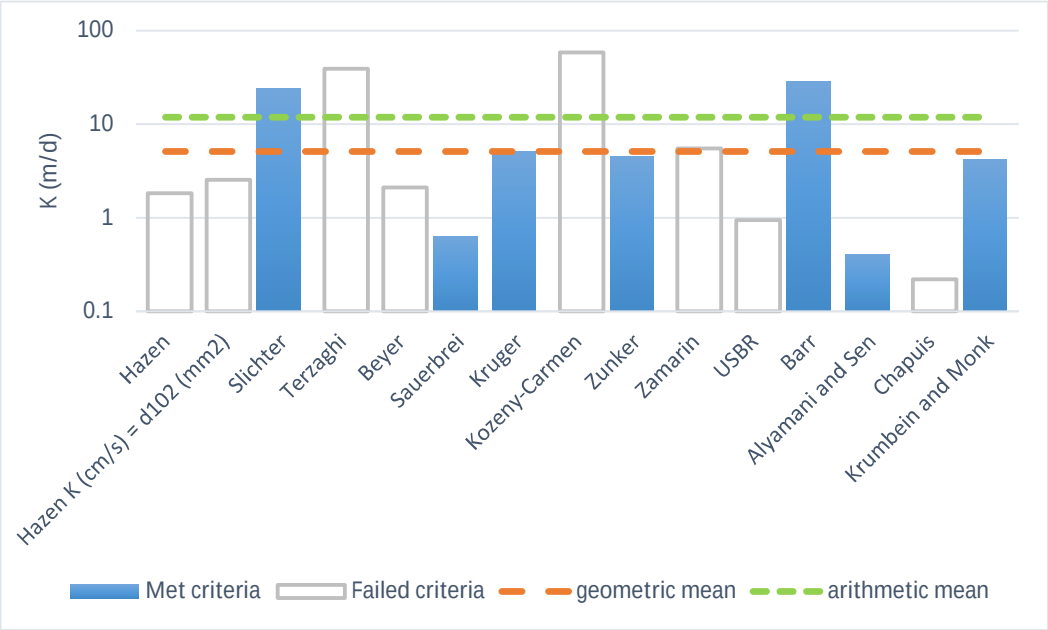
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-304 (3.5ft)

Mass Sample (g): 307.5 20 T (oC) 20

Poorly sorted gravelly sand low in fines



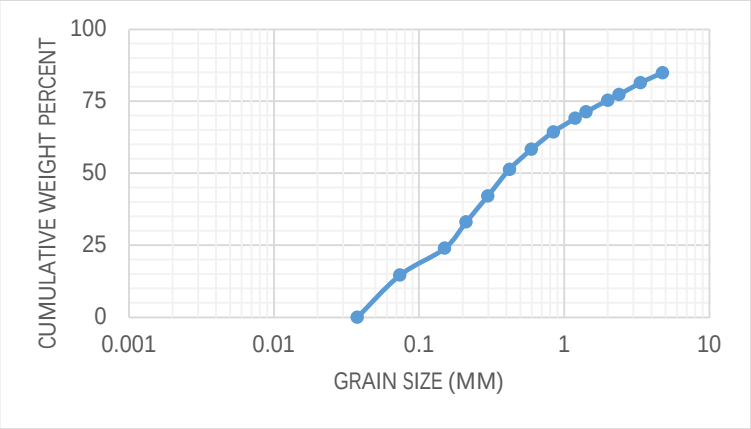
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.211E-02	.211E-04	1.82	6.0
Hazen K (cm/s) = d_{10} (mm)	.295E-02	.295E-04	2.54	8.3
Slichter	.276E-01	.276E-03	23.84	78.2
Terzaghi	.454E-01	.454E-03	39.27	128.8
Beyer	.244E-02	.244E-04	2.11	6.9
Sauerbrei	.726E-03	.726E-05	0.63	2.1
Kruger	.596E-02	.596E-04	5.15	16.9
Kozeny-Carmen	.679E-01	.679E-03	58.64	192.4
Zunker	.520E-02	.520E-04	4.49	14.7
Zamarin	.636E-02	.636E-04	5.49	18.0
USBR	.109E-02	.109E-04	0.94	3.1
Barr	.329E-01	.329E-03	28.40	93.2
Alyamani and Sen	.469E-03	.469E-05	0.41	1.3
Chapuis	.254E-03	.254E-05	0.22	0.7
Krumbein and Monk	.495E-02	.495E-04	4.27	14.0
Shepherd	.326E-01	.326E-03	28.18	92.4
geometric mean	.594E-02	.594E-04	5.13	16.8
arithmetic mean	.138E-01	.138E-03	11.92	39.1

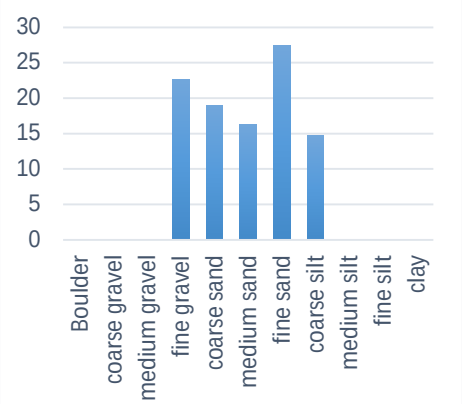
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-303 (8 ft)

Mass Sample (g): 356.7 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	53.7	0.150547	84.94533
3.3528	12.4	0.034763	81.46902
2.37998	14.7	0.041211	77.34791
1.99898	7	0.019624	75.38548
1.4097	14.3	0.04009	71.37651
1.19126	8.1	0.022708	69.10569
0.84074	16.8	0.047098	64.39585
0.59436	21.4	0.059994	58.39641
0.4191	25	0.070087	51.38772
0.29718	33	0.092515	42.13625
0.21082	32.1	0.089992	33.13709
0.14986	32.6	0.091393	23.99776
0.07366	33.2	0.093075	14.69022
0.0375	52.4	0.146902	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.062	Uniformity Coef.	10.63
d17	0.093	n computed	0.29
d20	0.117	g (cm/s^2)	980.00
d50	0.401	ρ (g/cm^3)	0.9981
d60	0.660	μ (g/cm s)	0.0098
de (Kruger)	0.203	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.185	tau (Sauerbrei)	1.053
de (Zunker)	0.191	$d_{geometric\ mean}$	0.384
de (Zamarin)	0.197	σ_ϕ	2.444
Io (Alyameni)	-0.023		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	22.65208859
0.5 - 2	coarse sand	18.95149986
0.25 - 0.5	medium sand	16.2601626
0.063 - 0.25	fine sand	27.44603308
0.016 - 0.063	coarse silt	14.69021587
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

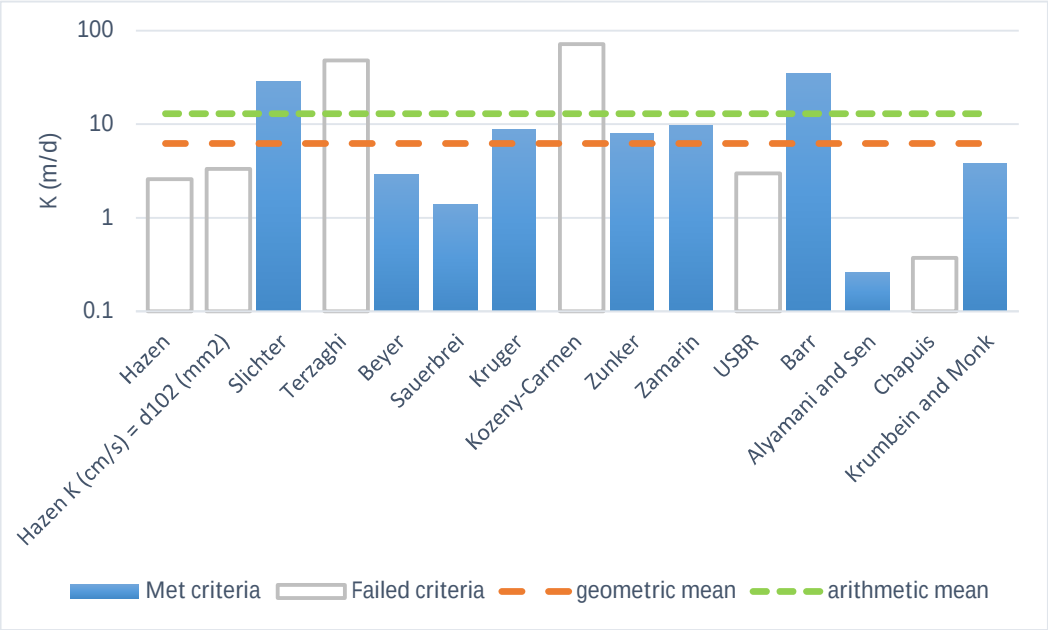
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-303 (8 ft)

Mass Sample (g): 356.7 20 T (oC) 20

Poorly sorted gravelly sand low in fines



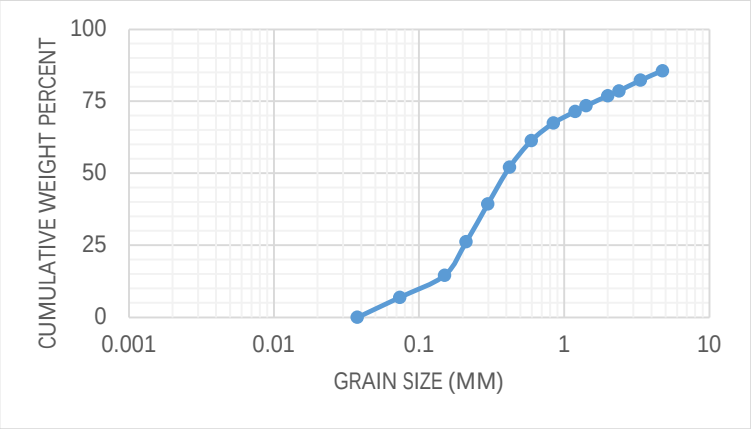
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.299E-02	.299E-04	2.59	8.5
Hazen K (cm/s) = d_{10} (mm)	.386E-02	.386E-04	3.33	10.9
Slichter	.335E-01	.335E-03	28.96	95.0
Terzaghi	.554E-01	.554E-03	47.89	157.1
Beyer	.333E-02	.333E-04	2.88	9.4
Sauerbrei	.163E-02	.163E-04	1.41	4.6
Kruger	.102E-01	.102E-03	8.82	28.9
Kozeny-Carmen	.830E-01	.830E-03	71.67	235.1
Zunker	.936E-02	.936E-04	8.09	26.5
Zamarin	.114E-01	.114E-03	9.82	32.2
USBR	.344E-02	.344E-04	2.97	9.7
Barr	.402E-01	.402E-03	34.71	113.9
Alyamani and Sen	.299E-03	.299E-05	0.26	0.8
Chapuis	.430E-03	.430E-05	0.37	1.2
Krumbein and Monk	.446E-02	.446E-04	3.85	12.6
Shepherd	.366E-01	.366E-03	31.59	103.6
geometric mean	.722E-02	.722E-04	6.24	20.5
arithmetic mean	.151E-01	.151E-03	13.04	42.8

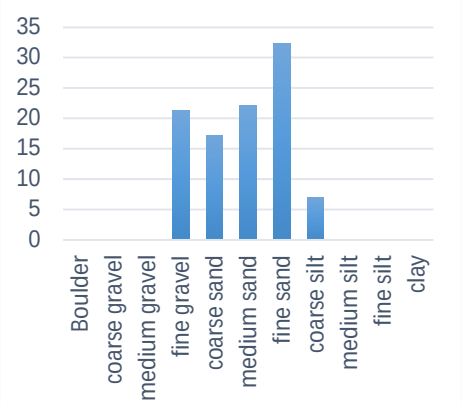
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-303 (6 ft)

Mass Sample (g): 348.1 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	50.1	0.143924	85.60758
3.3528	11.3	0.032462	82.36139
2.37998	13	0.037346	78.62683
1.99898	5.8	0.016662	76.96064
1.4097	12.1	0.03476	73.48463
1.19126	6.8	0.019535	71.53117
0.84074	14.2	0.040793	67.45188
0.59436	21.1	0.060615	61.39041
0.4191	32.2	0.092502	52.14019
0.29718	44.6	0.128124	39.32778
0.21082	45.6	0.130997	26.2281
0.14986	40.3	0.115771	14.65096
0.07366	26.8	0.076989	6.952025
0.0375	24.2	0.06952	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.104	Uniformity Coef.	5.47
d17	0.162	n computed	0.35
d20	0.178	g (cm/s^2)	980.00
d50	0.399	ρ (g/cm^3)	0.9981
d60	0.568	μ (g/cm s)	0.0098
de (Kruger)	0.261	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.243	tau (Sauerbrei)	1.053
de (Zunker)	0.249	$d_{geometric\ mean}$	0.424
de (Zamarin)	0.255	σ_ϕ	2.139
Io (Alyameni)	0.030		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	21.37316863
0.5 - 2	coarse sand	17.23642631
0.25 - 0.5	medium sand	22.06262568
0.063 - 0.25	fine sand	32.37575409
0.016 - 0.063	coarse silt	6.95202528
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

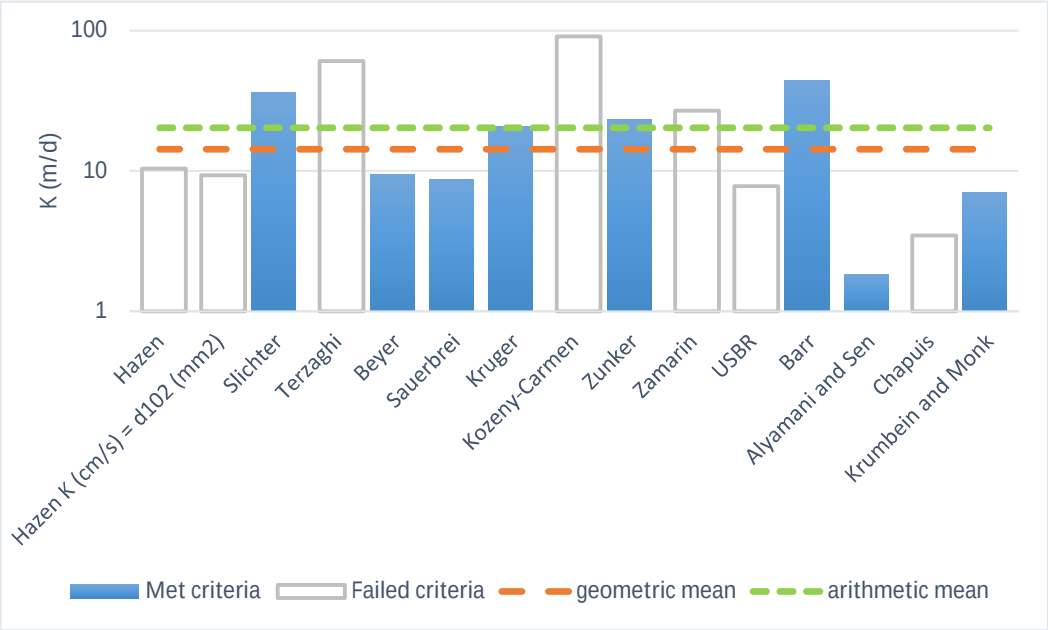
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-303 (6 ft)

Mass Sample (g): 348.1 20 T (oC) 20

Poorly sorted gravelly sand low in fines



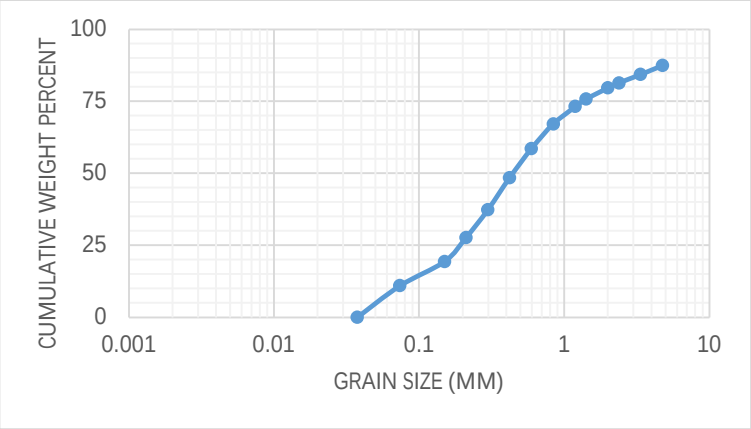
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.120E-01	.120E-03	10.38	34.1
Hazen K (cm/s) = d_{10} (mm)	.108E-01	.108E-03	9.31	30.6
Slichter	.423E-01	.423E-03	36.57	120.0
Terzaghi	.703E-01	.703E-03	60.72	199.2
Beyer	.109E-01	.109E-03	9.43	30.9
Sauerbrei	.101E-01	.101E-03	8.74	28.7
Kruger	.240E-01	.240E-03	20.75	68.1
Kozeny-Carmen	.105E+00	.105E-02	91.11	298.9
Zunker	.269E-01	.269E-03	23.25	76.3
Zamarin	.312E-01	.312E-03	26.94	88.4
USBR	.900E-02	.900E-04	7.78	25.5
Barr	.511E-01	.511E-03	44.13	144.8
Alyamani and Sen	.211E-02	.211E-04	1.83	6.0
Chapuis	.402E-02	.402E-04	3.47	11.4
Krumbein and Monk	.812E-02	.812E-04	7.01	23.0
Shepherd	.363E-01	.363E-03	31.32	102.8
geometric mean	.166E-01	.166E-03	14.35	47.1
arithmetic mean	.235E-01	.235E-03	20.34	66.7

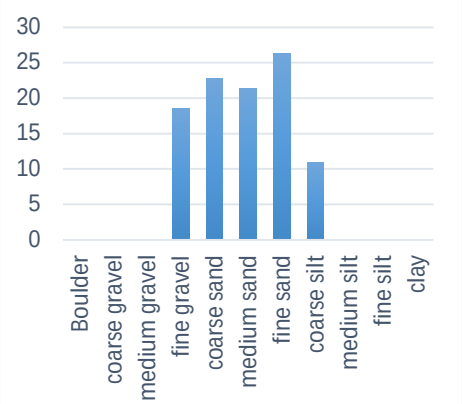
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-303 (2 ft)

Mass Sample (g): 289 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	36.2	0.12526	87.47405
3.3528	9	0.031142	84.35986
2.37998	8.5	0.029412	81.41869
1.99898	5	0.017301	79.68858
1.4097	11.3	0.0391	75.77855
1.19126	7.3	0.02526	73.2526
0.84074	17.6	0.0609	67.16263
0.59436	24.6	0.085121	58.65052
0.4191	29.5	0.102076	48.44291
0.29718	32.1	0.111073	37.33564
0.21082	27.7	0.095848	27.75087
0.14986	24.1	0.083391	19.41176
0.07366	24.3	0.084083	11.00346
0.0375	31.8	0.110035	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.070	Uniformity Coef.	9.00
d17	0.128	n computed	0.30
d20	0.154	g (cm/s^2)	980.00
d50	0.446	ρ (g/cm^3)	0.9981
d60	0.633	μ (g/cm s)	0.0098
de (Kruger)	0.231	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.212	tau (Sauerbrei)	1.053
de (Zunker)	0.218	$d_{geometric\ mean}$	0.410
de (Zamarin)	0.225	σ_ϕ	2.188
Io (Alyameni)	-0.024		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	18.58131488
0.5 - 2	coarse sand	22.76816609
0.25 - 0.5	medium sand	21.31487889
0.063 - 0.25	fine sand	26.33217993
0.016 - 0.063	coarse silt	11.00346021
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

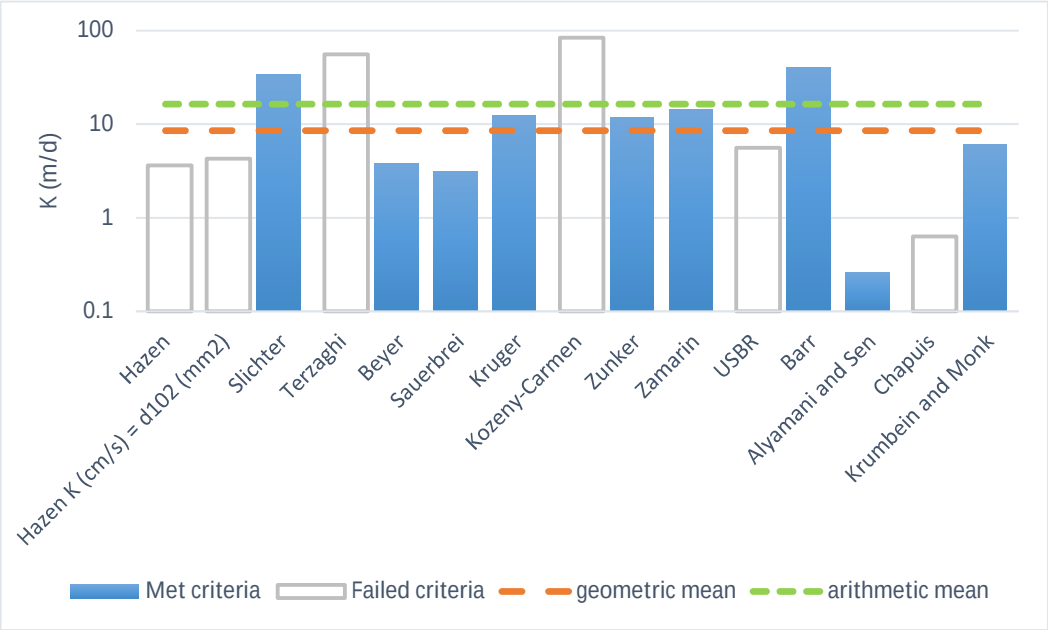
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-303 (2 ft)

Mass Sample (g): 289 20 T (oC) 20

Poorly sorted gravelly sand low in fines



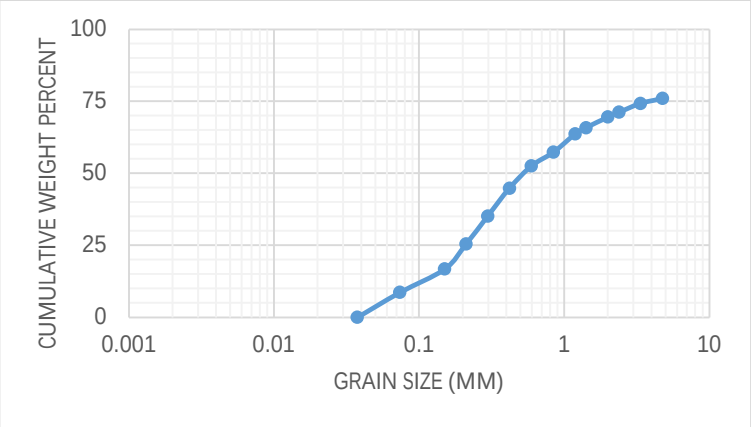
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.421E-02	.421E-04	3.64	11.9
Hazen K (cm/s) = d_{10} (mm)	.495E-02	.495E-04	4.28	14.0
Slichter	.391E-01	.391E-03	33.79	110.8
Terzaghi	.648E-01	.648E-03	56.03	183.8
Beyer	.446E-02	.446E-04	3.85	12.6
Sauerbrei	.366E-02	.366E-04	3.17	10.4
Kruger	.143E-01	.143E-03	12.39	40.7
Kozeny-Carmen	.972E-01	.972E-03	83.99	275.6
Zunker	.138E-01	.138E-03	11.94	39.2
Zamarin	.167E-01	.167E-03	14.39	47.2
USBR	.647E-02	.647E-04	5.59	18.3
Barr	.471E-01	.471E-03	40.68	133.5
Alyamani and Sen	.300E-03	.300E-05	0.26	0.9
Chapuis	.732E-03	.732E-05	0.63	2.1
Krumbein and Monk	.711E-02	.711E-04	6.14	20.2
Shepherd	.436E-01	.436E-03	37.66	123.6
geometric mean	.992E-02	.992E-04	8.57	28.1
arithmetic mean	.190E-01	.190E-03	16.43	53.9

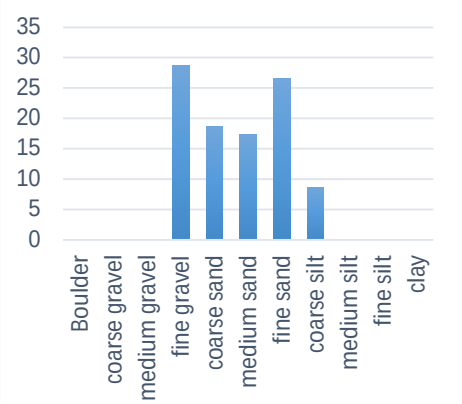
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-302 (5 ft)

Mass Sample (g): 345 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	82.7	0.23971	76.02899
3.3528	6	0.017391	74.28986
2.37998	10.6	0.030725	71.21739
1.99898	5.6	0.016232	69.5942
1.4097	12.9	0.037391	65.85507
1.19126	7.4	0.021449	63.71014
0.84074	21.9	0.063478	57.36232
0.59436	16.4	0.047536	52.6087
0.4191	26.7	0.077391	44.86957
0.29718	33.4	0.096812	35.18841
0.21082	33.4	0.096812	25.50725
0.14986	30.1	0.087246	16.78261
0.07366	28	0.081159	8.666667
0.0375	29.9	0.086667	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.086	Uniformity Coef.	11.45
d17	0.151	n computed	0.29
d20	0.172	g (cm/s^2)	980.00
d50	0.535	ρ (g/cm^3)	0.9981
d60	0.986	μ (g/cm s)	0.0098
de (Kruger)	0.266	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.245	tau (Sauerbrei)	1.053
de (Zunker)	0.252	$d_{geometric\ mean}$	0.449
de (Zamarin)	0.259	σ_ϕ	2.311
Io (Alyameni)	-0.026		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	28.7826087
0.5 - 2	coarse sand	18.60869565
0.25 - 0.5	medium sand	17.42028986
0.063 - 0.25	fine sand	26.52173913
0.016 - 0.063	coarse silt	8.666666667
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

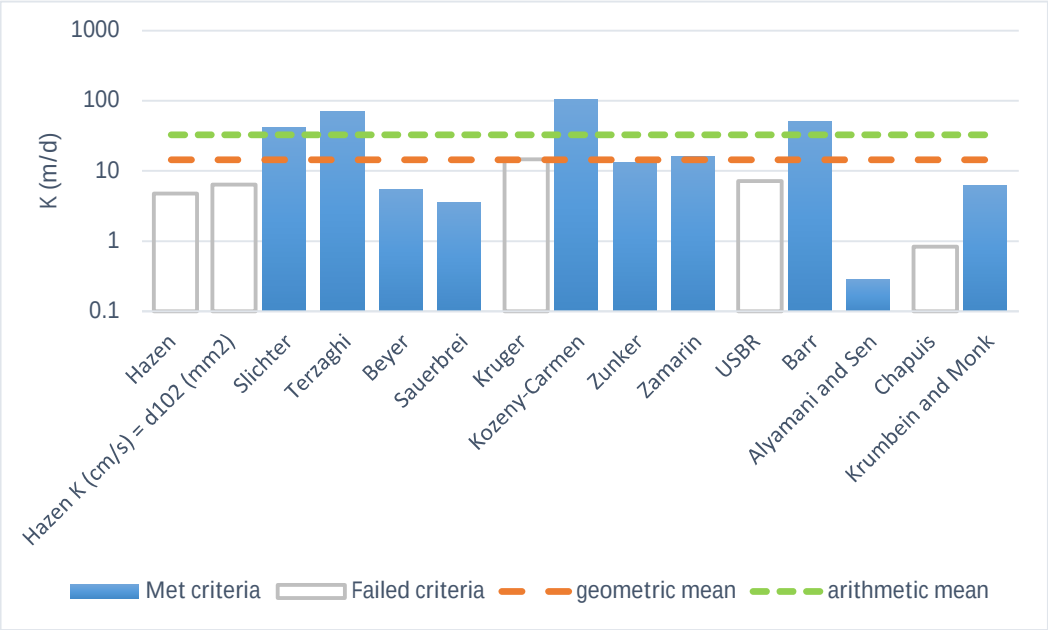
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-302 (5 ft)

Mass Sample (g): 345 20 T (oC) 20

Poorly sorted gravelly sand low in fines



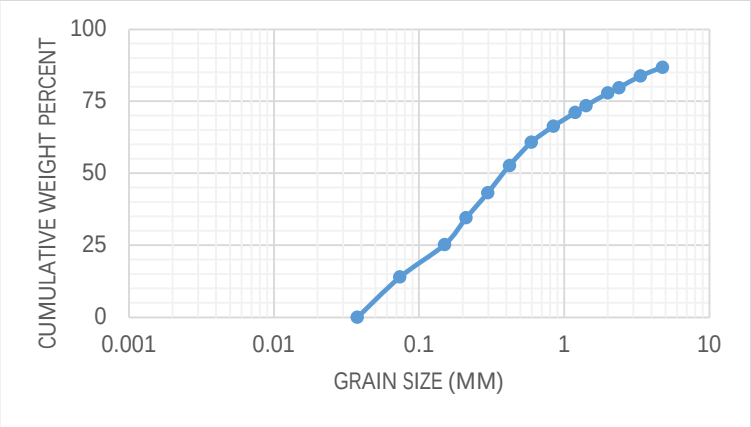
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.554E-02	.554E-04	4.79	15.7
Hazen K (cm/s) = d_{10} (mm)	.743E-02	.743E-04	6.42	21.1
Slichter	.484E-01	.484E-03	41.83	137.2
Terzaghi	.806E-01	.806E-03	69.60	228.4
Beyer	.629E-02	.629E-04	5.44	17.8
Sauerbrei	.408E-02	.408E-04	3.53	11.6
Kruger	.170E-01	.170E-03	14.72	48.3
Kozeny-Carmen	.121E+00	.121E-02	104.59	343.1
Zunker	.155E-01	.155E-03	13.40	44.0
Zamarin	.187E-01	.187E-03	16.18	53.1
USBR	.836E-02	.836E-04	7.22	23.7
Barr	.586E-01	.586E-03	50.66	166.2
Alyamani and Sen	.333E-03	.333E-05	0.29	0.9
Chapuis	.966E-03	.966E-05	0.83	2.7
Krumbein and Monk	.728E-02	.728E-04	6.29	20.6
Shepherd	.589E-01	.589E-03	50.92	167.1
geometric mean	.168E-01	.168E-03	14.49	47.5
arithmetic mean	.382E-01	.382E-03	32.98	108.2

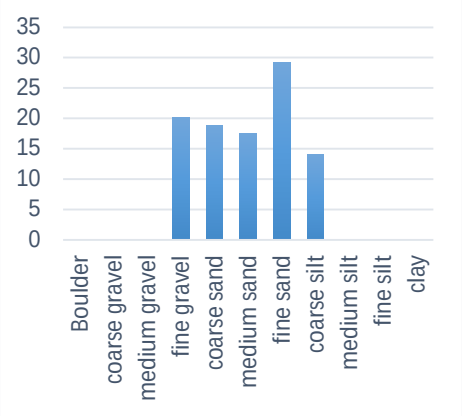
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-301 (7.5 ft)

Mass Sample (g): 353.6 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	46.5	0.131505	86.84955
3.3528	10.6	0.029977	83.85181
2.37998	14.5	0.041007	79.75113
1.99898	6.6	0.018665	77.88462
1.4097	15.4	0.043552	73.52941
1.19126	8.5	0.024038	71.12557
0.84074	16.8	0.047511	66.37443
0.59436	19.5	0.055147	60.85973
0.4191	28.7	0.081165	52.74321
0.29718	33.5	0.09474	43.26923
0.21082	30.8	0.087104	34.55882
0.14986	32.8	0.09276	25.28281
0.07366	39.9	0.112839	13.99887
0.0375	49.5	0.139989	0

Effective Grain Diameters (mm)	
d10	0.063
d17	0.094
d20	0.114
d50	0.384
d60	0.576
de (Kruger)	0.200
de (Kozeny)	0.182
de (Zunker)	0.188
de (Zamarin)	0.194
Io (Alyameni)	-0.017

Other Useful Parameters	
Uniformity Coef.	9.09
n computed	0.30
g (cm/s^2)	980.00
ρ (g/cm^3)	0.9981
μ (g/cm s)	0.0098
ρg/μ (1/cm s)	9.9327E+04
tau (Sauerbrei)	1.053
$d_{geometric\ mean}$	0.370
σ_ϕ	2.337

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	20.24886878
0.5 - 2	coarse sand	18.89140271
0.25 - 0.5	medium sand	17.59049774
0.063 - 0.25	fine sand	29.27036199
0.016 - 0.063	coarse silt	13.99886878
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

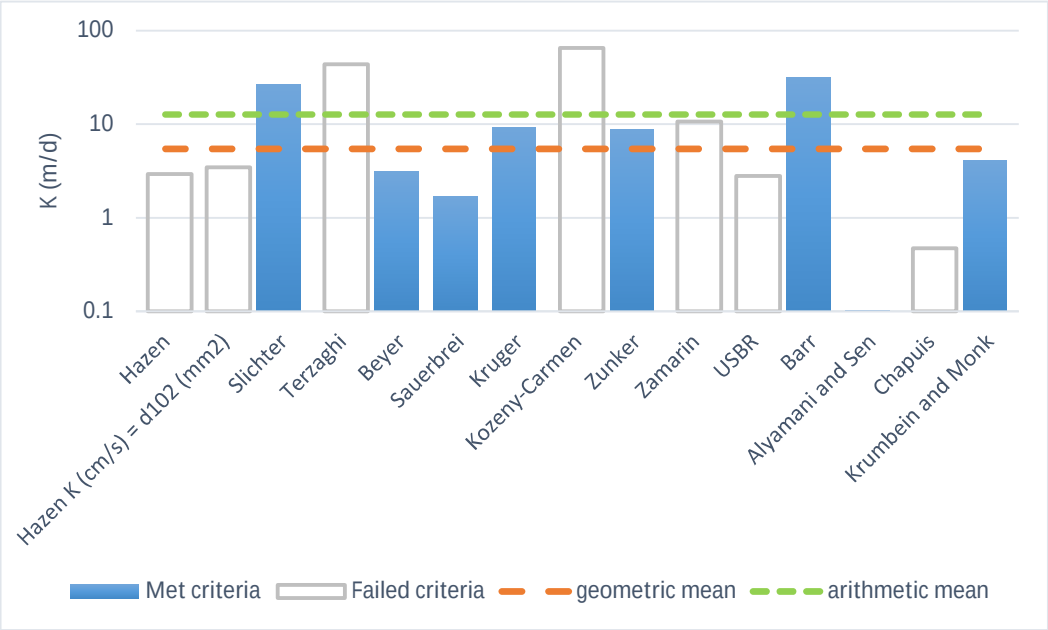
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-301 (7.5 ft)

Mass Sample (g): 353.6 20 T (oC) 20

Poorly sorted gravelly sand low in fines



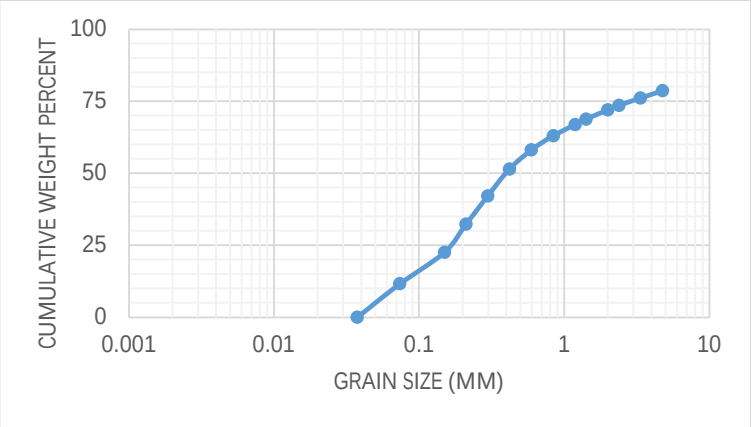
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.339E-02	.339E-04	2.93	9.6
Hazen K (cm/s) = d_{10} (mm)	.401E-02	.401E-04	3.47	11.4
Slichter	.307E-01	.307E-03	26.57	87.2
Terzaghi	.508E-01	.508E-03	43.85	143.9
Beyer	.361E-02	.361E-04	3.11	10.2
Sauerbrei	.195E-02	.195E-04	1.69	5.5
Kruger	.107E-01	.107E-03	9.22	30.2
Kozeny-Carmen	.759E-01	.759E-03	65.57	215.1
Zunker	.102E-01	.102E-03	8.79	28.8
Zamarin	.123E-01	.123E-03	10.64	34.9
USBR	.324E-02	.324E-04	2.80	9.2
Barr	.368E-01	.368E-03	31.76	104.2
Alyamani and Sen	.116E-03	.116E-05	0.10	0.3
Chapuis	.547E-03	.547E-05	0.47	1.5
Krumbein and Monk	.478E-02	.478E-04	4.13	13.5
Shepherd	.340E-01	.340E-03	29.41	96.5
geometric mean	.633E-02	.633E-04	5.47	17.9
arithmetic mean	.148E-01	.148E-03	12.75	41.8

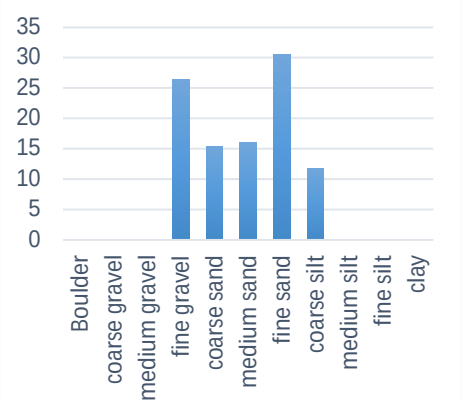
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-301 (2.5 ft)

Mass Sample (g): 359.6 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	76.7	0.213293	78.67075
3.3528	9	0.025028	76.16796
2.37998	9.1	0.025306	73.63737
1.99898	5.6	0.015573	72.08009
1.4097	11.7	0.032536	68.82647
1.19126	6.8	0.01891	66.93548
0.84074	13.8	0.038376	63.09789
0.59436	17.7	0.049221	58.17575
0.4191	24	0.066741	51.50167
0.29718	33.5	0.093159	42.18576
0.21082	35.1	0.097608	32.42492
0.14986	35.2	0.097887	22.63626
0.07366	39.3	0.109288	11.70745
0.0375	42.1	0.117075	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.068	Uniformity Coef.	10.03
d17	0.111	n computed	0.29
d20	0.131	g (cm/s^2)	980.00
d50	0.399	ρ (g/cm^3)	0.9981
d60	0.686	μ (g/cm s)	0.0098
de (Kruger)	0.219	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.201	tau (Sauerbrei)	1.053
de (Zunker)	0.207	$d_{geometric\ mean}$	0.382
de (Zamarin)	0.213	σ_ϕ	2.428
Io (Alyameni)	-0.014		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	26.36262514
0.5 - 2	coarse sand	15.46162403
0.25 - 0.5	medium sand	15.98998888
0.063 - 0.25	fine sand	30.47830923
0.016 - 0.063	coarse silt	11.70745273
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

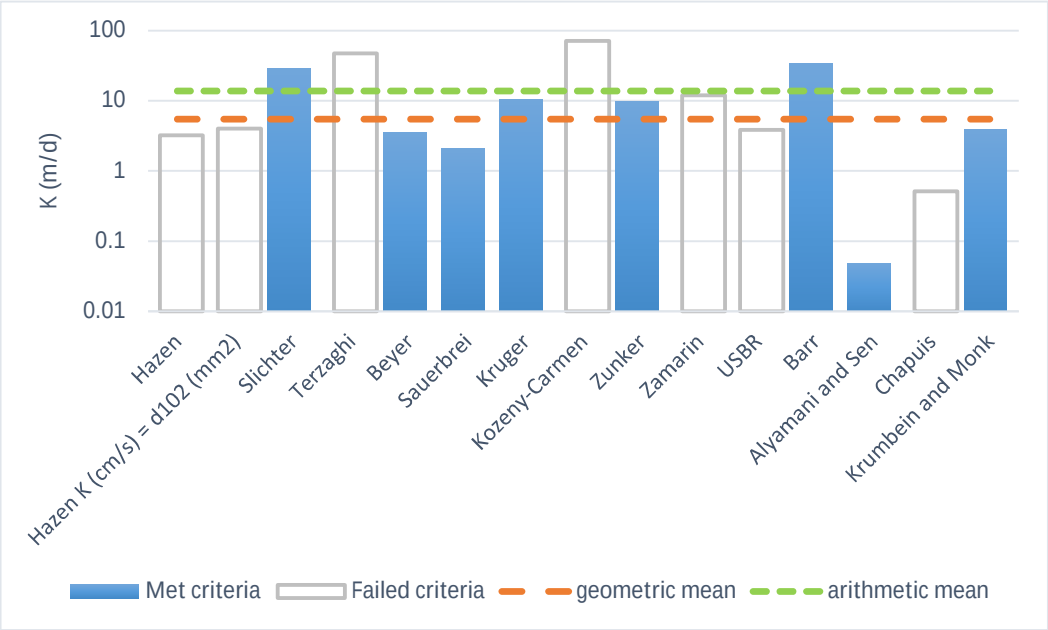
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TP-301 (2.5 ft)

Mass Sample (g): 359.6 20 T (oC) 20

Poorly sorted gravelly sand low in fines



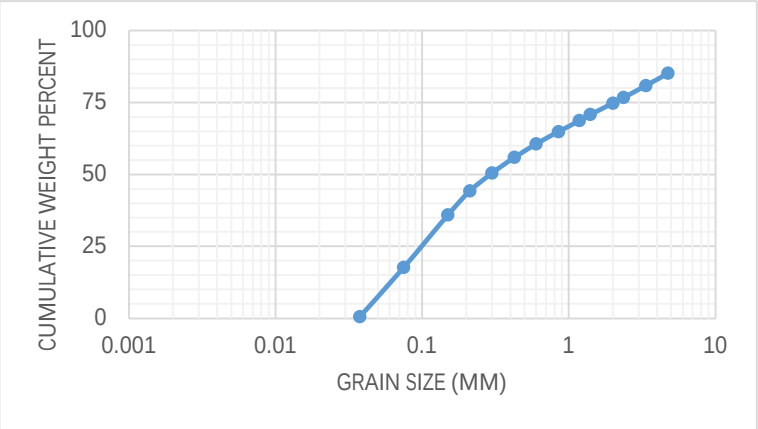
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.375E-02	.375E-04	3.24	10.6
Hazen K (cm/s) = d_{10} (mm)	.468E-02	.468E-04	4.04	13.3
Slichter	.333E-01	.333E-03	28.75	94.3
Terzaghi	.550E-01	.550E-03	47.54	156.0
Beyer	.410E-02	.410E-04	3.54	11.6
Sauerbrei	.246E-02	.246E-04	2.12	7.0
Kruger	.123E-01	.123E-03	10.59	34.7
Kozeny-Carmen	.823E-01	.823E-03	71.13	233.4
Zunker	.114E-01	.114E-03	9.87	32.4
Zamarin	.138E-01	.138E-03	11.96	39.2
USBR	.448E-02	.448E-04	3.87	12.7
Barr	.399E-01	.399E-03	34.45	113.0
Alyamani and Sen	.560E-04	.560E-06	0.05	0.2
Chapuis	.595E-03	.595E-05	0.51	1.7
Krumbein and Monk	.453E-02	.453E-04	3.92	12.8
Shepherd	.364E-01	.364E-03	31.41	103.1
geometric mean	.637E-02	.637E-04	5.50	18.1
arithmetic mean	.160E-01	.160E-03	13.86	45.5

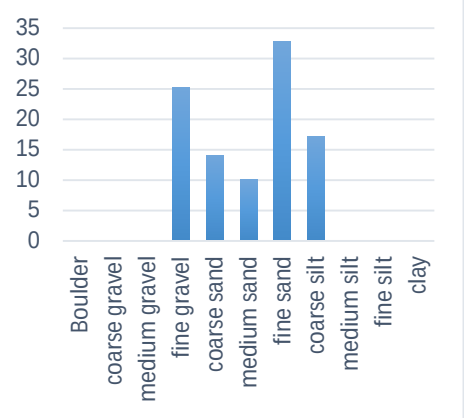
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-6 - (10 - 12) ft bg

Mass Sample (g): 168.3 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	25	0.148544	85.14557
3.35	7.2	0.042781	80.8675
2.36	7	0.041592	76.70826
2	3.3	0.019608	74.74747
1.4	6.6	0.039216	70.82591
1.18	3.6	0.02139	68.68687
0.85	6.4	0.038027	64.88414
0.6	7.1	0.042187	60.66548
0.425	8	0.047534	55.91206
0.3	9.1	0.05407	50.50505
0.212	10.4	0.061794	44.32561
0.15	14.1	0.083779	35.94771
0.075	30.6	0.181818	17.76589
0.0375	28.9	0.171717	0.594177

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.058	Uniformity Coef.	9.92
d17	0.073	n computed	0.30
d20	0.084	g (cm/s^2)	980.00
d50	0.293	ρ (g/cm^3)	0.9981
d60	0.576	μ (g/cm s)	0.0098
de (Kruger)	0.173	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.156	tau (Sauerbrei)	1.053
de (Zunker)	0.162	$d_{geometric\ mean}$	0.332
de (Zamarin)	0.167	σ_ϕ	2.518
lo (Alyameni)	-0.001		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	25.25252525
0.5 - 2	coarse sand	14.08199643
0.25 - 0.5	medium sand	10.16042781
0.063 - 0.25	fine sand	32.73915627
0.016 - 0.063	coarse silt	17.17171717
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

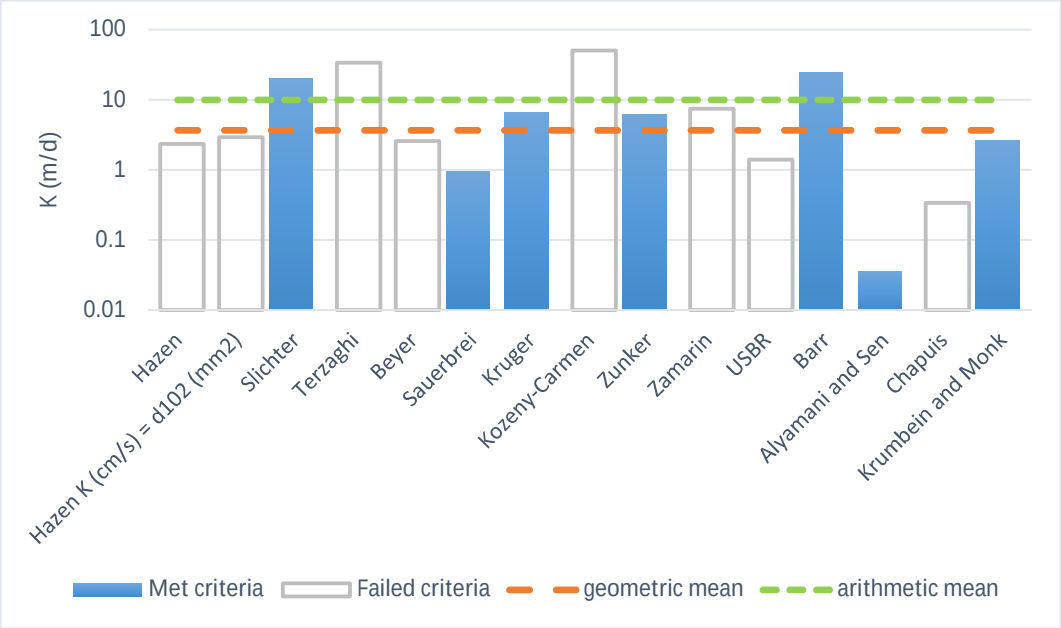
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-6 - (10 - 12) ft bg

Mass Sample (g): 168.3 20 T (oC) 20

Poorly sorted gravelly sand low in fines



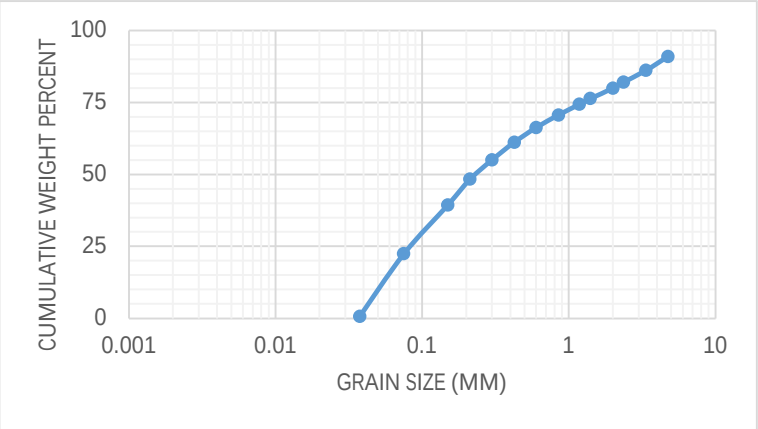
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.271E-02	.271E-04	2.35	7.7
Hazen K (cm/s) = d_{10} (mm)	.337E-02	.337E-04	2.91	9.5
Slichter	.238E-01	.238E-03	20.53	67.3
Terzaghi	.390E-01	.390E-03	33.68	110.5
Beyer	.296E-02	.296E-04	2.56	8.4
Sauerbrei	.109E-02	.109E-04	0.94	3.1
Kruger	.767E-02	.767E-04	6.63	21.8
Kozeny-Carmen	.581E-01	.581E-03	50.23	164.8
Zunker	.705E-02	.705E-04	6.09	20.0
Zamarin	.861E-02	.861E-04	7.44	24.4
USBR	.161E-02	.161E-04	1.39	4.6
Barr	.282E-01	.282E-03	24.33	79.8
Alyamani and Sen	.410E-04	.410E-06	0.04	0.1
Chapuis	.389E-03	.389E-05	0.34	1.1
Krumbein and Monk	.304E-02	.304E-04	2.63	8.6
Shepherd	.218E-01	.218E-03	18.82	61.7
geometric mean	.425E-02	.425E-04	3.68	12.1
arithmetic mean	.116E-01	.116E-03	10.00	32.8

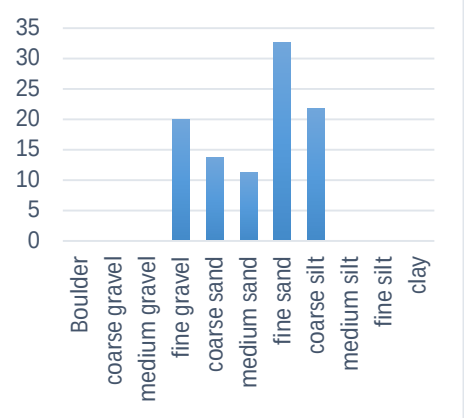
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-6 - (8 - 10) ft bg

Mass Sample (g): 161.5 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	14.6	0.090402	90.95975
3.35	7.8	0.048297	86.13003
2.36	6.6	0.040867	82.04334
2	3.3	0.020433	80
1.4	5.9	0.036533	76.34675
1.18	3.2	0.019814	74.36533
0.85	6	0.037152	70.65015
0.6	7	0.043344	66.31579
0.425	8.3	0.051393	61.17647
0.3	9.8	0.060681	55.10836
0.212	10.9	0.067492	48.35913
0.15	14.4	0.089164	39.44272
0.075	27.4	0.169659	22.47678
0.0375	35.2	0.217957	0.681115

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.054	Uniformity Coef.	7.49
d17	0.066	n computed	0.32
d20	0.071	g (cm/s^2)	980.00
d50	0.233	ρ (g/cm^3)	0.9981
d60	0.401	μ (g/cm s)	0.0098
de (Kruger)	0.152	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.137	tau (Sauerbrei)	1.053
de (Zunker)	0.142	$d_{geometric\ mean}$	0.292
de (Zamarin)	0.147	σ_ϕ	2.396
lo (Alyameni)	0.009		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	20
0.5 - 2	coarse sand	13.68421053
0.25 - 0.5	medium sand	11.20743034
0.063 - 0.25	fine sand	32.63157895
0.016 - 0.063	coarse silt	21.79566563
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

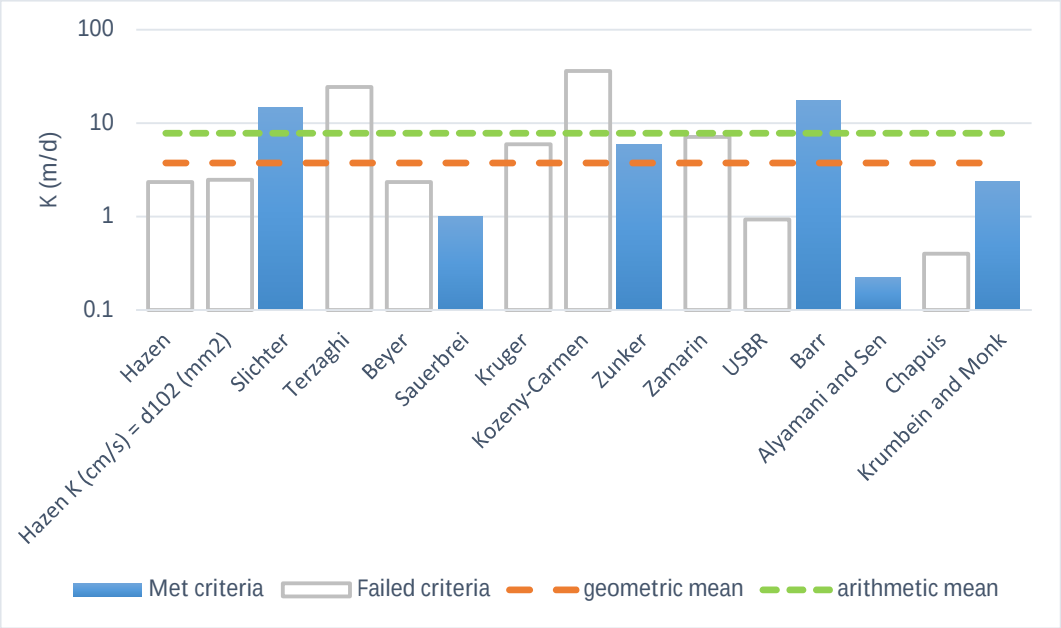
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-6 - (8 - 10) ft bg

Mass Sample (g): 161.5 20 T (oC) 20

Poorly sorted gravelly sand low in fines



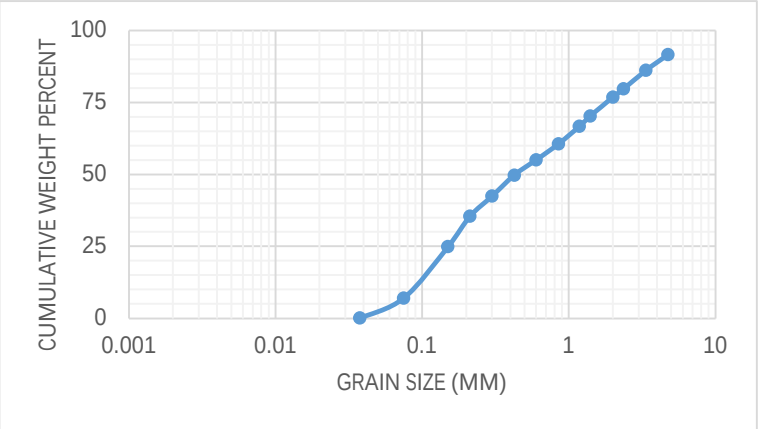
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.270E-02	.270E-04	2.33	7.7
Hazen K (cm/s) = d_{10} (mm)	.287E-02	.287E-04	2.48	8.1
Slichter	.172E-01	.172E-03	14.90	48.9
Terzaghi	.281E-01	.281E-03	24.24	79.5
Beyer	.270E-02	.270E-04	2.33	7.7
Sauerbrei	.117E-02	.117E-04	1.01	3.3
Kruger	.684E-02	.684E-04	5.91	19.4
Kozeny-Carmen	.417E-01	.417E-03	36.05	118.3
Zunker	.676E-02	.676E-04	5.84	19.2
Zamarin	.819E-02	.819E-04	7.08	23.2
USBR	.108E-02	.108E-04	0.93	3.1
Barr	.202E-01	.202E-03	17.46	57.3
Alyamani and Sen	.257E-03	.257E-05	0.22	0.7
Chapuis	.463E-03	.463E-05	0.40	1.3
Krumbein and Monk	.275E-02	.275E-04	2.38	7.8
Shepherd	.150E-01	.150E-03	12.94	42.5
geometric mean	.434E-02	.434E-04	3.75	12.3
arithmetic mean	.905E-02	.905E-04	7.82	25.7

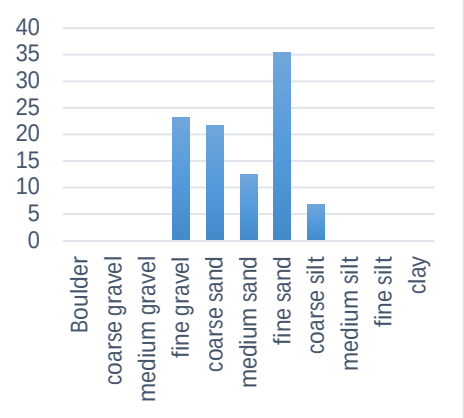
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-6 - (6 - 8) ft bg

Mass Sample (g): 155.9 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	13.1	0.084028	91.59718
3.35	8.5	0.054522	86.14496
2.36	10	0.064144	79.7306
2	4.5	0.028865	76.84413
1.4	10.2	0.065427	70.30148
1.18	5.6	0.03592	66.70943
0.85	9.5	0.060936	60.61578
0.6	8.6	0.055164	55.09942
0.425	8.3	0.053239	49.7755
0.3	11.3	0.072482	42.52726
0.212	10.9	0.069917	35.5356
0.15	16.6	0.106479	24.88775
0.075	27.8	0.178319	7.055805
0.0375	10.8	0.069275	0.128287

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.087	Uniformity Coef.	9.41
d17	0.117	n computed	0.30
d20	0.129	g (cm/s^2)	980.00
d50	0.432	ρ (g/cm^3)	0.9981
d60	0.822	μ (g/cm s)	0.0098
de (Kruger)	0.236	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.216	tau (Sauerbrei)	1.053
de (Zunker)	0.223	$d_{geometric\ mean}$	0.447
de (Zamarin)	0.229	σ_ϕ	2.136
lo (Alyameni)	0.001		

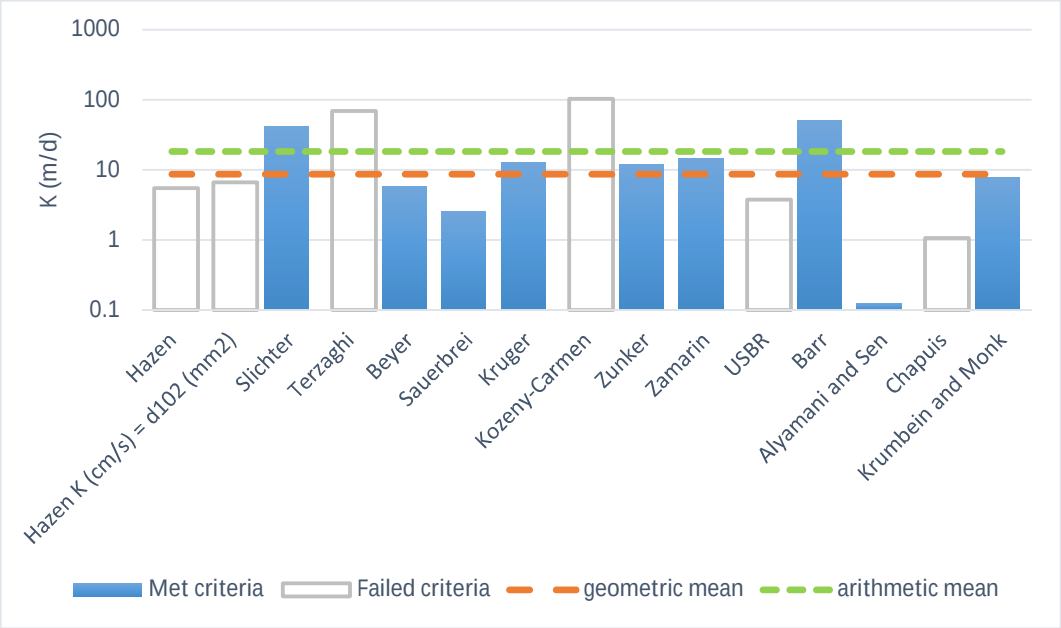
mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	23.15586915
0.5 - 2	coarse sand	21.74470815
0.25 - 0.5	medium sand	12.57216164
0.063 - 0.25	fine sand	35.47145606
0.016 - 0.063	coarse silt	6.92751764
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-6 - (6 - 8) ft bg

Mass Sample (g): 155.9 20 T (oC) 20

Poorly sorted gravelly sand low in fines



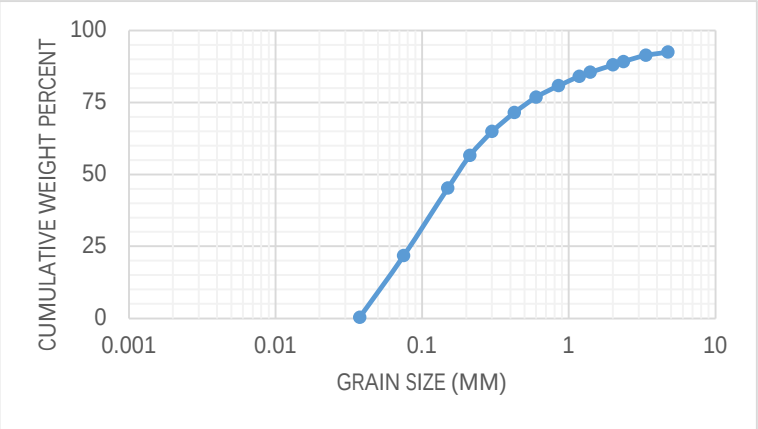
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.633E-02	.633E-04	5.47	18.0
Hazen K (cm/s) = d_{10} (mm)	.764E-02	.764E-04	6.60	21.6
Slichter	.478E-01	.478E-03	41.29	135.5
Terzaghi	.795E-01	.795E-03	68.70	225.4
Beyer	.681E-02	.681E-04	5.88	19.3
Sauerbrei	.292E-02	.292E-04	2.52	8.3
Kruger	.147E-01	.147E-03	12.69	41.6
Kozeny-Carmen	.119E+00	.119E-02	103.21	338.6
Zunker	.139E-01	.139E-03	12.01	39.4
Zamarin	.168E-01	.168E-03	14.54	47.7
USBR	.433E-02	.433E-04	3.74	12.3
Barr	.579E-01	.579E-03	49.99	164.0
Alyamani and Sen	.143E-03	.143E-05	0.12	0.4
Chapuis	.123E-02	.123E-04	1.07	3.5
Krumbein and Monk	.905E-02	.905E-04	7.82	25.7
Shepherd	.414E-01	.414E-03	35.80	117.5
geometric mean	.100E-01	.100E-03	8.65	28.4
arithmetic mean	.211E-01	.211E-03	18.27	59.9

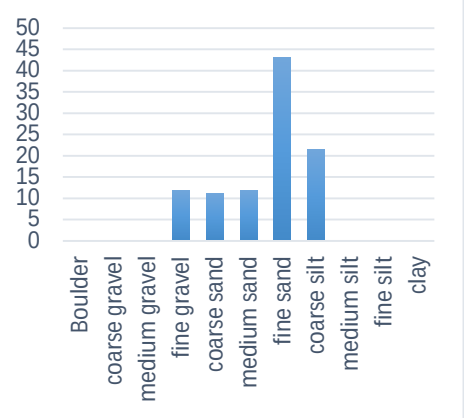
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-5 - (10 - 12) ft bg

Mass Sample (g): 92.9 T (oC) 20

Moderately well sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	7	0.07535	92.46502
3.35	1	0.010764	91.38859
2.36	2	0.021529	89.23574
2	1.1	0.011841	88.05167
1.4	2.4	0.025834	85.46825
1.18	1.3	0.013994	84.06889
0.85	3	0.032293	80.83961
0.6	3.7	0.039828	76.85684
0.425	5	0.053821	71.4747
0.3	6.1	0.065662	64.9085
0.212	7.7	0.082885	56.62002
0.15	10.5	0.113025	45.31755
0.075	21.8	0.234661	21.85145
0.0375	19.9	0.214209	0.430571

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.054	Uniformity Coef.	4.57
d17	0.067	n computed	0.36
d20	0.072	g (cm/s^2)	980.00
d50	0.176	ρ (g/cm^3)	0.9981
d60	0.248	μ (g/cm s)	0.0098
de (Kruger)	0.138	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.124	tau (Sauerbrei)	1.053
de (Zunker)	0.129	$d_{geometric\ mean}$	0.219
de (Zamarin)	0.133	σ_ϕ	2.067
lo (Alyameni)	0.024		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	11.94833154
0.5 - 2	coarse sand	11.19483315
0.25 - 0.5	medium sand	11.94833154
0.063 - 0.25	fine sand	43.05705059
0.016 - 0.063	coarse silt	21.42088267
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

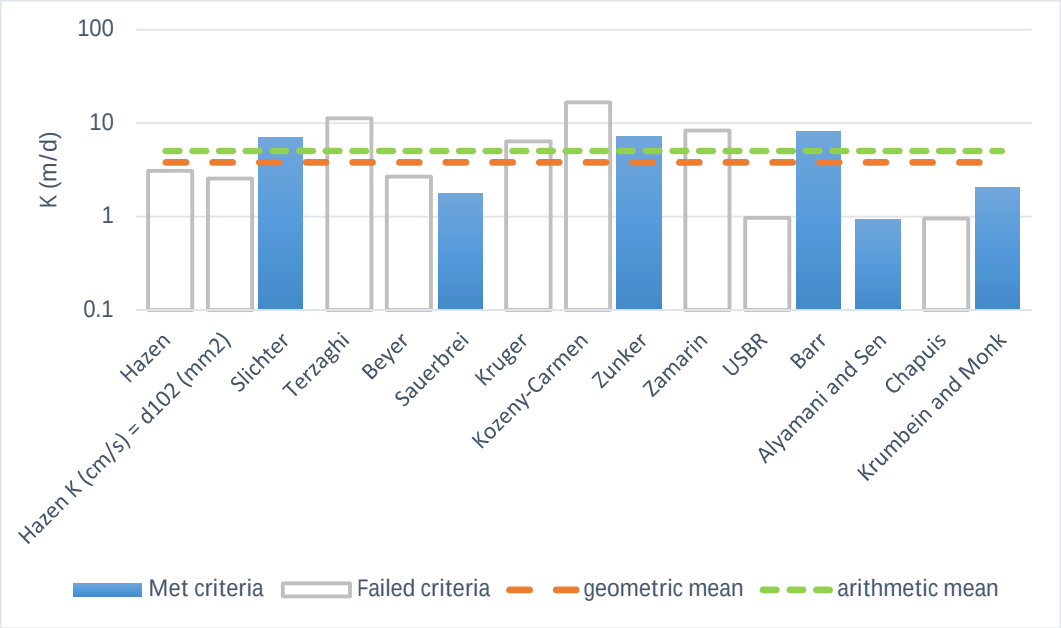
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-5 - (10 - 12) ft bg

Mass Sample (g): 92.9 20 T (oC) 20

Moderately well sorted gravelly sand low in fines



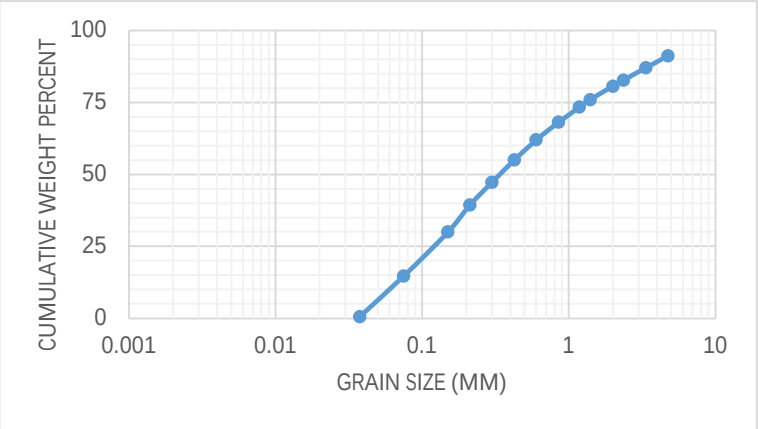
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.358E-02	.358E-04	3.09	10.1
Hazen K (cm/s) = d_{10} (mm)	.294E-02	.294E-04	2.54	8.3
Slichter	.821E-02	.821E-04	7.10	23.3
Terzaghi	.130E-01	.130E-03	11.23	36.9
Beyer	.310E-02	.310E-04	2.68	8.8
Sauerbrei	.206E-02	.206E-04	1.78	5.9
Kruger	.738E-02	.738E-04	6.37	20.9
Kozeny-Carmen	.193E-01	.193E-03	16.69	54.8
Zunker	.835E-02	.835E-04	7.21	23.7
Zamarin	.966E-02	.966E-04	8.34	27.4
USBR	.111E-02	.111E-04	0.96	3.2
Barr	.936E-02	.936E-04	8.08	26.5
Alyamani and Sen	.109E-02	.109E-04	0.94	3.1
Chapuis	.110E-02	.110E-04	0.95	3.1
Krumbein and Monk	.238E-02	.238E-04	2.06	6.7
Shepherd	.938E-02	.938E-04	8.10	26.6
geometric mean	.441E-02	.441E-04	3.81	12.5
arithmetic mean	.583E-02	.583E-04	5.04	16.5

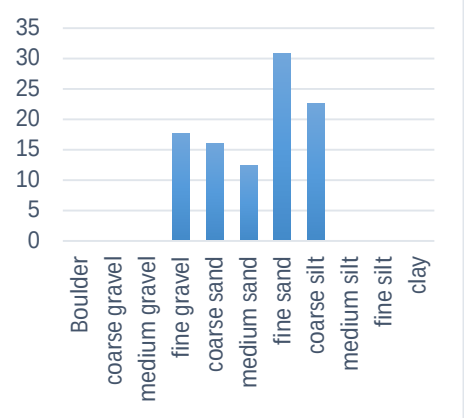
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-5 - (8 - 10 ft bg)

Mass Sample (g): 161.4 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	14.2	0.08798	91.20198
3.35	6.7	0.041512	87.05081
2.36	7	0.043371	82.71375
2	3.3	0.020446	80.66914
1.4	7.6	0.047088	75.96035
1.18	4.2	0.026022	73.35812
0.85	8.4	0.052045	68.15366
0.6	9.9	0.061338	62.01983
0.425	11.3	0.070012	55.01859
0.3	12.4	0.076828	47.33581
0.212	12.8	0.079306	39.4052
0.15	15.1	0.093556	30.04957
0.075	24.7	0.153036	14.74597
0.0375	22.8	0.141264	0.619579

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.053	Uniformity Coef.	7.79
d17	0.065	n computed	0.31
d20	0.070	g (cm/s^2)	980.00
d50	0.251	ρ (g/cm^3)	0.9981
d60	0.416	μ (g/cm s)	0.0098
de (Kruger)	0.151	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.136	tau (Sauerbrei)	1.053
de (Zunker)	0.141	$d_{geometric\ mean}$	0.279
de (Zamarin)	0.146	σ_ϕ	2.327
lo (Alyameni)	0.004		

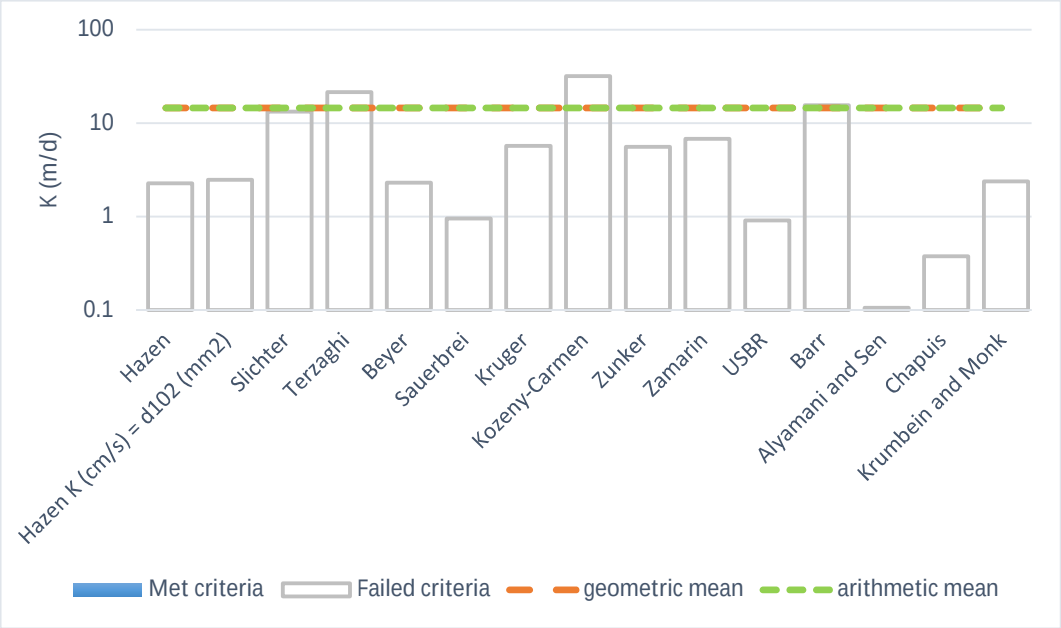
mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	17.65455704
0.5 - 2	coarse sand	16.06118547
0.25 - 0.5	medium sand	12.49203314
0.063 - 0.25	fine sand	30.78393881
0.016 - 0.063	coarse silt	22.56214149
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-5 - (8 - 10 ft bg)

Mass Sample (g): 161.4 20 T (oC) 20

Poorly sorted gravelly sand low in fines



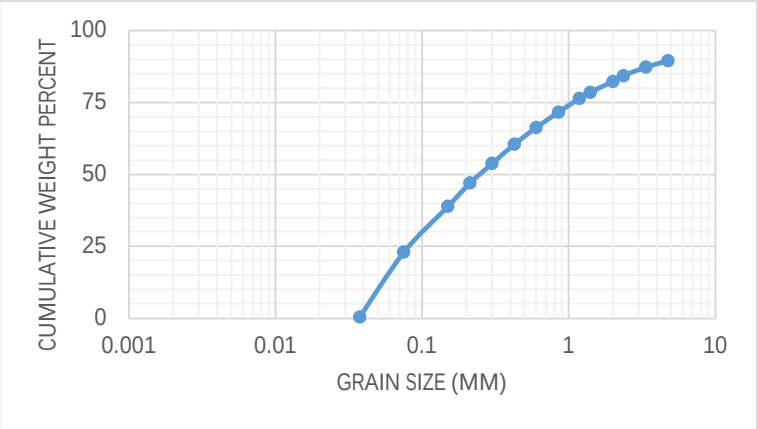
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.263E-02	.263E-04	2.27	7.4
Hazen K (cm/s) = d_{10} (mm)	.285E-02	.285E-04	2.46	8.1
Slichter	.153E-01	.153E-03	13.25	43.5
Terzaghi	.249E-01	.249E-03	21.48	70.5
Beyer	.266E-02	.266E-04	2.30	7.5
Sauerbrei	.110E-02	.110E-04	0.95	3.1
Kruger	.661E-02	.661E-04	5.71	18.7
Kozeny-Carmen	.369E-01	.369E-03	31.92	104.7
Zunker	.646E-02	.646E-04	5.58	18.3
Zamarin	.784E-02	.784E-04	6.77	22.2
USBR	.105E-02	.105E-04	0.91	3.0
Barr	.179E-01	.179E-03	15.46	50.7
Alyamani and Sen	.122E-03	.122E-05	0.11	0.3
Chapuis	.433E-03	.433E-05	0.37	1.2
Krumbein and Monk	.275E-02	.275E-04	2.37	7.8
Shepherd	.168E-01	.168E-03	14.56	47.8
geometric mean	.168E-01	.168E-03	14.56	47.8
arithmetic mean	.168E-01	.168E-03	14.56	47.8

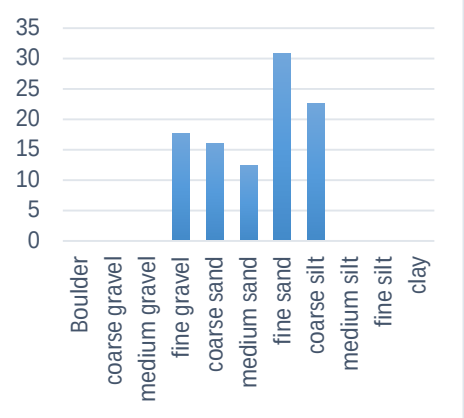
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-5 - (5 - 7 ft bg)

Mass Sample (g): 156.9 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	16.5	0.105163	89.48375
3.35	3.5	0.022307	87.25303
2.36	4.6	0.029318	84.32122
2	3.1	0.019758	82.34544
1.4	6	0.038241	78.52135
1.18	3.4	0.02167	76.35437
0.85	7.4	0.047164	71.63799
0.6	8.4	0.053537	66.28426
0.425	9.1	0.057999	60.48438
0.3	10.5	0.066922	53.79222
0.212	10.6	0.067559	47.03633
0.15	12.7	0.080943	38.942
0.075	25	0.159337	23.00829
0.0375	35.4	0.225621	0.446144

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.053	Uniformity Coef.	7.79
d17	0.065	n computed	0.31
d20	0.070	g (cm/s^2)	980.00
d50	0.251	ρ (g/cm^3)	0.9981
d60	0.416	μ (g/cm s)	0.0098
de (Kruger)	0.151	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.136	tau (Sauerbrei)	1.053
de (Zunker)	0.141	$d_{geometric\ mean}$	0.279
de (Zamarin)	0.146	σ_ϕ	2.327
lo (Alyameni)	0.004		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	17.65455704
0.5 - 2	coarse sand	16.06118547
0.25 - 0.5	medium sand	12.49203314
0.063 - 0.25	fine sand	30.78393881
0.016 - 0.063	coarse silt	22.56214149
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

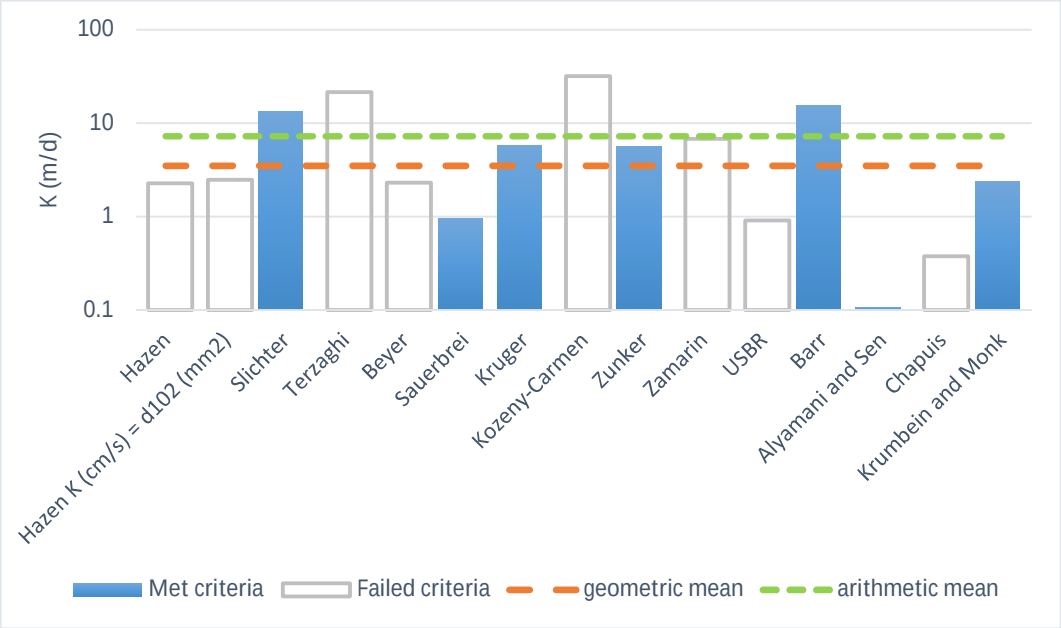
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-5 - (5 - 7 ft bg)

Mass Sample (g): 156.9 20 T (oC) 20

Poorly sorted gravelly sand low in fines



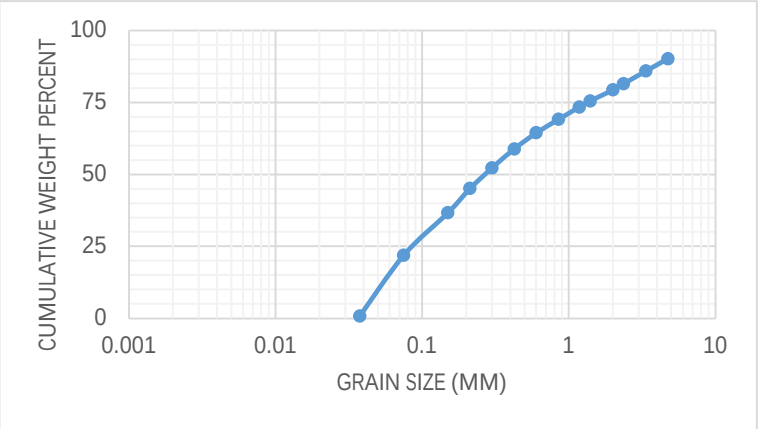
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.263E-02	.263E-04	2.27	7.4
Hazen K (cm/s) = d_{10} (mm)	.285E-02	.285E-04	2.46	8.1
Slichter	.153E-01	.153E-03	13.25	43.5
Terzaghi	.249E-01	.249E-03	21.48	70.5
Beyer	.266E-02	.266E-04	2.30	7.5
Sauerbrei	.110E-02	.110E-04	0.95	3.1
Kruger	.661E-02	.661E-04	5.71	18.7
Kozeny-Carmen	.369E-01	.369E-03	31.92	104.7
Zunker	.646E-02	.646E-04	5.58	18.3
Zamarin	.784E-02	.784E-04	6.77	22.2
USBR	.105E-02	.105E-04	0.91	3.0
Barr	.179E-01	.179E-03	15.46	50.7
Alyamani and Sen	.122E-03	.122E-05	0.11	0.3
Chapuis	.433E-03	.433E-05	0.37	1.2
Krumbein and Monk	.275E-02	.275E-04	2.37	7.8
Shepherd	.168E-01	.168E-03	14.56	47.8
geometric mean	.405E-02	.405E-04	3.50	11.5
arithmetic mean	.839E-02	.839E-04	7.25	23.8

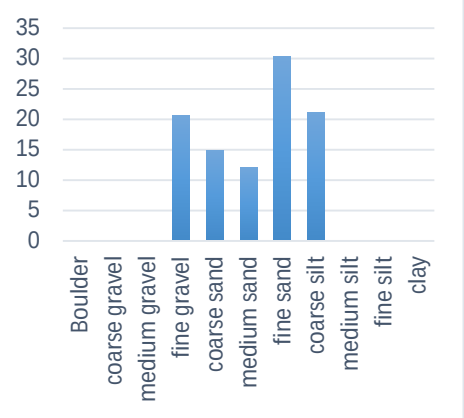
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-4 - (12 - 14 ft bg)

Mass Sample (g): 161.5 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	15.8	0.097833	90.21672
3.35	6.9	0.042724	85.94427
2.36	7.2	0.044582	81.48607
2	3.4	0.021053	79.3808
1.4	6.2	0.03839	75.5418
1.18	3.4	0.021053	73.43653
0.85	6.9	0.042724	69.16409
0.6	7.6	0.047059	64.4582
0.425	9	0.055728	58.88545
0.3	10.6	0.065635	52.32198
0.212	11.6	0.071827	45.13932
0.15	13.6	0.084211	36.71827
0.075	23.8	0.147368	21.98142
0.0375	34.2	0.211765	0.804954

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.054	Uniformity Coef.	8.55
d17	0.066	n computed	0.31
d20	0.071	g (cm/s^2)	980.00
d50	0.272	ρ (g/cm^3)	0.9981
d60	0.460	μ (g/cm s)	0.0098
de (Kruger)	0.159	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.144	tau (Sauerbrei)	1.053
de (Zunker)	0.149	$d_{geometric\ mean}$	0.310
de (Zamarin)	0.154	σ_ϕ	2.406
lo (Alyameni)	-0.001		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	20.61919505
0.5 - 2	coarse sand	14.92260062
0.25 - 0.5	medium sand	12.13622291
0.063 - 0.25	fine sand	30.34055728
0.016 - 0.063	coarse silt	21.17647059
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

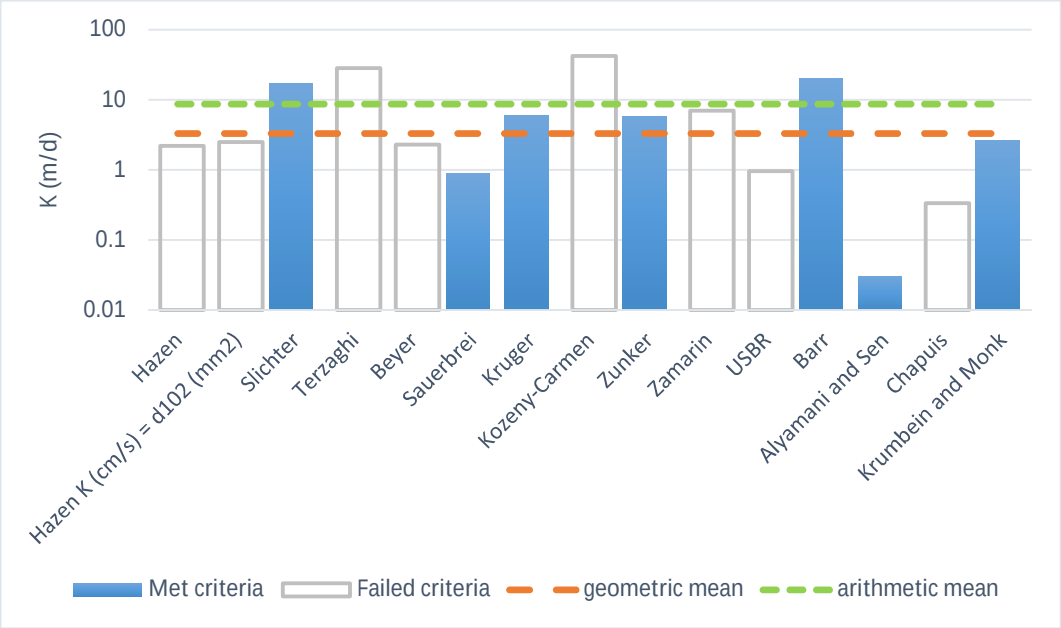
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-4 - (12 - 14 ft bg)

Mass Sample (g): 161.5 20 T (oC) 20

Poorly sorted gravelly sand low in fines



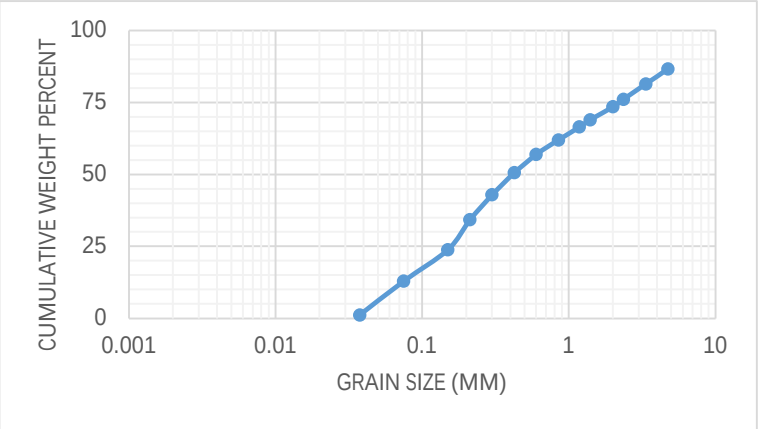
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.253E-02	.253E-04	2.19	7.2
Hazen K (cm/s) = d_{10} (mm)	.289E-02	.289E-04	2.50	8.2
Slichter	.200E-01	.200E-03	17.27	56.7
Terzaghi	.327E-01	.327E-03	28.21	92.6
Beyer	.264E-02	.264E-04	2.28	7.5
Sauerbrei	.103E-02	.103E-04	0.89	2.9
Kruger	.697E-02	.697E-04	6.02	19.8
Kozeny-Carmen	.486E-01	.486E-03	42.01	137.8
Zunker	.665E-02	.665E-04	5.75	18.9
Zamarin	.810E-02	.810E-04	7.00	23.0
USBR	.110E-02	.110E-04	0.95	3.1
Barr	.235E-01	.235E-03	20.35	66.8
Alyamani and Sen	.344E-04	.344E-06	0.03	0.1
Chapuis	.386E-03	.386E-05	0.33	1.1
Krumbein and Monk	.306E-02	.306E-04	2.65	8.7
Shepherd	.192E-01	.192E-03	16.62	54.5
geometric mean	.382E-02	.382E-04	3.30	10.8
arithmetic mean	.101E-01	.101E-03	8.70	28.5

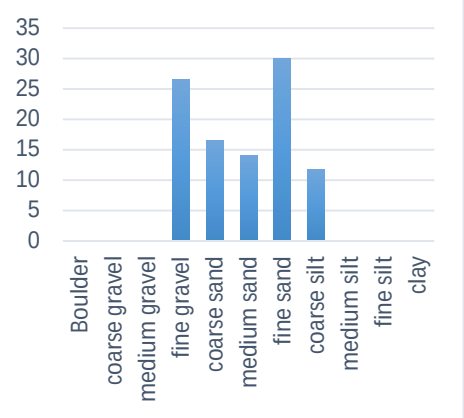
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-3 - (4 -6 ft bg)

Mass Sample (g): 156.6 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	20.9	0.133461	86.6539
3.35	8.2	0.052363	81.41762
2.36	8.3	0.053001	76.1175
2	4.1	0.026181	73.49936
1.4	7.1	0.045338	68.96552
1.18	3.9	0.024904	66.4751
0.85	7	0.0447	62.00511
0.6	7.9	0.050447	56.96041
0.425	10	0.063857	50.57471
0.3	12	0.076628	42.91188
0.212	13.5	0.086207	34.29119
0.15	16.3	0.104087	23.8825
0.075	17.1	0.109195	12.96296
0.0375	18.4	0.117497	1.213282

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.066	Uniformity Coef.	11.45
d17	0.103	n computed	0.29
d20	0.123	g (cm/s^2)	980.00
d50	0.416	ρ (g/cm^3)	0.9981
d60	0.751	μ (g/cm s)	0.0098
de (Kruger)	0.222	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.203	tau (Sauerbrei)	1.053
de (Zunker)	0.209	$d_{geometric\ mean}$	0.427
de (Zamarin)	0.215	σ_ϕ	2.367
lo (Alyameni)	-0.022		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	26.50063857
0.5 - 2	coarse sand	16.53895275
0.25 - 0.5	medium sand	14.04853129
0.063 - 0.25	fine sand	29.94891443
0.016 - 0.063	coarse silt	11.74968072
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

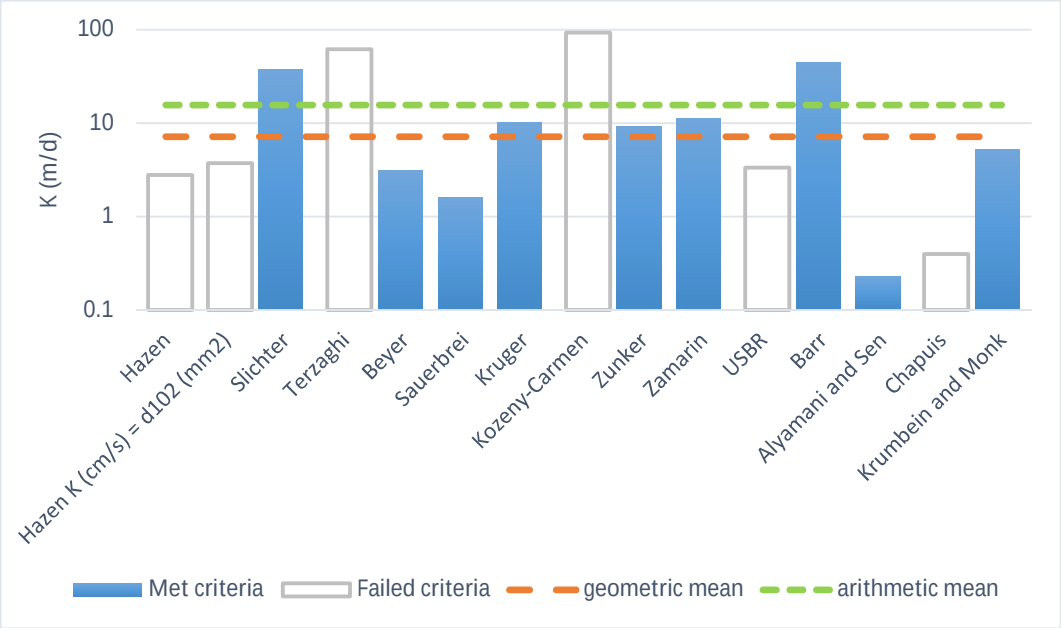
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-3 - (4 -6 ft bg)

Mass Sample (g): 156.6 20 T (oC) 20

Poorly sorted gravelly sand low in fines



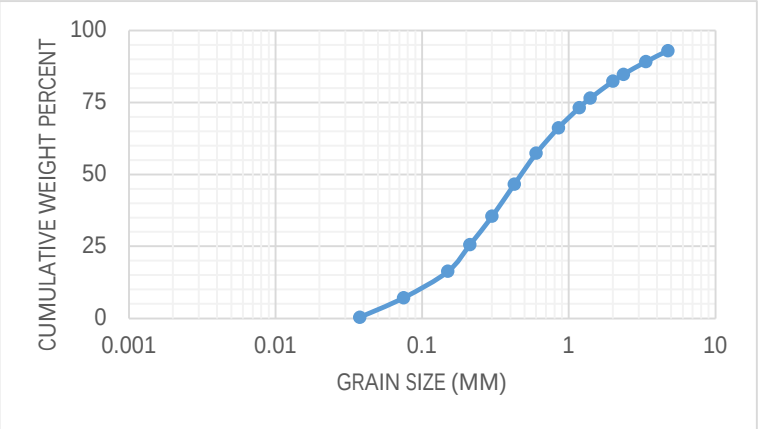
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.321E-02	.321E-04	2.77	9.1
Hazen K (cm/s) = d_{10} (mm)	.430E-02	.430E-04	3.71	12.2
Slichter	.431E-01	.431E-03	37.26	122.2
Terzaghi	.716E-01	.716E-03	61.88	203.0
Beyer	.364E-02	.364E-04	3.14	10.3
Sauerbrei	.188E-02	.188E-04	1.62	5.3
Kruger	.119E-01	.119E-03	10.24	33.6
Kozeny-Carmen	.107E+00	.107E-02	92.87	304.7
Zunker	.107E-01	.107E-03	9.23	30.3
Zamarin	.130E-01	.130E-03	11.20	36.8
USBR	.387E-02	.387E-04	3.34	11.0
Barr	.521E-01	.521E-03	44.98	147.6
Alyamani and Sen	.263E-03	.263E-05	0.23	0.7
Chapuis	.460E-03	.460E-05	0.40	1.3
Krumbein and Monk	.612E-02	.612E-04	5.29	17.4
Shepherd	.388E-01	.388E-03	33.54	110.0
geometric mean	.831E-02	.831E-04	7.18	23.6
arithmetic mean	.181E-01	.181E-03	15.67	51.4

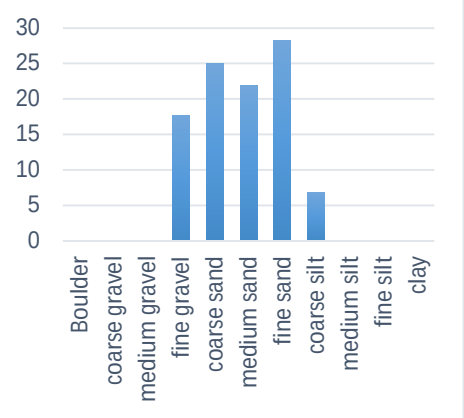
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (15 -19 ft bg)

Mass Sample (g): 145.8 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	10.26628	0.070413	92.95866
3.35	5.556977	0.038114	89.14729
2.36	6.404651	0.043928	84.75452
2	3.484884	0.023902	82.36434
1.4	8.57093	0.058786	76.48579
1.18	4.803488	0.032946	73.19121
0.85	10.17209	0.069767	66.21447
0.6	12.90349	0.088501	57.36434
0.425	15.72907	0.107881	46.57623
0.3	16.2	0.111111	35.46512
0.212	14.31628	0.098191	25.64599
0.15	13.56279	0.093023	16.34367
0.075	13.37442	0.091731	7.170543
0.0375	9.889535	0.067829	0.387597

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.098	Uniformity Coef.	6.87
d17	0.154	n computed	0.33
d20	0.174	g (cm/s^2)	980.00
d50	0.481	ρ (g/cm^3)	0.9981
d60	0.674	μ (g/cm s)	0.0098
de (Kruger)	0.269	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.248	tau (Sauerbrei)	1.053
de (Zunker)	0.255	$d_{geometric\ mean}$	0.466
de (Zamarin)	0.262	σ_ϕ	1.933
lo (Alyameni)	0.003		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	17.63565891
0.5 - 2	coarse sand	25
0.25 - 0.5	medium sand	21.89922481
0.063 - 0.25	fine sand	28.29457364
0.016 - 0.063	coarse silt	6.782945736
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

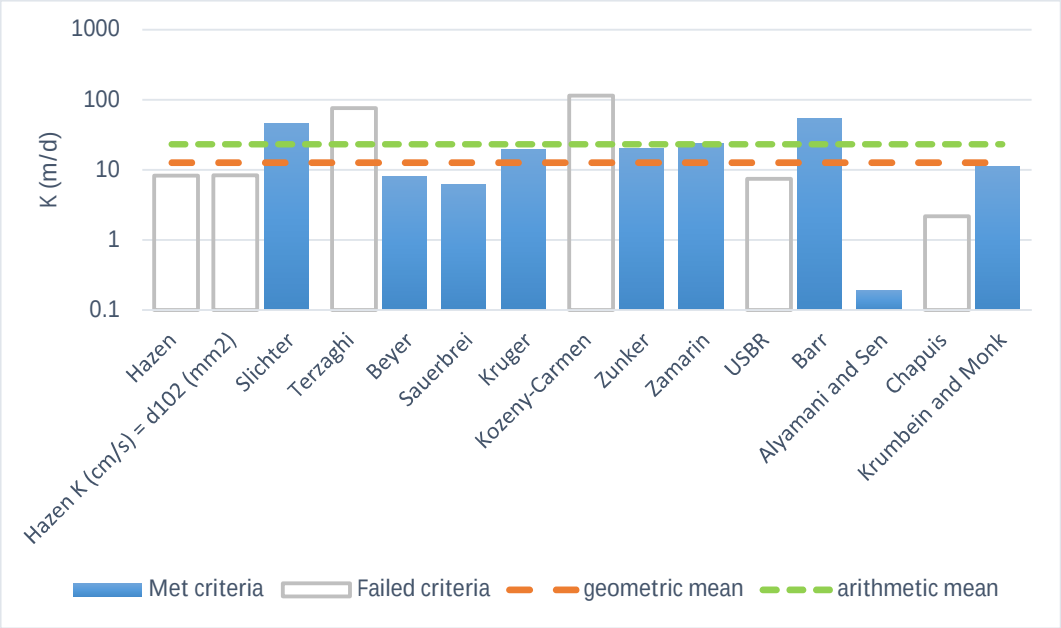
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (15 -19 ft bg)

Mass Sample (g): 145.8 20 T (oC) 20

Poorly sorted gravelly sand low in fines



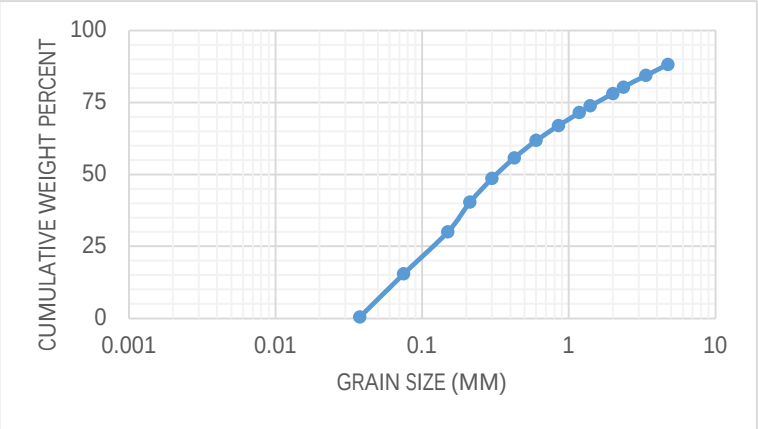
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.952E-02	.952E-04	8.22	27.0
Hazen K (cm/s) = d_{10} (mm)	.963E-02	.963E-04	8.32	27.3
Slichter	.527E-01	.527E-03	45.54	149.4
Terzaghi	.878E-01	.878E-03	75.88	249.0
Beyer	.926E-02	.926E-04	8.00	26.3
Sauerbrei	.712E-02	.712E-04	6.15	20.2
Kruger	.224E-01	.224E-03	19.32	63.4
Kozeny-Carmen	.132E+00	.132E-02	114.13	374.4
Zunker	.234E-01	.234E-03	20.21	66.3
Zamarin	.277E-01	.277E-03	23.95	78.6
USBR	.858E-02	.858E-04	7.42	24.3
Barr	.640E-01	.640E-03	55.28	181.4
Alyamani and Sen	.220E-03	.220E-05	0.19	0.6
Chapuis	.250E-02	.250E-04	2.16	7.1
Krumbein and Monk	.129E-01	.129E-03	11.12	36.5
Shepherd	.493E-01	.493E-03	42.62	139.8
geometric mean	.146E-01	.146E-03	12.64	41.5
arithmetic mean	.269E-01	.269E-03	23.24	76.2

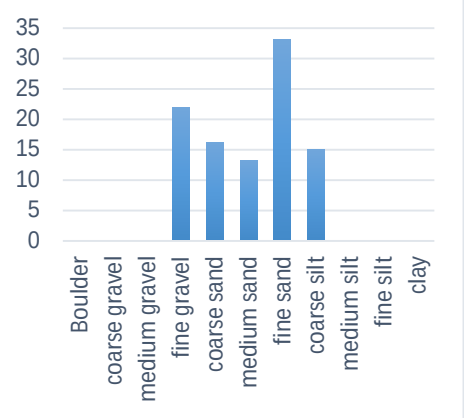
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (10 -12 ft bg)

Mass Sample (g): 152.1 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	17.95279	0.118033	88.19672
3.35	5.784787	0.038033	84.39344
2.36	6.183738	0.040656	80.32787
2	3.391082	0.022295	78.09836
1.4	6.482951	0.042623	73.83607
1.18	3.590557	0.023607	71.47541
0.85	6.881902	0.045246	66.95082
0.6	7.779541	0.051148	61.83607
0.425	9.275607	0.060984	55.7377
0.3	10.77167	0.07082	48.65574
0.212	12.56695	0.082623	40.39344
0.15	15.65882	0.102951	30.09836
0.075	22.14177	0.145574	15.54098
0.0375	22.93967	0.15082	0.459016

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.061	Uniformity Coef.	8.94
d17	0.083	n computed	0.30
d20	0.098	g (cm/s^2)	980.00
d50	0.324	ρ (g/cm^3)	0.9981
d60	0.547	μ (g/cm s)	0.0098
de (Kruger)	0.186	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.169	tau (Sauerbrei)	1.053
de (Zunker)	0.175	$d_{geometric\ mean}$	0.349
de (Zamarin)	0.180	σ_ϕ	2.366
lo (Alyameni)	-0.004		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	21.90163934
0.5 - 2	coarse sand	16.26229508
0.25 - 0.5	medium sand	13.18032787
0.063 - 0.25	fine sand	33.1147541
0.016 - 0.063	coarse silt	15.08196721
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

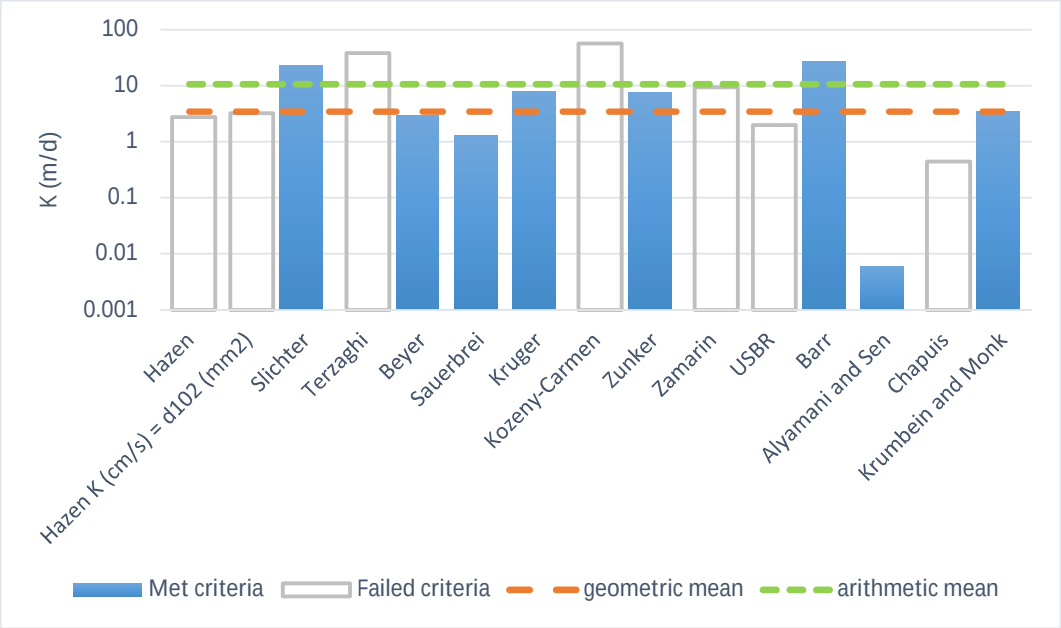
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (10 -12 ft bg)

Mass Sample (g): 152.1 20 T (oC) 20

Poorly sorted gravelly sand low in fines



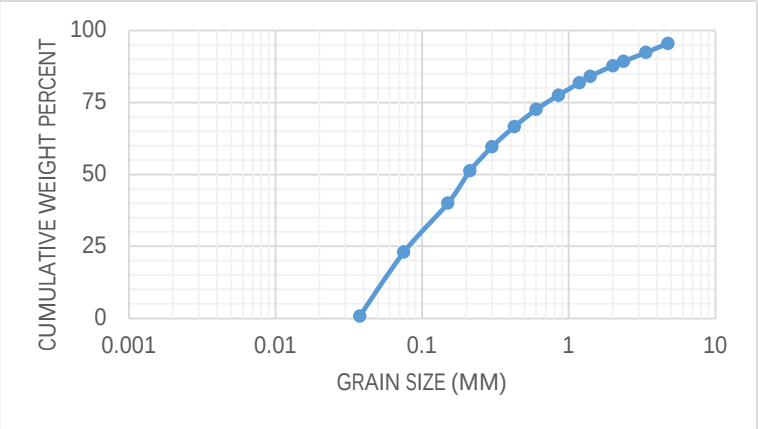
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.320E-02	.320E-04	2.76	9.1
Hazen K (cm/s) = d_{10} (mm)	.375E-02	.375E-04	3.24	10.6
Slichter	.267E-01	.267E-03	23.08	75.7
Terzaghi	.440E-01	.440E-03	37.98	124.6
Beyer	.338E-02	.338E-04	2.92	9.6
Sauerbrei	.153E-02	.153E-04	1.32	4.3
Kruger	.935E-02	.935E-04	8.07	26.5
Kozeny-Carmen	.656E-01	.656E-03	56.71	186.1
Zunker	.889E-02	.889E-04	7.68	25.2
Zamarin	.108E-01	.108E-03	9.32	30.6
USBR	.228E-02	.228E-04	1.97	6.5
Barr	.318E-01	.318E-03	27.47	90.1
Alyamani and Sen	.702E-05	.702E-07	0.01	0.0
Chapuis	.511E-03	.511E-05	0.44	1.4
Krumbein and Monk	.409E-02	.409E-04	3.53	11.6
Shepherd	.257E-01	.257E-03	22.21	72.9
geometric mean	.401E-02	.401E-04	3.47	11.4
arithmetic mean	.124E-01	.124E-03	10.70	35.1

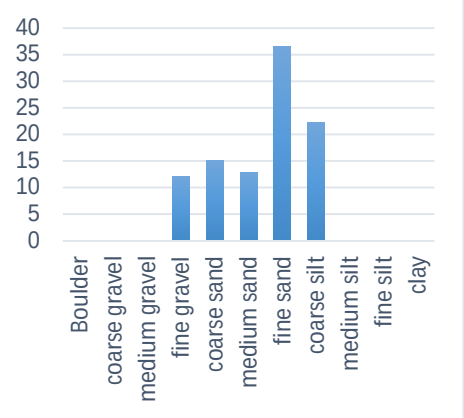
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (8 -10 ft bg)

Mass Sample (g): 152.1 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	6.9	0.045365	95.46351
3.35	4.7	0.030901	92.37344
2.36	4.7	0.030901	89.28337
2	2.3	0.015122	87.7712
1.4	5.6	0.036818	84.08941
1.18	3.4	0.022354	81.85404
0.85	6.6	0.043393	77.51479
0.6	7.5	0.04931	72.58383
0.425	9.1	0.059829	66.60092
0.3	10.6	0.069691	59.63182
0.212	12.7	0.083498	51.28205
0.15	17.1	0.112426	40.03945
0.075	25.9	0.170283	23.01118
0.0375	33.8	0.222222	0.788955

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.053	Uniformity Coef.	5.78
d17	0.065	n computed	0.34
d20	0.070	g (cm/s^2)	980.00
d50	0.205	ρ (g/cm^3)	0.9981
d60	0.307	μ (g/cm s)	0.0098
de (Kruger)	0.145	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.131	tau (Sauerbrei)	1.053
de (Zunker)	0.136	$d_{geometric\ mean}$	0.256
de (Zamarin)	0.140	σ_ϕ	2.126
lo (Alyameni)	0.015		

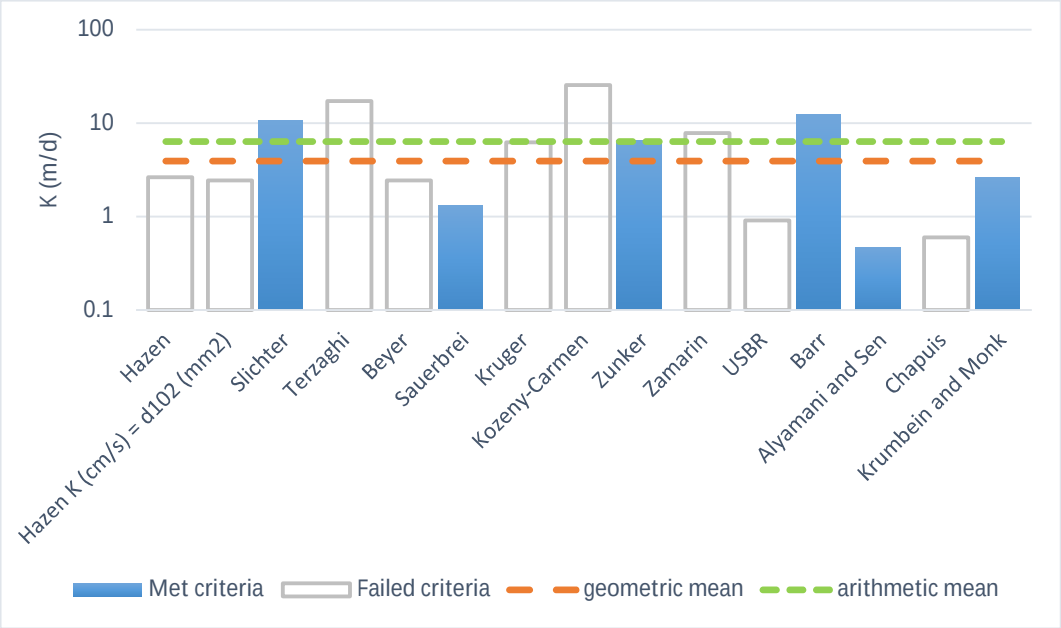
mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	12.22879684
0.5 - 2	coarse sand	15.18737673
0.25 - 0.5	medium sand	12.95200526
0.063 - 0.25	fine sand	36.62064431
0.016 - 0.063	coarse silt	22.22222222
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (8 -10 ft bg)

Mass Sample (g): 152.1 20 T (oC) 20

Poorly sorted gravelly sand low in fines



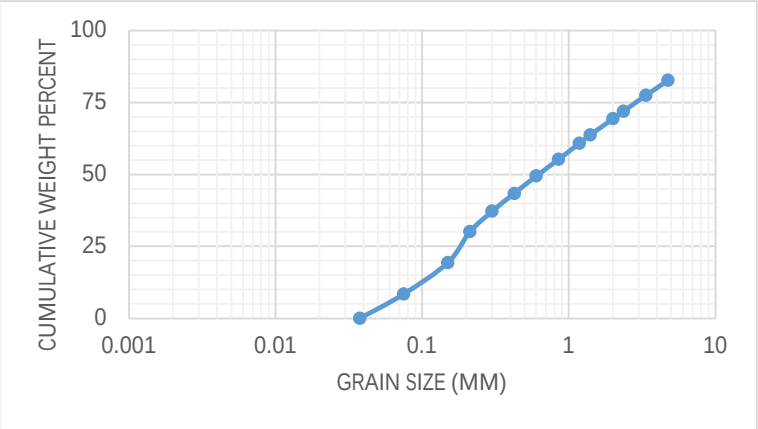
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.305E-02	.305E-04	2.63	8.6
Hazen K (cm/s) = d_{10} (mm)	.281E-02	.281E-04	2.43	8.0
Slichter	.124E-01	.124E-03	10.70	35.1
Terzaghi	.199E-01	.199E-03	17.21	56.5
Beyer	.281E-02	.281E-04	2.43	8.0
Sauerbrei	.152E-02	.152E-04	1.31	4.3
Kruger	.717E-02	.717E-04	6.20	20.3
Kozeny-Carmen	.296E-01	.296E-03	25.57	83.9
Zunker	.764E-02	.764E-04	6.60	21.7
Zamarin	.906E-02	.906E-04	7.83	25.7
USBR	.105E-02	.105E-04	0.91	3.0
Barr	.143E-01	.143E-03	12.38	40.6
Alyamani and Sen	.536E-03	.536E-05	0.46	1.5
Chapuis	.691E-03	.691E-05	0.60	2.0
Krumbein and Monk	.302E-02	.302E-04	2.61	8.6
Shepherd	.121E-01	.121E-03	10.44	34.3
geometric mean	.455E-02	.455E-04	3.93	12.9
arithmetic mean	.736E-02	.736E-04	6.36	20.9

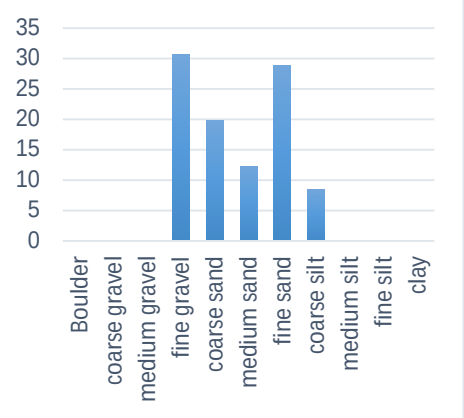
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (6 -8 ft bg)

Mass Sample (g): 113.4 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	26.9	0.173102	82.68983
3.35	8.1	0.052124	77.47748
2.36	8.6	0.055341	71.94337
2	4	0.02574	69.36937
1.4	8.8	0.056628	63.70656
1.18	4.5	0.028958	60.81081
0.85	8.6	0.055341	55.27671
0.6	9	0.057915	49.4852
0.425	9.4	0.060489	43.43629
0.3	9.6	0.061776	37.25869
0.212	11	0.070785	30.18018
0.15	16.7	0.107465	19.43372
0.075	17	0.109395	8.494208
0.0375	13.1	0.084299	0.06435

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.085	Uniformity Coef.	13.26
d17	0.133	n computed	0.28
d20	0.153	g (cm/s^2)	980.00
d50	0.622	ρ (g/cm^3)	0.9981
d60	1.132	μ (g/cm s)	0.0098
de (Kruger)	0.259	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.237	tau (Sauerbrei)	1.053
de (Zunker)	0.244	$d_{geometric\ mean}$	0.489
de (Zamarin)	0.252	σ_ϕ	2.301
lo (Alyameni)	-0.049		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	30.63063063
0.5 - 2	coarse sand	19.88416988
0.25 - 0.5	medium sand	12.22651223
0.063 - 0.25	fine sand	28.76447876
0.016 - 0.063	coarse silt	8.42985843
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

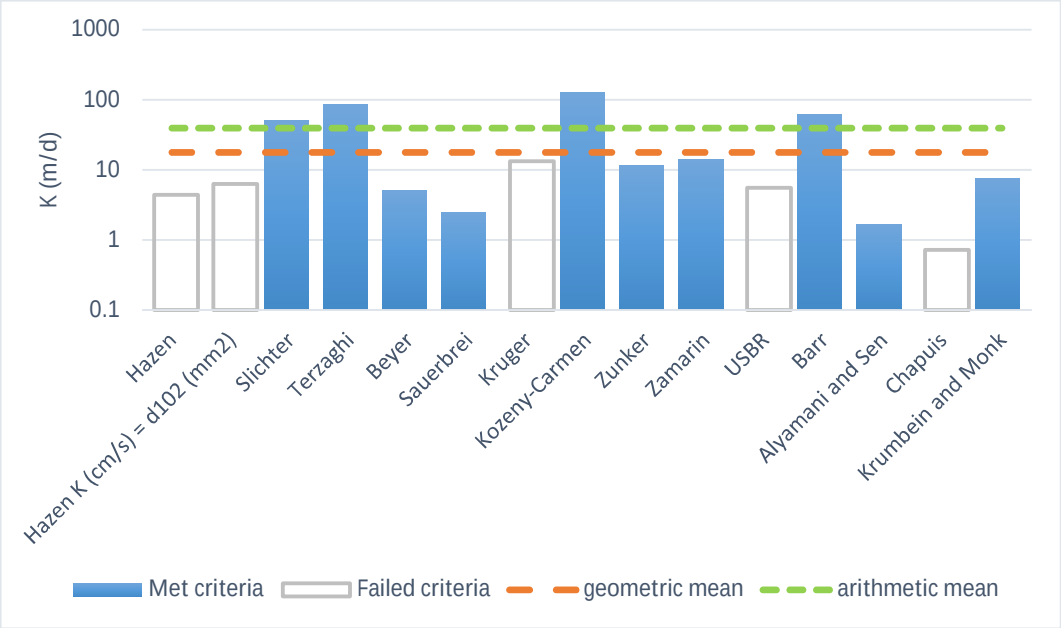
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (6 -8 ft bg)

Mass Sample (g): 155.4 20 T (oC) 20

Poorly sorted gravelly sand low in fines



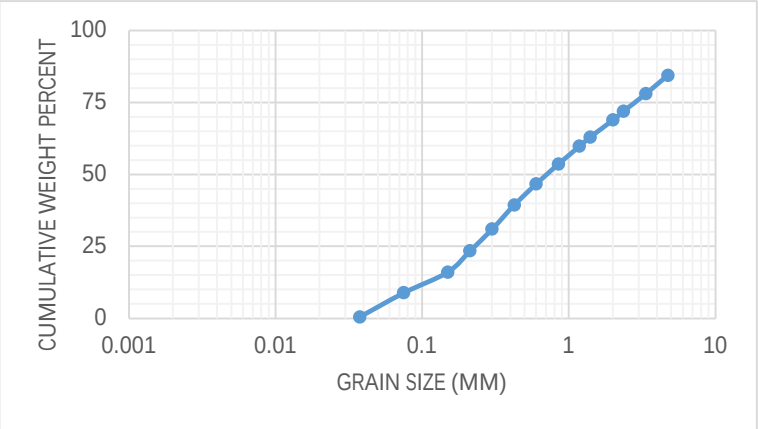
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.506E-02	.506E-04	4.37	14.3
Hazen K (cm/s) = d_{10} (mm)	.728E-02	.728E-04	6.29	20.6
Slichter	.589E-01	.589E-03	50.88	166.9
Terzaghi	.983E-01	.983E-03	84.89	278.5
Beyer	.593E-02	.593E-04	5.12	16.8
Sauerbrei	.282E-02	.282E-04	2.43	8.0
Kruger	.153E-01	.153E-03	13.21	43.3
Kozeny-Carmen	.148E+00	.148E-02	127.84	419.4
Zunker	.134E-01	.134E-03	11.60	38.0
Zamarin	.163E-01	.163E-03	14.04	46.1
USBR	.638E-02	.638E-04	5.51	18.1
Barr	.717E-01	.717E-03	61.92	203.1
Alyamani and Sen	.189E-02	.189E-04	1.64	5.4
Chapuis	.829E-03	.829E-05	0.72	2.3
Krumbein and Monk	.876E-02	.876E-04	7.56	24.8
Shepherd	.755E-01	.755E-03	65.27	214.2
geometric mean	.206E-01	.206E-03	17.78	58.3
arithmetic mean	.456E-01	.456E-03	39.38	129.2

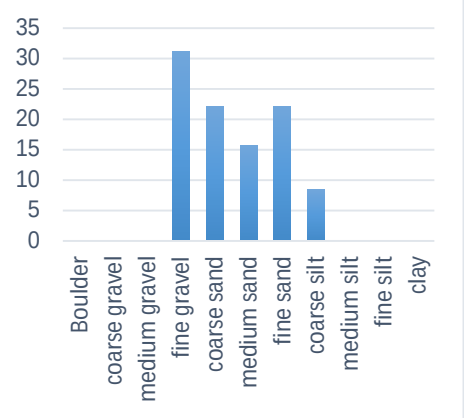
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (4 - 6 ft bg)

Mass Sample (g): 113.4 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	24.9	0.155431	84.45693
3.35	10.3	0.064295	78.02747
2.36	9.7	0.060549	71.97253
2	4.9	0.030587	68.91386
1.4	9.5	0.059301	62.98377
1.18	5.1	0.031835	59.80025
0.85	9.9	0.061798	53.62047
0.6	11	0.068664	46.75406
0.425	11.8	0.073658	39.38826
0.3	13.4	0.083645	31.02372
0.212	12.1	0.075531	23.47066
0.15	11.8	0.073658	16.10487
0.075	11.5	0.071785	8.926342
0.0375	13.5	0.08427	0.499376

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.086	Uniformity Coef.	13.85
d17	0.158	n computed	0.27
d20	0.183	g (cm/s^2)	980.00
d50	0.718	ρ (g/cm^3)	0.9981
d60	1.194	μ (g/cm s)	0.0098
de (Kruger)	0.287	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.264	tau (Sauerbrei)	1.053
de (Zunker)	0.272	$d_{geometric\ mean}$	0.557
de (Zamarin)	0.280	σ_ϕ	2.232
lo (Alyameni)	-0.072		

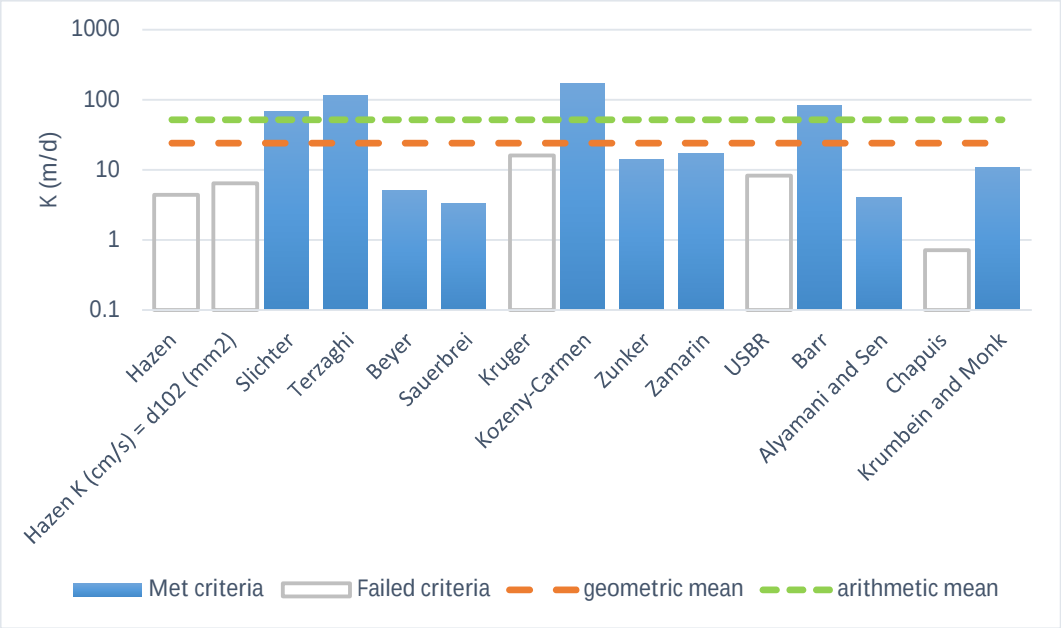
mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	31.08614232
0.5 - 2	coarse sand	22.15980025
0.25 - 0.5	medium sand	15.73033708
0.063 - 0.25	fine sand	22.09737828
0.016 - 0.063	coarse silt	8.426966292
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (4 - 6 ft bg)

Mass Sample (g): 160.2 20 T (oC) 20

Poorly sorted gravelly sand low in fines



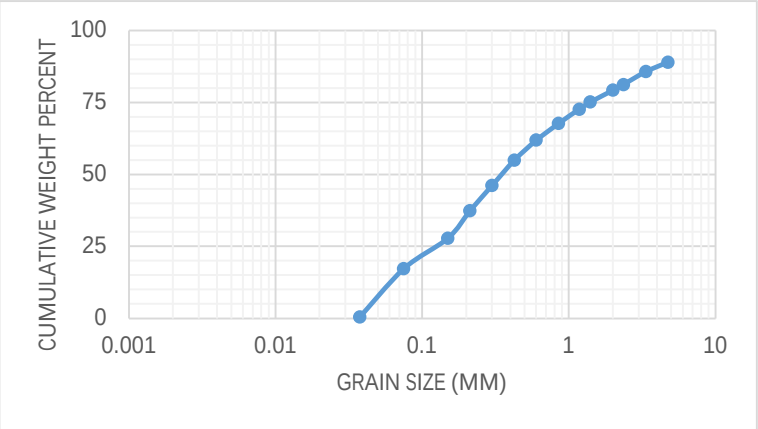
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.506E-02	.506E-04	4.38	14.4
Hazen K (cm/s) = d_{10} (mm)	.743E-02	.743E-04	6.42	21.1
Slichter	.785E-01	.785E-03	67.84	222.6
Terzaghi	.131E+00	.131E-02	113.56	372.6
Beyer	.598E-02	.598E-04	5.17	17.0
Sauerbrei	.382E-02	.382E-04	3.30	10.8
Kruger	.186E-01	.186E-03	16.07	52.7
Kozeny-Carmen	.198E+00	.198E-02	171.49	562.6
Zunker	.162E-01	.162E-03	14.03	46.0
Zamarin	.196E-01	.196E-03	16.96	55.6
USBR	.957E-02	.957E-04	8.27	27.1
Barr	.961E-01	.961E-03	83.06	272.5
Alyamani and Sen	.471E-02	.471E-04	4.07	13.4
Chapuis	.826E-03	.826E-05	0.71	2.3
Krumbein and Monk	.124E-01	.124E-03	10.73	35.2
Shepherd	.957E-01	.957E-03	82.70	271.3
geometric mean	.279E-01	.279E-03	24.12	79.1
arithmetic mean	.603E-01	.603E-03	52.08	170.9

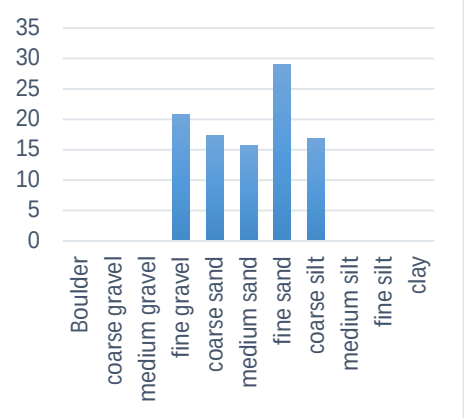
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (2 - 4 ft bg)

Mass Sample (g): 113.4 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.75	12.5	0.110229	88.97707
3.35	3.7	0.032628	85.71429
2.36	5.1	0.044974	81.21693
2	2.2	0.0194	79.2769
1.4	4.7	0.041446	75.13228
1.18	2.8	0.024691	72.66314
0.85	5.6	0.049383	67.72487
0.6	6.6	0.058201	61.90476
0.425	7.9	0.069665	54.93827
0.3	9.9	0.087302	46.20811
0.212	10	0.088183	37.38977
0.15	10.8	0.095238	27.86596
0.075	12	0.10582	17.28395
0.0375	19.1	0.16843	0.440917

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.059	Uniformity Coef.	9.39
d17	0.074	n computed	0.30
d20	0.094	g (cm/s^2)	980.00
d50	0.354	ρ (g/cm^3)	0.9981
d60	0.552	μ (g/cm s)	0.0098
de (Kruger)	0.186	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.169	tau (Sauerbrei)	1.053
de (Zunker)	0.174	$d_{geometric\ mean}$	0.353
de (Zamarin)	0.180	σ_ϕ	2.361
lo (Alyameni)	-0.015		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	20.72310406
0.5 - 2	coarse sand	17.37213404
0.25 - 0.5	medium sand	15.69664903
0.063 - 0.25	fine sand	28.92416226
0.016 - 0.063	coarse silt	16.84303351
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

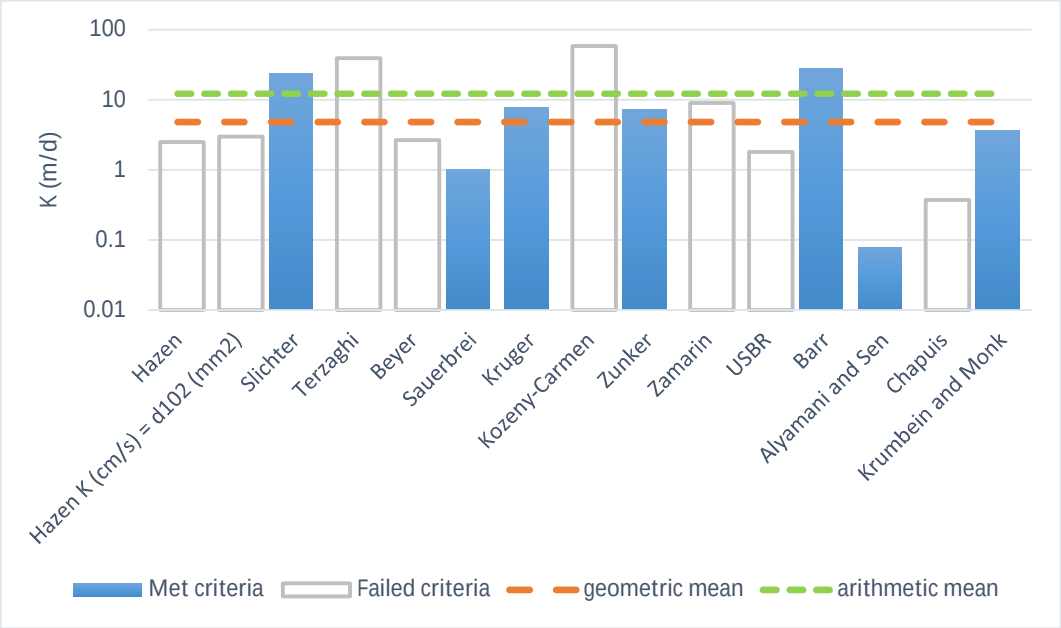
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (2 - 4 ft bg)

Mass Sample (g): 113.4 20 T (oC) 20

Poorly sorted gravelly sand low in fines



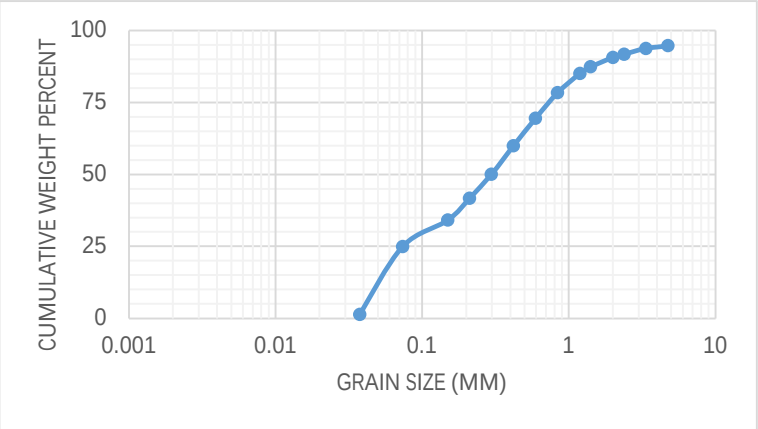
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.287E-02	.287E-04	2.48	8.1
Hazen K (cm/s) = d_{10} (mm)	.346E-02	.346E-04	2.99	9.8
Slichter	.275E-01	.275E-03	23.77	78.0
Terzaghi	.453E-01	.453E-03	39.15	128.4
Beyer	.308E-02	.308E-04	2.66	8.7
Sauerbrei	.118E-02	.118E-04	1.02	3.4
Kruger	.907E-02	.907E-04	7.84	25.7
Kozeny-Carmen	.677E-01	.677E-03	58.47	191.8
Zunker	.853E-02	.853E-04	7.37	24.2
Zamarin	.104E-01	.104E-03	8.95	29.4
USBR	.209E-02	.209E-04	1.80	5.9
Barr	.328E-01	.328E-03	28.32	92.9
Alyamani and Sen	.894E-04	.894E-06	0.08	0.3
Chapuis	.430E-03	.430E-05	0.37	1.2
Krumbein and Monk	.422E-02	.422E-04	3.64	11.9
Shepherd	.298E-01	.298E-03	25.77	84.6
geometric mean	.557E-02	.557E-04	4.81	15.8
arithmetic mean	.142E-01	.142E-03	12.23	40.1

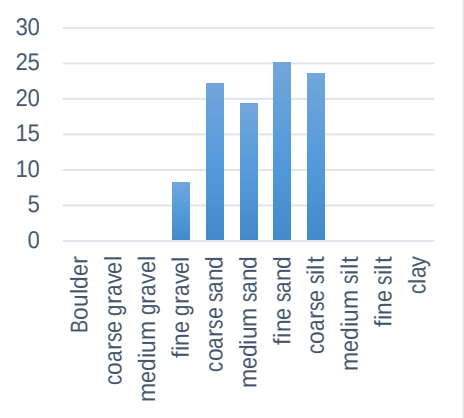
Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (0 - 2 ft bg)

Mass Sample (g): 156.3 T (oC) 20

Poorly sorted sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	8.3	0.053103	94.6897
3.3528	1.4	0.008957	93.79399
2.37998	3.2	0.020473	91.74664
1.99898	1.7	0.010877	90.65899
1.4097	5.1	0.03263	87.39603
1.19126	3.6	0.023033	85.09277
0.84074	10.4	0.066539	78.4389
0.59436	13.9	0.088932	69.54575
0.4191	15	0.095969	59.94882
0.29718	15.4	0.098528	50.09597
0.21082	13	0.083173	41.77863
0.14986	11.9	0.076136	34.16507
0.07366	14.4	0.092131	24.95202
0.0375	36.9	0.236084	1.34357

Effective Grain Diameters (mm)	
d10	0.051
d17	0.061
d20	0.066
d50	0.296
d60	0.420
de (Kruger)	0.153
de (Kozeny)	0.139
de (Zunker)	0.144
de (Zamarin)	0.148
lo (Alyameni)	-0.011

Other Useful Parameters	
Uniformity Coef.	8.28
n computed	0.31
g (cm/s^2)	980.00
ρ (g/cm^3)	0.9981
μ (g/cm s)	0.0098
ρg/μ (1/cm s)	9.9327E+04
tau (Sauerbrei)	1.053
$d_{geometric\ mean}$	0.277
σ_ϕ	2.089

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	8.253358925
0.5 - 2	coarse sand	22.20089571
0.25 - 0.5	medium sand	19.44977607
0.063 - 0.25	fine sand	25.14395393
0.016 - 0.063	coarse silt	23.6084453
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

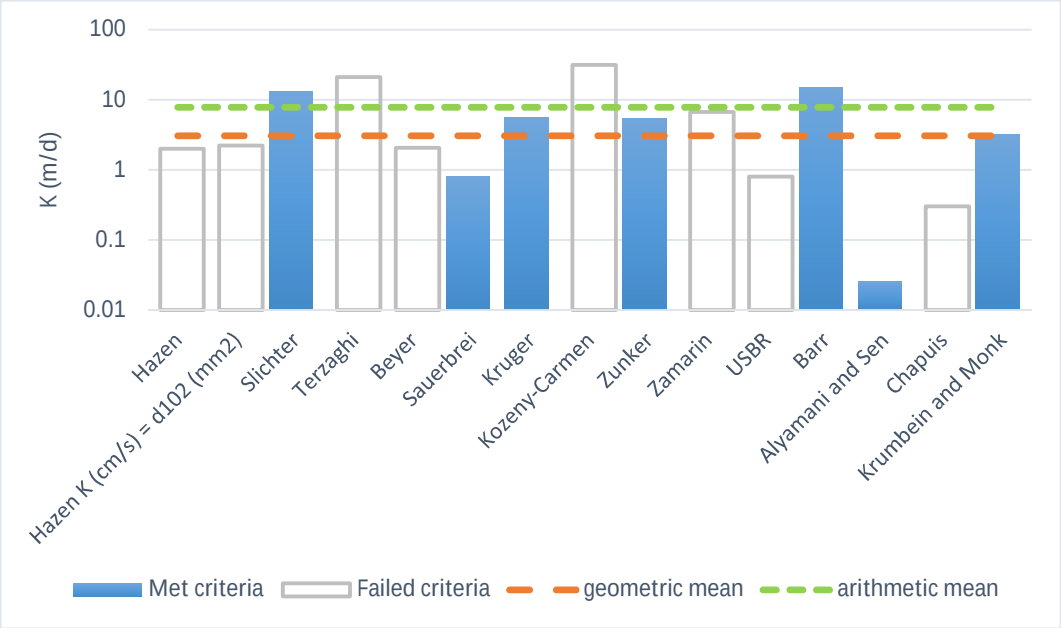
WSP USA.

K from Grain Size Analysis Report Date: 4/26/2022

Sample Name: TW-2 - (0 - 2 ft bg)

Mass Sample (g): 156.3 20 T (oC) 20

Poorly sorted sand low in fines



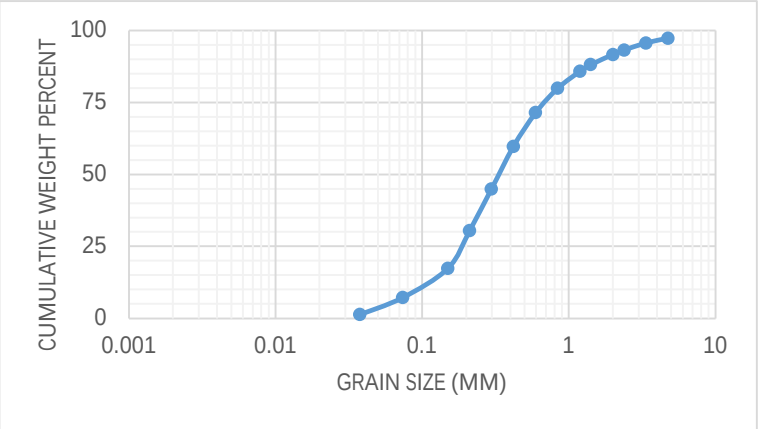
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.230E-02	.230E-04	1.98	6.5
Hazen K (cm/s) = d_{10} (mm)	.258E-02	.258E-04	2.23	7.3
Slichter	.151E-01	.151E-03	13.01	42.7
Terzaghi	.244E-01	.244E-03	21.08	69.1
Beyer	.237E-02	.237E-04	2.05	6.7
Sauerbrei	.923E-03	.923E-05	0.80	2.6
Kruger	.659E-02	.659E-04	5.69	18.7
Kozeny-Carmen	.363E-01	.363E-03	31.32	102.8
Zunker	.640E-02	.640E-04	5.53	18.1
Zamarin	.775E-02	.775E-04	6.69	22.0
USBR	.921E-03	.921E-05	0.80	2.6
Barr	.176E-01	.176E-03	15.17	49.8
Alyamani and Sen	.300E-04	.300E-06	0.03	0.1
Chapuis	.347E-03	.347E-05	0.30	1.0
Krumbein and Monk	.370E-02	.370E-04	3.19	10.5
Shepherd	.222E-01	.222E-03	19.18	62.9
geometric mean	.355E-02	.355E-04	3.07	10.1
arithmetic mean	.906E-02	.906E-04	7.82	25.7

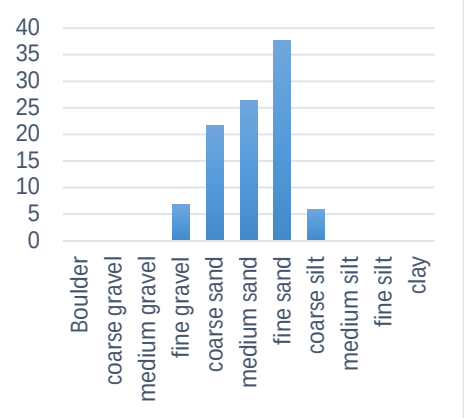
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (8 -10 ft bg)

Mass Sample (g): 156 T (oC) 20

Moderately well sorted sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	4.2	0.026923	97.30769
3.3528	2.6	0.016667	95.64103
2.37998	3.8	0.024359	93.20513
1.99898	2.4	0.015385	91.66667
1.4097	5.5	0.035256	88.14103
1.19126	3.6	0.023077	85.83333
0.84074	9.2	0.058974	79.9359
0.59436	13.2	0.084615	71.47436
0.4191	18.4	0.117949	59.67949
0.29718	22.9	0.146795	45
0.21082	22.6	0.144872	30.51282
0.14986	20.4	0.130769	17.4359
0.07366	15.9	0.101923	7.24359
0.0375	9.2	0.058974	1.346154

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.094	Uniformity Coef.	4.50
d17	0.147	n computed	0.37
d20	0.162	g (cm/s^2)	980.00
d50	0.339	ρ (g/cm^3)	0.9981
d60	0.424	μ (g/cm s)	0.0098
de (Kruger)	0.241	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.224	tau (Sauerbrei)	1.053
de (Zunker)	0.230	$d_{geometric\ mean}$	0.364
de (Zamarin)	0.236	σ_ϕ	1.602
lo (Alyameni)	0.033		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	6.794871795
0.5 - 2	coarse sand	21.73076923
0.25 - 0.5	medium sand	26.47435897
0.063 - 0.25	fine sand	37.75641026
0.016 - 0.063	coarse silt	5.897435897
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

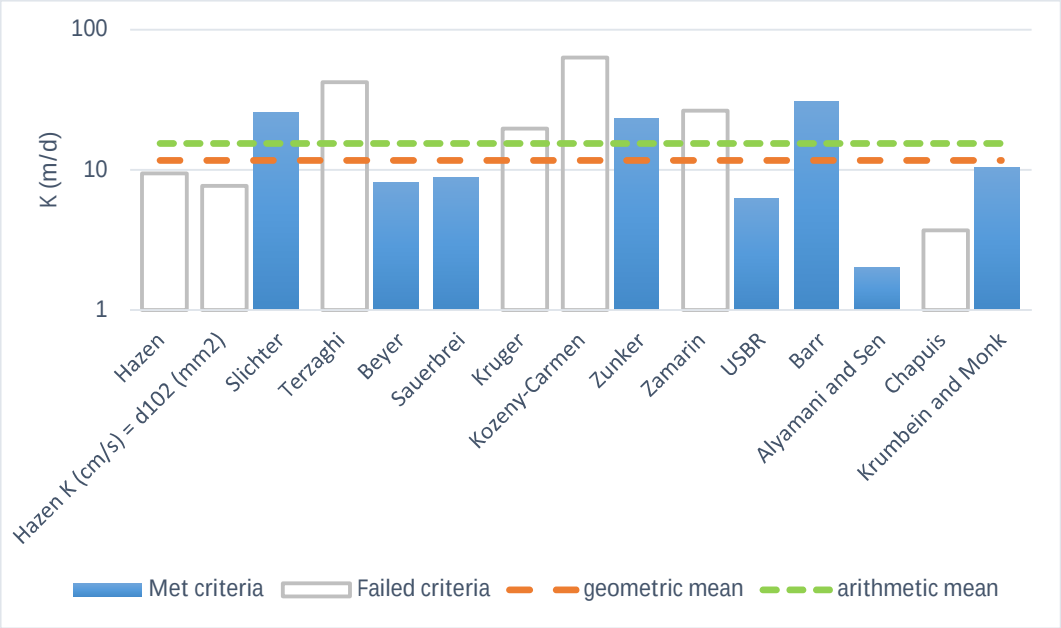
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (8 -10 ft bg)

Mass Sample (g): 156 20 T (oC) 20

Moderately well sorted sand low in fines



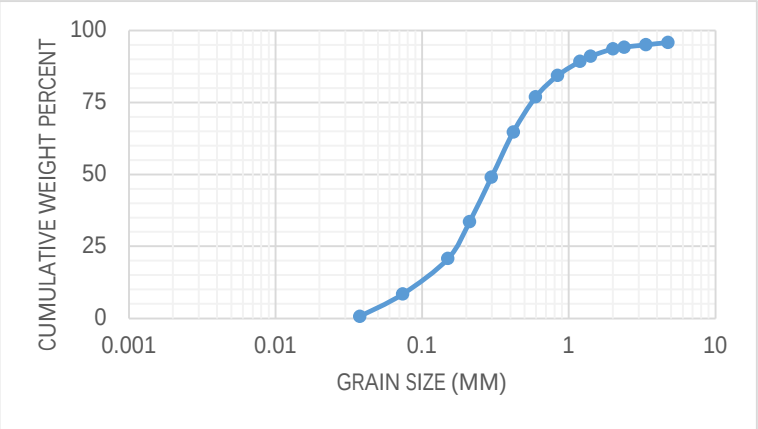
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.109E-01	.109E-03	9.40	30.8
Hazen K (cm/s) = d_{10} (mm)	.889E-02	.889E-04	7.68	25.2
Slichter	.296E-01	.296E-03	25.62	84.0
Terzaghi	.489E-01	.489E-03	42.25	138.6
Beyer	.939E-02	.939E-04	8.11	26.6
Sauerbrei	.102E-01	.102E-03	8.82	28.9
Kruger	.228E-01	.228E-03	19.70	64.6
Kozeny-Carmen	.731E-01	.731E-03	63.15	207.2
Zunker	.270E-01	.270E-03	23.30	76.5
Zamarin	.305E-01	.305E-03	26.36	86.5
USBR	.723E-02	.723E-04	6.25	20.5
Barr	.354E-01	.354E-03	30.59	100.3
Alyamani and Sen	.232E-02	.232E-04	2.00	6.6
Chapuis	.428E-02	.428E-04	3.70	12.1
Krumbein and Monk	.121E-01	.121E-03	10.48	34.4
Shepherd	.277E-01	.277E-03	23.93	78.5
geometric mean	.135E-01	.135E-03	11.70	38.4
arithmetic mean	.179E-01	.179E-03	15.45	50.7

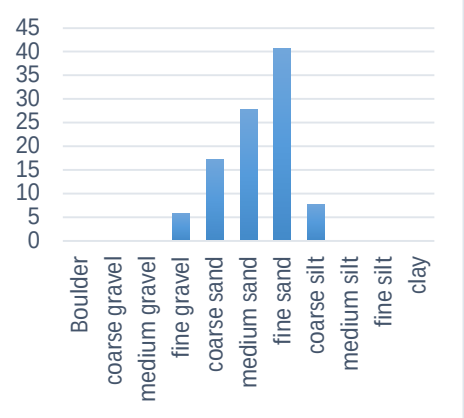
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (6 -8 ft bg)

Mass Sample (g): 153.7 T (oC) 20

Moderately well sorted sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	6.387532	0.041558	95.84416
3.3528	1.197662	0.007792	95.06494
2.37998	1.297468	0.008442	94.22078
1.99898	0.898247	0.005844	93.63636
1.4097	3.892403	0.025325	91.1039
1.19126	2.794545	0.018182	89.28571
0.84074	7.585195	0.049351	84.35065
0.59436	11.37779	0.074026	76.94805
0.4191	18.76338	0.122078	64.74026
0.29718	24.05305	0.156494	49.09091
0.21082	23.75364	0.154545	33.63636
0.14986	19.76143	0.128571	20.77922
0.07366	18.96299	0.123377	8.441558
0.0375	11.87682	0.077273	0.714286

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.083	Uniformity Coef.	4.59
d17	0.127	n computed	0.36
d20	0.145	g (cm/s^2)	980.00
d50	0.304	ρ (g/cm^3)	0.9981
d60	0.382	μ (g/cm s)	0.0098
de (Kruger)	0.214	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.198	tau (Sauerbrei)	1.053
de (Zunker)	0.203	$d_{geometric\ mean}$	0.309
de (Zamarin)	0.208	σ_ϕ	1.580
lo (Alyameni)	0.028		

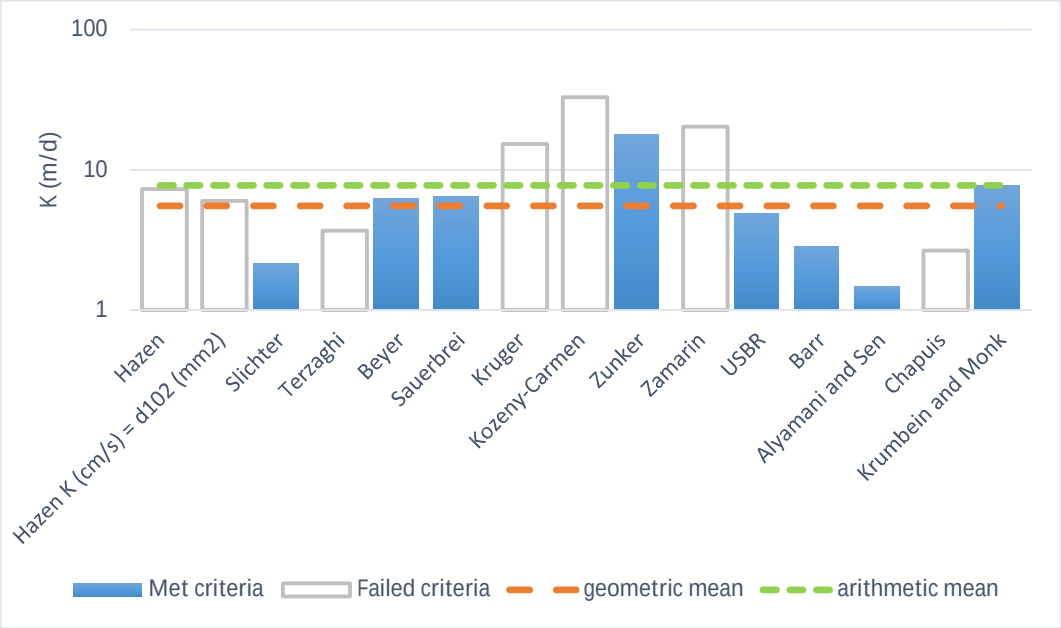
mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	5.779220779
0.5 - 2	coarse sand	17.27272727
0.25 - 0.5	medium sand	27.85714286
0.063 - 0.25	fine sand	40.64935065
0.016 - 0.063	coarse silt	7.727272727
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (6 -8 ft bg)

Mass Sample (g): 153.7 20 T (oC) 20

Moderately well sorted sand low in fines



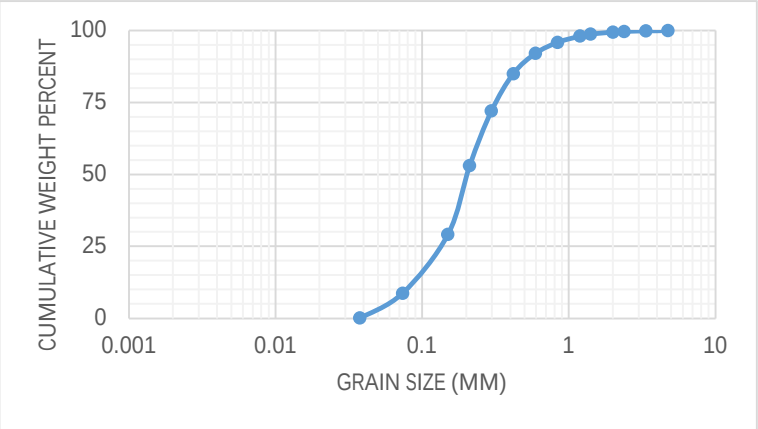
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.841E-02	.841E-04	7.27	23.8
Hazen K (cm/s) = d_{10} (mm)	.694E-02	.694E-04	5.99	19.7
Slichter	.247E-02	.247E-04	2.14	7.0
Terzaghi	.426E-02	.426E-04	3.68	12.1
Beyer	.730E-02	.730E-04	6.31	20.7
Sauerbrei	.744E-02	.744E-04	6.43	21.1
Kruger	.177E-01	.177E-03	15.28	50.1
Kozeny-Carmen	.382E-01	.382E-03	33.01	108.3
Zunker	.207E-01	.207E-03	17.86	58.6
Zamarin	.235E-01	.235E-03	20.32	66.7
USBR	.562E-02	.562E-04	4.86	15.9
Barr	.328E-02	.328E-04	2.84	9.3
Alyamani and Sen	.170E-02	.170E-04	1.46	4.8
Chapuis	.308E-02	.308E-04	2.66	8.7
Krumbein and Monk	.900E-02	.900E-04	7.78	25.5
Shepherd	.232E-01	.232E-03	20.05	65.8
geometric mean	.640E-02	.640E-04	5.53	18.2
arithmetic mean	.896E-02	.896E-04	7.75	25.4

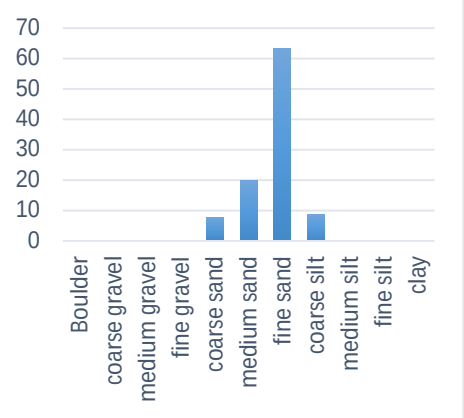
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (4 -6 ft bg)

Mass Sample (g): 153.7 T (oC) 20

Moderately well sorted sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	0	0	100
3.3528	0.2	0.001301	99.86988
2.37998	0.3	0.001952	99.67469
1.99898	0.4	0.002602	99.41444
1.4097	1	0.006506	98.76383
1.19126	1.1	0.007157	98.04815
0.84074	3.3	0.02147	95.90111
0.59436	5.8	0.037736	92.12752
0.4191	11	0.071568	84.97072
0.29718	19.8	0.128822	72.08848
0.21082	29.2	0.18998	53.09044
0.14986	36.7	0.238777	29.21275
0.07366	31.5	0.204945	8.718282
0.0375	13.2	0.085882	0.130124

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.078	Uniformity Coef.	3.09
d17	0.104	n computed	0.40
d20	0.116	g (cm/s^2)	980.00
d50	0.203	ρ (g/cm^3)	0.9981
d60	0.242	μ (g/cm s)	0.0098
de (Kruger)	0.166	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.153	tau (Sauerbrei)	1.053
de (Zunker)	0.157	$d_{geometric\ mean}$	0.207
de (Zamarin)	0.161	σ_ϕ	1.075
lo (Alyameni)	0.047		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	0.325309044
0.5 - 2	coarse sand	7.547169811
0.25 - 0.5	medium sand	20.03903709
0.063 - 0.25	fine sand	63.37020169
0.016 - 0.063	coarse silt	8.588158751
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

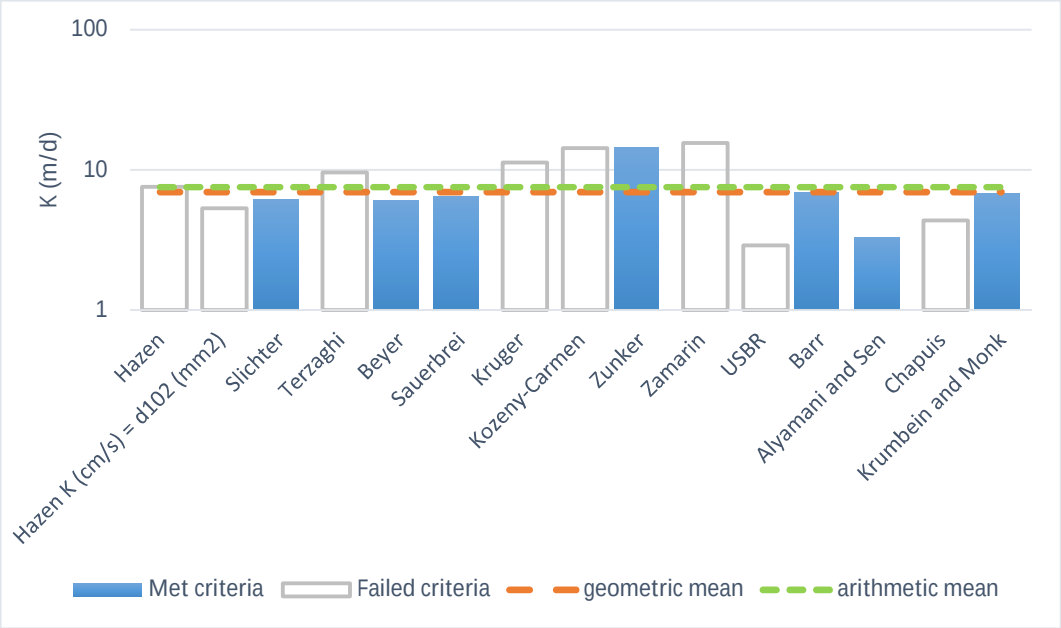
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (4 -6 ft bg)

Mass Sample (g): 153.7 20 T (oC) 20

Moderately well sorted sand low in fines



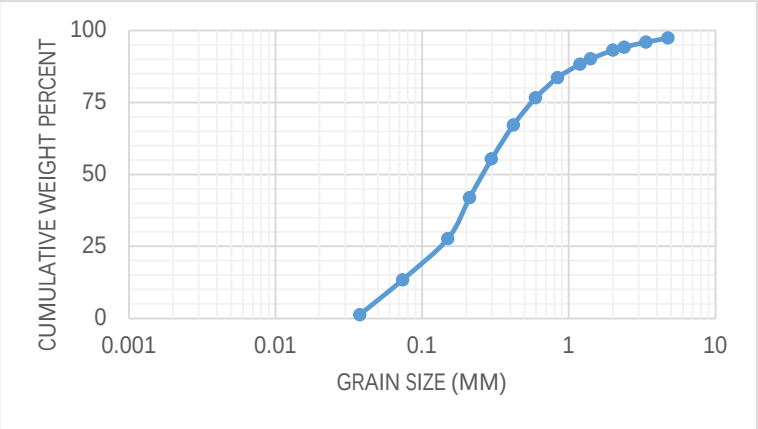
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.874E-02	.874E-04	7.55	24.8
Hazen K (cm/s) = d_{10} (mm)	.615E-02	.615E-04	5.31	17.4
Slichter	.706E-02	.706E-04	6.10	20.0
Terzaghi	.111E-01	.111E-03	9.59	31.4
Beyer	.702E-02	.702E-04	6.06	19.9
Sauerbrei	.748E-02	.748E-04	6.46	21.2
Kruger	.131E-01	.131E-03	11.28	37.0
Kozeny-Carmen	.165E-01	.165E-03	14.26	46.8
Zunker	.167E-01	.167E-03	14.39	47.2
Zamarin	.179E-01	.179E-03	15.50	50.8
USBR	.334E-02	.334E-04	2.88	9.5
Barr	.799E-02	.799E-04	6.91	22.7
Alyamani and Sen	.382E-02	.382E-04	3.30	10.8
Chapuis	.504E-02	.504E-04	4.36	14.3
Krumbein and Monk	.779E-02	.779E-04	6.73	22.1
Shepherd	.119E-01	.119E-03	10.28	33.7
geometric mean	.804E-02	.804E-04	6.95	22.8
arithmetic mean	.871E-02	.871E-04	7.53	24.7

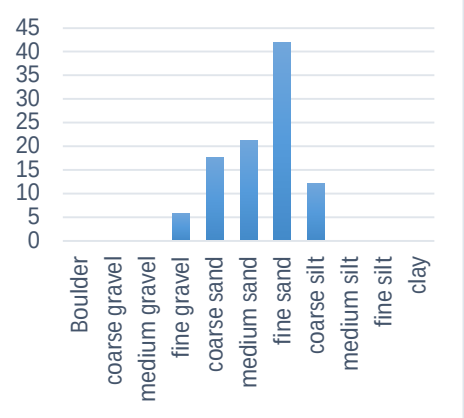
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (10 -12 ft bg)

Mass Sample (g): 168.2 T (oC) 20

Poorly sorted sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	4.4	0.026159	97.38407
3.3528	2.4	0.014269	95.95719
2.37998	2.9	0.017241	94.23306
1.99898	1.7	0.010107	93.22235
1.4097	5.2	0.030916	90.1308
1.19126	3	0.017836	88.34721
0.84074	7.9	0.046968	83.65042
0.59436	11.8	0.070155	76.63496
0.4191	16	0.095125	67.12247
0.29718	19.8	0.117717	55.35077
0.21082	22.5	0.133769	41.97384
0.14986	23.9	0.142093	27.76457
0.07366	24.1	0.143282	13.43639
0.0375	20.4	0.121284	1.307967

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.063	Uniformity Coef.	5.45
d17	0.093	n computed	0.35
d20	0.109	g (cm/s^2)	980.00
d50	0.263	ρ (g/cm^3)	0.9981
d60	0.345	μ (g/cm s)	0.0098
de (Kruger)	0.182	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.167	tau (Sauerbrei)	1.053
de (Zunker)	0.172	$d_{geometric\ mean}$	0.284
de (Zamarin)	0.177	σ_ϕ	1.715
lo (Alyameni)	0.014		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	5.766944114
0.5 - 2	coarse sand	17.5980975
0.25 - 0.5	medium sand	21.28418549
0.063 - 0.25	fine sand	41.91438763
0.016 - 0.063	coarse silt	12.12841855
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

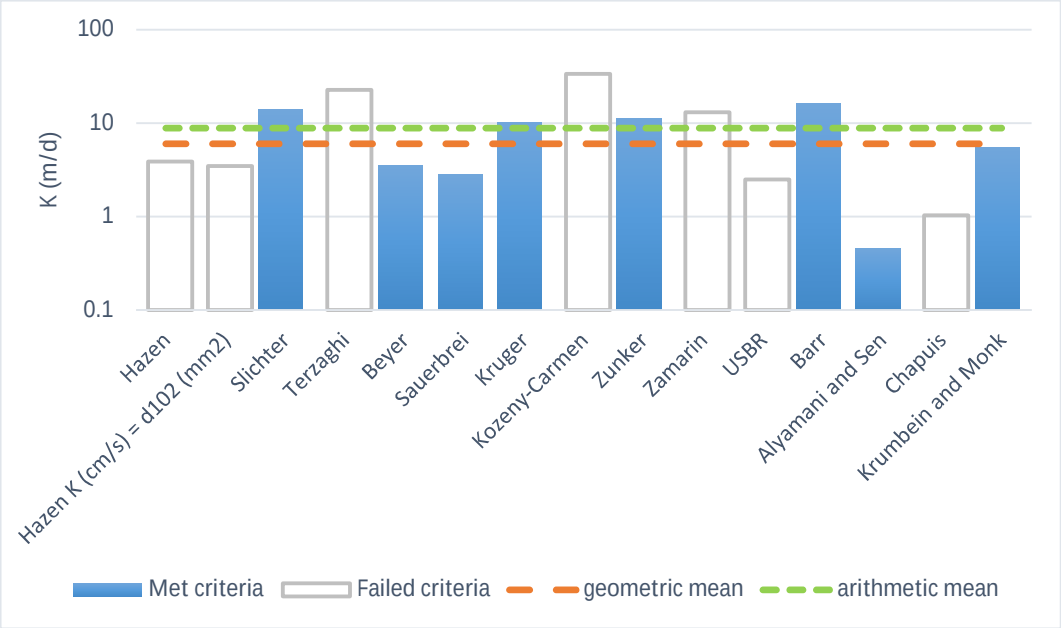
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (10 -12 ft bg)

Mass Sample (g): 168.2 20 T (oC) 20

Poorly sorted sand low in fines



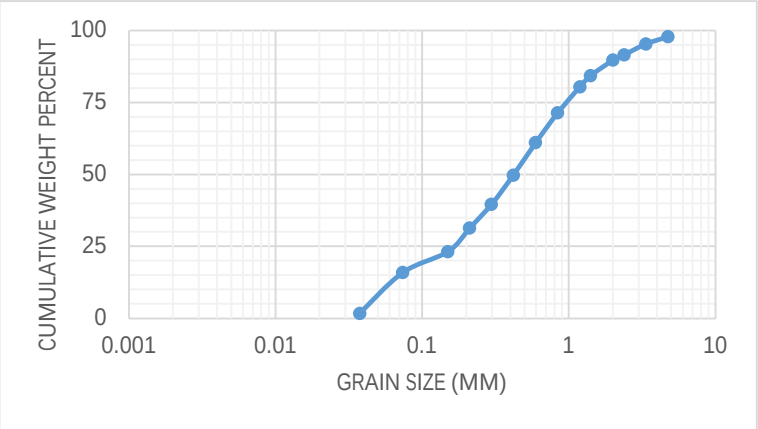
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.449E-02	.449E-04	3.88	12.7
Hazen K (cm/s) = d_{10} (mm)	.402E-02	.402E-04	3.47	11.4
Slichter	.161E-01	.161E-03	13.93	45.7
Terzaghi	.262E-01	.262E-03	22.62	74.2
Beyer	.408E-02	.408E-04	3.52	11.6
Sauerbrei	.331E-02	.331E-04	2.86	9.4
Kruger	.117E-01	.117E-03	10.12	33.2
Kozeny-Carmen	.389E-01	.389E-03	33.63	110.3
Zunker	.130E-01	.130E-03	11.19	36.7
Zamarin	.151E-01	.151E-03	13.06	42.8
USBR	.289E-02	.289E-04	2.49	8.2
Barr	.189E-01	.189E-03	16.29	53.4
Alyamani and Sen	.520E-03	.520E-05	0.45	1.5
Chapuis	.119E-02	.119E-04	1.03	3.4
Krumbein and Monk	.636E-02	.636E-04	5.50	18.0
Shepherd	.182E-01	.182E-03	15.73	51.6
geometric mean	.694E-02	.694E-04	6.00	19.7
arithmetic mean	.102E-01	.102E-03	8.84	29.0

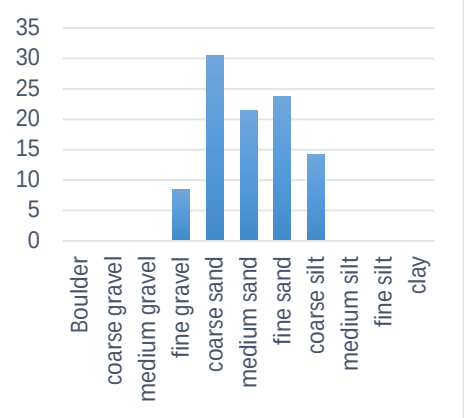
Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (0 - 4 ft bg)

Mass Sample (g): 162 T (oC) 20

Poorly sorted sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	3.5	0.021605	97.83951
3.3528	4.1	0.025309	95.30864
2.37998	6.1	0.037654	91.54321
1.99898	3	0.018519	89.69136
1.4097	8.7	0.053704	84.32099
1.19126	6.3	0.038889	80.4321
0.84074	14.6	0.090123	71.41975
0.59436	16.8	0.103704	61.04938
0.4191	18.3	0.112963	49.75309
0.29718	16.4	0.101235	39.62963
0.21082	13.4	0.082716	31.35802
0.14986	13.2	0.081481	23.20988
0.07366	11.8	0.07284	15.92593
0.0375	23	0.141975	1.728395

Effective Grain Diameters (mm)	
d10	0.059
d17	0.085
d20	0.116
d50	0.423
d60	0.578
de (Kruger)	0.208
de (Kozeny)	0.191
de (Zunker)	0.196
de (Zamarin)	0.202
lo (Alyameni)	-0.033

Other Useful Parameters	
Uniformity Coef.	9.87
n computed	0.30
g (cm/s^2)	980.00
ρ (g/cm^3)	0.9981
μ (g/cm s)	0.0098
ρg/μ (1/cm s)	9.9327E+04
tau (Sauerbrei)	1.053
$d_{geometric\ mean}$	0.394
σ_ϕ	1.989

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	8.456790123
0.5 - 2	coarse sand	30.49382716
0.25 - 0.5	medium sand	21.41975309
0.063 - 0.25	fine sand	23.7037037
0.016 - 0.063	coarse silt	14.19753086
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

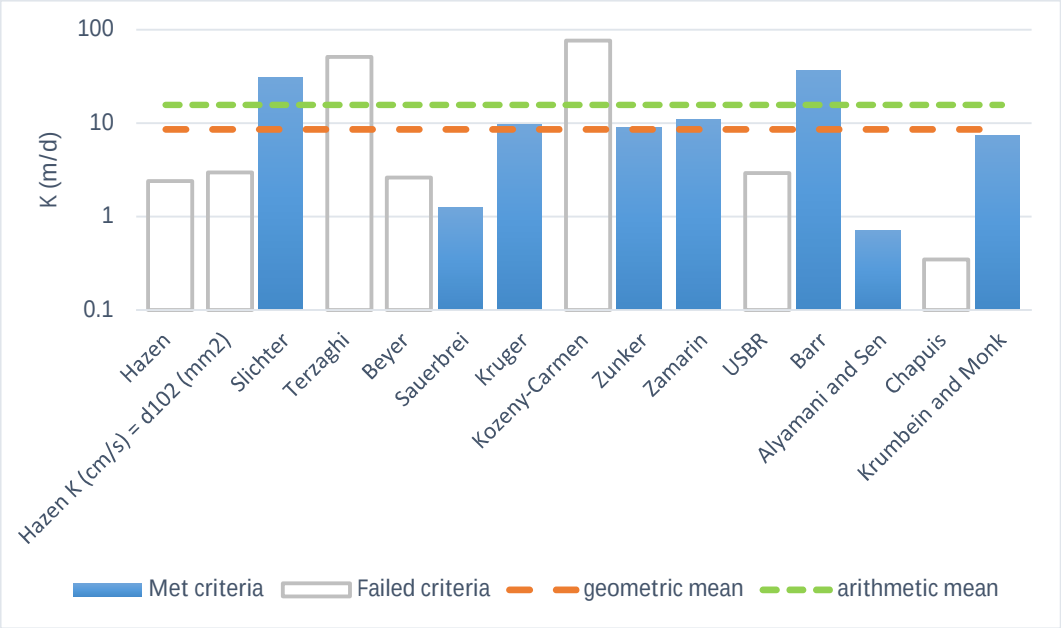
WSP USA.

K from Grain Size Analysis Report Date: 4/25/2022

Sample Name: TW-1 - (0 - 4 ft bg)

Mass Sample (g): 162 20 T (oC) 20

Poorly sorted sand low in fines



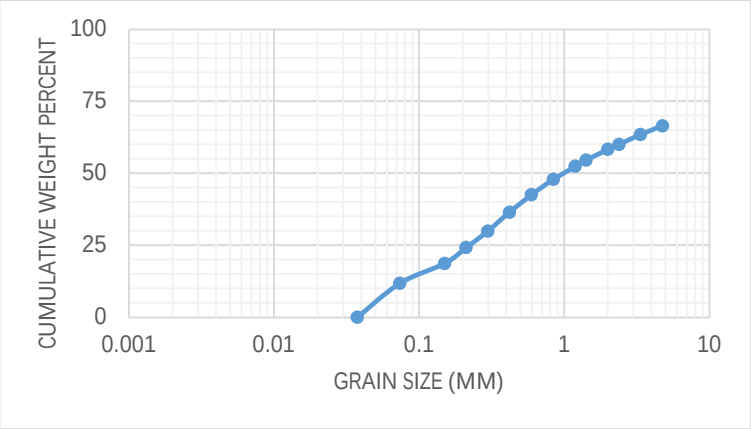
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.277E-02	.277E-04	2.39	7.9
Hazen K (cm/s) = d_{10} (mm)	.343E-02	.343E-04	2.96	9.7
Slichter	.357E-01	.357E-03	30.87	101.3
Terzaghi	.591E-01	.591E-03	51.10	167.7
Beyer	.302E-02	.302E-04	2.61	8.6
Sauerbrei	.147E-02	.147E-04	1.27	4.2
Kruger	.111E-01	.111E-03	9.60	31.5
Kozeny-Carmen	.886E-01	.886E-03	76.53	251.1
Zunker	.104E-01	.104E-03	9.01	29.6
Zamarin	.126E-01	.126E-03	10.90	35.7
USBR	.338E-02	.338E-04	2.92	9.6
Barr	.429E-01	.429E-03	37.06	121.6
Alyamani and Sen	.825E-03	.825E-05	0.71	2.3
Chapuis	.400E-03	.400E-05	0.35	1.1
Krumbein and Monk	.855E-02	.855E-04	7.38	24.2
Shepherd	.400E-01	.400E-03	34.52	113.3
geometric mean	.992E-02	.992E-04	8.57	28.1
arithmetic mean	.182E-01	.182E-03	15.70	51.5

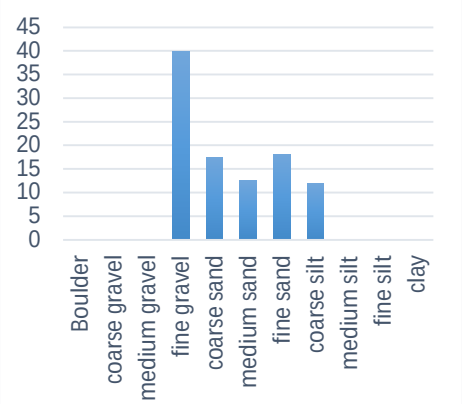
Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-306(9ft)

Mass Sample (g): 357.3 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	119.6	0.334733	66.52673
3.3528	10.8	0.030227	63.50406
2.37998	12.5	0.034985	60.0056
1.99898	5.9	0.016513	58.35432
1.4097	13.5	0.037783	54.57599
1.19126	7.5	0.020991	52.47691
0.84074	16.3	0.04562	47.91492
0.59436	19	0.053177	42.59726
0.4191	21.8	0.061013	36.49594
0.29718	23.3	0.065211	29.97481
0.21082	20.5	0.057375	24.23734
0.14986	19.7	0.055136	18.72376
0.07366	24.5	0.06857	11.86678
0.0375	42.4	0.118668	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.068	Uniformity Coef.	35.00
d17	0.131	n computed	0.26
d20	0.164	g (cm/s^2)	980.00
d50	1.001	ρ (g/cm^3)	0.9981
d60	2.379	μ (g/cm s)	0.0098
de (Kruger)	0.265	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.242	tau (Sauerbrei)	1.053
de (Zunker)	0.250	$d_{geometric\ mean}$	0.501
de (Zamarin)	0.258	σ_ϕ	2.474
Io (Alyameni)	-0.165		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	39.99440246
0.5 - 2	coarse sand	17.40834033
0.25 - 0.5	medium sand	12.62244612
0.063 - 0.25	fine sand	18.10803247
0.016 - 0.063	coarse silt	11.86677862
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

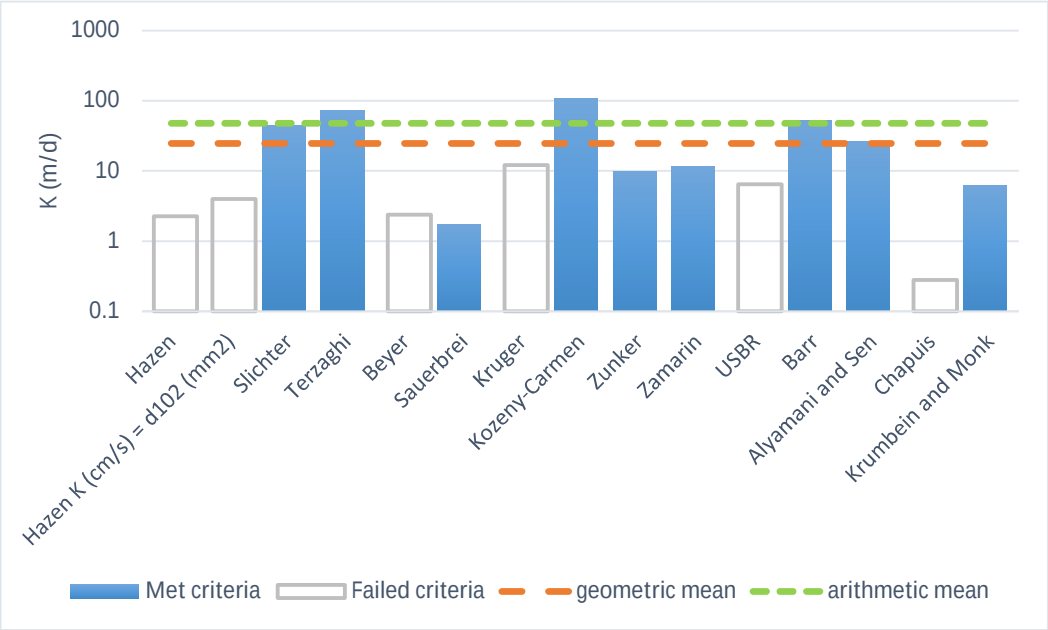
WSP USA.

K from Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-306(9ft)

Mass Sample (g): 357.3 20 T (oC) 20

Poorly sorted gravelly sand low in fines



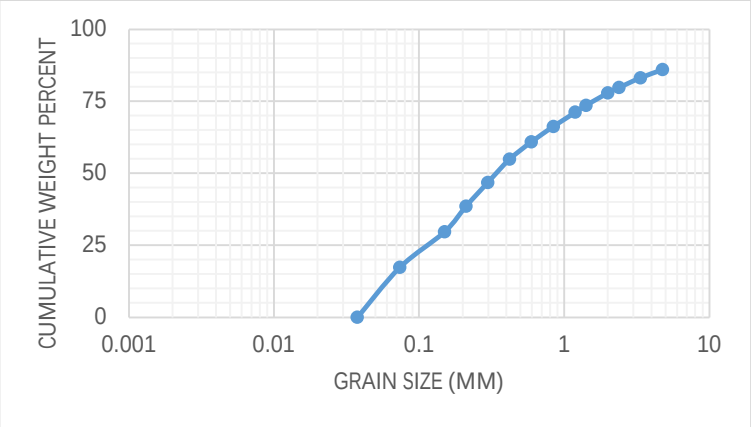
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.263E-02	.263E-04	2.27	7.4
Hazen K (cm/s) = d_{10} (mm)	.462E-02	.462E-04	3.99	13.1
Slichter	.521E-01	.521E-03	44.98	147.6
Terzaghi	.850E-01	.850E-03	73.45	241.0
Beyer	.276E-02	.276E-04	2.38	7.8
Sauerbrei	.201E-02	.201E-04	1.74	5.7
Kruger	.140E-01	.140E-03	12.12	39.7
Kozeny-Carmen	.127E+00	.127E-02	109.36	358.8
Zunker	.113E-01	.113E-03	9.75	32.0
Zamarin	.136E-01	.136E-03	11.76	38.6
USBR	.745E-02	.745E-04	6.44	21.1
Barr	.613E-01	.613E-03	52.97	173.8
Alyamani and Sen	.303E-01	.303E-03	26.19	85.9
Chapuis	.324E-03	.324E-05	0.28	0.9
Krumbein and Monk	.731E-02	.731E-04	6.32	20.7
Shepherd	.166E+00	.166E-02	143.02	469.2
geometric mean	.288E-01	.288E-03	24.87	81.6
arithmetic mean	.555E-01	.555E-03	47.95	157.3

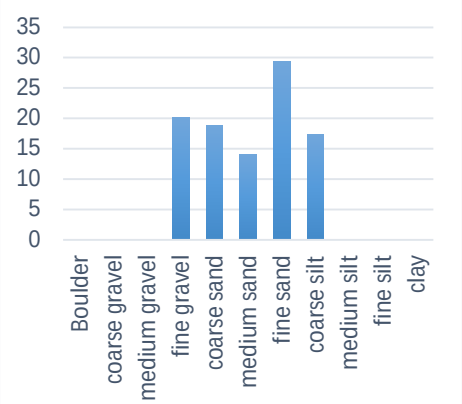
Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-305(9ft)

Mass Sample (g): 360.5 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	50.4	0.139806	86.01942
3.3528	10.2	0.028294	83.19001
2.37998	12.2	0.033842	79.80583
1.99898	6.7	0.018585	77.9473
1.4097	15.6	0.043273	73.61997
1.19126	8.6	0.023856	71.2344
0.84074	17.9	0.049653	66.26907
0.59436	19.1	0.052982	60.97087
0.4191	21.9	0.060749	54.89598
0.29718	29	0.080444	46.8516
0.21082	29.6	0.082108	38.64078
0.14986	32.1	0.089043	29.73648
0.07366	44.5	0.12344	17.39251
0.0375	62.7	0.173925	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.058	Uniformity Coef.	9.72
d17	0.073	n computed	0.30
d20	0.090	g (cm/s^2)	980.00
d50	0.345	ρ (g/cm^3)	0.9981
d60	0.566	μ (g/cm s)	0.0098
de (Kruger)	0.179	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.163	tau (Sauerbrei)	1.053
de (Zunker)	0.168	$d_{geometric\ mean}$	0.338
de (Zamarin)	0.173	σ_ϕ	2.459
lo (Alyameni)	-0.013		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	20.19417476
0.5 - 2	coarse sand	18.83495146
0.25 - 0.5	medium sand	14.11927878
0.063 - 0.25	fine sand	29.4590846
0.016 - 0.063	coarse silt	17.3925104
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

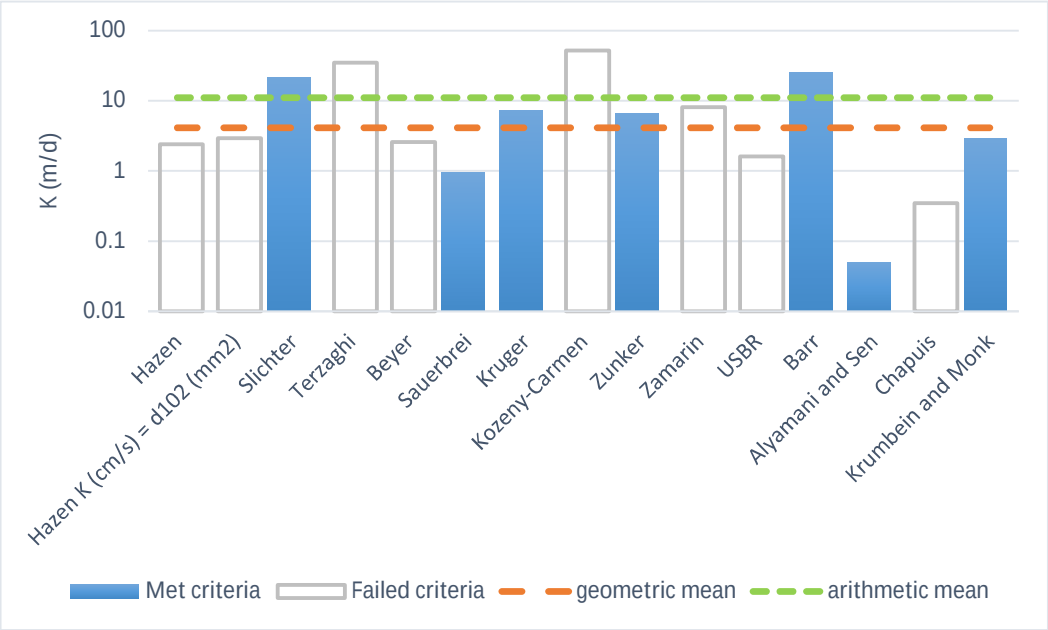
WSP USA.

K from Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-305(9ft)

Mass Sample (g): 360.5 20 T (oC) 20

Poorly sorted gravelly sand low in fines



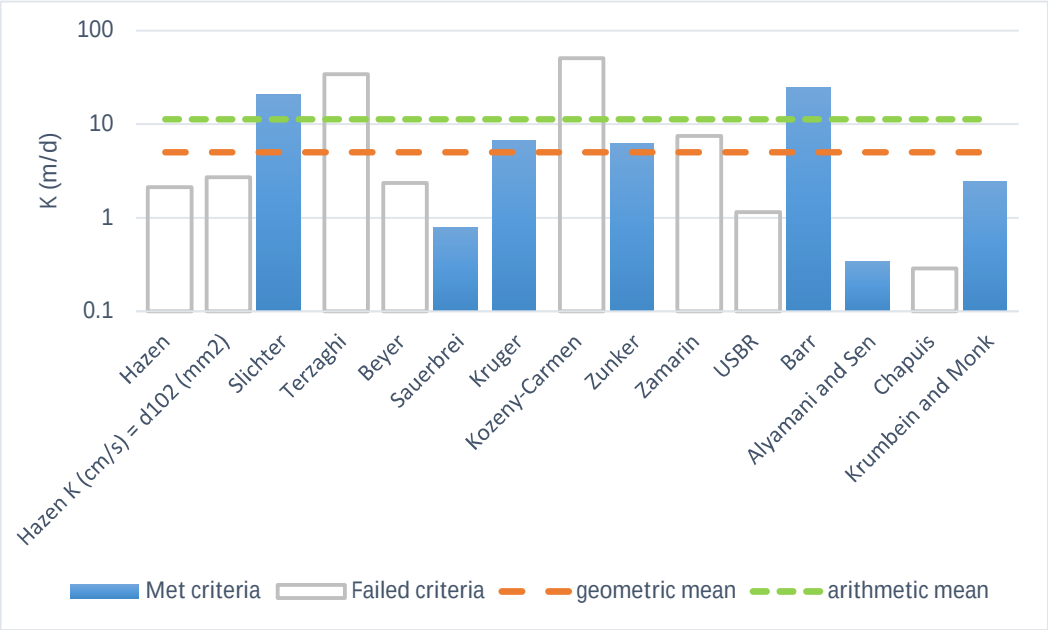
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.277E-02	.277E-04	2.39	7.8
Hazen K (cm/s) = d_{10} (mm)	.340E-02	.340E-04	2.94	9.6
Slichter	.247E-01	.247E-03	21.35	70.1
Terzaghi	.406E-01	.406E-03	35.07	115.1
Beyer	.300E-02	.300E-04	2.60	8.5
Sauerbrei	.110E-02	.110E-04	0.95	3.1
Kruger	.830E-02	.830E-04	7.17	23.5
Kozeny-Carmen	.606E-01	.606E-03	52.32	171.7
Zunker	.773E-02	.773E-04	6.68	21.9
Zamarin	.940E-02	.940E-04	8.12	26.6
USBR	.186E-02	.186E-04	1.61	5.3
Barr	.293E-01	.293E-03	25.34	83.1
Alyamani and Sen	.578E-04	.578E-06	0.05	0.2
Chapuis	.403E-03	.403E-05	0.35	1.1
Krumbein and Monk	.340E-02	.340E-04	2.93	9.6
Shepherd	.285E-01	.285E-03	24.66	80.9
geometric mean	.481E-02	.481E-04	4.16	13.6
arithmetic mean	.129E-01	.129E-03	11.14	36.6

K from Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-306(3ft)

Mass Sample (g): 318 20 T (oC) 20

Poorly sorted gravelly sand low in fines



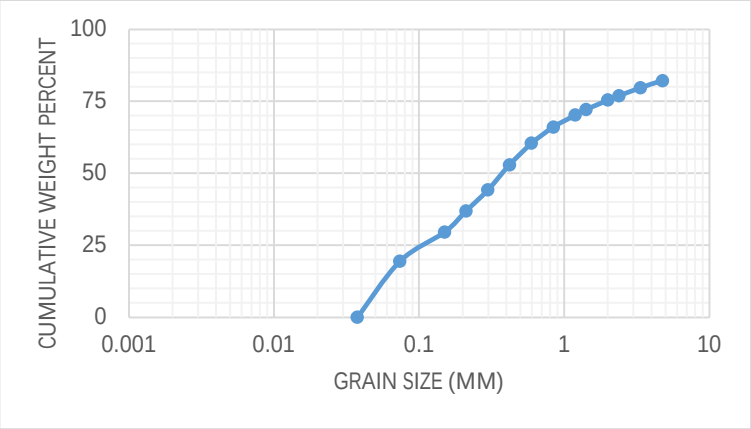
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.246E-02	.246E-04	2.13	7.0
Hazen K (cm/s) = d_{10} (mm)	.314E-02	.314E-04	2.71	8.9
Slichter	.241E-01	.241E-03	20.79	68.2
Terzaghi	.395E-01	.395E-03	34.13	112.0
Beyer	.273E-02	.273E-04	2.36	7.7
Sauerbrei	.923E-03	.923E-05	0.80	2.6
Kruger	.779E-02	.779E-04	6.73	22.1
Kozeny-Carmen	.589E-01	.589E-03	50.90	167.0
Zunker	.712E-02	.712E-04	6.15	20.2
Zamarin	.868E-02	.868E-04	7.50	24.6
USBR	.133E-02	.133E-04	1.15	3.8
Barr	.285E-01	.285E-03	24.65	80.9
Alyamani and Sen	.401E-03	.401E-05	0.35	1.1
Chapuis	.334E-03	.334E-05	0.29	0.9
Krumbein and Monk	.281E-02	.281E-04	2.43	8.0
Shepherd	.332E-01	.332E-03	28.65	94.0
geometric mean	.582E-02	.582E-04	5.03	16.5
arithmetic mean	.131E-01	.131E-03	11.32	37.1

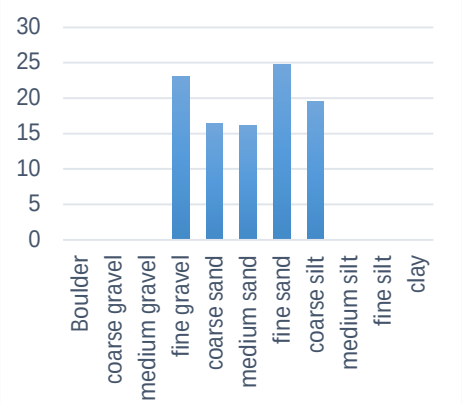
Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-306(3ft)

Mass Sample (g): 318 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	56.6	0.177987	82.20126
3.3528	7.8	0.024528	79.74843
2.37998	8.9	0.027987	76.94969
1.99898	4.8	0.015094	75.44025
1.4097	10.4	0.032704	72.16981
1.19126	6.2	0.019497	70.22013
0.84074	13.1	0.041195	66.10063
0.59436	18	0.056604	60.44025
0.4191	23.8	0.074843	52.95597
0.29718	27.7	0.087107	44.24528
0.21082	23.1	0.072642	36.98113
0.14986	23.3	0.07327	29.65409
0.07366	32.3	0.101572	19.49686
0.0375	62	0.194969	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.056	Uniformity Coef.	10.42
d17	0.069	n computed	0.29
d20	0.077	g (cm/s^2)	980.00
d50	0.378	ρ (g/cm^3)	0.9981
d60	0.584	μ (g/cm s)	0.0098
de (Kruger)	0.176	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.160	tau (Sauerbrei)	1.053
de (Zunker)	0.165	$d_{geometric\ mean}$	0.334
de (Zamarin)	0.171	σ_ϕ	2.585
Io (Alyameni)	-0.024		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	23.05031447
0.5 - 2	coarse sand	16.50943396
0.25 - 0.5	medium sand	16.19496855
0.063 - 0.25	fine sand	24.74842767
0.016 - 0.063	coarse silt	19.49685535
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

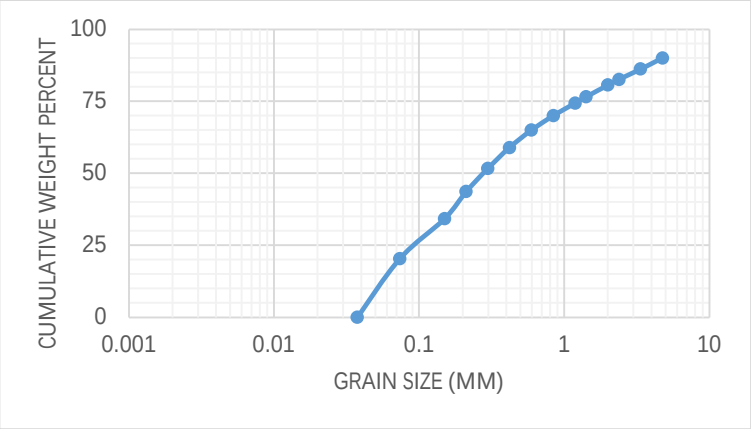
WSP USA.

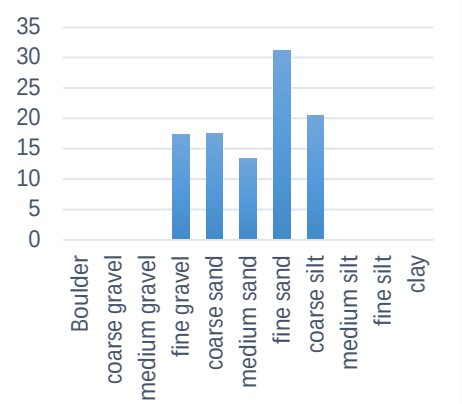
Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-305(2ft)

Mass Sample (g): 362.6 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	36.00072	0.099285	90.07151
3.3528	13.9615	0.038504	86.22112
2.37998	13.06397	0.036029	82.61826
1.99898	6.980748	0.019252	80.69307
1.4097	14.85902	0.040979	76.59516
1.19126	7.878273	0.021727	74.42244
0.84074	15.85627	0.043729	70.0495
0.59436	18.14994	0.050055	65.044
0.4191	22.13894	0.061056	58.93839
0.29718	26.22767	0.072332	51.70517
0.21082	29.11969	0.080308	43.67437
0.14986	33.90649	0.093509	34.32343
0.07366	50.36111	0.138889	20.43454
0.0375	74.09565	0.204345	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.055	Uniformity Coef.	8.15
d17	0.068	n computed	0.31
d20	0.073	g (cm/s^2)	980.00
d50	0.279	ρ (g/cm^3)	0.9981
d60	0.450	μ (g/cm s)	0.0098
de (Kruger)	0.160	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.145	tau (Sauerbrei)	1.053
de (Zunker)	0.150	$d_{geometric\ mean}$	0.304
de (Zamarin)	0.155	σ_ϕ	2.370
Io (Alyameni)	-0.001		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	17.38173817
0.5 - 2	coarse sand	17.57425743
0.25 - 0.5	medium sand	13.33883388
0.063 - 0.25	fine sand	31.27062706
0.016 - 0.063	coarse silt	20.43454345
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

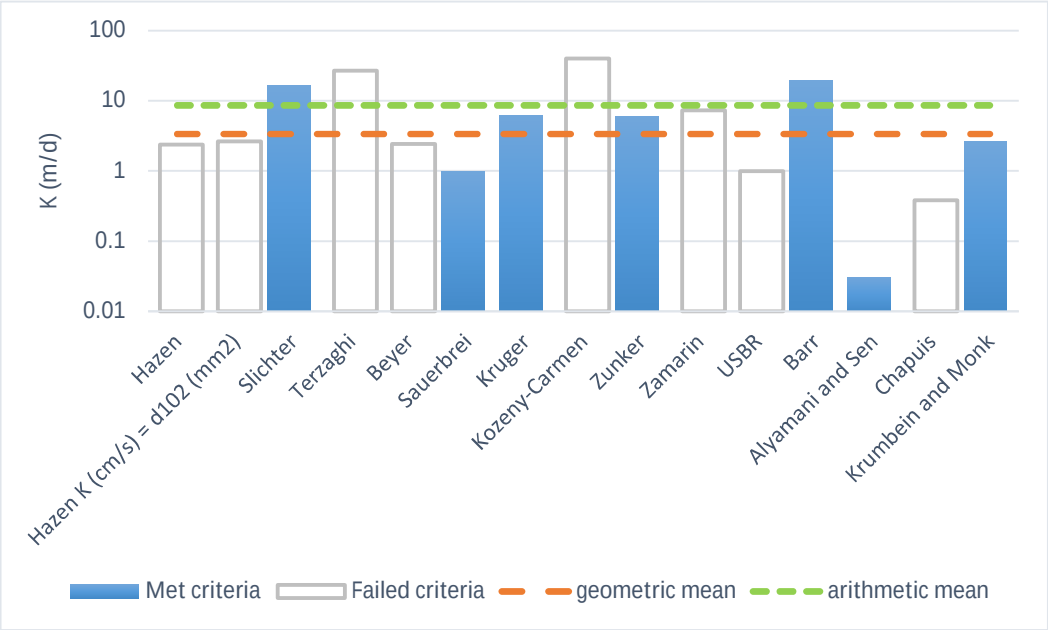
WSP USA.

K from Grain Size Analysis Report Date: #########

Sample Name: TP-305(2ft)

Mass Sample (g): 362.6 20 T (oC) 20

Poorly sorted gravelly sand low in fines



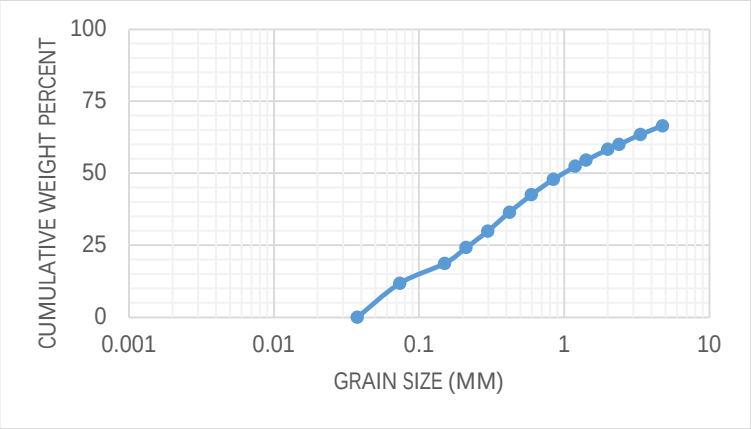
Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.274E-02	.274E-04	2.37	7.8
Hazen K (cm/s) = d_{10} (mm)	.305E-02	.305E-04	2.63	8.6
Slichter	.191E-01	.191E-03	16.49	54.1
Terzaghi	.311E-01	.311E-03	26.91	88.3
Beyer	.281E-02	.281E-04	2.43	8.0
Sauerbrei	.113E-02	.113E-04	0.98	3.2
Kruger	.722E-02	.722E-04	6.24	20.5
Kozeny-Carmen	.464E-01	.464E-03	40.05	131.4
Zunker	.702E-02	.702E-04	6.07	19.9
Zamarin	.851E-02	.851E-04	7.35	24.1
USBR	.115E-02	.115E-04	1.00	3.3
Barr	.225E-01	.225E-03	19.40	63.6
Alyamani and Sen	.358E-04	.358E-06	0.03	0.1
Chapuis	.442E-03	.442E-05	0.38	1.3
Krumbein and Monk	.309E-02	.309E-04	2.67	8.8
Shepherd	.201E-01	.201E-03	17.36	57.0
geometric mean	.391E-02	.391E-04	3.38	11.1
arithmetic mean	.100E-01	.100E-03	8.65	28.4

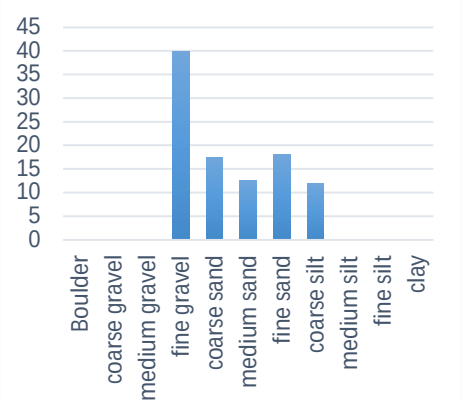
Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-306(9ft)

Mass Sample (g): 357.3 T (oC) 20

Poorly sorted gravelly sand low in fines





Sieve opening (ps) di (mm)	Mass of retained (mr) (g)	mass fraction (mf)	Percent Passing (pp)
4.7498	119.6	0.334733	66.52673
3.3528	10.8	0.030227	63.50406
2.37998	12.5	0.034985	60.0056
1.99898	5.9	0.016513	58.35432
1.4097	13.5	0.037783	54.57599
1.19126	7.5	0.020991	52.47691
0.84074	16.3	0.04562	47.91492
0.59436	19	0.053177	42.59726
0.4191	21.8	0.061013	36.49594
0.29718	23.3	0.065211	29.97481
0.21082	20.5	0.057375	24.23734
0.14986	19.7	0.055136	18.72376
0.07366	24.5	0.06857	11.86678
0.0375	42.4	0.118668	0

Effective Grain Diameters (mm)		Other Useful Parameters	
d10	0.068	Uniformity Coef.	35.00
d17	0.131	n computed	0.26
d20	0.164	g (cm/s^2)	980.00
d50	1.001	ρ (g/cm^3)	0.9981
d60	2.379	μ (g/cm s)	0.0098
de (Kruger)	0.265	ρg/μ (1/cm s)	9.9327E+04
de (Kozeny)	0.242	tau (Sauerbrei)	1.053
de (Zunker)	0.250	$d_{geometric\ mean}$	0.501
de (Zamarin)	0.258	σ_ϕ	2.474
Io (Alyameni)	-0.165		

mm	0	% in sample
>64	Boulder	
16 - 64	coarse gravel	
8 - 16	medium gravel	
2 - 8	fine gravel	39.99440246
0.5 - 2	coarse sand	17.40834033
0.25 - 0.5	medium sand	12.62244612
0.063 - 0.25	fine sand	18.10803247
0.016 - 0.063	coarse silt	11.86677862
0.008 - 0.016	medium silt	
0.002 - 0.008	fine silt	
<0.002	clay	

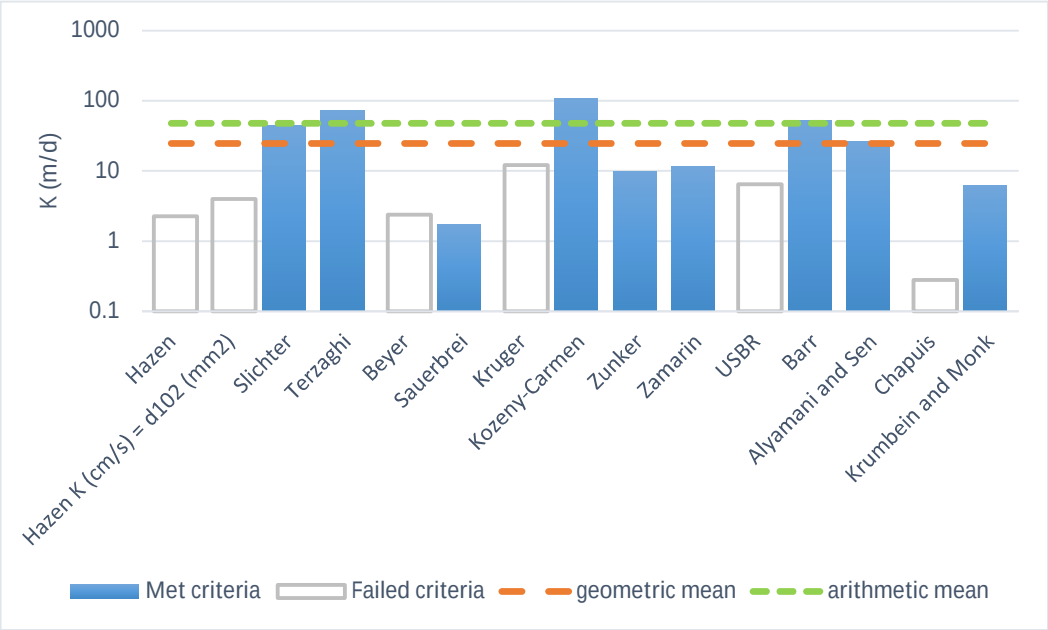
WSP USA.

K from Grain Size Analysis Report Date: 12/12/2022

Sample Name: TP-306(9ft)

Mass Sample (g): 357.3 20 T (oC) 20

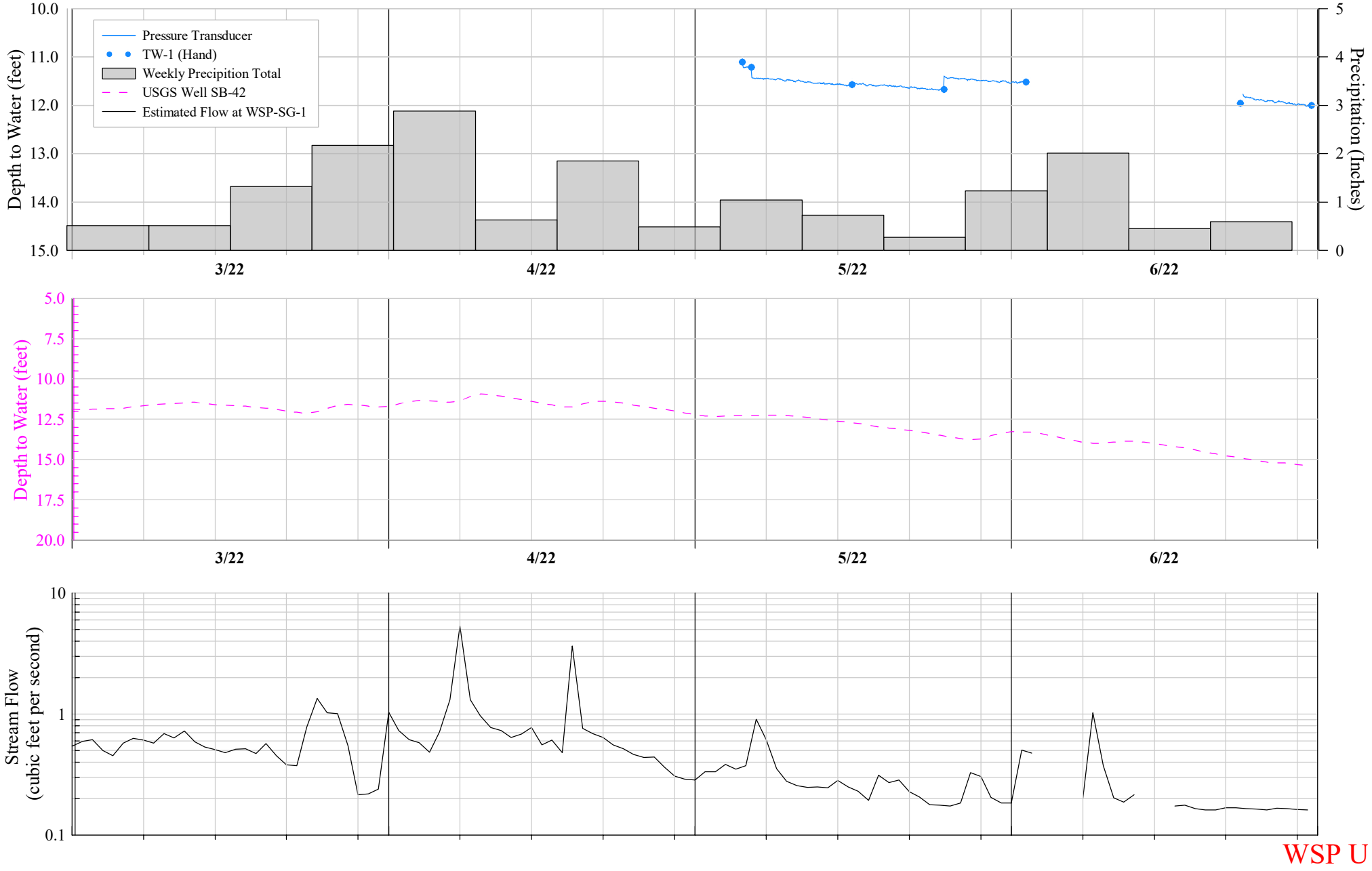
Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	Ft/d
Hazen	.263E-02	.263E-04	2.27	7.4
Hazen K (cm/s) = d_{10} (mm)	.462E-02	.462E-04	3.99	13.1
Slichter	.521E-01	.521E-03	44.98	147.6
Terzaghi	.850E-01	.850E-03	73.45	241.0
Beyer	.276E-02	.276E-04	2.38	7.8
Sauerbrei	.201E-02	.201E-04	1.74	5.7
Kruger	.140E-01	.140E-03	12.12	39.7
Kozeny-Carmen	.127E+00	.127E-02	109.36	358.8
Zunker	.113E-01	.113E-03	9.75	32.0
Zamarin	.136E-01	.136E-03	11.76	38.6
USBR	.745E-02	.745E-04	6.44	21.1
Barr	.613E-01	.613E-03	52.97	173.8
Alyamani and Sen	.303E-01	.303E-03	26.19	85.9
Chapuis	.324E-03	.324E-05	0.28	0.9
Krumbein and Monk	.731E-02	.731E-04	6.32	20.7
Shepherd	.166E+00	.166E-02	143.02	469.2
geometric mean	.288E-01	.288E-03	24.87	81.6
arithmetic mean	.555E-01	.555E-03	47.95	157.3

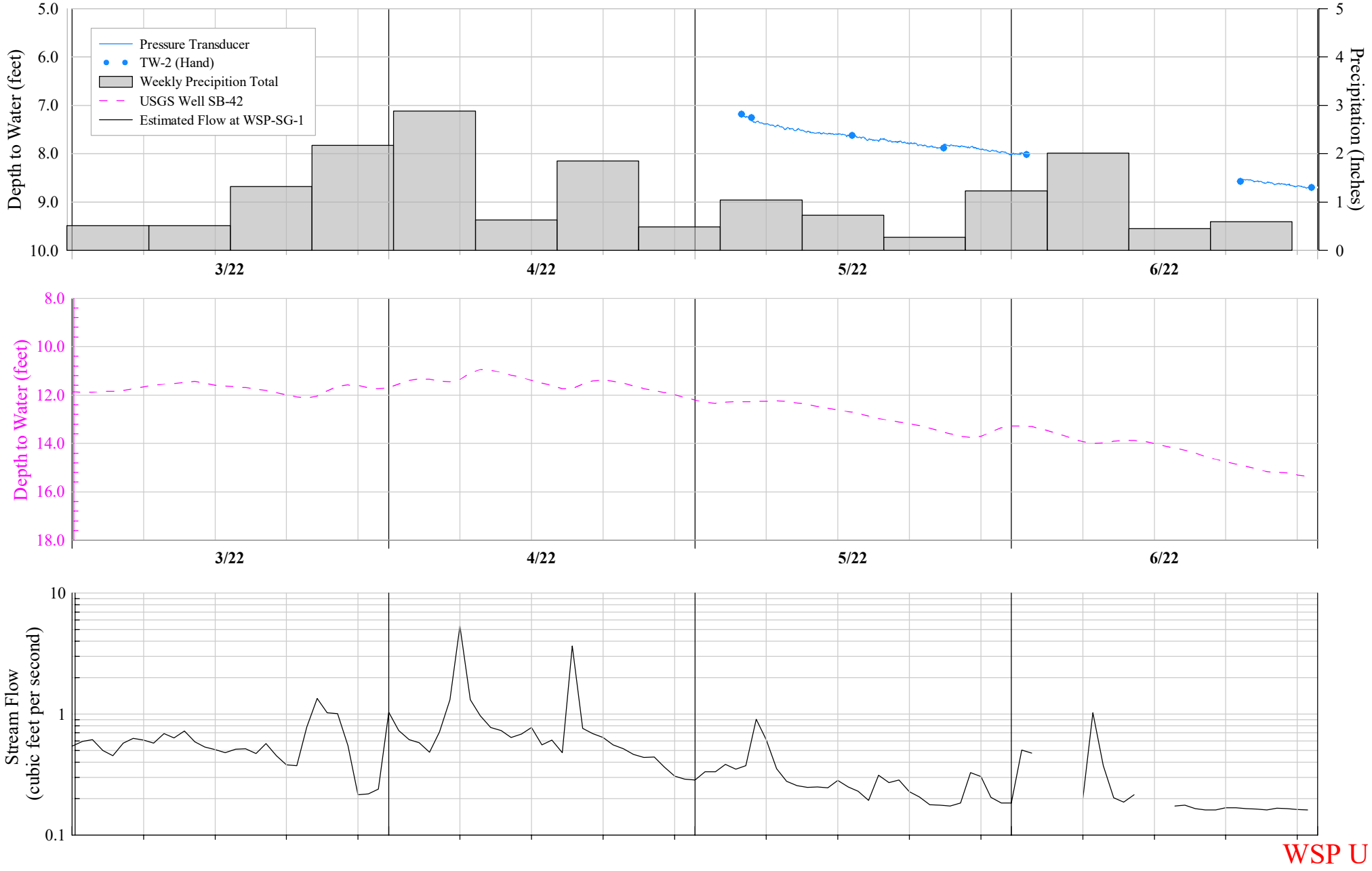
APPENDIX IV

TW-1 - Hydrograph



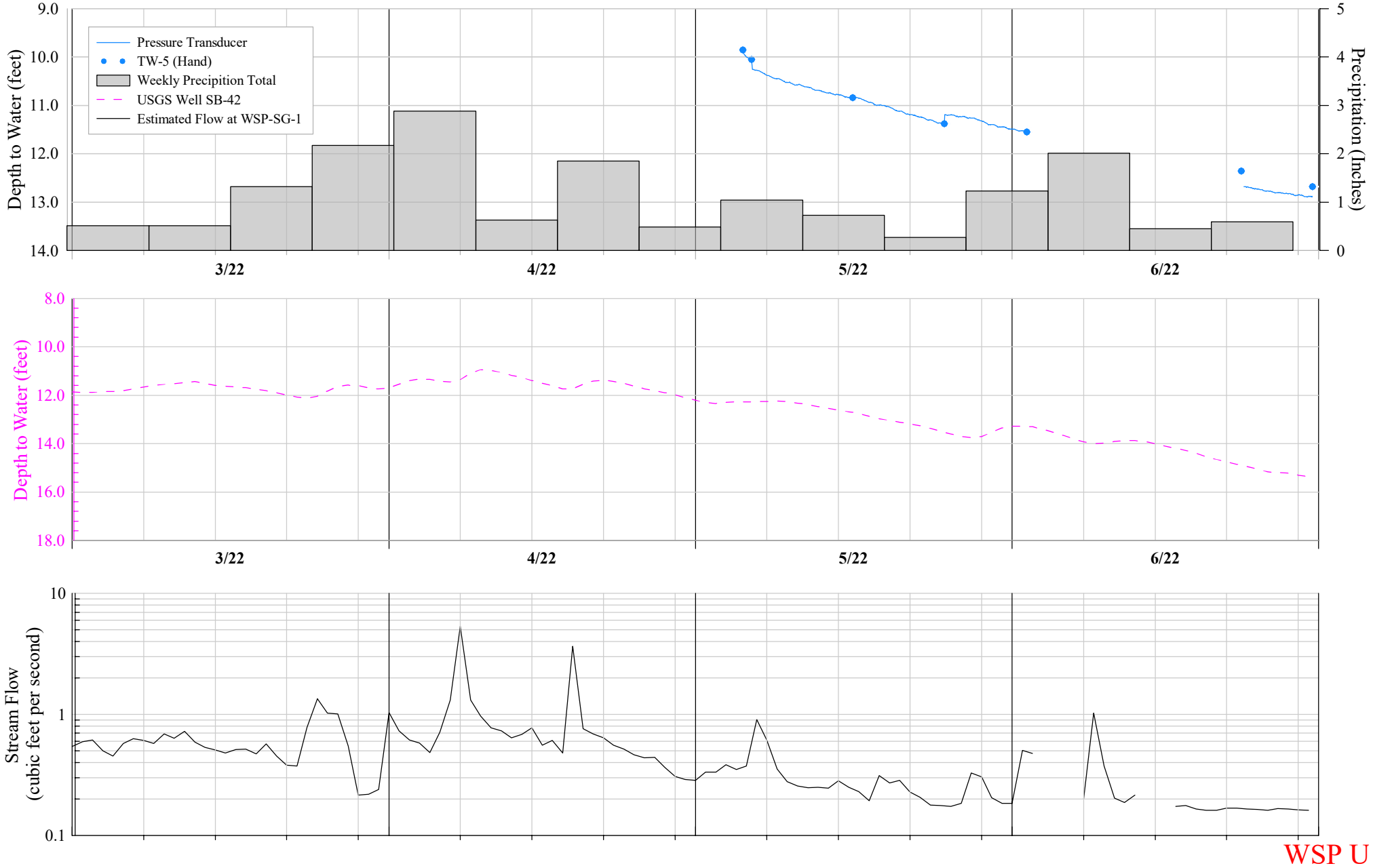
WSP U

TW-2 - Hydrograph



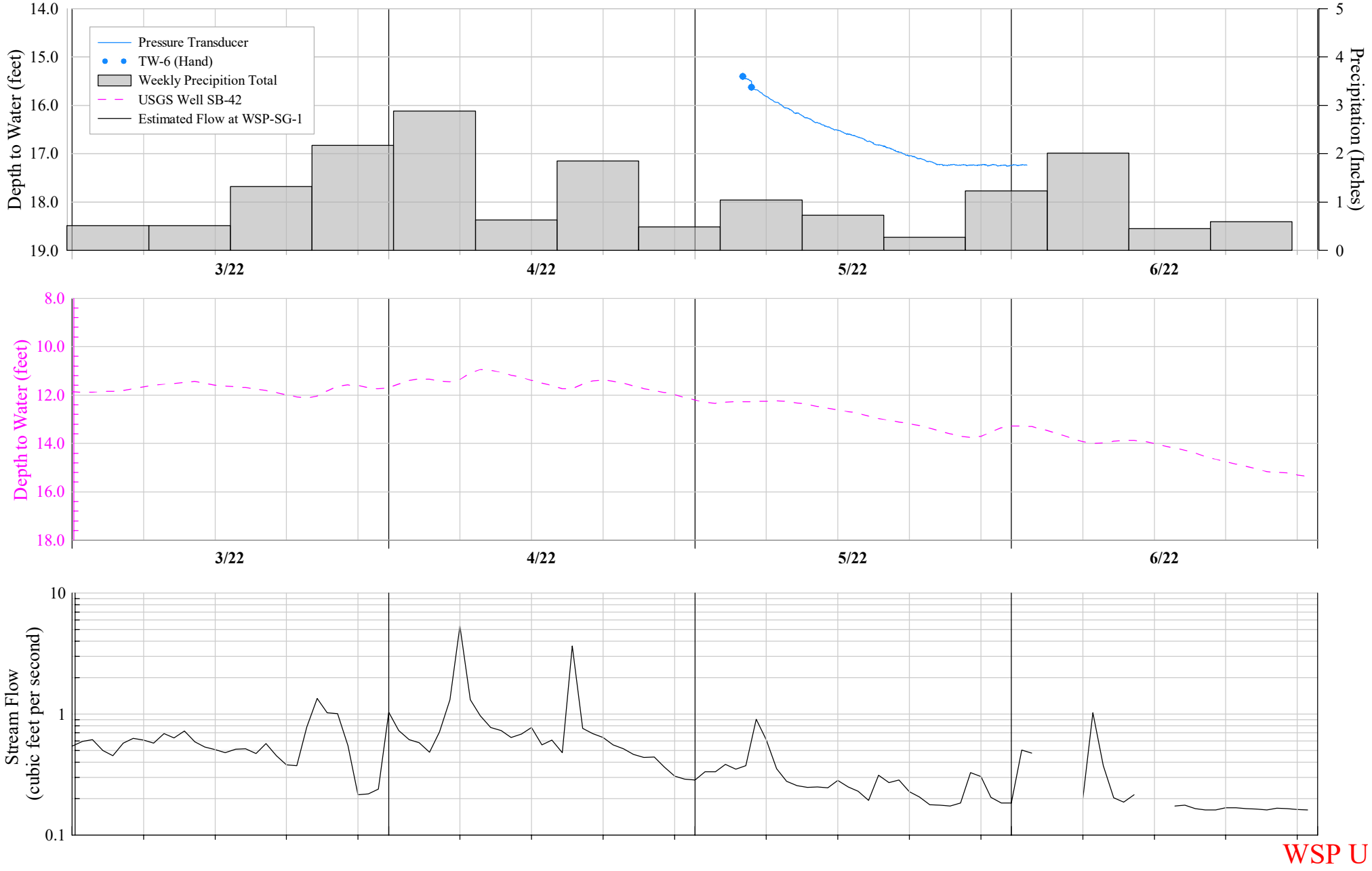
WSP U

TW-5- Hydrograph



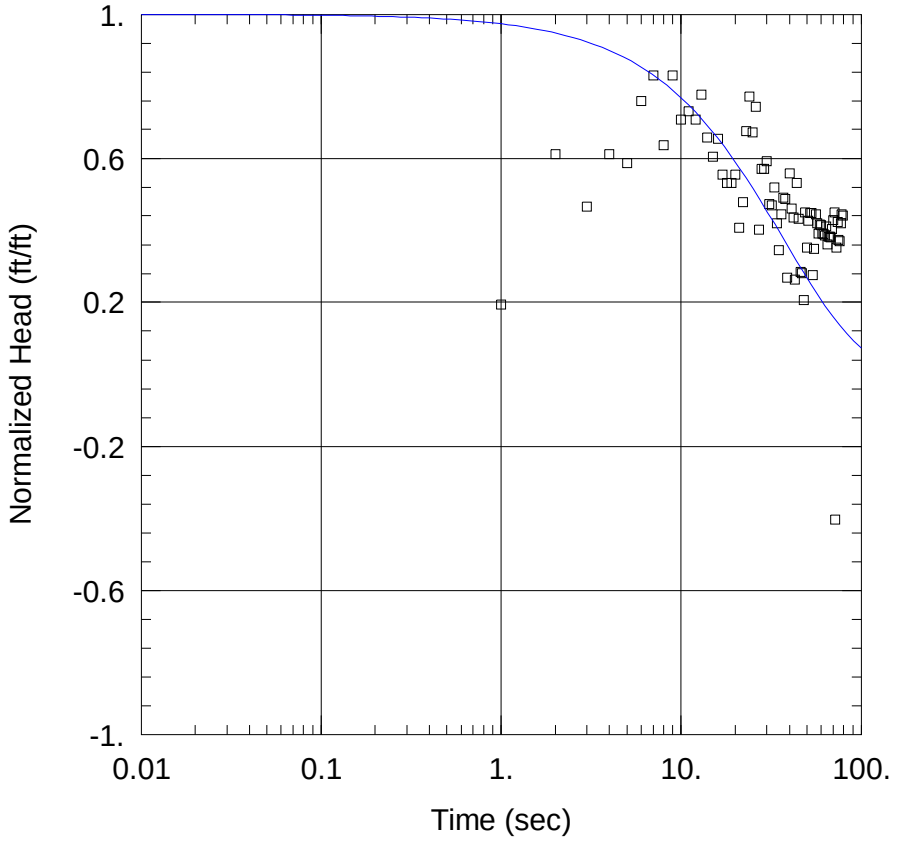
WSP U

TW-6- Hydrograph



WSP U

APPENDIX V



SLUG TEST ANALYSIS

Data Set: K:\Jobs\Quarry Ridge\2022\Slug Tests\TW-1a.aqt

Date: 06/03/22 Time: 11:31:52

PROJECT INFORMATION

Company: WSP USA
Client: J. Edwards Associates, LLC
Project: 31404418.000
Location: Monroe, Connecticut
Test Well: TW-1
Test Date: 6/2/22

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 5.33 ft/day
Ss = 9.762E-11 ft^{-1}
Kz/Kr = 0.01115

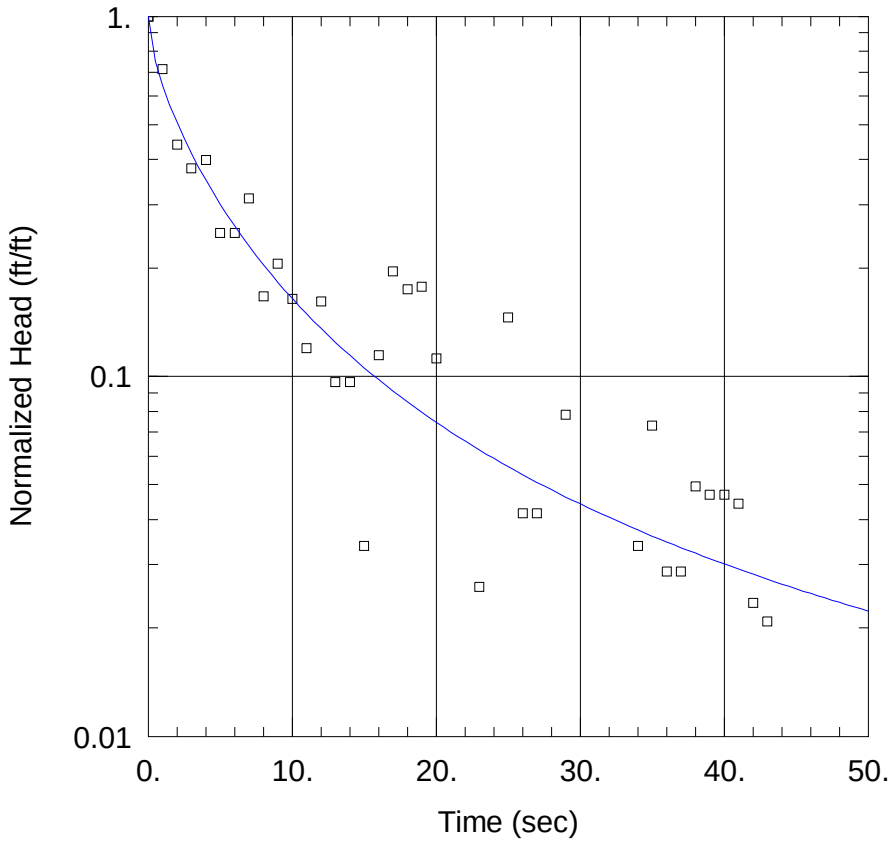
AQUIFER DATA

Saturated Thickness: 11.53 ft

WELL DATA (TW-1)

Initial Displacement: 0.324 ft
Total Well Penetration Depth: 11.61 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 11.53 ft
Screen Length: 10. ft
Well Radius: 0.08333 ft



SLUG TEST ANALYSIS

Data Set: K:\Jobs\Quarry Ridge\2022\Slug Tests\TW-2.aqt

Date: 08/08/22 Time: 15:43:52

PROJECT INFORMATION

Company: WSP USA
Client: J. Edwards Associates, LLC
Project: 31404418.000
Location: Monroe, Connecticut
Test Well: TW-1
Test Date: 6/2/22

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 42.03 ft/day
Ss = 0.02567 ft^{-1}
Kz/Kr = 0.09426

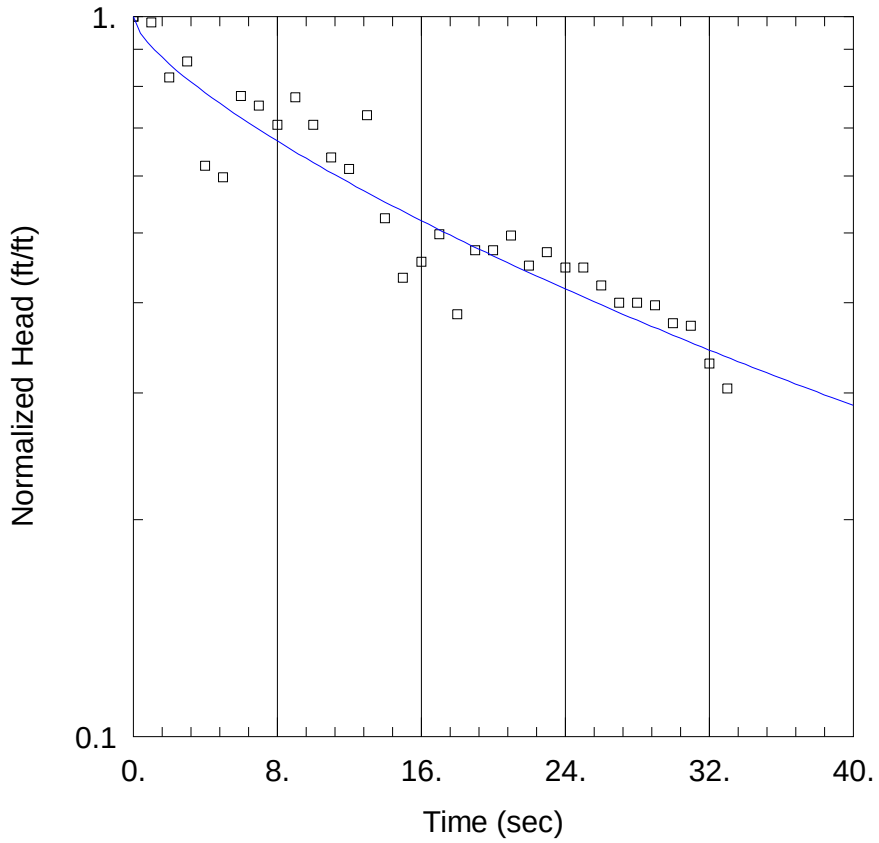
AQUIFER DATA

Saturated Thickness: 2.04 ft

WELL DATA (TW-2)

Initial Displacement: 0.384 ft
Total Well Penetration Depth: 13.73 ft
Casing Radius: 0.08333 ft

Static Water Column Height: 13.74 ft
Screen Length: 10. ft
Well Radius: 0.08333 ft



SLUG TEST ANALYSIS

Data Set: K:\Jobs\Quarry Ridge\2022\Slug Tests\TW-5.aqt

Date: 08/08/22 Time: 15:41:54

PROJECT INFORMATION

Company: WSP USA
Client: J. Edwards Associates, LLC
Project: 31404418.000
Location: Monroe, Connecticut
Test Well: TW-1
Test Date: 6/2/22

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 12.42 ft/day
Ss = 0.008673 ft^{-1}
Kz/Kr = 0.01

AQUIFER DATA

Saturated Thickness: 2.04 ft

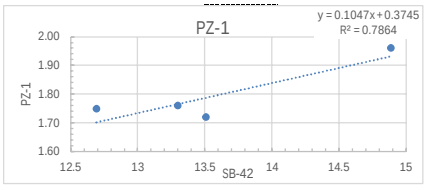
WELL DATA (TW-5)

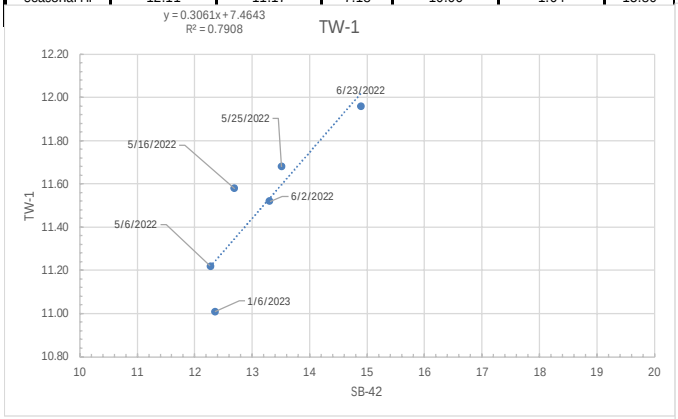
Initial Displacement: 0.355 ft
Total Well Penetration Depth: 2.04 ft
Casing Radius: 0.08333 ft

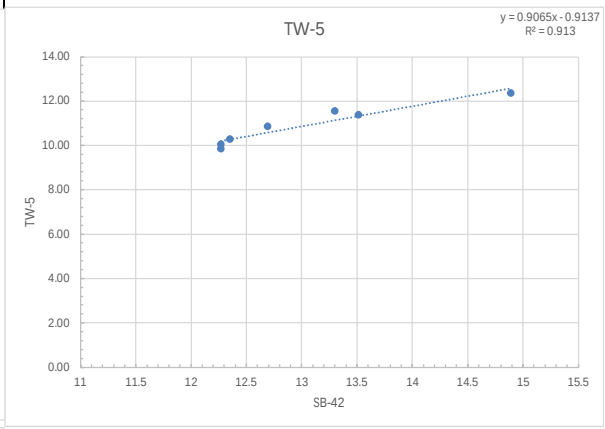
Static Water Column Height: 2.04 ft
Screen Length: 2.04 ft
Well Radius: 0.08333 ft
Gravel Pack Porosity: 0.35

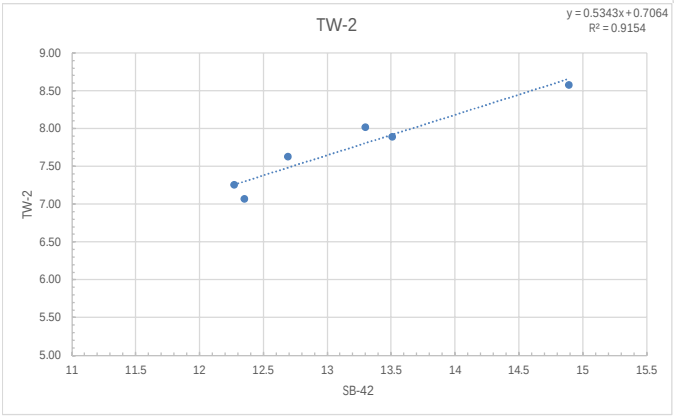
APPENDIX VI

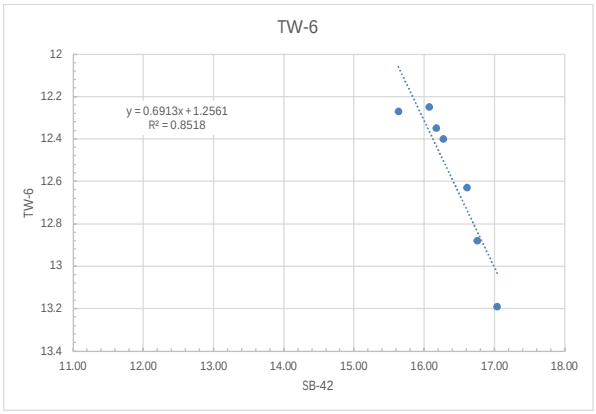
Date	USGS Well	Monitor Well				
	SB-42	TW-1	TW-2	TW-5	PZ-1	TW-6
5/5/2022	12.27	11.11		9.86		15.41
5/6/2022	12.27	11.22	7.26	10.06	1.85	15.63
5/16/2022	12.69	11.58	7.63	10.85	1.75	
5/25/2022	13.51	11.68	7.89	11.38	1.72	
6/2/2022	13.3	11.52	8.02	11.55	1.76	
6/23/2022	14.89	11.96	8.58	12.36	1.96	
1/6/2023	12.35	11.01	7.07	10.29		16.17
Seasonal Hi	12.11	11.17	7.18	10.06	1.64	15.80



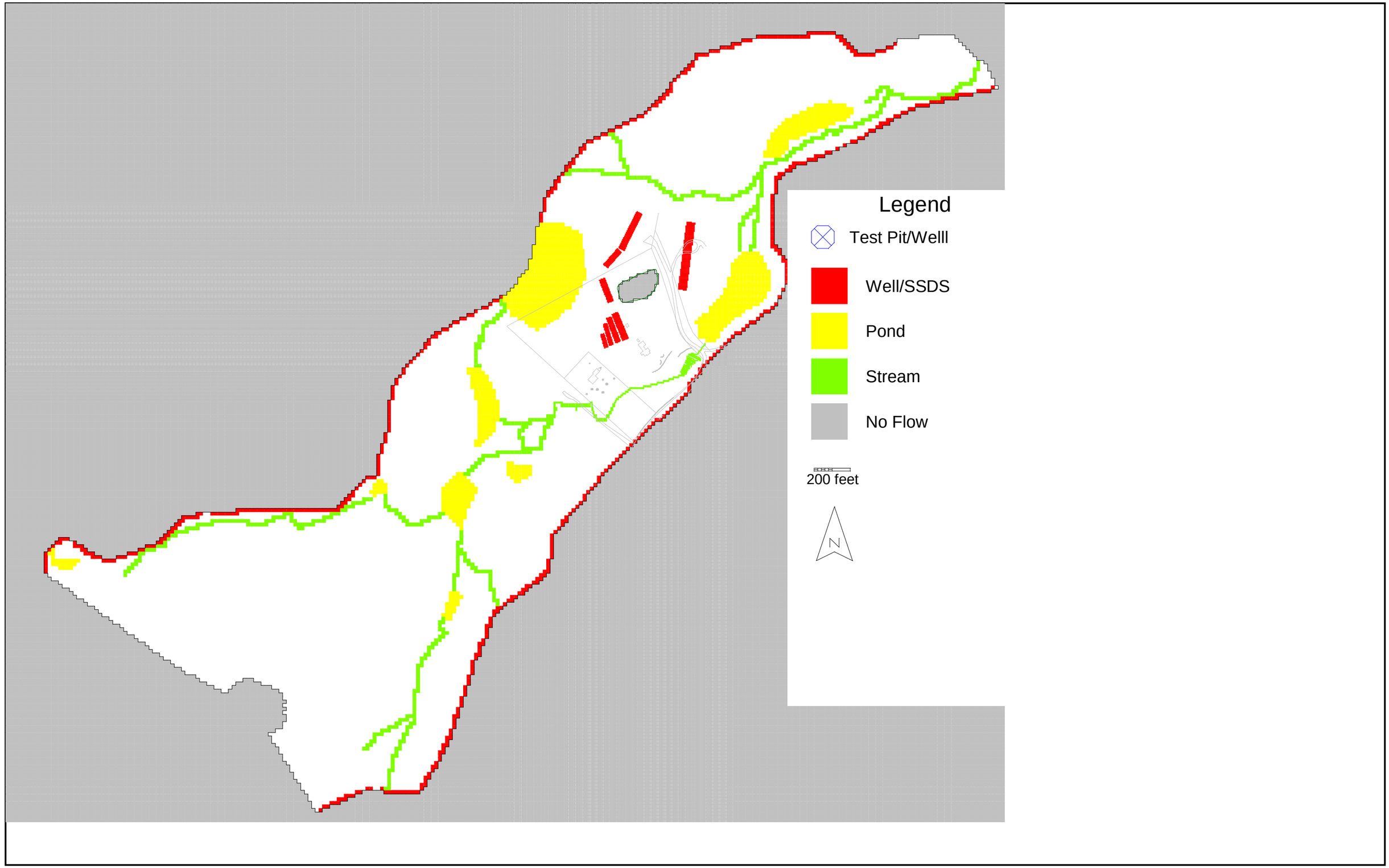


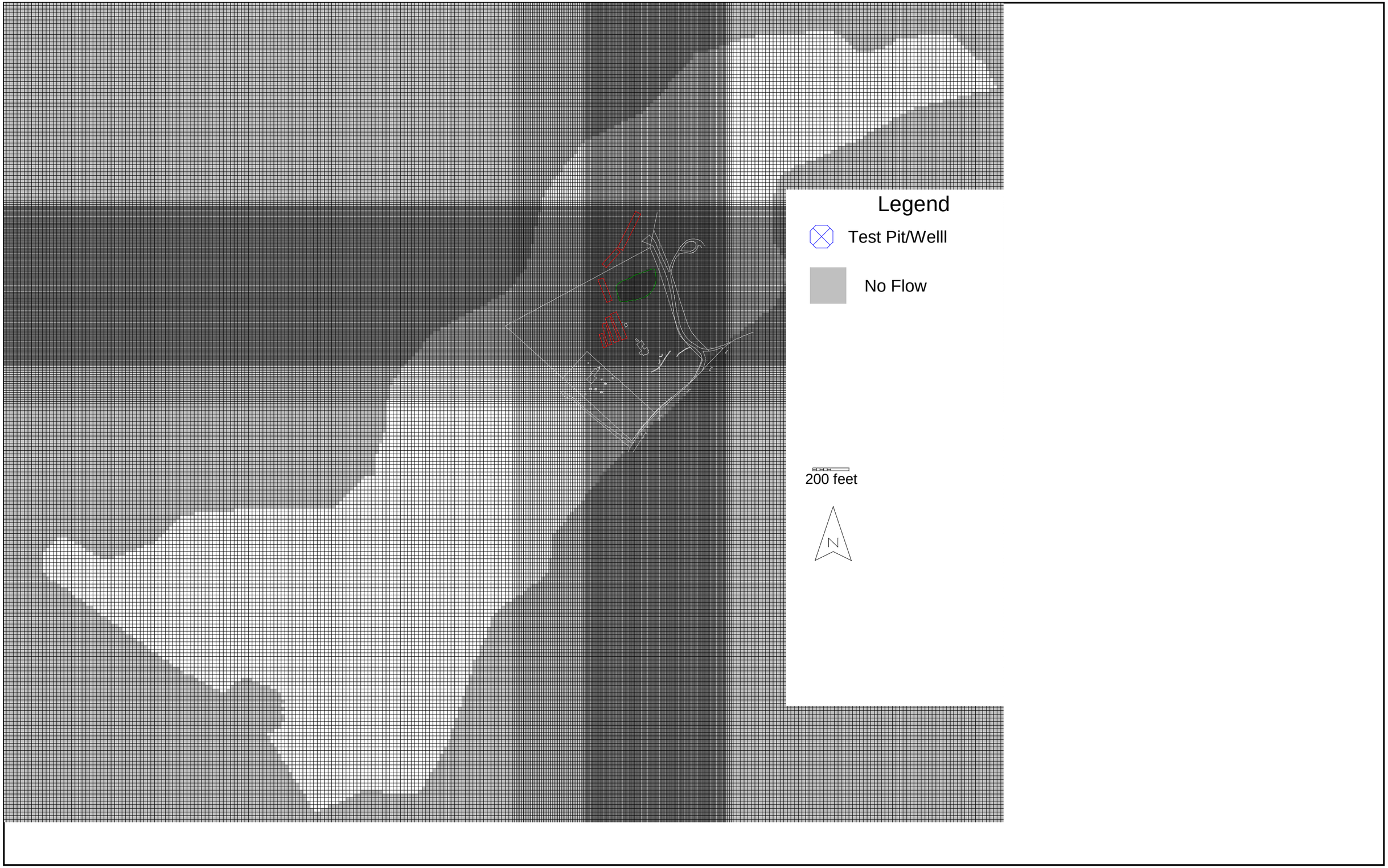


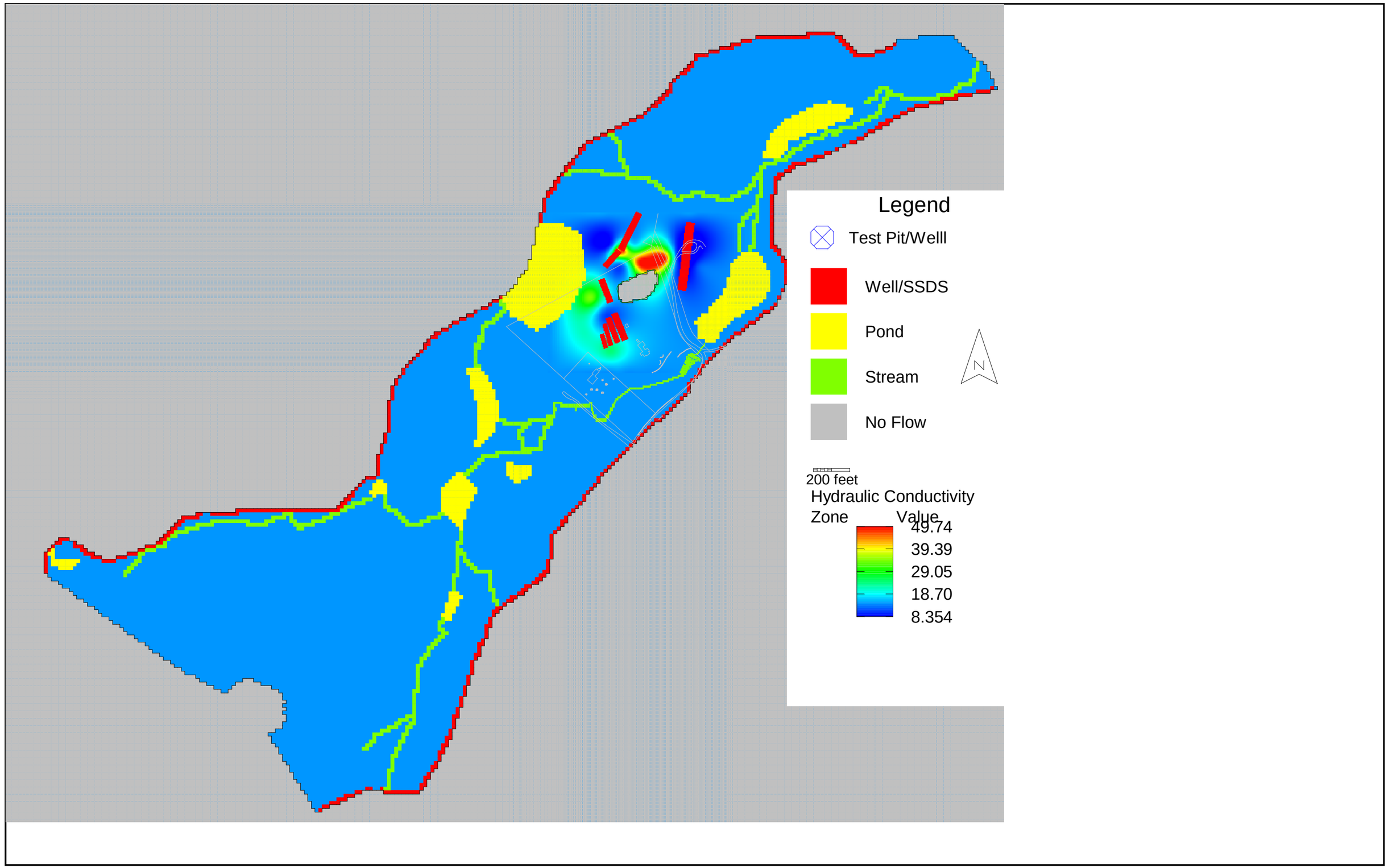


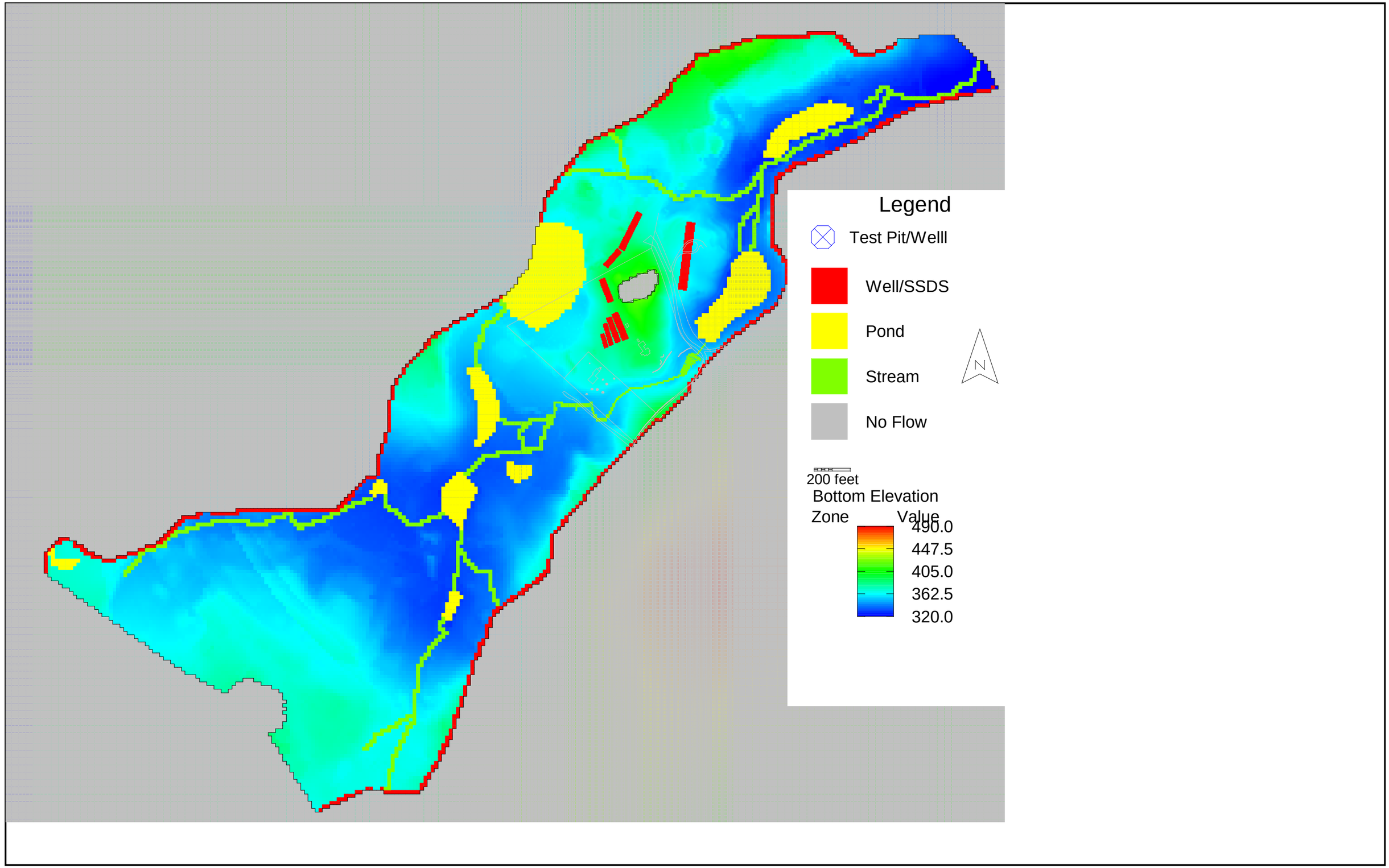


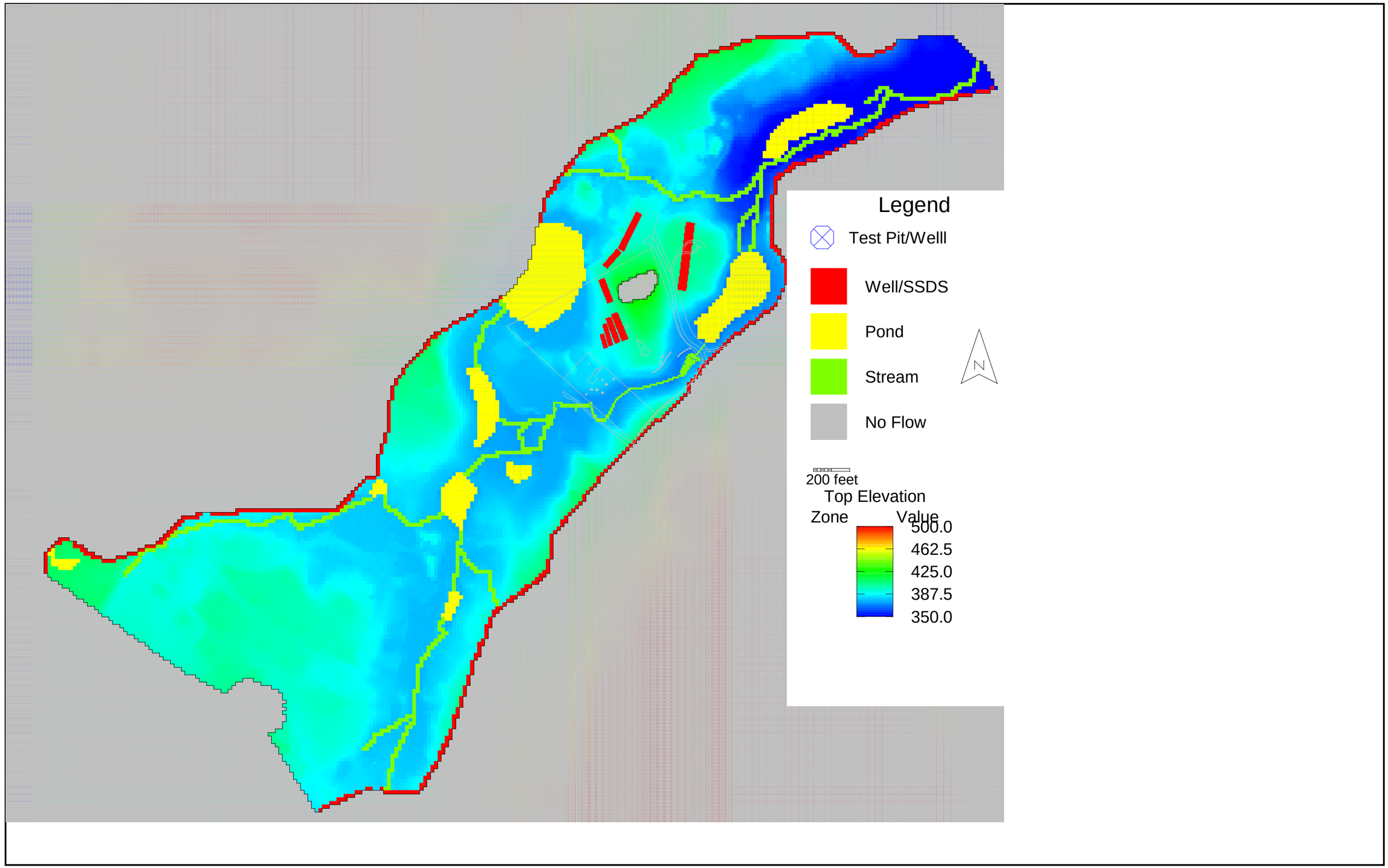
APPENDIX VII


Legend
Test Pit/Welll
Well/SSDS
Pond
Stream
No Flow
200 feet
N


Legend
Test Pit/Welll
No Flow
200 feet
N


Legend
Test Pit/Welll
Well/SSDS
Pond
Stream
No Flow
N
200 feet
Hydraulic Conductivity
Zone
Value
49.74
39.39
29.05
18.70
8.354


Legend
Test Pit/Welll
Well/SSDS
Pond
Stream
No Flow
N
200 feet
Bottom Elevation
Zone
Value
490.0
447.5
405.0
362.5
320.0


Legend
Test Pit/Welll
Well/SSDS
Pond
Stream
No Flow
N
200 feet
Top Elevation
Zone
Value
500.0
462.5
425.0
387.5
350.0

PRELIMINARY SYSTEM ANALYSIS

30 Cobblers Hill Court – Leaching Bed

This area is located in northern area of the property, upgradient of the propose development. Wastewater will flow to the treatment plant and designated volume will be pumped to this leaching bed. The wastewater is fully treated to upon leaving the plant, the leaching beds are a secondary level of treatment.

A total of 6 test pits were completed and witnessed by the Monroe Health Department in 2007. 4 additional holes were completed in 2023. The results of these tests can be found in the Soil Test Report included with the application. The average depth of the pits was 7.8' with soils consisting of sand and gravel. No ground water, ledge or mottling was found.

The soils in the new area are similar to those in the nearby areas studied by WSP. The WSP study is included with this application. Additionally, JEA conducted permeability tests on 4 samples and had findings consistent with WSP. Therefore soil characteristics identified by WSP were used in this study

Those results are:
Permeability (K) average rate of 17.6 ft/day
Porosity (n) =30%
Velocity rate (V) average of 2.7fps

Using this data along with the test pit data from the site, an estimated flow capacity has been calculated.

$$Q = KiA$$

K from WPS report is 17.6ft/day
i is the ground slope of the study area =6.1%
A is the cross-section area of the soil receiving the flow.
In this case that area would be:
the length of the proposed system (160') times the soil depth (7.8') or A =160'x7.8' =1248sf

Q =(17.6) x (0.061) x (1248sf) =1340cf/day or 10,023gal/day

DEEP regulations also required that the effluent from the leaching system travel in the soil for 21 days on the same property or before entering wetland, watercourse or domestic water system. The travel distance necessary to meet this requirement can be calculated using the following formula:

Travel distance (TD) = 21days x velocity(V) =21 x 2.7fps =56.7'

The length of the sloped study area is approximately 400'. The leaching beds can be stacked down the slope with a separation distance greater than the 21 day travel time.

Based on these calculations we estimate a capacity of approximately 20,000gpd within this leaching area. Prior to submission to CT DEEP a detailed ground water study will be prepared and CT DEEP will determine the permitted capacity.

AQUARION Water Company
Stewards of the Environment™

203.445.7310 phone
800.732.9678 (toll free)

May 2, 2023

Nicholas D. Clark, P.E
J. Edwards & Associates
225 Stepney Rd.
Easton, CT 06612

Re: Request for Water Service – 139, 141, & 201 Turkey Roost Rd., Monroe, CT
Quarry Ridge

Dear Mr. Clark,

This letter confirms that Aquarion Water Company of Connecticut (Aquarion) has sufficient water supply to meet the following estimated residential water demand for the proposed development at the above referenced property.

- Average Day Demand: 27,000 gallons per day
- Maximum Day Demand: 54,000 gallons per day
- Hydrant Demand: 1,000 gallons per minute at 20 psi

This commitment does not include irrigation or fire sprinkler demands because no demand projections for irrigation or fire sprinklers were included in the application submitted to Aquarion. If you wish to include irrigation or fire sprinkler demands in your project, you will need to update your application and resubmit your Will Serve Letter request.

The attached fire flow test report indicates an available fire flow of approximately 2,007 gallons per minute at 20 psi. Please note that fire flow tests are indicative of the available flow at a specific time. Available flow and pressures will vary throughout the day and year based on system demands, which may result in lower available flow and pressure. It is your engineer's responsibility to design accordingly to achieve the required flow and pressure while considering all the building demands and system demands.

This service commitment is valid for 12 months from the date of issuance. If your proposed project is not ready for water service (intended usage) within 12 months of this letter, then Aquarion's ability to serve your project will have to be re-evaluated.

While this letter serves as a service commitment, it is not an approval to connect (tap) to our water main. You must complete the Main Extension Process, including obtaining additional approvals that are required, payment of required fees, etc. Additionally, you must complete the New Service Process for final building connections and meter installation. If you have any questions regarding this letter, please feel free to contact me at 203.362.3067. If you have questions regarding the main extension process and next steps required to connect (tap) to our system, please contact Carlos Vizcarrondo at cvizarrondo@aquarionwater.com.

Very truly yours,
Aquarion Water Company

Hannah P. Swearsky
Planning Engineer

cc: New Services, Carlos Vizcarrondo, File
Attachment: Fire flow test at hydrant 0316 dated 04/04/2023
Will Serve Letter Application dated 03/21/2023

Reference Page _____

Aquarion Water Company Fire Flow Test

Test Location: MONROE, CT

Test Date: 04/04/2023 Test Time: 08:50 PM

Flow Hydrant: 0316 Location:Fan Hill Rd @ Karen Dr

Flow Hydrant Parameters:

Main Size:	12"
Pipe/Nozzle Diameter:	2.5 Diffuser X 2 inches
Pito Pressure:	6 psi
PSI Before:	98 psi

Residual Hydrant: 0081 Location: Fan Hill Rd #303 @ Lorraine Dr

Residual Hydrant Parameters:

PSI Before:	104 psi
Residual During Flow:	88 psi
PSI After:	104 psi
PSI Drop:	16 psi

Test Results:

GPM Available:	820
GPM @20 psi:	2,007

Test Performed By: JP&JOEW

NOTE: Static Pressure readings are actual, and test results are not corrected for elevation differential.

Test Method: Calibrated Orifice

Note: Elm St Regulator Closed

Disclaimer: This data represents system conditions on the date and time that the test was performed. System conditions may vary significantly throughout the year. The design of new water service installations and the identification and gathering of all necessary data is the sole responsibility of the Developer or his representative. In all instances, the water service designer should apply engineering judgment to ensure proper design. Aquarion Water Company does not guarantee the accuracy of this data.

Aquarion Water Company

WILL SERVE LETTER APPLICATION

APPLICATION DATE: 3-21-23

PROJECT / SITE INFORMATION

Project Name: Quarry Ridge

Location / Address: Site Plan, 139,141, & 201 Turkey Roost Road, Monroe, Connecticut

Proposed Use : ☐ Commercial / Industrial Building Size (s.f.): _____

☑ Residential Building Size (s.f.): 3500

Site Elevations: High: 450 ft. Low: 380 ft.

Datum Elevation (USGS): NGVD 1929

Length / Size (Dia.) of Proposed Service: 12" dia. 3470 lf offsite + 10" dia. 5530 lf onsite.

Site Plan Attached: ☑ (Must show Elevation Contours)

DEMAND INFORMATION (To be determined by the applicant's project plumbing consultant)

Commercial / Industrial Use	**Residential Use**
Comm./ Industrial Demand	Domestic Demand
Average Day _____ gal/day	No. Units 90
Maximum Day _____ gal/day	No. Bedrooms/Unit 3
	Total No. Bedrooms 270
Irrigation System Demand _____ gal/day	
	Total Average Day Demand 27,000 gal/day
	Total Maximum Day Demand 54,000 gal/day
	(Total Ave. Day Demand x 2)
	Irrigation System Demand 0 gal/day
Fire Demand	Fire Demand (13 requested including offsite)
Hydrant _____ gal/min.	Hydrant 1000 gal/min. (estimated)
Building Sprinklers: Yes ☐	Building Sprinklers: Yes ☐
No ☐	No ☑
Required Sprinkler Flow: _____ gal/min.	Required Sprinkler Flow: N/A gal/min.
Residual Pressure: _____ psi	Residual Pressure: _____ psi

CONTACT INFORMATION

Applicant (or Agent) Name: Nicholas D. Clark P.E (agent) c/o J. Ewards & Associates (formerly Spath-Bjorklund Associates)

Address: 225 Stepney Road, Easton, CT. 06612

Tel. No.: 203-268-4205

Email.: nick@jedwardsassoc.com

SIGNATURE: Nicholas D, Clark **PRINT NAME & TITLE:** Project civil engineer

Instructions: Please submit this form along with the site plan and a fire flow test:
Mr. Carlos Vizcarrondo, Utility Service Coordinator
Aquarion Water Co. - Engineering & Planning Dept., 600 Lindley Street, Bridgeport, CT 06606
Off. No. (203) 337-5950 Fax. No. (203) 337-5839 e-mail: cvizcarrondo@aquarionwater.com

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