INLAND WETLANDS COMMISSION
REGULAR MEETING
MINUTES

March 22, 2023 @ 7:30 p.m.
Multi-Purpose Room #3, Community Center
8 Simpson Street, Newtown CT

These Minutes are subject to approval by the Inland Wetland Commission

Present: Sharon Salling, Mike McCabe, Scott Jackson, Suzanne Guidera, Craig Ferris, Kendall Horch, Stephanie Kurose

Staff Present: Steve Maguire, Senior Land Use Enforcement Officer, Kiana Maisonet, Land Use Enforcement Officer, Dawn Fried, Clerk

Ms. Salling opened the meeting at 7:30 p.m.

PENDING APPLICATIONS

IW Application #23-05 by David & Molly Basak-Smith, property located at 71 Lakeview Terrace, to construct a sloped accessway from the property to the waterfront by decreasing the grade.

IW Application #23-05 will be TABLED until April 12, 2012.

PUBLIC HEARING

Application IW #23-04 by Teton Capital Company, LLC, property located at 6 & 8 Commerce Road, for construction of a 171-unit multifamily housing development.

Mr. McCabe read the legal notice into the record. Ms. Salling reviewed the public hearing process, which included a ten minute maximum time for public persons to speak. Mr. Maguire stated the public hearing will conclude at 9:30 pm and if needed will be continued to the next IWC meeting.

Attorney Peter Olsen, Land Use & Conservation Counsel, Bethel, CT, represented the applicant, Teton Capital Company. Atty. Olsen handed out an outline of the presentation (attached) and introduced the team: Steven Danzer, Wetland Scientist, PhD & Associates LLC, Stamford, CT, Jason Edwards, Civil Engineer, J. Edwards & Associates LLC, Easton, CT, and Matthew Popp, Landscape Architect, Environmental Land Solutions LLC, Norwalk, CT.

Atty. Olsen gave an overview of the property and stated the Town of Newtown acquired the property from the State in 2004. The Town recorded a lot line revision which divided the lot into two parcels. Both parcels are part of this application which total approximately 41 acres. Teton

Capital is proposing to develop 14.2 acres with the remaining 27 acres subject to a conservation easement.

The proposed 171 units of housing will be age restricted for 55 years and older.

In 2022 the Economic Development Commission and the Board of Selectman approved the sale of this land to Teton Capital. In 2022 the Planning and Zoning Commission approved a Zone Change. Currently there is a Planning and Zoning application for a Site Development Plan.

Atty. Olsen gave a brief history of the property. In 2009/2010 an industrial park was proposed for the property. The Inland Wetland Commission (IWC) approved application IW #10-32 for wetland impacts associated with the industrial park proposal. The IWC also approved a wetland road-crossing which has since been completed. Permit IW #10-32 is still active at this time and has been extended to 2025. Atty. Olsen stated most of the proposed wetland activities in the current application are covered by permit IW #10-32. But since permit IW #10-32 expires in 2025 they might run out of time, which is the principal reason for the current application.

Atty. Olsen stated in comparison with IW #10-32 they have significantly pulled back from the wetands and the upland review area, as well as reducing the overall impervious coverage.

In 2019 the Town received approval from the Army Corp of Engineers to construct a road off of Commerce Road.

Mr. Danzer stated he is familiar with this property. He gave a brief geographic overview and described the water course systems. He stated the Deep Brook system lets out into the Pootatuck River.

In 2010, Mr. Danzer was hired by the Town to prepare an independent expert report for application IW #10-32, which was approved by the IW Commission. Mr. Danzer submitted two reports, one in December of 2010 and one in January of 2011. Mr. Danzer gave a brief overview of the reports and detailed the criticisms from the prior application. He stated the current application is substantially better than IW #10-32 due to the fact that his previous criticisms have been addressed. Mr. Danzer detailed the differences between application IW #10-32 and the current application. (See attached Environmental Report.)

Mr. Danzer emphasized the importance of meadows and habitats. He stated the 27.5 acres of preserved open space has connectivity with the Catherine Violet Hubbard Animal Sanctuary, which creates a continuous, valuable habitat.

Mr. Edwards reviewed the existing topography of the site. This property is within the Newtown Aquifer District. Mr. Edwards stated for the record, an aquifer impact assessment report has been submitted by WSP USA to the P&Z Commission. The report states there is no negative impacts to the aquifer by this development.

Mr. Edwards reviewed the Grading and Utility Plan 2.1. There is one large sediment basin. He described the sediment basin as being the final stop for the stormwater before it exits the site. Mr. Edwards stated the test results from various percolation rates and infiltration rates are in the Stormwater Management Plan (see attached).

Mr. Edwards stated his company was involved in the 2010 application. They are relying on extensive soil testing done over the years as well as new testing in the basin. Mr. Edwards stated the soils are suitable.

Mr. Edwards gave a brief description of the following (see attached site plan).

- Access road into the site
- Two-way road that goes completely around the site.
- 3 Building Phases
- Grading of property

Mr. Edwards gave an overview of the stormwater management system (attached). The stormwater and roof runoff will go through the piping collection system used in Phase 1 and will be used as part of the irrigation system.

The water from the drainage piping network will come down the hill into a hydrodynamic separator. The water will enter a water quality basin, which is approximately 1 acre in size. From there the water will enter a quality volume storage unit which holds one inch of runoff. The water will percolate in the ground and exit through the basin outlet. It will then discharge through a riprap energy dissipater before it flows over land into Deep Brook.

Mr. Edwards distributed "Addendum 2, Stormwater Management Plan" (see attached) to provide additional confirmation of the water quality in the basin and to demonstrate the following:

- Removal of 80% of the total suspended solids from stormwater runoff.
- Attempts to protect thermal pollution from Deep Brook
- Maintaining the hydrology of the site to the wetlands.

Mr. Edwards gave an overview of the Sediment and Erosion and Control Plan. There will be anti-tracking pads at every entrance, washout areas, a variety of stockpiles, diversion swales, double silt fence barriers, erosion matting and hay bale dams.

Mr. Edwards mentioned a Wood turtle protection plan for the Wood turtles. (see attached document from CT DEEP Natural Diversity Data Base.)

The site will be serviced by public water and sewers.

Mr. Edwards stated this project will have minimal impact on wetlands, watercourses, the aquifer and Deep Brook.

Mr. Olsen introduced Mr. Popp, Landscape Architect. Mr. Popp gave an overview of the landscape plan LP1 and LP2 (attached). Mr. Popp is proposing 45 native shade trees, over 100 ornate trees

(80% are native), 140 evergreen trees along the perimeter and around the buildings, native shrubs throughout the property and along the wetland buffer, four different native seed mixes and a community garden.

Mr. Popp described the lighting on the site. The pole lighting will be pointed downward with “warm” lighting. The pole lighting is low level in height.

Mr. Popp stated he received a comment from Trout Unlimited regarding thermal pollution to Deep Brook. The concern is the thermal pollution sitting in the basin. Mr. Popp is proposing additional shade trees to shade the basin to reduce the thermal pollution.

Ms. Salling noted the previous 2010 wetland application had wetlands mitigation and wetlands restoration. Ms. Salling inquired whether the current application will have the same. Atty. Olsen stated the wetland area in the previous application no longer exists due to the creation of the road and the upland review area is no longer affected due to the project being pulled back. The detention basin is the only thing left from the prior applicaiton. Atty. Olsen stated the basin will be kept where it is proposed because it’s the most logical place.

Mr. Danzer gave an overview of the 2010 application and the prior mitigation approvals. The mitigation from the previous application was tailored to that application. Mr. Danzer stated there are different ways to enhance the wetlands in the current application.

- Avoidance – no work in the review area.
- Preservation of open space
- Weeding out the invasive species and encouraging an overstory to develop.
- Replant trees to give canopy coverage to reduce thermal impact

Mr. Danzer reviewed the Inland Wetland Regulations “Criteria for Decision”, Reg. 10.2(d)(3) and stated mitigation by wetland creation is not the only thing to consider, other considerations are avoidance, restoration and enhancement.

Mr. Danzer stated the proposed location of the detention basin is in a highly disturbed area. Over the years it has been a dumping ground for excess materials. The area is very dense, the soils are “fill” soils, and the wetland habitat is not pristine.

Ms. Salling requested alternate mitigation options. Atty. Olsen will review and present revised mitigation options at the next meeting.

Ms. Horch asked a variety of questions and had several comments regarding the project. (Please see attached review.) Mr. Edwards will have the answers by the next meeting. Ms. Horch recommends the project be peer reviewed by another engineering firm to make sure the calculations and drawings are accurate.

Mr. McCabe asked where the water will flow when it leaves the culverts. Mr. Edwards stated the water will flow through the existing culverts into the existing creeks. Mr. McCabe asked about the

surface flow through the meadow. Mr. Edwards stated the water will be more heated in the open field then will enter the wooded area. In time the water will end up in the same creeks.
Mr. Ferris asked if fertilizers are going to be used and whether that will effect water quality leaving the site. Mr. Popp stated no fertilizers will be used along the perimeter of the site or near the access roads. The seed mixes do not need fertilizer, but the lawn areas in the center of the site will possibly be fertilized. The fertilizer will flow into the lawn, not sheet flow off the site.
Mr. Popp suggested getting the soil tested.

Mr. Ferris wanted to confirm the detention basin can only hold one inch of rainfall. Mr. Edwards stated that is correct, one inch of rainfall is retained. Mr. Ferris has concerns with extra stormwater, above one inch, discharging directly into the brook. Mr. Ferris would like models done on the flows and an alternative proposal to diffuse the stormwater flow. Mr. Edwards stated they are working on other alternatives.

Mr. Ferris would like documentation showing there are no negative impacts regarding thermal pollution and the first flush. Mr. Ferris would like to see a documented scientific study.
Mr. Edwards will try to find something.

Mr. Guidera asked how much sediment will end up in the brook. Mr. Edwards stated he will find out.

Mr. Maguire appreciated the increase in open space and the increased buffer, but is concerned with the stormwater basin and thermal pollution. He compared the 2010 application as having three detention basins and more overland flow, which gives the water time to cool off. The current application has one detention basin with the water exiting through the outlet, travelling 20-ft and going directly into the stream channel. The water then enters another 30-ft pipe system that goes directly into Deep Brook. Mr. Maguire is concerned with the capacity and the thermal impacts of the water running off.

Mr. Maguire is concerned with the impervious surfaces and would like Mr. Edwards to look into the calculations from the previous application and compare to the current one.

Mr. Maguire is concerned with the mitigation conflicts around the stormwater basin. He would like alternative mitigations options.

Mr. Maguire has concerns with the longevity of the first inch of stormwater and whether it will be a straight flow over time.

PUBLIC PARTICIPTION

Joe Hovious, Leopard Drive, Sandy Hook, represented Mike Fatse, President of Trout Unlimited (TU) Candlewood Valley. Mr. Hovious summarized a letter from Mr. Fatse (see attached). Mr. Hovious emphasized the importance of Deep Brook and the self-sustaining population of native trout. Mr. Hovious would like the Commission to consider the thermal impacts to the rivers and watercourses.

Neil Baldino, 18 Gelding Hill Road, Sandy Hill, Vice President of Trout Unlimited Candlewood Valley appreciated the comments and concerns from the IW Commission. Mr. Baldino gave a Powerpoint presentation titled "Deep Brook Watercourse – A High-Quality Aquifer "Why It's So Special", dated March 22, 2023 (see attached).

Michael Humphreys, 9 Evans Hill Road, Sherman CT, speaking on behalf of TU read a letter (see attached) to the Commission offering his scientific knowledge and comments regarding the potential impacts of this project on Deep Brook and its wild trout habitat.

The Public Hearing for IW #23-04 by Teton Capital Company, LLC will remain open and be CONTINUED to the next IWC meeting on Wednesday, April 12, 2023 at 7:30 pm in the Council Chambers, Municipal Center, 3 Primrose Street, Newtown.

APPROVAL OF MINUTES

Regular Meeting of March 8, 2023
The Commission found no substantive errors. Mr. Jackson moved to accept the minutes from March 8, 2023. Mr. McCabe seconded. Mr. Ferris, Ms. Horch and Ms. Kurose abstained. All others in favor. The minutes from March 8, 2023 were approved.

ADJOURNMENT

With no additional business, Mr. Ferris moved to adjourn. Ms. Horch seconded. All in favor. The Regular IWC Meeting of March 22, 2023 was adjourned at 9:38 pm.

Respectfully Submitted,
Dawn Fried

INLAND WETLANDS COMMISSION
OF THE
TOWN OF NEWTOWN

APPLICATION OF
TETON CAPITAL COMPANY, LLC AND
THE TOWN OF NEWTOWN

FOR PERMIT TO CONDUCT REGULATED ACTIVITY

0, 6, 8 COMMERCE ROAD

PUBLIC HEARING
MARCH 22, 2023

Presenters for the Applicant

A. Peter S. Olson, Attorney for the Applicant — Land Use & Conservation Counsel, Bethel, Connecticut

1. Overview of the land involved in the Application
2. Overview of the transaction between Teton Capital Company, LLC and the Town of Newtown
3. Development History of the Property and Prior Approvals
4. Discussion of Required Permit Applications

B. Steve Danzer, Soil Scientist, Professional Wetlands Scientist, Arborist — Steven Danzer, PhD & Associates LLC, Stamford, Connecticut

1. Overview of wetlands and watercourses from Commerce Road to the principal development site
2. Overview of wetlands and watercourses on the principal development site
3. Review of nearby wetlands and watercourse resources
4. Change in wetlands and watercourse impacts from prior approved plan
5. Wetlands enhancement and mitigation

C. Jason Edwards, Civil Engineer and Surveyor — J. Edwards & Associates, LLC, Easton, Connecticut

1. Site Topography
2. Groundwater and Aquifer Site Conditions; Site Soil Conditions
3. Stormwater management, detention and discharge, including thermal impacts, infiltration and sediments
4. Grading
5. Erosion Controls
6. Site Circulation and bus staging area
7. Sewer and other site utilities
8. The project will have minimal impact on wetlands and watercourses, the aquifer and Deep Brook.

D. Matthew Popp, Landscape Architect, Professional Wetlands Scientist — Environmental Land Solutions, LLC, Norwalk, Connecticut

1. Overall Landscaping on site
2. Wetlands Mitigation Plantings

IWC mtg
3-22-23
A2

STEVEN DANZER, PHD & ASSOCIATES LLC
Wetlands & Environmental Consulting
WWW.CTWETLANDSCONSULTING.COM
203 451-8319

WETLAND BOUNDARIES ‣ POND & LAKE MANAGEMENT ‣ CONSTRUCTION FEASIBILITY CONSULTATIONS ‣ ENVIRONMENTAL STUDIES

Environmental Report

6 & 8 Commerce Road, Newtown, CT

Church Hill Farm at Deep Brook

Date: February 23, 2023

By: Steven Danzer Ph.D.

- Soil Scientist – Certified Nationally by the Soil Science Society of America (#353463).
  – Registered with the Society of Soil Scientists of Southern New England.
- Senior Professional Wetland Scientist - PWS #1321, Society of Wetland Scientists.
- Arborist - CT DEEP License S-5639; ISA Certified NE-7409A.
- Ph.D. - Renewable Natural Resource Studies.

Introduction

Regulated activities are proposed adjacent to the wetlands and watercourses located at 6 & 8 Commerce Road, Newtown, Connecticut.

The proposed development will be an active adult conservation community. The proposed activities include the phased construction of residential building units, clubhouse & pool area, parking, grading, and the installation of utilities including a water quality basin, as well as preservation of 27.5 acres of open space, as indicated on the plans prepared by J. Edwards & Associates LLC.

The property is located on a 14.2 acre parcel that is mainly undeveloped except for the recently constructed access road over the wetland corridor. The proposed development will create a total of 5.3 acres of impervious area, the rest remaining as forested wetlands, forested upland buffer, and hayfield/meadow. The bulk of the proposed activities will occur entirely outside of the 100 foot upland review area. Only the outer edge of grading, the installation of landscaping plants, and the water quality basin will be located within the review area.

A previous proposal for a "Technology Park" on the same site was reviewed and approved by the Inland Wetlands Commission back in 2011. Since the approvals, the access road from Commerce Drive over the main wetland corridor has been constructed.

The current site plan is substantially better than the previously approved 2011 site plan as it eliminates the residential units in the north, pulls most development out of the 100 foot upland review, and preserves a larger swath of open space.

There will be no significant impacts or direct impacts to the wetlands/watercourses on or adjacent to the site. Nor will the proposed activities change, diminish, or otherwise detrimentally alter the ecological communities or the functions or values of the wetlands on or adjacent to the site.

Landscape Context

The site is bounded to the south by Old Farm Road and the 34 acre Katherine Hubbard Animal Sanctuary, to the north and east by Town of Newtown land currently managed as open space, and to the west by the railroad. The landscape directly contiguous to the site is primarily comprised of old field or current agricultural fields, forest, and forested wetlands. The nearest pocket of dense development to the site is the residential neighborhood located along Grand Place to the northwest, and the corridor of industrial and commercial development located along Commerce Road to the northeast. Both of these areas are roughly 700 feet away from the proposed limit of disturbance.

The property is located within the watershed of Deep Brook, a tributary to the Pootatuck River. Deep Brook flows southeasterly along the northern and eastern perimeter of the site.

Wetland Resources

The wetland boundary has been delineated and reviewed by multiple soil scientists over the last twenty years. A history of the work is as follows: The wetlands were originally delineated by Soil Science and Environmental Services (Ken Stevens) in 2004. The wetland boundary was then adopted by Environmental Planning Services (Michael Klein) a few years later and then subsequently reviewed by Steven Danzer PhD on behalf of the Town of Newtown during the 2010 review process for the Technology Park. The wetland boundary was accepted by the Town during that process. The boundary was subsequently reconfirmed once again in 2017 by Davison Environmental Services during their submission of documentation to the Army Corp of Engineers for the wetland crossing and access road. In 2023, the wetland line closest to the proposed work was then again examined by Steven Danzer PhD in 2023 to confirm that the wetland boundary depicted on the current 2023 site plan is still substantially accurate.

The wetlands within closest proximity to the work area consist of a forested drainage corridor and a small wet meadow area. These wetland areas are located north and east of the proposed activities. Wetland soils in these areas are within the Ridgebury fine sandy loam mapping unit (2). The Ridgebury series consists of very deep, somewhat poorly and poorly drained soils formed in glacial lodgment till.

The wetland resources were described in full detail in a previous environmental report dated 5/8/18 by Davison Environmental, LLC. The characterization included the wetland types, vegetative cover, and wetland functions and values. During the more recent 2023 winter investigation by Steven Danzer PhD, it was determined that no substantial changes to the wetlands had occurred since the 2018 Davison report, and that the characterizations within that 2018 report were still valid.

The wetland resources throughout the site are accurately described in the Davison report as a single contiguous wetland unit, generally draining from northwest to southeast. The main wetland corridor contains an embedded network of small intermittent headwater watercourses which flow into the main channel. The wetlands closest to the proposed activities are predominately forested, but also contain a small wet meadow where the wetland crosses a small 0.7 acre hayfield/meadow located northeast of the proposed activities.

The forested canopy within the wetland corridor is dominated by Red Maple and American Elm. The shrub layer is mainly Spicebush with Winterberry, Arrow-wood Viburnum, Japanese Barberry and Multi-flora Rose. The herb layer was not qualitatively observable during the 2023 winter visits by Steven Danzer PhD but it was previously described by Davison as consisting of Skunk Cabbage, Jewelweed, Fowl Mannagrass, Bog Goldenrod, Dewberry, Cinnamon and Sensitive Fern, Poison Ivy and Tussock Sedge.

Proposed Activities

The proposed activities include the construction of residential building units, clubhouse & pool area, parking, grading, and the installation of utilities including a water quality basin. The residential buildings will be constructed in phases. Twenty-seven and a half (27.5) acres of open space comprised of forest and hayfield/meadow will be preserved.

The proposed activities will occur almost entirely outside of the 100 foot upland review area. Only the outer northern edge of grading, the installation of landscaping plants, and the water quality basin will be located within the 100 foot upland review area.

Under existing conditions, the portion of the 42 acre site that will be developed consists of the mowed hayfield meadow located in the western and central region (depicted on the site plan as the southern region of Lot 1A and western region of Lot 1B), and the wooded areas in the eastern region (depicted on the site plan as the eastern region of Lot 1B). The residential buildings within Phase 1 and Phase 2 will occur in the existing hayfield/meadow, while Phase 3 will occur in both hayfield/meadow and wooded areas. The water quality basin will be constructed in the wooded area under Phase 1.

The existing hayfield/meadow where Phase 1 and Phase 2 will be constructed is vegetated predominately with grass species such as Orchard Grass, Reed Canary Grass, and Smooth Chess. The field is hayed regularly.

The wooded area that will be developed under Phase 3 has been highly disturbed in the past (see Photos 1 and 2). The wooded area is underlain by fill soils. Most likely the area received excess graded material from the adjacent farm fields during farming operations including the leveling of the fields. The southeastern portion of this region (where the stormwater basin and the eastern portion of buildings 8 and 10 will be located) is only thinly wooded with abundant brushy species and younger trees, while the canopy cover in the northern portion of the wooded area is comparatively more mature. Woody species throughout the area included Black Birch, Yellow Birch, Juniper, Red Oak, White Oak, Cherry, Multiflora Rose, and Wineberry.

A storm drainage network is proposed to collect and pipe all runoff from impervious surfaces. The runoff will be directed to a hydrodynamic separator and ultimately be discharged to a water quality basin located in the wooded area in the southeastern region of the site.

A significant portion of the 42 acre site (65%, or 27.5 acres) will be preserved as open space, consisting of hayfield/meadow and the forested wetland corridor. As noted in prior comments issued by Steven Danzer PhD in 2011 on behalf of the Town, the uniqueness of this habitat and the heterogeneity it provides to the landscape makes this area ecologically notable. The fact that this habitat exists in significant acreage under existing conditions brings value to the landscape, and to the wetlands. The grassland habitat is an example of early-successional stage habitat. Early-successional stage habitats include grasslands, agricultural lands, old fields, and seedling/sapling stands. Remaining open tracts of this size are rare in Connecticut due to a variety of factors such as development, loss of farmland, lack of fire, and forest succession. The CT DEEP recognizes the early-successional stage habitat as an important land cover type and as a natural resource in its own right, and identifies these habitats as priority habitats for preservation.

Impact Analysis

The project was reviewed to determine if there were any significant impacts to the wetland resources, pursuant to the definition of "Significant Impact Activity" contained within Section 2.1 of the Inland Wetlands and Watercourses Regulations of the Town and Borough of Newtown, Connecticut.

According to Section 2.1, "Significant Activity" include activities that (to summarize) 1) involve deposition or removal of material; 2) substantially changes the natural channel or may inhibit watercourse dynamics; 3) substantially diminish the natural capacity of the wetland resources or provide other functions; 4) cause or potentially cause substantial turbidity, siltation or sedimentation; 5) cause substantial diminution of flow or groundwater levels to the wetland resources; 6) cause or potentially cause pollution; and 7) damage or destroys unique, scientifically or educationally valuable wetland areas.

As per the above definitions, the project ***will not*** cause significant impacts to the wetlands/watercourses for the following reasons and with the following considerations:

- There is no work being proposed in the wetlands. The wetlands are located a considerable distance from the residential development, roughly 100 feet north of the northern limits of disturbance from the northern driveway and roughly 100-160 feet east of the eastern limits of disturbance for the residential units.

- The proposed activities will occur almost entirely outside of the 100 foot upland review area. Only the outer northern edge of grading, the installation of landscaping plants, and the water quality basin will be located within the review area. Existing wooded wetland buffers to the north will not be disturbed.

- The residential buildings within Phase 1 and Phase 2 will occur in the existing hayfield/meadow and as such, forest canopy will not need to be removed in those areas, reducing site disturbance.

- Portions of the wooded area in the eastern region (where Phase 3 and the water quality basin will be constructed) have been previously disturbed (as discussed in the previous section).

- Native plantings are proposed within the 100 foot upland review area as per the landscaping plan prepared by Environmental Land Solutions.

- A previous concept for development for this site has already been reviewed in 2010/11 and approved by the town in 2011. Under the previous site plan, development was proposed well within the 100 foot upland review area. Residential units were proposed in the northern portion of the site. The current site plan largely limits activities to outside of this 100 foot upland review area, and eliminates the northern residential units approved in 2011, preserving that area as open space.

- Furthermore, another major concern of Commission during the previous 2011 proposal was to preserve the hayfield/meadow area to the northeast. Under the current proposal, the hayfield/meadow will be preserved along with the forested wetland corridor. A total of 27.5 acres of open space will be preserved.

- Stormwater generated from the site will be mitigated by a storm water system which is proposed to collect and treat runoff generated by the roof of the proposed buildings, driveway, and parking areas, and which will eventually discharge the runoff into the water quality basin.

- Erosion controls are proposed to prevent erosion and sedimentation towards the wetland/watercourse.

With the above considerations in mind, it is my opinion that there will be no significant impacts to the wetland resources on the site, nor will be there any significant alteration to the existing wetland functions or values.

Summary Conclusions

The proposed activities include the construction of residential building units, clubhouse & pool area, parking, grading, and the installation of utilities including a water quality basin. The residential buildings will be constructed in phases.

The proposed activities will occur almost entirely outside of the 100 foot upland review area. Only the outer northern edge of grading, the installation of landscaping plants, and the water quality basin will be located within the review area. No work is proposed in the wetlands/watercourses.

A significant portion of existing hayfield/meadow and forested wetland corridor, 27.5 acres, will be preserved as open space.

A previous site plan was approved in 2011. The current site plan is substantially better in comparison as it eliminates residential units in the north, pulls most development out of the 100 foot upland review, and preserves a larger swath of open space.

It is my professional opinion that the proposed activities will not significantly impact, or change, diminish, or otherwise detrimentally alter the ecological communities or the functions or values of the wetland/watercourse areas located on or adjacent to the property. Impacts by the proposed activities are anticipated to be minimal or nonexistent.

Thank you for the opportunity to comment.

Respectfully submitted,
Signed,

Steven Danzer Ph.D.
Professional Wetland Scientist, Soil Scientist, Arborist,
Ph.D. in Renewable Natural Resource Studies

Certified Professional Soil Scientist

Attachment: Appendix A – Photo log

Appendix A.
Photos
6 and 8 Commerce Drive, Newtown

Photo 1. Wooded area where Phase 3 is proposed: Note the disturbed character of the forest, with thinning and fill soils. Looking towards the field. **2/13/23.**

Photo 2. Wooded area in vicinity of proposed water quality basin. Note the abundance of brushy species and younger ages of the trees. Looking west towards the field. **2/13/23.**

Town Municipal Center
3 Primrose Street
Newtown, CT 06470
203-270-4250
203-270-4278 Fax

TOWN OF NEWTOWN

INLAND WETLANDS COMMISSION

March 14, 2011

Town of Newtown Technology Park
c/o First Selectman
3 Primrose Street
Newtown, CT 06470

Re: **IW 10-32 Commerce Rd, Newtown Technology Park.** Application to construct an industrial condominium complex.

Dear First Selectman Llodra:

At the regular meeting of March 9, 2011 of the Inland Wetlands Commission, your application for a license to conduct regulated activities on the above-referenced property was APPROVED to conduct regulated activities in accordance with Section 11.1 of the Inland Wetland Regulations of the Town of Newtown. The regulated activities, for which a license has been granted, are only those indicated on the application and plans approved with your application.

The license was granted with the following conditions:

A. Erosion and sediment controls as illustrated on the plan and where deemed necessary by the Conservation Official will be installed prior to construction and maintained until directed by the Conservation Official.

B. The Conservation Official must be notified in writing one week prior to commencement of the permitted activity and again upon completion of the activity.

C. A copy of the approved plans will be on site at all times.

D. The Conservation Official must inspect and approve the marked limits of disturbance on the site prior to any site activity.

E. No alterations of the site plans are allowed for this permit, unless a modification is requested and granted by the commission or its agent.

G The conservation easement approved by the Conservation Official, is to be filed at the office of the Town Clerk, on the title deed, and the Land Use Office.

H Any proposed easement areas and open space shall be marked on the entire site prior to any site activity, with permanent markers approved by the Conservation Official.

L. An environmental management consultant will be retained by the licensee to implement and maintain the certified erosion and sediment control plan for the duration of the construction until completion. The consultant's contractual arrangement with the licensee will be approved by the Conservation Official prior to site work beginning and includes a minimum weekly monitoring of all necessary materials, equipment and labor necessary to execute and maintenance of the erosion & sediment plan. Weekly activities reports will be submitted to the Conservation Official; AND

1. The approved maps for site development are "Newtown Technology Park, Wetlands Mitigation Plan, Commerce Road, Newtown, CT" by Spath-Bjorklund Associated Inc., sheet S-3, scale 1: - 80', dated December 9, 2010 and stamped 12-30-10 and "Newtown Technology Park Display 1" dated 10-15-10 and associated maps.
2. The Commission will receive and approve the final language of the 11.6 acre Conservation Easement prior development and recording on the land records.
3. As offered by the applicant, specific building site plans will be submitted for Commission approval prior to building permits being issued.
4. As offered by the applicant, a no-mow fescue mix will be used in the rear and sides of the buildings as part of the landscape plan.
5. As offered by the applicant, a preconstruction conference will be held with the developer/s and Newtown Land Use Agency prior to clearing or breaking ground.
6. All recommendations and notes, especially those referencing supervision of wetland mitigation and watercourse crossing restoration, cited in the "Environmental Inventory, Evaluation and Impact Assessment", dated October 6, 2010 and revised 11-11-2010 by Environmental Planning Services and the December 8, 2010 letter to Elizabeth Stocker from Michael Klein and Bill Carboni, stamped on December 30, 2010 will be incorporated into the permit conditions.
7. Quarterly status reports on forms provided on the Town of Newtown website or in the Land Use office will be submitted to the Commission when the project begins and will continue until the project is complete.

<u>If any changes are made which differ from the information filed in support of this license,</u> new information must be filed with this Commission accompanied by a <u>letter detailing all changes,</u> including but not limited to, changes in lot lines, changes to proposed locations of streets, drainage and easements; changes to location of proposed dwellings and septic systems, changes in proposed cuts and fills, and/or changes to licensed activities.

<u>Changes in proposed licensed activities or new activities requiring licensing will require reapplication to this Commission.</u> The Commission reserves the right to determine what effect, if any, such changes will have on wetlands, watercourses and/or regulated activities. <u>If it comes to the attention of the Commission at the start of construction that the Commission records do not reflect the most recent revised plans, THIS LICENSE IS AUTOMATICALLY REVOKED.</u>

Sincerely,

Anne Peters

Anne Peters, Chairperson
Inland Wetlands Commission

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(203) 270-4278 Fax
steve.maguire@newtown-ct.gov

Steve Maguire
Senior Land Use Enforcement Officer

TOWN OF NEWTOWN

MEMO

August 5, 2019

To: (File) IW #10-32 Commerce Road (Tech Park) Town of Newtown

From: Steve Maguire – Senior Land Use Enforcement Officer

Re: Wetland Permit Validity

Pursuant to Public Act No. 11-5, entitled "An Act Ex-tending the Time of Expiration of Certain Land Use Permits,"

The above mentioned permit was approved on March 9, 2011 and valid as of May 9, 2011 therefore falling within the window that automatically extends the permit to be valid for 9 years until March 9, 2020.

The permit can be renewed by request so long as the permit is not valid for more than 14 years which would be March 9, 2025

INLAND WETLANDS COMMISSION
MINUTES
Regular Meeting of November 13, 2019 at 7:30 p.m.
Council Chambers, Newtown Municipal Center
3 Primrose Street, Newtown, CT

These Minutes are subject to Approval by the Inland Wetlands Commission

Present: Sharon Salling, Mike McCabe, Vanessa Villamil, Suzanne Guidera, Craig Ferris

Staff Present: Steve Hnatuk, Land Use Officer, Dawn Fried, Clerk

Ms. Salling opened the meeting at 7:30 p.m.

PENDING APPLICATION

Application IW #19-12 by Robert and Sian Nimkoff, property located at 7 Hundred Acres Road, for construction of a natural stone catch basin to hold gravel run off from Ox Hill Road.

Mr. Douglas DiVesta, P.E., DiVesta Civil Engineering Associates, Inc., Roxbury CT spoke on the behalf of the applicant. Mr. DiVesta gave an overview of the project and presented a detailed site plan to the Commission. Mr. DiVesta described the pond as having accumulated a lot of sediment over the years. He referred to the pond as a "fire pond" and explained the importance of keeping the pond at maximum capacity and keeping the water clear. A berm will be created with the material that is excavated. Only the outlet will be cleaned of the sediment leaving the brush and vegetation. Approximately 30 cubic yards of sediment will be removed. The sediment will be disposed in the upland area to dewater. An anti-tracking pad area will be created and a silt fence will be utilized in case of a rain event. There will be a plunge pool close to the road which Mr. DiVesta stated should be cleaned out by Public Works every few years.

Ms. Salling questioned the start time of the project. Mr. DiVesta stated most likely springtime.

Ms. Guidera questioned whether the outlet area is the only area that has silt run-off or will more silt travel to the rest of the pond over time. Mr. DiVesta stated that the silt run-off is only in the outlet area and there is no reason to dredge the rest of the pond.

Mr. Ferris questioned where the gravel was travelling. Mr. DiVesta stated there is a catch basin and pipe that runs along the edge of the road. Mr. Ferris questioned if the project will run during low flow conditions, suggesting late July and August being the best times.

Ms. Guidera questioned what material will be used to redirect the channel. Mr. DiVesta responded the excavated materials.

Ms. Salling appreciated the detail description of the soil stockpile ring.

Mr. Ferris moved to APPROVE Application IW #19-12 by Robert and Sian Nimkoff, property located at 7 Hundred Acres Road, for construction of a natural stone catch basin to hold gravel run off from Ox Hill Road with standard conditions A, B, C, D, E, F, O and P. The approved plans are: Nimkoff Property, Ox Hill Road, Newtown, Connecticut. Proposed Site Development Plan; Prepared by DiVesta Civil Engineering Associates, Inc. 51 Painter Ridge Road Roxbury, CT 06783. Dated for submission October 15, 2019. Date Received October 15, 2019. And all supporting documents. Mr. McCabe seconded. All in favor.

APPROVAL OF MINUTES for the Regular Meeting of October 9, 2019

Under "Pending Application" change "of" to "to". Ms. Villamil moved to accept the amended minutes from October 9, 2019. Mr. McCabe seconded. Mr. Ferris abstained. The remaining Commissioners were in favor. The minutes from October 9, 2019 were approved.

APPROVAL OF MINUTES for the Regular Meeting of October 23, 2019

Ms. Villamil moved to accept the minutes from October 23, 2019. Ms. Salling seconded. Mr. Ferris, Mr. McCabe and Ms. Guidera abstained. The remaining Commissioners were in favor. The minutes from October 23, 2019 were approved.

SET IWC CALENDAR FOR 2020

Mr. Ferris moved to approve the IWC calendar for 2020. Ms. Guidera seconded. All in favor.

OTHER BUSINESS

Mr. Hnatuk read a memo dated August 5, 2019, from Steve Maguire, Senior Land Use Enforcement Officer, regarding the extension of the Wetland Permit IW #10-32 Commerce Road (Tech Park) of Newtown. Pursuant to Public Act No 11-5, entitled "An Act Extending the Time of Expiration of Certain Land Use Permits", the renewed expiration date is March 9, 2025.

ACCEPTANCE OF APPLICATIONS

The Commission accepted Application IW #18-25 (MOD), Planters' Choice, LLC, 153/155 Huntingtown Road to modify the original permit to treat water in upland area at 155 Huntingtown Road and create additional wetland at 153 Huntingtown Road to comply with Army Corps requirements. The Commission discussed the option of holding a Public Hearing and will make a decision at a later date.

ADJOURNMENT

With no additional business, Mr. McCabe moved to adjourn. Ms. Guidera seconded. All in favor. The meeting of November 13, 2019 was adjourned at 8:04 pm.

Respectfully Submitted, Dawn Fried.

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- 520.2 EXISTING SPOT ELEVATION
- 520.2 x PROPOSED SPOT ELEVATION
- EXISTING DRAINAGE
- PROPOSED DRAINAGE
- EXISTING SANITARY
- PROPOSED SANITARY
- L SANITARY LATERALS
- FM FORCE MAIN
- FD FOOTING DRAIN
- RD ROOF DRAIN
- HO 6" PVC HIGH OVERFLOW
- W WATER SERVICE
- G GAS LINE
- o COTG CLEAN OUT TO GRADE
- INLAND WETLANDS WITH FLAG #
- APD AQUIFER PROTECTION DISTRICT BOUNDARY
- GTD GRADE TO DRAIN
- SF SYNTHETIC FILTER BARRIER
- LOD LIMIT OF DISTURBANCE
- WATER BREAK
- BUILDING SETBACK LINE
- DE DRAINAGE EASEMENT
- SE SANITARY EASEMENT
- CE CONSERVATION EASEMENT
- SR SLOPE RIGHTS
- 100' UPLAND REVIEW AREA
- TST TEMPORARY SEDIMENT TRAP
- 12 OBSERVATION PIT

NO.	DATE	DESCRIPTION
5	12-9-10	WETLANDS
4	10-6-10	WETLANDS
3	8-10-10	WETLANDS
2	7-14-10	WETLANDS
1	5-12-10	WETLANDS

SUBMITTALS

NEWTOWN TECHNOLOGY PARK
SITE PLAN
COMMERCE ROAD
NEWTOWN, CONNECTICUT
PREPARED FOR
TOWN OF NEWTOWN

DATE:	SCALE:	DRAFTER:	JOB NO:	FILE NUMBER:
5-4-10	1"-100'	DCH	5704	

SB GROUP
SPATH-BJORKLUND ASSOCIATES, INC
PO Box 324, Monroe, Connecticut 06468
Phone: 203-268-5216

L-1

C:\PROJECTS\5704 TOWN OF NEWTOWN\DRAWINGS\CONDO JAN 2010\L-1.DWG, 12/9/2010 3:25:58 PM, HP DesignJet 1050C by HP

STORMWATER MANAGEMENT PLAN

FOR

“CHURCH HILL FARM AT DEEP BROOK”

6 COMMERCE ROAD

NEWTOWN, CONNECTICUT

February 14, 2023

Prepared by
J. Edwards & Associates, LLC
227 Stepney Road, Easton, CT 06612

STATE OF CONNECTICUT
LARRY B. EDWARDS
No. 10937
LICENSED
PROFESSIONAL ENGINEER

Larry Edwards P.E. #10937

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PROJECT NARRATIVE

This proposed development is located on a 14.2 acre undeveloped parcel. This parcel is bounded to the south by the Katherine Hubbard Animal Sanctuary, to the north and east by town of Newtown open space and to the west by the railroad. The property is accessed via a previously approved and constructed private roadway that connects to commerce road. The stormwater runoff for the roadway is collected and treated by an independent drainage system and was not included in this analysis.

Upland soils in the proposed development area consist of Paxton and Montauk soil types (soil group b&c). The wetland soils consist primarily of Ridgebury soils. The proposed development of the site will create a total of 5.3 acres of impervious area.

The drainage study area consists of 7.4 acres. The site currently flows east eventually draining to deep brook. All impervious surface in the new development will discharge to a piping network. This network flows to the east and eventually terminates at a hydrodynamic separator unit which will provide primary treatment, The separator outlets to a water quality retention basin which in turn overflows to deep brook. Each catch basin will have a 2' minimum sump with the last basin in the system equipped with a hooded trap

The drainage analysis for the project was performed using the SCS TR55 computer model using NOAA IDF data. Storm frequencies of 2, 10, 25 and 100 years have been evaluated. The basin outlet has been sized to handle a 100 year storm.

STORM WATER QUALITY CALCULATIONS

Water Quality Volume

This volume represents the amount of storm water runoff that should be captured and treated in order to remove the majority pollutants on an average annual basis. The study area includes the total project site along with any offsite area passing through.

TOTAL SITE AREA (A) = 7.24 acres

DRAINAGE AREAS

Drainage Area	Impervious Area
Subcatchment-1	5.23
Subcatchment-2	0.00
Subcatchment-3	0.00
Total Impervious	5.3

WATER QUALITY VOLUME (WQV) CALCULATION

Design Precipitation (P) =	1	inch
% Impervious Cover (I) =	72	
Volumetric Runoff Coefficient (R) =	0.700	
WQV =	**0.422**	**ac-ft**
	18400	**cu-ft**

WQ Basin	Area	Imperv. Area	% Imperv.	R	WQV Required (cf)	WQV Proposed (cf)
1	7.4	5.23	72.0	.7	18,400	18,784

*A hydrodynamic separator unit will provide secondary water quality treatment

A Downstream Defender Model 4, hydrodynamic separator unit. This model will handle a peak treatment flow of up to 3cfs.

The required Water Quality flow rate is:
WQF =WQV(ac-ft)x(12inc/ft/ (drainage area (acre) = (0.431)x12/7.4 =0.7cfs
An 8” pipe will direct the initial flow to the separator with a 36” bypass pipe.

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 basin

GWV = DxAxI/12

Soil recharge depth calculation:
Soil group C D =0.10

Site	Area	% Imperv.	GWV Required (cf)	GWV Proposed (cf)
1	7.4	72.0	1934	18,784

Stream Channel Protection
The design criteria will be to limit the 2 year 24 hour post development flow rate to 50% of the pre development 2 year 24 hour flow rate.

WQ Basin	2yr Exist	2yr Prop
1	7.19	2.14

Outlet Protection
The water quality basin outlet will be protected with a rip rap pad 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. An overflow from the parking area to the WQ basins has been provided to assure that the 100 year storm event will flow through the basin.

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

Emergency Outlet Protection
The emergency outlet control haS 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.

PEAK FLOW SUMMARY TOTAL STUDY AREA

	2 YR EXIST	**2 YR PROP**	10 YR EXIST	**10 YR PROP**	25 YR EXIST	**25 YR PROP**	100 YR EXIST	**100 YR PROP**
BASIN 1	7.19	**2.14**	15.55	**9.85**	21.02	**18.15**	29.50	**28.6**

ADDENDUM #1
NOAA RAINFALL AND NRCS MAPPING

NOAA Atlas 14, Volume 10, Version 3
Location name: Newtown, Connecticut, USA*
Latitude: 41.4138°, Longitude: -73.2915°
Elevation: 372.22 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	0.362 (0.277-0.467)	0.424 (0.324-0.548)	0.526 (0.400-0.681)	0.611 (0.462-0.795)	0.727 (0.534-0.976)	0.815 (0.588-1.11)	0.906 (0.635-1.27)	1.00 (0.674-1.44)	1.14 (0.740-1.68)	1.25 (0.795-1.88)
10-min	0.513 (0.392-0.662)	0.601 (0.459-0.777)	0.745 (0.567-0.965)	0.864 (0.655-1.12)	1.03 (0.757-1.38)	1.15 (0.832-1.58)	1.28 (0.900-1.80)	1.42 (0.955-2.04)	1.62 (1.05-2.39)	1.78 (1.13-2.66)
15-min	0.604 (0.461-0.779)	0.707 (0.540-0.914)	0.876 (0.666-1.13)	1.02 (0.770-1.32)	1.21 (0.890-1.63)	1.36 (0.979-1.86)	1.51 (1.06-2.12)	1.67 (1.12-2.40)	1.91 (1.23-2.81)	2.09 (1.32-3.13)
30-min	0.839 (0.641-1.08)	0.980 (0.748-1.27)	1.21 (0.921-1.57)	1.40 (1.06-1.82)	1.67 (1.22-2.24)	1.87 (1.34-2.54)	2.07 (1.45-2.90)	2.29 (1.53-3.28)	2.59 (1.68-3.82)	2.83 (1.79-4.24)
60-min	1.08 (0.821-1.39)	1.25 (0.957-1.62)	1.54 (1.18-2.00)	1.79 (1.35-2.32)	2.12 (1.56-2.84)	2.37 (1.71-3.23)	2.63 (1.84-3.68)	2.90 (1.95-4.16)	3.28 (2.12-4.82)	3.57 (2.26-5.34)
2-hr	1.40 (1.08-1.80)	1.63 (1.25-2.10)	2.01 (1.54-2.59)	2.33 (1.78-3.01)	2.77 (2.05-3.70)	3.10 (2.25-4.21)	3.44 (2.43-4.82)	3.83 (2.57-5.44)	4.38 (2.84-6.40)	4.83 (3.07-7.18)
3-hr	1.62 (1.25-2.06)	1.89 (1.46-2.42)	2.35 (1.81-3.01)	2.72 (2.08-3.50)	3.24 (2.41-4.32)	3.63 (2.65-4.93)	4.04 (2.88-5.66)	4.51 (3.04-6.40)	5.21 (3.39-7.59)	5.79 (3.68-8.57)
6-hr	2.02 (1.57-2.57)	2.40 (1.87-3.05)	3.03 (2.34-3.85)	3.54 (2.73-4.53)	4.25 (3.19-5.65)	4.78 (3.52-6.47)	5.35 (3.84-7.48)	6.02 (4.08-8.49)	7.03 (4.59-10.2)	7.89 (5.03-11.6)
12-hr	2.46 (1.93-3.11)	2.99 (2.34-3.77)	3.84 (2.99-4.86)	4.55 (3.53-5.78)	5.52 (4.16-7.30)	6.24 (4.62-8.41)	7.02 (5.08-9.79)	7.96 (5.41-11.2)	9.38 (6.14-13.5)	10.6 (6.78-15.5)
24-hr	2.89 (2.28-3.62)	3.56 (2.81-4.47)	4.67 (3.66-5.87)	5.58 (4.36-7.05)	6.85 (5.20-9.00)	7.78 (5.80-10.4)	8.79 (6.40-12.2)	10.0 (6.83-14.0)	11.9 (7.83-17.1)	13.6 (8.72-19.7)
2-day	3.29 (2.61-4.09)	4.10 (3.25-5.11)	5.43 (4.29-6.78)	6.54 (5.14-8.19)	8.06 (6.16-10.6)	9.17 (6.90-12.3)	10.4 (7.65-14.4)	12.0 (8.17-16.5)	14.4 (9.47-20.4)	16.5 (10.6-23.8)
3-day	3.58 (2.86-4.44)	4.47 (3.56-5.54)	5.92 (4.70-7.37)	7.13 (5.63-8.90)	8.79 (6.75-11.5)	10.0 (7.55-13.3)	11.3 (8.38-15.7)	13.0 (8.94-18.0)	15.7 (10.4-22.3)	18.1 (11.7-26.0)
4-day	3.85 (3.08-4.76)	4.79 (3.83-5.92)	6.33 (5.04-7.84)	7.60 (6.01-9.46)	9.35 (7.20-12.2)	10.6 (8.05-14.1)	12.1 (8.92-16.6)	13.8 (9.51-19.0)	16.7 (11.0-23.5)	19.1 (12.4-27.4)
7-day	4.60 (3.70-5.65)	5.64 (4.53-6.93)	7.33 (5.87-9.04)	8.74 (6.95-10.8)	10.7 (8.24-13.8)	12.1 (9.17-15.9)	13.7 (10.1-18.6)	15.6 (10.7-21.3)	18.5 (12.3-26.0)	21.1 (13.7-30.1)
10-day	5.34 (4.31-6.54)	6.43 (5.19-7.88)	8.22 (6.61-10.1)	9.71 (7.75-12.0)	11.7 (9.09-15.1)	13.3 (10.1-17.3)	14.9 (11.0-20.1)	16.8 (11.6-22.9)	19.8 (13.1-27.7)	22.3 (14.5-31.7)
20-day	7.62 (6.20-9.26)	8.81 (7.15-10.7)	10.8 (8.70-13.1)	12.4 (9.94-15.1)	14.6 (11.3-18.5)	16.3 (12.3-20.9)	18.0 (13.2-23.8)	19.9 (13.9-26.9)	22.6 (15.1-31.4)	24.8 (16.1-35.0)
30-day	9.51 (7.77-11.5)	10.8 (8.77-13.0)	12.8 (10.4-15.5)	14.5 (11.7-17.7)	16.8 (13.1-21.1)	18.6 (14.1-23.7)	20.4 (14.9-26.7)	22.3 (15.6-29.9)	24.8 (16.6-34.2)	26.8 (17.4-37.6)
45-day	11.8 (9.70-14.3)	13.2 (10.8-15.9)	15.3 (12.5-18.5)	17.1 (13.9-20.8)	19.5 (15.3-24.4)	21.4 (16.3-27.2)	23.3 (17.1-30.3)	25.2 (17.7-33.7)	27.6 (18.6-38.0)	29.4 (19.2-41.2)
60-day	13.8 (11.3-16.5)	15.1 (12.4-18.2)	17.4 (14.2-21.0)	19.3 (15.7-23.3)	21.8 (17.1-27.2)	23.8 (18.2-30.1)	25.8 (18.9-33.3)	27.7 (19.5-36.9)	30.1 (20.3-41.3)	31.9 (20.8-44.4)

[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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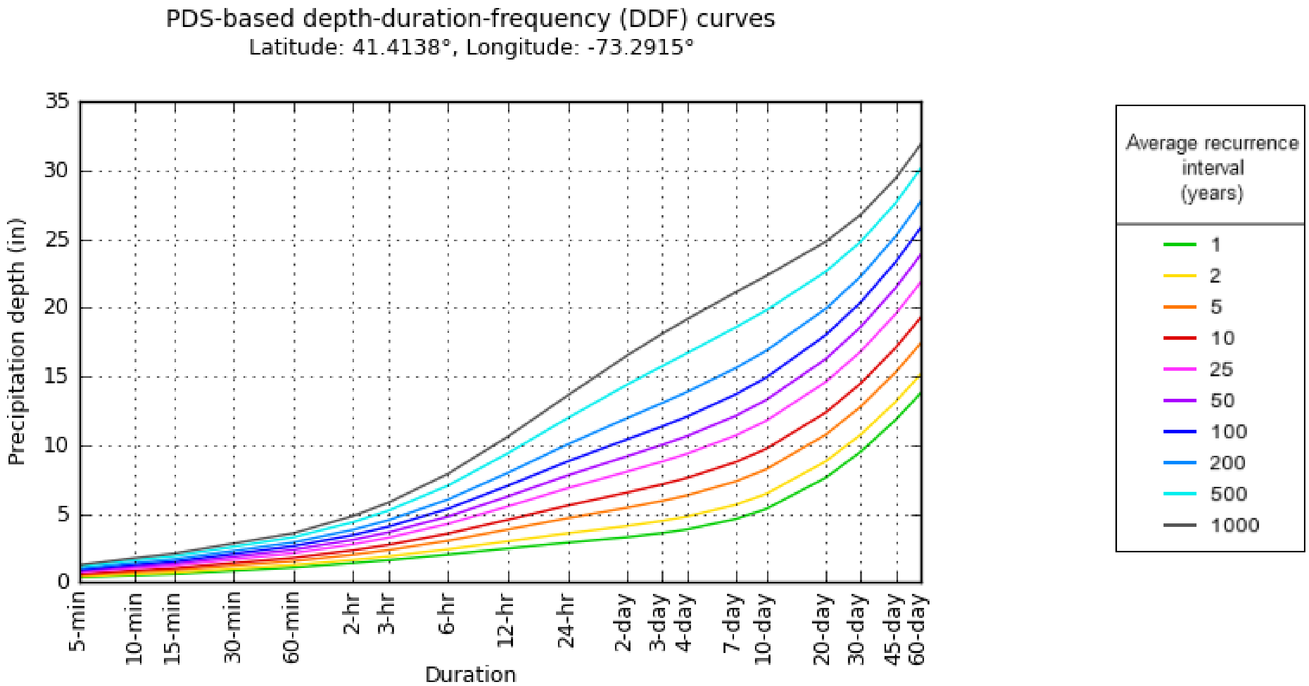
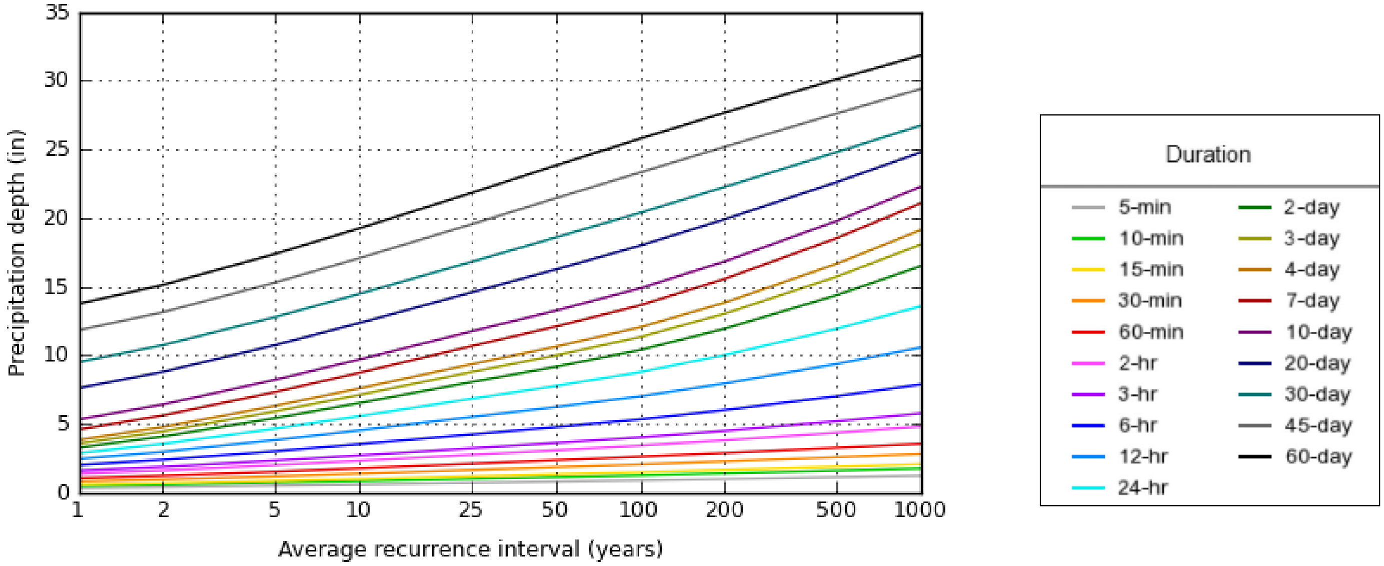
PF graphical





NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Fri Jan 20 18:22:20 2023

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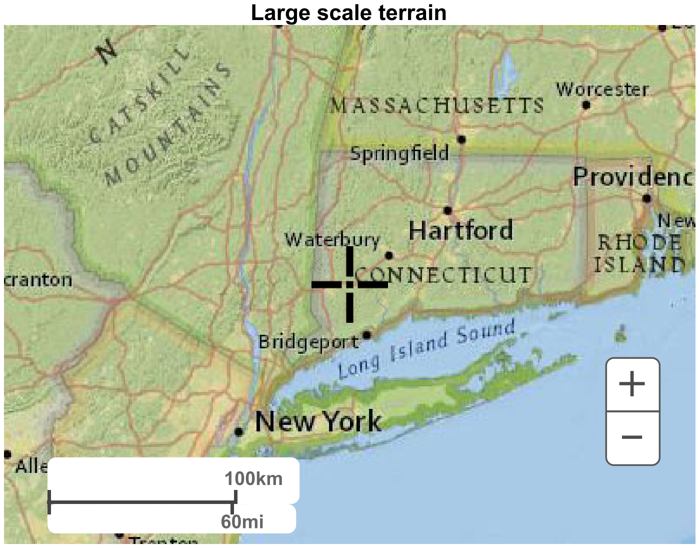
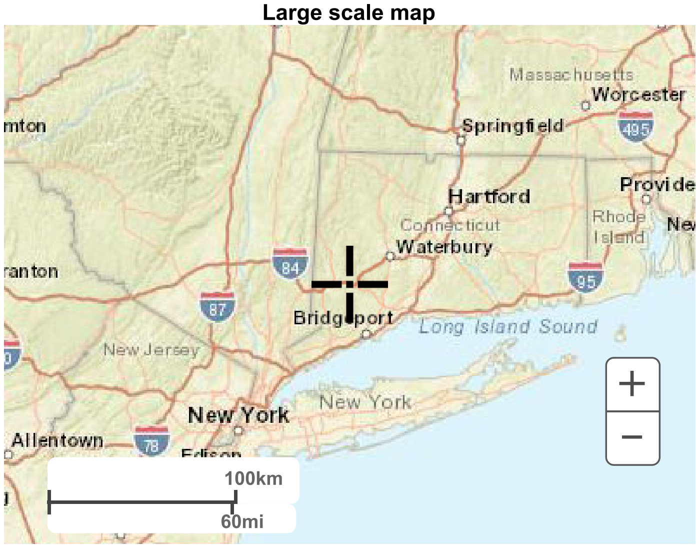
Maps & aerials

Small scale terrain

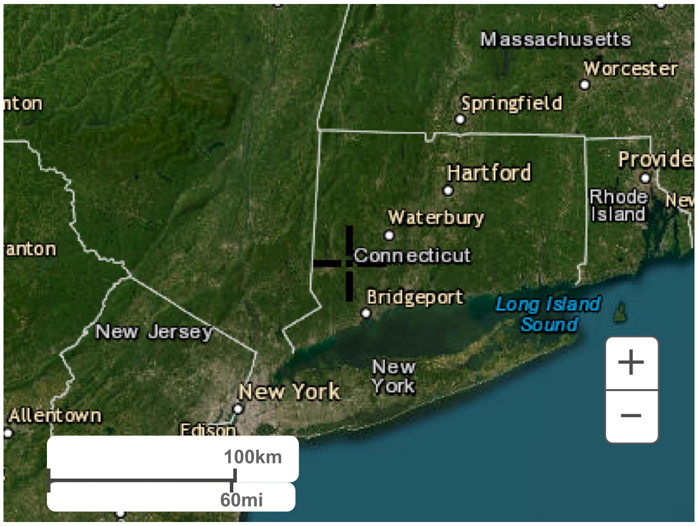
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

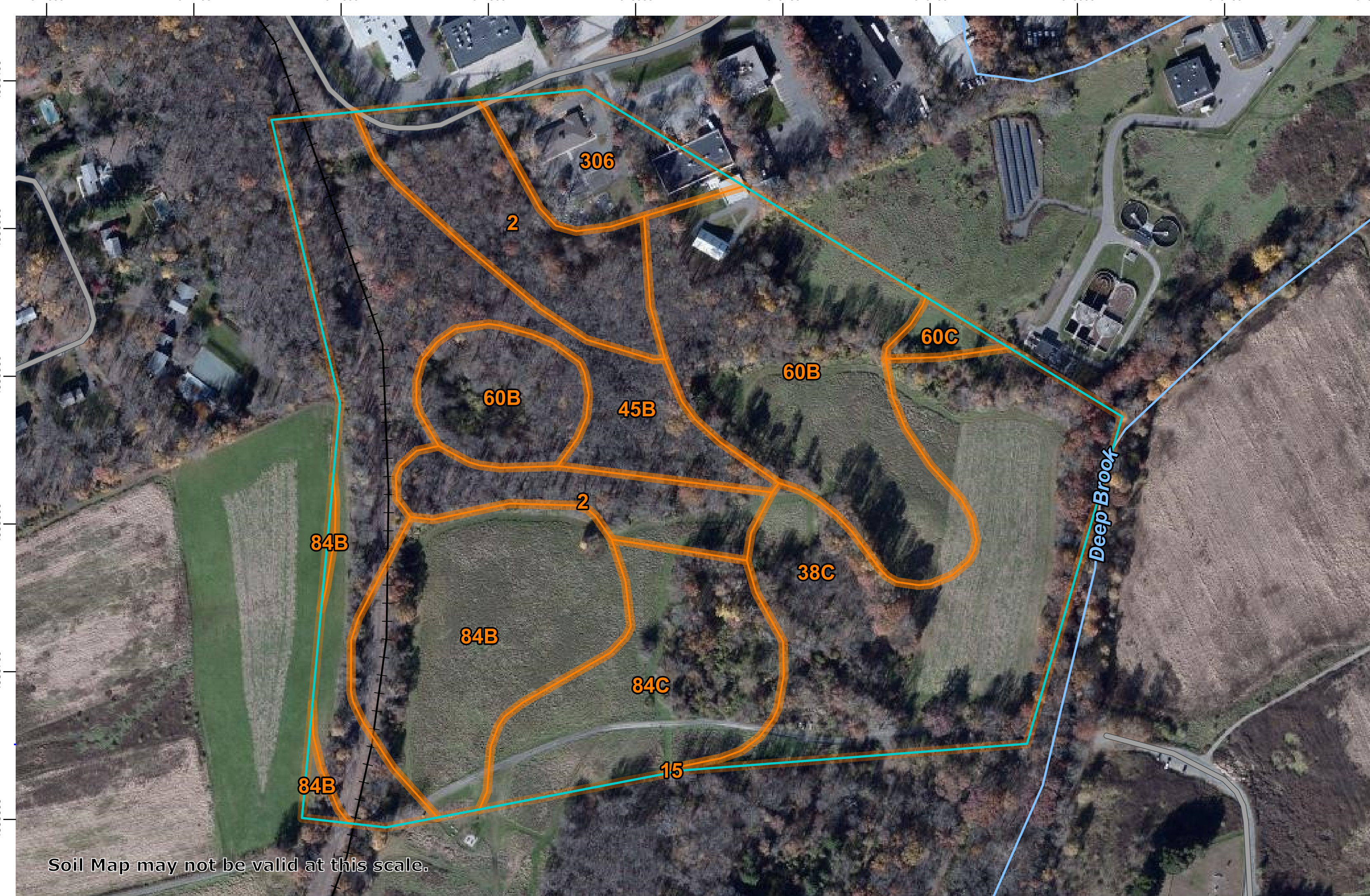
Disclaimer

73° 17' 38" W | 73° 16' 58" W

41° 24' 51" N | 41° 24' 51" N

642600 642700 642800 642900 643000 643100 643200 643300 643400 643500

4586100 4586000 4585900 4585800 4585700 4585600



41° 24' 31" N | 41° 24' 31" N

642600 642700 642800 642900 643000 643100 643200 643300 643400 643500

73° 17' 38" W | 73° 16' 58" W

Map Scale: 1:4,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

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

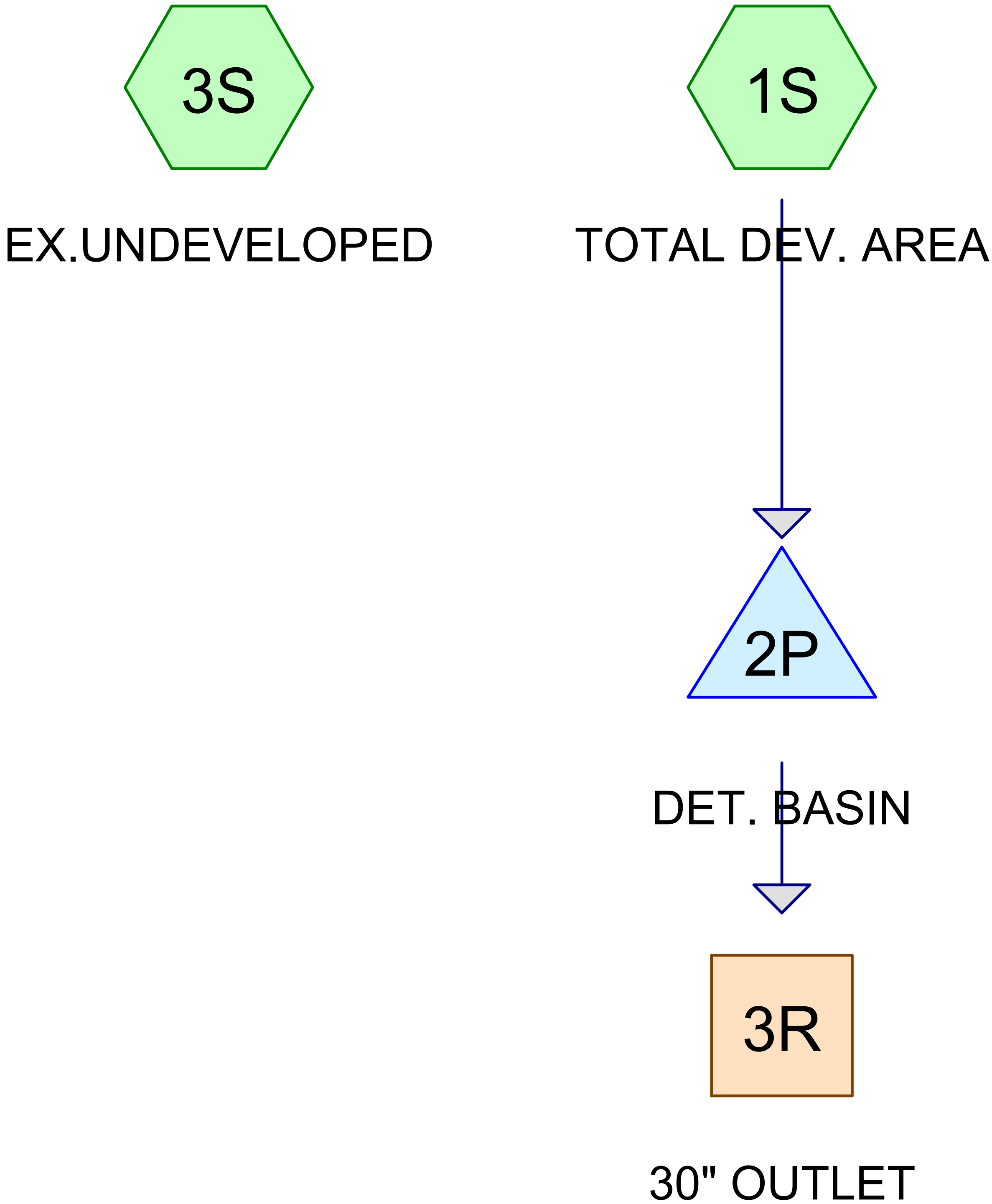
Date(s) aerial images were photographed: Oct 5, 2018—Nov 4, 2018

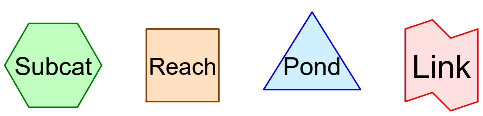
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Ridgebury fine sandy loam, 0 to 3 percent slopes	6.0	11.7%
15	Scarboro muck, 0 to 3 percent slopes	0.0	0.0%
38C	Hinckley loamy sand, 3 to 15 percent slopes	10.7	20.9%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	9.3	18.1%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	10.4	20.4%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	0.4	0.9%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	6.7	13.2%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	5.2	10.2%
306	Udorthents-Urban land complex	2.4	4.7%
Totals for Area of Interest		**51.1**	**100.0%**

ADDENDUM #2
HYDROLOGICAL ANALYSIS





Routing Diagram for 5704
Prepared by J. EDWARDS ASSOCIATES, Printed 1/24/2023
HydroCAD® 10.10-6a s/n 04982 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.522	74	>75% Grass cover, Good, HSG C (1S, 3S)
5.328	98	Unconnected roofs, HSG C (1S)
14.850	**83**	**TOTAL AREA**

Soil Listing (all nodes)

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

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	9.522	0.000	0.000	9.522	>75% Grass cover, Good	1S, 3S
0.000	0.000	5.328	0.000	0.000	5.328	Unconnected roofs	1S
0.000	**0.000**	**14.850**	**0.000**	**0.000**	**14.850**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	900.0	0.0600	0.012	0.0	15.0	0.0
2	3R	317.00	309.00	60.0	0.1333	0.013	0.0	30.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TOTAL DEV. AREA Runoff Area=323,424 sf 71.76% Impervious Runoff Depth>2.37"
Flow Length=1,050' Tc=19.8 min CN=91 Runoff=14.49 cfs 1.464 af

Subcatchment 3S: EX.UNDEVELOPED Runoff Area=323,424 sf 0.00% Impervious Runoff Depth>1.12"
Flow Length=970' Tc=18.2 min CN=74 Runoff=7.19 cfs 0.692 af

Reach 3R: 30" OUTLET Avg. Flow Depth=0.31' Max Vel=14.16 fps Inflow=5.08 cfs 0.541 af
30.0" Round Pipe n=0.013 L=60.0' S=0.1333 '/' Capacity=149.77 cfs Outflow=5.07 cfs 0.541 af

Pond 2P: DET. BASIN Peak Elev=318.67' Storage=19,927 cf Inflow=14.49 cfs 1.464 af
Discarded=0.93 cfs 0.793 af Primary=5.08 cfs 0.541 af Outflow=6.01 cfs 1.334 af

Total Runoff Area = 14.850 ac Runoff Volume = 2.156 af Average Runoff Depth = 1.74"
64.12% Pervious = 9.522 ac 35.88% Impervious = 5.328 ac

Summary for Subcatchment 1S: TOTAL DEV. AREA

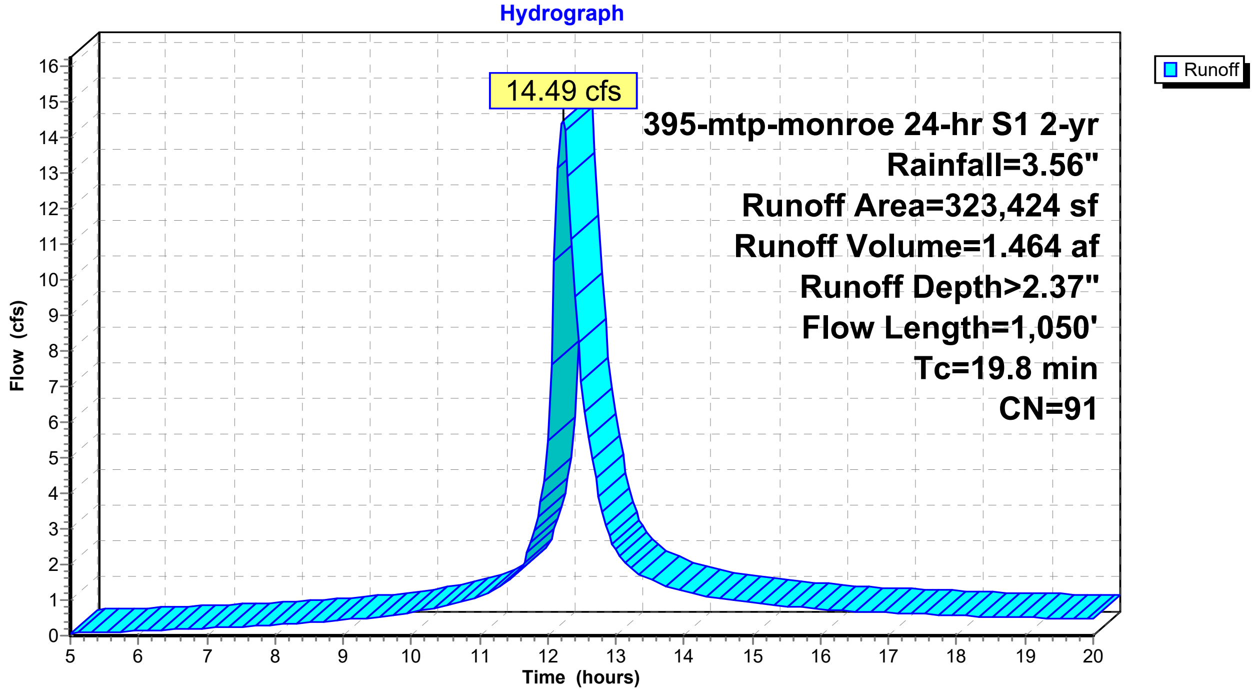
Runoff = 14.49 cfs @ 12.22 hrs, Volume= 1.464 af, Depth> 2.37"
Routed to Pond 2P : DET. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 2-yr Rainfall=3.56"

Area (sf)	CN	Description
232,075	98	Unconnected roofs, HSG C
91,349	74	>75% Grass cover, Good, HSG C
323,424	91	Weighted Average
91,349		28.24% Pervious Area
232,075		71.76% Impervious Area
232,075		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	150	0.0200	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
1.1	900	0.0600	13.97	17.14	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
19.8	1,050	Total			

Subcatchment 1S: TOTAL DEV. AREA



Summary for Subcatchment 3S: EX.UNDEVELOPED

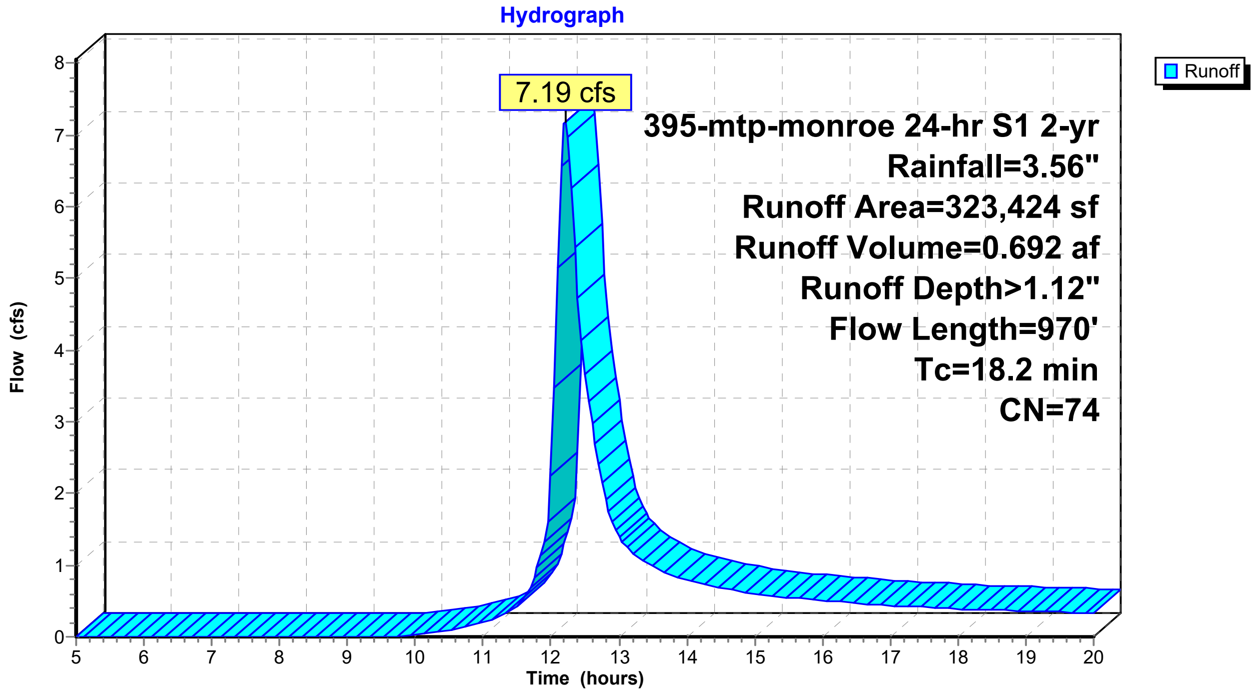
Runoff = 7.19 cfs @ 12.21 hrs, Volume= 0.692 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 2-yr Rainfall=3.56"

Area (sf)	CN	Description
323,424	74	>75% Grass cover, Good, HSG C
323,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.0700	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
6.9	820	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.2	970	Total			

Subcatchment 3S: EX.UNDEVELOPED



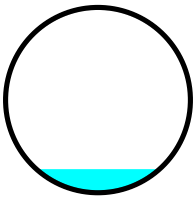
Summary for Reach 3R: 30" OUTLET

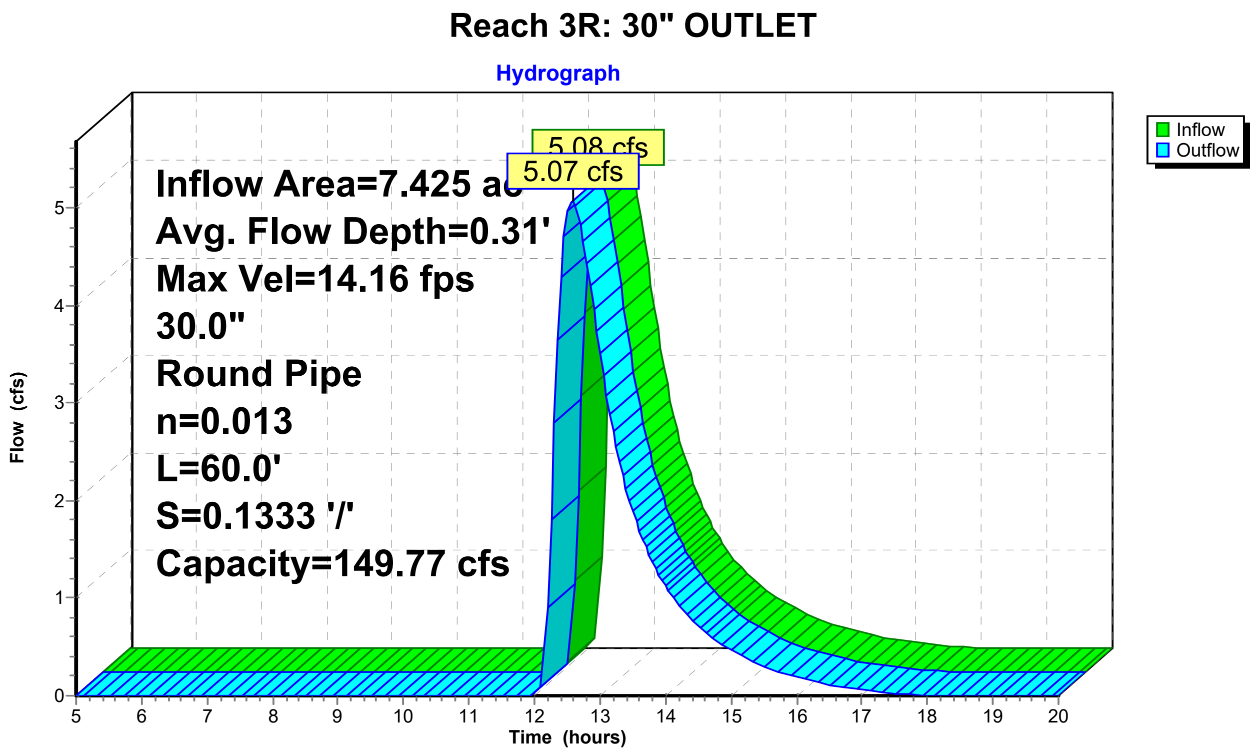
Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth = 0.87" for 2-yr event
Inflow = 5.08 cfs @ 12.57 hrs, Volume= 0.541 af
Outflow = 5.07 cfs @ 12.58 hrs, Volume= 0.541 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.16 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.15 fps, Avg. Travel Time= 0.1 min

Peak Storage= 21 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.31' , Surface Width= 1.66'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 149.77 cfs

30.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.1333 '/'
Inlet Invert= 317.00', Outlet Invert= 309.00'





Summary for Pond 2P: DET. BASIN

Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth > 2.37" for 2-yr event
Inflow = 14.49 cfs @ 12.22 hrs, Volume= 1.464 af
Outflow = 6.01 cfs @ 12.57 hrs, Volume= 1.334 af, Atten= 59%, Lag= 21.2 min
Discarded = 0.93 cfs @ 12.57 hrs, Volume= 0.793 af
Primary = 5.08 cfs @ 12.57 hrs, Volume= 0.541 af
Routed to Reach 3R : 30" OUTLET

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 318.67' @ 12.57 hrs Surf.Area= 13,392 sf Storage= 19,927 cf

Plug-Flow detention time= 81.5 min calculated for 1.329 af (91% of inflow)
Center-of-Mass det. time= 49.3 min (826.6 - 777.2)

Volume	Invert	Avail.Storage	Storage Description
#1	317.00'	38,934 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

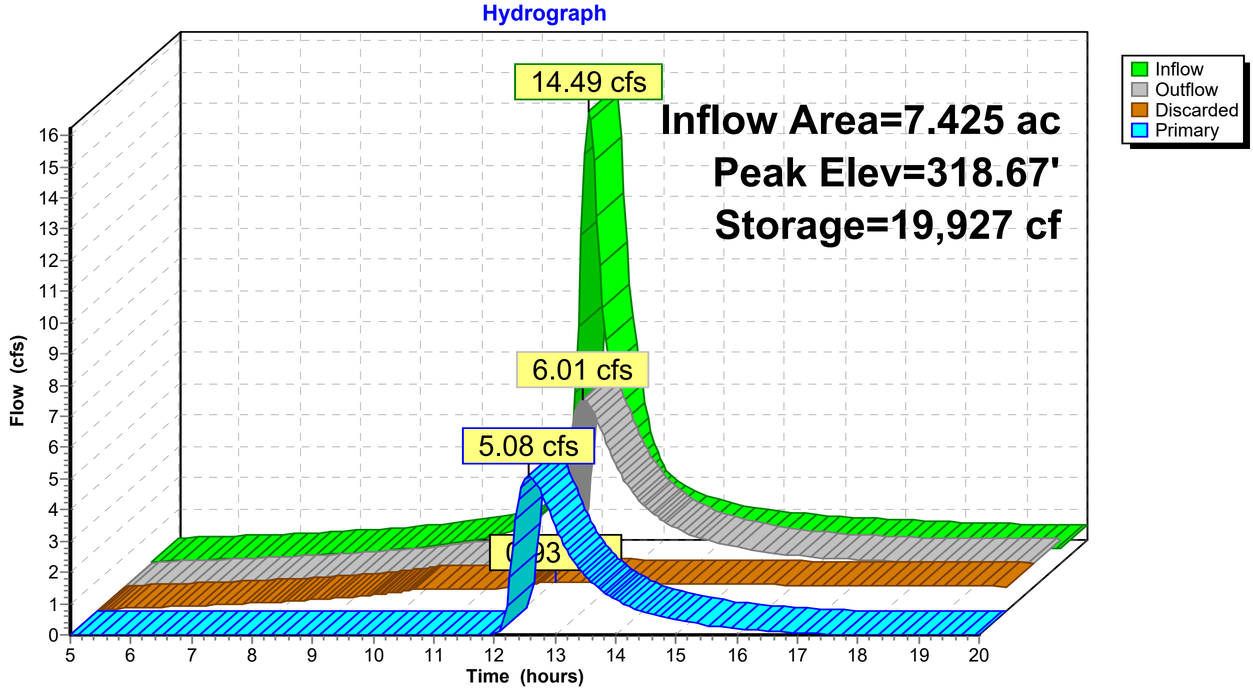
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
317.00	10,016	441.0	0	0	10,016
318.00	12,508	478.0	11,239	11,239	12,761
320.00	15,232	482.0	27,695	38,934	13,768

Device	Routing	Invert	Outlet Devices
#1	Primary	317.70'	**24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 1	317.00'	**30.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	317.00'	**3.000 in/hr Exfiltration over Surface area**
#4	Primary	319.20'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.93 cfs @ 12.57 hrs HW=318.67' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.93 cfs)

Primary OutFlow Max=5.06 cfs @ 12.57 hrs HW=318.67' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 5.06 cfs @ 3.35 fps)
│ └─**2=Orifice/Grate** (Passes 5.06 cfs of 15.33 cfs potential flow)
└─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: DET. BASIN



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TOTAL DEV. AREA Runoff Area=323,424 sf 71.76% Impervious Runoff Depth>4.11"
Flow Length=1,050' Tc=19.8 min CN=91 Runoff=23.06 cfs 2.542 af

Subcatchment 3S: EX.UNDEVELOPED Runoff Area=323,424 sf 0.00% Impervious Runoff Depth>2.51"
Flow Length=970' Tc=18.2 min CN=74 Runoff=15.55 cfs 1.554 af

Reach 3R: 30" OUTLET Avg. Flow Depth=0.51' Max Vel=18.91 fps Inflow=13.50 cfs 1.381 af
30.0" Round Pipe n=0.013 L=60.0' S=0.1333 '/' Capacity=149.77 cfs Outflow=13.50 cfs 1.381 af

Pond 2P: DET. BASIN Peak Elev=319.33' Storage=29,070 cf Inflow=23.06 cfs 2.542 af
Discarded=0.99 cfs 0.955 af Primary=13.50 cfs 1.381 af Outflow=14.49 cfs 2.335 af

Total Runoff Area = 14.850 ac Runoff Volume = 4.096 af Average Runoff Depth = 3.31"
64.12% Pervious = 9.522 ac 35.88% Impervious = 5.328 ac

Summary for Subcatchment 1S: TOTAL DEV. AREA

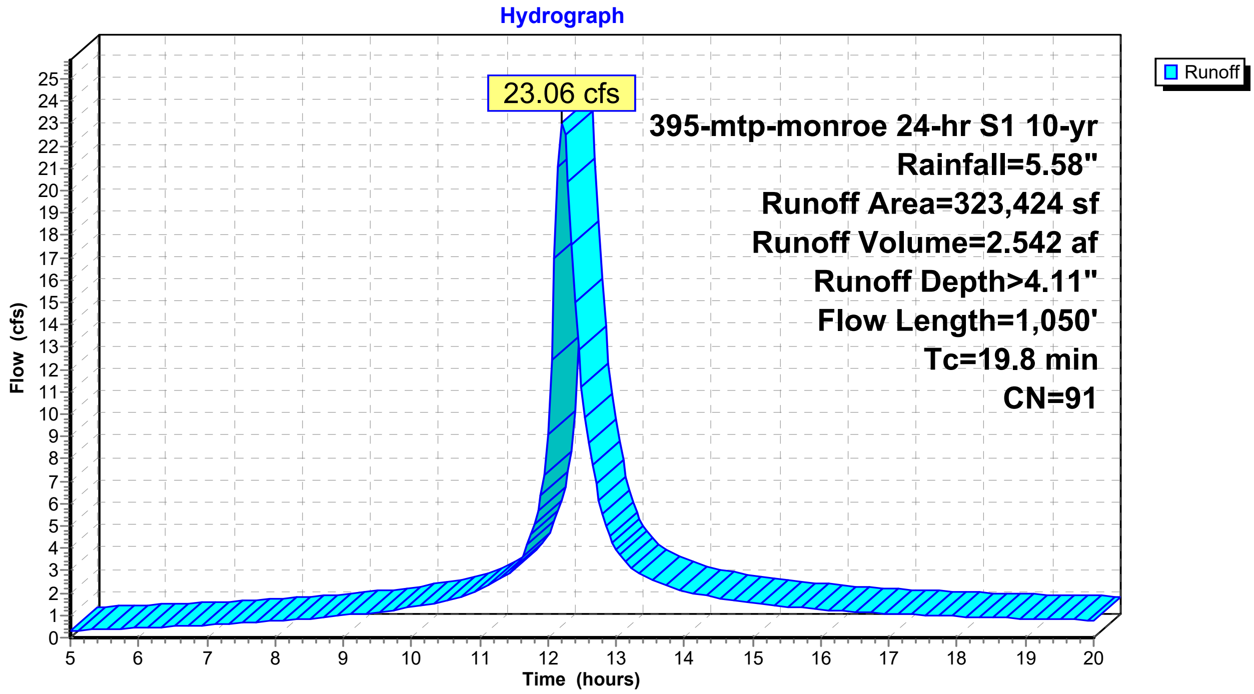
Runoff = 23.06 cfs @ 12.22 hrs, Volume= 2.542 af, Depth> 4.11"
Routed to Pond 2P : DET. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 10-yr Rainfall=5.58"

Area (sf)	CN	Description
232,075	98	Unconnected roofs, HSG C
91,349	74	>75% Grass cover, Good, HSG C
323,424	91	Weighted Average
91,349		28.24% Pervious Area
232,075		71.76% Impervious Area
232,075		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	150	0.0200	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
1.1	900	0.0600	13.97	17.14	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
19.8	1,050	Total			

Subcatchment 1S: TOTAL DEV. AREA



Summary for Subcatchment 3S: EX.UNDEVELOPED

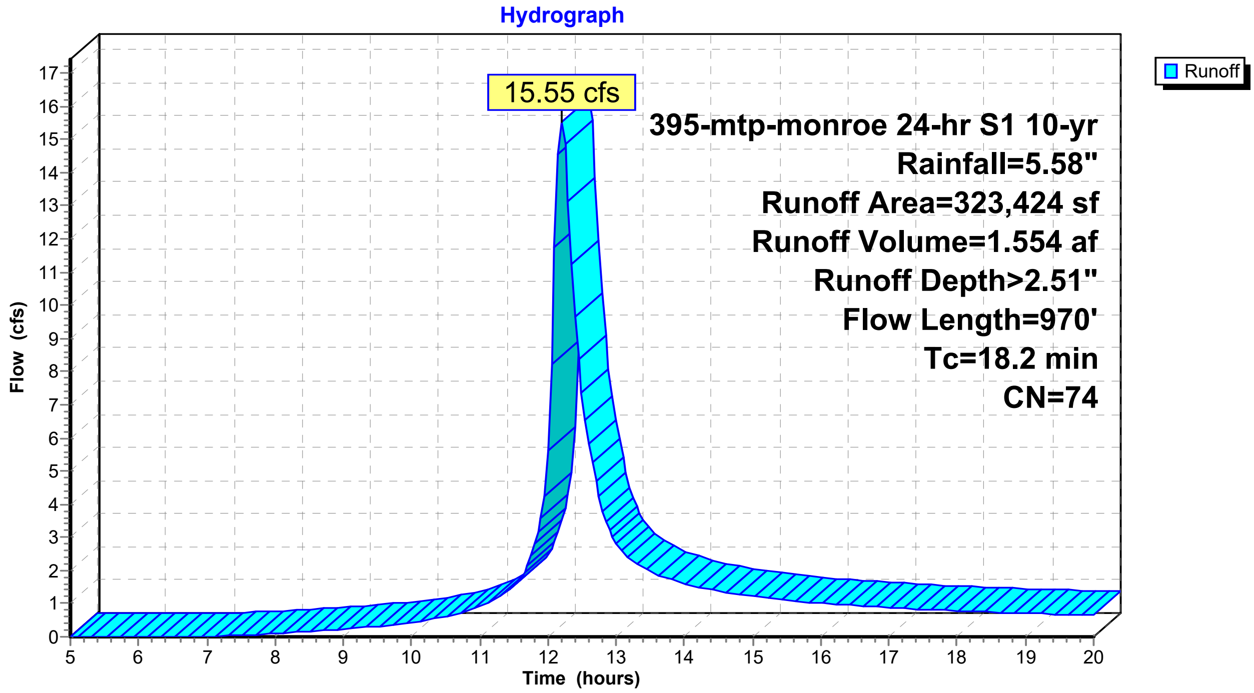
Runoff = 15.55 cfs @ 12.20 hrs, Volume= 1.554 af, Depth> 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 10-yr Rainfall=5.58"

Area (sf)	CN	Description
323,424	74	>75% Grass cover, Good, HSG C
323,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.0700	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
6.9	820	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.2	970	Total			

Subcatchment 3S: EX.UNDEVELOPED



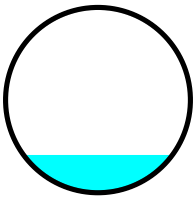
Summary for Reach 3R: 30" OUTLET

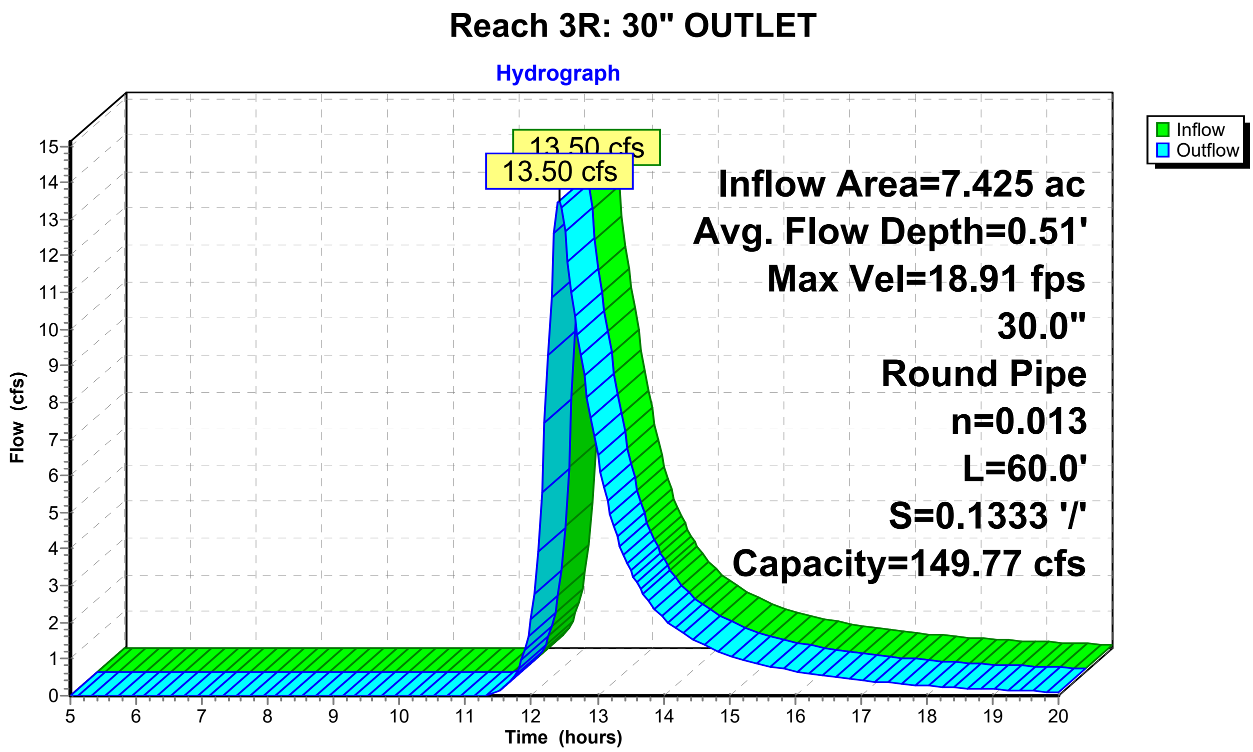
Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth > 2.23" for 10-yr event
Inflow = 13.50 cfs @ 12.42 hrs, Volume= 1.381 af
Outflow = 13.50 cfs @ 12.42 hrs, Volume= 1.381 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 18.91 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 8.66 fps, Avg. Travel Time= 0.1 min

Peak Storage= 43 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.51' , Surface Width= 2.01'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 149.77 cfs

30.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.1333 '/'
Inlet Invert= 317.00', Outlet Invert= 309.00'





Summary for Pond 2P: DET. BASIN

Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth > 4.11" for 10-yr event
Inflow = 23.06 cfs @ 12.22 hrs, Volume= 2.542 af
Outflow = 14.49 cfs @ 12.42 hrs, Volume= 2.335 af, Atten= 37%, Lag= 12.0 min
Discarded = 0.99 cfs @ 12.42 hrs, Volume= 0.955 af
Primary = 13.50 cfs @ 12.42 hrs, Volume= 1.381 af
Routed to Reach 3R : 30" OUTLET

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 319.33' @ 12.42 hrs Surf.Area= 14,292 sf Storage= 29,070 cf

Plug-Flow detention time= 66.2 min calculated for 2.327 af (92% of inflow)
Center-of-Mass det. time= 35.3 min (799.6 - 764.3)

Volume	Invert	Avail.Storage	Storage Description
#1	317.00'	38,934 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

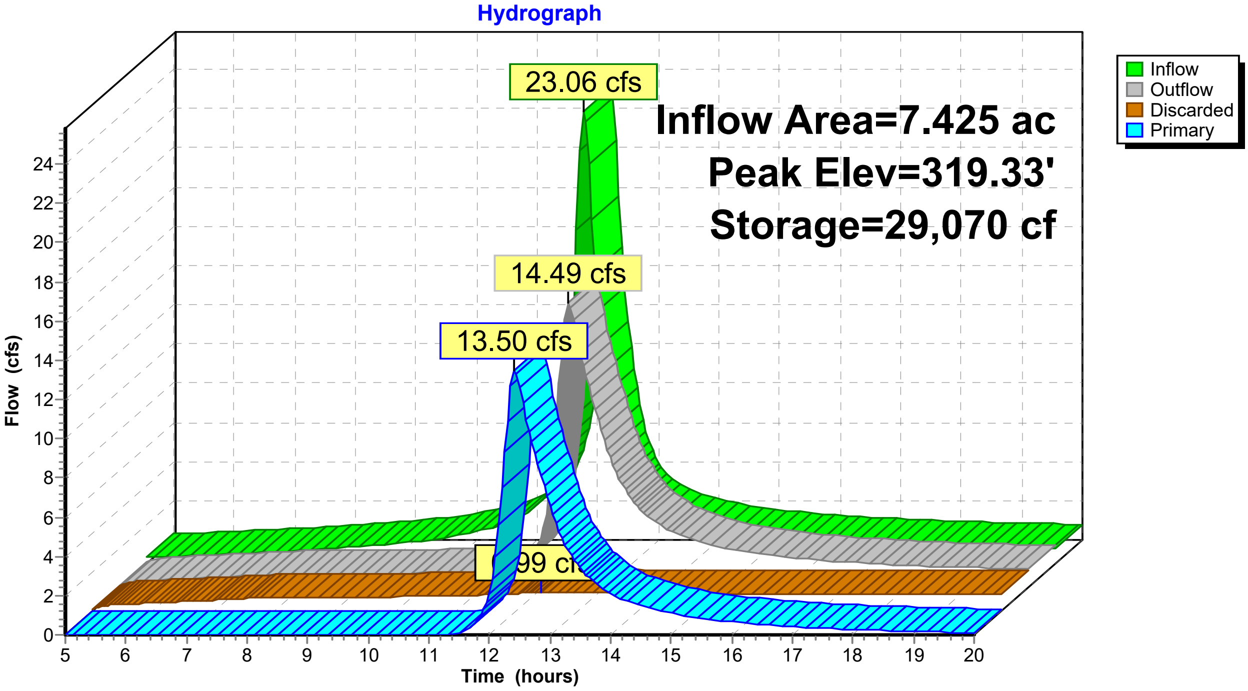
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
317.00	10,016	441.0	0	0	10,016
318.00	12,508	478.0	11,239	11,239	12,761
320.00	15,232	482.0	27,695	38,934	13,768

Device	Routing	Invert	Outlet Devices
#1	Primary	317.70'	**24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 1	317.00'	**30.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	317.00'	**3.000 in/hr Exfiltration over Surface area**
#4	Primary	319.20'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.99 cfs @ 12.42 hrs HW=319.33' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.99 cfs)

Primary OutFlow Max=13.39 cfs @ 12.42 hrs HW=319.33' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 11.90 cfs @ 4.34 fps)
│ └─**2=Orifice/Grate** (Passes 11.90 cfs of 24.73 cfs potential flow)
└─**4=Sharp-Crested Rectangular Weir** (Weir Controls 1.49 cfs @ 1.17 fps)

Pond 2P: DET. BASIN



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TOTAL DEV. AREA Runoff Area=323,424 sf 71.76% Impervious Runoff Depth>5.20"
Flow Length=1,050' Tc=19.8 min CN=91 Runoff=28.26 cfs 3.220 af

Subcatchment 3S: EX.UNDEVELOPED Runoff Area=323,424 sf 0.00% Impervious Runoff Depth>3.48"
Flow Length=970' Tc=18.2 min CN=74 Runoff=21.02 cfs 2.155 af

Reach 3R: 30" OUTLET Avg. Flow Depth=0.62' Max Vel=21.28 fps Inflow=20.23 cfs 1.974 af
30.0" Round Pipe n=0.013 L=60.0' S=0.1333 '/' Capacity=149.77 cfs Outflow=20.20 cfs 1.974 af

Pond 2P: DET. BASIN Peak Elev=319.54' Storage=32,009 cf Inflow=28.26 cfs 3.220 af
Discarded=1.01 cfs 1.014 af Primary=20.23 cfs 1.974 af Outflow=21.24 cfs 2.988 af

Total Runoff Area = 14.850 ac Runoff Volume = 5.375 af Average Runoff Depth = 4.34"
64.12% Pervious = 9.522 ac 35.88% Impervious = 5.328 ac

Summary for Subcatchment 1S: TOTAL DEV. AREA

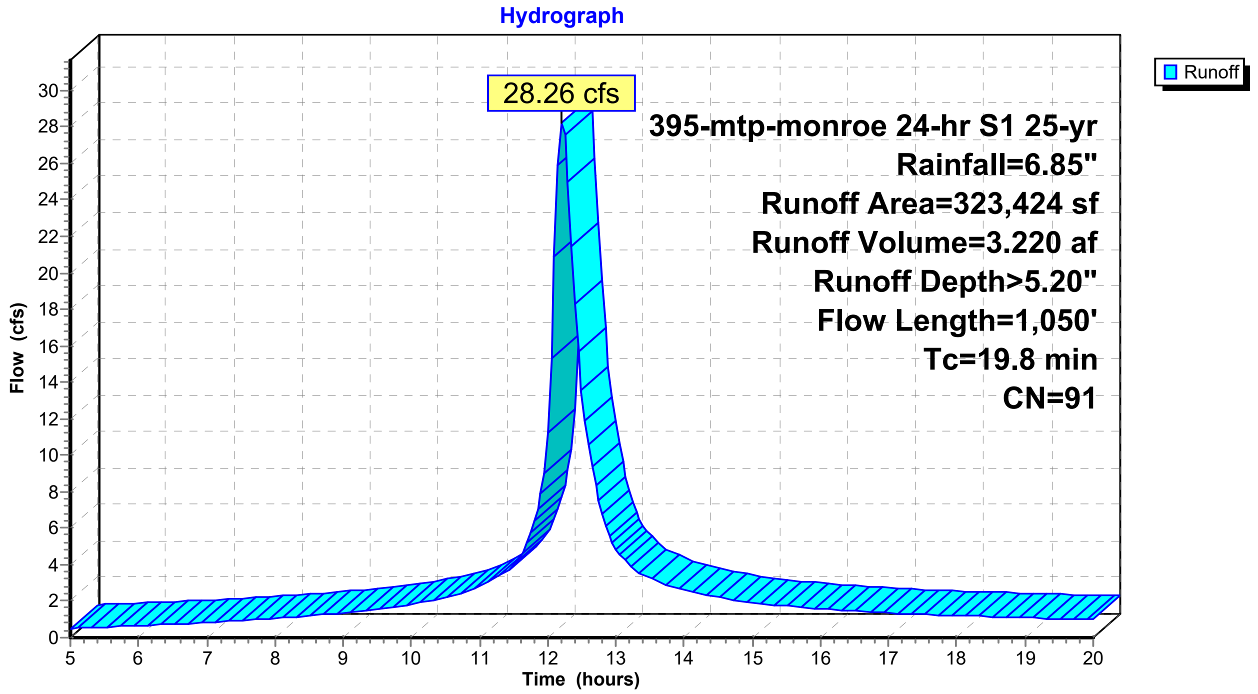
Runoff = 28.26 cfs @ 12.22 hrs, Volume= 3.220 af, Depth> 5.20"
Routed to Pond 2P : DET. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 25-yr Rainfall=6.85"

Area (sf)	CN	Description
232,075	98	Unconnected roofs, HSG C
91,349	74	>75% Grass cover, Good, HSG C
323,424	91	Weighted Average
91,349		28.24% Pervious Area
232,075		71.76% Impervious Area
232,075		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	150	0.0200	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
1.1	900	0.0600	13.97	17.14	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
19.8	1,050	Total			

Subcatchment 1S: TOTAL DEV. AREA



Summary for Subcatchment 3S: EX.UNDEVELOPED

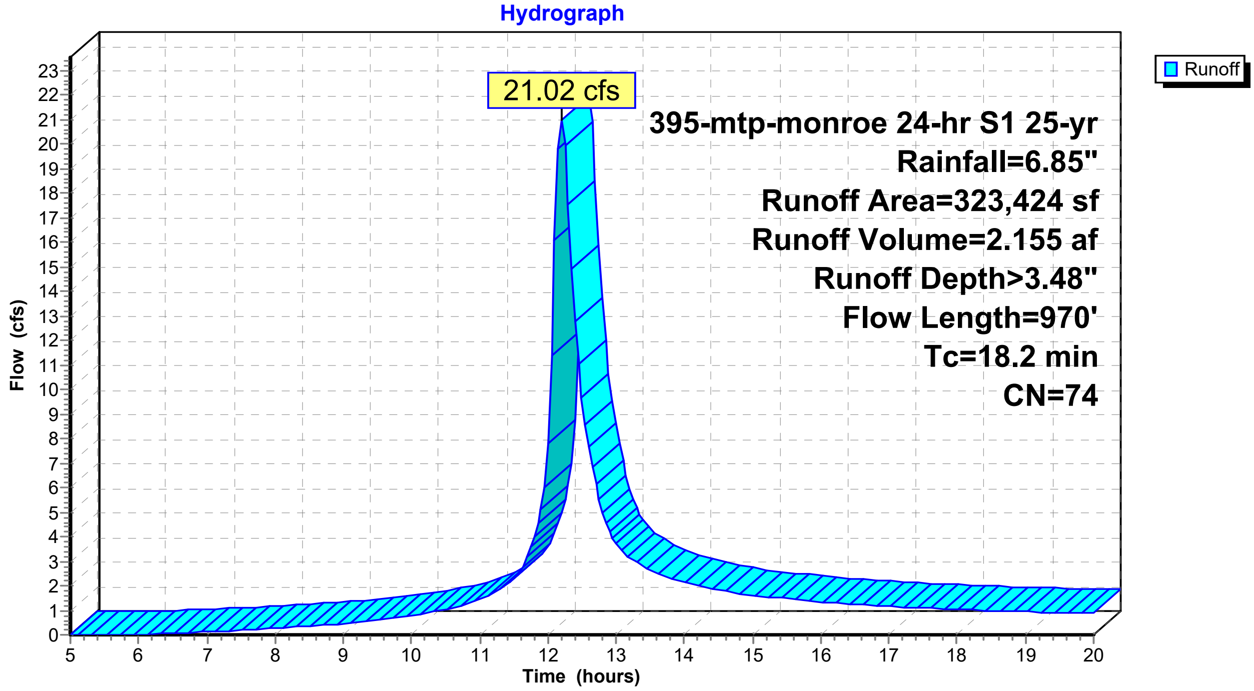
Runoff = 21.02 cfs @ 12.20 hrs, Volume= 2.155 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 25-yr Rainfall=6.85"

Area (sf)	CN	Description
323,424	74	>75% Grass cover, Good, HSG C
323,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.0700	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
6.9	820	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.2	970	Total			

Subcatchment 3S: EX.UNDEVELOPED



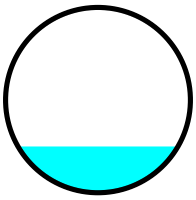
Summary for Reach 3R: 30" OUTLET

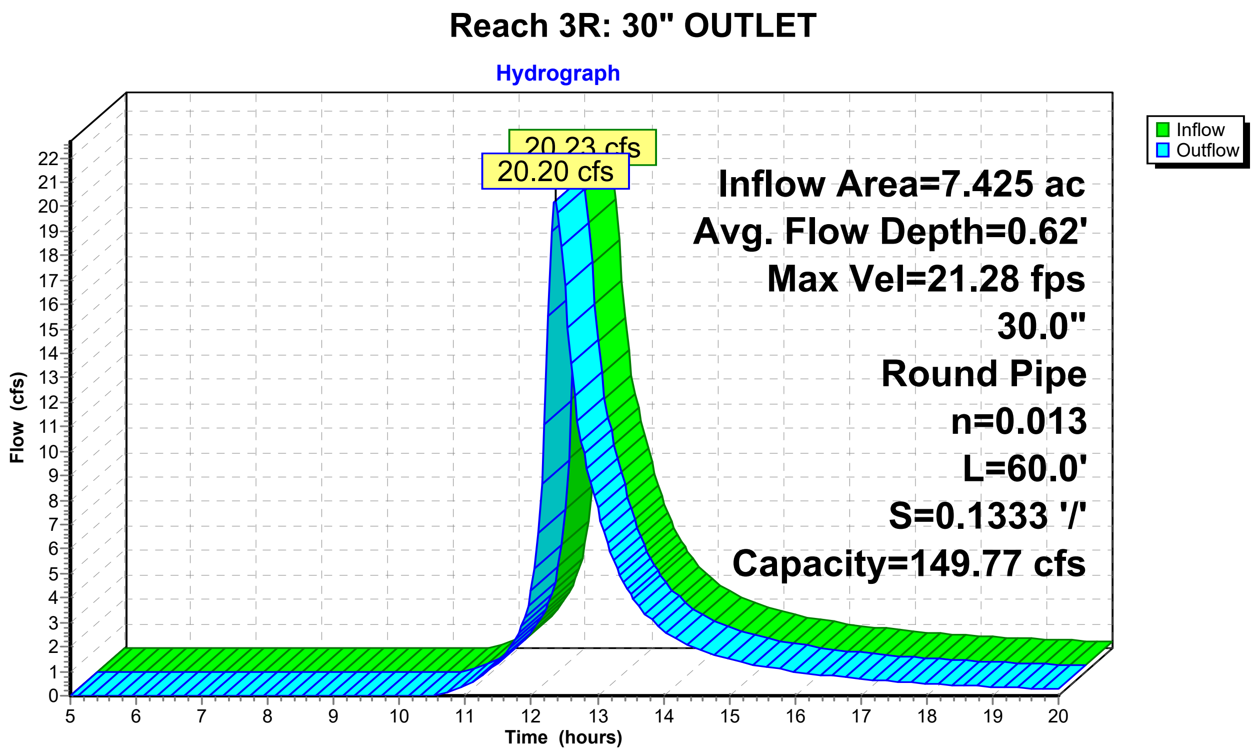
Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth > 3.19" for 25-yr event
Inflow = 20.23 cfs @ 12.36 hrs, Volume= 1.974 af
Outflow = 20.20 cfs @ 12.36 hrs, Volume= 1.974 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 21.28 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 9.62 fps, Avg. Travel Time= 0.1 min

Peak Storage= 57 cf @ 12.36 hrs
Average Depth at Peak Storage= 0.62' , Surface Width= 2.16'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 149.77 cfs

30.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.1333 '/'
Inlet Invert= 317.00', Outlet Invert= 309.00'





Summary for Pond 2P: DET. BASIN

Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth > 5.20" for 25-yr event
Inflow = 28.26 cfs @ 12.22 hrs, Volume= 3.220 af
Outflow = 21.24 cfs @ 12.36 hrs, Volume= 2.988 af, Atten= 25%, Lag= 8.7 min
Discarded = 1.01 cfs @ 12.36 hrs, Volume= 1.014 af
Primary = 20.23 cfs @ 12.36 hrs, Volume= 1.974 af
Routed to Reach 3R : 30" OUTLET

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 319.54' @ 12.36 hrs Surf.Area= 14,575 sf Storage= 32,009 cf

Plug-Flow detention time= 62.6 min calculated for 2.978 af (92% of inflow)
Center-of-Mass det. time= 34.5 min (794.1 - 759.7)

Volume	Invert	Avail.Storage	Storage Description
#1	317.00'	38,934 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

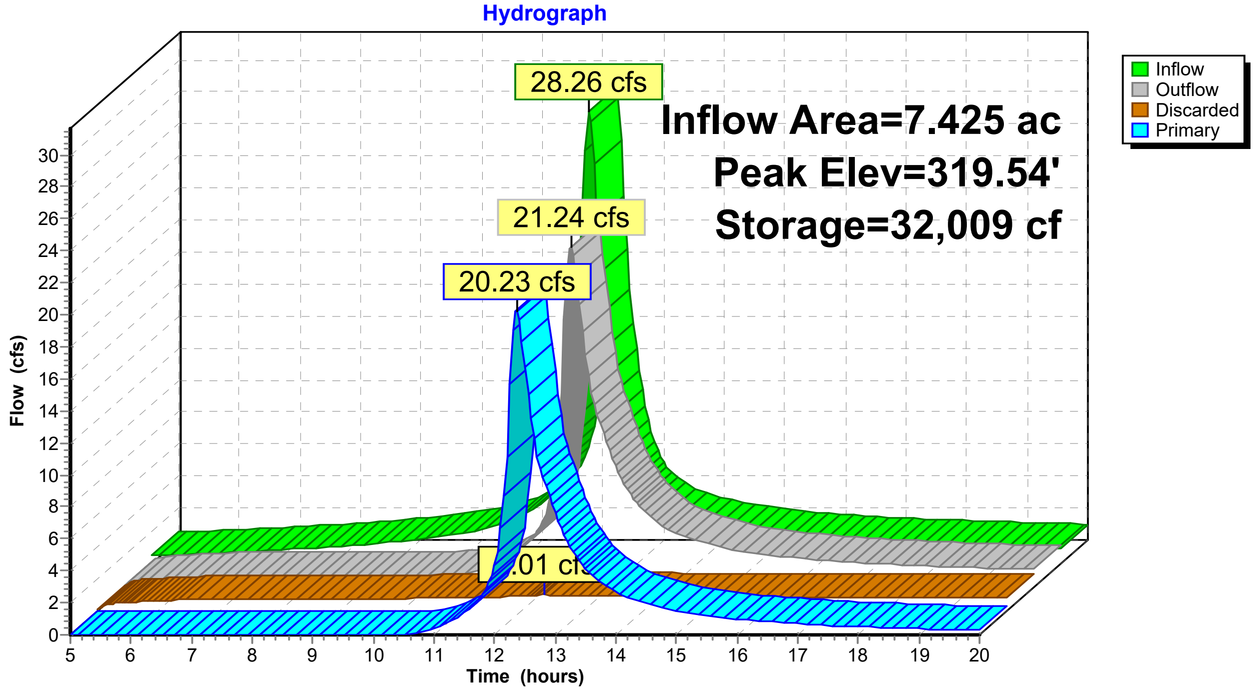
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
317.00	10,016	441.0	0	0	10,016
318.00	12,508	478.0	11,239	11,239	12,761
320.00	15,232	482.0	27,695	38,934	13,768

Device	Routing	Invert	Outlet Devices
#1	Primary	317.70'	**24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 1	317.00'	**30.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	317.00'	**3.000 in/hr Exfiltration over Surface area**
#4	Primary	319.20'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=1.01 cfs @ 12.36 hrs HW=319.53' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.01 cfs)

Primary OutFlow Max=20.10 cfs @ 12.36 hrs HW=319.53' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 13.89 cfs @ 4.61 fps)
│ └─**2=Orifice/Grate** (Passes 13.89 cfs of 26.76 cfs potential flow)
└─**4=Sharp-Crested Rectangular Weir** (Weir Controls 6.21 cfs @ 1.88 fps)

Pond 2P: DET. BASIN



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TOTAL DEV. AREA Runoff Area=323,424 sf 71.76% Impervious Runoff Depth>6.87"
Flow Length=1,050' Tc=19.8 min CN=91 Runoff=36.13 cfs 4.252 af

Subcatchment 3S: EX.UNDEVELOPED Runoff Area=323,424 sf 0.00% Impervious Runoff Depth>5.05"
Flow Length=970' Tc=18.2 min CN=74 Runoff=29.50 cfs 3.125 af

Reach 3R: 30" OUTLET Avg. Flow Depth=0.74' Max Vel=23.52 fps Inflow=28.92 cfs 2.934 af
30.0" Round Pipe n=0.013 L=60.0' S=0.1333 '/' Capacity=149.77 cfs Outflow=28.80 cfs 2.934 af

Pond 2P: DET. BASIN Peak Elev=319.76' Storage=35,253 cf Inflow=36.13 cfs 4.252 af
Discarded=1.03 cfs 1.060 af Primary=28.92 cfs 2.934 af Outflow=29.95 cfs 3.994 af

Total Runoff Area = 14.850 ac Runoff Volume = 7.377 af Average Runoff Depth = 5.96"
64.12% Pervious = 9.522 ac 35.88% Impervious = 5.328 ac

Summary for Subcatchment 1S: TOTAL DEV. AREA

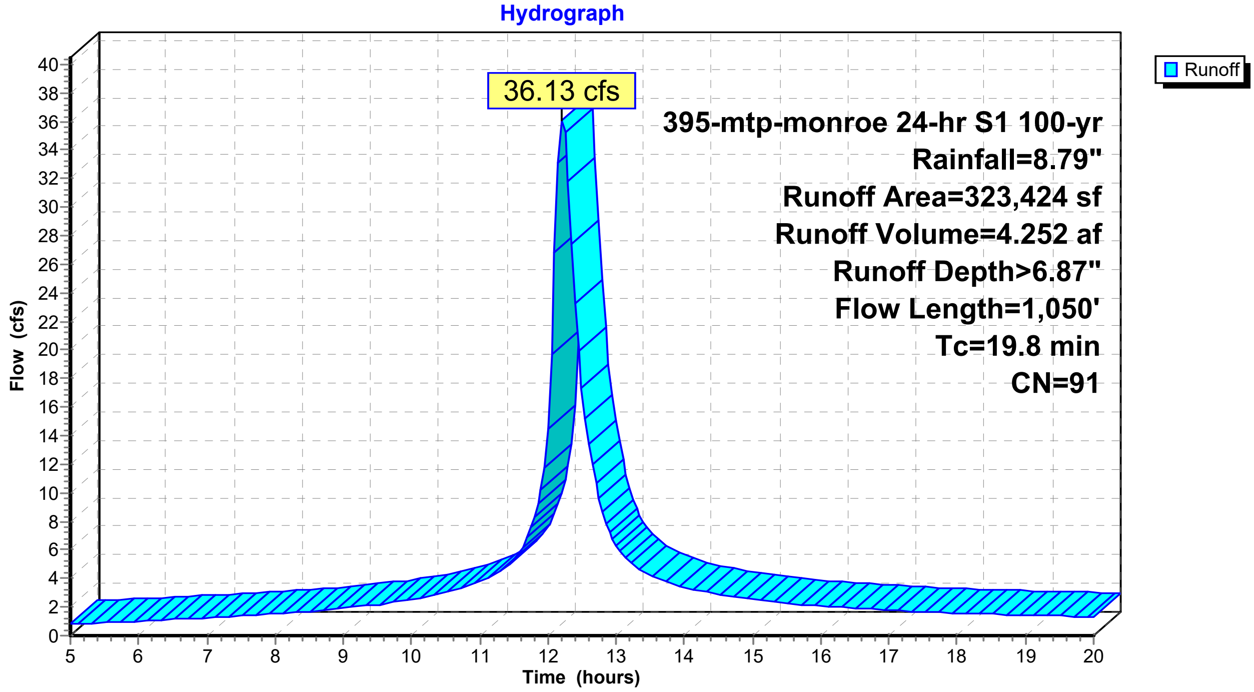
Runoff = 36.13 cfs @ 12.21 hrs, Volume= 4.252 af, Depth> 6.87"
Routed to Pond 2P : DET. BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 100-yr Rainfall=8.79"

Area (sf)	CN	Description
232,075	98	Unconnected roofs, HSG C
91,349	74	>75% Grass cover, Good, HSG C
323,424	91	Weighted Average
91,349		28.24% Pervious Area
232,075		71.76% Impervious Area
232,075		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	150	0.0200	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
1.1	900	0.0600	13.97	17.14	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
19.8	1,050	Total			

Subcatchment 1S: TOTAL DEV. AREA



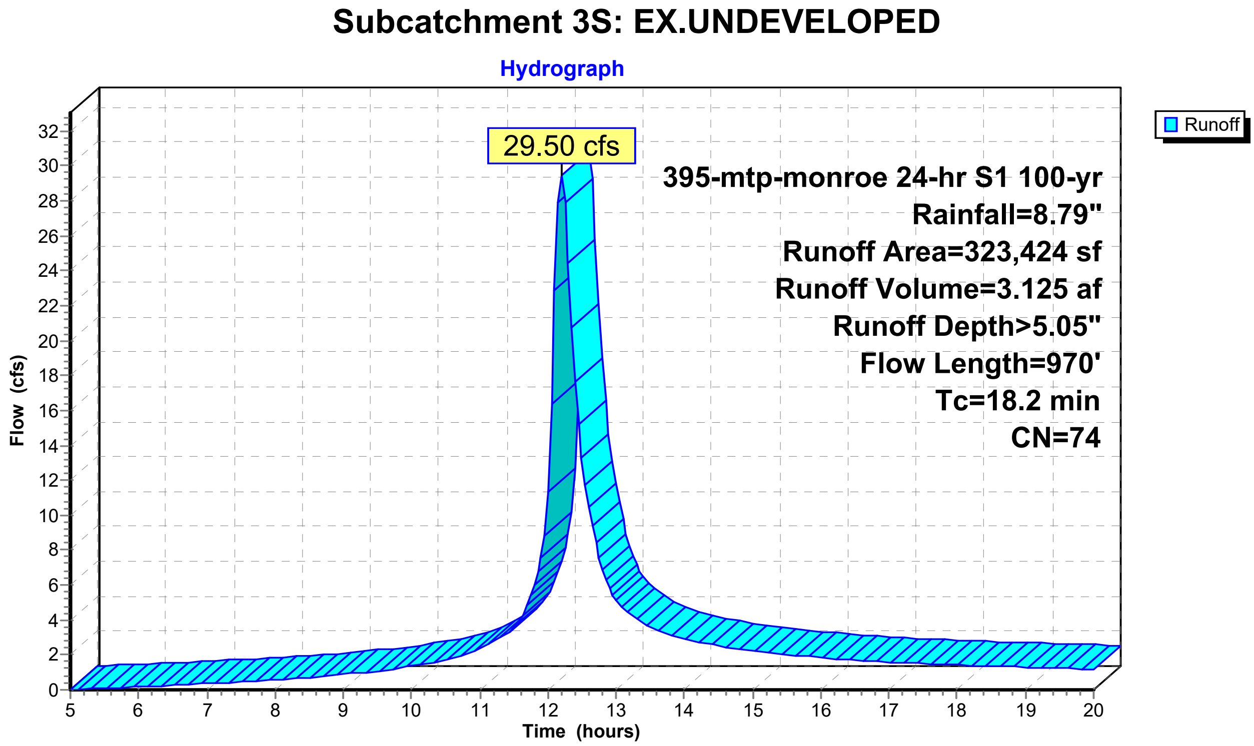
Summary for Subcatchment 3S: EX.UNDEVELOPED

Runoff = 29.50 cfs @ 12.20 hrs, Volume= 3.125 af, Depth> 5.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
395-mtp-monroe 24-hr S1 100-yr Rainfall=8.79"

Area (sf)	CN	Description
323,424	74	>75% Grass cover, Good, HSG C
323,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.0700	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.58"
6.9	820	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
18.2	970	Total			



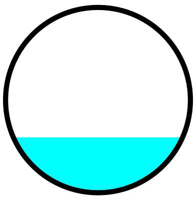
Summary for Reach 3R: 30" OUTLET

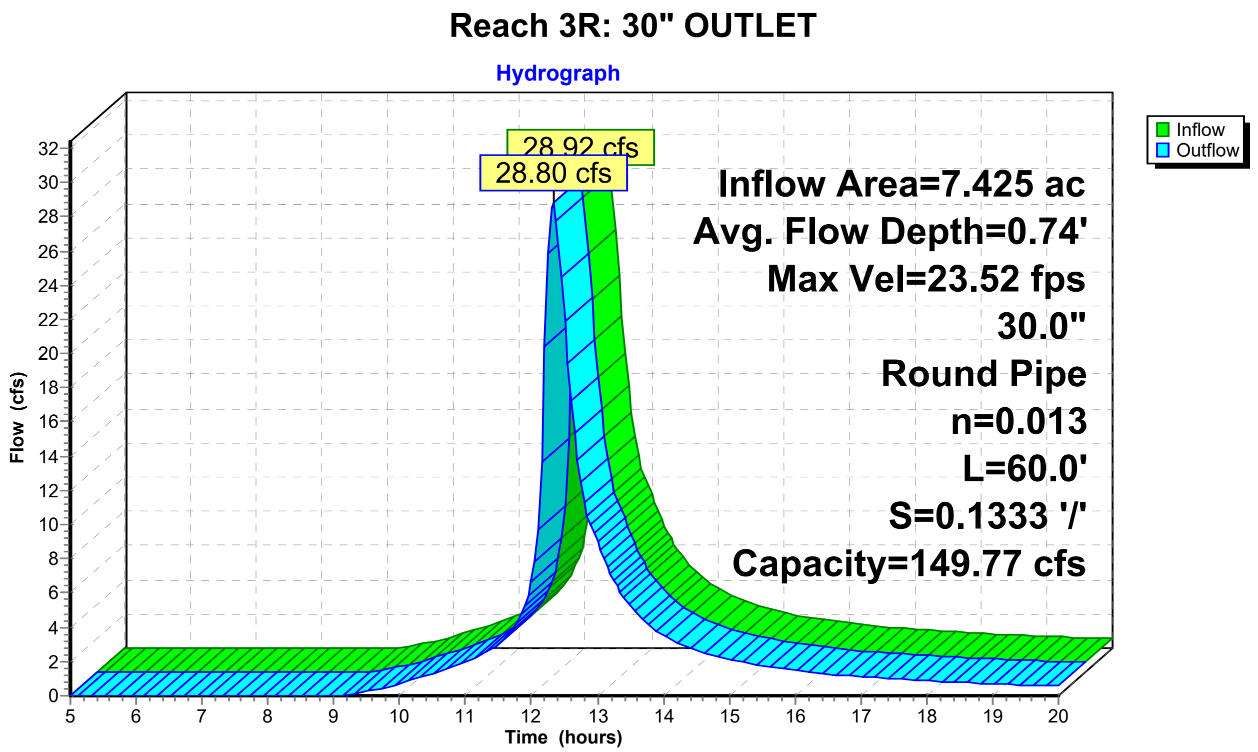
Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth > 4.74" for 100-yr event
Inflow = 28.92 cfs @ 12.32 hrs, Volume= 2.934 af
Outflow = 28.80 cfs @ 12.33 hrs, Volume= 2.934 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 23.52 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 10.58 fps, Avg. Travel Time= 0.1 min

Peak Storage= 73 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.74' , Surface Width= 2.29'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 149.77 cfs

30.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.1333 '/'
Inlet Invert= 317.00', Outlet Invert= 309.00'





Summary for Pond 2P: DET. BASIN

Inflow Area = 7.425 ac, 71.76% Impervious, Inflow Depth > 6.87" for 100-yr event
Inflow = 36.13 cfs @ 12.21 hrs, Volume= 4.252 af
Outflow = 29.95 cfs @ 12.32 hrs, Volume= 3.994 af, Atten= 17%, Lag= 6.6 min
Discarded = 1.03 cfs @ 12.32 hrs, Volume= 1.060 af
Primary = 28.92 cfs @ 12.32 hrs, Volume= 2.934 af
Routed to Reach 3R : 30" OUTLET

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 319.76' @ 12.32 hrs Surf.Area= 14,885 sf Storage= 35,253 cf

Plug-Flow detention time= 59.0 min calculated for 3.993 af (94% of inflow)
Center-of-Mass det. time= 34.2 min (789.2 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1	317.00'	38,934 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

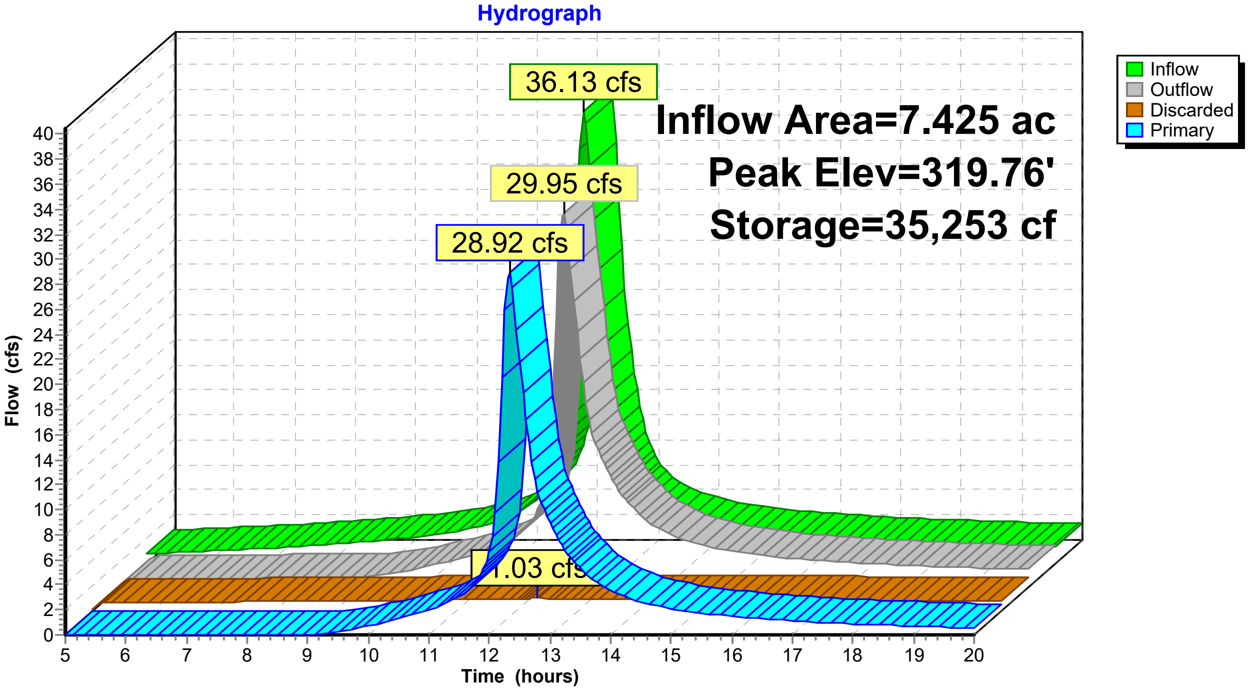
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
317.00	10,016	441.0	0	0	10,016
318.00	12,508	478.0	11,239	11,239	12,761
320.00	15,232	482.0	27,695	38,934	13,768

Device	Routing	Invert	Outlet Devices
#1	Primary	317.70'	**24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 1	317.00'	**30.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	317.00'	**3.000 in/hr Exfiltration over Surface area**
#4	Primary	319.20'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=1.03 cfs @ 12.32 hrs HW=319.75' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.03 cfs)

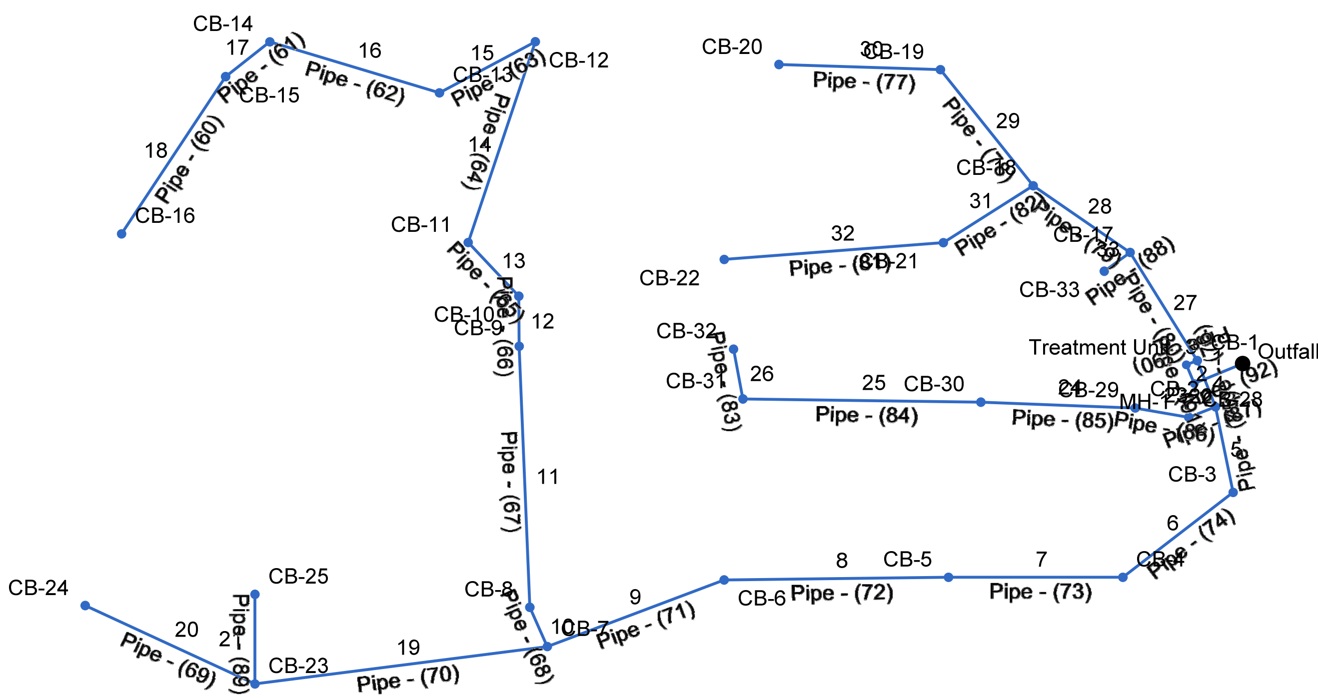
Primary OutFlow Max=28.59 cfs @ 12.32 hrs HW=319.75' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 15.48 cfs @ 4.93 fps)
│ └─**2=Orifice/Grate** (Passes 15.48 cfs of 28.92 cfs potential flow)
└─**4=Sharp-Crested Rectangular Weir** (Weir Controls 13.10 cfs @ 2.42 fps)

Pond 2P: DET. BASIN



ADDENDUM #3
HYDRAULIC ANALYSIS

CHURCH HILL FARM AT DEEP BROOK



Project File: pipe-network.stm	Number of lines: 33	Date: 1/20/2023

Storm Sewers v2022.00

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure Shape	Structure Length (ft)	Structure Width (ft)	Line Out Size (in)	Line Out Shape	Line Out Invert (ft)	Line In Size (in)	Line In Shape	Line In Invert (ft)
1	MH-1	Manhole	328.43	Cir	4.00	4.00	36	Cir	318.50	36	Cir	321.50
2	Treatment Unit	Manhole	328.53	Cir	4.00	4.00	36	Cir	321.60	36	Cir	321.60
3	CB-1	Grate	327.82	Cir	4.50	4.50	36	Cir	321.75	30 24	Cir Cir	322.75 322.75
4	CB-2	Grate	328.24	Cir	4.50	4.50	30	Cir	323.07	30 24	Cir Cir	323.07 324.55
5	CB-3	Grate	329.02	Cir	4.50	4.50	30	Cir	323.68	30	Cir	323.68
6	CB-4	Grate	330.76	Cir	4.50	4.50	30	Cir	324.50	24	Cir	324.50
7	CB-5	Grate	340.90	Cir	4.50	4.50	24	Cir	334.90	24	Cir	335.40
8	CB-6	Grate	353.78	Cir	4.50	4.50	24	Cir	348.63	24	Cir	348.63
9	CB-7	Grate	360.75	Cir	4.50	4.50	24	Cir	355.46	24 18	Cir Cir	355.46 356.71
10	CB-8	Grate	362.45	Cir	4.50	4.50	24	Cir	355.75	18	Cir	355.75
11	CB-9	Grate	361.00	Cir	4.50	4.50	18	Cir	358.00	18	Cir	358.00
12	CB-10	Grate	362.35	Cir	4.50	4.50	18	Cir	358.75	15	Cir	359.00
13	CB-11	Grate	363.60	Cir	4.50	4.50	15	Cir	360.16	15	Cir	360.16
14	CB-12	Grate	367.46	Cir	4.50	4.50	15	Cir	363.90	15	Cir	363.90
15	CB-13	Grate	370.00	Cir	4.50	4.50	15	Cir	368.00	15	Cir	368.00
16	CB-14	Grate	375.00	Cir	4.50	4.50	15	Cir	370.67	15	Cir	370.67
17	CB-15	Grate	376.00	Cir	4.50	4.50	15	Cir	370.86	15	Cir	370.86
18	CB-16	Grate	375.00	Cir	4.50	4.50	15	Cir	371.50			
19	CB-23	Grate	371.13	Cir	4.50	4.50	18	Cir	367.50	18 18	Cir Cir	367.50 367.50
20	CB-24	Grate	376.50	Cir	4.50	4.50	18	Cir	373.00			
21	CB-25	Grate	369.96	Cir	4.50	4.50	18	Cir	368.10			

CHURCH HILL FARM AT DEEP BROOK	Number of Structures: 33	Run Date: 1/20/2023

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)
22	CB-28	Grate	328.68	Cir	4.50	4.50	24	Cir	325.00	24	Cir	325.00
23	CB-29	Grate	329.70	Cir	4.50	4.50	24	Cir	325.27	18	Cir	325.27
24	CB-30	Grate	337.00	Cir	4.50	4.50	18	Cir	332.50	15	Cir	332.75
25	CB-31	Grate	348.00	Cir	4.50	4.50	15	Cir	344.00	15	Cir	344.00
26	CB-32	Grate	348.00	Cir	4.50	4.50	15	Cir	344.50			
27	CB-17	Grate	332.98	Cir	4.50	4.50	24	Cir	327.50	18 15	Cir Cir	328.00 329.00
28	CB-18	Grate	339.52	Cir	4.50	4.50	18	Cir	335.03	15 15	Cir Cir	335.28 335.28
29	CB-19	Grate	347.65	Cir	4.50	4.50	15	Cir	344.00	15	Cir	344.00
30	CB-20	Grate	356.70	Cir	4.50	4.50	15	Cir	353.00			
31	CB-21	Grate	340.56	Cir	4.50	4.50	15	Cir	336.00	15	Cir	336.00
32	CB-22	Grate	350.96	Cir	4.50	4.50	15	Cir	347.00			
33	CB-33	Grate	334.00	Cir	4.50	4.50	15	Cir	330.50			

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 - (92)	34.16	36	Cir	35.484	318.00	318.50	1.409	319.32	320.40	0.82	320.40	End	Manhole
2	Pipe - (91)	32.11	36	Cir	13.850	321.50	321.60	0.722	323.04	323.44	0.78	323.44	1	Manhole
3	Pipe - (90)	32.14	36	Cir	8.000	321.60	321.75	1.875	323.44	323.59	1.75	323.59	2	Grate
4	Pipe - (76)	25.33	30	Cir	33.887	322.75	323.07	0.944	324.13	324.78	1.16	324.78	3	Grate
5	Pipe - (75)	19.37	30	Cir	59.433	323.07	323.68	1.026	324.78	325.17	n/a	325.17 j	4	Grate
6	Pipe - (74)	18.86	30	Cir	94.492	323.68	324.50	0.868	325.17	325.97	n/a	325.97 j	5	Grate
7	Pipe - (73)	18.55	24	Cir	118.239	324.50	334.90	8.796	325.97	336.45	0.39	336.45	6	Grate
8	Pipe - (72)	18.12	24	Cir	152.091	335.40	348.63	8.699	336.45	350.16	0.45	350.16	7	Grate
9	Pipe - (71)	17.57	24	Cir	128.208	348.63	355.46	5.327	350.16	356.97	n/a	356.97 j	8	Grate
10	Pipe - (68)	6.86	24	Cir	29.261	355.46	355.75	0.991	356.97	356.68	n/a	356.68	9	Grate
11	Pipe - (67)	7.03	18	Cir	177.926	355.75	358.00	1.265	356.68	359.03	n/a	359.03	10	Grate
12	Pipe - (66)	5.24	18	Cir	34.108	358.00	358.75	2.199	359.03	359.63	n/a	359.63 j	11	Grate
13	Pipe - (65)	4.11	15	Cir	50.122	359.00	360.16	2.314	359.63	360.98	n/a	360.98	12	Grate
14	Pipe - (64)	3.74	15	Cir	144.060	360.16	363.90	2.596	360.98	364.68	n/a	364.68 j	13	Grate
15	Pipe - (63)	3.34	15	Cir	73.728	363.90	368.00	5.561	364.68	368.74	n/a	368.74 j	14	Grate
16	Pipe - (62)	2.69	15	Cir	120.105	368.00	370.67	2.223	368.74	371.33	n/a	371.33 j	15	Grate
17	Pipe - (61)	2.04	15	Cir	38.176	370.67	370.86	0.498	371.33	371.43	n/a	371.43 j	16	Grate
18	Pipe - (60)	1.45	15	Cir	128.244	370.86	371.50	0.499	371.43	371.98	n/a	371.98 j	17	Grate
19	Pipe - (70)	10.31	18	Cir	199.834	356.71	367.50	5.399	357.36	368.73	n/a	368.73	9	Grate
20	Pipe - (69)	0.25	18	Cir	126.848	367.50	373.00	4.336	368.73	373.18	n/a	373.18 j	19	Grate
21	Pipe - (89)	9.90	18	Cir	61.000	367.50	368.10	0.984	368.73	369.31	n/a	369.31 j	19	Grate
22	Pipe - (87)	7.16	24	Cir	19.446	324.55	325.00	2.314	325.14	325.95	0.32	325.95	4	Grate
23	Pipe - (86)	5.94	24	Cir	36.857	325.00	325.27	0.733	325.95	326.13	n/a	326.13 j	22	Grate
24	Pipe - (85)	4.59	18	Cir	104.720	325.27	332.50	6.904	326.13	333.32	n/a	333.32 j	23	Grate

CHURCH HILL FARM AT DEEP BROOK	Number of lines: 33	Run Date: 1/20/2023

NOTES: Return period = 25 Yrs. ; 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 - (84)	2.23	15	Cir	161.345	332.75	344.00	6.973	333.32	344.60	0.34	344.60	24	Grate
26	Pipe - (83)	2.10	15	Cir	34.461	344.00	344.50	1.451	344.60	345.08	n/a	345.08 j	25	Grate
27	Pipe - (80)	7.59	24	Cir	86.504	322.75	327.50	5.491	323.59	328.48	0.58	328.48	3	Grate
28	Pipe - (79)	6.37	18	Cir	79.960	328.00	335.03	8.792	328.48	336.01	0.60	336.01	27	Grate
29	Pipe - (78)	1.22	15	Cir	100.987	335.28	344.00	8.635	336.01	344.44	n/a	344.44 j	28	Grate
30	Pipe - (77)	0.73	15	Cir	109.526	344.00	353.00	8.217	344.44	353.33	n/a	353.33 j	29	Grate
31	Pipe - (82)	4.99	15	Cir	72.179	335.28	336.00	0.998	336.06	336.90	n/a	336.90	28	Grate
32	Pipe - (81)	2.86	15	Cir	148.991	336.00	347.00	7.383	336.90	347.68	n/a	347.68 j	31	Grate
33	Pipe - (88)	1.05	15	Cir	21.714	329.00	330.50	6.908	329.20	330.90	0.15	330.90	27	Grate

CHURCH HILL FARM AT DEEP BROOK | Number of lines: 33 | Run Date: 1/20/2023

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	MH-1	2.83	0.00	0.00	2.83	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	Treatment Unit	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB-1	0.68	0.00	0.68	0.00	Grate	0.0	0.00	0.12	0.06	2.00	Sag	2.00	0.050	0.020	0.013	1.16	55.22	1.16	55.22	0.0	Off
4	CB-2	0.26	0.00	0.26	0.00	Grate	0.0	0.00	0.04	0.02	2.00	Sag	2.00	0.050	0.020	0.013	1.48	71.23	1.48	71.23	0.0	Off
5	CB-3	1.01	0.00	1.01	0.00	Grate	0.0	0.00	0.16	0.08	2.00	Sag	2.00	0.050	0.020	0.013	1.43	68.34	1.43	68.34	0.0	Off
6	CB-4	0.76	0.00	0.76	0.00	Grate	0.0	0.00	0.11	0.06	2.00	Sag	2.00	0.050	0.020	0.013	1.72	83.13	1.72	83.13	0.0	Off
7	CB-5	0.92	0.00	0.92	0.00	Grate	0.0	0.00	0.14	0.07	2.00	Sag	2.00	0.050	0.020	0.013	1.55	74.53	1.55	74.53	0.0	Off
8	CB-6	1.10	0.00	1.10	0.00	Grate	0.0	0.00	0.16	0.08	2.00	Sag	2.00	0.050	0.020	0.013	1.69	81.28	1.69	81.28	0.0	Off
9	CB-7	1.50	0.00	1.50	0.00	Grate	0.0	0.00	0.24	0.12	2.00	Sag	2.00	0.050	0.020	0.013	1.40	66.92	1.40	66.92	0.0	Off
10	CB-8	0.05	0.00	0.05	0.00	Grate	0.0	0.00	0.01	0.01	2.00	Sag	2.00	0.050	0.020	0.013	0.82	37.95	0.82	37.95	0.0	Off
11	CB-9	2.19	0.00	2.19	0.00	Grate	0.0	0.00	0.30	0.15	2.00	Sag	2.00	0.050	0.020	0.013	1.89	91.66	1.89	91.66	0.0	Off
12	CB-10	1.38	0.00	1.38	0.00	Grate	0.0	0.00	0.21	0.11	2.00	Sag	2.00	0.050	0.020	0.013	1.55	74.53	1.55	74.53	0.0	Off
13	CB-11	0.58	0.00	0.58	0.00	Grate	0.0	0.00	0.08	0.04	2.00	Sag	2.00	0.050	0.020	0.013	1.87	90.35	1.87	90.35	0.0	Off
14	CB-12	0.53	0.00	0.53	0.00	Grate	0.0	0.00	0.08	0.04	2.00	Sag	2.00	0.050	0.020	0.013	1.57	75.67	1.57	75.67	0.0	Off
15	CB-13	0.83	0.00	0.83	0.00	Grate	0.0	0.00	0.14	0.07	2.00	Sag	2.00	0.050	0.020	0.013	1.27	60.48	1.27	60.48	0.0	Off
16	CB-14	0.72	0.00	0.72	0.00	Grate	0.0	0.00	0.10	0.05	2.00	Sag	2.00	0.050	0.020	0.013	1.85	89.25	1.85	89.25	0.0	Off
17	CB-15	0.71	0.00	0.71	0.00	Grate	0.0	0.00	0.08	0.04	2.00	Sag	2.00	0.050	0.020	0.013	2.75	134.69	2.75	134.69	0.0	Off
18	CB-16	1.45	0.00	1.45	0.00	Grate	0.0	0.00	0.24	0.12	2.00	Sag	2.00	0.050	0.020	0.013	1.32	62.89	1.32	62.89	0.0	Off
19	CB-23	1.71	0.00	1.71	0.00	Grate	0.0	0.00	0.16	0.08	2.00	Sag	2.00	0.050	0.020	0.013	4.01	197.59	4.01	197.59	0.0	Off
20	CB-24	0.25	0.00	0.25	0.00	Grate	0.0	0.00	0.11	0.06	2.00	Sag	2.00	0.050	0.020	0.013	0.23	8.54	0.23	8.54	0.0	Off
21	CB-25	9.90	0.00	9.90	0.00	Grate	0.0	0.00	3.68	1.84	2.00	Sag	2.00	0.050	0.020	0.013	0.73	33.66	0.73	33.66	0.0	Off
22	CB-28	1.41	0.00	1.41	0.00	Grate	0.0	0.00	0.16	0.08	2.00	Sag	2.00	0.050	0.020	0.013	2.75	134.69	2.75	134.69	0.0	Off
23	CB-29	1.62	0.00	1.62	0.00	Grate	0.0	0.00	0.16	0.08	2.00	Sag	2.00	0.050	0.020	0.013	3.61	177.71	3.61	177.71	0.0	Off

CHURCH HILL FARM AT DEEP BROOK | Number of lines: 33 | Run Date: 1/20/2023

NOTES: Inlet N-Values = 0.016; Intensity = 40.41 / (Inlet time + 3.80) ^ 0.70; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	CB-30	2.63	0.00	2.63	0.00	Grate	0.0	0.00	0.16	0.08	2.00	Sag	2.00	0.050	0.020	0.013	9.42	467.76	9.42	467.76	0.0	Off
25	CB-31	0.16	0.00	0.16	0.00	Grate	0.0	0.00	0.08	0.04	2.00	Sag	2.00	0.050	0.020	0.013	0.18	6.18	0.18	6.18	0.0	Off
26	CB-32	2.10	0.00	2.10	0.00	Grate	0.0	0.00	0.02	0.01	2.00	Sag	2.00	0.050	0.020	0.013	382.06	19099.92	382.06	19099.92	0.0	Off
27	CB-17	0.40	0.00	0.40	0.00	Grate	0.0	0.00	0.06	0.03	2.00	Sag	2.00	0.050	0.020	0.013	1.57	75.67	1.57	75.67	0.0	Off
28	CB-18	0.55	0.00	0.55	0.00	Grate	0.0	0.00	0.10	0.05	2.00	Sag	2.00	0.050	0.020	0.013	1.10	51.84	1.10	51.84	0.0	Off
29	CB-19	0.57	0.00	0.57	0.00	Grate	0.0	0.00	0.08	0.04	2.00	Sag	2.00	0.050	0.020	0.013	1.83	88.44	1.83	88.44	0.0	Off
30	CB-20	0.73	0.00	0.73	0.00	Grate	0.0	0.00	0.12	0.06	2.00	Sag	2.00	0.050	0.020	0.013	1.32	62.89	1.32	62.89	0.0	Off
31	CB-21	2.40	0.00	2.40	0.00	Grate	0.0	0.00	0.22	0.11	2.00	Sag	2.00	0.050	0.020	0.013	4.16	205.10	4.16	205.10	0.0	Off
32	CB-22	2.86	0.00	2.86	0.00	Grate	0.0	0.00	0.13	0.07	2.00	Sag	2.00	0.050	0.020	0.013	16.84	838.98	16.84	838.98	0.0	Off
33	CB-33	1.05	0.00	1.05	0.00	Grate	0.0	0.00	0.23	0.11	2.00	Sag	2.00	0.050	0.020	0.013	0.78	36.14	0.78	36.14	0.0	Off

CHURCH HILL FARM AT DEEP BROOK | Number of lines: 33 | Run Date: 1/20/2023

NOTES: Inlet N-Values = 0.016; Intensity = 40.41 / (Inlet time + 3.80) ^ 0.70; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

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)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	36	34.16	318.00	319.32	1.32	3.00	11.40	0.82	320.14	0.000	35.484	318.50	320.40	1.90**	4.71	7.25	0.82	321.21	0.000	0.000	n/a	1.00	0.82
2	36	32.11	321.50	323.04	1.54*	3.66	8.78	0.78	323.82	0.000	13.850	321.60	323.44	1.84**	4.53	7.08	0.78	324.22	0.000	0.000	n/a	1.00	0.78
3	36	32.14	321.60	323.44	1.84	4.53	7.09	0.78	324.22	0.000	8.000	321.75	323.59	1.84**	4.54	7.08	0.78	324.37	0.000	0.000	n/a	2.25	1.75
4	30	25.33	322.75	324.13	1.38*	2.77	9.14	0.78	324.90	0.000	33.887	323.07	324.78	1.71**	3.59	7.06	0.78	325.56	0.000	0.000	n/a	1.50	1.16
5	30	19.37	323.07	324.78	1.71	3.05	5.40	0.63	325.41	0.000	59.433	323.68	325.17 j	1.49**	3.05	6.34	0.63	325.80	0.000	0.000	n/a	1.37	n/a
6	30	18.86	323.68	325.17	1.49	3.00	6.18	0.61	325.78	0.000	94.492	324.50	325.97 j	1.47**	3.00	6.28	0.61	326.58	0.000	0.000	n/a	0.99	n/a
7	24	18.55	324.50	325.97	1.47	2.48	7.49	0.78	326.76	0.000	118.239	334.90	336.45	1.55**	2.61	7.10	0.78	337.23	0.000	0.000	n/a	0.50	0.39
8	24	18.12	335.40	336.45	1.05	1.67	10.86	0.77	337.22	0.000	152.091	348.63	350.16	1.53**	2.58	7.02	0.77	350.93	0.000	0.000	n/a	0.59	0.45
9	24	17.57	348.63	350.16	1.53	2.54	6.80	0.74	350.90	0.000	128.208	355.46	356.97 j	1.51**	2.54	6.91	0.74	357.71	0.000	0.000	n/a	2.10	n/a
10	24	6.86	355.46	356.97	1.51	1.43	2.70	0.36	357.33	0.000	29.261	355.75	356.68	0.93**	1.43	4.81	0.36	357.04	0.000	0.000	n/a	0.63	n/a
11	18	7.03	355.75	356.68	0.93	1.15	6.13	0.46	357.14	0.000	177.926	358.00	359.03	1.03**	1.29	5.46	0.46	359.49	0.000	0.000	n/a	0.50	n/a
12	18	5.24	358.00	359.03	1.03	1.08	4.07	0.37	359.39	0.000	34.108	358.75	359.63 j	0.88**	1.08	4.86	0.37	360.00	0.000	0.000	n/a	1.09	0.40
13	15	4.11	359.00	359.63	0.63	0.62	6.62	0.36	359.99	0.000	50.122	360.16	360.98	0.82**	0.85	4.82	0.36	361.34	0.000	0.000	n/a	1.35	n/a
14	15	3.74	360.16	360.98	0.82	0.81	4.39	0.33	361.31	0.000	144.060	363.90	364.68 j	0.78**	0.81	4.64	0.33	365.02	0.000	0.000	n/a	1.50	0.50
15	15	3.34	363.90	364.68	0.78	0.75	4.14	0.31	364.99	0.000	73.728	368.00	368.74 j	0.74**	0.75	4.44	0.31	369.04	0.000	0.000	n/a	1.12	0.34
16	15	2.69	368.00	368.74	0.74	0.65	3.58	0.26	369.00	0.000	120.105	370.67	371.33 j	0.66**	0.65	4.11	0.26	371.59	0.000	0.000	n/a	1.28	0.34
17	15	2.04	370.67	371.33	0.66	0.54	3.13	0.22	371.55	0.000	38.176	370.86	371.43 j	0.57**	0.54	3.76	0.22	371.65	0.000	0.000	n/a	0.55	0.12
18	15	1.45	370.86	371.43	0.57	0.43	2.67	0.18	371.61	0.000	128.244	371.50	371.98 j	0.48**	0.43	3.38	0.18	372.15	0.000	0.000	n/a	1.00	0.18
19	18	10.31	356.71	357.36	0.65*	0.74	14.02	0.68	358.04	0.000	199.834	367.50	368.73	1.23**	1.56	6.62	0.68	369.42	0.000	0.000	n/a	1.50	n/a
20	18	0.25	367.50	368.73	1.23	0.12	0.16	0.06	368.80	0.000	126.848	373.00	373.18 j	0.18**	0.12	2.02	0.06	373.25	0.000	0.000	n/a	1.00	n/a
21	18	9.90	367.50	368.73	1.23	1.53	6.36	0.65	369.38	0.000	61.000	368.10	369.31 j	1.21**	1.53	6.47	0.65	369.96	0.000	0.000	n/a	1.00	n/a

CHURCH HILL FARM AT DEEP BROOK	Number of lines: 33	Run Date: 1/20/2023

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)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
22	24	7.16	324.55	325.14	0.59*	0.78	9.16	0.37	325.51	0.000	19.446	325.00	325.95	0.95**	1.47	4.87	0.37	326.32	0.000	0.000	n/a	0.86	0.32
23	24	5.94	325.00	325.95	0.95	1.29	4.04	0.33	326.28	0.000	36.857	325.27	326.13 j	0.86**	1.29	4.59	0.33	326.46	0.000	0.000	n/a	0.50	0.16
24	18	4.59	325.27	326.13	0.86	0.99	4.37	0.33	326.46	0.000	104.720	332.50	333.32 j	0.82**	0.99	4.63	0.33	333.65	0.000	0.000	n/a	0.50	0.17
25	15	2.23	332.75	333.32	0.57	0.55	4.08	0.23	333.55	0.000	161.345	344.00	344.60	0.60**	0.58	3.86	0.23	344.83	0.000	0.000	n/a	1.48	0.34
26	15	2.10	344.00	344.60	0.60	0.55	3.64	0.22	344.82	0.000	34.461	344.50	345.08 j	0.58**	0.55	3.79	0.22	345.30	0.000	0.000	n/a	1.00	0.22
27	24	7.59	322.75	323.59	0.84	1.25	6.09	0.38	323.97	0.000	86.504	327.50	328.48	0.98**	1.53	4.97	0.38	328.86	0.000	0.000	n/a	1.50	0.58
28	18	6.37	328.00	328.48	0.48	0.49	13.12	0.43	328.91	0.000	79.960	335.03	336.01	0.98**	1.22	5.24	0.43	336.43	0.000	0.000	n/a	1.40	0.60
29	15	1.22	335.28	336.01	0.73	0.38	1.66	0.16	336.17	0.000	100.987	344.00	344.44 j	0.44**	0.38	3.21	0.16	344.60	0.000	0.000	n/a	1.20	n/a
30	15	0.73	344.00	344.44	0.44	0.26	1.91	0.12	344.56	0.000	109.526	353.00	353.33 j	0.33**	0.26	2.77	0.12	353.45	0.000	0.000	n/a	1.00	0.12
31	15	4.99	335.28	336.06	0.78*	0.81	6.18	0.43	336.49	0.000	72.179	336.00	336.90	0.90**	0.95	5.24	0.43	337.33	0.000	0.000	n/a	0.79	n/a
32	15	2.86	336.00	336.90	0.90	0.68	3.01	0.27	337.18	0.000	148.991	347.00	347.68 j	0.68**	0.68	4.20	0.27	347.95	0.000	0.000	n/a	1.00	0.27
33	15	1.05	329.00	329.20	0.20*	0.13	8.10	0.15	329.35	0.000	21.714	330.50	330.90	0.40**	0.34	3.07	0.15	331.05	0.000	0.000	n/a	1.00	0.15

CHURCH HILL FARM AT DEEP BROOK	Number of lines: 33	Run Date: 1/20/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

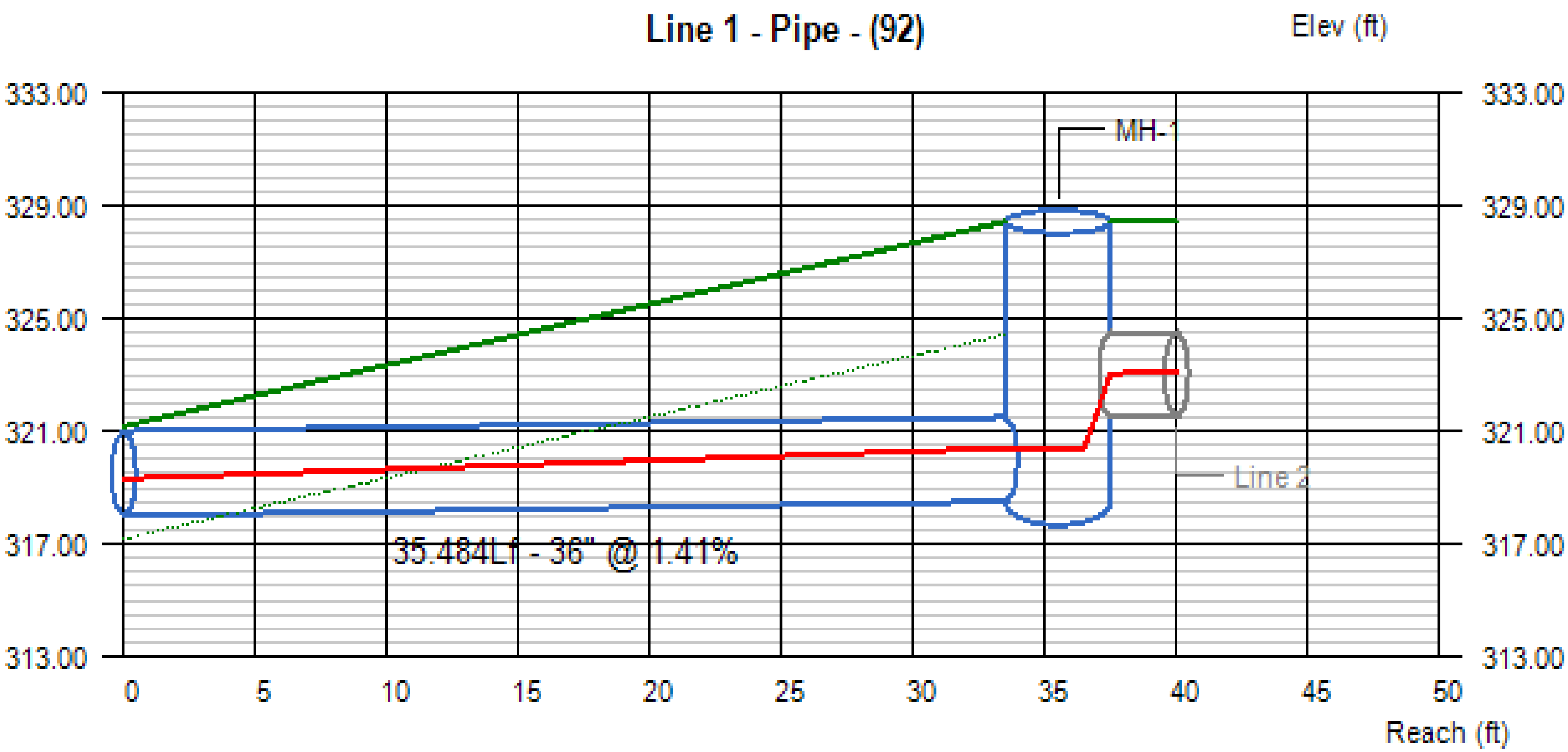
Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

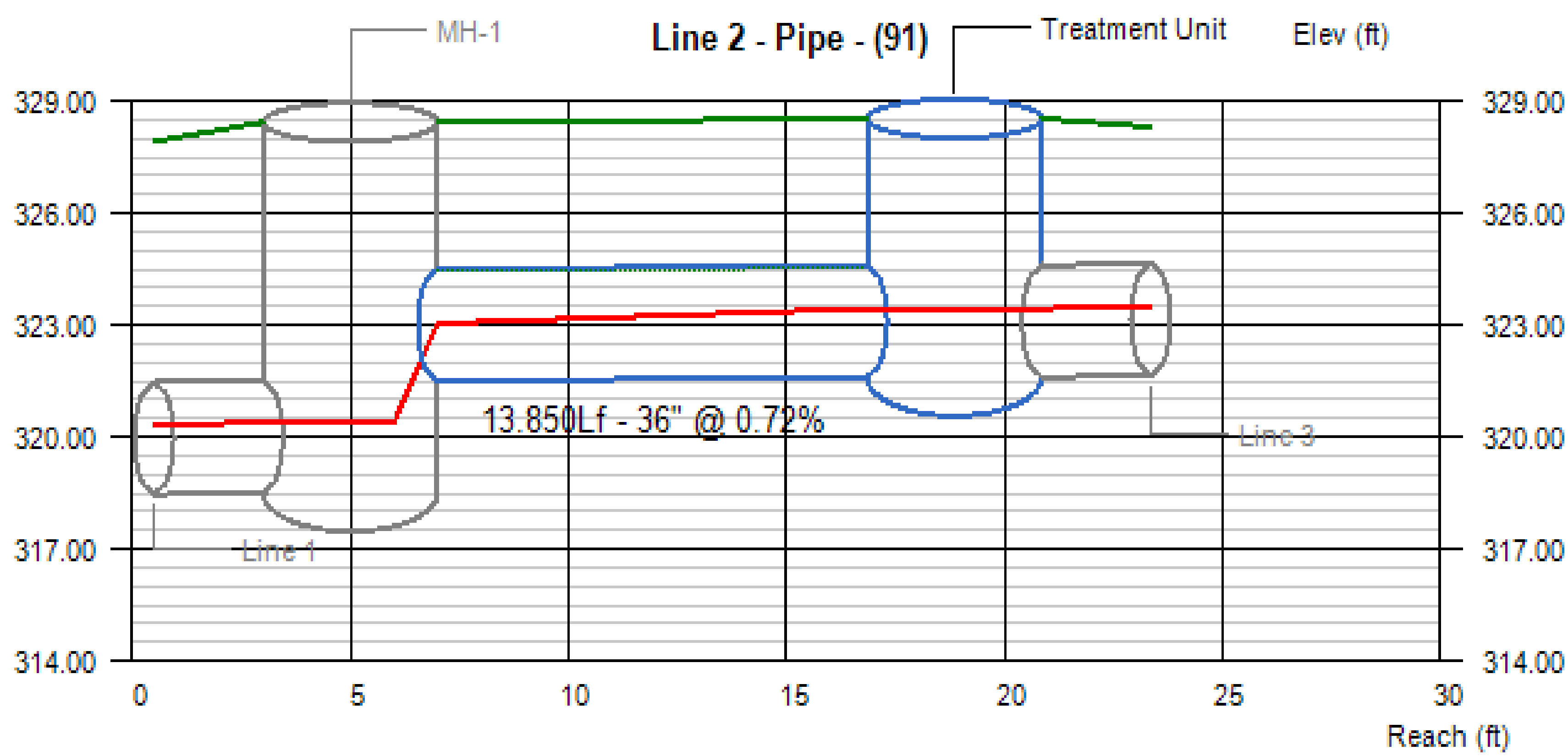
Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

Line Profile (Line 1) - Pipe - (92)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
1	34.16	318.00	318.50	1.32	1.90	1.90	319.32	320.40	320.40	11.40	7.25	0.18	6.93

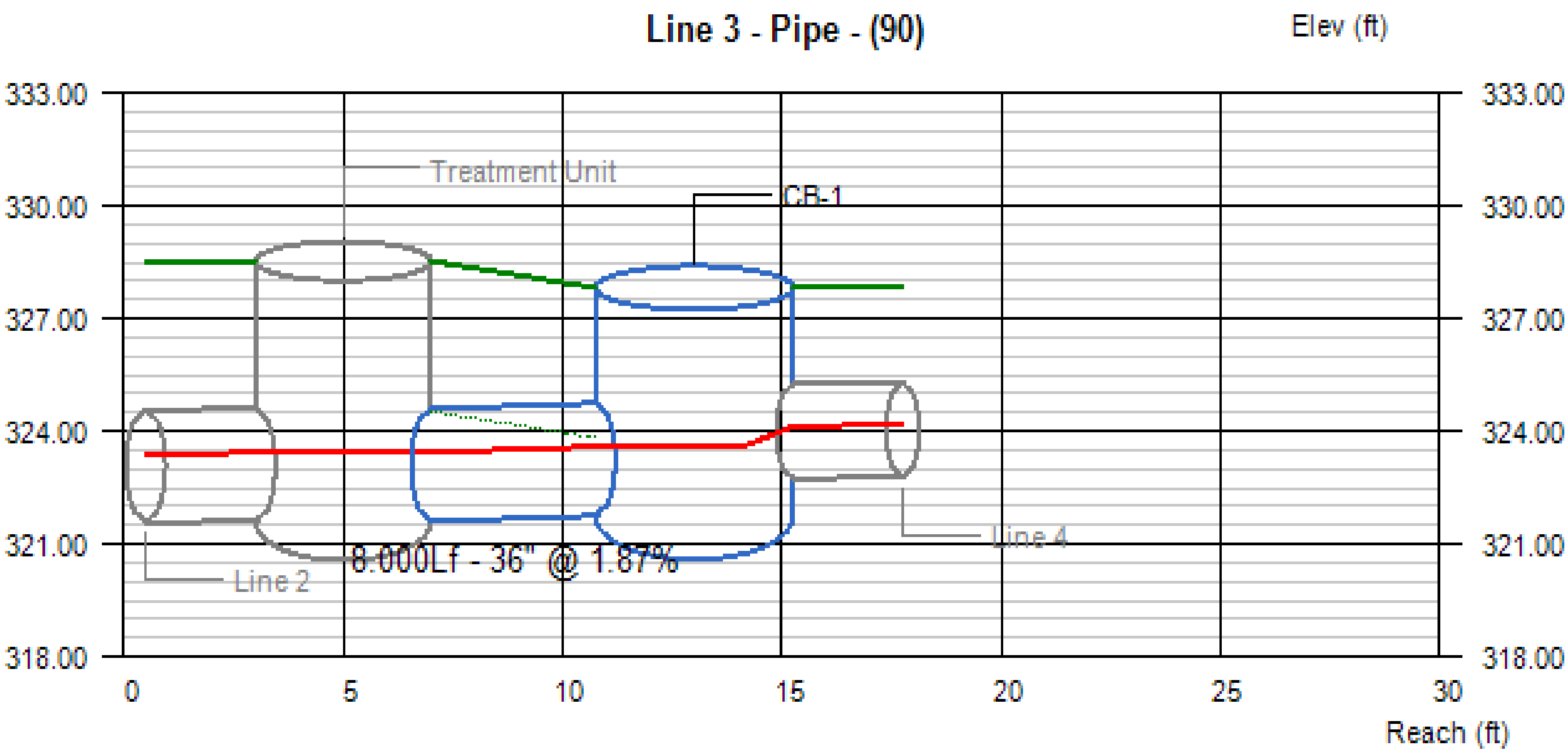
Line Profile (Line 2) - Pipe - (91)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
2	32.11	321.50	321.60	1.54	1.84	1.84	323.04	323.44	323.44	8.78	7.08	3.93	3.93

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

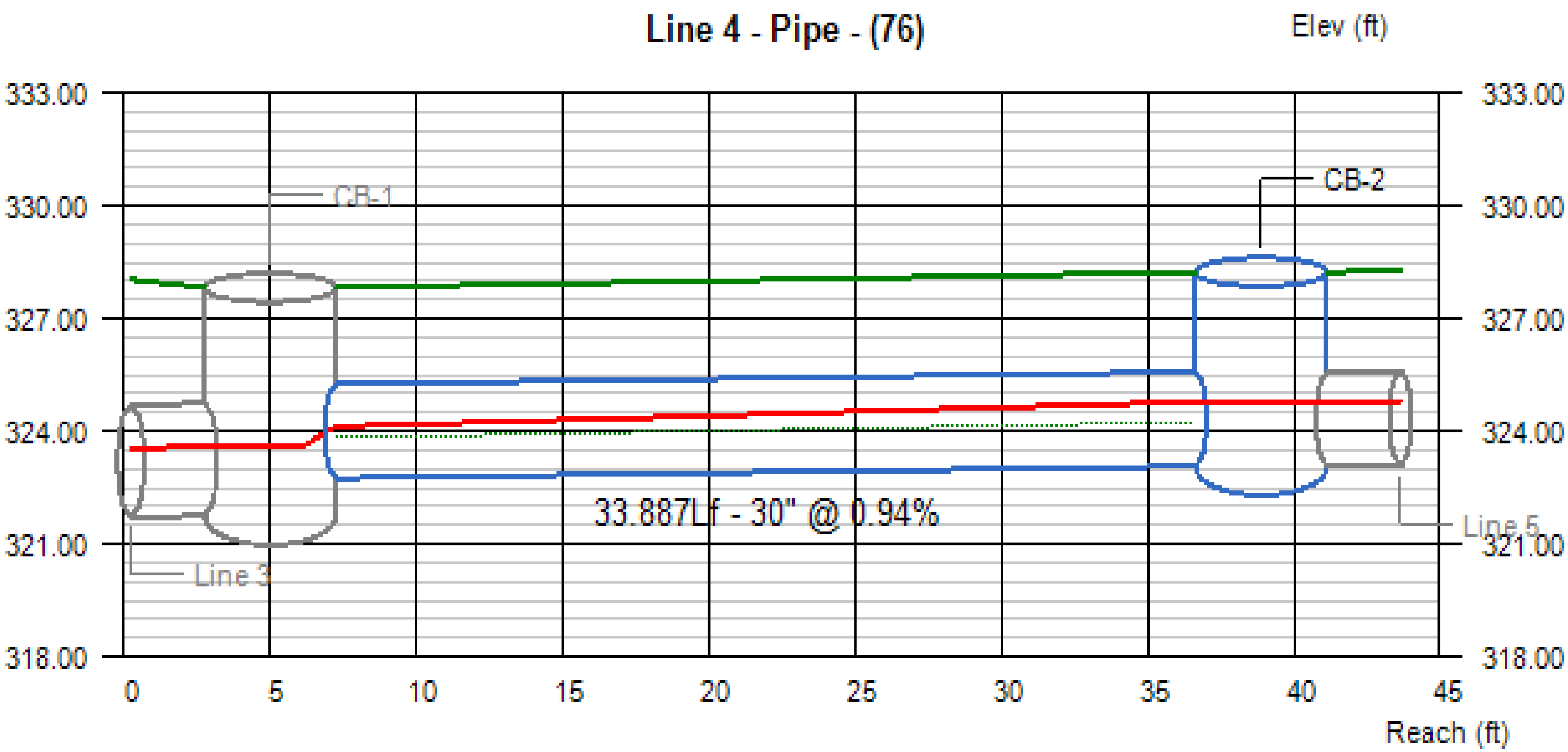
Line Profile (Line 3) - Pipe - (90)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
3	32.14	321.60	321.75	1.84	1.84	1.84	323.44	323.59	323.59	7.09	7.08	3.93	3.07

CHURCH HILL FARM AT DEEP BROOK | No. Lines: 33 | Run Date: 1/20/2023

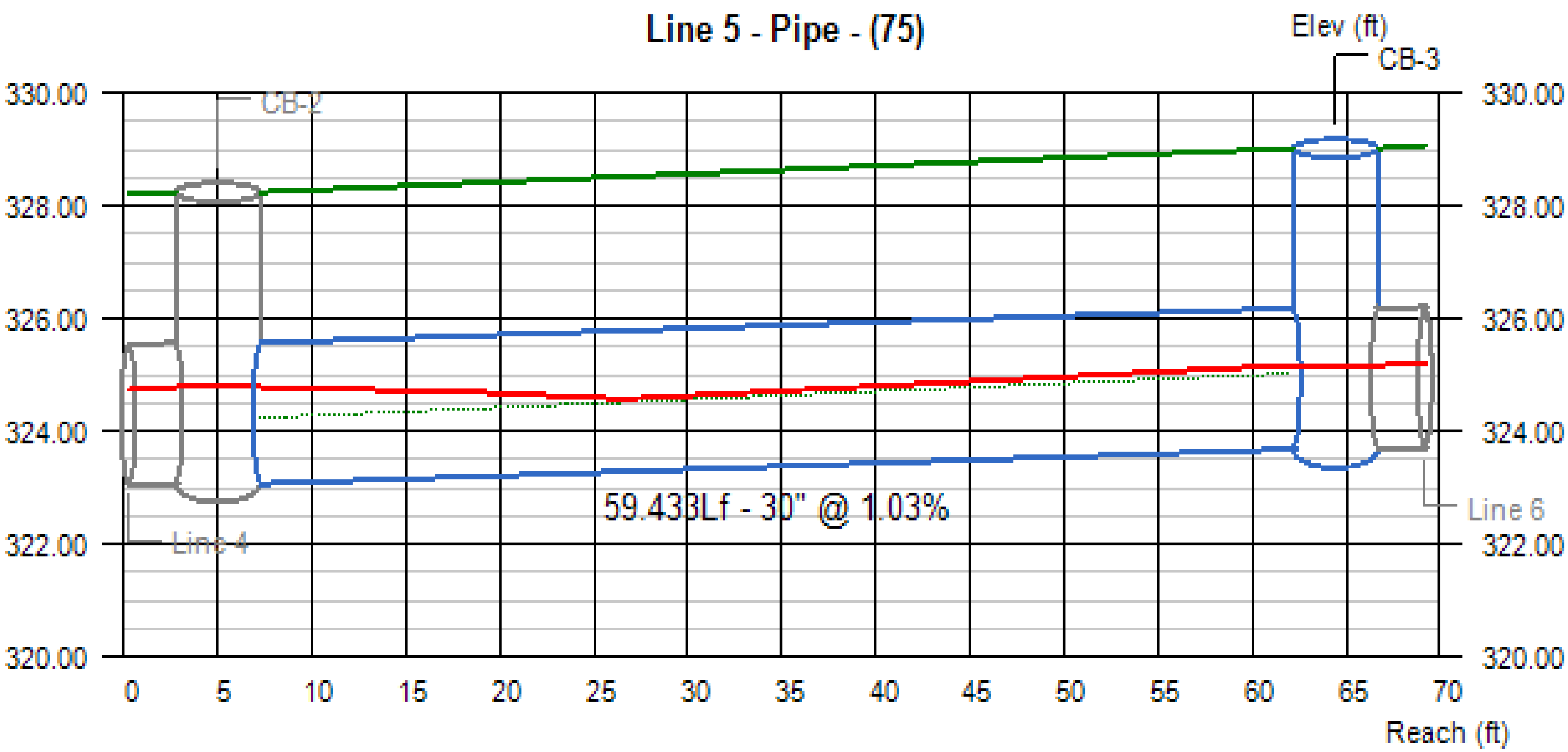
Line Profile (Line 4) - Pipe - (76)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
4	25.33	322.75	323.07	1.38	1.71	1.71	324.13	324.78	324.78	9.14	7.06	2.57	2.67

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

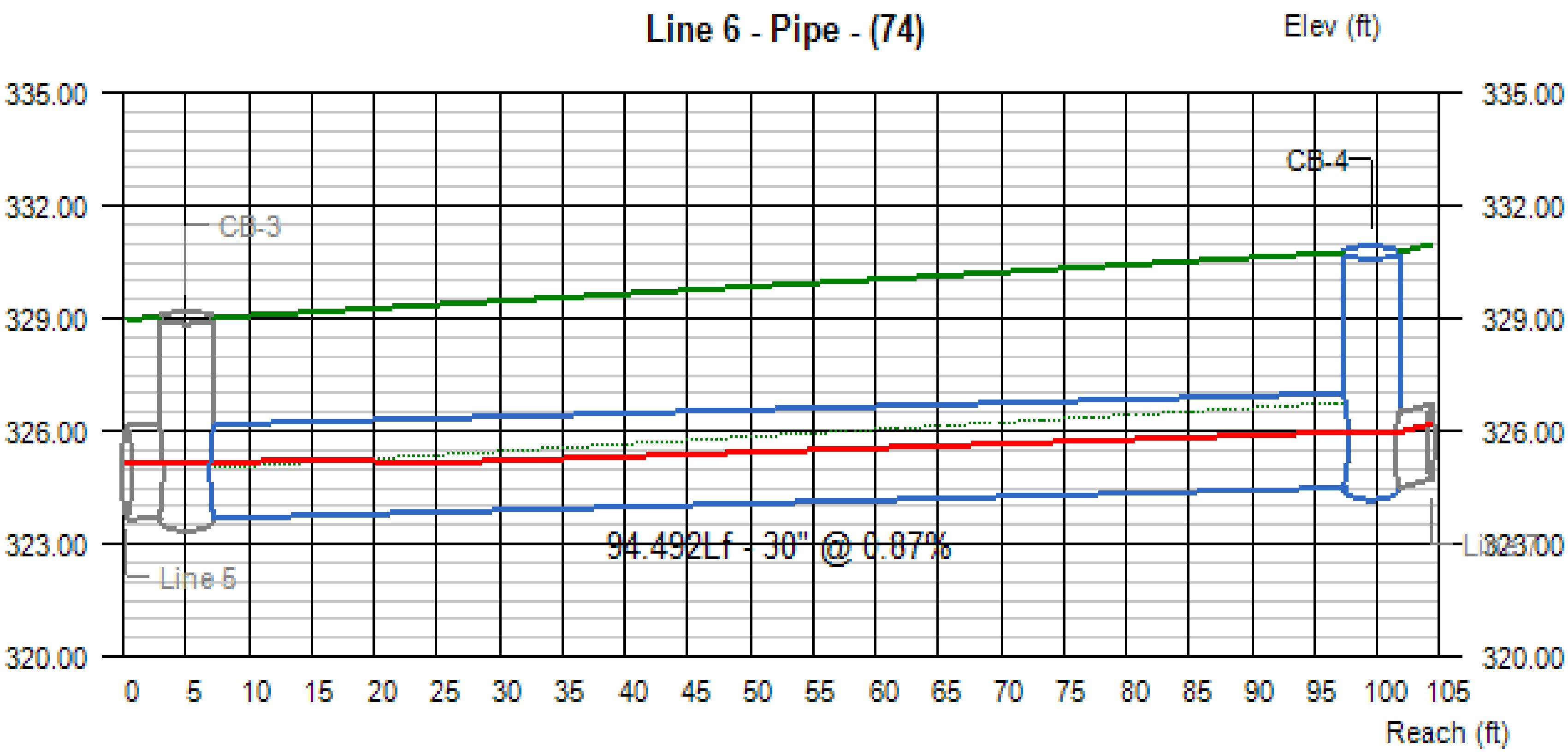
Line Profile (Line 5) - Pipe - (75)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
5	19.37	323.07	323.68	1.71	1.49	1.49	324.78	325.17 j	325.17	5.40	6.34	2.67	2.84

CHURCH HILL FARM AT DEEP BROOK | No. Lines: 33 | Run Date: 1/20/2023

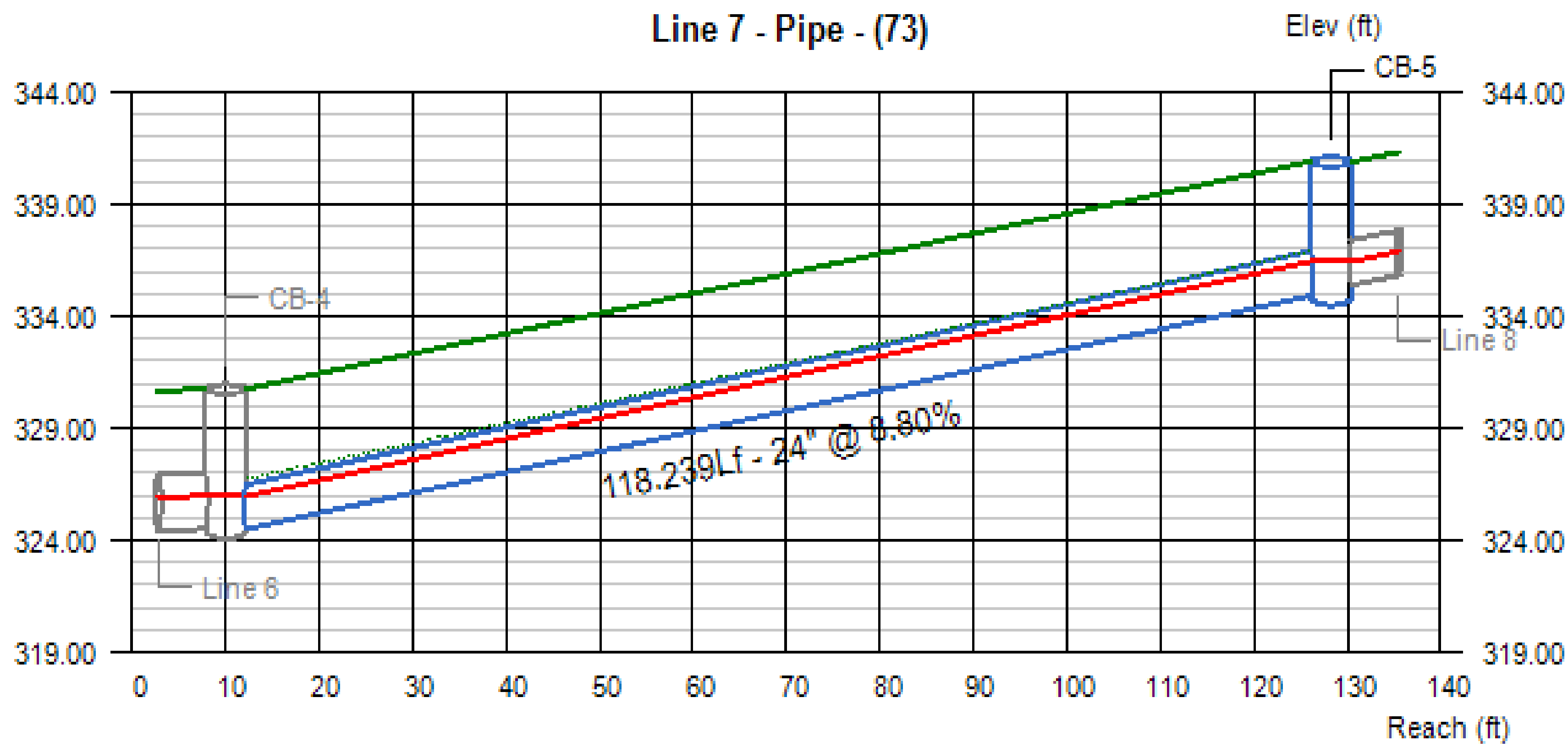
Line Profile (Line 6) - Pipe - (74)



Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
6	18.86	323.68	324.50	1.49	1.47	1.47	325.17	325.97 j	325.97	6.18	6.28	2.84	3.76

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

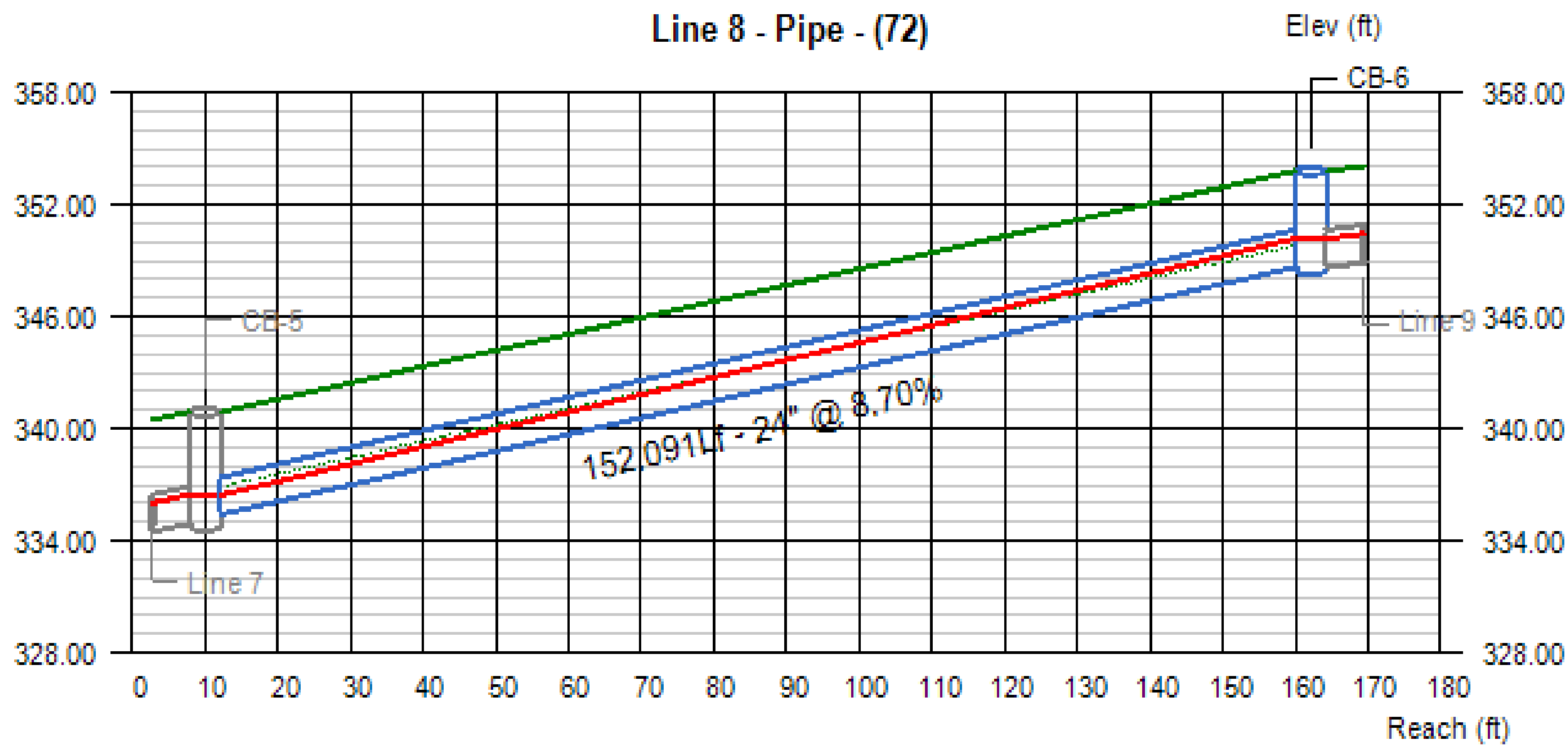
Line Profile (Line 7) - Pipe - (73)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
7	18.55	324.50	334.90	1.47	1.55	1.55	325.97	336.45	336.45	7.49	7.10	4.26	4.00

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

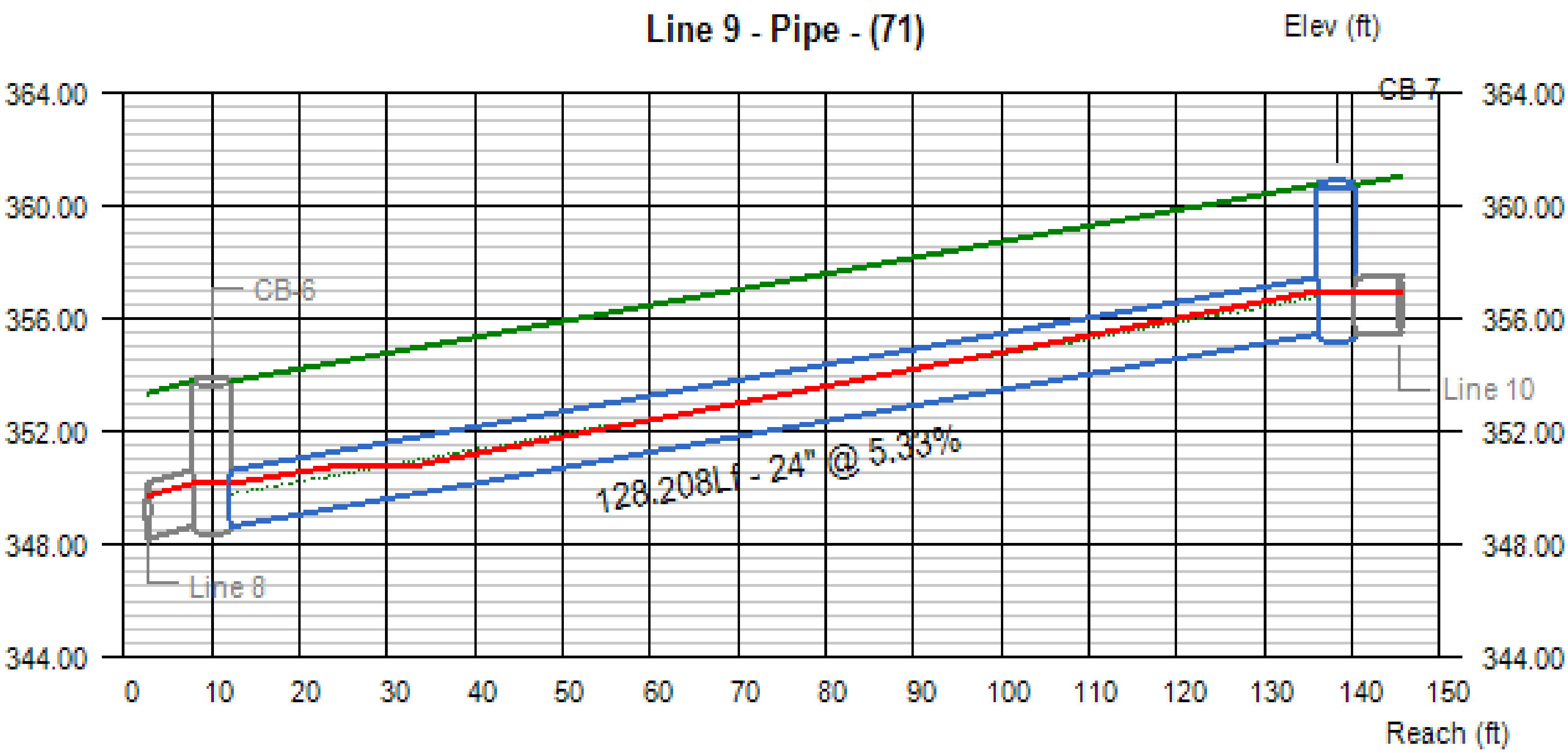
Line Profile (Line 8) - Pipe - (72)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
8	18.12	335.40	348.63	1.05	1.53	1.53	336.45	350.16	350.16	10.86	7.02	3.50	3.15

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

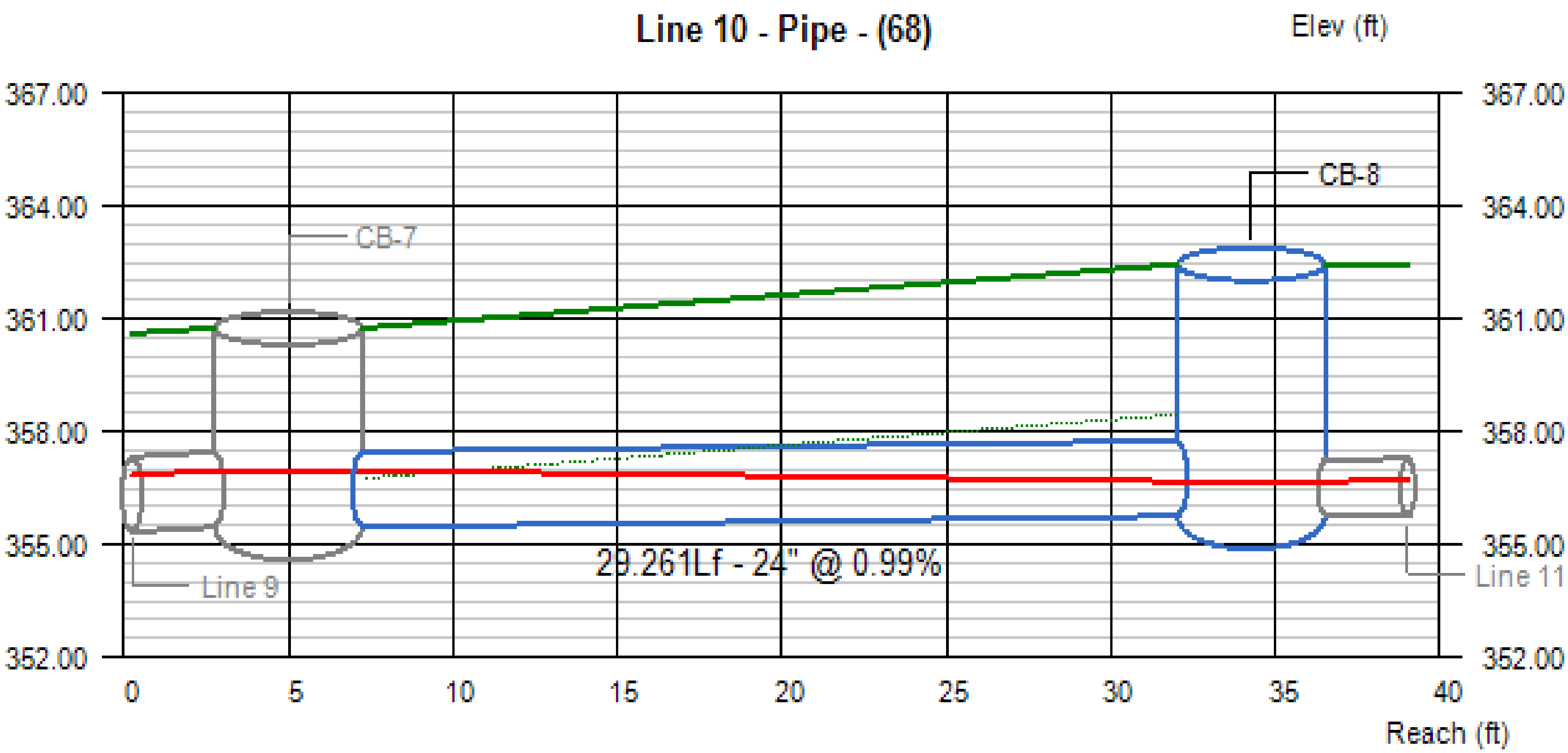
Line Profile (Line 9) - Pipe - (71)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
9	17.57	348.63	355.46	1.53	1.51	1.51	350.16	356.97 j	356.97	6.80	6.91	3.15	3.29

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

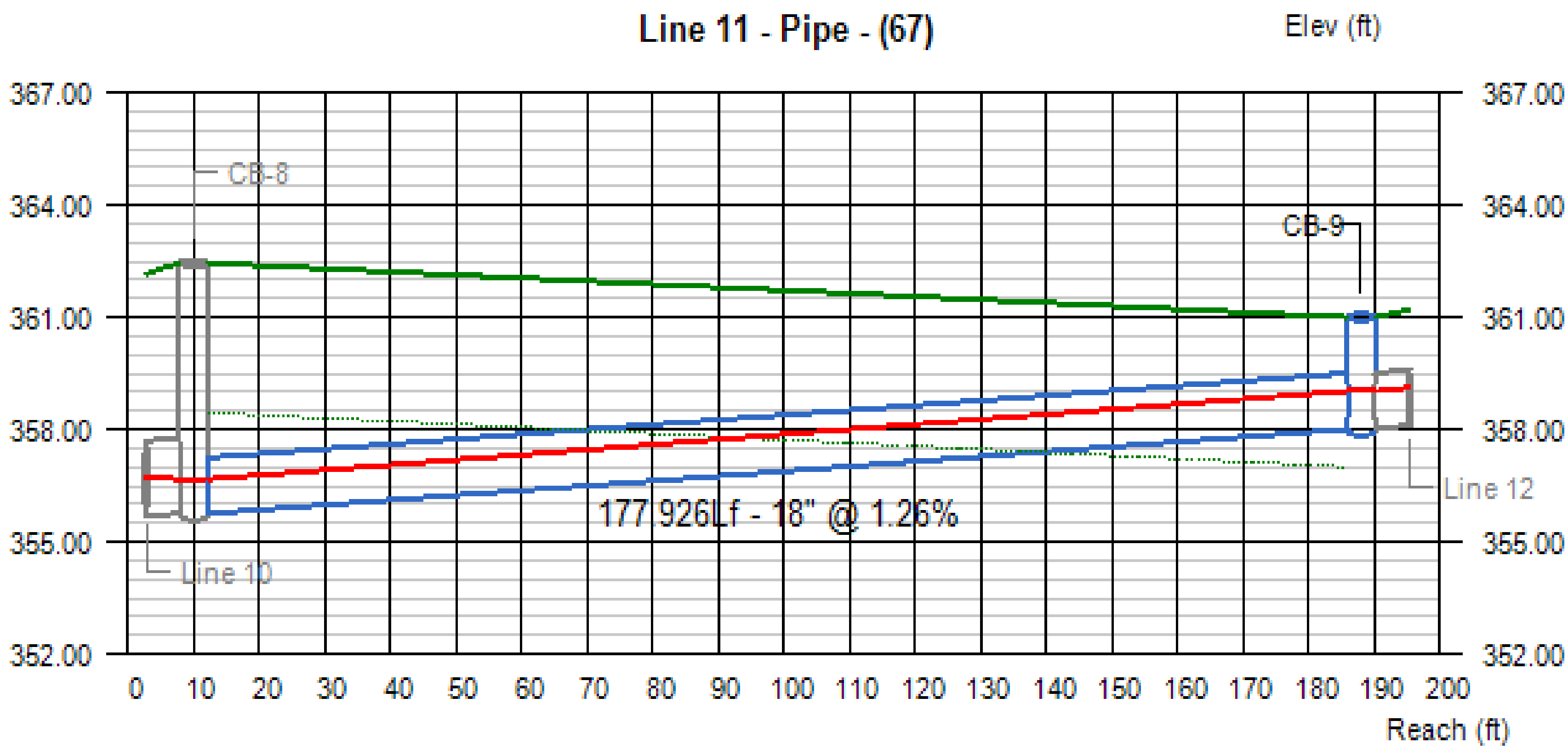
Line Profile (Line 10) - Pipe - (68)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
10	6.86	355.46	355.75	1.51	0.93	0.93	356.97	356.68	356.68	2.70	4.81	3.29	4.70

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

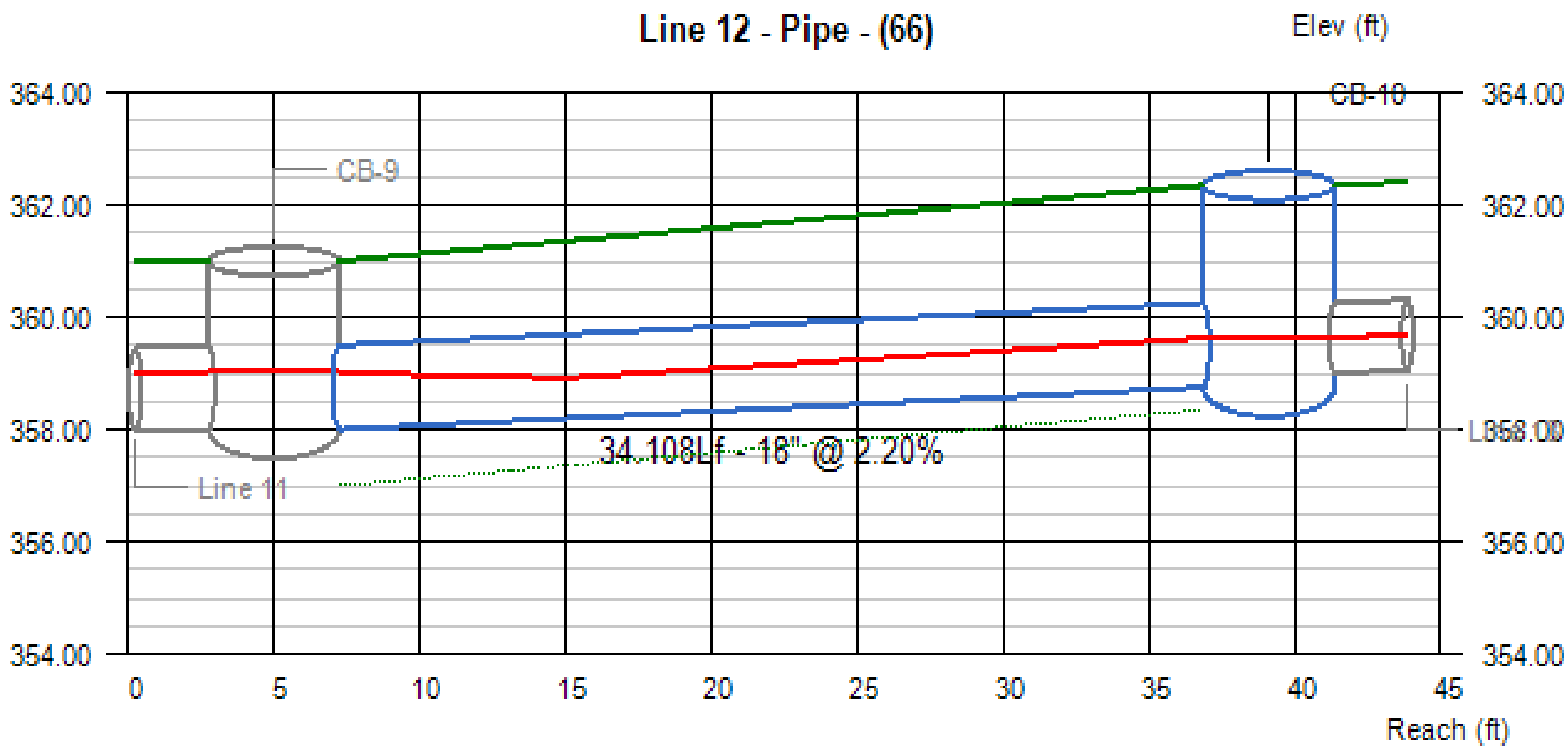
Line Profile (Line 11) - Pipe - (67)



Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
11	7.03	355.75	358.00	0.93	1.03	1.03	356.68	359.03	359.03	6.13	5.46	5.20	1.50

CHURCH HILL FARM AT DEEP BROOK | No. Lines: 33 | Run Date: 1/20/2023

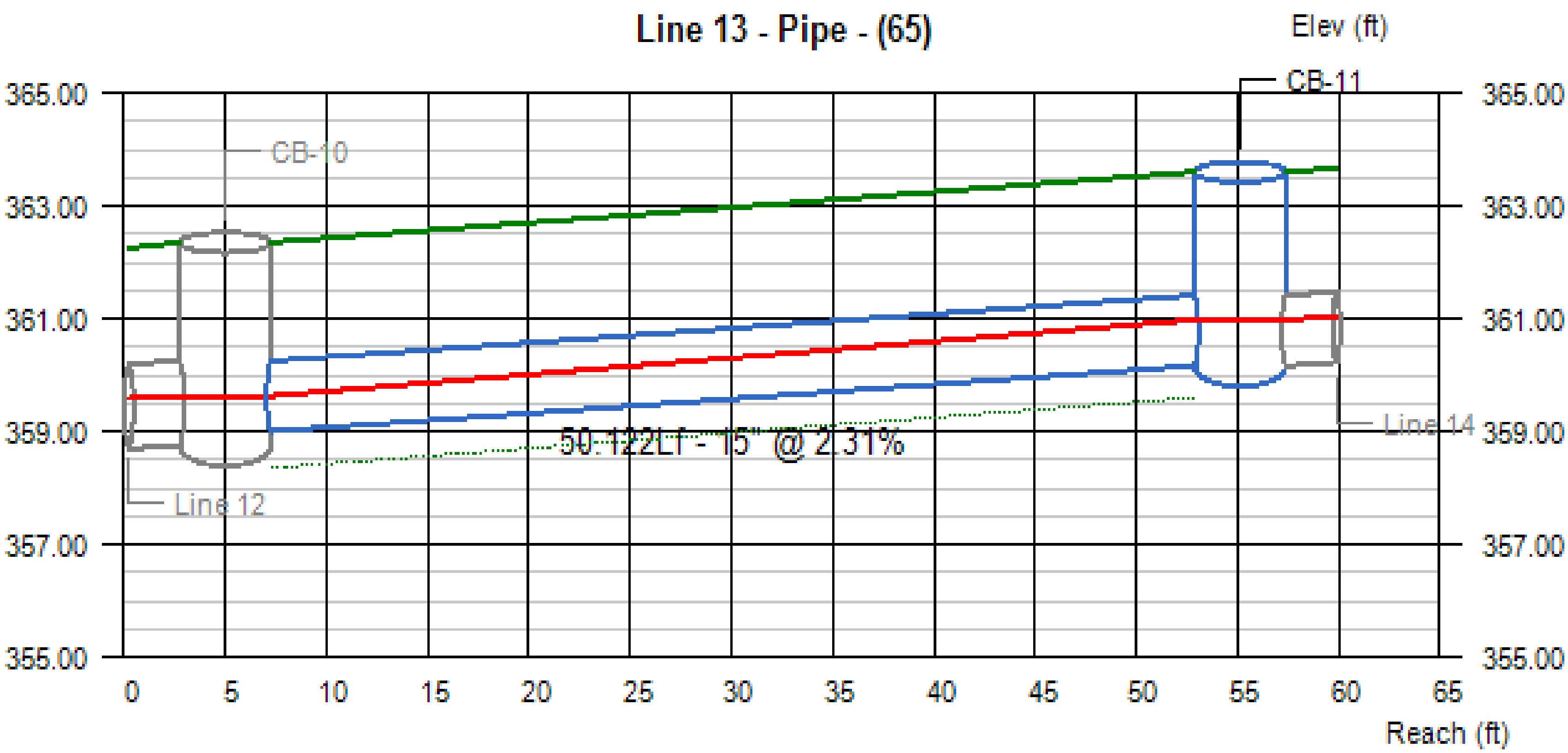
Line Profile (Line 12) - Pipe - (66)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
12	5.24	358.00	358.75	1.03	0.88	0.88	359.03	359.63 j	359.63	4.07	4.86	1.50	2.10

CHURCH HILL FARM AT DEEP BROOK | No. Lines: 33 | Run Date: 1/20/2023

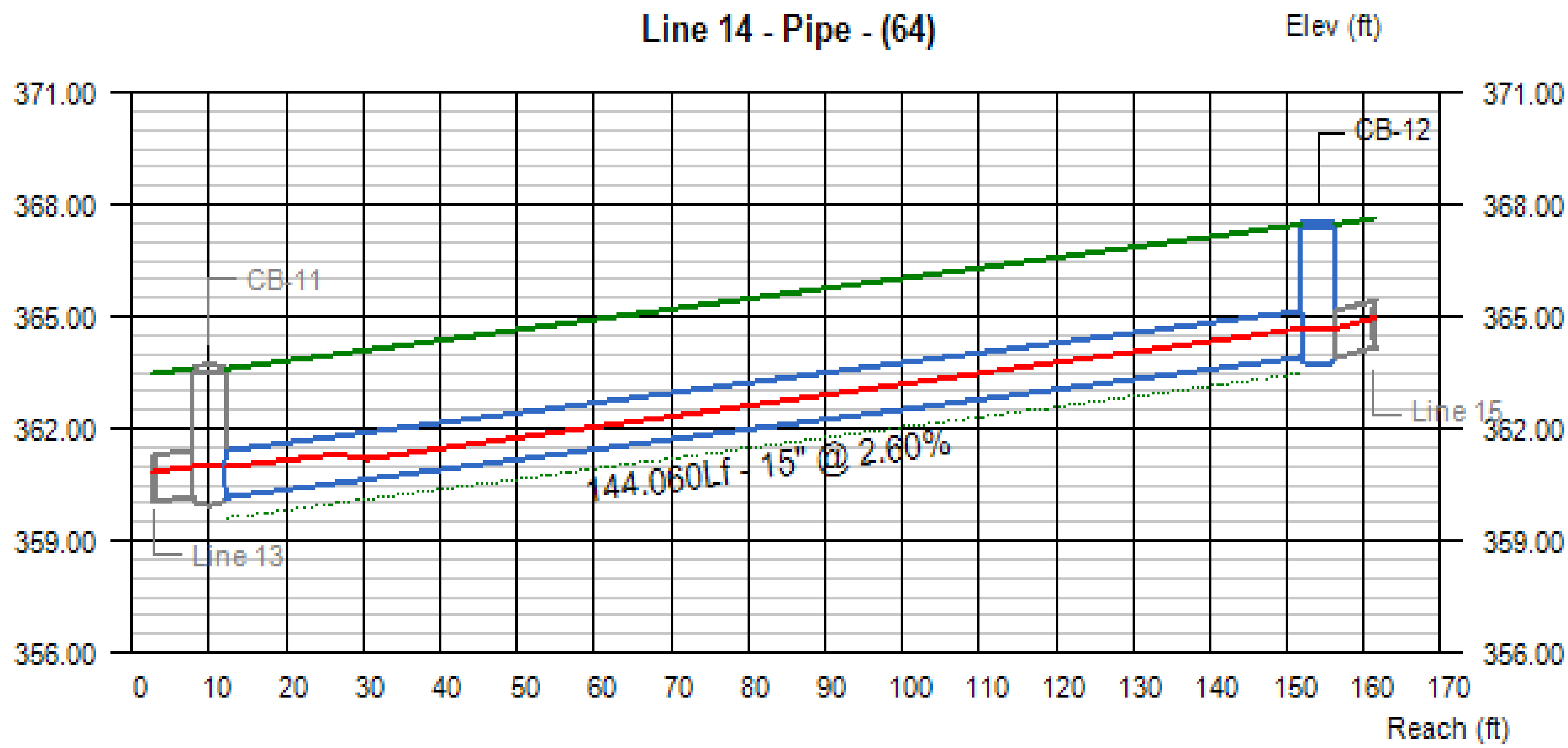
Line Profile (Line 13) - Pipe - (65)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
13	4.11	359.00	360.16	0.63	0.82	0.82	359.63	360.98	360.98	6.62	4.82	2.10	2.19

CHURCH HILL FARM AT DEEP BROOK | No. Lines: 33 | Run Date: 1/20/2023

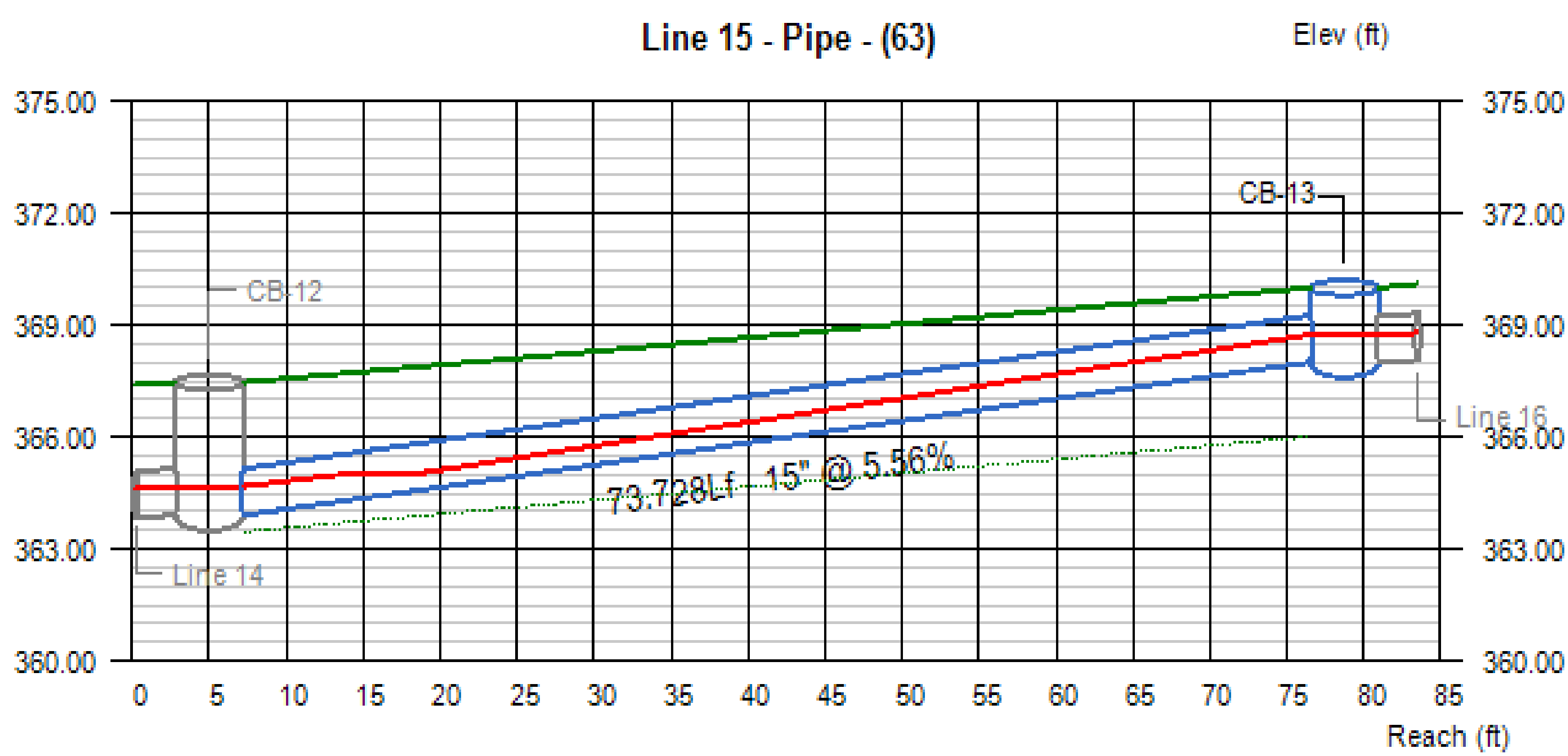
Line Profile (Line 14) - Pipe - (64)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
14	3.74	360.16	363.90	0.82	0.78	0.78	360.98	364.68 j	364.68	4.39	4.64	2.19	2.31

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

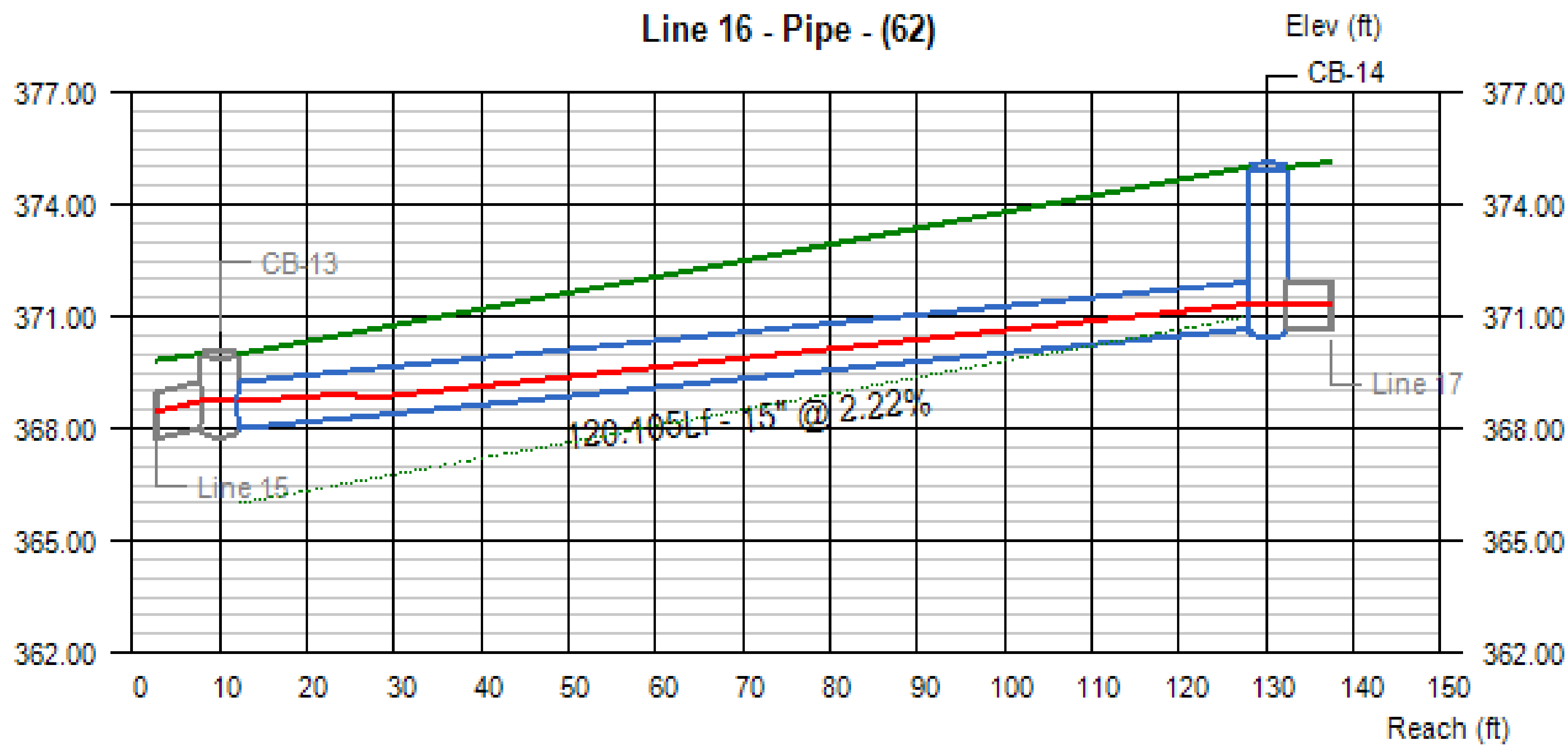
Line Profile (Line 15) - Pipe - (63)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
15	3.34	363.90	368.00	0.78	0.74	0.74	364.68	368.74 j	368.74	4.14	4.44	2.31	0.75

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

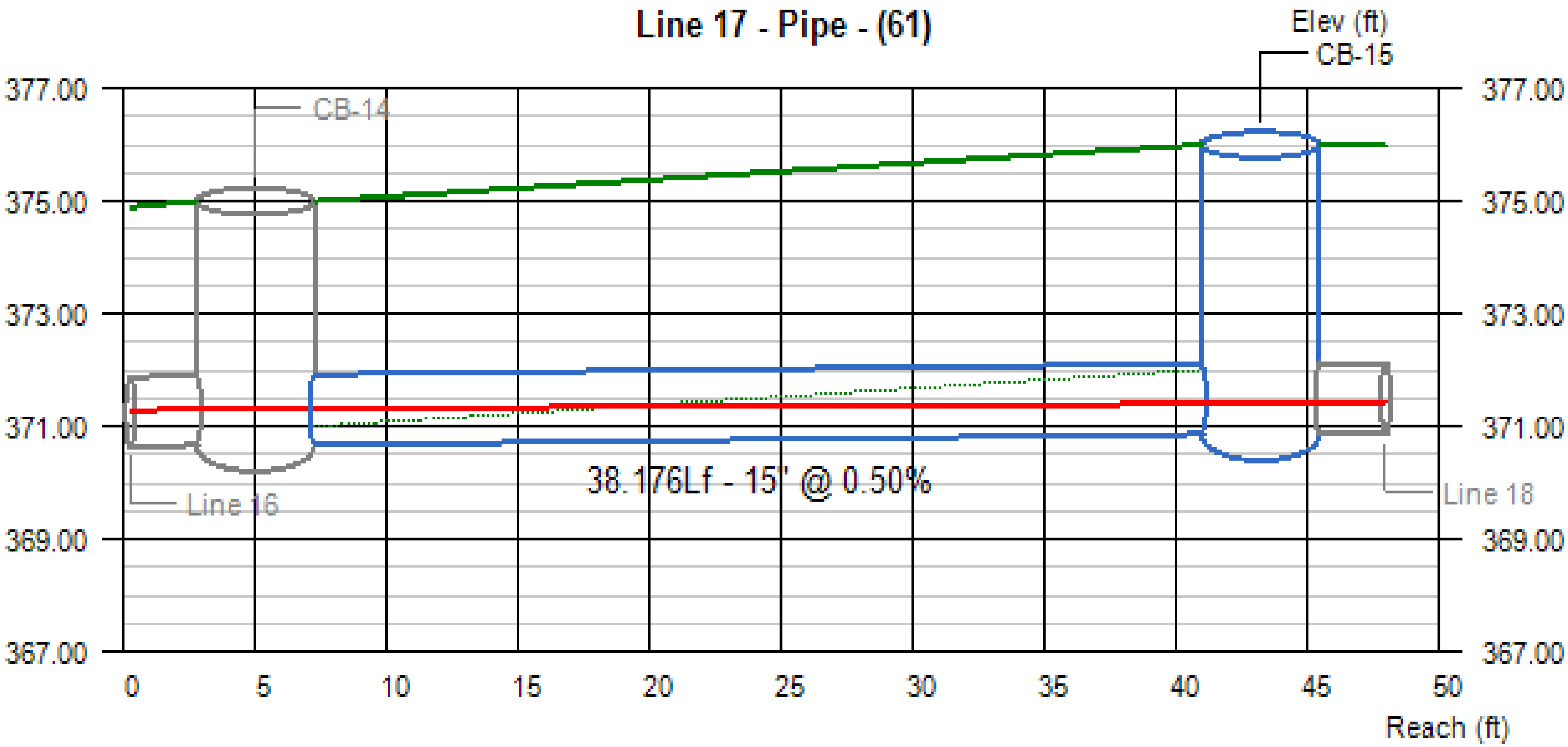
Line Profile (Line 16) - Pipe - (62)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
16	2.69	368.00	370.67	0.74	0.66	0.66	368.74	371.33 j	371.33	3.58	4.11	0.75	3.08

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

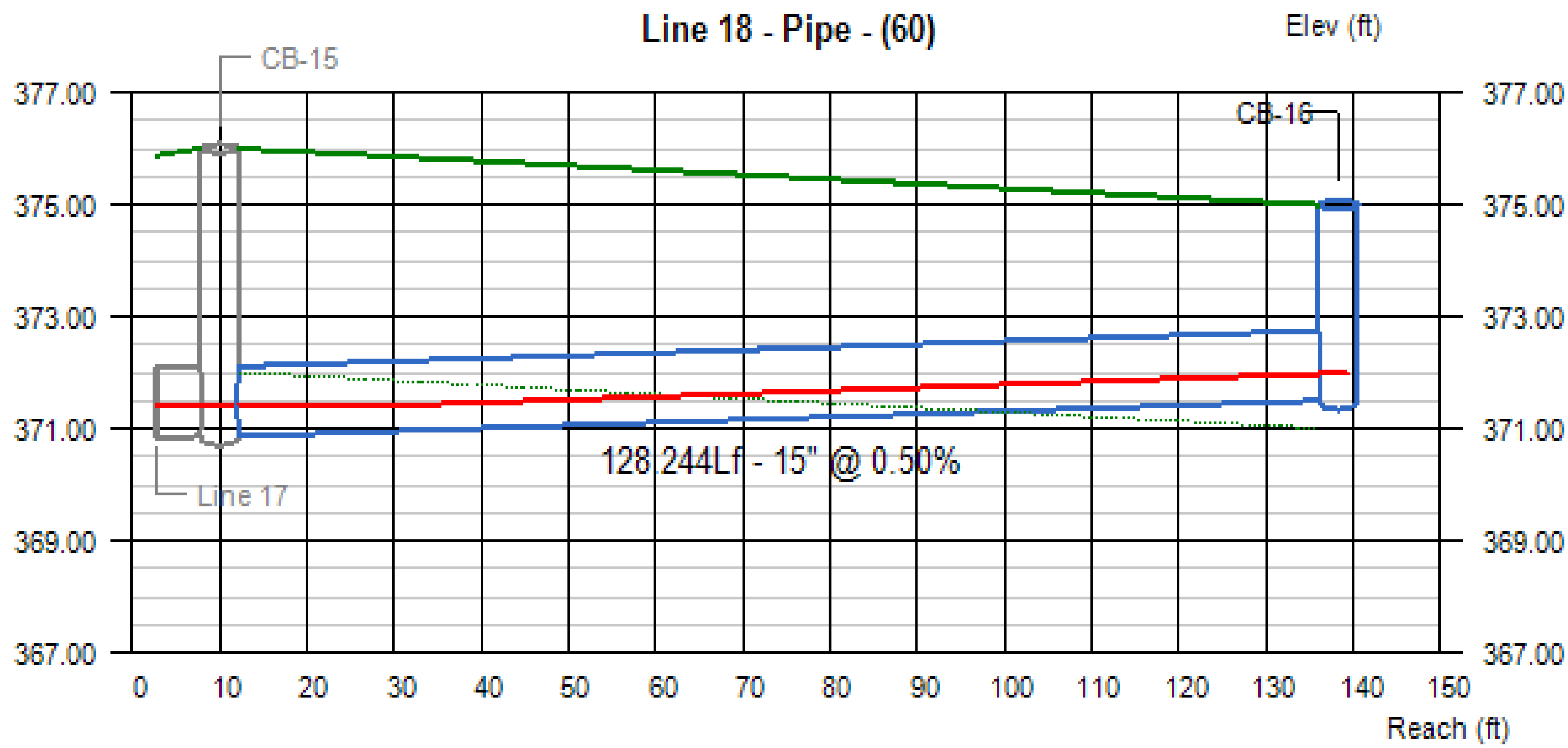
Line Profile (Line 17) - Pipe - (61)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
17	2.04	370.67	370.86	0.66	0.57	0.57	371.33	371.43 j	371.43	3.13	3.76	3.08	3.89

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

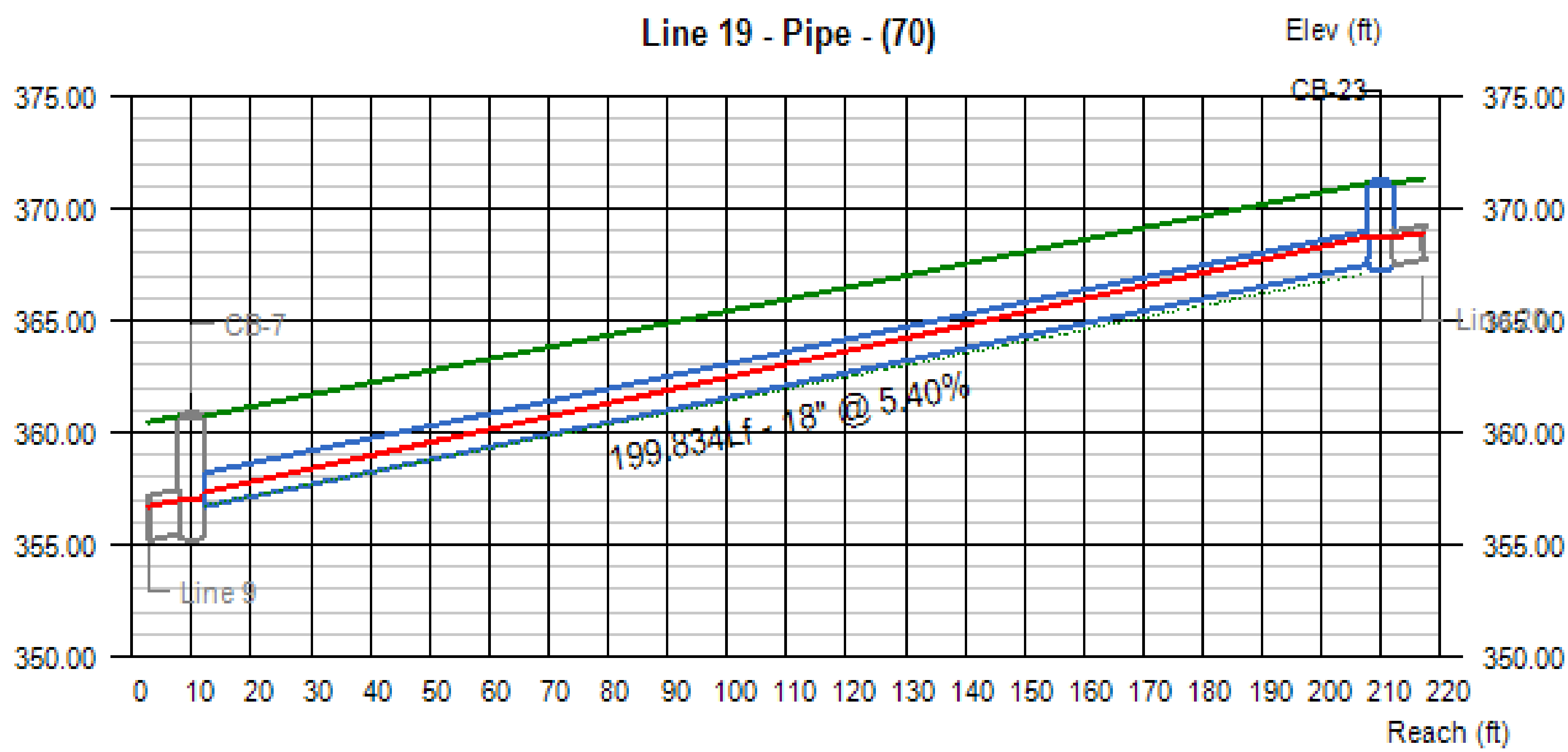
Line Profile (Line 18) - Pipe - (60)



Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
18	1.45	370.86	371.50	0.57	0.48	0.48	371.43	371.98 j	371.98	2.67	3.38	3.89	2.25

CHURCH HILL FARM AT DEEP BROOK | No. Lines: 33 | Run Date: 1/20/2023

Line Profile (Line 19) - Pipe - (70)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
19	10.31	356.71	367.50	0.65	1.23	1.23	357.36	368.73	368.73	14.02	6.62	2.54	2.13

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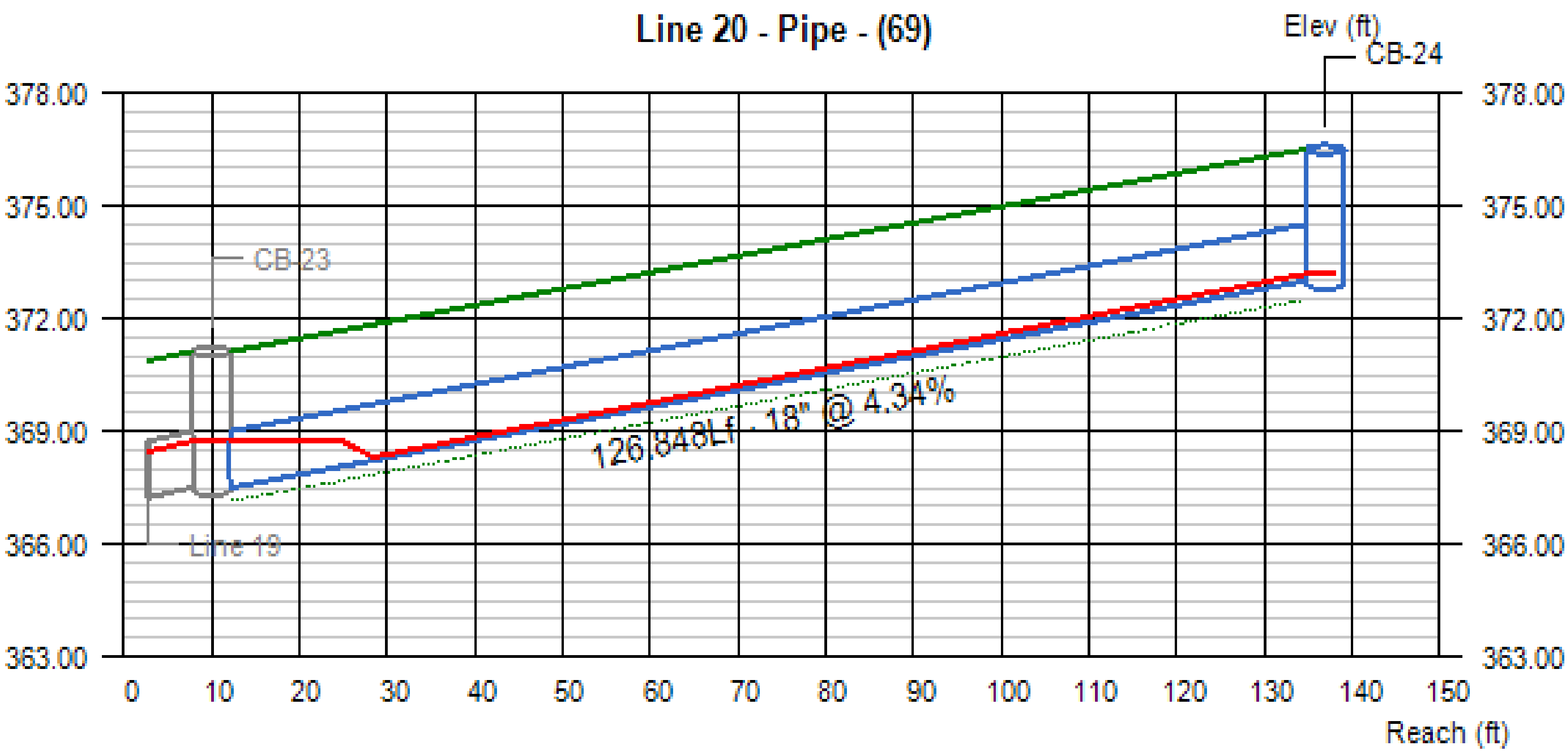
Line Profile (Line 20) - Pipe - (69)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
20	0.25	367.50	373.00	1.23	0.18	0.18	368.73	373.18 j	373.18	0.16	2.02	2.13	2.00

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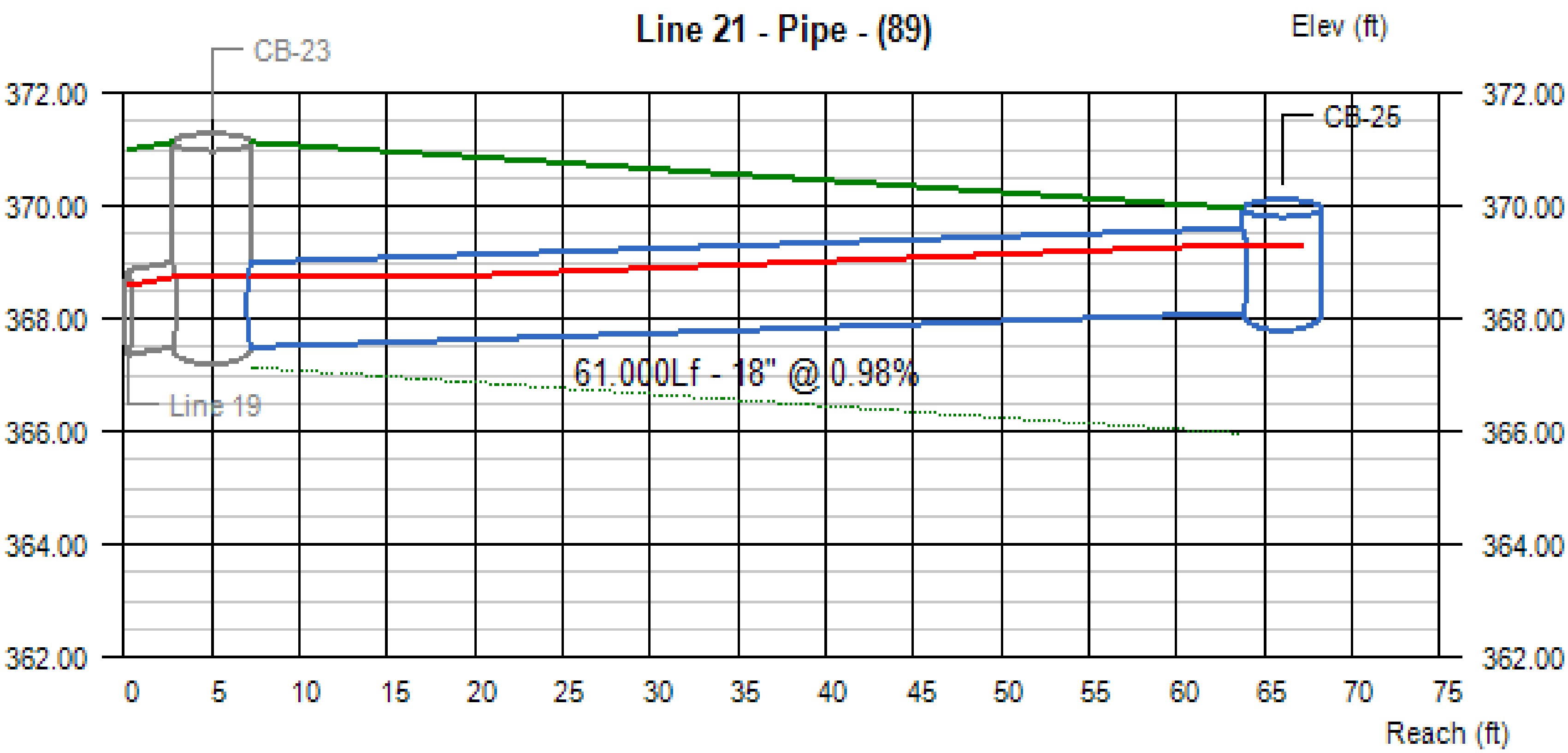
Line Profile (Line 21) - Pipe - (89)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
21	9.90	367.50	368.10	1.23	1.21	1.21	368.73	369.31 j	369.31	6.36	6.47	2.13	0.36

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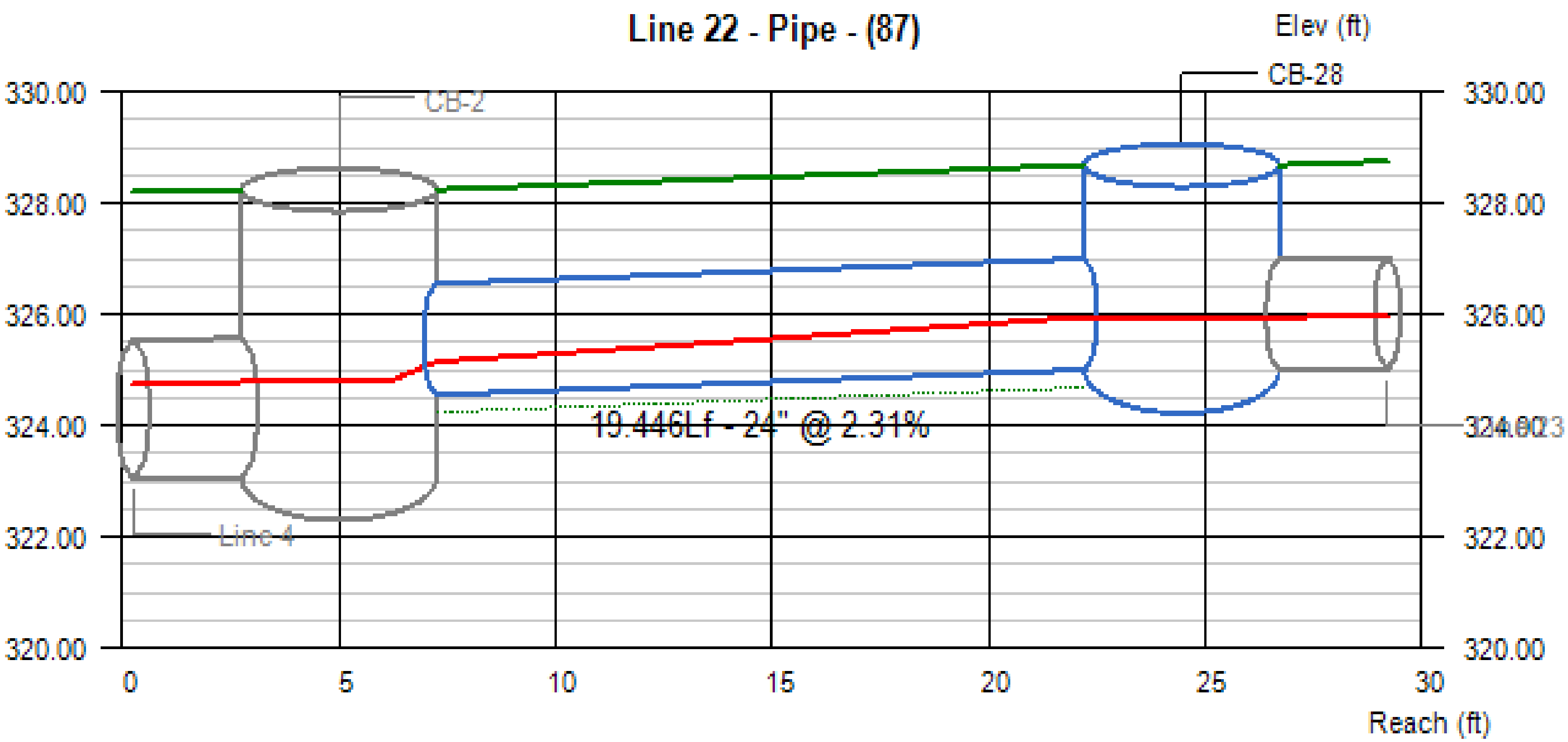
Line Profile (Line 22) - Pipe - (87)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
22	7.16	324.55	325.00	0.59	0.95	0.95	325.14	325.95	325.95	9.16	4.87	1.69	1.68

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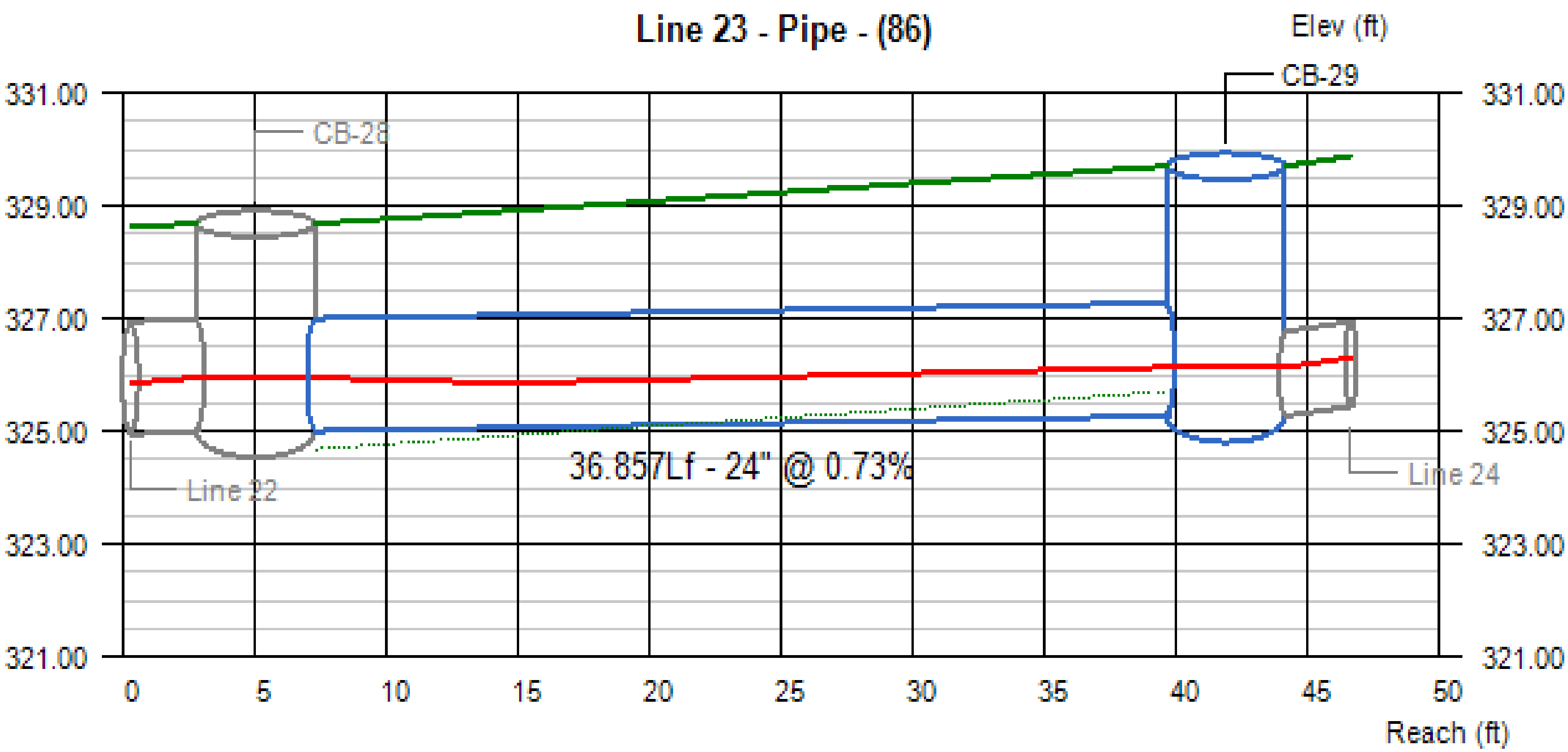
Line Profile (Line 23) - Pipe - (86)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
23	5.94	325.00	325.27	0.95	0.86	0.86	325.95	326.13 j	326.13	4.04	4.59	1.68	2.43

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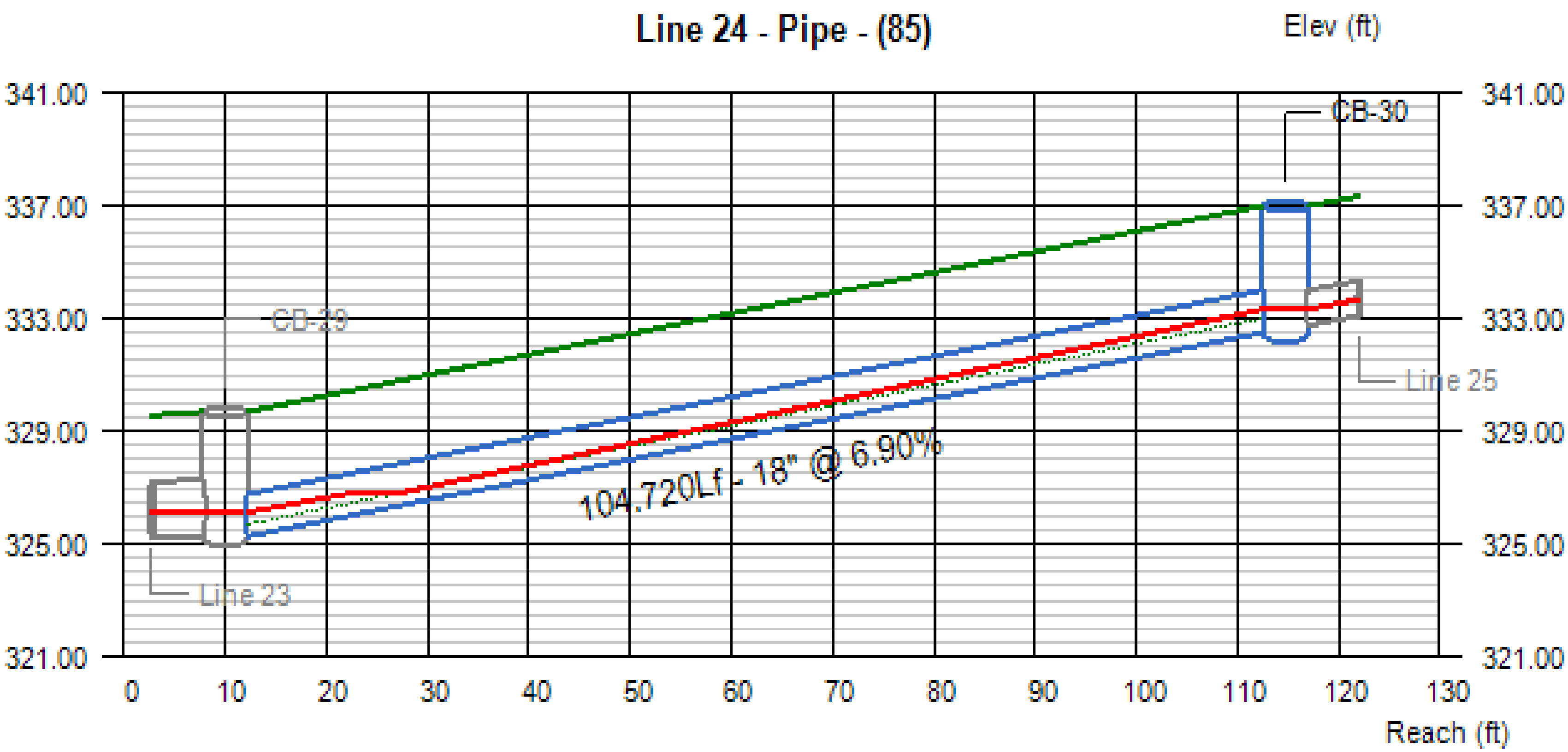
Line Profile (Line 24) - Pipe - (85)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
24	4.59	325.27	332.50	0.86	0.82	0.82	326.13	333.32 j	333.32	4.37	4.63	2.93	3.00

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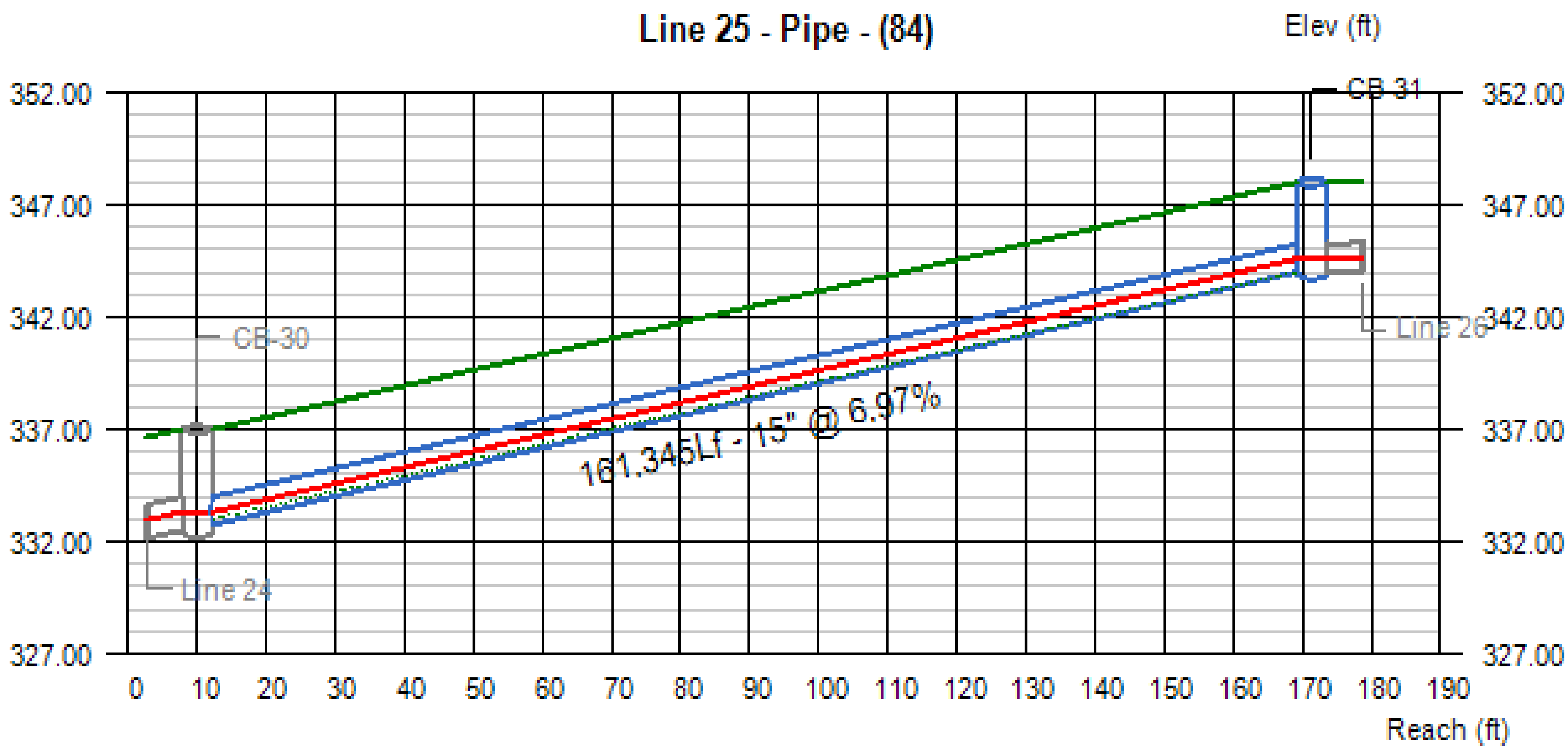
Line Profile (Line 25) - Pipe - (84)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
25	2.23	332.75	344.00	0.57	0.60	0.60	333.32	344.60	344.60	4.08	3.86	3.00	2.75

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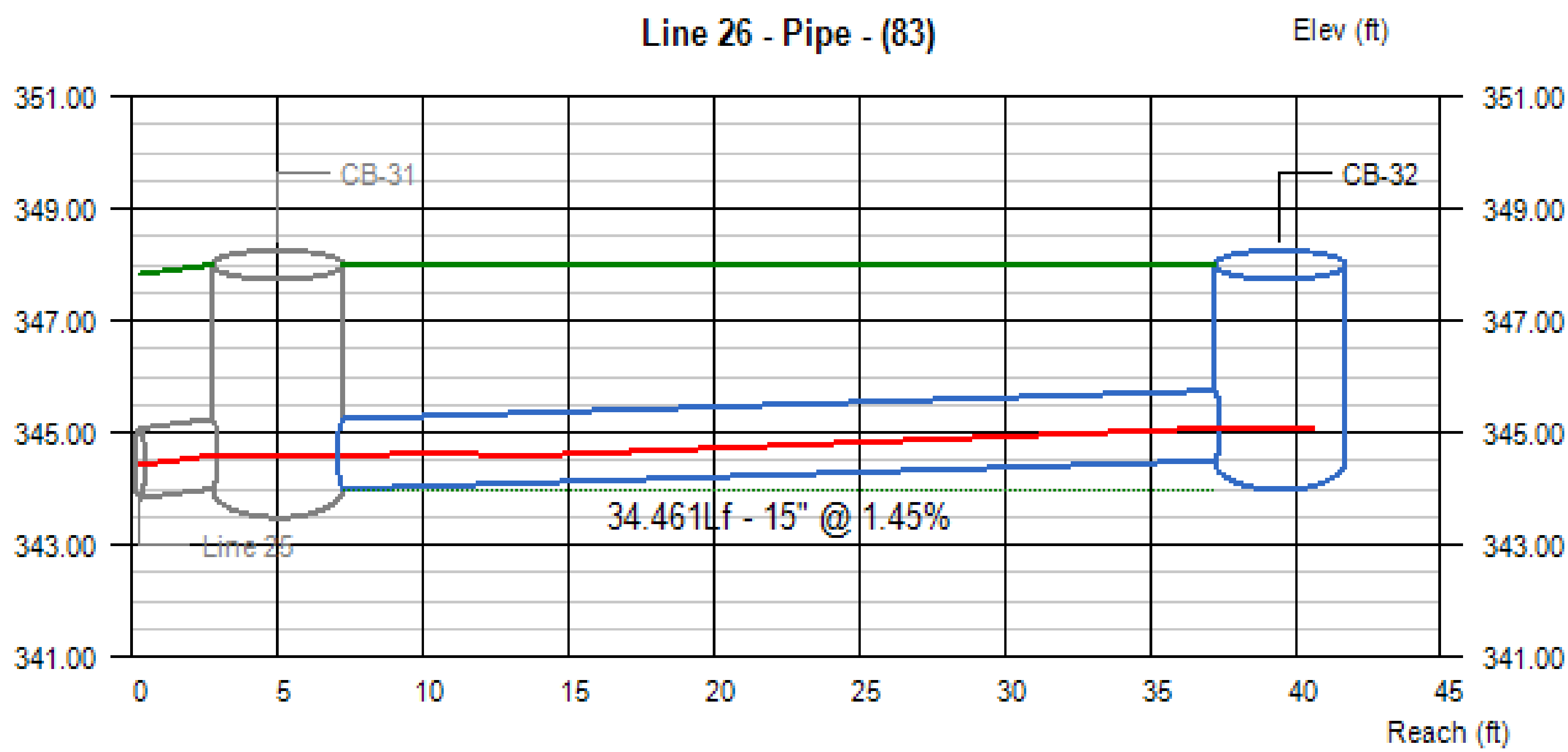
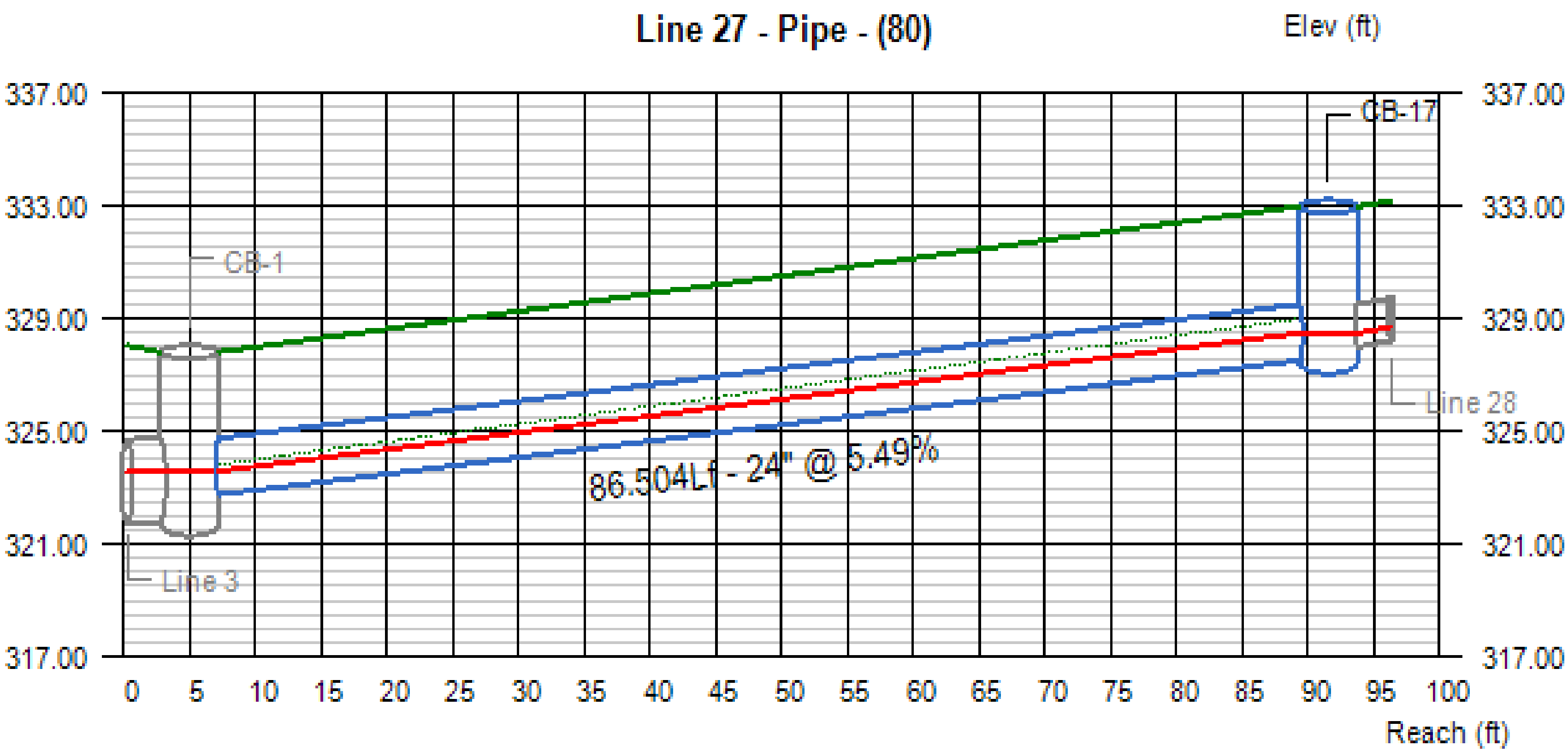
Line Profile (Line 26) - Pipe - (83)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
26	2.10	344.00	344.50	0.60	0.58	0.58	344.60	345.08 j	345.08	3.64	3.79	2.75	2.25

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

Line Profile (Line 27) - Pipe - (80)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
27	7.59	322.75	327.50	0.84	0.98	0.98	323.59	328.48	328.48	6.09	4.97	3.07	3.48

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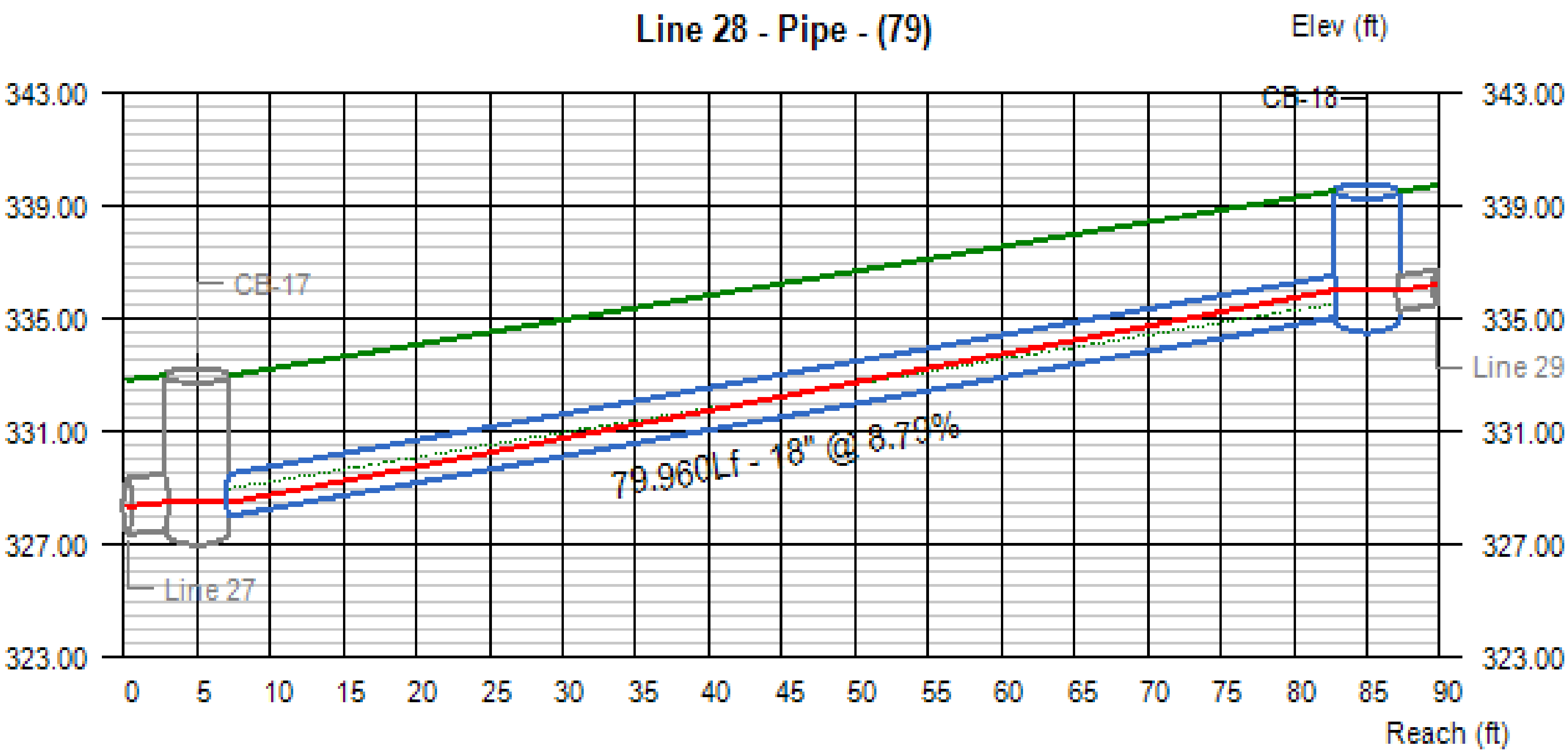
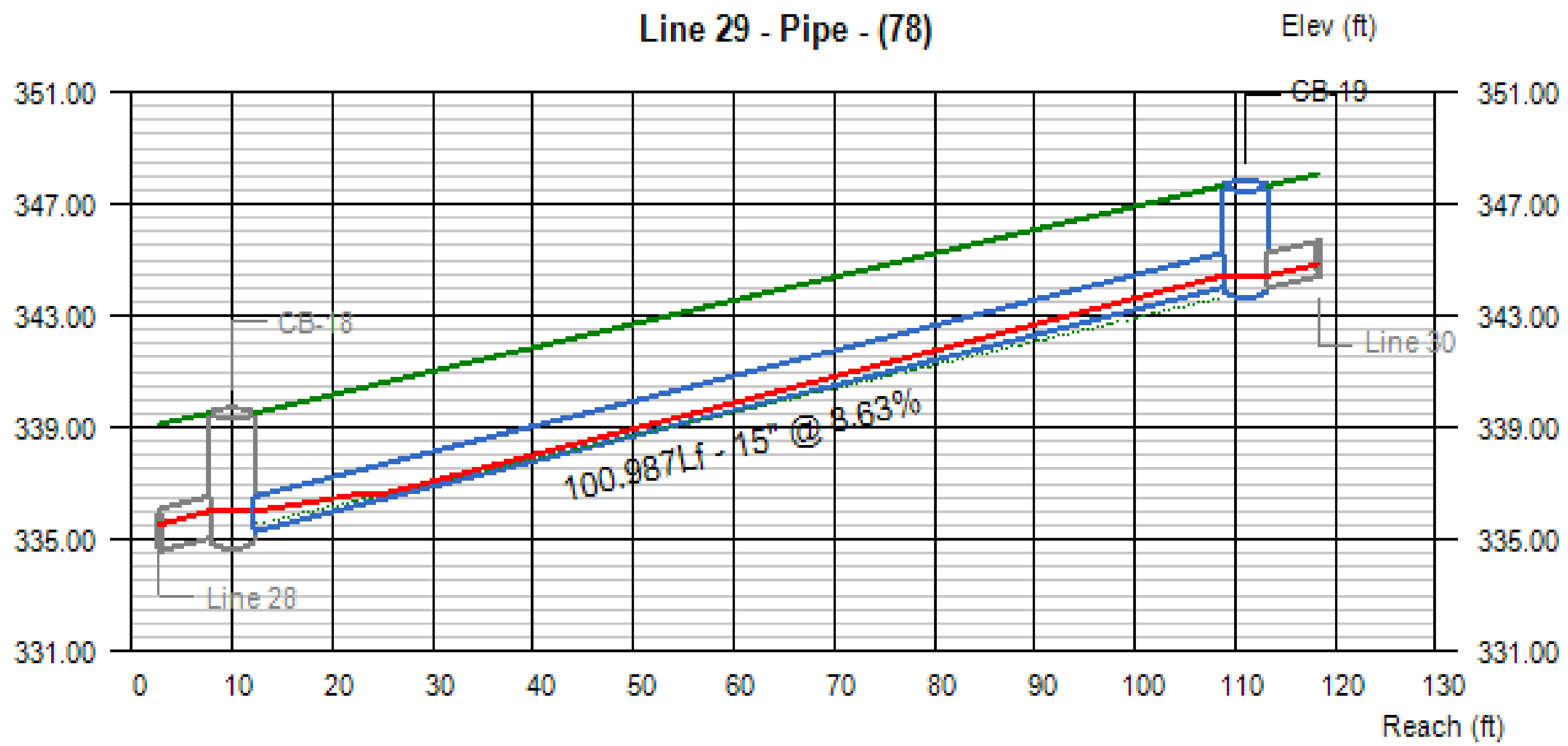
Line Profile (Line 28) - Pipe - (79)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
28	6.37	328.00	335.03	0.48	0.98	0.98	328.48	336.01	336.01	13.12	5.24	3.48	2.99

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

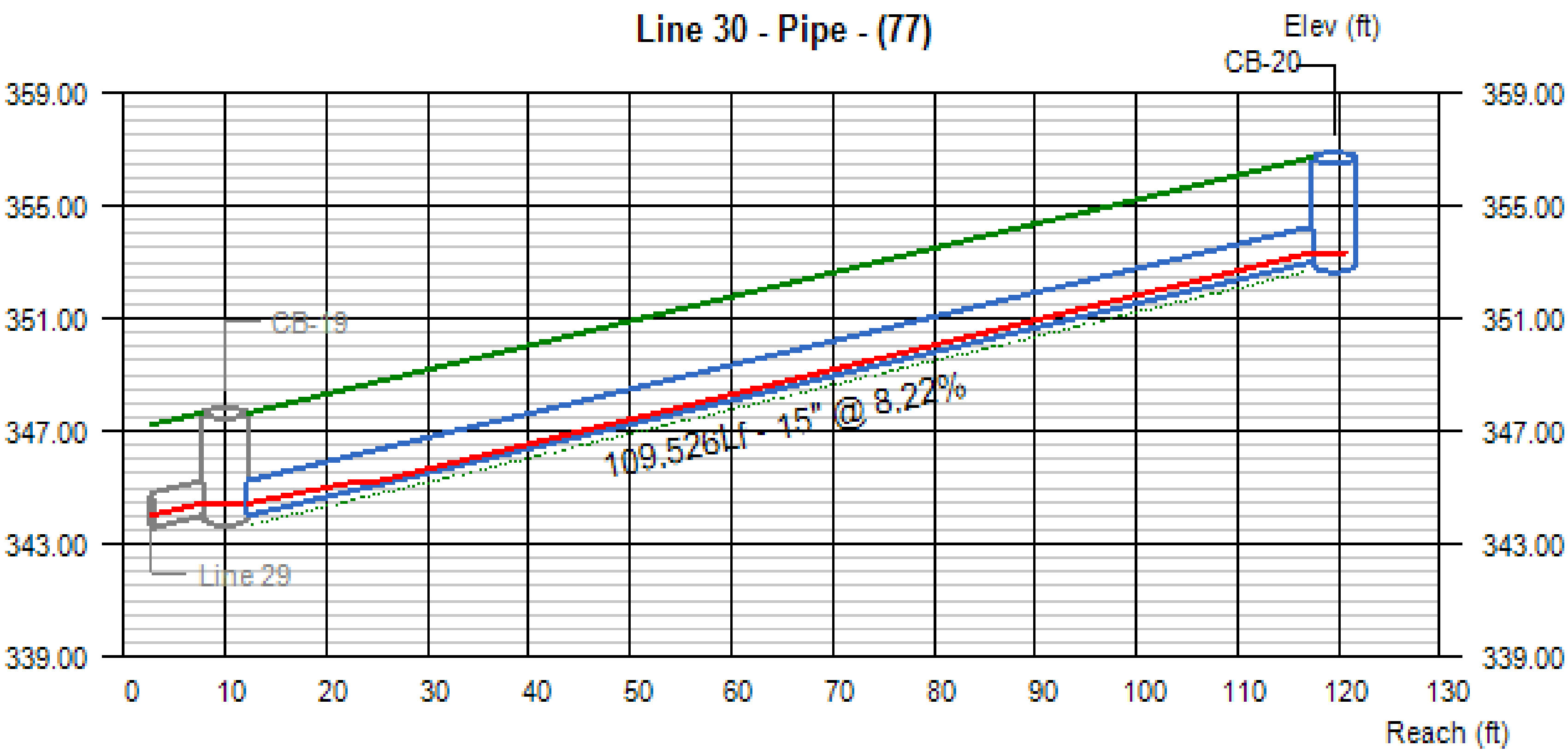
Line Profile (Line 29) - Pipe - (78)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
29	1.22	335.28	344.00	0.73	0.44	0.44	336.01	344.44 j	344.44	1.66	3.21	2.99	2.40

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

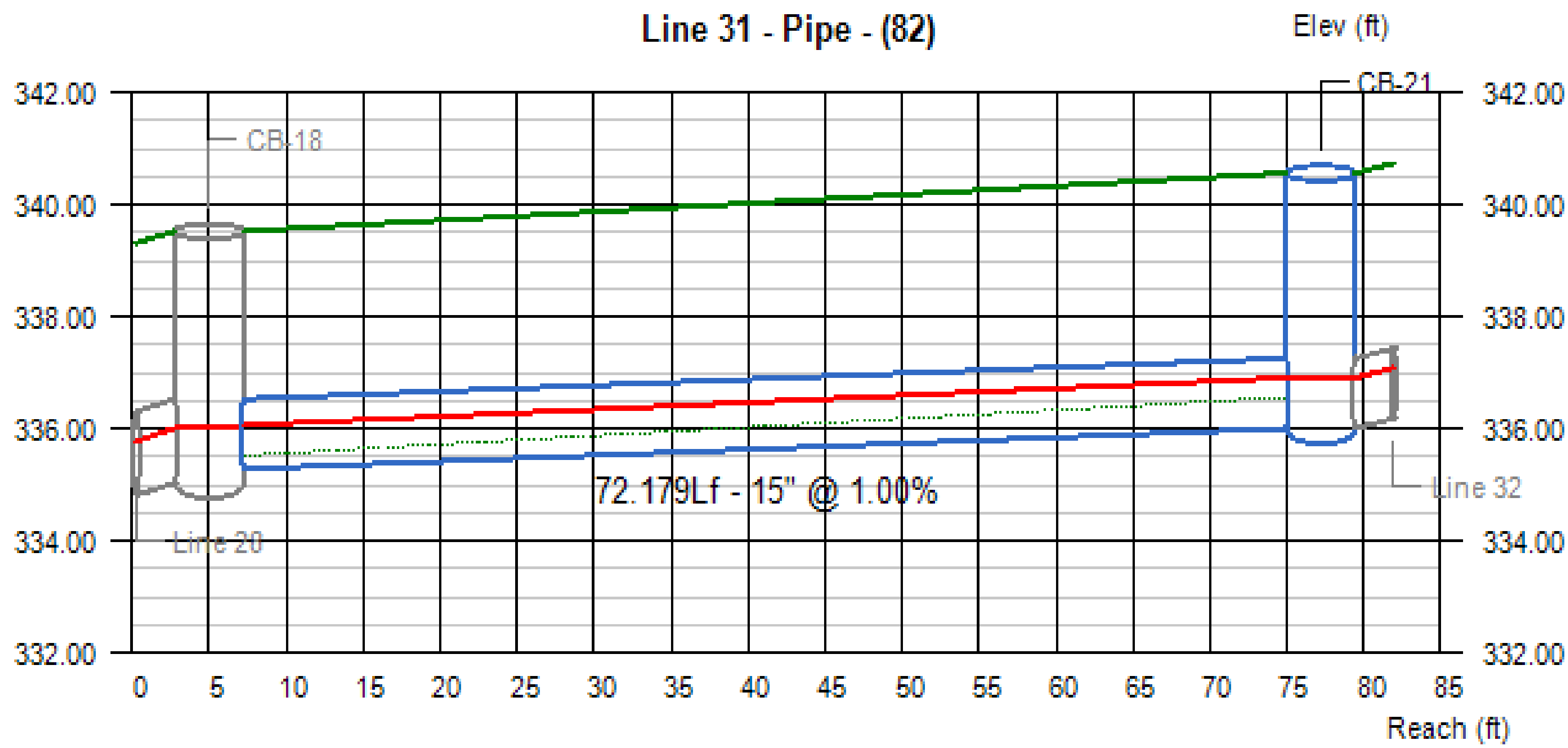
Line Profile (Line 30) - Pipe - (77)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
30	0.73	344.00	353.00	0.44	0.33	0.33	344.44	353.33 j	353.33	1.91	2.77	2.40	2.45

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

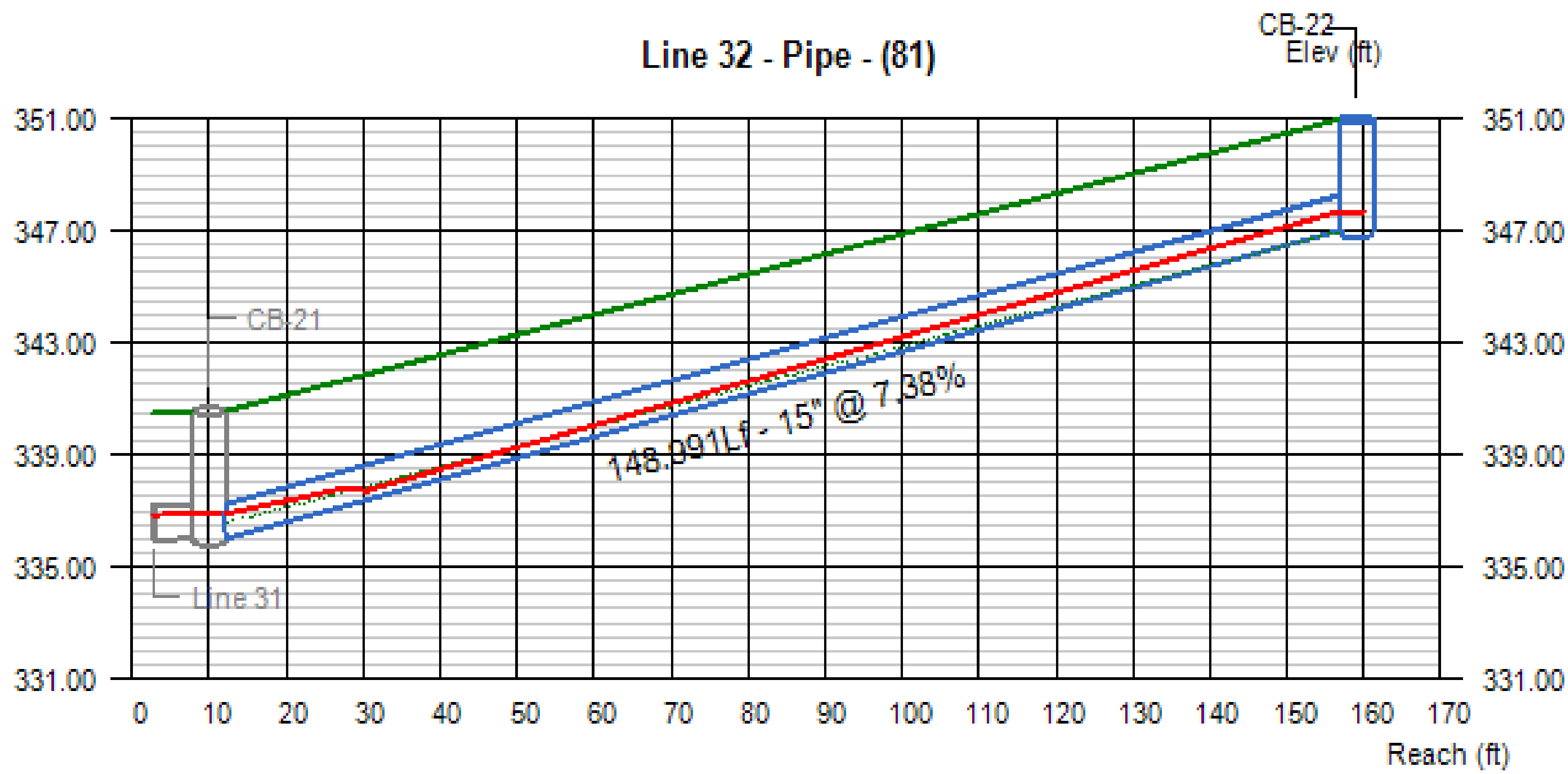
Line Profile (Line 31) - Pipe - (82)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
31	4.99	335.28	336.00	0.78	0.90	0.90	336.06	336.90	336.90	6.18	5.24	2.99	3.31

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

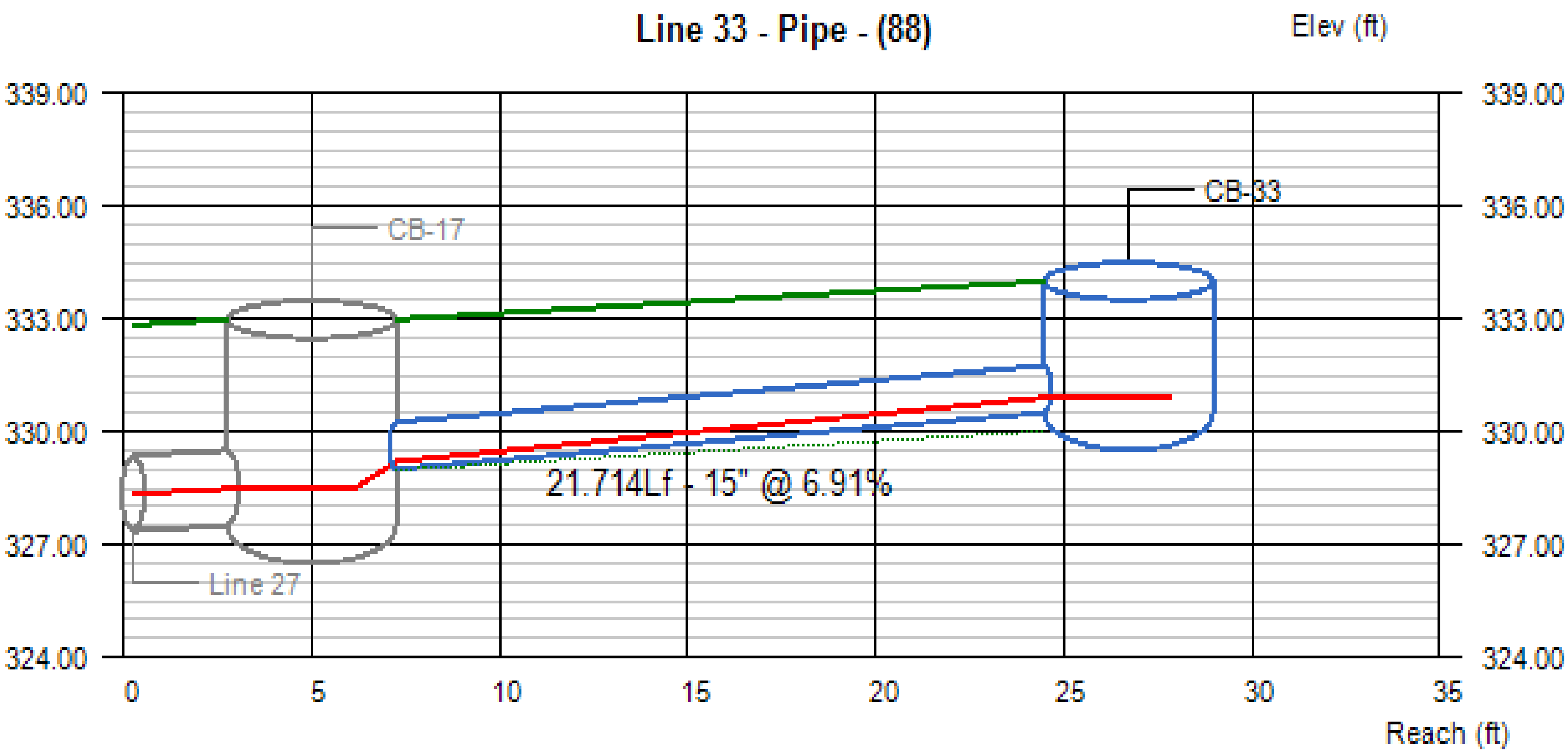
Line Profile (Line 32) - Pipe - (81)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
32	2.86	336.00	347.00	0.90	0.68	0.68	336.90	347.68 j	347.68	3.01	4.20	3.31	2.71

CHURCH HILL FARM AT DEEP BROOK	No. Lines: 33	Run Date: 1/20/2023

Line Profile (Line 33) - Pipe - (88)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
33	1.05	329.00	330.50	0.20	0.40	0.40	329.20	330.90	330.90	8.10	3.07	2.73	2.25

CHURCH HILL FARM AT DEEP BROOK | No. Lines: 33 | Run Date: 1/20/2023

ADDENDUM 2
STORMWATER MANAGEMENT PLAN
DETAILED WATER QUALITY ANALYSIS

FOR

"CHURCH HILL FARM AT DEEP BROOK"

6 COMMERCE ROAD

NEWTOWN, CONNECTICUT

March 20, 2023

Prepared by
J. Edwards & Associates, LLC
227 Stepney Road, Easton, CT 06612

IWC meeting
3-22-23
DT

The objective of the study is to derive a plan to protect the water quality of the watersheds and Deep Brook and to maintain the hydrology of the wetlands.

The water quality objectives are:

1. To remove 80 percent of the total suspended solids from stormwater runoff from paved surfaces.

2. To prevent thermal pollution in Deep Brook.

3. To maintain the hydrology of the wetlands on the site.

SEDIMENTATION

The first criteria are that all runoff from paved surfaces will be treated before discharge to a wetland or watercourse. The primary source of suspended solids will be from road treatment used during the winter. The criteria for the future driveways and parking lots is that 80 percent of the total suspended solids will be removed from the runoff water.

The runoff from the development will be directed into a sediment basin. The criteria used to size the sedimentation basin is the basin will be able to remove 80 percent of the suspended solids during a 10-year return frequency storm. The basin will also be able to pass a 25–year storm through the system without resuspending the collected material. The sediment basins will be designed using the criteria for sewage treatment plant grit chambers. The removal is a function of the surface loading rate and the settling velocities of the suspended solids.

The settling velocity in the sediment basin can be calculated using Stokes' Law of settling velocity. The following equation[1] relates settling velocity to particle size.

$$V_s = \frac{g d^2 (S_s - 1)}{18 v}$$

where: V_s = settling velocity, in cm per second
- g = gravity, 980.5 cm per second
- d = diameter of particle, in cm
- S_s = Specific gravity of particle, unitless = 2.65
- v = kinematic viscosity, in cm per second = .015676

The grain size of 0.2 mm was selected as the design criterion. Based on sieve analysis of road sand, 95 percent of the sand will be larger than this grain size. The maximum allowable settling velocity to obtain the removal of particles greater than 0.2 mm in the sediment basin is:

[1] Source: Fair, Geyer, Okun "Water and Wastewater Engineering" Volume 2 "Water Purification and Wastewater Treatment and Disposal " 1968.

V_s ={ 980.5(0.02) SUP 2(2.65-1)} over { 18(.015676)}

V_s = 2.29 cm per sec

= 0.075 feet per sec

The following equation is used to determine the actual settling velocity that will occur in the sediment basin. It relates the peak flow during a 10-year storm to the surface area of the sediment basin.
V SUB s = Q over A SUB s

where: V_s = the settling rate, in feet per second
Q = the peak flow, in cubic feet per second
A_s = the surface area of the sediment basin, in sq. ft.

The second criterion for the sediment basin is that the material removed is not resuspended during a 25-year storm. The scouring velocity for 0.2 mm particles is 0.75 fps[2]. Velocity through the sediment basin is calculated from the following equation:

V =Q over A

where: V = velocity through basin, in feet per second
Q = the peak flow, in cubic feet per second
A = the area of the sediment basin perpendicular to the direction of flow, in sq. ft.

The actual velocity through the sediment basin in a 25-year will not exceed the scouring velocity of 0.75 fps.

The sedimentation basin will be 160 feet by 80 feet and have a surface area of 11241 square feet. The basin will be 4 feet deep. The perpendicular section area of the basin will be 504 square feet The inflow into the basin during a 10-year design storm is 28.24 cubic feet per second (cfs). During a 25-year storm the flow is 34.16 cfs.

The actual settling velocity will be;

$$V_s = \frac{Q}{A_s} = \frac{28.24}{11241} = 0.0025 \text{ fps}$$

The actual settling velocity will be less than the maximum allowable settling velocity (0.075 fps). Therefore, the sediment basin will be able to settle particles 0.2 mm or larger.

The actual resuspension velocity will be:

$$V = \frac{Q}{A} = \frac{34.16}{504} = 0.068 \text{ fps}$$

The actual resuspension velocity will be less than the maximum allowable settling velocity (0.075 fps). Therefore, the sediment basin will not resuspend the sediment.

---

[2]Source: Clark, Viessman and Hammer "Water Supply and Pollution Control" 1977

THERMAL POLLUTION

The second criterion is to prevent thermal pollution of Deep Brook. During summer months, rainfall on pavement is heated and the runoff carries the heat to the stream into which it discharges. The runoff from the proposed project will enter a water quality basin after it has been treated for sediment using a hydrodynamic separator. The basin is designed to store the runoff from a storm and allow it to infiltrate into the groundwater which will then seep into the stream.

The storage volume of the infiltration basin is 43,089 cubic feet. The area tributary to the basin will produce 0.195 acre-feet of runoff during a 1 inch rainstorm. Storms of this magnitudes will be completely stored in the basin and will percolate into the ground. The amount of water percolating into the ground is dependent on the length of the storm. Percolation tests were conducted in the area of the proposed basin. These test show that the percolation rate is 1 inch per 10 minutes. For design purposes, a conservative value of 1 inch per 20 minutes was used. If the 1 inch storm occurs over a four hour period, the entire 0.195 acre-feet would be stored and percolated into the ground.

A review of the rainfall records taken at the Bridgeport airport, shows that the majority of the total annual rainfall occurs in the first one inch of rain. The following table relates the inches of rainfall to the percent of total annual rainfall which occurs in storms of lower intensity.

Inches of rain	Percent of total annual rainfall occurring in storms of lesser intensity[3]
0.5	83%
1.00	90%
1.50	96%

The infiltration basin is designed to store a 1-inch storm which accounts for approximately 90 percent of the total annual rainfall.

A key element of the design of the infiltration basin is the use of vegetation. The proposed vegetation will have a high nutrient uptake to remove dissolved solids from the runoff. The bottom of the basin will be seeded with New England seed mix which provides a good level of nutrient uptake.

The perimeter of the basin is to be plant with shade trees. These trees will reduce the thermal heating of the water.

HYDROLOGY

The third criteria is to maintain the hydrology of the wetland areas on the site. There are two wetland corridors on the site. The northerly corridor (north of the proposed extension of Commerce Drive) is feed by a 31-acre watershed located west of the railroad tracks. The runoff from this area flows in two culverts under the tracks and then through the newly constructed roadway.

The southerly corridor (south of the proposed extension of Commerce Drive) is feed by a 9 ½ acre watershed located west of the railroad tracts. The runoff from this area flows in two culverts under the tracks. The runoff then flows in an intermittent watercourse across an agricultural field. The flows to the wetlands will be maintained by directing the flow from our development, into the water quality basin and then discharging to the intermittent watercourse which feeds into the wetland corridor located in the south east.

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[3]NWSnow data 2000-2022

Connecticut Department of

ENERGY & ENVIRONMENTAL PROTECTION

March 20, 2018

Mr. Eric Davison
Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
eric@davisonenvironmental.com

Project: Construction of a 1,500 Lineal Foot Driveway for Deep Brook West, Commerce Road, Newtown, Connecticut
NDDB Determination No.: 201800567

Dear Eric Davison,

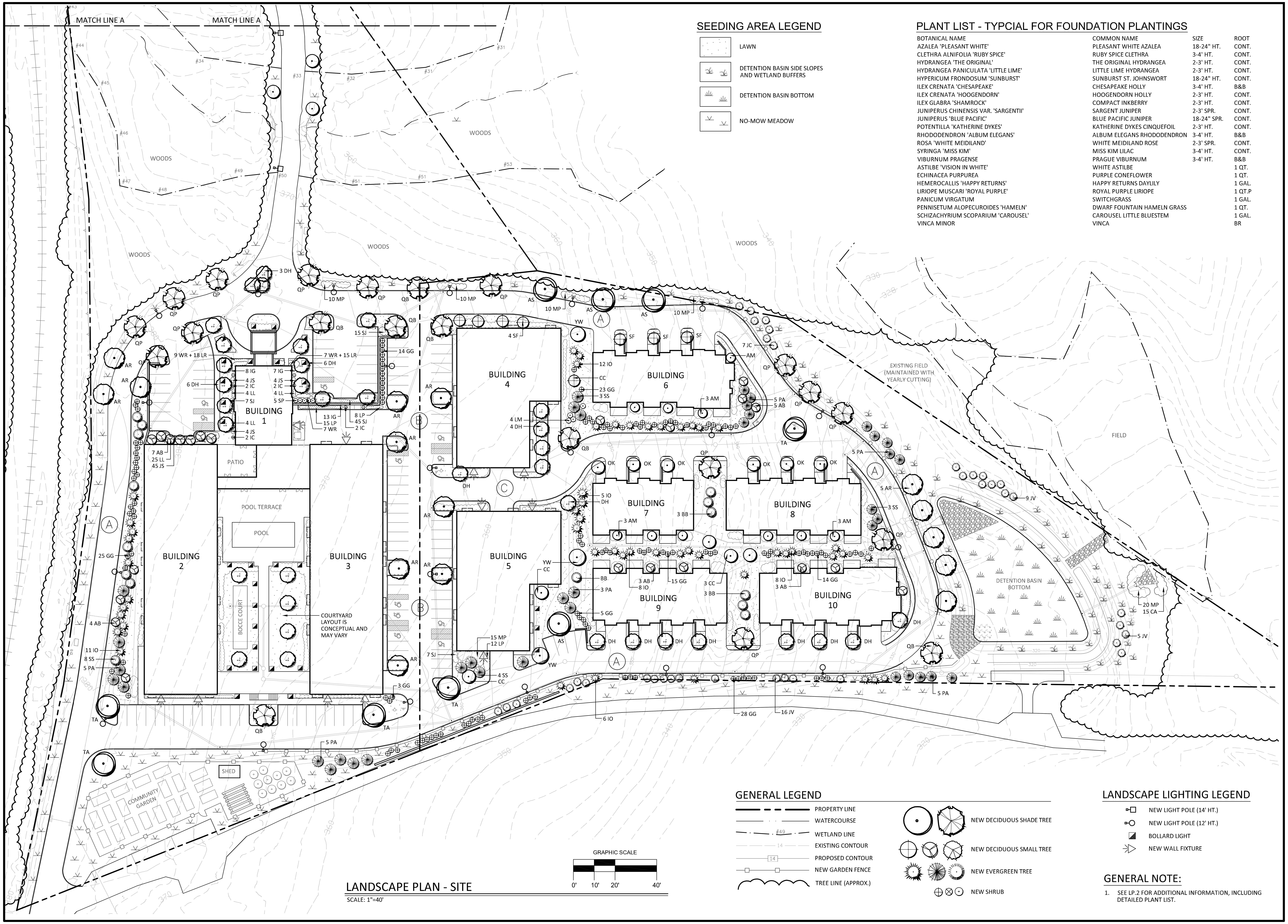
I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided for the proposed Construction of a 1,500 Lineal Foot Driveway for Deep Brook West, Commerce Road, Newtown, Connecticut. According to our records we have known extant populations of State Special Concern *Glyptemys insculpta* (wood turtle) in the vicinity of this project site.

Wood turtle: Wood turtles require riparian habitats bordered by floodplain, woodland or meadows. They hibernate in the banks of the river in submerged tree roots. Their summer habitat includes pastures, old fields, woodlands, powerline cuts and railroad beds bordering or adjacent to streams and rivers. This species has been negatively impacted by the loss of suitable habitat.

Recommended Protection Strategies for Turtles:

Work should occur when these turtles are active (April 1st to October 30th). Conducting land clearing while the turtle is active will allow the animal to move out of harm's way and minimize mortality to hibernating individuals. I recommend the additional following protection strategies in order to protect these turtles:

- Hire a qualified herpetologist to be on site to ensure these protection guidelines remain in effect and prevent turtles from being run over when moving heavy equipment. This is especially important in the month of June when turtles are selecting nesting sites.
- Exclusionary practices will be required to prevent any turtle access into construction areas. These measures will need to be installed at the limits of disturbance.
- Exclusionary fencing must be at least 20 in tall and must be secured to and remain in contact with the ground and be regularly maintained (at least bi-weekly and after major weather events) to secure any gaps or openings at ground level that may let animal pass through. Do not use plastic or netted silt-fence.
- All staging and storage areas, outside of previously paved locations, regardless of the duration of time they will be utilized, must be reviewed to remove individuals and exclude them from re-entry.
- All construction personnel working within the turtle habitat must be apprised of the species description and the possible presence of a listed species, and instructed to relocate turtles found inside work areas or notify the appropriate authorities to relocate individuals.



SEEDING AREA LEGEND

- LAWN
- DETENTION BASIN SIDE SLOPES AND WETLAND BUFFERS
- DETENTION BASIN BOTTOM
- NO-MOW MEADOW

PLANT LIST - TYPCIAL FOR FOUNDATION PLANTINGS

BOTANICAL NAME	COMMON NAME	SIZE	ROOT
AZALEA 'PLEASANT WHITE'	PLEASANT WHITE AZALEA	18-24" HT.	CONT.
CLETHRA ALNIFOLIA 'RUBY SPICE'	RUBY SPICE CLETHRA	3-4' HT.	CONT.
HYDRANGEA 'THE ORIGINAL'	THE ORIGINAL HYDRANGEA	2-3' HT.	CONT.
HYDRANGEA PANICULATA 'LITTLE LIME'	LITTLE LIME HYDRANGEA	2-3' HT.	CONT.
HYPERICUM FRONDOSUM 'SUNBURST'	SUNBURST ST. JOHNSWORT	18-24" HT.	CONT.
ILEX CRENATA 'CHESAPEAKE'	CHESAPEAKE HOLLY	3-4' HT.	B&B
ILEX CRENATA 'HOOGENDORN'	HOOGENDORN HOLLY	2-3' HT.	CONT.
ILEX GLABRA 'SHAMROCK'	COMPACT INKBERRY	2-3' HT.	CONT.
JUNIPERUS CHINENSIS VAR. 'SARGENTII'	SARGENT JUNIPER	2-3' SPR.	CONT.
JUNIPERUS 'BLUE PACIFIC'	BLUE PACIFIC JUNIPER	18-24" SPR.	CONT.
POTENTILLA 'KATHERINE DYKES'	KATHERINE DYKES CINQUEFOIL	2-3' HT.	CONT.
RHODODENDRON 'ALBUM ELEGANS'	ALBUM ELEGANS RHODODENDRON	3-4' HT.	B&B
ROSA 'WHITE MEIDILAND'	WHITE MEIDILAND ROSE	2-3' SPR.	CONT.
SYRINGA 'MISS KIM'	MISS KIM LILAC	3-4' HT.	CONT.
VIBURNUM PRAGENSE	PRAGUE VIBURNUM	3-4' HT.	B&B
ASTILBE 'VISION IN WHITE'	WHITE ASTILBE		1 QT.
ECHINACEA PURPUREA	PURPLE CONEFLOWER		1 QT.
HEMEROCALLIS 'HAPPY RETURNS'	HAPPY RETURNS DAYLILY		1 GAL.
LIRIOPE MUSCARI 'ROYAL PURPLE'	ROYAL PURPLE LIRIOPE		1 QT.P
PANICUM VIRGATUM	SWITCHGRASS		1 GAL.
PENNISETUM ALOPECUROIDES 'HAMELN'	DWARF FOUNTAIN HAMELN GRASS		1 QT.
SCHIZACHYRIUM SCOPARIUM 'CAROUSEL'	CAROUSEL LITTLE BLUESTEM		1 GAL.
VINCA MINOR	VINCA		BR

GENERAL LEGEND

- PROPERTY LINE
- WATERCOURSE
- WETLAND LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- NEW GARDEN FENCE
- TREE LINE (APPROX.)
- NEW DECIDUOUS SHADE TREE
- NEW DECIDUOUS SMALL TREE
- NEW EVERGREEN TREE
- NEW SHRUB

LANDSCAPE LIGHTING LEGEND

- NEW LIGHT POLE (14' HT.)
- NEW LIGHT POLE (12' HT.)
- BOLLARD LIGHT
- NEW WALL FIXTURE

GENERAL NOTE:

1. SEE LP.2 FOR ADDITIONAL INFORMATION, INCLUDING DETAILED PLANT LIST.

GRAPHIC SCALE 0' 10' 20' 40'

LANDSCAPE PLAN - SITE

SCALE: 1"=40'

PREPARED BY:

ENVIRONMENTAL LAND SOLUTIONS, LLC
8 KNIGHT STREET, SUITE 203
NORWALK, CT 06851
TEL: (203) 855-7879
FAX: (203) 855-7836
info@elsllc.net

"CALL BEFORE YOU DIG".

PROJECT:

CHURCH HILL FARM AT DEEP BROOK
6 & 8 COMMERCE ROAD
NEWTOWN, CONECTICUT

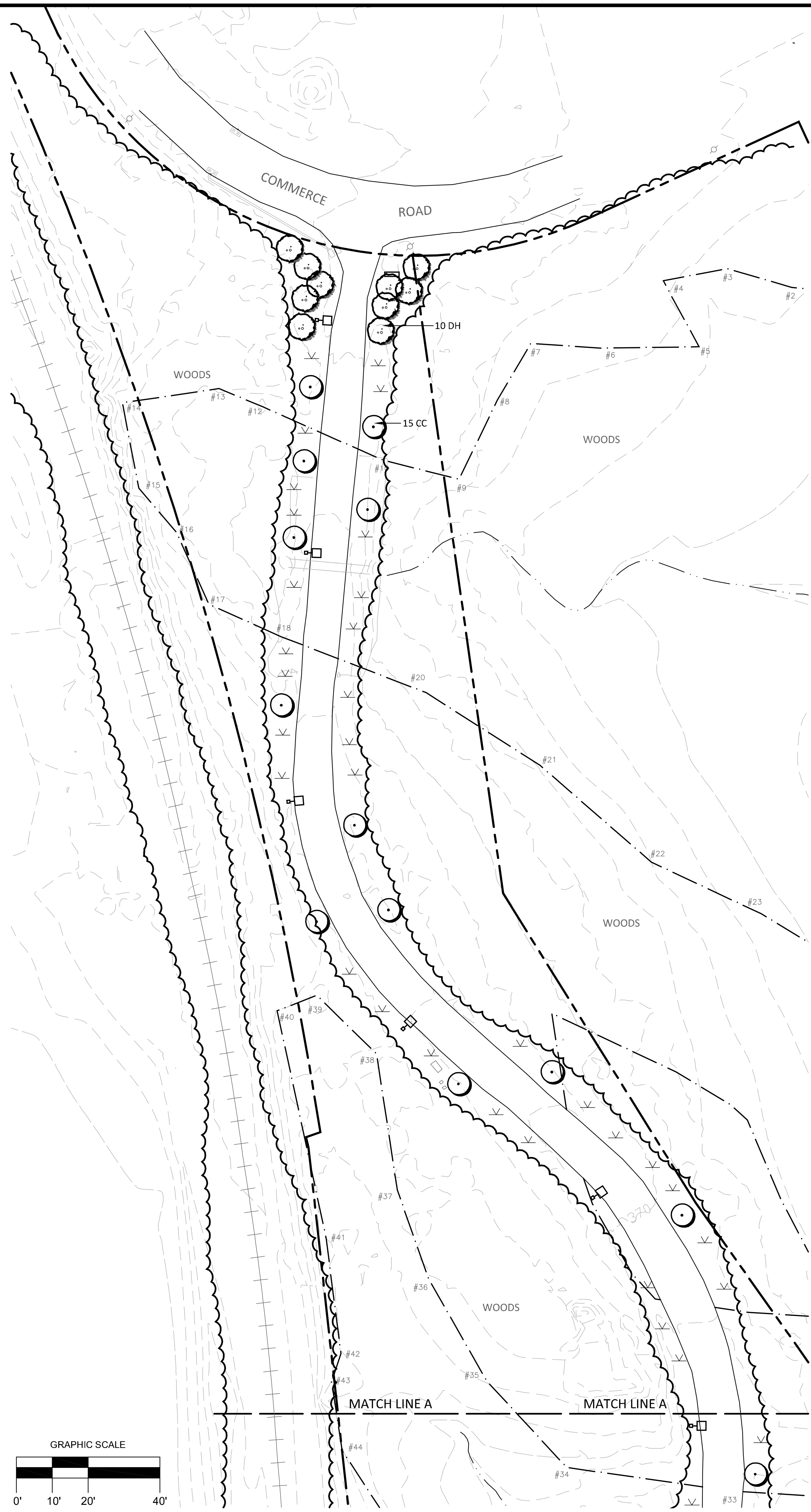
REVISIONS:

SCALE: 1"=40'

DATE: 3.6.23

TITLE: LANDSCAPE PLAN

SHEET NO.: LP.1



LANDSCAPE PLAN - ENTRANCE DRIVE

SCALE: 1"=40'

GENERAL NOTES:

1. EXISTING AND PROPOSED SITE INFORMATION TAKEN FROM A DIGITAL AUTOCADD SITE PLAN SUPPLIED BY J. EDWARDS ASSOCIATES, LLC.
2. EXACT LOCATION OF PROPOSED PLANTINGS AND SPECIES TYPES MAY VARY FROM THIS PLAN BASED ON SITE PLAN REVISIONS AND/OR ACTUAL FIELD CONDITIONS.
3. 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.
4. ALL PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
5. THE CONTRACTOR SHALL VERIFY WITH THE PROJECT ENGINEER THAT THE NEW PLANTINGS DO NOT INTERFERE WITH EXISTING AND/OR PROPOSED UTILITIES, SIGHT LINES, AND/OR STRUCTURES.
6. THIS PLAN FOR PLANTING PURPOSES ONLY. SEE PLANS BY OTHERS FOR ADDITIONAL INFORMATION.
7. SPRAY NEW PLANTINGS IMMEDIATELY AFTER INSTALLATION WITH A WHITE-TAILED DEER REPELLENT AND CONTINUE AS NEEDED TO MAINTAIN PLANTS FREE OF SIGNIFICANT DEER BROWSING.

SEEDING NOTES (TYP.):

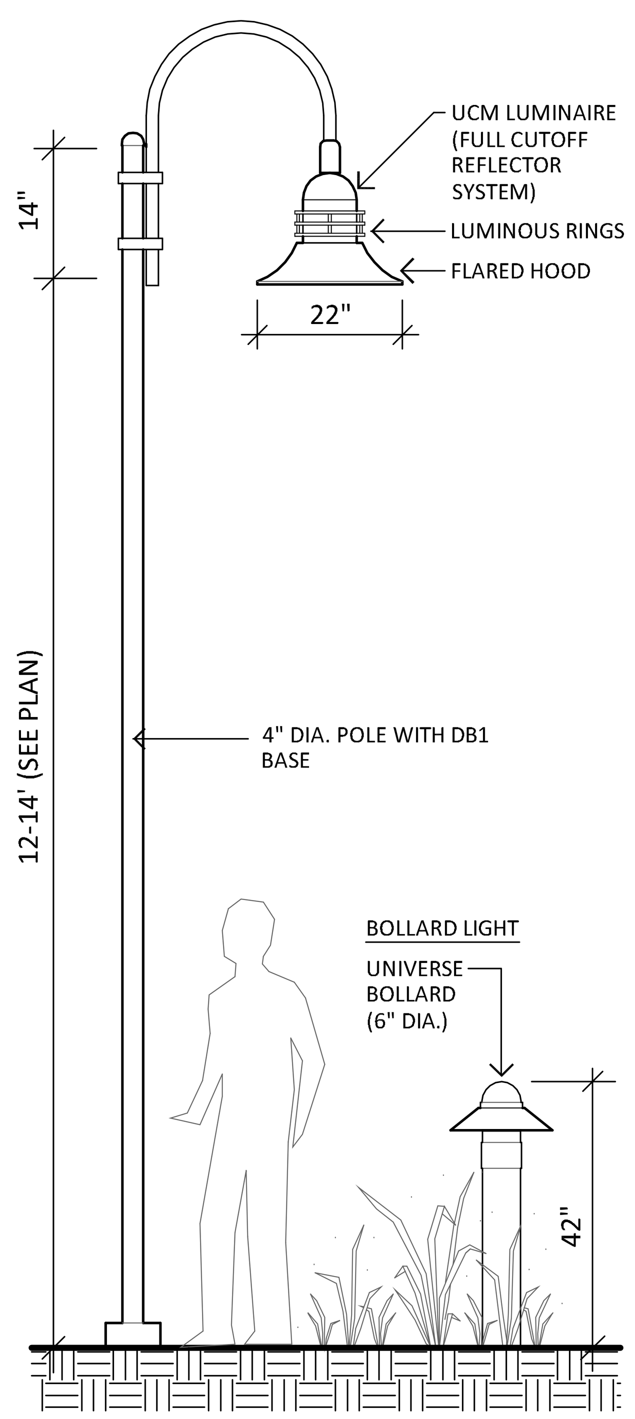
1. SEED AREAS PER PLAN AT THE METHODS AND 125% THE APPLICATION RATE RECOMMENDED BY THE MANUFACTURER. THE SEED SHALL BE SPREAD ON THE PREPARED SOIL, LIGHTLY RAKED TO ESTABLISH GOOD SOIL CONTACT AFTER SOWING, AND MULCHED WITH A 2 INCH LOOSE LAYER OF CLEAN OAT STRAW OR COMMERCIAL WOOD FIBER PRODUCTS APPLIED BY HAND OR BY HYDROSEEDING. A NURSE CROP OF PERENNIAL RYE GRASS AT THE RATE OF 40 LBS./ACRE SHALL BE ADDED TO THE SEED MIX ON SLOPES OF EXCESS OF 10% AND AS SPECIFIED. SEED MIX SUBSTITUTIONS SHALL BE EQUIVALENT TO THAT SPECIFIED AND APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE. MAINTAIN SEEDED AREAS AS RECOMMENDED BY THE MANUFACTURER. SEED AREAS AS PER THE FOLLOWING SCHEDULE:

   A. LAWN:
   SEED DISTURBED LAWN AREAS WITH A HIGH QUALITY SUN AND SHADE TURF SEED MIXTURE CONSISTING OF BLUEGRASS, FESCUE, AND PERENNIAL RYEGRASS AT THE MANUFACTURER'S RECOMMENDED SEEDING RATE.

   B. NO-MOW MEADOW:
   SEED NO-MOW LAWN AREA WITH A "NO-MOW" LAWN SEED MIX WITH AN ANNUAL RYE NURSE CROP BY PRAIRIE NURSERY (WWW.PRAIRIENURSERY.COM). THIS MIX CONTAINS SEVERAL LOW-MAINTENANCE FESCUE GRASS SPECIES THAT WILL DEVELOP A STABLE LOW GRASS COVER OVER DISTURBED SOILS THAT MAY BE MOWED REGULARLY, YEARLY, OR NOT MOWED AT ALL. APPLY SOIL AMENDMENTS AS RECOMMENDED BY THE SEED MIX MANUFACTURER.

   C. DETENTION BASIN BOTTOM AND WETLAND BUFFERS:
   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).

   B. DETENTION BASIN SIDE SLOPES:
   SEED THIS AREA WITH "NEW ENGLAND EROSION CONTROL/RESTORATION MIX (FOR DRY SITES)" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000).



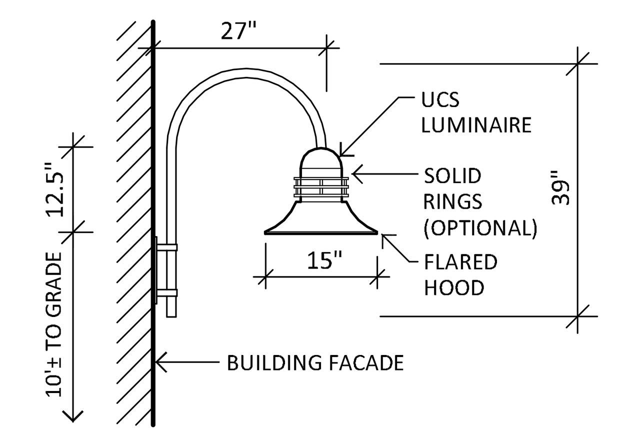
NOTE:
1. LIGHT FIXTURE (UNIVERSE COLLECTION), POLE, AND BOLLARD BY ARCHITECTURAL AREA LIGHTING.
2. POLE COLOR AND FIXTURE SHALL BE BRONZE IN COLOR.

LIGHT POLE & BOLLARD LIGHT

SCALE: NOT TO SCALE

PLANT LIST

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
15	AR	ACER RUBRUM	RED MAPLE	2 1/2-3" CAL.	B&B	FULL
13	AM	ACER RUBRUM 'ARMSTRONG'	ARMSTRONG MAPLE	2-2 1/2" CAL.	B&B	
4	AS	ACER SACCHARUM	SUGAR MAPLE	2 1/2-3" CAL.	B&B	FULL
39	DH	BETULA NIGRA 'DURA HEAT'	DURA HEAT BIRCH	8-9' HT.	B&B	MULITSTEM
3	YW	CLADRASTIS LUTEA	YELLOWWOOD	2-2 1/2" CAL.	B&B	FULL
7	QB	QUERCUS BICOLOR	SWAMP WHITE OAK	3-3 1/2" CAL.	B&B	FULL
14	QP	QUERCUS PALUSTRIS	PIN OAK	2-2 1/2" CAL.	B&B	FULL
5	TA	TILIA AMERICANA 'REDMOND'	REDMOND LINDEN	2 1/2-3" CAL.	B&B	FULL
22	AB	AMELANCHIER 'AUTUMN BRILLIANCE'	AUTUMN BRILLIANCE SHAD	5-6' HT.	B&B	
7	SF	AMELANCHIER LAEVIS 'SPRING FLURRY'	SPRING FLURRY SHAD	2-2 1/2" CAL.	B&B	
21	CC	CERCIS CANADENSIS	REDBUD	7-8' HT.	B&B	
7	BB	MAGNOLIA GRANDIFLORA 'BRACKEN'S BEAUTY'	BRACKEN'S BEAUTY MAGNOLIA	6-7' HT.	B&B	FULL
6	OK	PRUNUS 'OKAME'	OKAME CHERRY	2-2 1/2" CAL.	B&B	MATCHING
50	IO	ILEX OPACA	AMERICAN HOLLY	5-6' HT.	B&B	20% MALES
37	JV	JUNIPERUS VIRGINIANA'	RED CEDAR	5-6' HT.	B&B	
28	PA	PICEA ABIES	NORWAY SPRUCE	8-10' HT.	B&B	
18	SS	PICEA OMORIKA	SERBIAN SPRUCE	8-10' HT.	B&B	
127	GG	THUJA 'GREEN GIANT'	GREEN GIANT ARBORVITAE	6-7' HT.	B&B	
15	CA	CLETHRA ALNIFOLIA	SUMMERSWEET	2-3' HT.	CONT.	
37	LL	HYDRANGEA PANICULATA 'LITTLE LIME'	LITTLE LIME HYDRANGEA	2-3' HT.	CONT.	
4	LM	HYDRANGEA PANICULATA 'LIME LIGHT'	LIMELIGHT HYDRANGEA	4-5' HT.	CONT.	
74	SJ	HYPERICUM FRONDOSUM 'SUNBURST'	SUNBURST ST. JOHNSWORT	18-24" HT.	CONT.	
8	IC	ILEX CRENATA 'CHESAPEAKE'	CHESAPEAKE HOLLY	3-4' HT.	B&B	
28	IG	ILEX GLABRA 'SHAMROCK'	COMPACT INKBERRY	2-3' HT.	CONT.	
57	JS	JUNIPERUS CHINENSIS VAR. 'SARGENTII'	SARGENT JUNIPER	2-3' SPR.	CONT.	
75	MP	MYRICA PENSYLVANICA	NORTHERN BAYBERRY	2-3' HT.	CONT.	
24	WR	ROSA 'WHITE MEIDILAND'	WHITE MEIDILAND ROSE	2-3' SPR.	CONT.	
35	LP	SPIRAEA 'LITTLE PRINCESS'	LITTLE PRINCESS SPIREA	2-3' HT.	CONT.	
5	SP	SYRINGA MEYERI 'PALIBIN'	PALIBIN LILAC	30-36" HT.	CONT.	
18	LR	LIRIOPE MUSCARI 'MONROE WHITE'	MONROE WHITE LIRIOPE		1 QT.	



NOTE:
1. LIGHT FIXTURE (UNIVERSE COLLECTION) BY ARCHITECTURAL AREA LIGHTING OR EQUIVALENT (3000K). INSTALL LIGHT FIXTURE PER MANUFACTURER'S RECOMMENDATIONS.
2. FIXTURE SHALL BE BRONZE IN COLOR.
3. SEE ARCHITECTURAL PLANS FOR FINAL MOUNTING HEIGHT AND PLACEMENT.

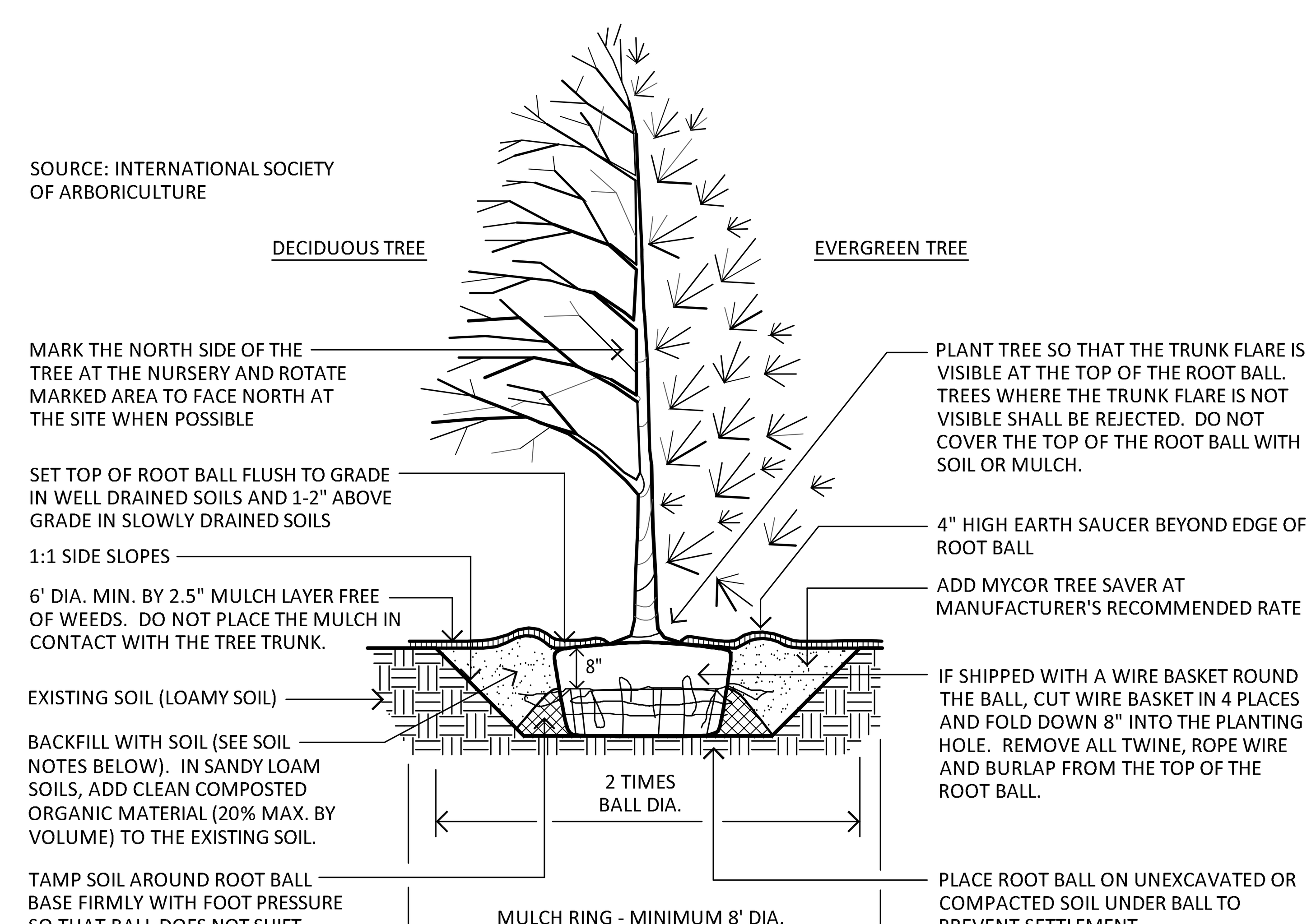
WALL FIXTURE (TYP.)

SCALE: NOT TO SCALE

LANDSCAPE LIGHTING NOTES (TYP.):

1. SITE LIGHTING INFORMATION AND LIGHTING PLANS PREPARED BY ENVIRONMENTAL LAND SOLUTIONS, LLC ARE DESIGNED FOR GENERAL LANDSCAPE AESTHETIC PURPOSES ONLY. LIGHTING INFORMATION SHOWN ON THIS PLAN SHALL NOT BE USED FOR SECURITY OR SAFETY PURPOSES.
2. LOCATION AND TYPE OF LIGHT FIXTURES ARE TYPICAL AND MAY VARY BASED ON ACTUAL FIELD CONDITIONS, SITE AND ARCHITECTURAL PLAN REVISIONS, USE OF EXISTING LIGHTING (IF ANY), NEW BUILDING MOUNTED LIGHTING, AESTHETICS, AND CONSULTATIONS WITH LIGHTING CONSULTANT AND/OR MANUFACTURER.
3. THIS PLAN ASSUMES THAT THE BUILDING WILL HAVE WALL MOUNTED FIXTURES (BY OTHERS) TO LIGHT THE FACADE AND ADJACENT LANDSCAPE AREAS (INCLUDING WALKS AND DOORS).
4. LIGHT POLES BASE SHALL BE MOUNTED FLUSH WITH GRADE AND LOCATED A MINIMUM OF 3' FROM THE EDGE OF VEHICLE PAVEMENT IF FEASIBLE.

SOURCE: INTERNATIONAL SOCIETY OF ARBORICULTURE



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. WRAP TREE TRUNKS ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT.

TREE PLANTING DETAIL

SCALE: NOT TO SCALE

PREPARED BY:

ENVIRONMENTAL LAND SOLUTIONS, LLC

8 KNIGHT STREET, SUITE 203
NORWALK, CT 06851

TEL: (203) 855-7879
FAX: (203) 855-7836
info@elsllc.net

"CALL BEFORE YOU DIG" .

PROJECT:

CHURCH HILL FARM AT DEEP BROOK
6 & 8 COMMERCE ROAD
NEWTOWN, CONECTICUT

REVISIONS:

SCALE: AS SHOWN

DATE: 3.6.23

TITLE: LANDSCAPE PLAN

SHEET NO.: LP.2

Church Hill Farm Review - Kendall Horch

1. Deep Brook should be labeled on the plans as it is an important watercourse and resource for the town.

2. Is the applicant a purchaser of Lots 1A, 1B and 2? Will Lot 2 will remain as Open Space? If the applicant isn't purchasing Lot 2, how can it be considered part of the project? Seems to me that you would need to purchase both Lot 1 and Lot 2 then give Lot 2 back to the town for open space.

a) In the zoning chart it looks like you need 40+ acres for this kind of development (AAHCDD M-5). If this is accurate, you need Lot 2 in order to have 40 acres.

b) Density on Lot 1A is very high considering the lot has significant wetlands and the access drive running through it. It's buildable area is considerably less than the 8.758 acres, more like 7 acres. I think this adds to development density. This is important because if you had less units, there could be less pavement and less impervious surfaces creating less potential impacts to Deep Brook and the onsite/offsite wetland system. Just a comment for consideration.

3. Three Phases of construction are indicated on the plans but the plans do not indicate three phases of construction. Will the project be built all at once or separately? Very concerned if built all at once! We have seen what happens if you expose an entire site uphill of wetlands.

a) There is significant grading between each phase and extensive cut and fill. Development of the site appears to be very dense with parking, drives and units based on 14.2 acres but really just crammed into 7 acres. What was the density on the previously approved project?

b) There is excess fill of 11,179 cy. How many truck trips will be needed to remove this fill? I assume a whole lot....Plus the trucks have to come and go so 2 trips per load. They will have to use the new accessway that crosses wetlands with every trip. Have you accounted for the impact this will have? Maybe an additional hydrodynamic separator to catch oils/truck runoff is needed on the accessway?

c) Do you expect significant dewatering to take place excavating the garage parking and how will it be handled? You are looking at a 15+ foot cut in the north corner of building 2. Test holes show groundwater at 3-5ft deep.

d) Will the dewatering fill up the temporary sediment traps leaving no volume for rainfall runoff? Controlling erosion and sedimentation to Deep Brook is our major concern.

e) How will you control the potential turbidity of the runoff water? Answered in additional materials supplied by engineer at meeting, therefore not mentioned.

f) Please describe the treatment train for addressing runoff water quality for this project and its discharge into Deep Brook?

4. Erosion Control Plan:

a) The controls identified on the plans and details are too generic and do not fully represent the proposed phased construction.

b) If the entire site is to be stripped and regraded, there needs to be significantly more controls and the phasing procedure needs to be better outlined for the contractor. If you don't do this there will be a very good chance of significant negative impacts to the onsite/offsite wetland system and Deep Brook. A double row of silt fence around the perimeter of the site will not stop the runoff from the multi-acre site. This does not follow the guidelines for silt fence and total upland contributing area per DOT standards, I am pretty sure. In my opinion this is very critical

c) Sediment traps are shown but have no outlets shown on the plans. The detail shows a modified rip-rap weir overflow. The problem is that the proposed stockpile areas are shown directly downslope from the sediment traps of the basins. This is an invitation for a significant soil and erosion control problem!!

d) The Erosion Control Plan needs further work and description to provide for phased construction to limit the potential negative impacts from soil erosion and runoff turbidity.

5. Details Plan 5.1:

a) General Notes: Note 15 - The Project is in Newtown and "Monroe Standards" do not apply. Please correct. This also applies to the Note 1 in the Stormwater Pollution Control Section.

b) Stormwater Pollution Control Section: Note 7 - Stockpiles shall be located outside regulated areas, end of story. Not whenever possible.

c) Stormwater Pollution Control Section: Notes 18 - Several methods of erosion control are indicated and but not shown on the plans. A full construction sequence indicating where these controls are to be placed is needed.

d) Stormwater Pollution Control Section: Note 19 - This note indicates that only 1 acre of disturbance will take place at a time and then the area stabilized. Given the density of the plan and interrelated grading, this construction procedure must be shown on a plan for the contractor. And if there are changes the IW Commission and other town representatives should be notified and necessary approvals granted.

e) A lot more detail needs to be added to the plans to show how this project will be constructed while protecting the IW resources and Deep Brook.

f) Construction Sequence: This is pretty generic and needs to be expanded to conform to the additional plan information required in the Stormwater Pollution Control Plan.

g) Detention Basin Construction: Additional information is required to detail how the bottom of the basin is to be constructed. It is a cut and fill section and the project design utilizes infiltration for water quality. The infiltration is critical for its success. If the bottom is impervious, the design calculations do not apply and there will certainly be impacts to Deep Brook from the discharge runoff. It will be hard to build the berm without compacting the bottom of the basin.

6. General Comment - Utilizing a single Stormwater Treatment Unit for this size of project seems to be a poor design. I would recommend considering using 3 smaller units, one for each branch of the stormwater collection system. This would be a more effective design.

Stormwater Management Plan:

One primary comment that needs addressing. The existing conditions Time of Concentration is 18.2 minutes for runoff flowing over the grass field and woods as shown on Drawing 4.1. The proposed Time of Concentration is 19.8 minutes for water flowing over parking lots, roofs and in pipes. This does not really make sense given your many small catchment areas as shown on Drawing 4.2. The proposed Time of Concentration is mostly over impervious surfaces but you are measuring a small area of grass that extends the TOC. This is not representative of the majority of the developed area. The TOC is critical to the sizing of the detention basin which right now is the only thing standing between this construction and Deep Brook.

The report also reports 5.32 acres of unconnected roofs. Can we assume this includes the impervious parking areas and walks as well?

Environmental Report:

Revisit the introduction as I think your numbers are not described correctly. There are three parcels and this section needs to be discussed as three parcels to understand the numbers.

Revisit the stormwater treatment train and make recommendations to engineer how to improve or enhance the water quality. The treatment train for water quality is very limited.

<u>Summary:</u>

Based on the additional information that needs to be provided by the applicant to address my concerns, I think this project should be Peer Reviewed by another engineering firm to make sure the calculations and drawings are accurate. It's critical that the design be coordinated and provide the best protection for the onsite and offsite Inland Wetland Systems as well as Deep Brook. This includes during construction and post construction.

Thank You

TROUT UNLIMITED
CANDLEWOOD VALLEY

Newtown Inland Wetlands Commission
Newtown Municipal Center
3 Primrose Lane
Newtown, CT 06470

March 22, 2023

Good evening my name is Mike Fatse, I am a Newtown resident and president of the Candlewood Valley Chapter of Trout Unlimited (CVTU).
We are here to express the concerns we at CVTU have regarding the proposed project (Application IW #23-04) at 6-8 Commerce Road and the impact we believe it will have on Deep Brook, and the Pootatuck river. CVTU is a local chapter of Trout Unlimited, a world wide organization whose mission is to conserve, protect and restore coldwater fisheries and their watersheds. We have an active group of 200+ members, 54 of which reside in Newtown.

CVTU has worked tirelessly for the past two plus decades to improve, protect and restore the rivers and streams in Newtown, especially Deep Brook and the Pootatuck river which is directly down stream of the proposed project. Deep Brook is one of only 9 Class 1 trout streams (a class one designation is given a stream with a self-sustaining population of native trout) in the state and is home to both native Brook trout and wild Brown trout, both of which are self-sustaining populations. Unfortunately, due to a number of factors effecting both waters their population numbers have declined in recent years. It is our true belief that any adverse effects from the propsed development will have devastating effects on the river system down stream.

Our concerns are many and include …
1.Thermal effects of summer thunderstorms falling on extremely hot parking surfaces which can significantly raise water temperatures to lethal levels for fish and aquatic insects in a matter of minutes.
2. The disturbance of the property and the effects of sediment which will find its way into Deep Brook ,cover the stream bed, thus making natural reproduction extremely difficult due to the lack of available gravel beds that are currently down stream of the project.
3.The potential for contaminated runoff during all seasons which could include sand, road oils, and salt/chemicals used during winter for snow removal.
4. Overall impact and negative effects on the health of Deep brook and the Pootatuck river below the project.

Starting in 2015, during the administration of our former First Selectmen, CVTU, The PWA (Pootatuck Watershed Association), and the Town of Newtown formed a team to collectively work to protect Deep Brook and the surrounding area from threats to water quality, habitat and native fish populations. We met monthly and then quarterly with the First Selectmen's office, Newtown Public Works, Parks and Recreation, and the Land Use Office. Our collaborative efforts successfully found ways to limit new harmful impact and to mitigate existing sources that flow into Meeker Brook, Deep Brook, and the Pootatuck River. We believed that by raising awareness of the value of these streams' beautiful resources to our community, initiatives that negatively impact these watercourses would be either eliminated or rigorously reviewed to safeguard the ecosystem's health.

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CANDLEWOOD VALLEY

In order to be sure our concerns are heard and taken seriously we have invited the following people to speak on our behalf.

Neil Baldino - Vice President of CVTU

Michael Humphreys - CT DEEP/Fisheries Biologist (retired)

Steven Trinkaus - Civil Engineer/Owner Trinkaus Engineering

In Closing, I ask on behalf of the members of CVTU, other like minded residents of Newtown and visitors to Deep Brook and the surrounding area that the IWC and the town look very closely and pay strict attention to the potential of losing this resource due to development. Once the land and the watercourse are gone they will be gone forever, the native trout in Deep Brook have a history that goes back thousands of years.

Respectfully submitted,

Mike Fatse
President CVTU
shflyguy@gmail.com

TROUT UNLIMITED
CANDLEWOOD VALLEY

Deep Brook Watercourse – A High-Quality Aquifer

"Why It's So Special"

Newtown Inland Wetlands Commission Public Hearing
Regarding IW Application #23-04 – Teton Capital Company, LLC
Wednesday, March 22, 2023

Why Deep Brook Watercourse Is So Special
A High-Quality Aquatic Resource

TROUT UNLIMITED
CANDLEWOOD VALLEY

- **Deep Brook is a designated Class 1 Wild Trout Management Area watercourse which is rare in Connecticut. It is 1 of only 9 in the state . This classification means a river or stream has adequate natural reproduction to support a sustained trout habitat and ecosystem.**
- **It is a high-quality aquatic resource in the Town of Newtown, running through Fairfield Hills and is vital to the Pootatuck aquifer system (Watershed).**

Concerns with 6-8 Commerce Road Project Impact on the Deep Brook Watercourse

(NOTE: Not in any order of importance)

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- **Organic pollutants from vehicle, in addition to oil and fuel spills getting into the watercourse**
- **Sizing of Water Quality Basin containment**
- **Water Quality Basin "pooled" hot water**
- **Silt, debris, contaminants, and hazard spills runoff during project construction**
- **Hot water runoff during heavy rains during peak temperature months (Summer) into the watercourse**
- **Maintenance of the facility & grounds – Additions of fertilizers, pest control, building washing, and ground nutrients**
- **Increased run-off (Silt & sediment) into the Deep Brook watercourse during trout spawning period (Sept. - Nov.).**
- **Discharge rate of Water Quality Basin into the watercourse**
- **The impact of an additional 171 units on the Wastewater Treatment Plant**
- **CO2 Footprint Contribution – Total CO2 Emissions**
- **Impact on Connecticut Endangered Species (Wood Turtles…)**

Deep Brook/Meeker Brook Temperature Data Observations

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CANDLEWOOD VALLEY

Lethal Trout Temps: 75F to 77F

- **It can be seen in this brief summary that thermal shocking is occurring in Deep Brook and Meeker Brook.**
- **The average temperature (May thru Sept.) in Deep Brook is hovering around 66F which is very close to the stress level temp for trout ~ 68F**
- **Thermal shocking events raise the water temp. by 10+ degrees in both Deep Brook & Meeker Brook.**
- **Thermal shocking events elevates the water temps to an unhealthy level for the trout habitat + macroinvertebrate.**
- **The average temperature of Meeker Brook has increased in the last 9 years by 2.5 degrees.**
- **Any additional unhealthy contributions to Deep Brook; more impervious surface runoff (Not to mention additional nutrient load) can "tip" Deep Brook to be an unhealthy ecosystem for trout to sustain and reproduce.**
- **NOTE: The section of Deep Brook from the confluence of Meeker Brook down past the Deep Brook Mouth thermo logger has a very well shaded canopy.**

Deep Brook/Meeker Brook Temperature Data Background Information

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CANDLEWOOD VALLEY

- **The slides in this portion of the presentation outline the temperature profile for Deep Brook. This is a Class 1 Wild Trout Management designated watercourse (Natural reproducing trout) and is 1 of 9 within Connecticut.**
- **Meeker Brook is a cold-water tributary of Deep Brook, and it flows into Deep Brook roughly ½ mile upstream of the Deep Brook Mouth thermo logger. Meeker Brook is fed from the underground and stormwater from Fairfield Hills complex. Meeker Brook itself has a thermo logger installed and also provides spawning refuse for trout.**
- **Temperature data has been collected over 16 years but in this presentation, only the past 8 years has been noted. They are installed in mid-May and extracted by mid-September of each year. They are capturing data for the hottest and sometimes the dries months of the year.**
- **Figure #1 – Depicts the location of data loggers in reference to the proposed Commerce Rd. apartment complex within Fairfield Hill land.**
- **Figure #2 – Shows the historical temperature data for the Deep Brook Mouth location (Max, Min and Average from May 15th thru September 15th)**
- **Figure #3 – Shows the historical temperature data for the Meeker Brook location (Max, Min and Average from May 15th thru September 15th)**
- **Figure #4 – Show the thermal shocking that occurs in Meeker Brook during hot weather and heavy rain fall (This was just for one year, 2016 but the behavior would be similar year over year.) Rainfall is shown on the graph. NOTE: On this graph, 2 sections are outlined that are further detailed in Fig # 5 & 6. Showing the influence of the thermal spikes on Deep Brook.**
- **Figure #5 – Shows the influence of thermal spikes coming out of Meeker Brook, flowing into Deep Brook and recorded by the Deep Brook Mouth thermo logger. NOTE: Air temp and rain fall are shown for this period (July 1st thru July 15th, 2016).**
- **Figure #6 – Shows the influence of thermal spikes coming out of Meeker Brook, flowing into Deep Brook and recorded by the Deep Brook Mouth thermo logger. NOTE: Air temp and rain fall are shown for this period (July 30th thru August 30th, 2016).**

Fig. #1:Temp Data Logger Locations Relative to 6-8 Commerce Rd Project

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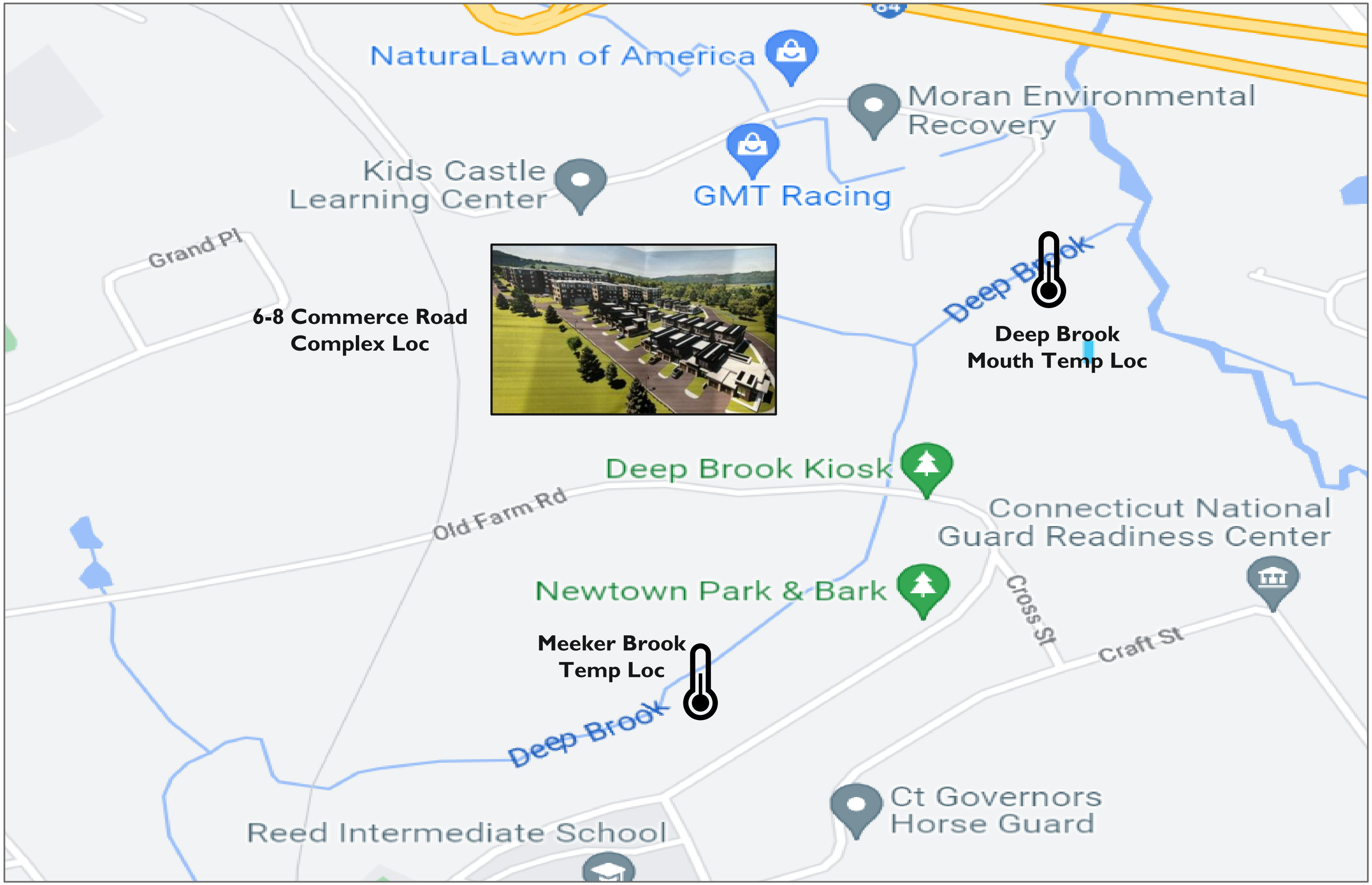

Fig #2: Deep Brook Mouth Historical Temp Data

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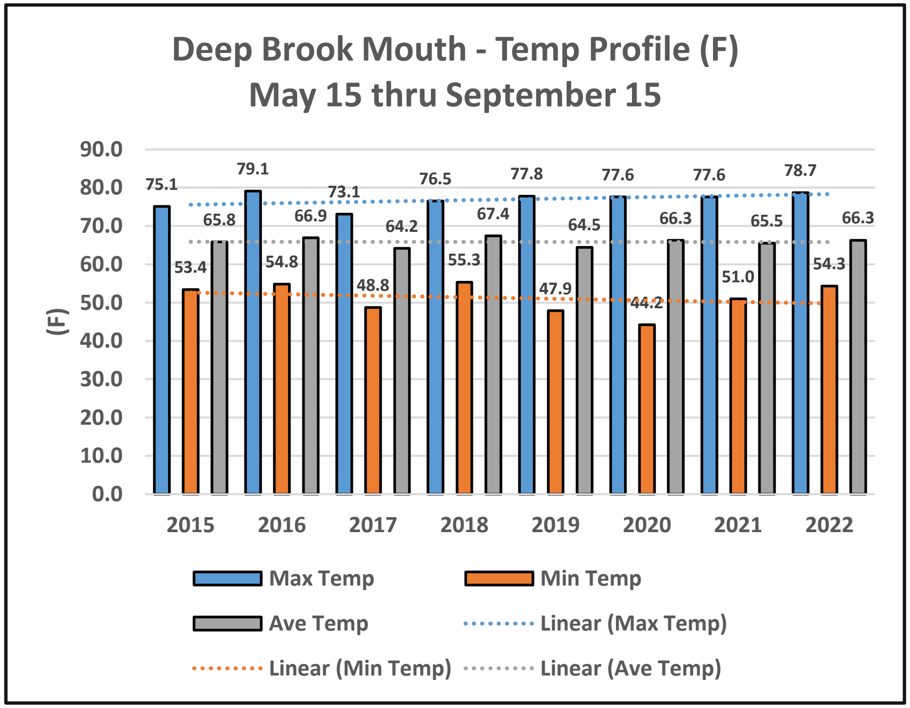

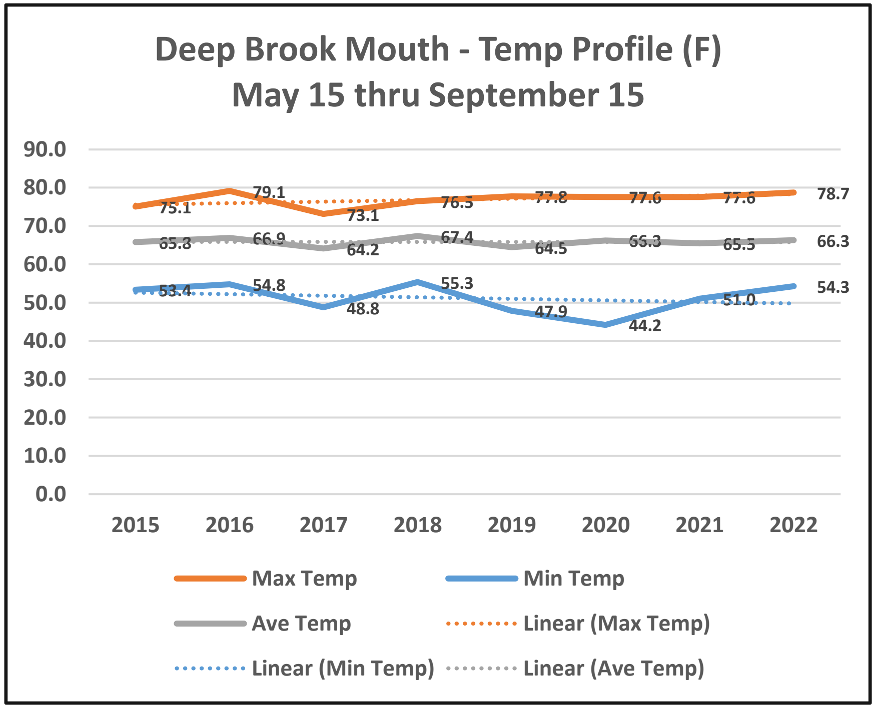

Fig #3: Meeker Brook Historical Temp Data

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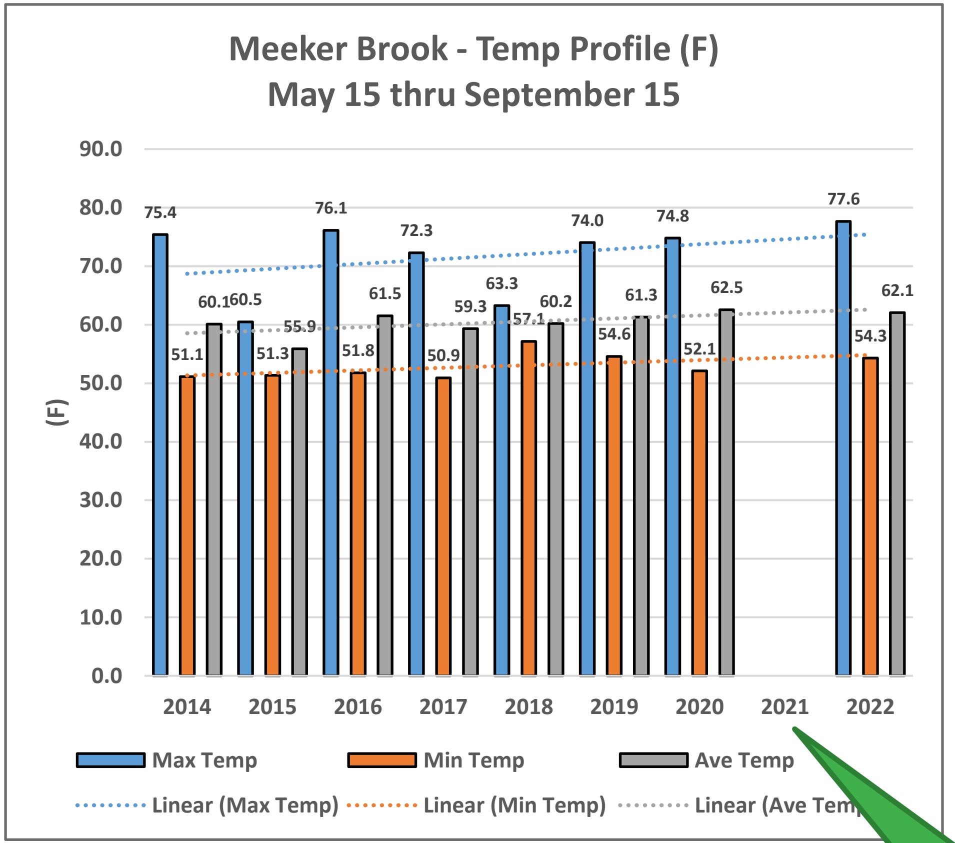

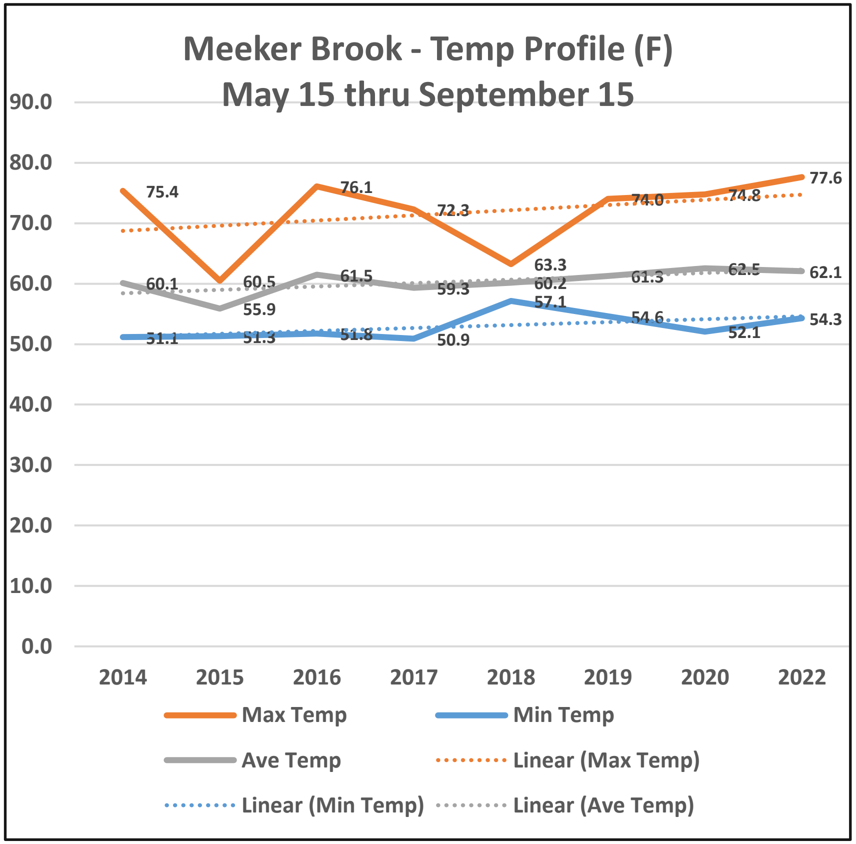

2021 Logger buried during Hurricane Ida

Fig #4: Meeker Brook Time Temp Data 2016 (Temp + Rain Fall)

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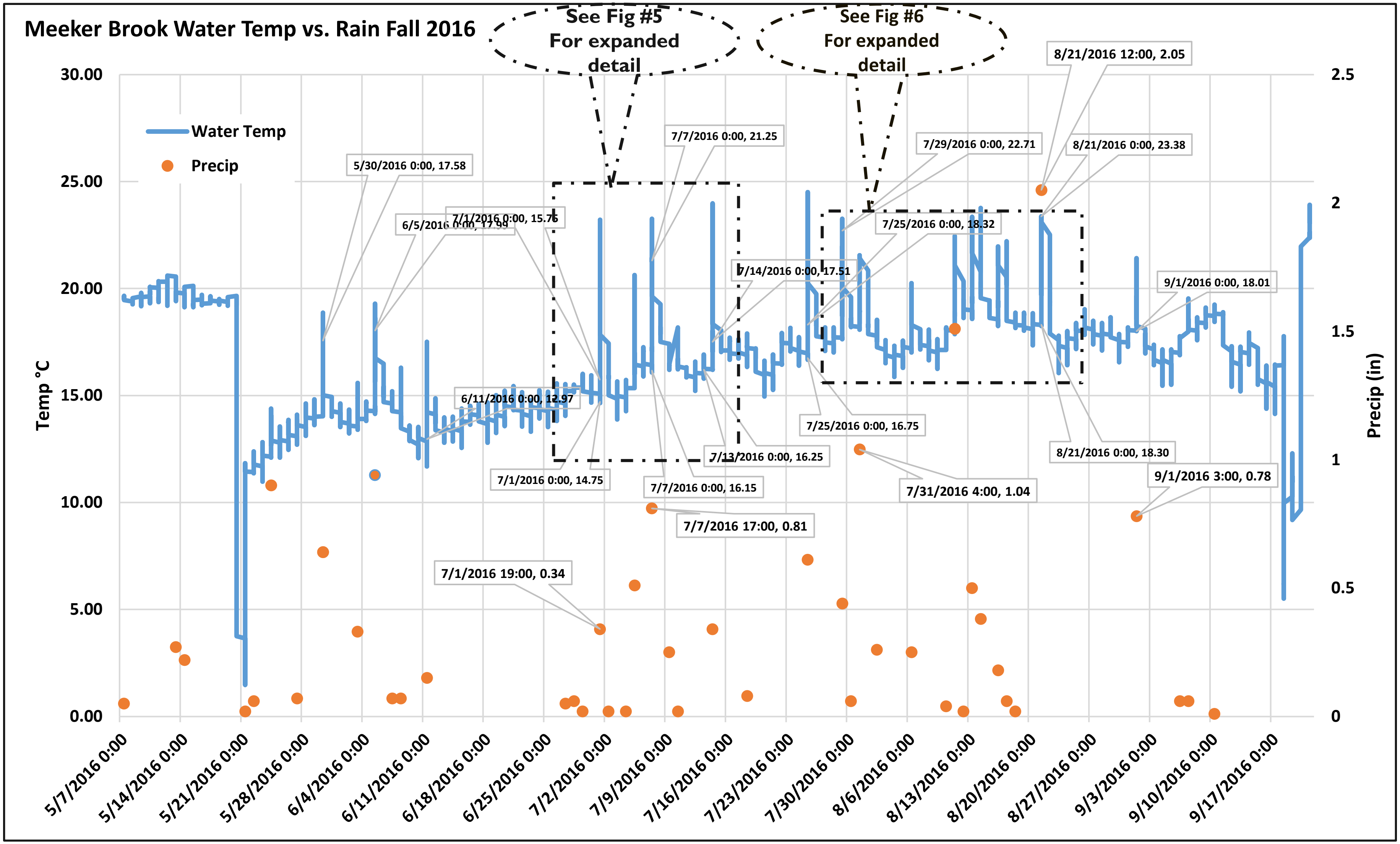

Fig #5: Meeker Brook & Deep Brook Mouth Time Temp Data 2016 (Temp + Rain Fall) July 1st thru July 15th, 2016

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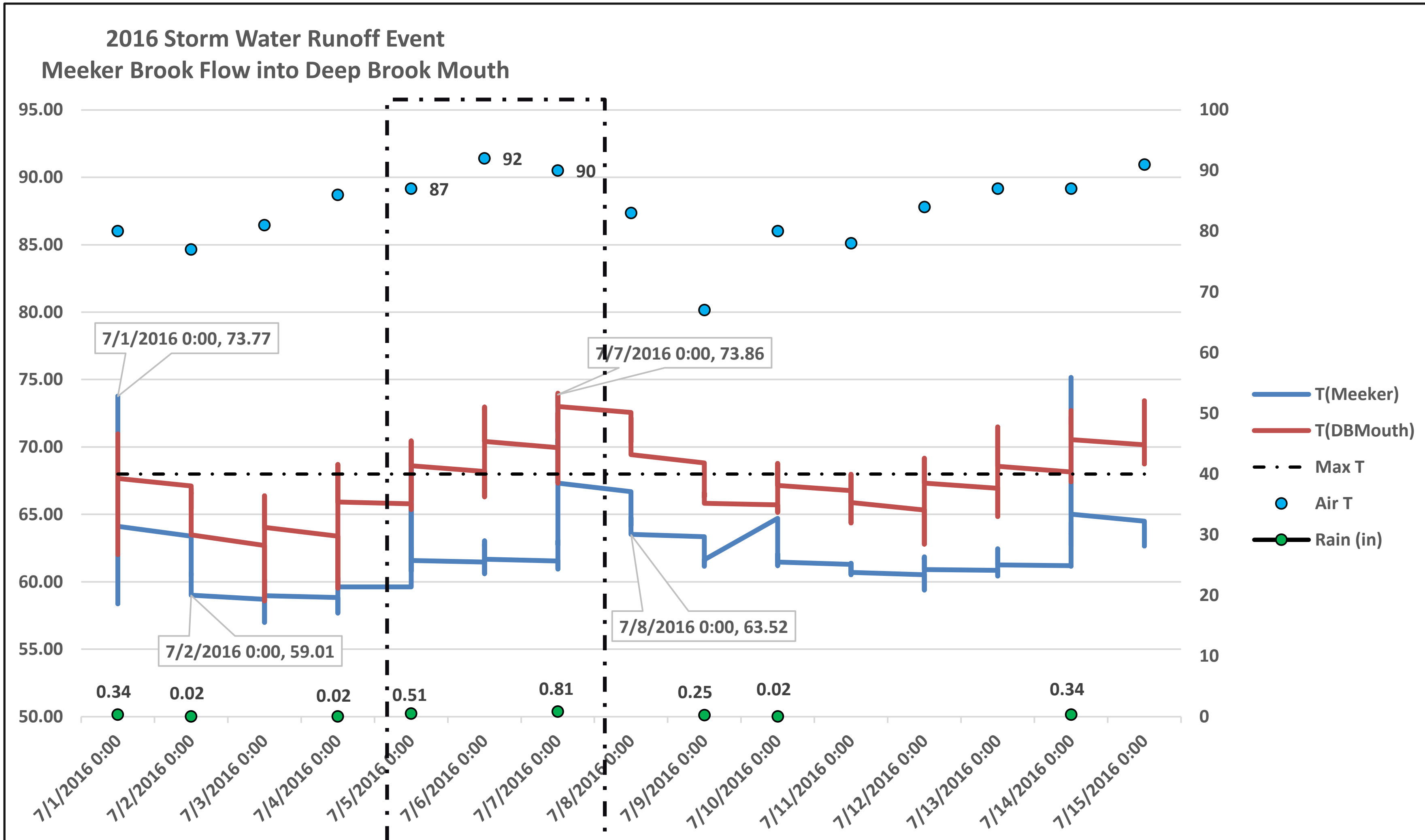

Fig #6:Meeker Brook & Deep Brook Mouth Time Temp Data 2016(Temp + Rain Fall) August 2016

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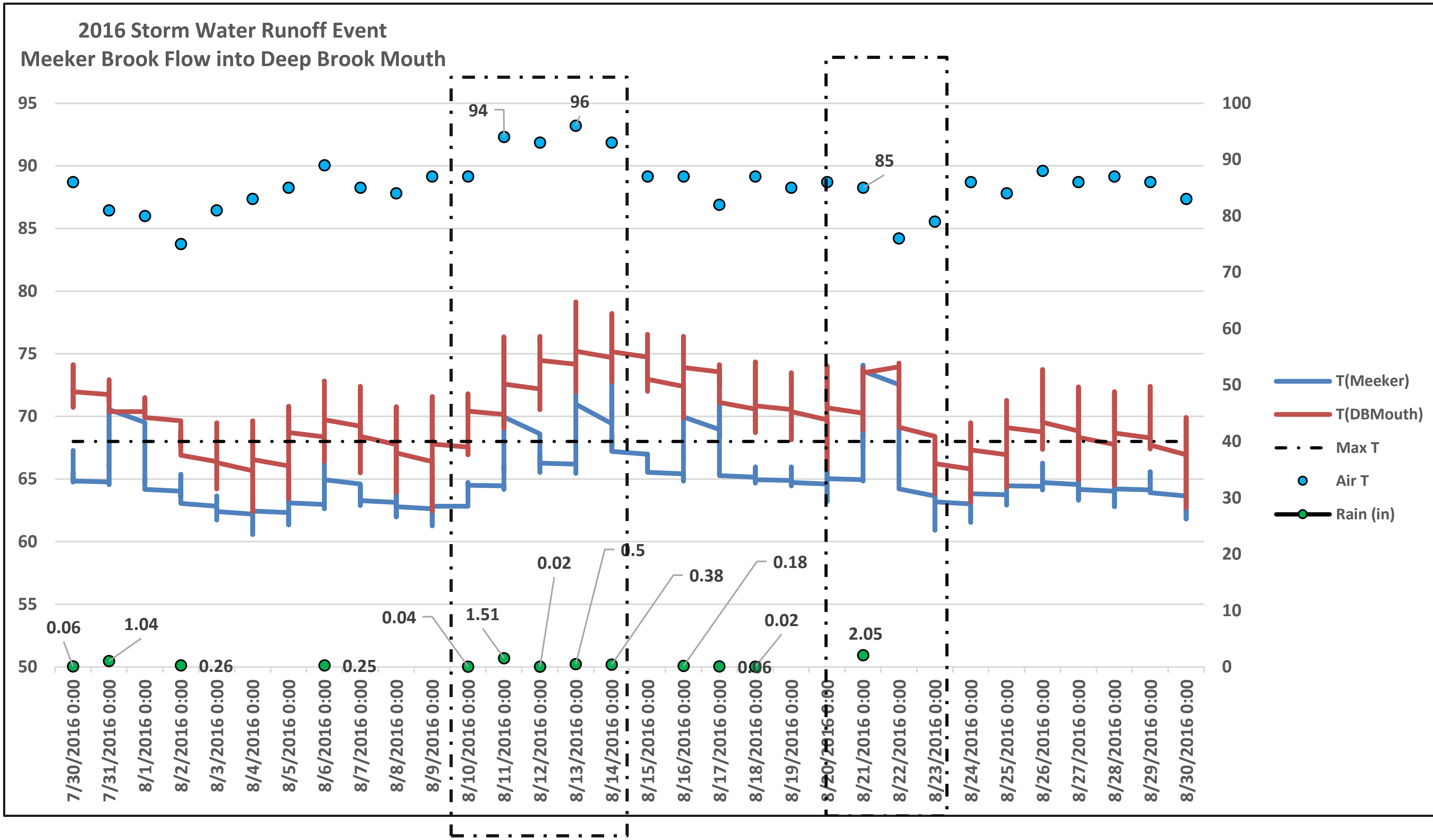

Deep Brook Electroshocking Sampling Observations

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- **The data summary shows that ANY hazardous events can have a negative impact to this watercourse.**
- **Since the last hazardous event in 2012, the resilience and high-quality aquifer of Deep Brook has shown an increase wild trout population.**

September 2022 DEEP Electro Shocking & Macroinvertebrate Sampling

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Note: Wood turtles have been included on the International Union for Conservation of Nature's (IUCN) Red List as a vulnerable species since 1996. They are listed as a species of special concern in Connecticut and protected by the Connecticut Endangered Species Act.

- **Wild Brown Trout**
- **Endangered Wood Turtle**
- **Macroinvertebrates**

Natural Diversity Database Map, the portion of Deep Brook from the intersection with the Pootatuck up to a point just about opposite the southern limit of the wastewater treatment facility is included

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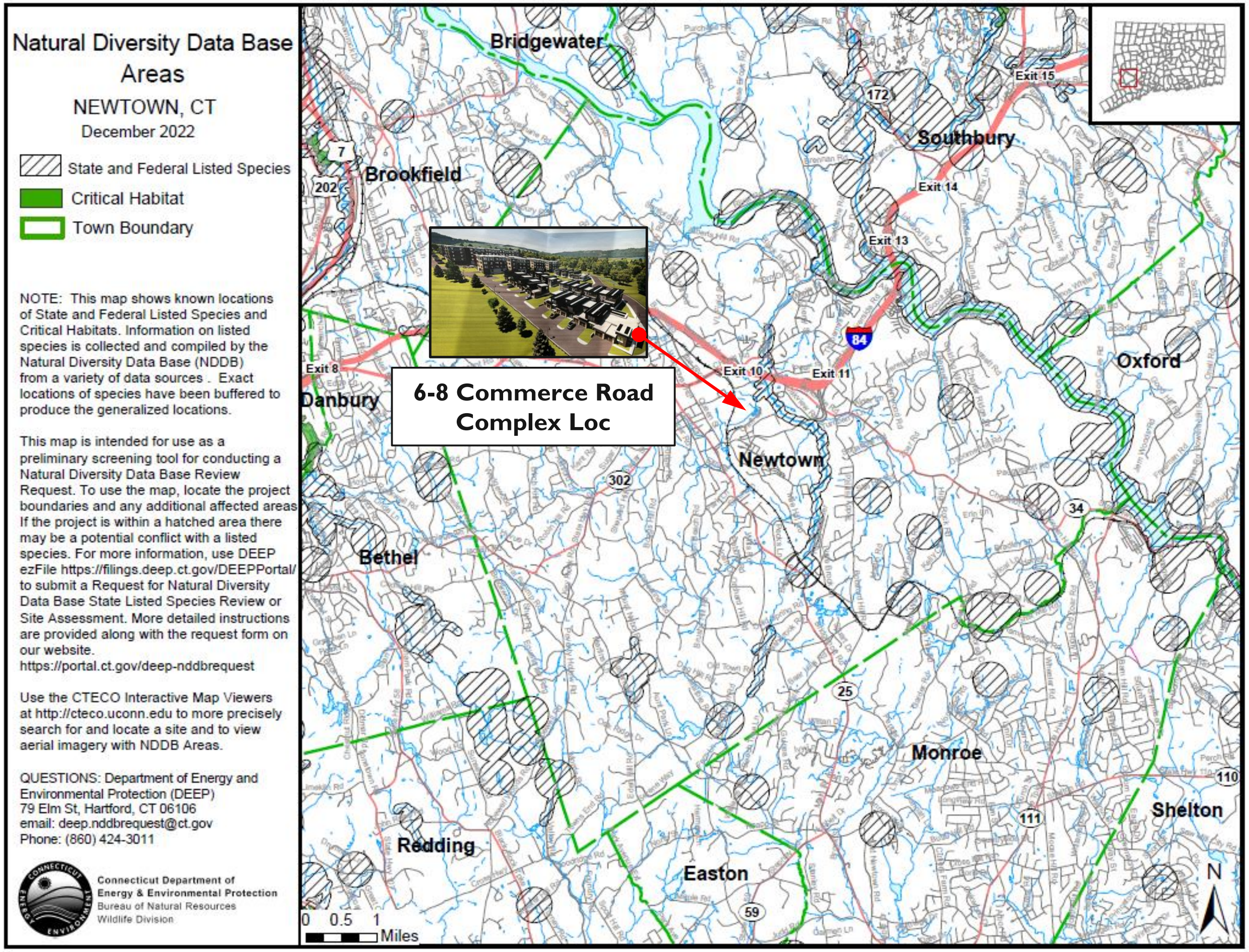

https://www.depdata.ct.gov/naturalresources/endangeredspeciesmaps/nd097.pdf

Electroshocking Background Information

- The slides in this portion of the presentation outlines the electroshocking, fish sampling for Deep Brook from 1998 thru 2022
- Data Source: State of Connecticut ,DEEP Fish Sampling Surveys
- Figure #7 – Depicts the location of electroshocking sampling corridor on Deep Brook in reference to the proposed Commerce Rd. apartment complex
- Figure #8 – Shows the historical electroshocking sampling for the Deep Brook corridor - 1998 thru 2022
    - Note: During this period, Deep Brook experienced 3 hazardous events which greatly impacted the watercourse
        1. FFH Campus Heating Sys. Oil Spill – 2003
        2. Reed School Heating Sys. Oil Leak – 2004
        3. Fill Kill (Source Unknown) - 2012
- Figure #9 – Shows the historical electroshocking sampling for the Deep Brook corridor during the period of the 3 hazardous events – 2003 thru 2013
- Figure #10 – Shows the historical electroshocking sampling for the Deep Brook corridor after the period of the 3 hazardous events – 2013 thru 2022
- Figure #11 – Shows the historical electroshocking sampling for the Deep Brook corridor after the period of the 3 hazardous events for "Young of the Year", age 0 fish – 2013 thru 2022
- Figure #12 – Shows the historical electroshocking sampling for the Deep Brook corridor after the period of the 3 hazardous events for age 1 fish – 2013 thru 2022
- Figure #13 – Shows the historical electroshocking sampling for the Deep Brook corridor after the period of the 3 hazardous events for age 2+ fish – 2013 thru 2022

Fig. #7: Fish Sampling Corridor Relative to 6-8 Commerce Rd Project

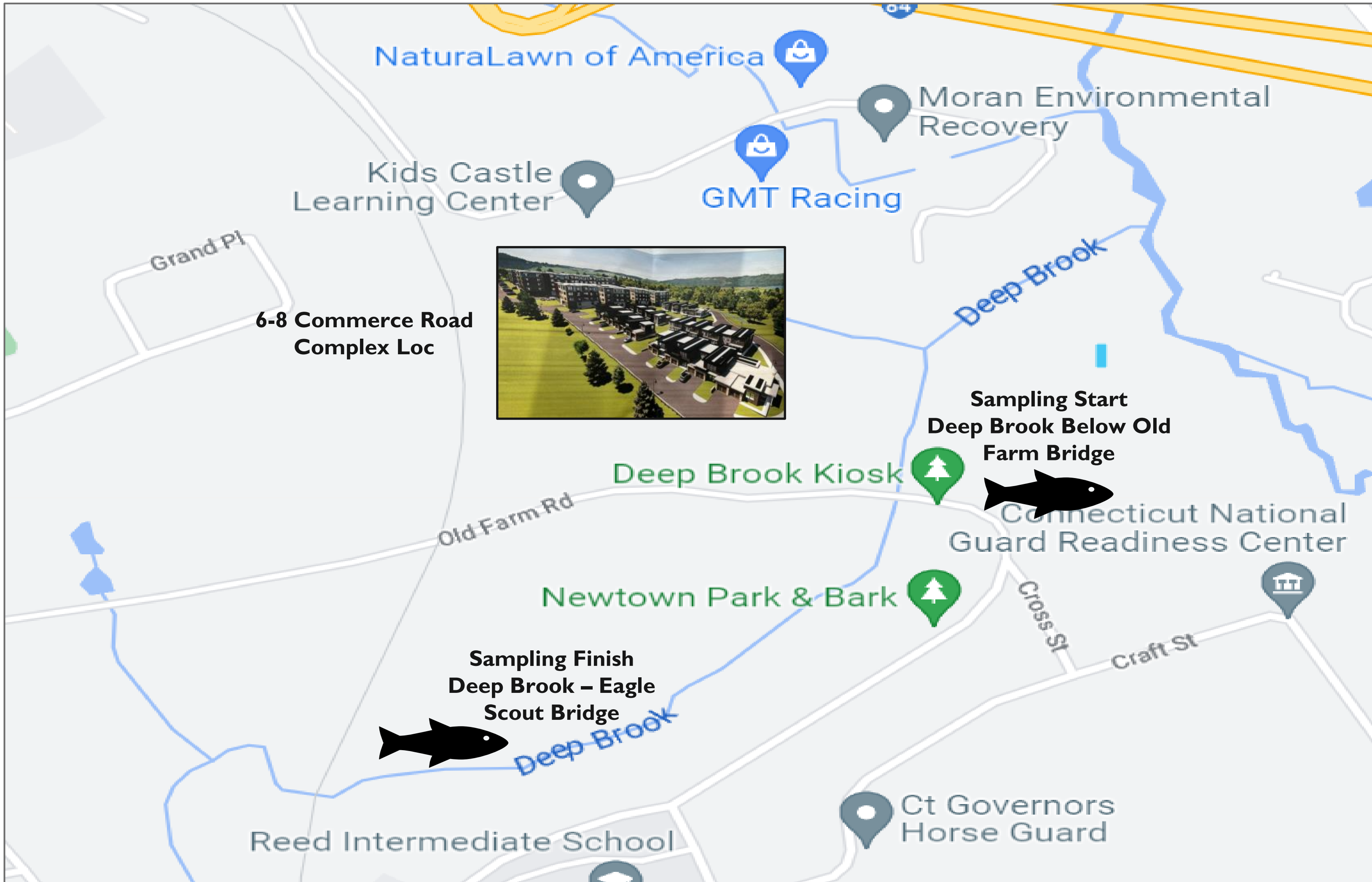

Fig #8: Deep Brook Fish Sampling History – 1998 thru 2022

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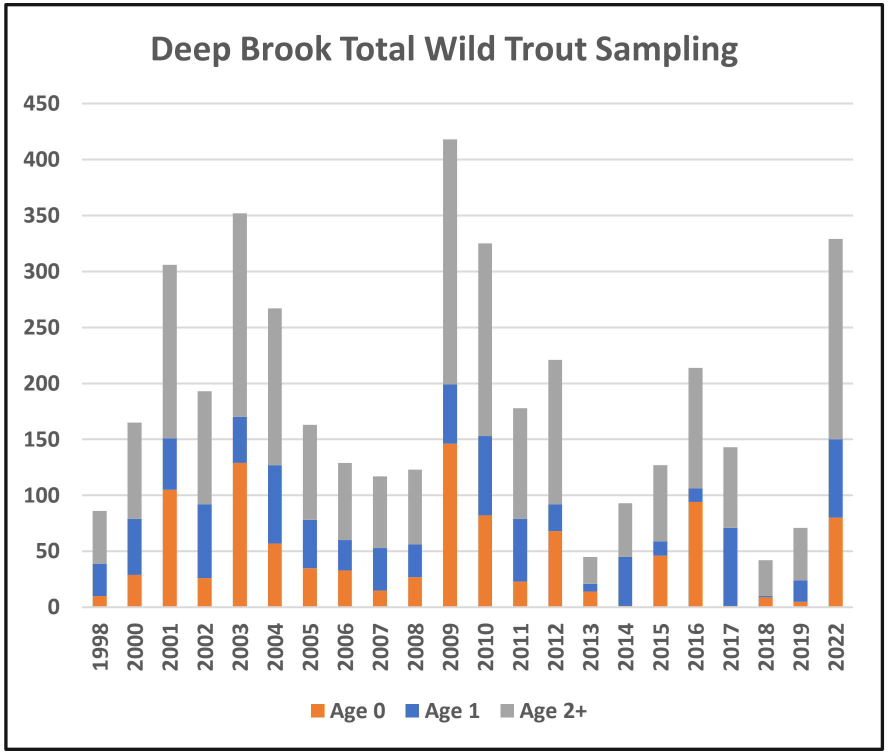

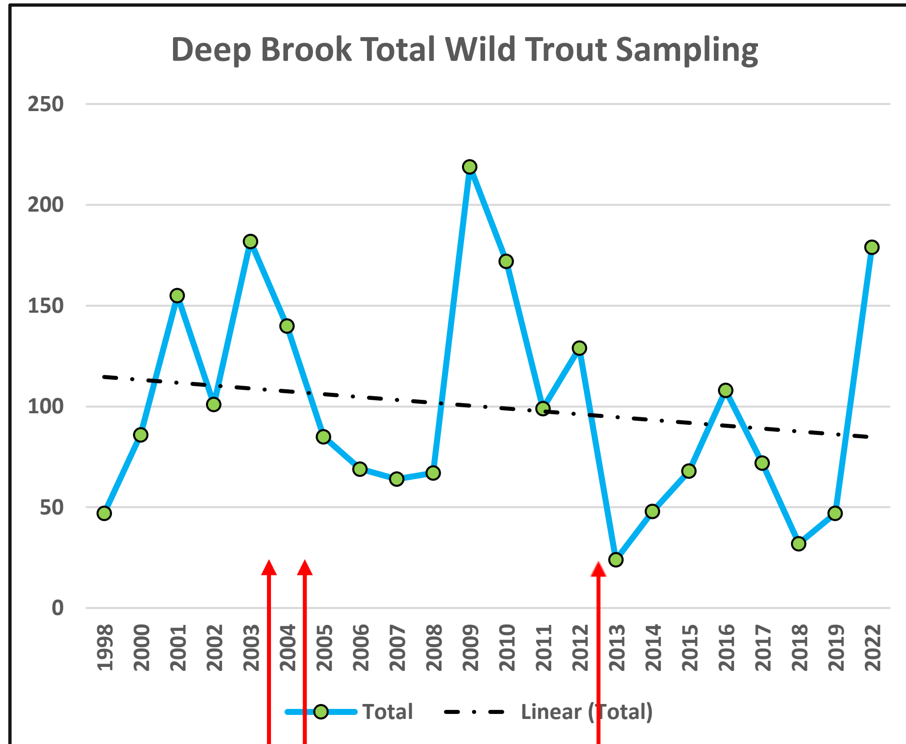

2 Consecutive Oil Spills

- **Reed School - Heating Sys. Tank Leak**
- **FFH Campus - Heating Sys, Tank Leak**

Fish Kill
Source unknown

Fig #9: Deep Brook Fish Sampling History Thru Hazardous Events

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CANDLEWOOD VALLEY

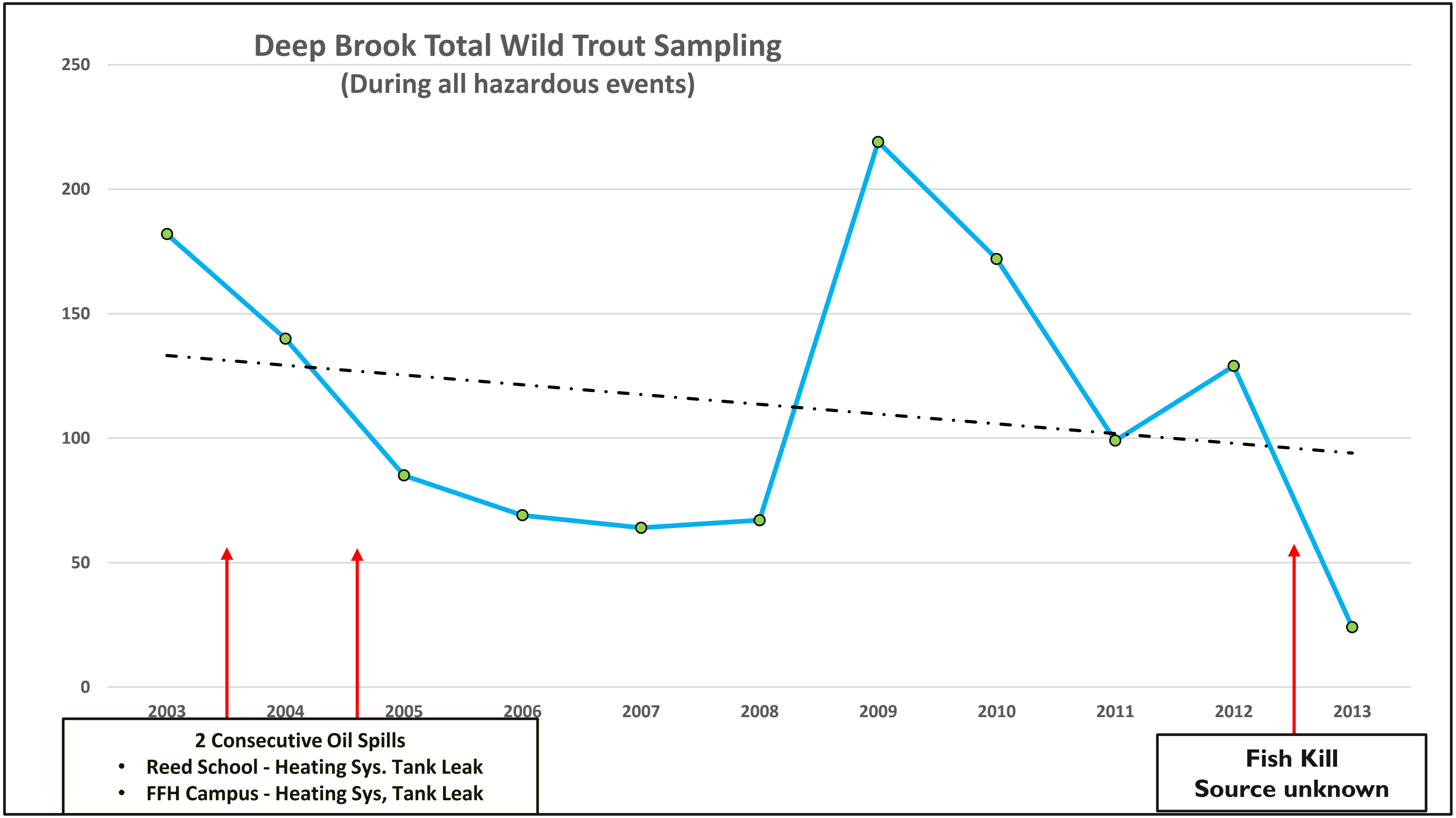

Fig #10: Deep Brook Fish Sampling History After Hazardous Events

TROUT UNLIMITED
CANDLEWOOD VALLEY

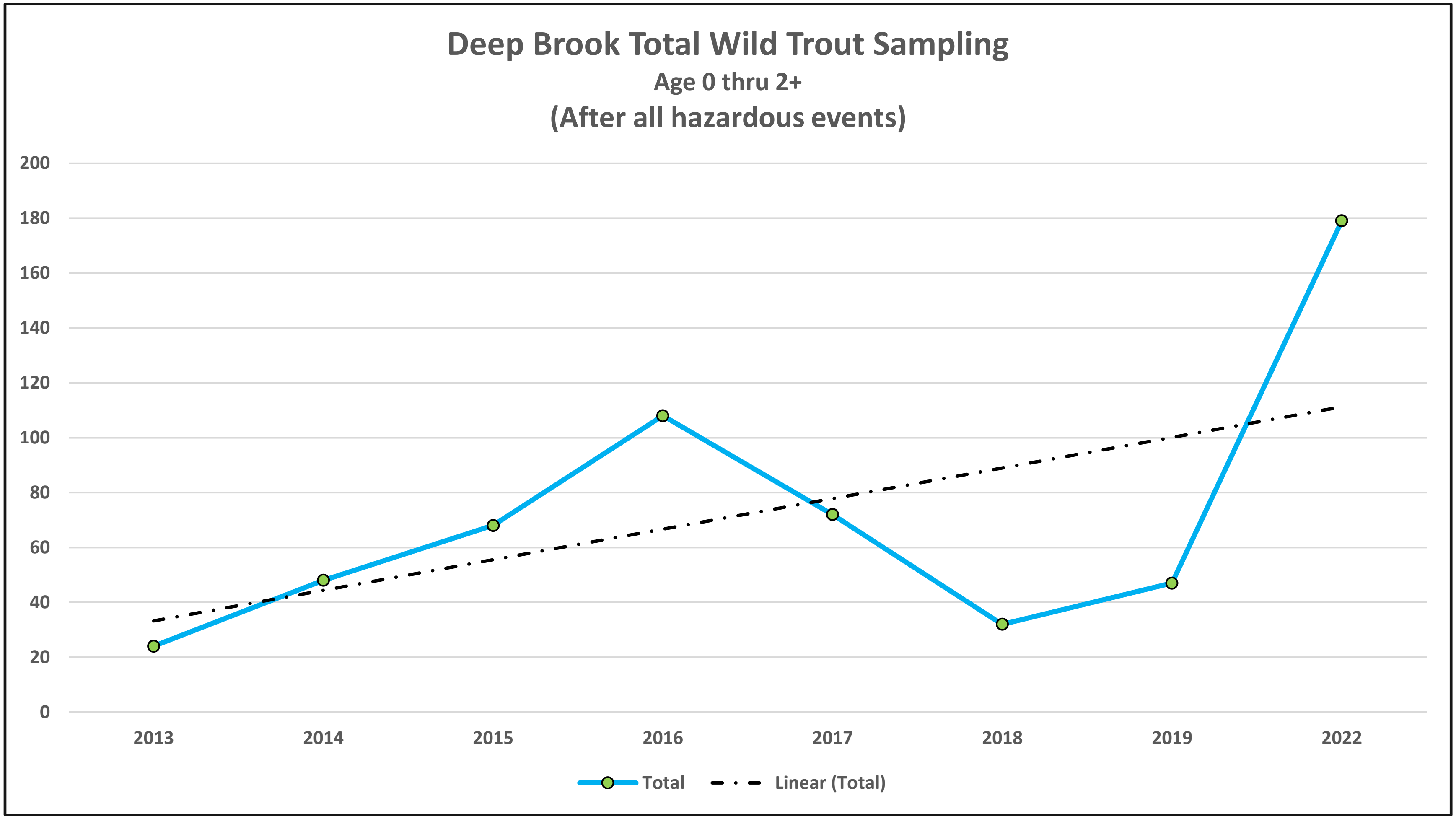

Fig 11: Deep Brook Fish Sampling History After Hazardous Events
Age 0 Fish (Young of the Year)

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CANDLEWOOD VALLEY

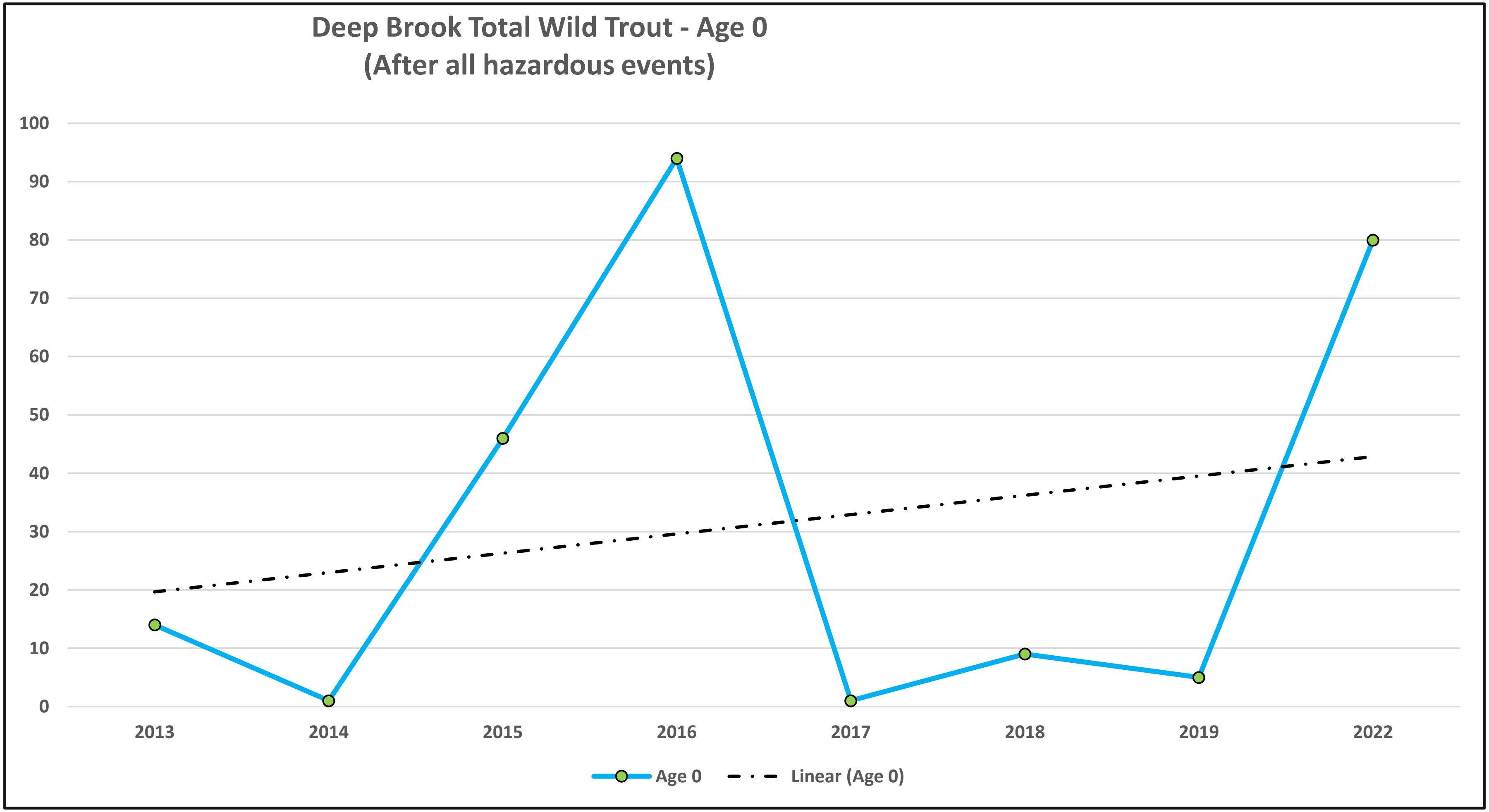


Fig #12: Deep Brook Fish Sampling History After Hazardous Events Age 1 Fish

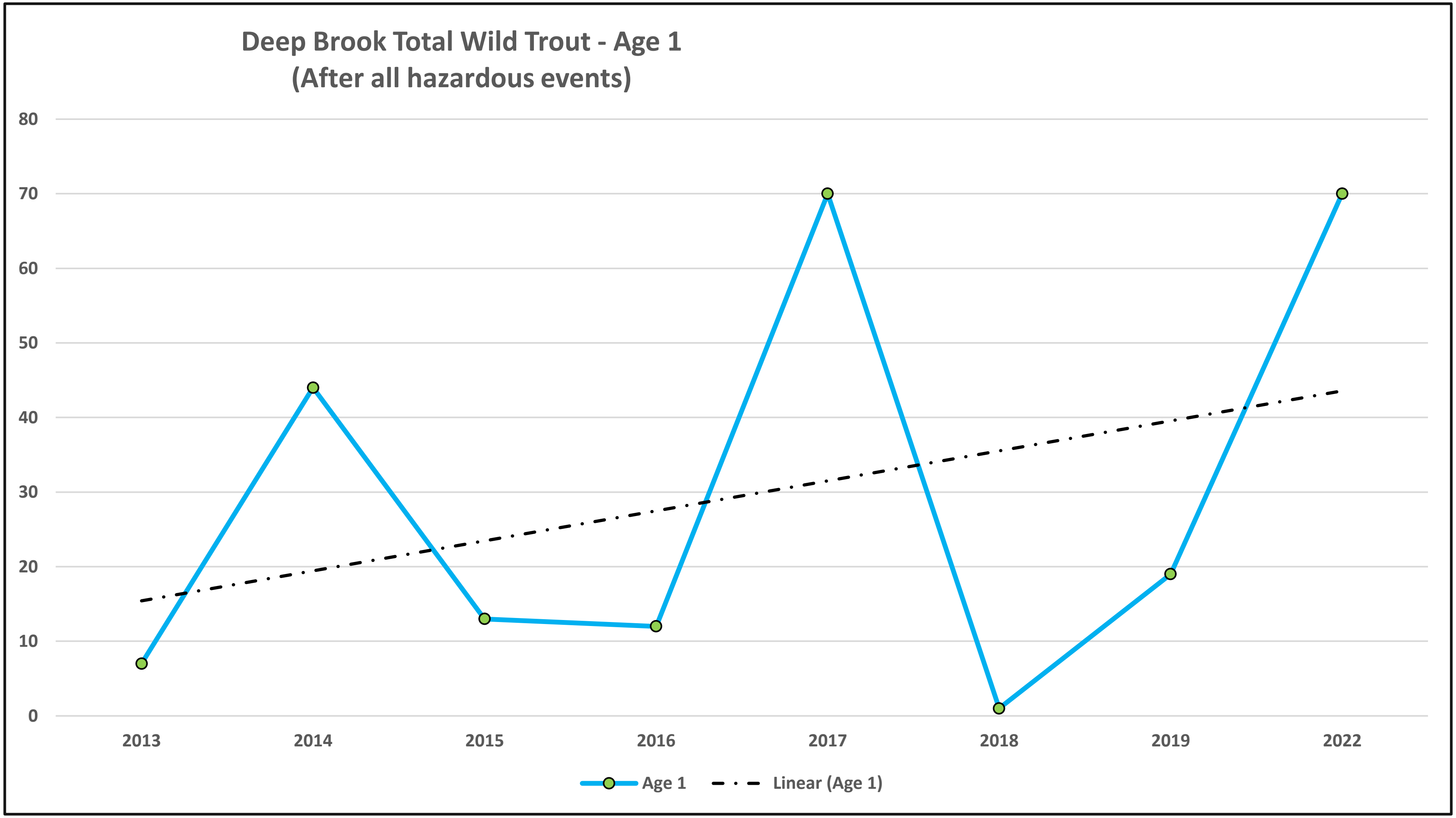
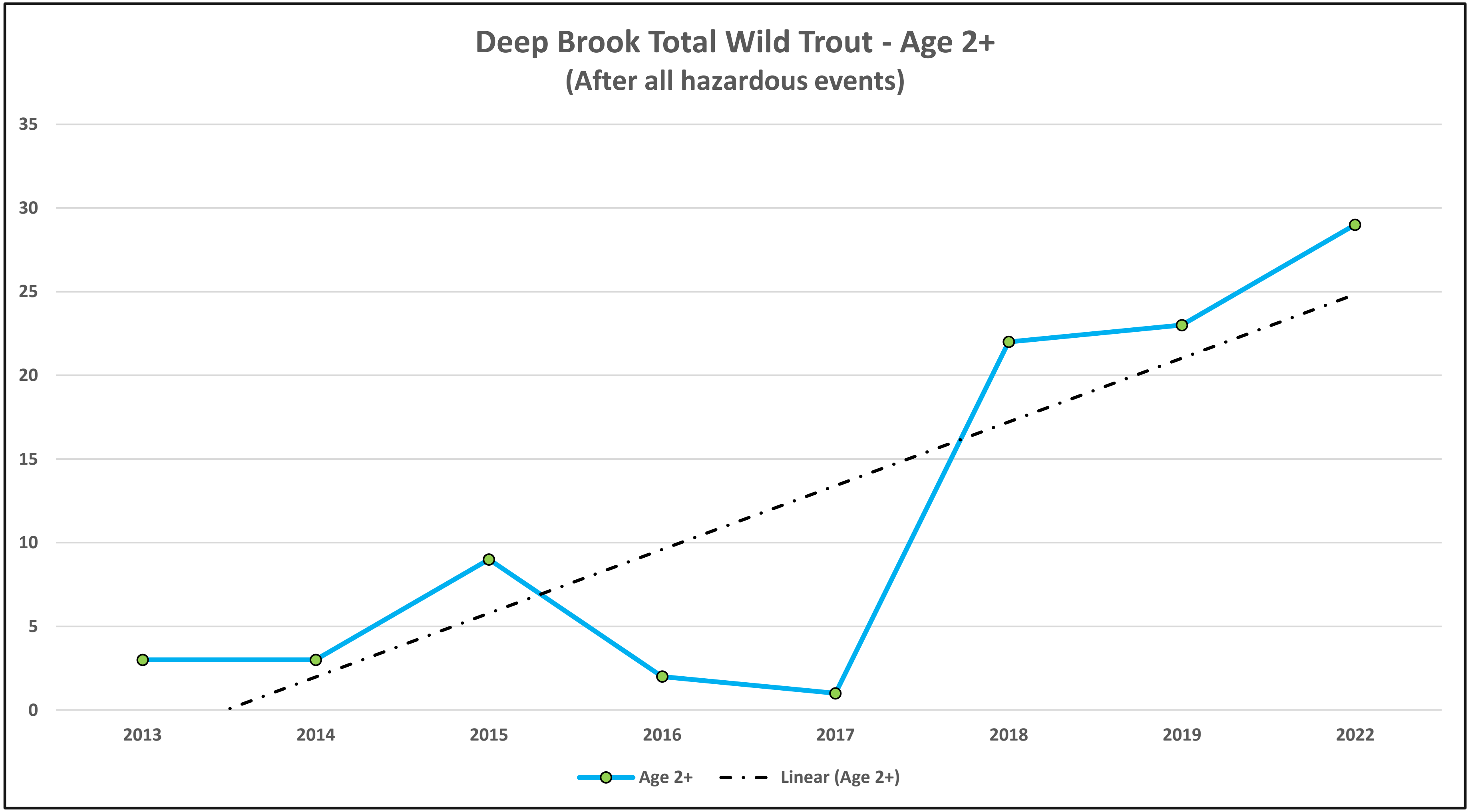


Fig #13: Deep Brook Fish Sampling History After Hazardous Events Age 2+ Fish



Deep Brook and The Pootatuck Watercourse Protect, Preserve and Enhancement Projects List

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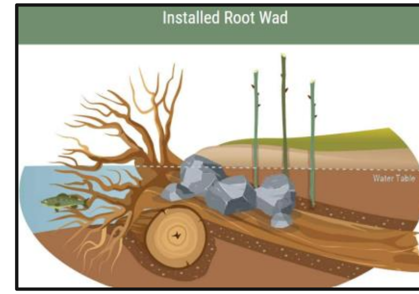
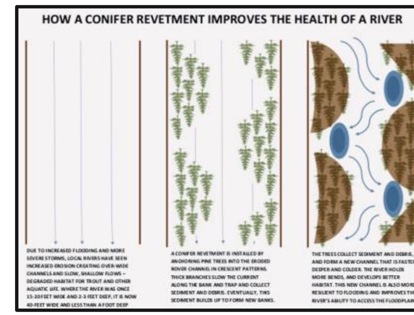
CANDLEWOOD VALLEY

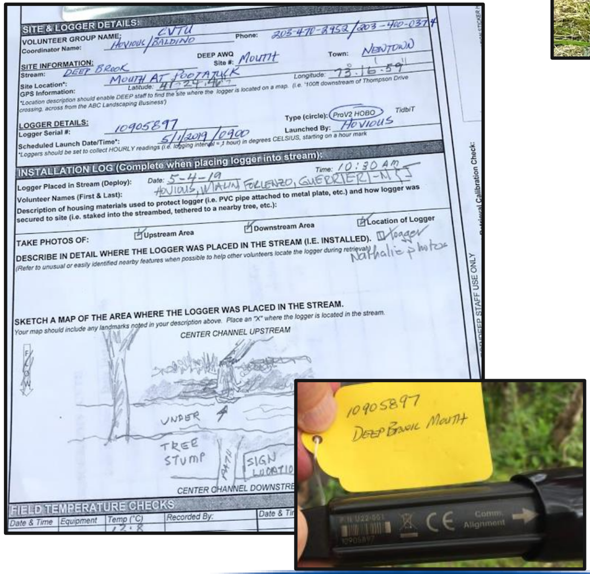
- **The Pootatuck River Root Wad Project** **(Had to consider endanger species, the Wood Turtle)**
- **Conifer Revetment Bank Restoration Projects**
- **Annual Thermal Monitoring - Over 16yrs of data**
- **Annual Invasive Plant Species Removal - Protects planted trees**
- **Riparian Buffer Native Tree Planting - Bank protection & stream cooling**
- **Meeker Brook Trail Relocation - Sediment and Erosion Control Project**
- **DEEP Fisheries Electro Shocking Sampling**
- **Macroinvertebrate Sampling**
- **Annual Earth Day Stream Cleanup**
- **Willow Tree Stake Planting – Bank Stabilization and Shade Cooling Project**
- **Meeker Brook tributary at Deep Brook confluence Entry Improvement Project**





Deep Brook and The Pootatuck Watercourse Protect, Preserve and Enhancement Projects Pictures

TROUT UNLIMITED
CANDLEWOOD VALLEY



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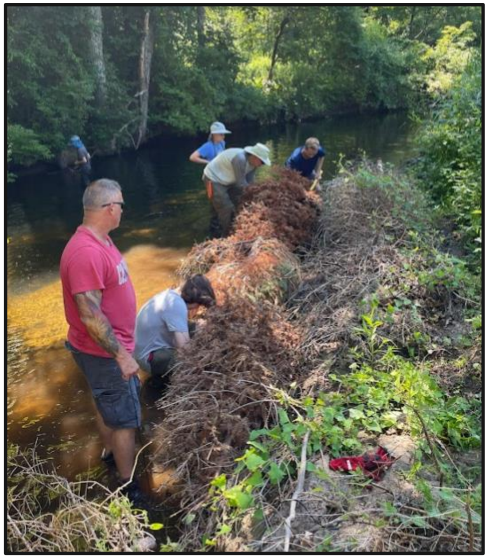


CVTU Letter for Request to IWC for a Public Hearing Concern with 6-8 Commerce Road Project

TROUT UNLIMITED
CANDLEWOOD VALLEY

Newtown Inland Wetlands Commission
Newtown Municipal Center
3 Primrose Street
Newtown, CT 06470
Attention: Ms. Sharon Sallings, Chair

March 6, 2023

RE: IW Application #23-04 for property located at 6&8 Commerce Road for construction of a 171-unit multifamily housing development

Ms. Sallings and Commission:

The minutes of the February 22, 2023 IWC meeting indicate that "The Commission will decide at the next Regular meeting on March 8, 2023 whether Application IW #23-04 will be heard as a Public Hearing." On behalf of the 54 Members who are Newtown residents, The Candlewood Valley Chapter of Trout Unlimited (CVTU) requests that a public hearing be held for the subject project.

Our organization has great interest in the project as the property to be developed abuts and drains both surface and groundwater into Deep Brook which is a Connecticut Class I Wild Trout Management Area. CVTU has expended hundreds of hours and many thousands of dollars in this area of Deep Brook as part of our cold-water conservation mission. This work has been completed in cooperation with the Town of Newtown, local Boy Scout troops, Newtown High School Conservation Clubs, and other citizens. CVTU is concerned that activities planned for the project may have a significant impact on the Deep Brook watershed in the area of our work and we wish to participate in a Public Hearing on the project.

Thank you in advance for considering this request. If there are any questions I may be reached at 203-650-1359.

Mike Fatse, President CVTU
125 High Rock
Sandy Hook, CY 06482

Comments submitted to Newtown Inland Wetlands and Watercourses Commission regarding the proposed development at 6 and 8 Commerce Drive, titled "Church Hill Farm at Deep Brook"

Submitted at public hearing, March 22, 2023

by Michael Humphreys

Professional experience:
- Master of Science Degree in Fisheries, 1983
- 40+ years of experience as a professional Fisheries Biologist, the last 32 of which were with the CT DEEP Fisheries Division with primary responsibility for Wild Trout Management in CT during the last 20 years. Retired June 2022. (Comments are my own and do not represent the DEEP)
- As a DEEP Biologist, I was involved with the annual monitoring of wild trout populations and stream temperatures throughout CT, including the establishment and monitoring of the Deep Brook Wild Trout Management Area since 1991.
- 22 years of experience as a Commissioner for the Sherman Inland Wetlands and Watercourses Commission, and have been secretary of the commission for the last 15 years.

Comments:
The Candlewood Valley Chapter of Trout Unlimited has forwarded to me numerous project-related documents which I have examined, and I conducted a site walk on my own, on the morning of March 20.

Generally, I thought the application material was thorough, detailed, and professional, with one significant and important omission. I expected to see, within the Environmental Report by Steven Danzer, some discussion of the long-term effects of the proposed storm water management on sensitive downstream resources. Deep Brook Wild Trout Management Area is the receiving stream a short distance below the stormwater detention pond/"water quality pond." It is apparent that water quality, water temperature, and runoff and infiltration volumes will be altered. These changes have the potential to cause adverse impacts to the Deep Brook ecosystem, including the wild reproducing trout populations.

Cold, clean water and clean silt-free gravel substrate are key to sustaining wild trout. Relatively small changes to one or more of these parameters have the potential to reduce or eliminate conditions suitable for long-term sustenance of wild trout populations, especially in a system that is already chronically stressed by the cumulative effects of other development within the watershed. Potentially, a small increase in water temperature, or a small reduction in dissolved oxygen, or an increase in turbidity and silt, or a new source of occasional adverse toxic spill events, could put an already stressed stream over the edge, with regard to supporting wild trout.

Extensive water temperature logger data show that temperatures in Deep Brook now occasionally exceed the short-term lethal level for trout on hot summer afternoons. Warmer water holds less dissolved oxygen, while at the same time speeding up a fish's metabolism, thus increasing the need for oxygen. This causes stress, and can cause mortality. Some sections of Deep Brook have already become too warm to support wild trout, while other sections have remained suitable, partially due to inputs of cold ground water and shading by an intact tree canopy. Volunteer stewards of Deep Brook have, among other initiatives, undertaken extensive tree planting along the brook to combat warming of the water by

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direct sun exposure. Additional judicious protection of suitable water temperatures for trout is appropriate. In my opinion, a thorough application for the proposed development project should include a comprehensive analysis of impacts to Deep Brook wild trout populations, and should engage specific measures to mitigate negative effects where feasible. Such measures would likely include more robust design of the stormwater water quality pond to minimize warm water overflow during summer storm events. This might include increasing the size and retention capacity of the pond. The engineer's calculations may show that future water quality and flow volume may fall within standard "acceptable" ranges, but in this particular case, general guidelines might not be protective enough.

Good stewardship of wild trout streams is difficult. Town commissions hear from experts hired by applicants, who may not be well informed on the sensitivity and requirements of wild trout. Sometimes so called "best management practices," even guideline documents published by the State, aren't protective enough to preserve sensitive high-quality coldwater stream resources. This is why wild trout populations have been in dramatic and alarming decline statewide in recent years. Some towns have completely lost all of their wild reproducing trout populations, primarily due to development. Newtown has a couple of wild trout streams left; lower Deep Brook is one of the strongest, and actually still supports valuable recreational fishing for free, with no stocking.
My intent in providing these comments tonight is to provide the commission with expert testimony which could be used as justification for requiring additional analysis and incorporation of measures designed to provide a higher level of protection to Deep Brook resources, if the commission has the desire to do so.

Signed,

Michael Humphreys
9 Evans Hill Rd
Sherman, CT 06784

Cell: 860 488-0985
Email: Shadowrocks@sbcglobal.net